

CATALOGUE No.  
**KG5001EN**

# **KG STOCK GEARS**

## **Metric Gears**



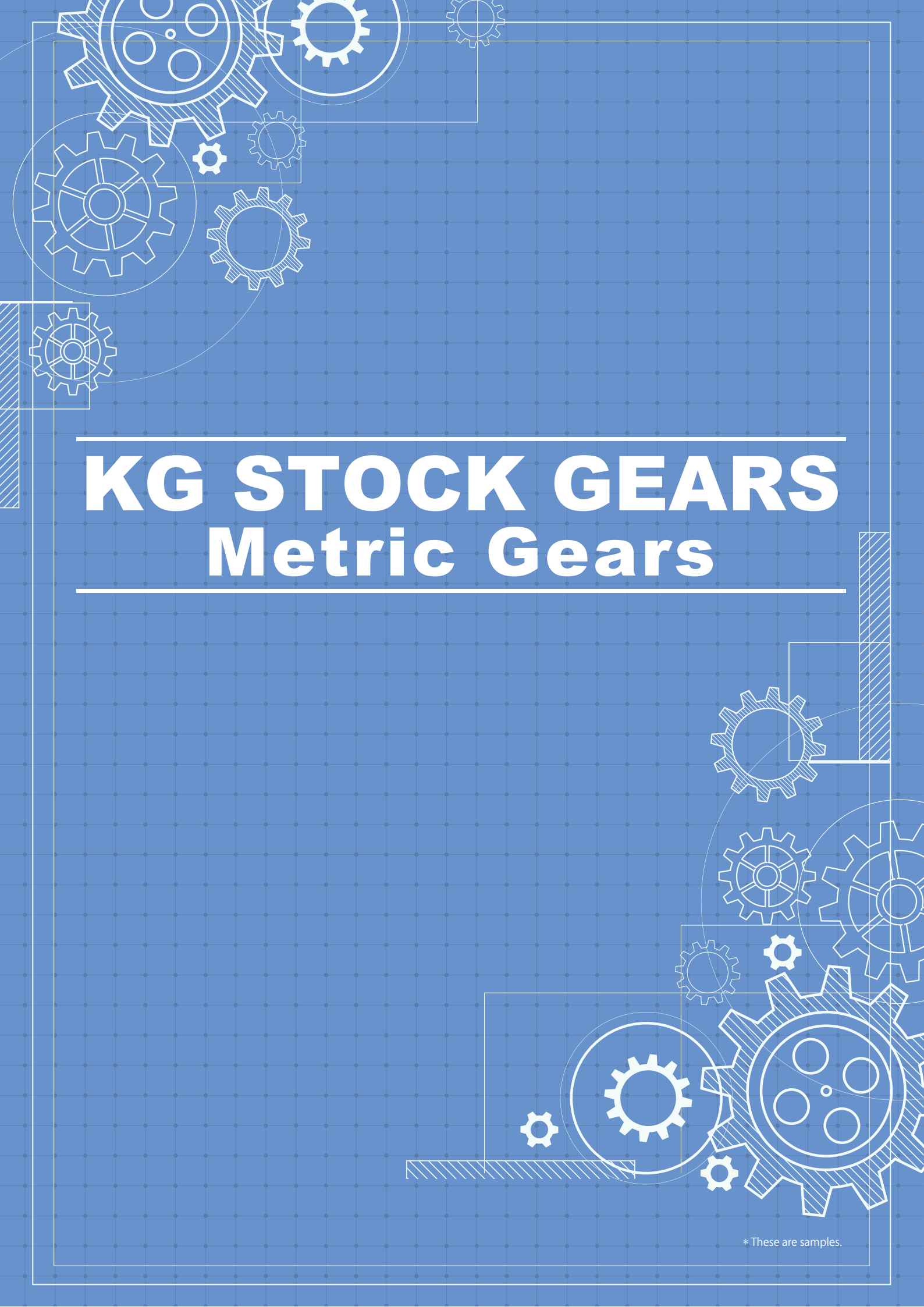
EN CATALOG



EN 2D 3D CAD



**協育齒車工業株式会社**



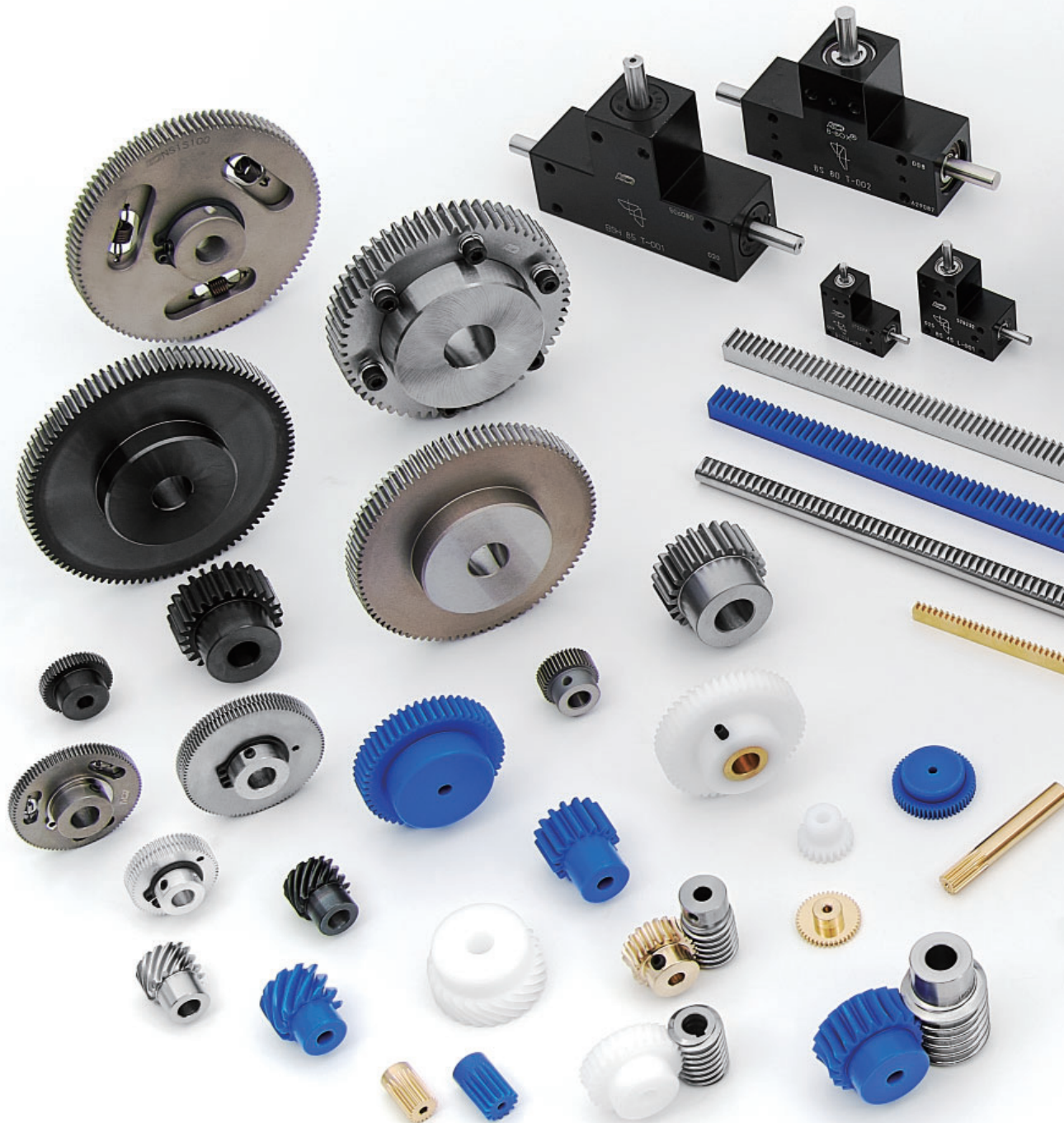
# **KG STOCK GEARS**

## **Metric Gears**

\* These are samples.

# KG STOCK GEARS

*Gears for Every Need.....*



URL <https://www.kggear.co.jp/en/>



## Greetings

Thank you for your patronage.

We are proud to publish our new catalogue series KG STOCK GEARS KG4000.

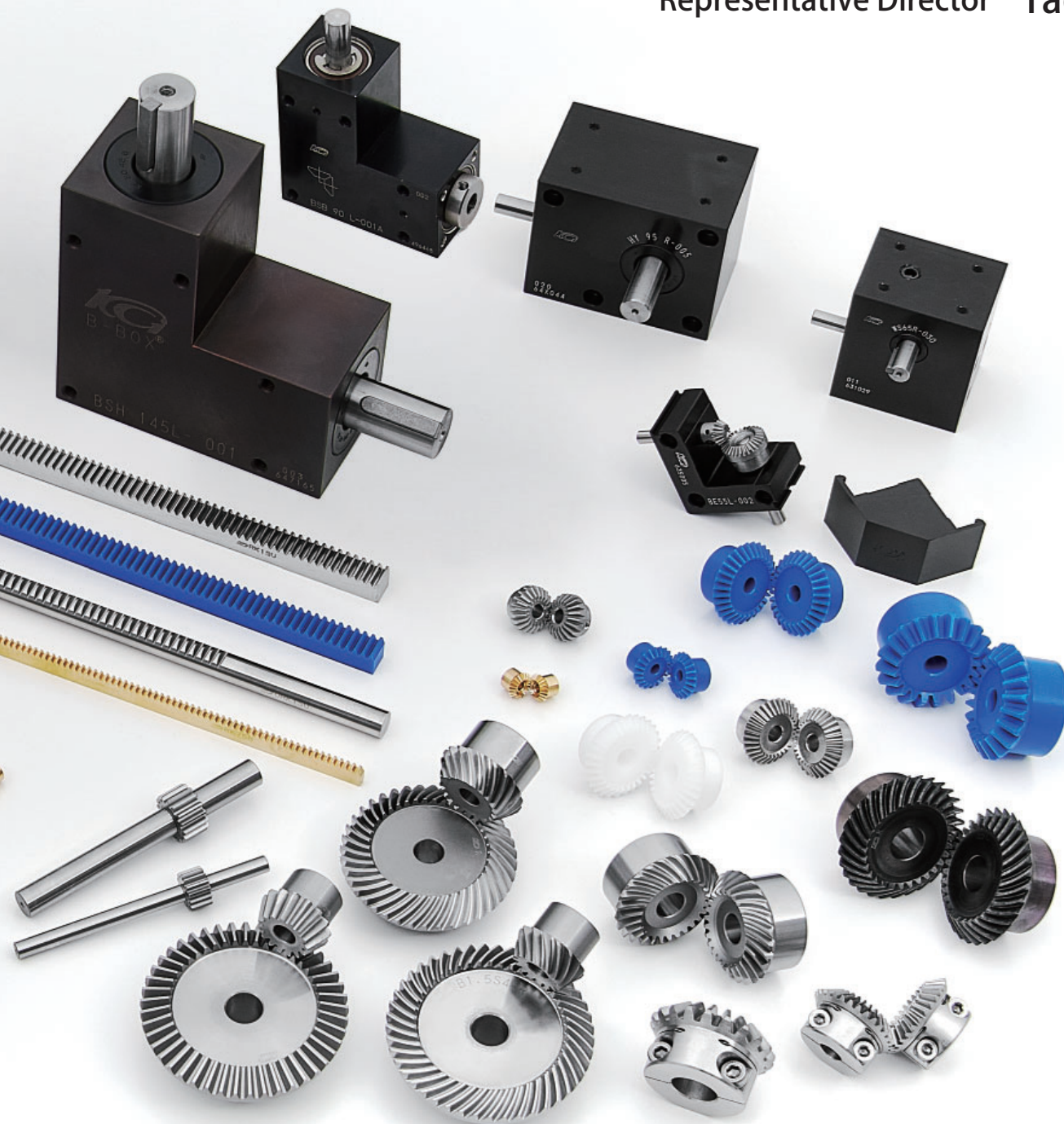
KG STOCK GEARS has anticipated various needs from our customers.

The products we have been offering from our founding. The products we had released with cutting-edge technology. I believe both of our products are the monument of customers' needs.

Offering nearly 2,700 products anytime, anywhere, and timely, with stable quality has been our credo from the beginning.

I hope you make full use of our featured KG STOCK GEARS.

Representative Director **Tadaaki Ida**



## The Contents of KG-General Catalogue.

Information of KG STOCK GEARS  
Edition of Dimensions



# Product page introduction

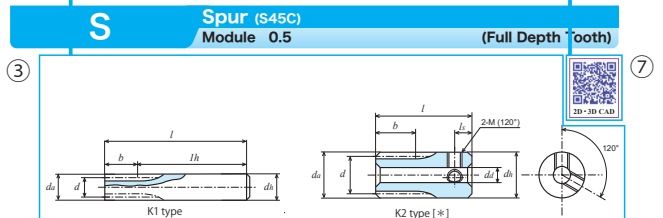
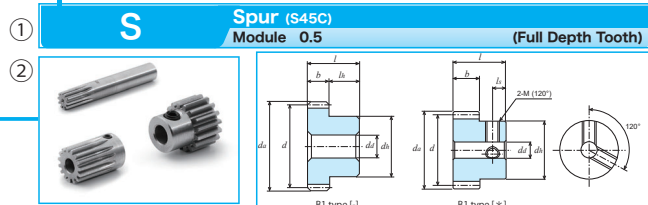
## ② Goods image

## ① Basic information

Series code, Material, Gear type, Module, Tooth profile

## ③ Simple dimension symbol diagram

## ⑦ 2D,3D CAD download URL



④

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. (\*) Two screw holes and set screws are provided.  
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."  
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

⑤

| Catalogue number | Number of teeth | Refer-ence diameter | Tip di-ometer | Type | Face width | Hole di-amer | Hub di-amer | Hub length | Overall length | Screw     | Weight |
|------------------|-----------------|---------------------|---------------|------|------------|--------------|-------------|------------|----------------|-----------|--------|
|                  | z               | d                   | d1            |      | b          | d1           | d2          | l          | L              | 2-M(120°) | W(g)   |
| S505 10K — 1006  | 10              | φ 5                 | φ 6           | K1   | 10         | —            | φ 6         | 45         | 55             | —         | 11.5   |
| S505 12K — 1007  | 12              | φ 6                 | φ 7           | K1   | 10         | —            | φ 7         | 45         | 55             | —         | 15.8   |
| S505 15K * 0803  | 15              | φ 7.5               | φ 8.5         | K2   | 8          | φ3(H8)       | φ 8.5       | 10         | 18             | 2-M3      | 6.0    |
| S505 16K * 0803  | 16              | φ 8                 | φ 9           | K2   | 8          | φ3(H8)       | φ 9         | 10         | 18             | 2-M3      | 6.9    |
| S505 18K * 0804  | 18              | φ 9                 | φ 10          | K2   | 8          | φ4(H8)       | φ 10        | 10         | 18             | 2-M3      | 8.1    |
| S505 20K * 0804  | 20              | φ 10                | φ 11          | K2   | 8          | φ4(H8)       | φ 11        | 10         | 18             | 2-M3      | 10.3   |
| S505 22K * 0804  | 22              | φ 11                | φ 12          | K2   | 8          | φ4(H8)       | φ 12        | 10         | 18             | 2-M3      | 12.7   |
| S505 24K * 0804  | 24              | φ 12                | φ 13          | K2   | 8          | φ4(H8)       | φ 13        | 10         | 18             | 2-M3      | 15.4   |
| S505 25B * 0804  | 25              | φ 12.5              | φ 13.5        | B1   | 8          | φ4(H8)       | φ 10        | 8          | 16             | 2-M3      | 4 10.8 |
| S505 26B * 0804  | 26              | φ 13                | φ 14          | B1   | 8          | φ4(H8)       | φ 10        | 8          | 16             | 2-M3      | 4 11.4 |
| S505 28B * 0804  | 28              | φ 14                | φ 15          | B1   | 8          | φ4(H8)       | φ 10        | 8          | 16             | 2-M3      | 4 12.8 |
| S505 30B * 0805  | 30              | φ 15                | φ 16          | B1   | 8          | φ5(H8)       | φ 12        | 8          | 16             | 2-M3      | 4 15.4 |
| S505 32B * 0505  | 32              | φ 16                | φ 17          | B1   | 5          | φ5           | φ 12        | 8          | 13             | 2-M3      | 4 12.7 |
| S505 35B * 0505  | 35              | φ 17.5              | φ 18.5        | B1   | 5          | φ5           | φ 12        | 8          | 13             | 2-M3      | 4 14.2 |
| S505 36B * 0505  | 36              | φ 18                | φ 19          | B1   | 5          | φ5           | φ 12        | 8          | 13             | 2-M3      | 4 14.8 |
| S505 40BF — 0504 | 40              | φ 20                | φ 21          | B1   | 5          | φ4(H8)       | φ 15        | 8          | 13             | —         | 22.1   |
| S505 40B * 0505  | 40              | φ 20                | φ 21          | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 21.0 |
| S505 42 * 0505   | 42              | φ 21                | φ 22          | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 22.3 |
| S505 44B * 0505  | 44              | φ 22                | φ 23          | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 23.6 |
| S505 45B * 0505  | 45              | φ 22.5              | φ 23.5        | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 24.3 |
| S505 48B * 0505  | 48              | φ 24                | φ 25          | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 26.4 |
| S505 50B * 0505  | 50              | φ 25                | φ 26          | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 27.9 |
| S505 52B * 0505  | 52              | φ 26                | φ 27          | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 29.5 |
| S505 54B * 0505  | 54              | φ 27                | φ 28          | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 31.1 |
| S505 55B * 0505  | 55              | φ 27.5              | φ 28.5        | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 32.0 |
| S505 56B * 0505  | 56              | φ 28                | φ 29          | B1   | 5          | φ5           | φ 15        | 8          | 13             | 2-M3      | 4 32.8 |
| S505 60B * 0506  | 60              | φ 30                | φ 31          | B1   | 5          | φ6           | φ 18        | 8          | 13             | 2-M4      | 4 39.9 |
| S505 64B * 0506  | 64              | φ 32                | φ 33          | B1   | 5          | φ6           | φ 18        | 8          | 13             | 2-M4      | 4 43.7 |
| S505 70B * 0506  | 70              | φ 36                | φ 36          | B1   | 5          | φ6           | φ 18        | 8          | 13             | 2-M4      | 4 49.9 |
| S505 72B * 0506  | 72              | φ 36                | φ 37          | B1   | 5          | φ6           | φ 18        | 8          | 13             | 2-M4      | 4 52.1 |
| S505 75B * 0506  | 75              | φ 37.5              | φ 38.5        | B1   | 5          | φ6           | φ 18        | 8          | 13             | 2-M4      | 4 55.5 |
| S505 80BF — 0506 | 80              | φ 40                | φ 41          | B1   | 5          | φ6           | φ 28        | 8          | 13             | —         | 85.0   |
| S505 80B * 0508  | 80              | φ 40                | φ 41          | B1   | 5          | φ8           | φ 22        | 8          | 13             | 2-M4      | 4 67.0 |
| S505 90B * 0508  | 90              | φ 45                | φ 46          | B1   | 5          | φ8           | φ 22        | 8          | 13             | 2-M4      | 4 80.1 |
| S505 96B * 0508  | 96              | φ 48                | φ 49          | B1   | 5          | φ8           | φ 22        | 8          | 13             | 2-M4      | 4 88.7 |

5

| Catalogue number | Number of teeth | Reference diameter | Tip diameter   | Type | Face width | Hole diameter       | Hub diameter   | Hub length     | Overall length | Screw     | Weight  |
|------------------|-----------------|--------------------|----------------|------|------------|---------------------|----------------|----------------|----------------|-----------|---------|
|                  | z               | d                  | d <sub>1</sub> |      | b          | d <sub>1</sub> (H7) | d <sub>2</sub> | l <sub>1</sub> | L              | 2-M(120°) | W(g)    |
| S505 100B * 0508 | 100             | φ50                | φ51            | B1   | 5          | φ8                  | φ25            | 8              | 13             | 2-M4      | 4 101.4 |
| S505 110B * 0508 | 110             | φ55                | φ56            | B1   | 5          | φ8                  | φ25            | 8              | 13             | 2-M4      | 4 117.6 |
| S505 120B * 0508 | 120             | φ60                | φ61            | B1   | 5          | φ8                  | φ25            | 8              | 13             | 2-M4      | 4 135.4 |

6

| Catalogue number | Allowable transfer capability table for different revolutions per minute, Bending strength (Unit: W) |        |        |        |        |          |          |
|------------------|------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S505 10K — 1006  | 0.62                                                                                                 | 6.19   | 12.38  | 24.77  | 49.53  | 74.30    | 92.87    |
| S505 12K — 1007  | 0.85                                                                                                 | 8.49   | 16.98  | 33.96  | 67.91  | 101.87   | 127.33   |
| S505 15K * 0803  | 0.99                                                                                                 | 9.92   | 19.84  | 39.68  | 79.37  | 119.05   | 148.81   |
| S505 16K * 0803  | 1.10                                                                                                 | 11.01  | 22.02  | 44.04  | 88.08  | 132.12   | 165.15   |
| S505 18K * 0804  | 1.32                                                                                                 | 13.24  | 26.47  | 52.94  | 105.88 | 158.82   | 198.53   |
| S505 20K * 0804  | 1.55                                                                                                 | 15.54  | 31.08  | 62.16  | 124.32 | 186.48   | 233.10   |
| S505 22K * 0804  | 1.79                                                                                                 | 17.88  | 35.76  | 71.52  | 143.04 | 214.57   | 268.21   |
| S505 24K * 0804  | 2.03                                                                                                 | 20.26  | 40.52  | 81.04  | 162.07 | 243.11   | 303.88   |
| S505 25B * 0804  | 2.15                                                                                                 | 21.46  | 42.93  | 85.86  | 172.72 | 257.57   | 321.97   |
| S505 26B * 0804  | 2.27                                                                                                 | 22.68  | 45.36  | 90.71  | 181.43 | 272.14   | 339.11   |
| S505 28B * 0804  | 2.51                                                                                                 | 25.13  | 50.26  | 100.52 | 201.03 | 301.55   | 371.39   |
| S505 30B * 0805  | 2.76                                                                                                 | 27.59  | 55.18  | 110.37 | 220.74 | 331.11   | 403.12   |
| S505 32B * 0505  | 1.88                                                                                                 | 18.81  | 37.61  | 75.22  | 150.44 | 225.69   | 271.63   |
| S505 35B * 0505  | 2.12                                                                                                 | 21.17  | 42.34  | 84.68  | 169.36 | 253.90   | 300.66   |
| S505 36B * 0505  | 2.20                                                                                                 | 21.96  | 43.93  | 87.85  | 175.71 | 258.48   | 310.20   |
| S505 40BF — 0504 | 2.51                                                                                                 | 25.13  | 50.26  | 100.53 | 201.05 | 290.27   | 347.13   |
| S505 40B * 0505  | 2.52                                                                                                 | 25.16  | 50.32  | 100.65 | 201.29 | 290.74   | 347.65   |
| S505 42B * 0505  | 2.68                                                                                                 | 26.77  | 53.55  | 107.09 | 214.19 | 306.59   | 365.96   |
| S505 44B * 0505  | 2.84                                                                                                 | 28.37  | 56.75  | 113.49 | 226.99 | 322.02   | 383.71   |
| S505 45B * 0505  | 2.92                                                                                                 | 29.18  | 58.37  | 116.74 | 233.47 | 329.75   | 392.59   |
| S505 48B * 0505  | 3.16                                                                                                 | 31.63  | 63.25  | 126.50 | 252.80 | 352.63   | 418.79   |
| S505 50B * 0505  | 3.33                                                                                                 | 33.26  | 66.52  | 133.04 | 264.20 | 367.63   | 435.89   |
| S505 52B * 0505  | 3.49                                                                                                 | 34.90  | 69.80  | 139.60 | 275.51 | 382.44   | 452.72   |
| S505 54B * 0505  | 3.65                                                                                                 | 36.54  | 73.08  | 146.17 | 286.71 | 397.03   | 469.26   |
| S505 55B * 0505  | 3.74                                                                                                 | 37.37  | 74.73  | 149.46 | 292.77 | 404.26   | 477.43   |
| S505 56B * 0505  | 3.82                                                                                                 | 38.19  | 76.38  | 152.76 | 297.80 | 411.43   | 485.53   |
| S505 60B * 0506  | 4.15                                                                                                 | 41.50  | 83.00  | 165.99 | 319.68 | 439.63   | 517.25   |
| S505 64B * 0506  | 4.48                                                                                                 | 44.82  | 89.64  | 179.28 | 341.14 | 467.04   | 547.92   |
| S505 70B * 0506  | 4.98                                                                                                 | 49.82  | 99.65  | 199.30 | 372.55 | 506.74   | 592.05   |
| S505 72B * 0506  | 5.15                                                                                                 | 51.50  | 102.99 | 205.99 | 382.81 | 519.61   | 606.27   |
| S505 75B * 0506  | 5.40                                                                                                 | 54.01  | 108.02 | 216.04 | 398.01 | 538.57   | 627.16   |
| S505 80BF — 0506 | 5.78                                                                                                 | 57.80  | 115.61 | 231.21 | 419.70 | 565.46   | 662.85   |
| S505 80B * 0508  | 5.82                                                                                                 | 58.21  | 116.42 | 232.85 | 422.85 | 569.31   | 668.04   |
| S505 90B * 0508  | 6.66                                                                                                 | 66.56  | 133.13 | 266.25 | 470.10 | 636.91   | 752.57   |
| S505 96B * 0508  | 7.16                                                                                                 | 71.63  | 143.26 | 286.28 | 497.59 | 660.77   | 802.70   |
| S505 100B * 0508 | 7.50                                                                                                 | 75.01  | 150.02 | 297.93 | 515.45 | 688.64   | 835.69   |
| S505 110B * 0508 | 8.35                                                                                                 | 83.48  | 166.96 | 326.48 | 558.60 | 757.32   | 916.71   |
| S505 120B * 0508 | 9.20                                                                                                 | 91.98  | 183.95 | 354.27 | 599.68 | 824.59   | 995.68   |

## ⑤ Each product dimension

## ⑥ Allowable transfer capability table

Bending strength, etc

## ④ Good information

Accuracy, Material, Pressure Angle, Heat treatment, Tooth surface hardness, Backlash, Note, etc.

# Contents

\* These are samples.

Catalogue number (Material)

Page number

## Gearbox



**Gearbox series**  
HY-BOX, BS-BOX, BSB-BOX, BSH-BOX  
B-SET, WS-BOX

Page 29 to 50

## Anti-backlash spur gear



**Anti-backlash ground spur gear**  
**ASG series** (SCM435, 440), **NSG series** (SCM435, 440)  
**Anti-backlash spur gear**  
**NS series** (S45C, AL), **NSU series** (SUS304)

Page 51 to 60

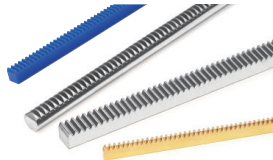
## Spur gear



Ground spur gear  
**SG series** (SCM435, 440), **SGR series** (S45C)  
Spur gear  
**S series** (S45C, SUS304, Brass, Blue POM, White POM  
White POM with brass bushing

Page 61 to 180

## Rack gear



Module size rack gear  
**RK series** (S45C, SUS304, Brass, Blue POM),  
**ORK series** (SUS304)  
Circular pitch size rack & pinion gear  
**RKP series** (Brass, S45C), **SP series** (S45C)

Page 181 to 190

## Helical / Screw gear



**Helix angle 45°**  
**H series** (S45C, SUS304, Blue POM, White POM)

Page 191 to 204

## Miter gear



**MG series** (SCM440), **MGE series** (SCM435, 440)  
**M series** (S45C, SUS304, SUS304L, Brass, Blue POM, White POM, White POM with Brass bushing)  
**MGH series** (S45C), **ML series** (SUS304),  
**ML-N series** (S45C)

Page 205 to 238

## Bevel gear



**BG series** (SCM440)  
**B series** (S45C, SUS304, Brass)

Page 239 to 256

## Worm & Worm Wheel



**W series** (SUS304, S45C)  
**G series** (Brass, Blue POM, White POM,  
White POM with Brass bushing, C6191BE, CAC702)

Page 257 to 278

## References

- Fundamental dimensions for various sizes of Tooth profile
- Advise on gear assembly
- Centre distance and Parallelism of axis for spur and helical gears,
- Measurement of the backlash: Bevel gear, Worm gear
- Tooth bearings, Gear efficiency
- Lubricating oil, noise and oscillation for gears
- Interpretation of Allowable capability torque table and example of use.
- The Conversion formula of Power
- The vocabulary of gear and gear terms, JIS standard and accuracy grade of standard products
- Hardness conversion table
- Commonly used fitting tolerances for bore and axis dimensions
- Metric coarse and fine screw threads, and reference pilot hole dimensions
- Spot facing and Thread hole for Hexagon socket head cap screws
- Shape and dimensions of keyway for parallel key
- C-type and E-type retaining ring (reference)
- Explanation of material notation

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND SCREW GEARS

MITER GEARS

BEVEL GEARS

WORMS AND WORM WHEELS

REFERENCES



| Gearbox                         |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|---------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Catalogue number                | HY-BOX                                                                            | BS-BOX                                                                            | BSB-BOX                                                                           | BSH-BOX                                                                            | B-SET                                                                               | WS-BOX                                                                              |
| Shape                           |  |  |  |  |  |  |
| Page                            | P. 38                                                                             | P. 40                                                                             | P. 42                                                                             | P. 44                                                                              | P. 46                                                                               | P. 48                                                                               |
| Material                        | Body: Aluminum<br>Shaft: SCM435/440, S45C                                         | Body: Aluminum<br>Shaft: SUS303                                                   | Body: Aluminum<br>Shaft: SUS303                                                   | Body: Aluminum<br>or FC200<br>Shaft: SUS303, S45C                                  | Body: Aluminum<br>Shaft: SUS303                                                     | Body: Aluminum<br>Shaft: S45C                                                       |
| Axis position and overall shape | Shaft twisted                                                                     | L shape, T shape                                                                  | L shape                                                                           | L shape, T shape                                                                   | L shape                                                                             | Shaft twisted                                                                       |
| Backlash                        | 20'                                                                               | 15' to 25'                                                                        | 15'                                                                               | 10' to 15'                                                                         | Sensory inspection                                                                  | 30' to 45'                                                                          |
| Type of gear used               | Hypoid gear                                                                       | Straight bevel gear                                                               | Straight bevel gear                                                               | Spiral bevel gear                                                                  | Straight bevel gear                                                                 | Worm gear                                                                           |

| Anti-backlash spur gear / Control-backlash spur gear |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |
|------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Catalogue number                                     | ASG                                                                               | NSG                                                                               | NS                                                                                | NSU                                                                                | NS                                                                                  |
| Shape                                                |  |  |  |  |  |
| Page                                                 | P. 56                                                                             | P. 56                                                                             | P. 58                                                                             | P. 58                                                                              | P. 58                                                                               |
| Material                                             | SCM435, 440                                                                       | SCM435, 440                                                                       | S45C                                                                              | SUS304                                                                             | A5056                                                                               |
| Module                                               | m1 to 2                                                                           | m0.5 to 1                                                                         | m0.8 to 1                                                                         | m0.5                                                                               | m0.5 to 1                                                                           |
| Mechanism parts                                      | Fixing bolts                                                                      | Arc spring / Coil spring                                                          | Coil spring                                                                       | Coil spring                                                                        | Arc spring                                                                          |
| Teeth process sequence                               | Grinding after<br>Induction hardening                                             | Grinding                                                                          | Soft nitriding after<br>cutting                                                   | Teflon after cutting                                                               | White alumite after<br>cutting                                                      |

| Ground spur gear / Spur gear |                                                                                     |                                                                                     |                                                                                     |                                                                                      |                                                                                       |
|------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Catalogue number             | SG                                                                                  | SGR                                                                                 | S                                                                                   | S                                                                                    | S                                                                                     |
| Shape                        |  |  |  |  |  |
| Page                         | P. 66                                                                               | P. 82                                                                               | P. 94                                                                               | P. 136                                                                               | P. 146                                                                                |
| Material                     | SCM435・440                                                                          | S45C                                                                                | S45C                                                                                | SUS304                                                                               | Brass                                                                                 |
| Module                       | m0.5 to 3                                                                           | m0.5 to 3                                                                           | m0.5 to 3                                                                           | m0.5 to 2                                                                            | m0.3 to 0.8                                                                           |
| Accuracy grade               | JIS Class N5                                                                        | JIS Class N6                                                                        | JIS Class N8                                                                        | JIS Class N9                                                                         | JIS Class N9 / Outside<br>of control range                                            |
| Teeth process sequence       | Grinding after<br>Induction hardening                                               | Grinding after<br>induction hardening<br>(black oxide is removed)                   | Cutting                                                                             | Cutting                                                                              | Cutting                                                                               |

| Spur gear              |                                                                                     |                                                                                     |                                                                                     |                                                                                      |
|------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Catalogue number       | S                                                                                   | S                                                                                   | S                                                                                   | S                                                                                    |
| Shape                  |  |  |  |  |
| Page                   | P. 158                                                                              | P. 160                                                                              | P. 170                                                                              | P. 176                                                                               |
| Material               | White POM<br>(w/ brass bushing)                                                     | Blue POM                                                                            | White POM                                                                           | White POM<br>(w/ screw hole)                                                         |
| Module                 | m1                                                                                  | m0.5 to 3                                                                           | m0.5 to 1                                                                           | m0.5 to 1                                                                            |
| Accuracy grade         | JIS Class N9 to N10 ※                                                               | JIS Class N9 to N10 ※                                                               | JIS Class N9 to N10 ※                                                               | JIS Class N9 to N10 ※                                                                |
| Teeth process sequence | Cutting                                                                             | Cutting                                                                             | Cutting                                                                             | Cutting                                                                              |

※ Accuracy at the time of manufacture.

| Module size rack gear  |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Catalogue number       | RK                                                                                | ORK                                                                               | RK                                                                                | RK                                                                                 | RK                                                                                  |
| Shape                  |  |  |  |  |  |
| Page                   | P. 183                                                                            | P. 184                                                                            | P. 184                                                                            | P. 185                                                                             | P. 185                                                                              |
| Material               | S45C                                                                              | SUS304                                                                            | SUS304                                                                            | Brass                                                                              | Blue POM                                                                            |
| Module                 | m1 to 3                                                                           | m0.5 to 1                                                                         | m0.5 to 1.5                                                                       | m0.3 to 0.8                                                                        | m0.5 to 1                                                                           |
| Heat treatment         | —                                                                                 | —                                                                                 | —                                                                                 | —                                                                                  | —                                                                                   |
| Teeth process sequence | Cutting                                                                           | Cutting                                                                           | Cutting                                                                           | Cutting                                                                            | Cutting                                                                             |

| CP size rack gear      |                                                                                   |                                                                                   |                                                                                   |                                                                                    |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Catalogue number       | RKP                                                                               | SP                                                                                | RKP                                                                               | SP                                                                                 |
| Shape                  |  |  |  |  |
| Page                   | P. 188                                                                            | P. 188                                                                            | P. 189                                                                            | P. 189                                                                             |
| Material               | Brass                                                                             | S45C                                                                              | S45C                                                                              | S45C                                                                               |
| Circular Pitch (CP)    | CP2                                                                               | CP2                                                                               | CP5 / CP10                                                                        | CP5 / CP10                                                                         |
| Heat treatment         | —                                                                                 | —                                                                                 | —                                                                                 | —                                                                                  |
| Teeth process sequence | Cutting                                                                           | Cutting                                                                           | Cutting                                                                           | Cutting                                                                            |

| Helical Gear / Screw Gear (Helix angle: 45°) |                                                                                     |                                                                                     |                                                                                     |                                                                                      |
|----------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Catalogue number                             | H                                                                                   | H                                                                                   | H                                                                                   | H                                                                                    |
| Shape                                        |  |  |  |  |
| Page                                         | P. 194                                                                              | P. 196                                                                              | P. 198                                                                              | P. 202                                                                               |
| Material                                     | S45C                                                                                | SUS304                                                                              | Blue POM                                                                            | White POM                                                                            |
| Module                                       | m1 to 3                                                                             | m1 to 1.5                                                                           | m1 to 3                                                                             | m1 to 1.5                                                                            |
| Accuracy grade                               | JIS Class N9                                                                        | JIS Class N9                                                                        | JIS Class N9 to N10 ※                                                               | JIS Class N9 to N10 ※                                                                |
| Teeth process sequence                       | Induction hardening after cutting                                                   | Cutting                                                                             | Cutting                                                                             | Cutting                                                                              |

※ Accuracy at the time of manufacture.

## Miter gear Gear ratio (1 : 1)

| Catalogue number       | MG                                                                                | MGE                                                                               | M                                                                                 | M                                                                                  | M                                                                                   | MGH                                                                                 |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |  |  |
| Page                   | P. 212                                                                            | P. 214                                                                            | P. 216                                                                            | P. 218                                                                             | P. 220                                                                              | P. 222                                                                              |
| Material               | SCM440                                                                            | SCM435, 440                                                                       | S45C                                                                              | S45C                                                                               | S45C                                                                                | S45C                                                                                |
| Module                 | m1.5 to 3                                                                         | m1.5 to 3                                                                         | m0.8 to 3                                                                         | m1 to 3                                                                            | m1 to 3                                                                             | m1 to 2                                                                             |
| Tooth trace shape      | <b>Spiral</b>                                                                     | <b>Spiral</b>                                                                     | <b>Spiral</b>                                                                     | <b>Spiral</b>                                                                      | <b>Spiral</b>                                                                       | <b>Spiral</b>                                                                       |
| Accuracy grade         | JIS Class 1                                                                       | JIS Class 2                                                                       | JIS Class 3                                                                       | JIS Class 4                                                                        | JIS Class 4                                                                         | JIS Class 4                                                                         |
| Teeth process sequence | Grinding after Induction hardening                                                | Grinding after Induction hardening                                                | Cutting                                                                           | Induction hardening & black oxide after cutting                                    | Induction hardening after cutting                                                   | Induction hardening after cutting                                                   |

## Miter gear Gear ratio (1 : 1)

| Catalogue number       | ML-N                                                                              | ML                                                                                | M                                                                                 | M                                                                                  | MGH                                                                                 | M                                                                                   |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |  |  |
| Page                   | P. 224                                                                            | P. 224                                                                            | P. 226                                                                            | P. 228                                                                             | P. 230                                                                              | P. 232                                                                              |
| Material               | S45C                                                                              | SUS304                                                                            | S45C                                                                              | S45C                                                                               | S45C                                                                                | SUS304                                                                              |
| Module                 | m1 to 2.5                                                                         | m0.8 to 2                                                                         | m0.5 to 4                                                                         | m1.5 to 4                                                                          | m2.5 to 3                                                                           | m0.8 to 3                                                                           |
| Tooth trace shape      | Straight                                                                          | Straight                                                                          | Straight                                                                          | Straight                                                                           | Straight                                                                            | Straight                                                                            |
| Accuracy grade         | JIS Class 3                                                                       | JIS Class 4                                                                       | JIS Class 3                                                                       | JIS Class 4                                                                        | JIS Class 4                                                                         | JIS Class 4                                                                         |
| Teeth process sequence | Cutting                                                                           | Cutting                                                                           | Cutting                                                                           | Induction hardening after cutting                                                  | Induction hardening after cutting                                                   | Cutting                                                                             |

## Miter gear Gear ratio (1 : 1)

| Catalogue number       | M                                                                                   | M                                                                                   | M                                                                                   | M                                                                                    |
|------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |
| Page                   | P. 232                                                                              | P. 234                                                                              | P. 234                                                                              | P. 236                                                                               |
| Material               | SUS304L                                                                             | Brass                                                                               | White POM                                                                           | Blue POM                                                                             |
| Module                 | m0.5 to 1                                                                           | m0.5 to 1                                                                           | m1                                                                                  | m0.8 to 3                                                                            |
| Tooth trace shape      | Straight                                                                            | Straight                                                                            | Straight                                                                            | Straight                                                                             |
| Accuracy grade         | —                                                                                   | JIS Class 4                                                                         | JIS Class 5 to 6 *                                                                  | JIS Class 5 to 6 *                                                                   |
| Teeth process sequence | MIM<br>(metal injection molding)                                                    | Cutting                                                                             | Cutting                                                                             | Cutting                                                                              |

## Bevel gear Gear ratio (1 : 1.5 / 1 : 2 / 1 : 3)

| Catalogue number       | BG                                                                                  | B                                                                                   | B                                                                                   | B                                                                                    | B                                                                                     | B                                                                                     |
|------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |  |  |
| Page                   | P. 244                                                                              | P. 246                                                                              | P. 248                                                                              | P. 250                                                                               | P. 252                                                                                | P. 254                                                                                |
| Material               | SCM440                                                                              | S45C                                                                                | S45C                                                                                | S45C                                                                                 | S45C                                                                                  | SUS304                                                                                |
| Module                 | m1.5 to 2.5                                                                         | m1 to 3                                                                             | m1 to 2.5                                                                           | m0.5 to 3                                                                            | m1.5 to 4                                                                             | m0.8 to 2                                                                             |
| Tooth trace shape      | <b>Spiral</b>                                                                       | <b>Spiral</b>                                                                       | <b>Spiral</b>                                                                       | Straight                                                                             | Straight                                                                              | Straight                                                                              |
| Accuracy grade         | JIS Class 1                                                                         | JIS Class 3                                                                         | JIS Class 4                                                                         | JIS Class 3                                                                          | JIS Class 4                                                                           | JIS Class 4                                                                           |
| Teeth process sequence | Grinding after Induction hardening                                                  | Cutting                                                                             | Induction hardening after cutting                                                   | Cutting                                                                              | Induction hardening after cutting                                                     | Cutting                                                                               |

## Bevel gear Gear ratio (1 : 1.5 / 1 : 2 / 1 : 3)

| Catalogue number       | B                                                                                   |
|------------------------|-------------------------------------------------------------------------------------|
| Shape                  |  |
| Page                   | P. 254                                                                              |
| Material               | Brass                                                                               |
| Module                 | m0.5 to 0.8                                                                         |
| Tooth trace shape      | Straight                                                                            |
| Accuracy grade         | JIS Class 4                                                                         |
| Teeth process sequence | Cutting                                                                             |



## Worm / Worm Wheel Module 0.5 to 3

| Catalogue number       | W50                                                                               | W50                                                                               | G50                                                                               | G50                                                                                | G50                                                                                 | W80                                                                                 |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |  |  |
| Page                   | P. 262                                                                            | P. 263                                                                            | P. 262                                                                            | P. 262                                                                             | P. 262                                                                              | P. 264                                                                              |
| Material               | SUS304                                                                            | S45C                                                                              | CAC702                                                                            | Brass                                                                              | Blue POM                                                                            | SUS304                                                                              |
| Module                 | m0.5                                                                              | m0.5                                                                              | m0.5                                                                              | m0.5                                                                               | m0.5                                                                                | m0.8                                                                                |
| Teeth process sequence | Precision cold rolling                                                            | Precision cold rolling                                                            | Cutting                                                                           | Cutting                                                                            | Cutting                                                                             | Precision cold rolling                                                              |

## Worm / Worm Wheel Module 0.5 to 3

| Catalogue number       | W80                                                                               | G80                                                                               | G80                                                                               | G80                                                                                | W1                                                                                  | W1                                                                                  |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |  |  |
| Page                   | P. 265                                                                            | P. 264                                                                            | P. 264                                                                            | P. 264                                                                             | P. 266                                                                              | P. 267                                                                              |
| Material               | S45C                                                                              | CAC702                                                                            | Blue POM                                                                          | White POM                                                                          | SUS304                                                                              | S45C                                                                                |
| Module                 | m0.8                                                                              | m0.8                                                                              | m0.8                                                                              | m0.8                                                                               | m1                                                                                  | m1                                                                                  |
| Teeth process sequence | Precision cold rolling                                                            | Cutting                                                                           | Cutting                                                                           | Cutting                                                                            | Precision cold rolling                                                              | Precision cold rolling                                                              |

## Worm / Worm Wheel Module 0.5 to 3

| Catalogue number       | G1                                                                                  | G1                                                                                  | G1                                                                                  | W1.5                                                                                 | W1.5                                                                                  | G1.5                                                                                  |
|------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |  |  |
| Page                   | P. 266                                                                              | P. 268                                                                              | P. 268                                                                              | P. 270                                                                               | P. 271                                                                                | P. 270                                                                                |
| Material               | CAC702                                                                              | White POM / White POM (w/ brass bushing)                                            | Blue POM                                                                            | SUS304                                                                               | S45C                                                                                  | CAC702                                                                                |
| Module                 | m1                                                                                  | m1                                                                                  | m1                                                                                  | m1.5                                                                                 | m1.5                                                                                  | m1.5                                                                                  |
| Teeth process sequence | Cutting                                                                             | Cutting                                                                             | Cutting                                                                             | Precision cold rolling                                                               | Precision cold rolling                                                                | Cutting                                                                               |

## Worm / Worm Wheel Module 0.5 to 3

| Catalogue number       | G1.5                                                                                | G1.5                                                                                | W2                                                                                  | G2                                                                                   | W2.5                                                                                  | G2.5                                                                                  |
|------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |  |  |
| Page                   | P. 272                                                                              | P. 272                                                                              | P. 274                                                                              | P. 274                                                                               | P. 276                                                                                | P. 276                                                                                |
| Material               | White POM / White POM (w/ brass bushing)                                            | Blue POM                                                                            | S45C                                                                                | CAC702                                                                               | S45C                                                                                  | CAC702                                                                                |
| Module                 | m1.5                                                                                | m1.5                                                                                | m2                                                                                  | m2                                                                                   | m2.5                                                                                  | m2.5                                                                                  |
| Teeth process sequence | Cutting                                                                             | Cutting                                                                             | Precision cold rolling                                                              | Cutting                                                                              | Cutting                                                                               | Cutting                                                                               |

## Worm / Worm Wheel Module 0.5 to 3

| Catalogue number       | W3                                                                                  | G3                                                                                  |
|------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Shape                  |  |  |
| Page                   | P. 277                                                                              | P. 277                                                                              |
| Material               | S45C                                                                                | CAC702                                                                              |
| Module                 | m3                                                                                  | m3                                                                                  |
| Teeth process sequence | Cutting                                                                             | Cutting                                                                             |

# Alphabetical search

※ Refer to the References for the details of the accuracy grade.

|          | Catalogue number |               | Gear type                                         | Page   | Material                       | Accuracy grade | Teeth process sequence                          |
|----------|------------------|---------------|---------------------------------------------------|--------|--------------------------------|----------------|-------------------------------------------------|
| <b>A</b> | ASG1S            | to ASG2S      | Control-backlash spur gear                        | P. 56  | SCM435・440                     | JIS N5         | Grinding after Induction hardening              |
| <b>B</b> | B50B             | to B80B       | Bevel gear (straight)                             | P. 254 | Brass                          | JIS 4          | Cutting                                         |
|          | B50S             | to B3S        | Bevel gear (straight)                             | P. 250 | S45C                           | JIS 3          | Cutting                                         |
|          | B1.5S-H          | to B4S-H      | Bevel gear (straight)                             | P. 252 | S45C                           | JIS 4          | Induction hardening after cutting               |
|          | B1S-L            | to B3S-L      | Bevel gear (spiral)                               | P. 246 | S45C                           | JIS 3          | Cutting                                         |
|          | B1S-R            | to B3S-R      | Bevel gear (spiral)                               | P. 246 | S45C                           | JIS 3          | Cutting                                         |
|          | B1S-L-H          | to B2.5S-L-H  | Bevel gear (spiral)                               | P. 248 | S45C                           | JIS 4          | Induction hardening after cutting               |
|          | B1S-R-H          | to B2.5S-R-H  | Bevel gear (spiral)                               | P. 248 | S45C                           | JIS 4          | Induction hardening after cutting               |
|          | B80SU            | to B2SU       | Bevel gear (straight)                             | P. 254 | SUS304                         | JIS 4          | Cutting                                         |
|          | BE40L            | to BE88L      | Bevel gearbox (L shape)                           | P. 46  | Body: Aluminum, Cover: Plastic | —              | —                                               |
|          | BG1.5S-L-H       | to BG2.5S-L-H | Bevel gear (spiral)                               | P. 244 | SCM440                         | JIS 1          | Grinding after Induction hardening              |
|          | BG1.5S-R-H       | to BG2.5S-R-H | Bevel gear (spiral)                               | P. 244 | SCM440                         | JIS 1          | Grinding after Induction hardening              |
|          | BS35L            | to BS105L     | Bevel gearbox (L shape)                           | P. 40  | Body: Aluminum                 | —              | —                                               |
|          | BS45T            | to BS105T     | Bevel gearbox (T shape)                           | P. 40  | Body: Aluminum                 | —              | —                                               |
|          | BSB65L           | to BSB105L    | Bevel gearbox hollow shaft type (L shape)         | P. 42  | Body: Aluminum                 | —              | —                                               |
|          | BSH70L           | to BSH170L    | Bevel gearbox strength enhancement type (L shape) | P. 44  | Body: Aluminum or FC200        | —              | —                                               |
|          | BSH70T           | to BSH145T    | Bevel gearbox strength enhancement type (T shape) | P. 44  | Body: Aluminum or FC200        | —              | —                                               |
| <b>G</b> | G50A-R           | to G3A-R      | Worm wheel                                        | P. 262 | CAC702, C6191BE                | —              | Cutting                                         |
|          | G1A-L            | to G3A-L      | Worm wheel                                        | P. 268 | CAC702, C6191BE                | —              | Cutting                                         |
|          | G50B             |               | Worm wheel                                        | P. 262 | Brass                          | —              | Cutting                                         |
|          | G50BP            | to G1.5BP     | Worm wheel                                        | P. 262 | Blue POM                       | —              | Cutting                                         |
|          | G80D             | to G1.5D      | Worm wheel                                        | P. 264 | White POM                      | —              | Cutting                                         |
|          | G1DB             | to G1.5DB     | Worm wheel                                        | P. 266 | White POM (w/ brass bushing)   | —              | Cutting                                         |
| <b>H</b> | H1BP-L           | to H3BP-L     | Helical gear                                      | P. 198 | Blue POM                       | JIS N9 to 10   | Cutting                                         |
|          | H1BP-R           | to H3BP-R     | Helical gear                                      | P. 198 | Blue POM                       | JIS N9 to 10   | Cutting                                         |
|          | H1D-L            | to H1.5D-L    | Helical gear                                      | P. 202 | White POM                      | JIS N9 to 10   | Cutting                                         |
|          | H1D-R            | to H1.5D-R    | Helical gear                                      | P. 202 | White POM                      | JIS N9 to 10   | Cutting                                         |
|          | H1S-L            | to H3S-L      | Helical gear                                      | P. 194 | S45C                           | JIS N9         | Induction hardening after cutting               |
|          | H1S-R            | to H3S-R      | Helical gear                                      | P. 194 | S45C                           | JIS N9         | Induction hardening after cutting               |
|          | H1SU-L           |               | Helical gear                                      | P. 196 | SUS304                         | JIS N9         | Cutting                                         |
|          | H1SU-R           | to H1.5SU-R   | Helical gear                                      | P. 196 | SUS304                         | JIS N9         | Cutting                                         |
|          | HY70R            | to HY150R     | Hypoid gearbox (shaft twisted)                    | P. 38  | Body: Aluminum                 | —              | —                                               |
| <b>M</b> | M50B             | to M1B        | Miter gear (straight)                             | P. 234 | Brass                          | JIS 4          | Cutting                                         |
|          | M80BP            | to M3BP       | Miter gear (straight)                             | P. 236 | Blue POM                       | —              | Cutting                                         |
|          | M1D              |               | Miter gear (straight)                             | P. 234 | White POM                      | —              | Cutting                                         |
|          | M50S             | to M4S        | Miter gear (straight)                             | P. 226 | S45C                           | JIS 3          | Cutting                                         |
|          | M1.5S-H          | to M4S-H      | Miter gear (straight)                             | P. 228 | S45C                           | JIS 4          | Induction hardening after cutting               |
|          | M80S-L           | to M3S-L      | Miter gear (spiral)                               | P. 216 | S45C                           | JIS 3          | Cutting                                         |
|          | M80S-R           | to M3S-R      | Miter gear (spiral)                               | P. 216 | S45C                           | JIS 3          | Cutting                                         |
|          | M1S-L-H          | to M3S-L-H    | Miter gear (spiral)                               | P. 220 | S45C                           | JIS 4          | Induction hardening after cutting               |
|          | M1S-R-H          | to M3S-R-H    | Miter gear (spiral)                               | P. 220 | S45C                           | JIS 4          | Induction hardening after cutting               |
|          | M1S-R-HB         | to M3S-R-HB   | Miter gear (spiral)                               | P. 218 | S45C                           | JIS 4          | Induction hardening & black oxide after cutting |

# Alphabetical search

|   | Catalogue number         | Gear type                    | Page   | Material                     | Accuracy grade | Teeth process sequence                          |
|---|--------------------------|------------------------------|--------|------------------------------|----------------|-------------------------------------------------|
| M | M1S-L-HB to M3S-L-HB     | Miter gear (spiral)          | P. 218 | S45C                         | JIS 4          | Induction hardening & black oxide after cutting |
|   | M80SU to M3SU            | Miter gear (straight)        | P. 232 | SUS304                       | JIS 4          | Cutting                                         |
|   | M50SUM to M1SUM          | Miter gear (straight)        | P. 232 | SUS304L                      | —              | MIM (metal injection molding)                   |
|   | MGE1.5S-L-H to MGE3S-L-H | Miter gear (spiral)          | P. 214 | SCM435 • 440                 | JIS 2          | Grinding after Induction hardening              |
|   | MGE1.5S-R-H to MGE3S-R-H | Miter gear (spiral)          | P. 214 | SCM435 • 440                 | JIS 2          | Grinding after Induction hardening              |
|   | ML1S-N to ML2.5S-N       | Miter gear (straight)        | P. 224 | S45C                         | JIS 3          | Cutting (w/ boss fastening mechanism)           |
|   | ML80SU to ML2SU          | Miter gear (straight)        | P. 224 | SUS304                       | JIS 4          | Cutting (w/ boss fastening mechanism)           |
|   | MG1.5S-L-H to MG3S-L-H   | Miter gear (spiral)          | P. 212 | SCM440                       | JIS 1          | Grinding after Induction hardening              |
|   | MG1.5S-R-H to MG3S-R-H   | Miter gear (spiral)          | P. 212 | SCM440                       | JIS 1          | Grinding after Induction hardening              |
|   | MGH                      | Miter gear (straight)        | P. 230 | S45C                         | JIS 4          | Induction hardening after cutting               |
|   | MGH-L                    | Miter gear (spiral)          | P. 222 | S45C                         | JIS 4          | Induction hardening after cutting               |
|   | MGH-R                    | Miter gear (spiral)          | P. 222 | S45C                         | JIS 4          | Induction hardening after cutting               |
| N | NS50AL to NS1AL          | Anti-backlash spur gear      | P. 58  | Aluminum                     | JIS N9         | Cutting                                         |
|   | NS80S to NS1S            | Anti-backlash spur gear      | P. 58  | S45C                         | JIS N8         | Cutting                                         |
|   | NS50SU                   | Anti-backlash spur gear      | P. 58  | SUS304                       | JIS N9         | Cutting                                         |
|   | NSG50S to NSG1S          | Anti-backlash spur gear      | P. 56  | SCM435 • 440                 | JIS N5         | Grinding                                        |
| O | ORK50SU to ORK1SU        | Round rack gear              | P. 184 | SUS304                       | —              | Cutting                                         |
| R | RK30B to RK80B           | Rack gear                    | P. 185 | Brass                        | —              | Cutting                                         |
|   | RK50BP to RK1BP          | Rack gear                    | P. 185 | Blue POM                     | —              | Cutting                                         |
|   | RK1SD to RK3SD           | Rack gear                    | P. 183 | S45C                         | —              | Cutting                                         |
|   | RK50SU to RK1.5SU        | Rack gear                    | P. 184 | SUS304                       | —              | Cutting                                         |
|   | RKP2B                    | Rack gear                    | P. 188 | Brass                        | —              | Cutting                                         |
|   | RKP5SD to RKP10SD        | Rack gear                    | P. 189 | S45C                         | —              | Cutting                                         |
| S | S30B to S80B             | Spur gear                    | P. 146 | Brass                        | JIS N9         | Cutting                                         |
|   | S50BP to S3BP            | Spur gear                    | P. 160 | Blue POM                     | JIS N9 to 10   | Cutting                                         |
|   | S50D to S1D              | Spur gear                    | P. 170 | White POM                    | JIS N9 to 10   | Cutting                                         |
|   | S1DB                     | Spur gear                    | P. 158 | White POM (w/ brass bushing) | JIS N9 to 10   | Cutting                                         |
|   | S50S to S3S              | Spur gear                    | P. 94  | S45C                         | JIS N8         | Cutting                                         |
|   | S50SU to S2SU            | Spur gear                    | P. 136 | SUS304                       | JIS N9         | Cutting                                         |
|   | SG50S to SG3S            | Ground spur gear             | P. 66  | SCM435 • 440                 | JIS N5         | Grinding after Induction hardening              |
|   | SGR50S to SGR3S          | Ground spur gear             | P. 82  | S45C                         | JIS N6         | Grinding after Induction hardening              |
|   | SP2S to SP10S            | CP Pinion (for CP Rack gear) | P. 188 | S45C                         | JIS N8         | CP size, Cutting                                |
| W | W50SU-R to W1.5SU-R      | Worm                         | P. 262 | SUS304                       | —              | Precision cold rolling                          |
|   | W1S-L to W3S-L           | Worm                         | P. 267 | S45C                         | —              | Precision cold rolling or Cutting               |
|   | W50S-R to W3S-R          | Worm                         | P. 263 | S45C                         | —              | Precision cold rolling or Cutting               |
|   | WS55R to WS90R           | Worm gearbox (shaft twisted) | P. 48  | Body: Aluminum               | —              | —                                               |

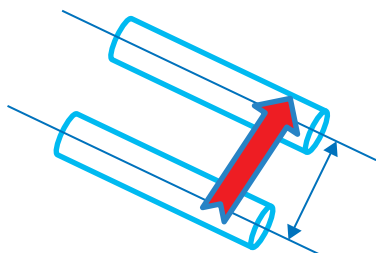
Search method:

|            |              |   |                  |
|------------|--------------|---|------------------|
| Miter gear | M1S30R*2610H | ➡ | M (module) S-R-H |
| Rack gear  | RK1SD10-1015 | ➡ | RK (module) SD   |
| Spur gear  | S1S100B-1012 | ➡ | S (module) S     |
| Worm       | W1S R1+B     | ➡ | W (module) S-R   |



# Select gears based on usage

## Transfer of rotational motion between parallel shafts: Spur gears, helical gears, anti-backlash spur gears



### Cautions on assembly:

- ① Center distance: For KG's spur gears, helical gears, and anti-backlash gears, we recommend setting the center distance to a value larger than the theoretical value.
- ② Arrange the bearing as close to the gear as possible and fasten it from both sides.
- ③ Helical gears are subject to a thrust load, and therefore, use thrust bearings or similar parts.

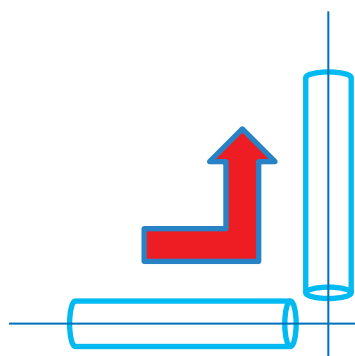


| Example of use                                  | Gear series used                                                 |
|-------------------------------------------------|------------------------------------------------------------------|
| High torque, high accuracy, low noise           | SG, ASG (backlash control function)                              |
| High torque, low noise, high cost-performance   | SGR                                                              |
| High torque, high cost-performance              | Induction-hardened products                                      |
| Elimination of backlash                         | NSG, NS, NSU                                                     |
| For medical use and for food and drinking water | Spur gears and helical gears made of SUS304 or blue or white POM |
| Humid environments                              | Spur gears and helical gears made of SUS304 or blue or white POM |

## Transfer of rotational motion between intersecting shafts with a shaft angle of 90° : Miter gears and bevel gears

### Cautions on assembly:

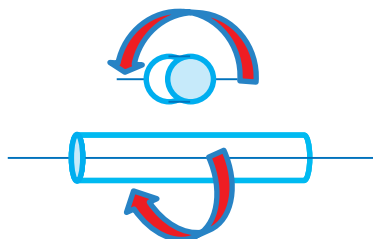
- ① Assembly distance: Adjust the assembly distance to the value set by KG.
  - ② Tooth contact check: Check that a pair of bevel gears have proper tooth contact.
  - ③ Bevel gears are subject to a thrust load, and therefore, use thrust bearings or similar parts.
- ★ Shaft check: The shafts may deform if they do not have adequate strength or are subject to an excessive load. Check the perpendicularity as well.



| Example of use                                  | Gear series used                                                |
|-------------------------------------------------|-----------------------------------------------------------------|
| High torque, high accuracy, low noise           | MG, BG                                                          |
| High torque, low noise, high cost-performance   | MGE                                                             |
| High torque, high cost-performance              | MGH, induction-hardened miter and bevel gears                   |
| Pursuit of convenience in assembly              | BS, BSB, BSH, B-SET, ML, ML-N                                   |
| For medical use and for food and drinking water | Miter gears and bevel gears made of SUS304 or blue or white POM |
| Humid environments                              | Miter gears and bevel gears made of SUS304 or blue or white POM |

# Select gears based on usage

## Transfer of rotational motion between helical gears with the shaft twisted 90° : Worm gears and helical gears



### Cautions on assembling worm gears:

- ① Assembly distance: For KG' s worms and worm wheels, we recommend setting the center distance to a value larger than the theoretical value.
- ② Arrange the bearing as close to the gear as possible and fasten it from both sides.
- ③ A thrust load is generated. Use thrust bearings or similar parts.
- ④ Warm-up operation: Warm-up operation provides an increased tooth contact area, enabling the product to be used in the allowable torque range.
- ⑤ Lubrication: For low-speed operation, apply grease lubrication, and for high-speed operation, use oil bath lubrication. Add oil up to the center of the worm when the worm is used below the worm wheel, and 1/3 of the worm wheel diameter when the worm is used above the worm wheel.

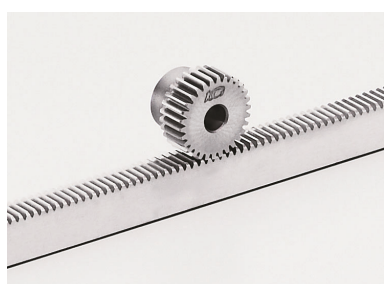
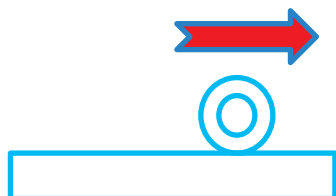
### Cautions on assembling screw gears:

With this assembly method, the gears have a point contact and wear quickly. Screw gears can be assembled more easily than bevel gears.

- ① Assembly distance: For KG' s helical gears, we recommend setting the center distance to a value larger than the theoretical value.
- ② Arrange the bearing as close to the gear as possible and fasten it from both sides.
- ③ A thrust load is generated. Use thrust bearings or similar parts.

| Example of use                                                    | Gear series used                                                               |
|-------------------------------------------------------------------|--------------------------------------------------------------------------------|
| For medical use and for food and drinking water                   | SUS304 worms, blue and white POM worm wheels, blue and white POM helical gears |
| High accuracy and pursuit of convenience in mounting and assembly | WS, HY                                                                         |
| Humid environments                                                | SUS304 worms, blue and white POM worm wheels, blue and white POM helical gears |

## Conversion of rotational motion to linear motion: Racks and CP racks



### Cautions on use:

- ① The pinion wears more quickly than the rack, and therefore, a more durable material may be selected for the pinion.
- ② Stick to the rack contact height set by KG.
- ③ Gears with a module size are not compatible with those with a CP size.

| Example of use                                                      | Gear series used                                                    |
|---------------------------------------------------------------------|---------------------------------------------------------------------|
| General use                                                         | RK, S                                                               |
| When the center travel distance per revolution is set to an integer | RKP, SP                                                             |
| For medical use and for food and drinking water                     | SUS304 and blue and white POM racks and pinions                     |
| Elimination or control of backlash                                  | Use a NSG, NS, NSU, or ASG gear having the same module as the rack. |

# About additional machining

We offer additional machining services for standard gears, even a single gear.



We offer products with various numbers of teeth, face widths, and hole diameters to meet a wide range of needs. We also offer additional machining (secondary processing) services for standard gears to more completely meet customer needs.

## Notes on additional machining of gear holes

Each KG gear series is available with several different hole diameters. To maintain the accuracy and performance of KG gears, avoid additional hole machining. If additional hole machining is required, use an F type gear (marked with “-” )

For centering, use a soft scroll chuck, three-claw scroll chuck, or similar tool. In additional machining, the maximum working diameter must be 60 to 70% of the hub diameter.

### Cautions on chucking

When holding a gear with a chuck during additional machining, do not set the chuck in the stamped area.

### Cautions on additional machining of hardened products

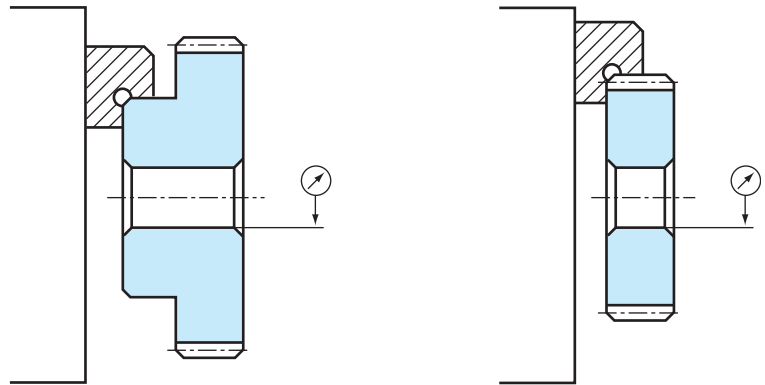
When additional machining is required for an induction-hardened gear, note that the area around the teeth has hardened due to the effect of heat treatment. Also, note that gears with a small outside diameter (with a small number of teeth) have low machinability because the hole surface has hardened due to the effect of hardening.

# Notes on additional machining

## Example of additional hole machining of gears

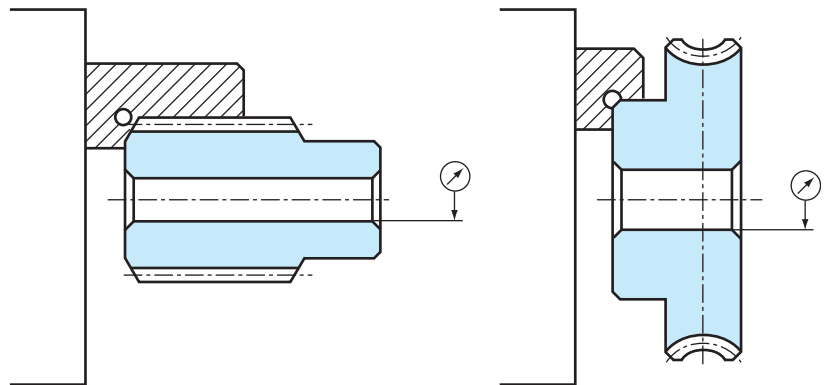
### Spur gears and helical gears

When holding the tooth tip circumference, be careful not to deform the teeth.



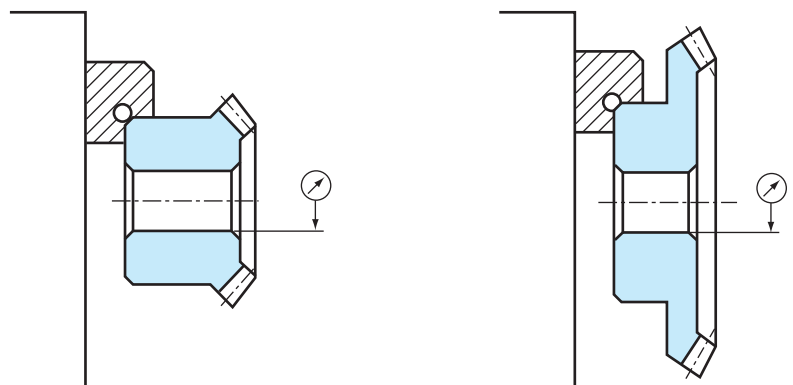
### Worms and worm wheels

For cold-rolled worms, we recommend holding the product as deeply as possible in the chuck, especially when holding the tooth tip circumference. When doing so, be careful not to deform the teeth.



### Miter gears and bevel gears

For gears with a module of  $m2.0$  or more, the tooth tip circumference has been chamfered parallel to the shaft center, which enables easy chucking. When holding the tooth tip circumference with a chuck, be careful not to deform the teeth.





# About custom-made gears

## We offer custom-made gears, even a single one, to meet your needs.

Taking advantage of the knowhow we have accumulated for producing precision, small standard gears, we offer custom-made gears in addition to standard products.



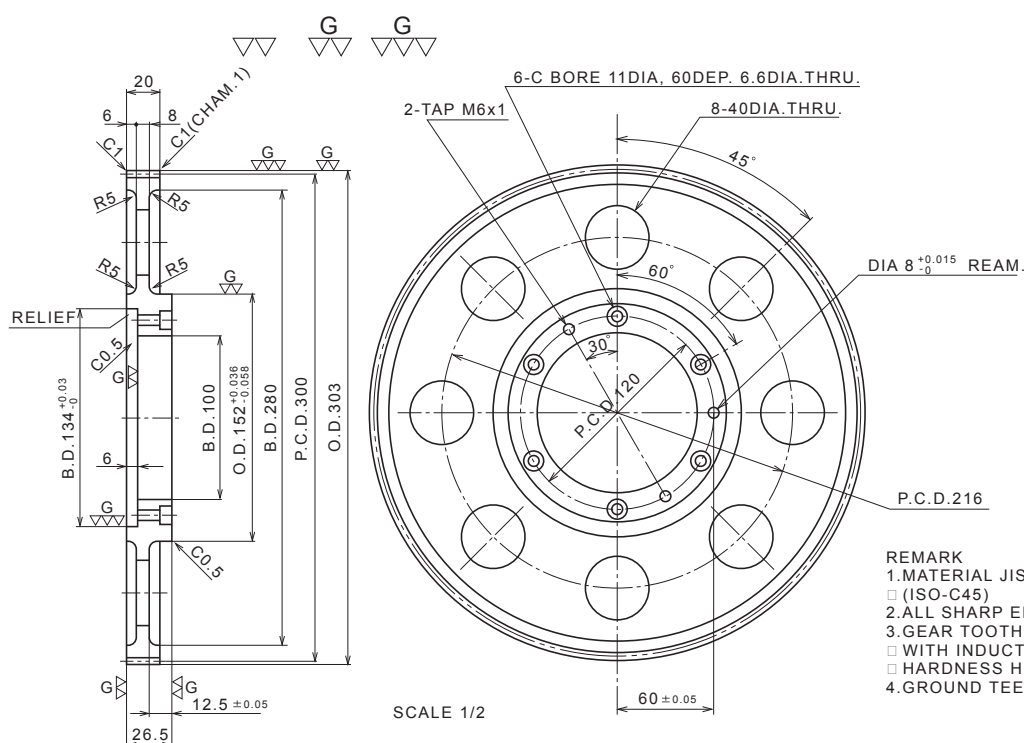
We offer KG-STOCK GEARS with various numbers of teeth, face widths, hole diameters, and hub diameters to meet a wide range of needs. When designing your device, first see if there is a KG-STOCK GEAR available. If you cannot find an appropriate gear among our KG-STOCK GEARS, please send your design drawings.

Please consult with us about price and delivery.

If you have any questions about design, please feel free to contact us. Our engineering department and branch offices have experienced engineering service personnel to meet your requests.

Note) Please note that, depending on our production capacity and equipment capabilities, we may not be able to accept your request or order.

## Reference drawing (example)



# About custom-made gears

We offer small-module and small gears, including spur gears and bevel gears. We also offer inspection services for our products.



We offer spur gears and bevel gears with a module of 0.3.



We have introduced the latest gear grinding machine Reishauer RZ260 4.0 (made in Switzerland) to offer custom-made products.

Tooth surface polishing provides high-accuracy, high-efficiency, high-strength, low-noise gears.

## Specification checklist for custom-made gears

|              | Size                  | Material              | Number of teeth       | Shape                 | Outside diameter      | Helix angle and direction | Number of threads     | Number of teeth of mating gear | Assembly distance     | Heat treatment        | Surface treatment     |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|-----------------------|--------------------------------|-----------------------|-----------------------|-----------------------|
| Spur gear    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                       |                           |                       |                                |                       | <input type="radio"/> | <input type="radio"/> |
| Rack         | <input type="radio"/> | <input type="radio"/> |                       | <input type="radio"/> |                       |                           |                       |                                |                       | <input type="radio"/> | <input type="radio"/> |
| Helical gear | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                       | <input type="radio"/>     |                       | <input type="radio"/>          |                       | <input type="radio"/> | <input type="radio"/> |
| Worm gear    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>     | <input type="radio"/> | <input type="radio"/>          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Bevel gear   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                       | <input type="radio"/>     |                       | <input type="radio"/>          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Please make requests and orders based on your drawings and specifications.

Depending on our equipment capabilities, we may not be able to accept your request or order.

## Customization of ground gears

Gear types: Spur gears, Helical gears, Spiral miter gears, Spiral bevel gears

Module size m (min. 0.3 to max. 3.0): Please consult with us.

DP (inch) size: Please consult with us.

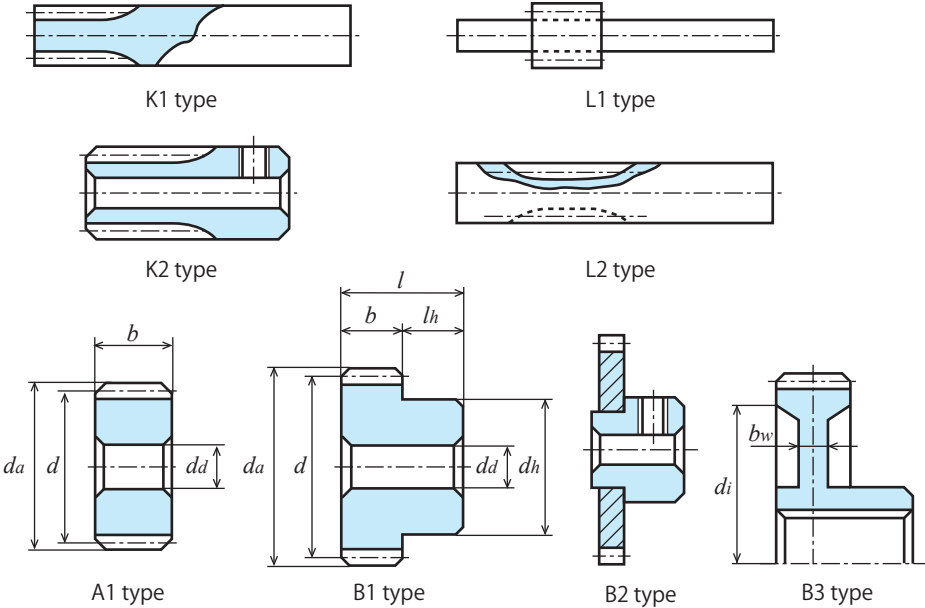
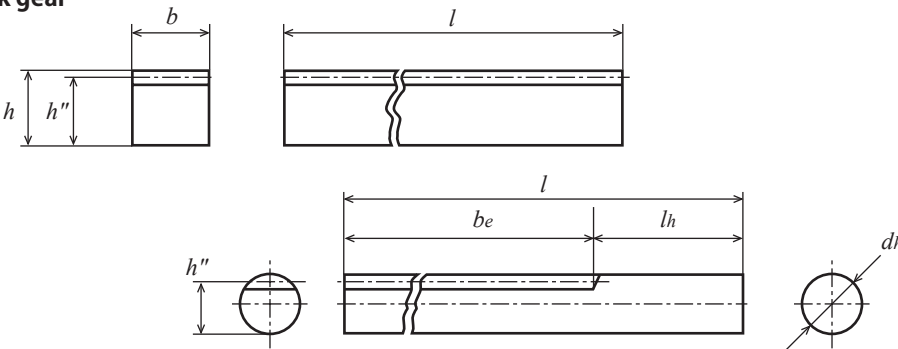
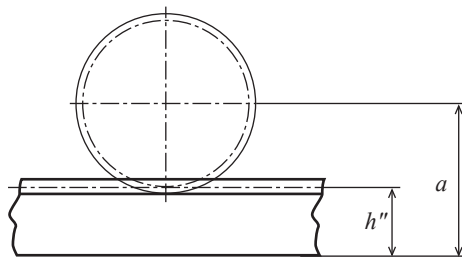
Number of teeth: 10 to 500 / Outside diameter:  $\varnothing$  8 to 350 mm / Face width: max. 200 mm / Maximum helix angle (right and left) 45°

Guaranteed accuracy grade: Please consult with us.

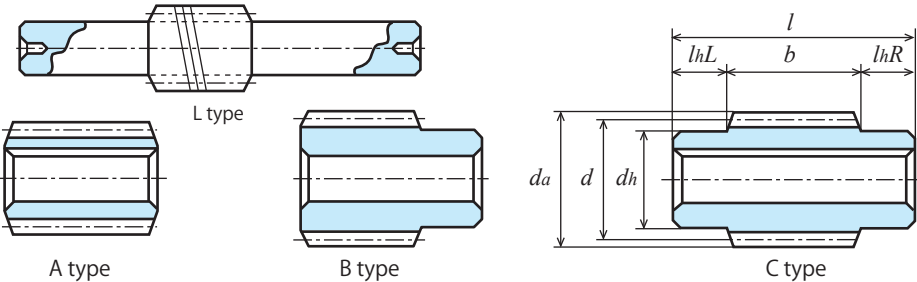
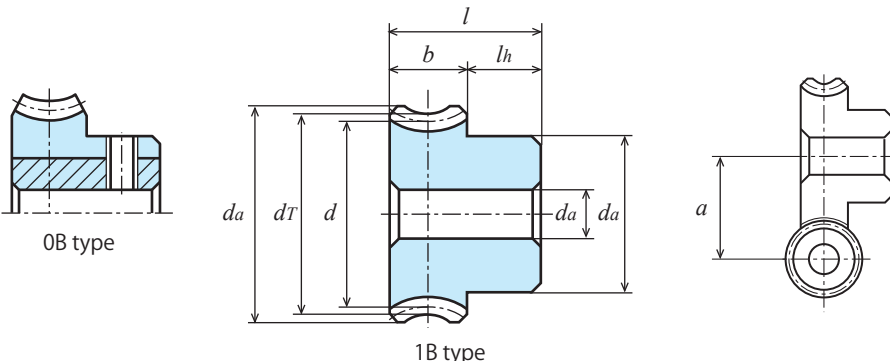
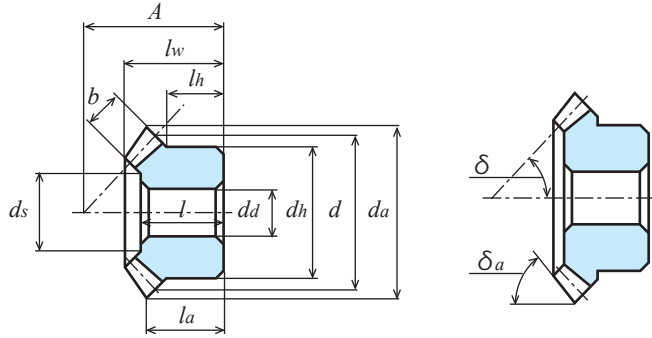
## Production flow for custom-made gears

1. Customer provides a drawing.
2. Our engineering and sales departments look over the customer's drawing, specifications, and conditions and determine the feasibility.
3. A meeting is held with the customer to discuss the details of the drawing. (e.g., dimensions, tolerances)
4. The details of the drawing and production quantity are determined.
5. We submit an official estimate. (Price and delivery)
6. The customer approves the estimate specifications and submits the order form.
7. Final check of the drawing. The customer signs the specification drawing.  
\* To be prepared based on our specification drawing.
8. Production starts.

# List of KG gear dimension symbols

| KG gear type and simple drawing                                                                                          |  | Part names                                                                                                                                                | Symbol                                                                  |
|--------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Spur gear, Helical gear</b><br><br> |  | Tip diameter<br>Reference diameter<br>Hub diameter<br>Hole diameter<br>Overall length<br>Face width<br>Hub length<br>Dimension of Rim<br>Thickness of Web | $d_a$<br>$d$<br>$d_h$<br>$d_d$<br>$l$<br>$b$<br>$l_h$<br>$d_i$<br>$b_w$ |
| <b>Rack gear</b><br><br>              |  | Overall length<br>Datum line<br>Face width<br>Height<br>Shaft diameter<br>Effective contact length<br>Stem length                                         | $l$<br>$h''$<br>$b$<br>$h$<br>$d_h$<br>$b_e$<br>$l_h$                   |
| <b>Rack &amp; Pinion</b><br><br>      |  | Assembly distance<br>Rack datum line                                                                                                                      | $a$<br>$h''$                                                            |

# List of KG gear dimension symbols

| KG gear type and simple drawing                                                                                      |  | Part names                                                                                                                                                                                                                                  | Symbol                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Worm</b><br>                    |  | Tip diameter<br>Reference diameter<br>Hub diameter<br>Hole diameter<br>Overall length<br>Face width<br>Hub length                                                                                                                           | $d_a$<br>$d$<br>$d_h$<br>$d_d$<br>$l$<br>$b$<br>$l_h$                                                             |
| <b>Worm wheel</b><br>             |  | Tip diameter<br>Throat diameter<br>Intermeshing pitch circle diameter<br>Hub diameter<br>Hole diameter<br>Overall length<br>Face width<br>Hub length<br><br>Intermeshing center distance                                                    | $d_a$<br>$d_T$<br>$d$<br>$d_h$<br>$d_d$<br>$l$<br>$b$<br>$l_h$<br><br>$a$                                         |
| <b>Miter gear, Bevel gear</b><br> |  | Assembly distance<br>Tip diameter<br>Reference diameter<br>Hub diameter<br>Hole diameter<br>Tip angle<br>Pitch angle<br>Face width<br>Hub length<br>Overall length<br>Distance from end face to tip<br>Hole length<br>Counter bore diameter | $A$<br>$d_a$<br>$d$<br>$d_h$<br>$d_d$<br>$\delta_a$<br>$\delta$<br>$b$<br>$l_h$<br>$l_w$<br>$l_a$<br>$l$<br>$d_s$ |

Please be aware that KG product is subject to dimensional changes without prior notice, to the extent that it does not adversely affect the functionality.



# Our environmental efforts and action on EU RoHS2 Directive

Recognizing global environmental preservation as one of the highest priority issues for all mankind, KYOIKU GEAR MFG. CO., LTD. is continuously working to reduce environmental burdens and contribute to realizing an economic society that can grow sustainably.

**RoHS2 Directive** : Requires non-use of 10 substances: lead, mercury, cadmium, hexavalent chromium, two specified brominated flame retardants (PBB and PBDE), and phthalates (DEHP, BBP, DBP, and DIBP).

**EU RoHS Directive** : This is a directive of the European Union (EU) that restricts the use of specified hazardous substances in electronic and electrical devices. Currently, the use of the above 10 substances is restricted.

## Action on our standard products :

We are gradually switching over to products that comply with the RoHS2 Directive.  
In November 2006, we began producing brass (C3604B and C3771) products that adopt low-cadmium material, thereby offering RoHS compliant products.  
From November 21, 2023, we will begin producing S45C carbon steel products with a lead content of 0.1wt% or less, and have begun switching to products that comply with the RoHS2 Directive.  
For details, feel free to check out our official website.  
<https://www.kggear.co.jp/en/rohs2>

## How to obtain RoHS2 Directive compliant products? :

Please consult with us beforehand. However, please note that products for which the changeover has not been completed may be made to order.

**Chinese RoHS Directive** : Not compliant.

# About our products

We have made every effort to ensure that everything is correct, but if there is any problem, please contact us.

All contents posted are subject to change without prior notice and will be posted on our website at any time.

The copyright of all content published in this catalog belongs to our company, so it is prohibited to copy, reprint, etc. any part or all of the content without our permission.

## About hole diameter inspection

The hole diameter inspection of our products is based on our internal inspection standards and is measured using a gauge (Plug gauge, Pin gauge, etc...).

## About lot numbers

On our products, the lot number is printed on the label along with the catalogue number.

By recording and keeping this lot number at your company, we will be traceable (can do tracking survey) of the product, and we will be able to respond quickly to various inquiries about the delivered product. As it's very important information, please keep the label in a safe place or take down the numbers on it.

### Lot number



Item code:  
A number that identifies  
the type of product.

Catalogue  
number

The label of new products released  
after October 2010.

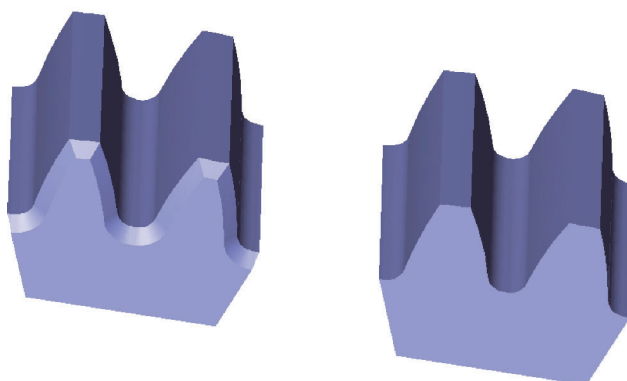
The label of products after  
January 2022.

(Sample label)

## About burr removal shape

The removal method and shape of burrs generated during the gear cutting process of standard products may differ even for the same product.

(Example) For spur gears



# Introducing food contact blue POM

We have released a POM gear series that is compliant with the Amended Food Sanitation Act (enforced in June 2020) and food contact regulations in the U.S. and EU markets. Since blue is not used in food materials, blue POM gears are suitable for use in food and packaging machines as a measure to prevent the inclusion of foreign objects.

| Product name    | Spur gear                                                                         | Helical gear                                                                      | Rack                                                                              | Worm gear                                                                           | Miter gear                                                                          |
|-----------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Photo           |  |  |  |  |  |
| Module          | 0.5 to 3.0                                                                        | 1.0 to 3.0                                                                        | 0.5 to 1.0                                                                        | 0.5 to 1.5                                                                          | 0.8 to 3.0                                                                          |
| Number of teeth | 12 to 120                                                                         | 10 to 26                                                                          | Overall length: 200 to 500 mm                                                     | 20 to 100                                                                           | 20 to 30                                                                            |

## Material

The materials of the blue POM gear series are compliant with the following regulations, or compliance with these regulations has been declared by the material manufacturers.

| Application                                  | Regulations of each country                                                                                                                                                                                                      |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Food appliance/<br>container and<br>packages | Amended Food Sanitation Act (enforced in June 2020 in Japan)                                                                                                                                                                     |
| Food contact<br>application                  | No 10/2011 (EU), FDA (U.S.), NSF 51 (U.S.), 3A-DAIRY (U.S., dairy products), Health Canada (Canada), Japan Hygienic Olefin And Styrene Plastics Association, Ministry of Health, Labor, and Welfare Notification No. 370 (Japan) |
| Drinking water<br>application                | NSF 61 (U.S.), KTW W270 (Germany), WRAS (Britain), ACS (France)                                                                                                                                                                  |

## Comparison of performance between blue POM (blue polyacetal resin) and MC nylon

| Comparison item | Food contact regulations in the U.S. and EU markets | Amended Food Sanitation Act, enforced in June 2020 | Dimensional change                          |                                                                                                   | Blue POM gear strength                                                                                                                                             | Ease of additional machining |                 |                |
|-----------------|-----------------------------------------------------|----------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------|----------------|
|                 |                                                     |                                                    | Water absorption % (depends on temperature) | Linear expansion coefficient × 10 <sup>-5</sup> /°C (depends on temperature change) <sup>*2</sup> |                                                                                                                                                                    | Dimensional stability        | Degree of aging | Amount of burr |
| Blue POM        | Compliant                                           | Compliant                                          | 0.2 (small)                                 | 9                                                                                                 | About 30% of the strength of MC nylon <sup>*1</sup><br>Equivalent to the strength of white POM<br>(For details, refer to the allowable transfer capability table.) | Good                         | Small           | Small          |
| MC nylon        | Not compliant                                       | Not compliant                                      | 0.8 (large)                                 |                                                                                                   |                                                                                                                                                                    | Unstable                     | Large           | Large          |

\*1 Care is required when replacing MC nylon with blue POM. \*2 Test specifications: Immerse in 23°C water for 24 hours.

Blue POM has self-lubricating properties. Therefore, you may consider using it without lubrication for low-speed, low-load operation.

| Lubrication                                                | No lubrication | Oil lubrication |
|------------------------------------------------------------|----------------|-----------------|
| Circumferential velocity of spur gears and bevel gears m/s | 6              | 12              |
| Sliding velocity of worm gears m/s                         | 1              | 2.5             |

Minimum operating limit temperature: -38°C

## Accuracy tolerance

For cut polyacetal gears, the dimensional tolerance for the hole diameter is H9 (machining control tolerance).

Because of the material characteristics, the dimensions of polyacetal products change with time and due to temperature changes. The machining control tolerance is H9, but because KG standard gears are temporarily stocked after being produced, they may be delivered to customers after dimensional changes have occurred. For details, refer to P.55 on "Technical Data (English)."

## Cautions on use:

- 1) Note that this product cannot be used for applications where there is contact with food with an alcohol concentration exceeding 15%.
- 2) Before using this product for production, verify its safety by using the final equipment containing this product under the actual operating conditions.
- 3) The blue POM gear series is produced in an environment with the possibility of exposure to cutting fluids or other such substances.

Marking paint for checking the tooth contact may remain on the product, but it does not adversely affect operation.

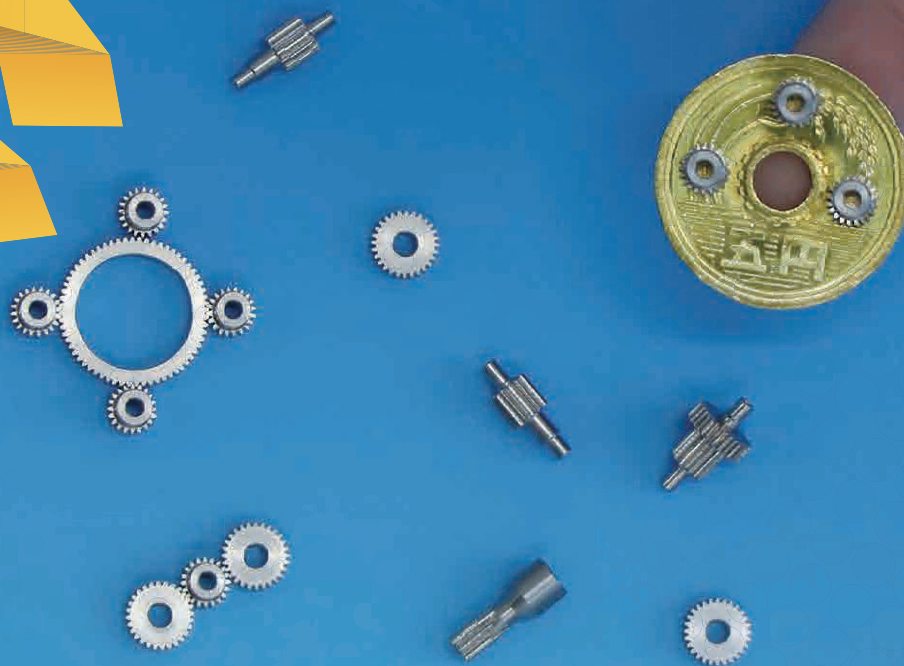


# Production of small precision gears

(custom made)

Supported from  
module 0.2

Ideal for robots,  
medical equipment,  
precision equipment, etc.



Reference table of specs that can be supported by  
small precision gears

Compatible with small precision gears

|   | Gear type                           | Accuracy grade                                   | Module      | Number of teeth | Maximum dimensions |
|---|-------------------------------------|--------------------------------------------------|-------------|-----------------|--------------------|
| 1 | Spur gear                           | JIS class N8 or below<br>(Tooth cutting finish)  | 0.2 or more | 13 or more      | Φ 1.0 or more      |
|   |                                     | JIS class N5 or below<br>(Tooth grinding finish) | 0.3 or more | 30 or more      | Φ 3.0 or more      |
| 2 | Helical gear                        | JIS class N8 or below<br>(Tooth cutting finish)  | 0.2 or more | 10 or more      | Φ 1.0 or more      |
|   |                                     | JIS class N5 or below<br>(Tooth grinding finish) | 0.3 or more | 28 or more      | Φ 3.0 or more      |
| 3 | Rack gear                           | Tooth cutting finish                             | 0.2 or more | —               | —                  |
| 4 | Straight Miter gear /<br>Bevel gear | JIS class 3 or below<br>(Tooth cutting finish)   | 0.3 or more | 20 or more      | Φ 1.0 or more      |
| 5 | Spiral Miter gear /<br>Bevel gear   | JIS class 3 or below<br>(Tooth cutting finish)   | 0.8 or more | 20 or more      | Φ 1.0 or more      |
|   |                                     | JIS class 1 or below<br>(Tooth grinding finish)  | 0.8 or more | 20 or more      | Φ 1.0 or more      |
| 6 | Worm                                | Tooth cutting finish                             | 0.5 or more | —               | Need to discuss    |
|   |                                     | Tooth grinding finish                            | 0.5 or more | —               | Need to discuss    |
| 7 | Worm Wheel                          | Tooth cutting finish                             | 0.5 or more | 18 or more      | Φ 1.0 or more      |

※ The accuracy grade of gears is based on the use of suitable materials.

※ Please contact us for available materials and heat treatments.

 **KYOUIKU GEAR MFG.CO.,LTD. (KG STOCK GEARS)**

Overseas Sales Department

Email: [export@kkgear.co.jp](mailto:export@kkgear.co.jp)

<https://www.kkgear.co.jp/en/>



EN KG WEB



Further  
improvement of  
tooth surface  
roughness

## High-precision tooth polish grinding gears

Accuracy grade JIS B1702-1: Class N4 to N5

High efficiency

Reduction of  
meshing friction

High strength

Improved pitting  
resistance  
(tooth surface damage)

Low noise

Reduction of gear noise  
(vibration noise generated  
during meshing)

A cutting-edge generating gear grinding machine  
**REISHAUER RZ 260 4.0** has introduced.



### Main expected uses

For Electric Vehicle,  
Clean room environment, robots,  
Medical equipment,  
Machine tool related, etc.

We manufacture polish grinding gears as custom-made.

**REISHAUER**

Overseas Sales Department

Email: [export@kkgear.co.jp](mailto:export@kkgear.co.jp)

<https://www.kkgear.co.jp/en/>



**KYOUIKU GEAR MFG.CO.,LTD.**  
(KG STOCK GEARS)



EN KG WEB



# Overview of processing specifications

|                                                   | Tooth ground products        | Tooth polished products |
|---------------------------------------------------|------------------------------|-------------------------|
| Compatible gear types                             | Spur gears and Helical gears |                         |
| Module size                                       | m = 0.5 to 3                 | m = 1.5 to 3            |
| Gear accuracy grade                               | JIS B 1702-1 class N4 to N5  |                         |
| Tip diameter                                      | ø20 to ø260                  | ø40 to ø260             |
| Tooth surface roughness (tooth profile direction) | Ra 0.32 to 0.5               | <b>Ra 0.10 to 0.2</b>   |

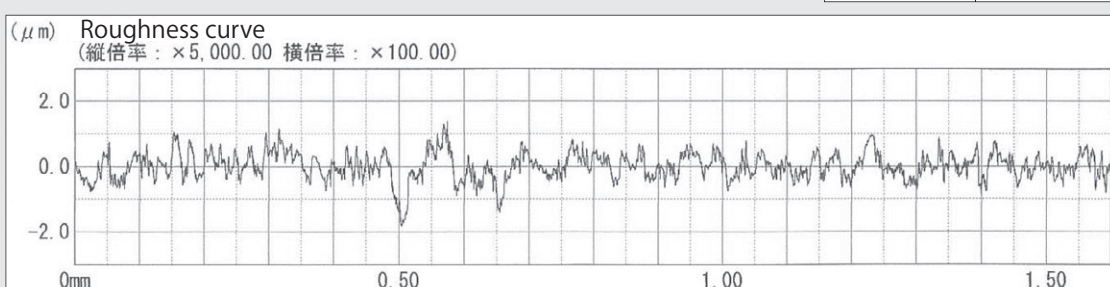
## Example of measurement data

### Tooth ground products

|         |          |
|---------|----------|
| 部品名     | No1      |
| 測定種別    | 粗さ測定     |
| 測定長さ    | 2.0mm    |
| カットオフ波長 | 0.25mm   |
| 測定倍率    | × 5K     |
| 測定速度    | 0.06mm/s |
| カットオフ種別 | ガウシアン    |

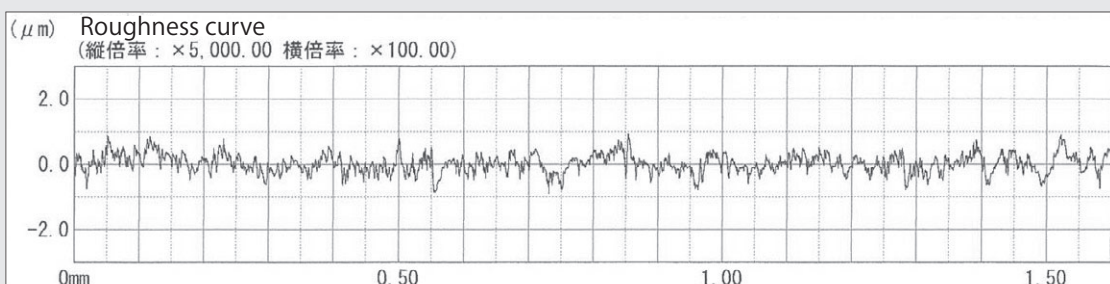
#### Right flank

|          |                      |
|----------|----------------------|
| Ra       | 0.3187 $\mu\text{m}$ |
| Ramax    | 0.4545 $\mu\text{m}$ |
| Rz       | 2.0740 $\mu\text{m}$ |
| *Rz. J94 | 1.4480 $\mu\text{m}$ |



#### Left flank

|         |                      |
|---------|----------------------|
| Ra      | 0.2232 $\mu\text{m}$ |
| Ramax   | 0.2609 $\mu\text{m}$ |
| Rz      | 1.5420 $\mu\text{m}$ |
| Rz. J94 | 1.0910 $\mu\text{m}$ |

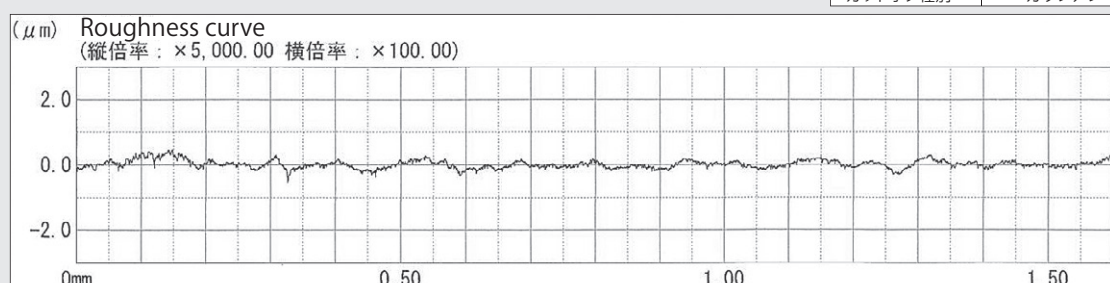


### Tooth polished products

|         |          |
|---------|----------|
| 部品名     | No2      |
| 測定種別    | 粗さ測定     |
| 測定長さ    | 2.0mm    |
| カットオフ波長 | 0.25mm   |
| 測定倍率    | × 5K     |
| 測定速度    | 0.06mm/s |
| カットオフ種別 | ガウシアン    |

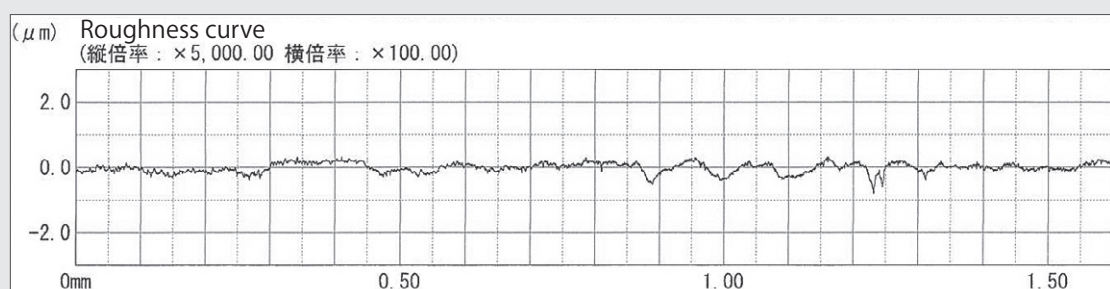
#### Right flank

|          |                      |
|----------|----------------------|
| Ra       | 0.0977 $\mu\text{m}$ |
| Ramax    | 0.1385 $\mu\text{m}$ |
| Rz       | 0.6230 $\mu\text{m}$ |
| *Rz. J94 | 0.3678 $\mu\text{m}$ |

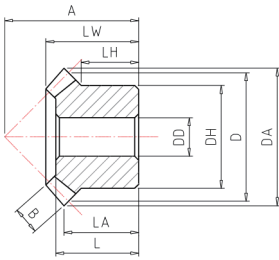
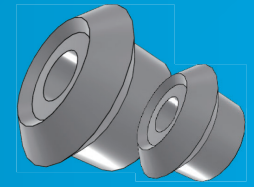


#### Left flank

|          |                      |
|----------|----------------------|
| Ra       | 0.1197 $\mu\text{m}$ |
| Ramax    | 0.1642 $\mu\text{m}$ |
| Rz       | 0.6630 $\mu\text{m}$ |
| *Rz. J94 | 0.4570 $\mu\text{m}$ |



# Gear Drawing CAD data download



| Features                                   |                                                                                       |
|--------------------------------------------|---------------------------------------------------------------------------------------|
| Product search                             | You can search KG standard gears you need. You can also check our recommend products. |
| Creating drawings for additional machining | You can change the shape to meet your needs.                                          |
| CAD data download                          | 2 D                                                                                   |
|                                            | 3 D                                                                                   |

## Access to KG web page

Click the left picture in the web page.



### ① Select the type of gear.

Select the gear type first, like Spur Gears Bevel Gears...

The page to download CAD data will be shown.

In this case, Module and Number of teeth are selected.  
Select from pull-down list.

### ② Click "Search" button.

### ③ Select the catalogue number.

The product list will be shown.  
Click the catalogue number you need.

If you cannot find the catalogue number you look for, add search conditions and click "Search" again.  
Or you can check next pages.

| ID | Catalog Number | Module | Number of Teeth | Material | Shape | Heat Treatment | Ground Teeth Surface | Backlash | Bore / Shaft Diameter | Face Width | Tapped Holes / Key Way |
|----|----------------|--------|-----------------|----------|-------|----------------|----------------------|----------|-----------------------|------------|------------------------|
| 1  | S1D30B*0805    | 1.00   | 30              | POM      | B     | -              | Cut                  | -        | 5                     | 8.0        | Set Screw              |
| 2  | S1D30B-0808    | 1.00   | 30              | POM      | B     | -              | Cut                  | -        | 8                     | 8.0        | -                      |

### ④ Check the basic specs.

The basic specs for the product you selected will be shown.

Double check the specs and the catalogue number, and click "Additional Machining • CAD" button.

At the bottom of the page, related products, like similar products and mating gears, will be shown. You can also refer them.

Catalog Number **S1D30B\*0805**

| Module | Number of Teeth | Material | Shape | Heat Treatment | Ground Teeth Surface | Backlash | Bore / Shaft Diameter | Face Width | Tapped Holes / Key Way | System of accuracy (JIS B 1702-1 / ISO) |
|--------|-----------------|----------|-------|----------------|----------------------|----------|-----------------------|------------|------------------------|-----------------------------------------|
| 1.00   | 30              | POM      | B     | -              | Cut                  | -        | 5                     | 8.0        | Set Screw              | class 9 - 10                            |

**Additional Machining • CAD**

| ID | Catalog Number | Gear type  | Material | Face Width | Bore / Shaft Diameter | Tapped Holes / Key Way | System of accuracy (JIS B 1702-1 / ISO) |
|----|----------------|------------|----------|------------|-----------------------|------------------------|-----------------------------------------|
| 1  | S1D30B-0808    | Spur Gears | POM      | 8.0        | 8                     | -                      | class 9 - 10                            |
| 2  | S1D630B+1010   | Spur Gears | POM      | 10.0       | 10                    | Set Screw              | class 9 - 10                            |

You can access to the download page through our web site or below two-dimensional code.



日本語ページ



中文页面



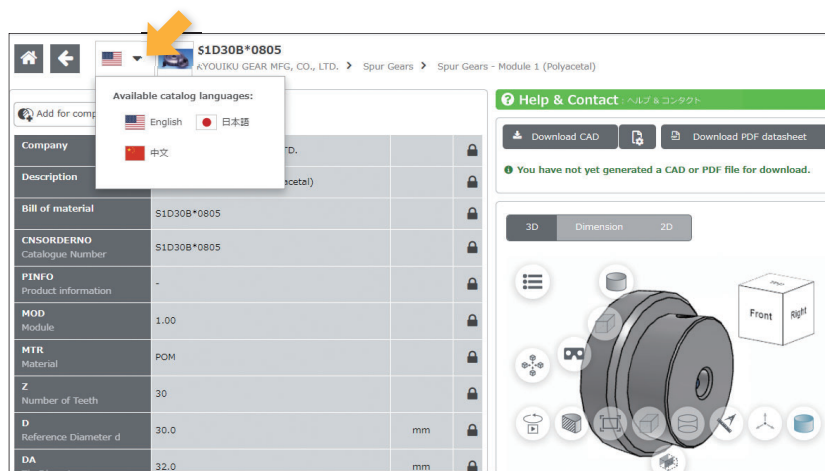
English

## ⑤ Check the detailed specs of the gear

The detailed specs of the standard gear you selected will be shown.

In this page, you can set specs for additional machining, generate data and select languages.

\*Drawings will be generated only in Japanese.

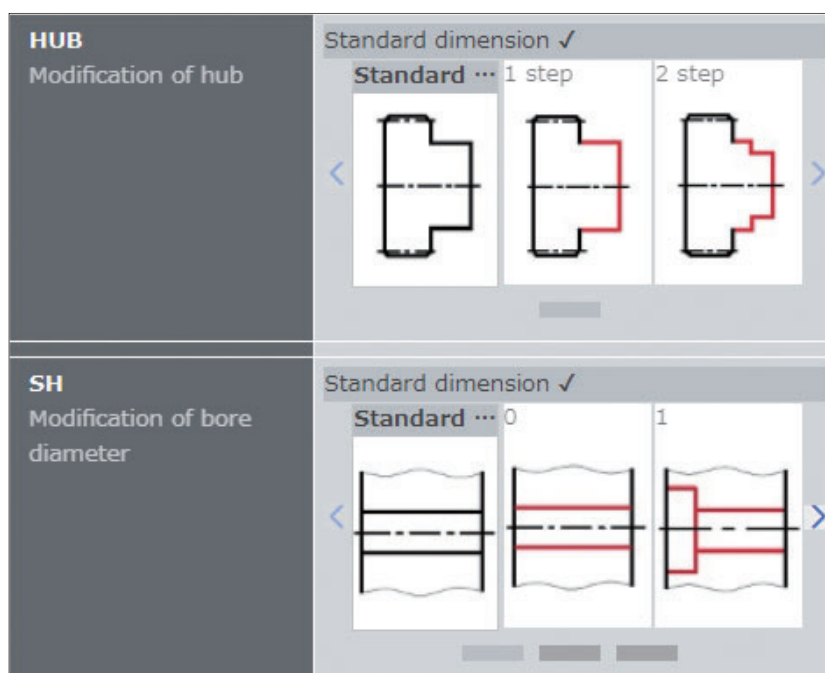


## ⑥ Set additional machining

In this page, you can set for additional machining, like changing bore dia., adding taps and modifying boss shape.

Note:

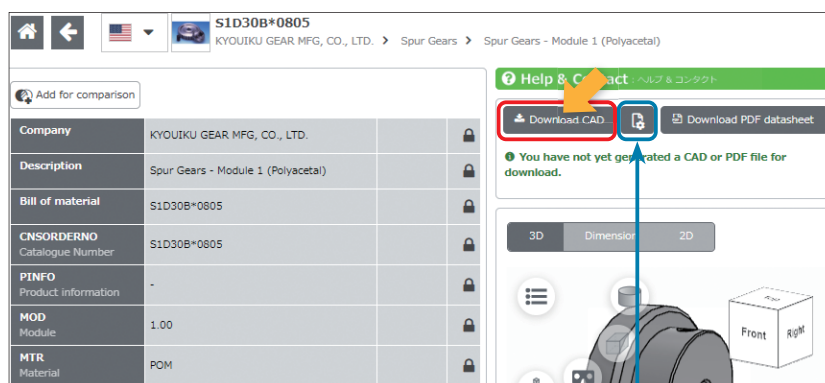
The categories with this padlock mark cannot be changed. Some gears cannot be modified.



## ⑦ Start generating data.

If you determine the specs including the additional machining, click "Download CAD" button.

If you need to change data format after you have already downloaded, click this button.

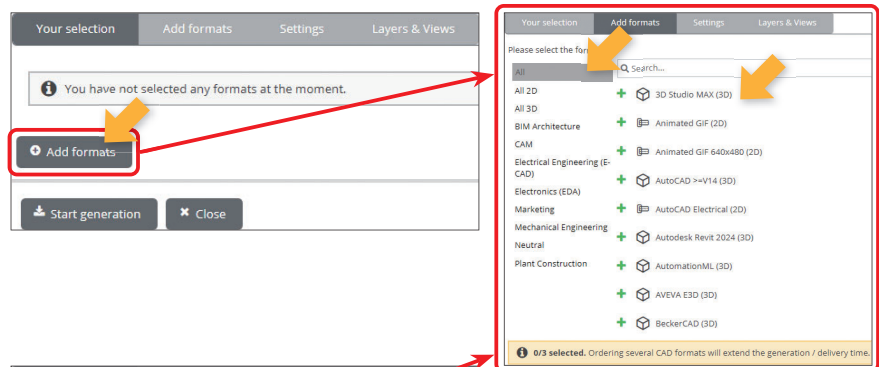


# Gear Drawing CAD data download

## ⑧ Select data format.

The page to choose data format will be shown.

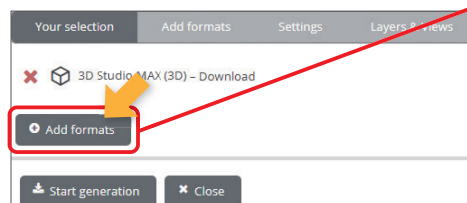
Select data format, like 2D or 3D, and select extension data you prefer.



## ⑨ Add formats

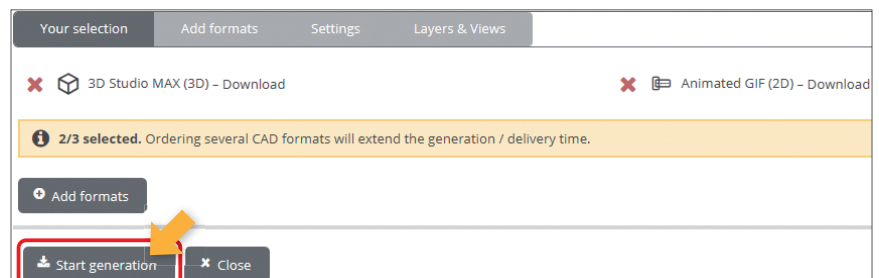
Confirmation screen for data format will be shown.

In this case, 3D studio is selected.  
You can add both 2D and 3D data by following the same procedure.  
You can add several data by "Add formats".



## ⑩ Check the contents.

After you check that you chose all format you need, click "Start generation" button.

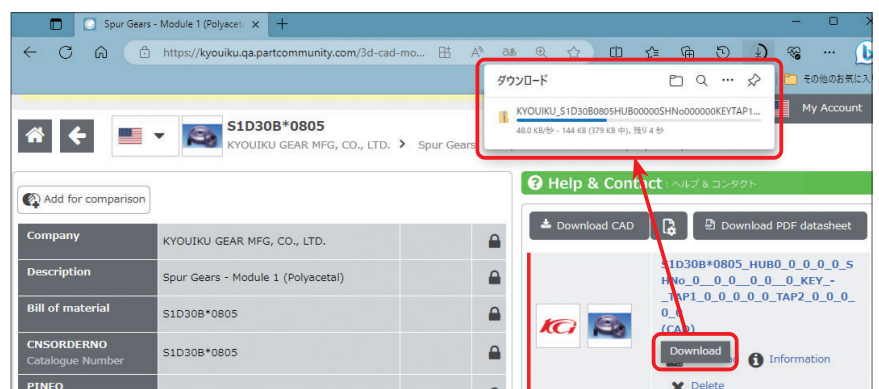


## ⑪ Download

Download screen will be shown after data generation has completed.

Click "Download" button to start.

\*There is a possibility that the download starts once you click "Start generation" button in ⑩.





# GEAR BOXES

## HY-BOX

## B-BOX®

## W-BOX

## B-SET

Trademark registered



※ These are samples.

### How to Read Catalogue Numbers

**BSB      105      L      –      001      A**

| Gear type                                                                                                                                                                               | Distance from body reference plane to shaft end surface | Axis position and overall shape                                                 |  | Ratio (pinion : gear)                                     | Shaft and hole shape                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------|--|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| HY : Hypoid gearbox<br>BS : Bevel gearbox<br>BSB : Bevel gearbox (hollow shaft type)<br>BSH : Bevel gearbox (reinforced type)<br>BE : Bevel gearbox (economy type)<br>WS : Worm gearbox | Unit: mm                                                | R : Box shape (output shaft is on the right side)<br>L : L shape<br>T : T shape |  | 001 → 1 : 1<br>002 → 1 : 2<br>005 → 1 : 5<br>010 → 1 : 10 | BSB series :<br>A : Small hole type<br>B : Large hole type<br><br>BE series<br>A : Thin shaft type<br>B : Thick shaft type |

| Catalogue number                | HY-BOX                                                                              | BS-BOX                                                                              | BSB-BOX                                                                             | BSH-BOX                                                                              | B-SET                                                                                 | WS-BOX                                                                                |
|---------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Shape                           |  |  |  |  |  |  |
| Page                            | P. 38                                                                               | P. 40                                                                               | P. 42                                                                               | P. 44                                                                                | P. 46                                                                                 | P. 48                                                                                 |
| Material                        | Body: Aluminum<br>Shaft: SCM435/440, S45C                                           | Body: Aluminum<br>Shaft: SUS303                                                     | Body: Aluminum<br>Shaft: SUS303                                                     | Body: Aluminum<br>or FC250<br>Shaft: SUS303, S45C                                    | Body: Aluminum<br>Shaft: SUS303                                                       | Body: Aluminum<br>Shaft: S45C                                                         |
| Axis position and overall shape | Shaft twisted                                                                       | L shape, T shape                                                                    | L shape                                                                             | L shape, T shape                                                                     | L shape                                                                               | Shaft twisted                                                                         |
| Backlash                        | 20'                                                                                 | 15' to 25'                                                                          | 15'                                                                                 | 10' to 15'                                                                           | Sensory inspection                                                                    | 30' to 45'                                                                            |
| Type of gear used               | Hypoid gear                                                                         | Straight bevel gear                                                                 | Straight bevel gear                                                                 | Spiral bevel gear                                                                    | Straight bevel gear                                                                   | Worm gear                                                                             |

## About Our GEARBOXES

|        | Series code | Gear type           | Page               |
|--------|-------------|---------------------|--------------------|
| HY-BOX | HY          | Hypoid gear         | P. 31<br>P. 38     |
| B-BOX  | BS          | Straight bevel gear | P. 31, 32<br>P. 40 |
|        | BSB         | Straight bevel gear | P. 31, 32<br>P. 42 |
|        | BSH         | Spiral bevel gear   | P. 31, 32<br>P. 44 |
| B-SET  | BE          | Straight bevel gear | P. 32, 33<br>P. 46 |
| WS-BOX | WS          | Worm<br>Worm wheel  | P. 34, 35<br>P. 48 |

### 1. Features

- 1) Compact and simple design
- 2) Sealed gearboxes with high dust resistance (except B-SET)
- 3) Low operating vibration and noise with high-precision gears
- 4) Easy installation with mounting screw holes
- 5) Never disassemble Our Gearboxes.

### 2. Cautions on installation

- 1) When securing the gearbox to the mating mounting surface, install the gearbox so that the gear shaft is parallel to the mating shaft and their shaft centers align. A coaxiality of  $\Phi$  0.05 mm or less is recommended.
- 2) It is recommended to use a flexible coupling to couple the gear shaft and mating shaft.
- 3) Use an anti-vibration mounting base.
- 4) It is recommended to install the gearbox in a well-ventilated location.
- 5) Set the overhang load and thrust load of the output shaft (gear side) so that they are within the ranges specified in the catalog.

### 3. Cautions on operation \* Please refer to a few more pages later: Notes on using B-BOX and Notes on using B-SET.

- 1) Do not touch the main body while in operation. Make sure that no foreign object is caught in the key grooves cut in the shaft or shaft stopper ring.
- 2) If any abnormal noise or temperature is observed during operation, immediately stop the machine and suspend operation until the cause is eliminated.
- 3) Warm-up operation is recommended. (Perform warm-up operation for at least 10 minutes with one-third to half of the allowable load.)
- 4) Our BOX products are designed for use as speed-reducing gearboxes. If used as speed-increasing gearboxes, they tend to be noisier and hotter.
- 5) After the start of operation, the backlash tends to increase due to initial wear.
- 6) Depending on the operating conditions and environment, oil components that have separated from the lubricating oil or grease may ooze out.

### 4. Cautions on additional machining \* Please refer to a few more pages later: Notes on using B-SET.

- 1) Before additional machining, take measures to prevent swarf or other foreign objects from getting into the bearings.
- 2) To prevent damage to the oil seals, apply masking to them.
- 3) When machining a shaft, be careful that the shaft or other parts do not deform.
- 4) When you need to machine the body, consult with us in advance as interference with internal parts must be avoided.

### 5. Allowable transfer capability, overhang load, and thrust load

- 1) For the BOX products to work at full performance, use them with a revolutions per minute and torque value not exceeding the values specified in the allowable transfer torque table.
- 2) While a BOX product is in use, avoid subjecting the input shaft (pinion side) to an overhang load or thrust load. If the input or output shaft is subject to an overhang load, provide a separate mechanism to support the load.

Details of BOX products (For details on B-SET, refer to the product details page.)

|         | Backlash*   | Service conditions | Lubrication     | Type        | Mounting reference plane | Bearing      |
|---------|-------------|--------------------|-----------------|-------------|--------------------------|--------------|
| HY-BOX  | 20' or less | -10° C to 40° C    | Grease sealing  | Sealed type | All planes               | Ball bearing |
| B-BOX   | 15' to 25'  | -20° C to 50° C    |                 |             |                          |              |
| BSB-BOX | 15' or less |                    |                 |             |                          |              |
| BSH-BOX | 10' to 15'  |                    |                 |             |                          |              |
| WS-BOX  | 30' to 45'  | -10° C to 40° C    | Oil lubrication |             |                          |              |

\* The backlash values are those at the time of assembly at our factory.

When the gear ratio is 1:2, the backlash values are those of the output shaft side.

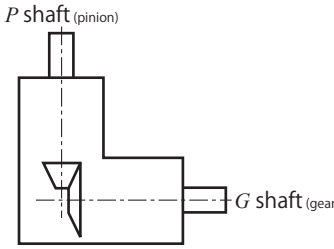
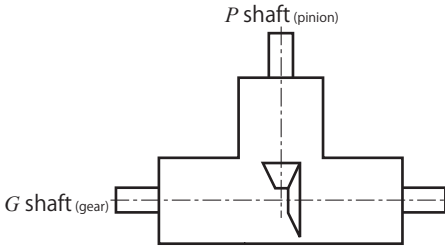
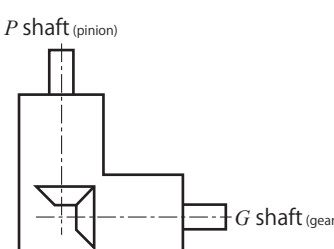
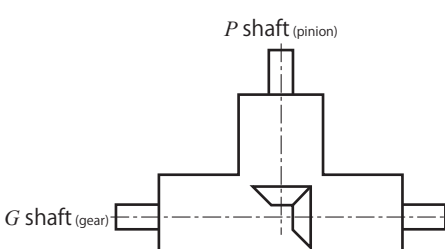
No oil seal is applied to the BS and BSB series. Also, no oil seal is applied to the BE series though it is not included in the table.

## Cautions on HY-BOX

- 1) Before use, make sure that each shaft rotates normally.
- 2) Use a flexible coupling to couple the gear shaft and its mating shaft.
- 3) Use HY-BOX with the overhang load on the output shaft side (gear side) not exceeding the value specified in the catalog.
- 4) After the start of operation, the backlash tends to increase due to initial wear.
- 5) If any abnormal noise is heard, immediately stop the machine and suspend operation until the cause is eliminated.
- 6) HY-BOX does not assume use in special environments. When using HY-BOX in a vacuum or other special environments, consult with us in advance.
- 7) The allowable transfer capability table in the catalog shows the performance as a speed-reducing gearbox. The table is not applicable when HY-BOX is used as a speed-increasing gearbox.

## Cautions on B-BOX

### Input, Gear Ratio, and Gear Layout of B-BOX

| Gear ratio (Pinion shaft P : Gear shaft G)                                                                                                    | L shape                                                                             | T shape                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p>When the P shaft is used as the input shaft</p> <p><b>1 : 2</b></p> <p>The rotational direction is not restricted and can be reversed.</p> |  |  |
| <p><b>1 : 1</b></p> <p>The rotational direction is not restricted and can be reversed.</p>                                                    |  |  |

Please be aware that this product is subject to dimensional changes without prior notice, to the extent that it does not adversely affect the functionality.

# Gearbox information

## Cautions on B-BOX

Never disassemble B-BOX.

Use B-BOX with a transfer torque not exceeding the value specified in the allowable transfer torque table.

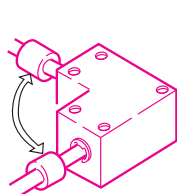
Avoid subjecting the shafts to an overhang load during use. However, if the input or output shaft is subject to an overhang load for design reasons, provide a separate mechanism to support the load. (See Fig. 9.)

Be careful not to apply a shock to the shafts or body.

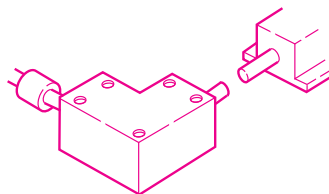
### When installing B-BOX (For effective use of B-BOX)

Warm-up operation is recommended. (Perform warm-up operation for at least 10 minutes with one-third to half of the allowable load.)

- ◇ Before operation, make sure that each shaft rotates normally by rotating it by hand.



- ◇ Install B-BOX so that the gear shaft is parallel to the mating shaft and their shaft centers align. Failure to do so may damage the shafts (a coaxiality of  $\phi 0.05$  mm or less is recommended).



- ◇ Be careful not to get caught in the exposed parts of the shafts. Also, make sure that no foreign object gets caught in the exposed parts of the shafts.

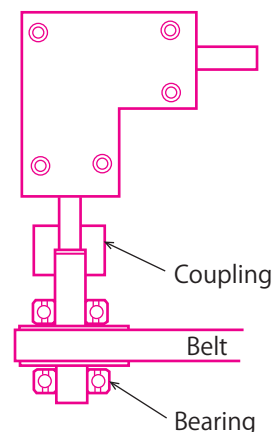
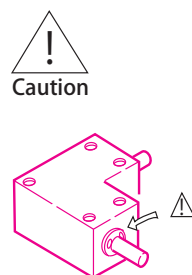


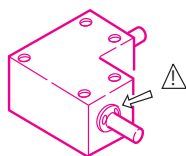
Fig. 9 Example of measure for overhang load

It is recommended to use a flexible coupling to couple the gear shaft and mating shaft.

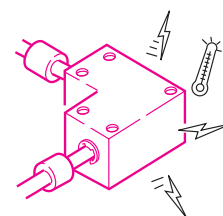
This product is not a fully sealed type. Avoid using this product where the body is exposed to water, oil, chemicals, or other fluids. When this product is used as a speed-increasing gearbox, it tends to be noisier and get hotter than when it is used as a constant-speed or speed-reducing gearbox.

### During use (Particular attention is required for safety.)

- ◇ During operation, do not touch this product as doing so is dangerous.
- ◇ Make sure that no foreign object gets caught in the exposed parts of the shafts.



- ◇ If any abnormal noise or temperature is observed during operation, immediately stop the machine and suspend the operation until the cause is eliminated.



## Cautions on B-SET

### Features of B-SET

- When B-SET is ready for operation, make sure that the provided cover is properly installed onto the main body. If the cover comes off due to vibration or other reasons during operation, add screws, etc. as necessary to firmly secure it. If the cover is damaged or has deteriorated, replace it with a new one. (You can purchase the cover alone.)
- For details, refer to "Notes on Using B-SET" on P. 35.

| Backlash              | Lubrication | Service conditions | Type      | Mounting reference plane | Bearing       |
|-----------------------|-------------|--------------------|-----------|--------------------------|---------------|
| Sensory inspection *1 | *2          | *3                 | Open type | Both lateral faces       | Plain bearing |

\*1 Check that the gears rotate normally.

\*2 Before use, apply grease to the tooth surfaces and set the plastic cover.

\*3 The service conditions depend on the performance of the grease you use. Make sure that no grease leaks from the cover at high temperatures.



# Gearbox information

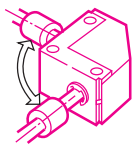
## Cautions on B-SET

Use B-SET with a transfer torque not exceeding the value specified in the allowable transfer capability table.

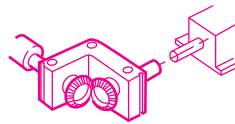
Avoid subjecting the shafts to an overhang load during use. However, if the input or output shaft is subject to an overhang load for design reasons, provide a separate mechanism to support the load. (See Fig. 10.)

### When installing B-SET (For effective use of B-SET)

- ◇ Before operation, make sure that each shaft rotates normally by rotating it by hand.



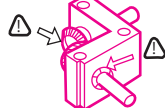
- ◇ Install B-SET so that the gear shaft is parallel to the mating shaft and their shaft centers align. (A coaxiality of  $\phi 0.05$  mm or less is recommended.)



- ◇ Apply grease to the gear teeth periodically. It is recommended to lubricate the bearings with lubricating oil. Make sure that the lubricating oil does not dry out.

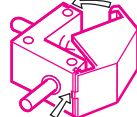


- ◇ Be careful not to get your fingers caught in the gears, shaft stopper rings, or other parts of the B-SET. Also, make sure that no foreign object gets caught in the B-SET.



- ◇ When a B-SET is ready for operation, make sure that the provided cover is securely set in the main body.

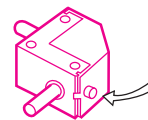
- ◇ Follow steps ① and ② to install the cover while taking care not to damage it.



- ② Push the cover until the tab is fully engaged with the groove in the body.

- ① Align the convex part on the cover stopper and concave part on the body.

- ◇ If the cover may come off during operation, use screws or other fasteners to firmly secure it.



When drilling a screw hole in the body, be careful not to damage the bearing.

Warm-up operation is recommended. (Perform warm-up operation for at least 10 minutes with one-third to half of the allowable load.)

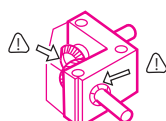
It is recommended to use a flexible coupling to couple the gear shaft and mating shaft.

Make sure that the bearings and teeth are free of dust or other foreign objects.

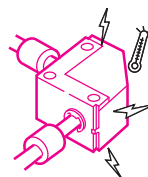
When B-SET is used as a speed-increasing gearbox, it tends to be noisier and get hotter than when it is used as a constant-speed or speed-reducing gearbox.

### During use (Particular attention is required for safety.)

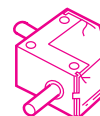
- ◇ During operation, do not touch the B-SET as doing so is dangerous.
- ◇ Make sure that no foreign object gets caught in the exposed parts of the shafts.



- ◇ If any abnormal noise or temperature is observed during operation, immediately stop the machine and suspend the operation until the cause is eliminated.



- ◇ If the provided cover is damaged or has deteriorated, replace it with a new one. (You can purchase the cover alone.)

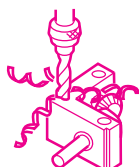


### When performing additional machining

Care is required as additional machining may adversely affect the functionality.

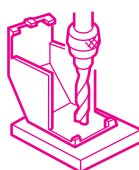
If you have any questions about additional machining, please consult us.

- ◇ Before additional machining, take measures to prevent swarf from getting into the bearings or gears.
- ◇ When making an additional mounting hole, make sure that the hole diameter is less than or equal to the allowable hole diameter specified for additional machining. (See Table 1 on the product description page.)



- ◇ When drilling an additional hole in the cover, be sure to place a support plate under the cover.

- Plate a support plate under the cover.



× Failure to use the back plate will damage the cover.

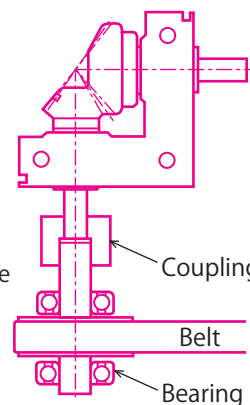
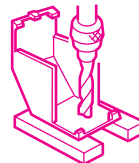


Fig. 10 Example of measure for overhang load

## Cautions on WS-BOX

### 1. Auto lock (self-lock) does not work

To stop the operation completely, provide a separate brake mechanism.

### 2. Warm-up operation

Before using a W-BOX, it is recommended to perform warm-up operation for at least six hours with a load about one-third to half of the normal load.

### 3. When abnormal noise is heard

If unusual noise is heard or vibration increases, immediately stop the machine and suspend the operation until the cause is eliminated. Also, replace the lubricating oil as necessary.

### 4. When W-BOX is abnormally hot

When the room temperature or BOX surface temperature is 80° C or more, suspend the operation. Replace the lubricating oil or check the operating conditions of the W-BOX.

### 5. How to replace the lubricating oil

- \* Perform the first lubricating oil replacement when the cumulative operation time reaches about 50 hours after the start of operation.  
After that, check the oil level and contamination every six months and replace the lubricating oil as necessary.
- \* Replace the lubricating oil when the body temperature and lubricating oil temperature are sufficiently low. Be careful as there is a risk of burn injury.
- \* Replace the lubricating oil with the drain ports at the top and bottom to ensure that the old lubricating oil is drained.
- \* Never replace the lubricating oil using any other than our lubricating oil replacement kit. Doing so may cause damage to the gear tooth surface.

It is recommended to replace the lubricating oil with the WS-BOX removed from the device.

- ① Remove the drain plugs (one at the top and one at the bottom) and drain the old lubricating oil.
- ② Using the wash oil of the lubricating oil replacement kit, remove abrasion powder and foreign objects from the gears.
- ③ Wipe off the remaining wash oil as much as possible.  
If the wash oil is not wiped off sufficiently, the oil level will be too high due to the residual oil and cause oil stain when new lubricating oil is added.
- ④ Close the drain port at the bottom. Wrap the drain plug with an appropriate amount of sealing tape and install the drain plug. Make sure that no oil leaks from the drain port.
- ⑤ Add new lubricating oil from the drain port at the top. Add new lubricating oil until the container is empty.
- ⑥ Close the drain port at the top. Wrap the drain plug with an appropriate amount of sealing tape and install it onto the drain plug.  
Make sure that no oil leaks from the drain port.
- ⑦ Before installing the WS-BOX to its original position in the device, check that the input and output shafts rotate normally. Double check that no oil leaks from any parts.

\* If anything abnormal is found, suspend the operation and contact us.

## 6. Lubricating oil replacement kit for WS-BOX only

| Catalogue number | Amount of oil to be added [ml] | Amount of wash oil [ml] | Total amount of oil |
|------------------|--------------------------------|-------------------------|---------------------|
| LO – WS55R – 020 | 3.0                            | 20.0                    | 23.0                |
| LO – WS55R – 030 | 2.3                            | 20.0                    | 22.3                |
| LO – WS60R – 040 | 4.5                            | 20.0                    | 24.5                |
| LO – WS60R – 050 | 2.5                            | 20.0                    | 22.5                |
| LO – WS65R – 020 | 4.2                            | 20.0                    | 24.2                |
| LO – WS65R – 030 | 4.5                            | 20.0                    | 24.5                |
| LO – WS75R – 040 | 6.5                            | 20.0                    | 26.5                |
| LO – WS75R – 050 | 7.0                            | 20.0                    | 27.0                |
| LO – WS80R – 010 | 9.0                            | 30.0                    | 39.0                |
| LO – WS80R – 020 | 7.0                            | 30.0                    | 37.0                |
| LO – WS80R – 030 | 8.5                            | 30.0                    | 38.5                |
| LO – WS90R – 040 | 15.0                           | 50.0                    | 65.0                |
| LO – WS90R – 050 | 19.0                           | 50.0                    | 69.0                |

\* Oil to be used: Sumigear Oil S0460 (semisynthetic oil)

Use the same oil as the filling oil and wash oil.

\* The oil may leak from the container if stored for a long time.

# About gearbox customization

## 1. Description of Standard Specifications for Customization (Reference Drawing)

| Body              |                                            |                                                                       |                                                                     |
|-------------------|--------------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------|
| Application       | Standard                                   | Strength enhancement                                                  | Cleanroom Vacuum                                                    |
| Material          | A5052P<br>A5056<br>A6063<br>A6061<br>FC200 | S45C<br>SCM435                                                        | SUS304<br>A5052 and others                                          |
| Surface treatment | Black alumite<br>Black oxide finish        | Black oxide finish<br>Electroless nickel plating<br>Raydent treatment | No surface treatment<br>Electroless nickel plating<br>White alumite |
| Other             | -                                          | Shape modification of body<br>Addition of mounting tap holes          |                                                                     |

| Shaft          |                               |                                                                                                                                                                |                  |
|----------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Application    | Standard                      | Strength enhancement                                                                                                                                           | Cleanroom Vacuum |
| Material       | SUS303<br>S45C                | S45C<br>SCM435                                                                                                                                                 | SUS304           |
| Heat treatment | -                             | Induction hardening                                                                                                                                            | -                |
| Other          | Key groove<br>D-shape cutting | Stepped shaft, change of shaft length, threading, key groove, D-shape cutting, drilled hole, black oxide finish, electroless nickel plating, Raydent treatment |                  |

\* Machining may be difficult if the parts have been heat treated.  
For details, contact us.

| Sleeve      |          |                  |
|-------------|----------|------------------|
| Application | Standard | Cleanroom Vacuum |
| Material    | S45C     | SUS304           |

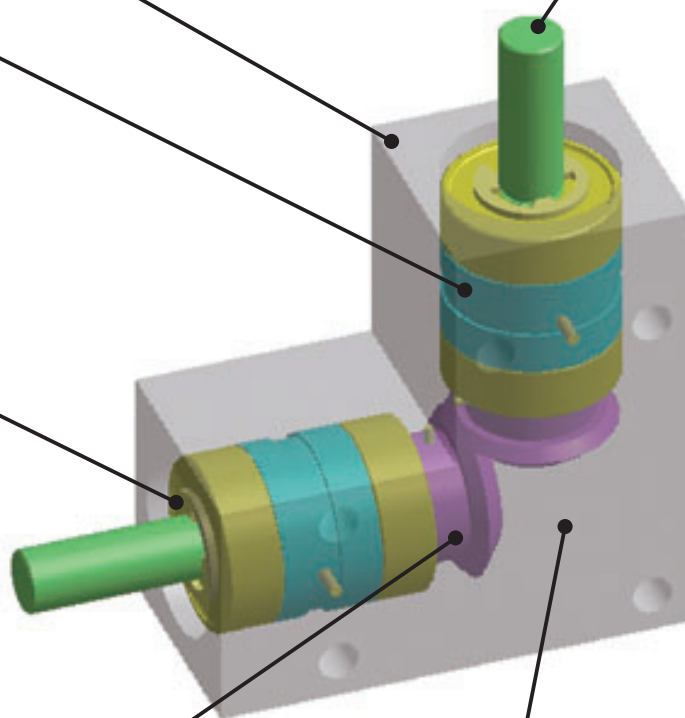
| Bearing     |                                   |                                                       |
|-------------|-----------------------------------|-------------------------------------------------------|
| Application | Standard                          | Cleanroom Vacuum                                      |
| Material    | Steel                             | Stainless steel Coating                               |
| Other       | Grease designated by manufacturer | Change of grease specifications (Designate a grease.) |

| Gear           |                                                                           |                                                        |                  |
|----------------|---------------------------------------------------------------------------|--------------------------------------------------------|------------------|
| Application    | Standard                                                                  | Strength enhancement                                   | Cleanroom Vacuum |
| Material       | S45C<br>SCM435<br>SCM415                                                  | S45C<br>SCM435<br>SCM415                               | SUS304           |
| Heat treatment | No heat treatment, or Isonite treatment, induction hardening, carburizing | Isonite treatment, induction hardening, or carburizing | -                |
| Other          | Fasteners: Spring pin, solid pin                                          |                                                        |                  |

| Grease      |                             |                   |                     |
|-------------|-----------------------------|-------------------|---------------------|
| Application | Standard                    | Cleanroom Vacuum  | Ambient temperature |
| Type        | Common gear grease (#0, #1) | Designated grease |                     |

\* Oil lubrication is used for W-BOX.

\* For special usage or additional machining, consult with us.



# About gearbox customization

## 2. Example of Customized Products

### Cost reduction

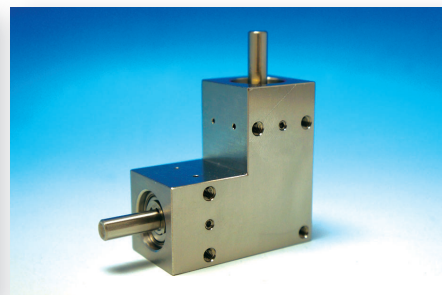
= Reduction of development time + Labor and time required for design and production · Reduction of risks



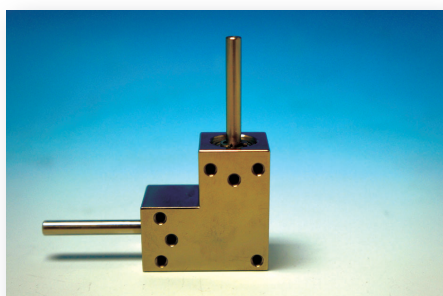
Electroless nickel plating of body



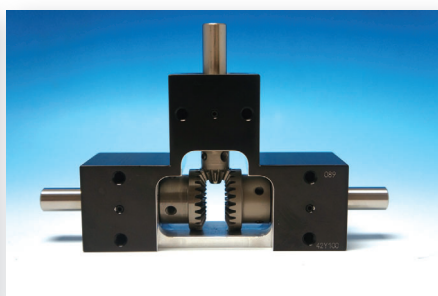
Raydent treatment of body



Stainless steel (entire body) + Additional drilling (body)



Change of shaft length



Three-shaft divided type

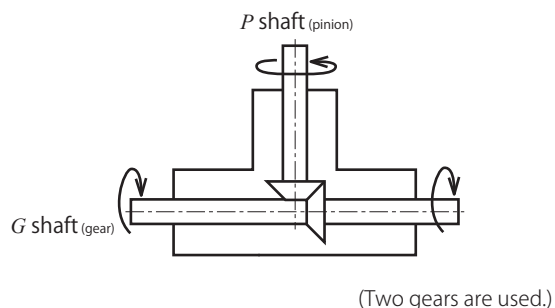


Additional machining of body

## 3. Three-shaft divided type

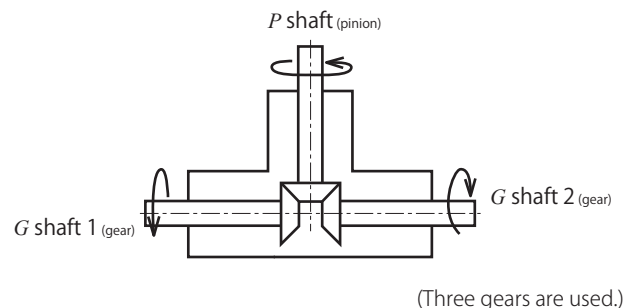
### What is the three-shaft divided type?

#### Standard T-shaped product



When viewed from the shaft end, the G shaft rotates in the opposite direction.

#### Customized three-shaft divided type



When viewed from the shaft end, G shafts 1 and 2 rotate in the same direction.

\* The three-shaft divided-type product has a larger backlash than the standard product. For details, contact us.

\* For customized specifications and additional machining (e.g., service conditions, oil leak prevention, installation of a shaft of another diameter), consult with us.





## Hypoid gears used

| Catalogue number | Pinion      | Gear         |
|------------------|-------------|--------------|
| HY70R-005        | m 0.75 × 8T | m 0.75 × 40T |
| HY90R-010        | m 0.71 × 7T | m 0.71 × 70T |
| HY95R-005        | m 1.1 × 8T  | m 1.1 × 40T  |
| HY120R-010       | m 1.0 × 7T  | m 1.0 × 70T  |
| HY125R-005       | m 1.5 × 8T  | m 1.5 × 40T  |
| HY150R-010       | m 1.45 × 6T | m 1.45 × 60T |

Type of gear used: Hypoid gear

How to read notation: "m1.0 × 20T" means that the module is 1, and the number of teeth is 20.

Unit: mm

| Body material           | Body surface treatment | Input shaft material | Output shaft material | Lubrication method | Backlash    |
|-------------------------|------------------------|----------------------|-----------------------|--------------------|-------------|
| Aluminum (A5052P/A5056) | Black alumite          | SCM435/440           | S45C                  | Grease sealing     | 20' or less |

★ For the KG-BOX, the pinion gear is used as the input shaft, and the gear shaft is used as the output shaft.

★ Rotational direction of each shaft: For the HY-BOX, when the input shaft is rotated clockwise with the shaft end facing the front, the output shaft rotates counter-clockwise. The rotational direction can be reversed.

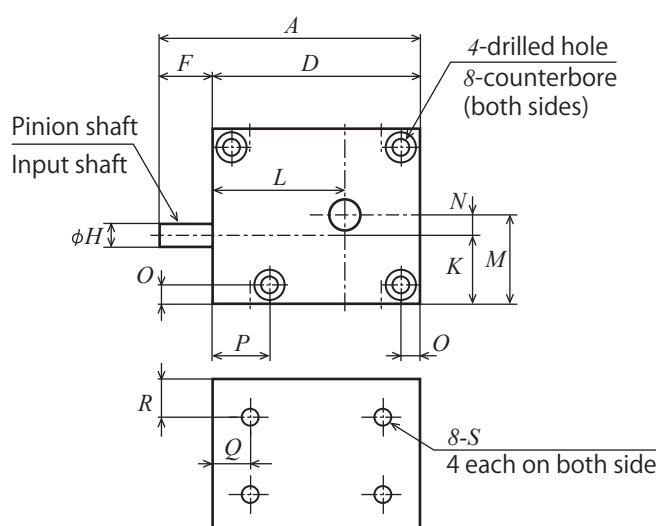
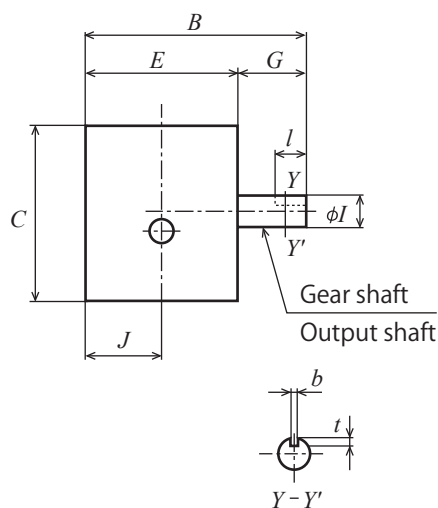
★ The backlash is the value on the output shaft side when the input shaft is fixed.

| Catalogue number | Gear ratio | Shaft diameter |              |          |          |          |          |          |              |              |          |          |          |          |
|------------------|------------|----------------|--------------|----------|----------|----------|----------|----------|--------------|--------------|----------|----------|----------|----------|
|                  |            |                |              |          |          |          |          |          |              |              |          |          |          |          |
|                  |            | Input shaft    | Output shaft |          |          |          |          |          |              |              |          |          |          |          |
|                  | <i>u</i>   | <i>A</i>       | <i>B</i>     | <i>C</i> | <i>D</i> | <i>E</i> | <i>F</i> | <i>G</i> | $\phi H(h7)$ | $\phi I(h7)$ | <i>J</i> | <i>K</i> | <i>L</i> | <i>M</i> |
| HY 70R — 005     | 1 : 5      | 70             | 58           | 45       | 55       | 40       | 15       | 18       | $\phi 6$     | $\phi 8$     | 20       | 17.5     | 36       | 22.5     |
| HY 90R — 010     | 1 : 10     | 90             | 68           | 60       | 75       | 50       | 15       | 18       | $\phi 6$     | $\phi 8$     | 25       | 20       | 47       | 30       |
| HY 95R — 005     | 1 : 5      | 95             | 75           | 60       | 75       | 50       | 20       | 25       | $\phi 8$     | $\phi 12$    | 25       | 20       | 49       | 30       |
| HY 120R — 010    | 1 : 10     | 120            | 80           | 80       | 100      | 55       | 20       | 25       | $\phi 8$     | $\phi 12$    | 27.5     | 25       | 62       | 40       |
| HY 125R — 005    | 1 : 5      | 125            | 85           | 80       | 100      | 55       | 25       | 30       | $\phi 12$    | $\phi 15$    | 27.5     | 30       | 65       | 40       |
| HY 150R — 010    | 1 : 10     | 150            | 90           | 95       | 125      | 60       | 25       | 30       | $\phi 12$    | $\phi 15$    | 30       | 32.5     | 77       | 47.5     |

| Catalogue number | Allowable input torque for different input revolutions per minute (Unit: N·cm) |        |        |        |          |          |          |          |
|------------------|--------------------------------------------------------------------------------|--------|--------|--------|----------|----------|----------|----------|
|                  | 100rpm                                                                         | 250rpm | 500rpm | 800rpm | 1,000rpm | 1,500rpm | 2,000rpm | 2,500rpm |
| HY 70R — 005     | 76.0                                                                           | 71.8   | 66.0   | 59.0   | 53.9     | 44.2     | 36.6     | 28.4     |
| HY 90R — 010     | 75.8                                                                           | 70.8   | 63.8   | 56.0   | 50.7     | 41.3     | 34.3     | 27.3     |
| HY 95R — 005     | 247.4                                                                          | 232.1  | 211.8  | 187.7  | 170.3    | 137.7    | 112.6    | 86.0     |
| HY 120R — 010    | 186.3                                                                          | 172.7  | 155.7  | 136.6  | 123.5    | 100.0    | 82.7     | 65.0     |
| HY 125R — 005    | 414.8                                                                          | 400.6  | 377.6  | 345.4  | 319.8    | 266.9    | 223.0    | 173.9    |
| HY 150R — 010    | 357.2                                                                          | 336.1  | 307.3  | 272.1  | 246.5    | 197.5    | 159.2    | 118.1    |



2D • 3D CAD



| Offset |    |    |    |    | Mounting screw |       | Drilled hole and counterbore |                      |                   | Key groove |   |    | Back-lash | Allowable overhang load<br>Output shaft | Allowable thrust load<br>Output shaft | Weight | Catalogue number     |
|--------|----|----|----|----|----------------|-------|------------------------------|----------------------|-------------------|------------|---|----|-----------|-----------------------------------------|---------------------------------------|--------|----------------------|
|        |    |    |    |    | 8-S            | Depth | Drilled hole                 | Counterbore diameter | Counterbore depth | b          | t | l  |           |                                         |                                       |        |                      |
| N      | O  | P  | Q  | R  |                |       |                              |                      |                   |            |   |    | ( ' )     | (N)                                     | (N)                                   | W(kg)  |                      |
| 5      | 5  | 14 | 10 | 10 | 8-M3           | 5     | φ3.2                         | φ6.5                 | 3.2               | -          | - | -  | 20        | 19                                      | 13                                    | 0.3    | <b>HY 70R — 005</b>  |
| 10     | 7  | 26 | 12 | 12 | 8-M4           | 6     | φ4.2                         | φ8.0                 | 4.3               | -          | - | -  |           | 19                                      | 20                                    | 0.6    | <b>HY 90R — 010</b>  |
| 10     | 7  | 28 | 12 | 12 | 8-M4           | 6     | φ4.2                         | φ8.0                 | 4.3               | -          | - | -  |           | 39                                      | 35                                    | 0.7    | <b>HY 95R — 005</b>  |
| 15     | 10 | 27 | 15 | 12 | 8-M5           | 8     | φ5.2                         | φ9.5                 | 5.3               | -          | - | -  |           | 39                                      | 35                                    | 1.3    | <b>HY 120R — 010</b> |
| 10     | 10 | 27 | 18 | 12 | 8-M5           | 8     | φ5.2                         | φ9.5                 | 5.3               | 5          | 3 | 20 |           | 54                                      | 42                                    | 1.4    | <b>HY 125R — 005</b> |
| 15     | 10 | 27 | 20 | 12 | 8-M5           | 8     | φ5.2                         | φ9.5                 | 5.3               | 5          | 3 | 20 |           | 54                                      | 42                                    | 2.2    | <b>HY 150R — 010</b> |

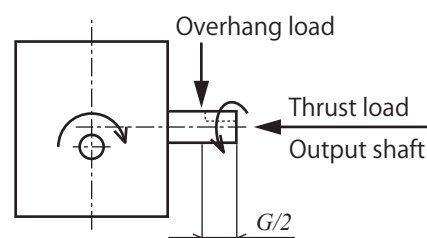


Fig. Overhang load position, thrust load, and shaft rotation direction

## Straight bevel gears used

| Catalogue number      | Pinion       | Gear         |
|-----------------------|--------------|--------------|
| BS35L-001             | m 0.4 × 20T  | m 0.4 × 20T  |
| BS45L-001/BS45T-001   | m 0.5 × 20T  | m 0.5 × 20T  |
| BS65L-001/BS65T-001   | m 0.8 × 20T  | m 0.8 × 20T  |
| BS80L-001/BS80T-001   | m 1.0 × 20T  | m 1.0 × 20T  |
| BS90L-001/BS90T-001   | m 1.25 × 20T | m 1.25 × 20T |
| BS105L-001/BS105T-001 | m 1.5 × 20T  | m 1.5 × 20T  |
| BS65L-002/BS65T-002   | m 0.6 × 14T  | m 0.6 × 28T  |
| BS80L-002/BS80T-002   | m 0.8 × 13T  | m 0.8 × 26T  |
| BS90L-002/BS90T-002   | m 1.0 × 13T  | m 1.0 × 26T  |
| BS105L-002/BS105T-002 | m 1.25 × 13T | m 1.25 × 26T |

Type of gear used: Straight bevel gear

How to read notation: "m1.0 × 20T" means that the module is 1, and the number of teeth is 20.

Unit: mm

| Body material                | Body surface treatment | Input shaft material | Output shaft material | Lubrication method | Backlash   |
|------------------------------|------------------------|----------------------|-----------------------|--------------------|------------|
| Aluminum (A5056/A6061/A6063) | Black alumite          | SUS303               | SUS303                | Grease sealing     | 15' to 25' |

★ For the KG-BOX, the pinion gear is used as the input shaft, and the gear shaft is used as the output shaft.

★ The backlash is the value on the output shaft side when the input shaft is fixed. For the amount of backlash, see the sections describing the respective catalogue numbers.

★ The D-shaped shafts are out of phase.

★ Avoid subjecting the shafts to an overhang load during use. If a shaft is subject to an overhang load or thrust load, provide a separate mechanism to support the load.

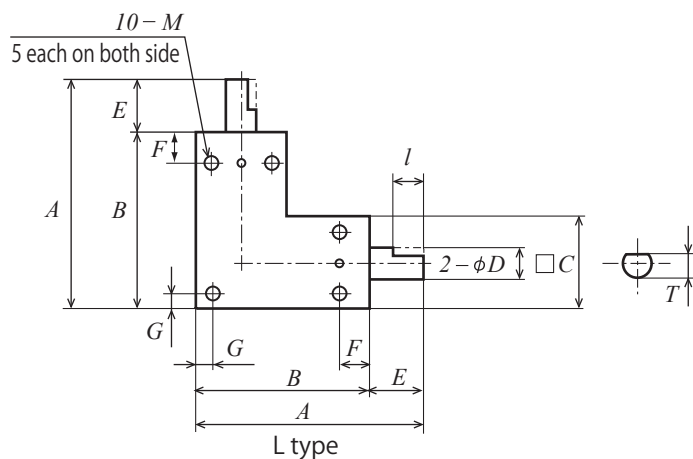
★ For customized specifications and additional machining (e.g., service conditions, oil leak prevention, installation of a shaft of another diameter), consult with us.

| Catalogue number | Type | Gear ratio |          |          |                       |          |          | Input/<br>output shaft<br>diameter |          |
|------------------|------|------------|----------|----------|-----------------------|----------|----------|------------------------------------|----------|
|                  |      | <i>u</i>   | <i>Z</i> | <i>Y</i> | $\square$<br><i>C</i> | <i>A</i> | <i>B</i> | $\phi D(h7)$                       | <i>E</i> |
| BS 35 L – 001    | L    | 1 : 1      | -        | -        | 14                    | 35       | 27       | $\phi$ 3                           | 8        |
| BS 45 L – 001    |      |            | -        | -        | 18                    | 45       | 33       | $\phi$ 4                           | 12       |
| BS 65 L – 001    |      |            | -        | -        | 25                    | 65       | 50       | $\phi$ 6                           | 15       |
| BS 80 L – 001    |      |            | -        | -        | 30                    | 80       | 60       | $\phi$ 8                           | 20       |
| BS 90 L – 001    |      |            | -        | -        | 35                    | 90       | 70       | $\phi$ 10                          | 20       |
| BS 105 L – 001   |      |            | -        | -        | 40                    | 105      | 80       | $\phi$ 12                          | 25       |
| BS 65 L – 002    | L    | 1 : 2      | -        | -        | 25                    | 65       | 50       | $\phi$ 6                           | 15       |
| BS 80 L – 002    |      |            | -        | -        | 30                    | 80       | 60       | $\phi$ 8                           | 20       |
| BS 90 L – 002    |      |            | -        | -        | 35                    | 90       | 70       | $\phi$ 10                          | 20       |
| BS 105 L – 002   |      |            | -        | -        | 40                    | 105      | 80       | $\phi$ 12                          | 25       |
| BS 45 T – 001    | T    | 1 : 1      | 72       | 48       | 18                    | 45       | 33       | $\phi$ 4                           | 12       |
| BS 65 T – 001    |      |            | 105      | 75       | 25                    | 65       | 50       | $\phi$ 6                           | 15       |
| BS 80 T – 001    |      |            | 130      | 90       | 30                    | 80       | 60       | $\phi$ 8                           | 20       |
| BS 90 T – 001    |      |            | 145      | 105      | 35                    | 90       | 70       | $\phi$ 10                          | 20       |
| BS 105 T – 001   |      |            | 170      | 120      | 40                    | 105      | 80       | $\phi$ 12                          | 25       |
| BS 65 T – 002    | T    | 1 : 2      | 105      | 75       | 25                    | 65       | 50       | $\phi$ 6                           | 15       |
| BS 80 T – 002    |      |            | 130      | 90       | 30                    | 80       | 60       | $\phi$ 8                           | 20       |
| BS 90 T – 002    |      |            | 145      | 105      | 35                    | 90       | 70       | $\phi$ 10                          | 20       |
| BS 105 T – 002   |      |            | 170      | 120      | 40                    | 105      | 80       | $\phi$ 12                          | 25       |

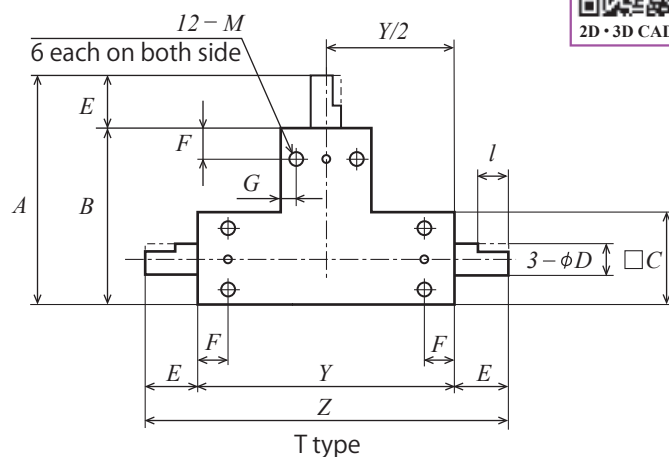
| Catalogue number |               | Allowable input torque for different input revolutions per minute (Unit: N·cm) |        |        |        |        |          |          |          |
|------------------|---------------|--------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|----------|
|                  |               | 50rpm                                                                          | 100rpm | 250rpm | 500rpm | 800rpm | 1,000rpm | 1,500rpm | 2,000rpm |
| BS 35 L – 001    | -             | 7.1                                                                            | 7.0    | 6.8    | 6.5    | 6.2    | 6.0      | 5.5      | 5.3      |
| BS 45 L – 001    | BS 45 T – 001 | 18.7                                                                           | 18.6   | 18.1   | 17.3   | 16.5   | 16.0     | 15.0     | 14.0     |
| BS 65 L – 001    | BS 65 T – 001 | 73.7                                                                           | 72.6   | 69.8   | 65.6   | 61.0   | 58.4     | 52.6     | 47.9     |
| BS 80 L – 001    | BS 80 T – 001 | 137.9                                                                          | 135.6  | 129.1  | 119.5  | 109.7  | 104.0    | 92.0     | 82.6     |
| BS 90 L – 001    | BS 90 T – 001 | 271.8                                                                          | 266.1  | 250.4  | 228.0  | 205.8  | 193.3    | 167.8    | 148.2    |
| BS 105L – 001    | BS 105T – 001 | 442.6                                                                          | 431.6  | 401.6  | 360.0  | 320.1  | 298.1    | 254.3    | 221.9    |
| BS 65 L – 002    | BS 65 T – 002 | 20.2                                                                           | 20.1   | 19.7   | 19.0   | 18.3   | 17.8     | 16.7     | 15.7     |
| BS 80 L – 002    | BS 80 T – 002 | 39.8                                                                           | 39.5   | 38.4   | 36.8   | 35.1   | 34.0     | 31.5     | 29.5     |
| BS 90 L – 002    | BS 90 T – 002 | 77.6                                                                           | 76.7   | 74.3   | 70.5   | 66.4   | 64.0     | 58.6     | 54.0     |
| BS 105 L – 002   | BS 105T – 002 | 141.5                                                                          | 139.6  | 134.0  | 125.7  | 116.9  | 111.7    | 100.7    | 91.5     |



2D • 3D CAD



L type



T type

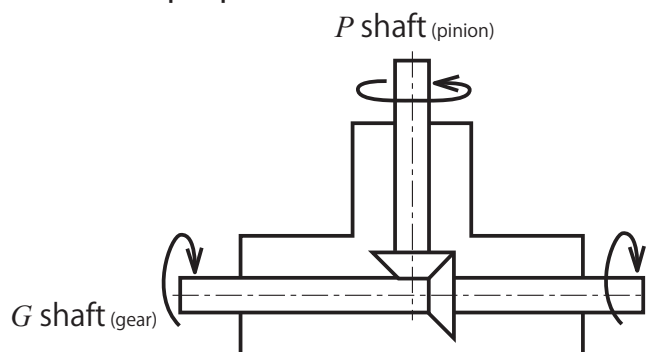


GOOD DESIGN AWARD 2010

**LONG LIFE  
DESIGN AWARD**

| F  | G   | Shaft end shape |     |   | Mounting screw |       | Backlash<br>( ' ) | Weight<br>W(g) | Catalogue number      |
|----|-----|-----------------|-----|---|----------------|-------|-------------------|----------------|-----------------------|
|    |     | φD              | T   | l | M              | Depth |                   |                |                       |
| 4  | 2   | D               | 2.7 | 5 | 10-M2          | 4     | 25                | 27             | <b>BS 35 L – 001</b>  |
| 5  | 3   | D               | 3.3 | 8 | 10-M3          | 4     | 20                | 55             | <b>BS 45 L – 001</b>  |
| 12 | 3.5 | φ               | -   | - | 10-M4          | 6     | 15                | 175            | <b>BS 65 L – 001</b>  |
| 15 | 5   | φ               | -   | - | 10-M5          | 6     |                   | 290            | <b>BS 80 L – 001</b>  |
| 15 | 5   | φ               | -   | - | 10-M5          | 7     |                   | 496            | <b>BS 90 L – 001</b>  |
| 20 | 5   | φ               | -   | - | 10-M6          | 7     |                   | 725            | <b>BS 105 L – 001</b> |
| 12 | 3.5 | φ               | -   | - | 10-M4          | 6     | 20                | 175            | <b>BS 65 L – 002</b>  |
| 15 | 5   | φ               | -   | - | 10-M5          | 6     |                   | 290            | <b>BS 80 L – 002</b>  |
| 15 | 5   | φ               | -   | - | 10-M5          | 7     |                   | 496            | <b>BS 90 L – 002</b>  |
| 20 | 5   | φ               | -   | - | 10-M6          | 7     |                   | 725            | <b>BS 105 L – 002</b> |
| 5  | 3   | D               | 3.3 | 8 | 12-M3          | 4     | 20                | 75             | <b>BS 45 T – 001</b>  |
| 12 | 3.5 | φ               | -   | - | 12-M4          | 6     | 15                | 246            | <b>BS 65 T – 001</b>  |
| 15 | 5   | φ               | -   | - | 12-M5          | 6     |                   | 410            | <b>BS 80 T – 001</b>  |
| 15 | 5   | φ               | -   | - | 12-M5          | 7     |                   | 679            | <b>BS 90 T – 001</b>  |
| 20 | 5   | φ               | -   | - | 12-M6          | 7     |                   | 991            | <b>BS 105 T – 001</b> |
| 12 | 3.5 | φ               | -   | - | 12-M4          | 6     | 20                | 246            | <b>BS 65 T – 002</b>  |
| 15 | 5   | φ               | -   | - | 12-M5          | 6     |                   | 410            | <b>BS 80 T – 002</b>  |
| 15 | 5   | φ               | -   | - | 12-M5          | 7     |                   | 679            | <b>BS 90 T – 002</b>  |
| 20 | 5   | φ               | -   | - | 12-M6          | 7     |                   | 991            | <b>BS 105 T – 002</b> |

## Standard T-shaped product





## Straight bevel gears used

| Catalogue number | Pinion       | Gear         |
|------------------|--------------|--------------|
| BSB65L-001A/B    | m 0.8 × 20T  | m 0.8 × 20T  |
| BSB80L-001A/B    | m 1.0 × 20T  | m 1.0 × 20T  |
| BSB90L-001A/B    | m 1.25 × 20T | m 1.25 × 20T |
| BSB105L-001A/B   | m 1.5 × 20T  | m 1.5 × 20T  |

Type of gear used: Straight bevel gear

How to read notation: "m1.0 × 20T" means that the module is 1, and the number of teeth is 20.

Unit: mm

| Body material                | Body surface treatment | Input shaft material | Output shaft material | Lubrication method | Backlash    |
|------------------------------|------------------------|----------------------|-----------------------|--------------------|-------------|
| Aluminum (A5056/A6061/A6063) | Black alumite          | SUS303               | SUS303                | Grease sealing     | 15' or less |

★ For the KG-BOX, the pinion gear is used as the input shaft, and the gear shaft is used as the output shaft.

★ The products with a catalogue number that ends with [B] have a slightly larger hole than those with a catalogue number that ends with [A] (1 to 2 mm).

★ Cautions on coupling a hollow shaft of BSB (LB type):

① When coupling a round shaft, provide two flat surfaces (spaced 120°). Reason: The contact area between the round shaft surface and tapped hole can be increased by providing flat surfaces.

② If a shaft has a stepped portion, provide a conner large radius to avoid stress concentration.

★ The backlash is the value on the output shaft side when the input shaft is fixed.

★ For customized specifications and additional machining (e.g., service conditions, oil leak prevention, installation of a shaft of another diameter), consult with us.

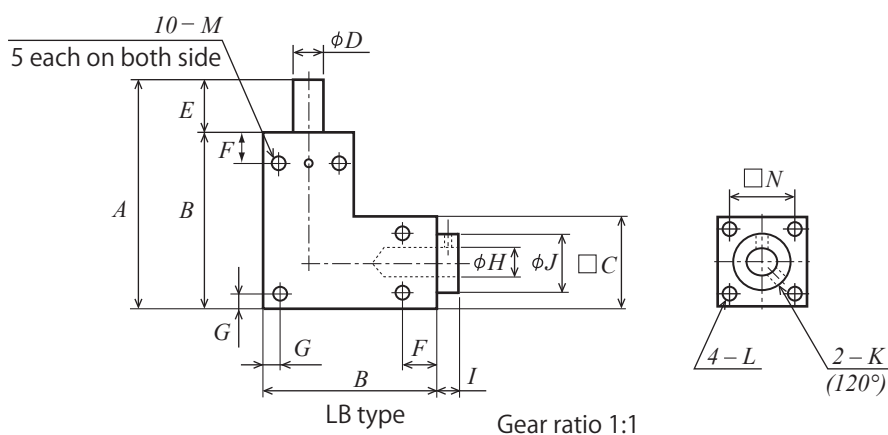
| Catalogue number       | Type | Gear ratio | $\square$<br><i>C</i> | <i>A</i> | <i>B</i> | Shaft diameter<br>$\phi D(h7)$ | Hole diameter |                 | <i>E</i> | <i>I</i> |
|------------------------|------|------------|-----------------------|----------|----------|--------------------------------|---------------|-----------------|----------|----------|
|                        |      |            |                       |          |          |                                | $\phi H(H7)$  | Effective depth |          |          |
| <b>BSB 65L — 001A</b>  | LB   | 1 : 1      | 25                    | 65       | 50       | $\phi 6$                       | $\phi 5$      | 15              | 15       | 5        |
| <b>BSB 65L — 001B</b>  |      |            | 25                    | 65       | 50       | $\phi 6$                       | $\phi 6$      | 15              | 15       | 5        |
| <b>BSB 80L — 001A</b>  |      |            | 30                    | 80       | 60       | $\phi 8$                       | $\phi 6$      | 19              | 20       | 5        |
| <b>BSB 80L — 001B</b>  |      |            | 30                    | 80       | 60       | $\phi 8$                       | $\phi 8$      | 19              | 20       | 5        |
| <b>BSB 90L — 001A</b>  |      |            | 35                    | 90       | 70       | $\phi 10$                      | $\phi 8$      | 19              | 20       | 6        |
| <b>BSB 90L — 001B</b>  |      |            | 35                    | 90       | 70       | $\phi 10$                      | $\phi 10$     | 19              | 20       | 6        |
| <b>BSB 105L — 001A</b> |      |            | 40                    | 105      | 80       | $\phi 12$                      | $\phi 10$     | 23              | 25       | 6        |
| <b>BSB 105L — 001B</b> |      |            | 40                    | 105      | 80       | $\phi 12$                      | $\phi 12$     | 23              | 25       | 6        |

| Catalogue number         | Allowable input torque for different input revolutions per minute (Unit: N-cm) |        |        |        |        |          |          |          |
|--------------------------|--------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|----------|
|                          | 50rpm                                                                          | 100rpm | 250rpm | 500rpm | 800rpm | 1,000rpm | 1,500rpm | 2,000rpm |
| <b>BSB 65L — 001A/B</b>  | 73.7                                                                           | 72.6   | 69.8   | 65.6   | 61.0   | 58.4     | 52.6     | 47.9     |
| <b>BSB 80L — 001A/B</b>  | 137.9                                                                          | 135.6  | 129.1  | 119.5  | 109.7  | 104.0    | 92.0     | 82.6     |
| <b>BSB 90L — 001A/B</b>  | 271.8                                                                          | 266.1  | 250.4  | 228.0  | 205.8  | 193.3    | 167.8    | 148.2    |
| <b>BSB 105L — 001A/B</b> | 442.6                                                                          | 431.6  | 401.6  | 360.0  | 320.1  | 298.1    | 254.3    | 221.9    |





2D • 3D CAD



| $\phi J$ | $2-K(120^\circ)$ | $F$ | $G$ | Mounting screw |       | Mounting screw |             |       | Backlash<br>( ' ) | Weight<br>$W(g)$ | Catalogue number       |
|----------|------------------|-----|-----|----------------|-------|----------------|-------------|-------|-------------------|------------------|------------------------|
|          |                  |     |     | $10-M$         | Depth | $4-L$          | $\square N$ | Depth |                   |                  |                        |
| 16       | 2-M3             | 12  | 3.5 | 10-M4          | 6     | 4-M3           | 19          | 6     | 15                | 169              | <b>BSB 65L – 001A</b>  |
| 16       | 2-M3             | 12  | 3.5 | 10-M4          | 6     | 4-M3           | 19          | 6     |                   | 167              | <b>BSB 65L – 001B</b>  |
| 19       | 2-M3             | 15  | 5   | 10-M5          | 6     | 4-M3           | 23          | 8     |                   | 293              | <b>BSB 80L – 001A</b>  |
| 19       | 2-M3             | 15  | 5   | 10-M5          | 6     | 4-M3           | 23          | 8     |                   | 289              | <b>BSB 80L – 001B</b>  |
| 21       | 2-M4             | 15  | 5   | 10-M5          | 7     | 4-M4           | 25          | 8     |                   | 465              | <b>BSB 90L – 001A</b>  |
| 21       | 2-M4             | 15  | 5   | 10-M5          | 7     | 4-M4           | 25          | 8     |                   | 460              | <b>BSB 90L – 001B</b>  |
| 26       | 2-M4             | 20  | 5   | 10-M6          | 7     | 4-M4           | 30          | 10    |                   | 722              | <b>BSB 105L – 001A</b> |
| 26       | 2-M4             | 20  | 5   | 10-M6          | 7     | 4-M4           | 30          | 10    |                   | 713              | <b>BSB 105L – 001B</b> |



**Assembly example of B-BOX and motor**  
To install a motor onto the BSB series, a flange is required.

# BSH-BOX® Bevel gearbox reinforced type

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES



## Spiral bevel gears used

| Catalogue number        | Pinion       | Gear         |
|-------------------------|--------------|--------------|
| BSH70L-001/BSH70T-001   | m 0.8 × 19T  | m 0.8 × 19T  |
| BSH85L-001/BSH85T-001   | m 1.0 × 19T  | m 1.0 × 19T  |
| BSH95L-001/BSH95T-001   | m 1.25 × 18T | m 1.25 × 18T |
| BSH115L-001/BSH115T-001 | m 1.5 × 19T  | m 1.5 × 19T  |
| BSH120L-001/BSH120T-001 | m 1.5 × 19T  | m 1.5 × 19T  |
| BSH140L-001/BSH140T-001 | m 2.0 × 19T  | m 2.0 × 19T  |
| BSH145L-001/BSH145T-001 | m 2.0 × 19T  | m 2.0 × 19T  |
| BSH165L-001             | m 2.5 × 19T  | m 2.5 × 19T  |
| BSH170L-001             | m 2.5 × 19T  | m 2.5 × 19T  |

Type of gear used: Spiral bevel gear

How to read notation: "m1.0 × 20T" means that the module is 1, and the number of teeth is 20.

Unit: mm

| Body material                                      | Body surface treatment                        | Input shaft material | Output shaft material | Lubrication method | Backlash   |
|----------------------------------------------------|-----------------------------------------------|----------------------|-----------------------|--------------------|------------|
| Aluminum (A6061/A6063)<br>Plain cast iron EC FC250 | Black alumite,<br>ferrosoferric oxide coating | SUS303/S45C          | SUS303/S45C           | Grease sealing     | 10' to 15' |

★ For the KG-BOX, the pinion gear is used as the input shaft, and the gear shaft is used as the output shaft.

★ The backlash is the value on the output shaft side when the input shaft is fixed. For the amount of backlash, see the sections describing the respective catalogue numbers.

★ The key grooves are out of phase.

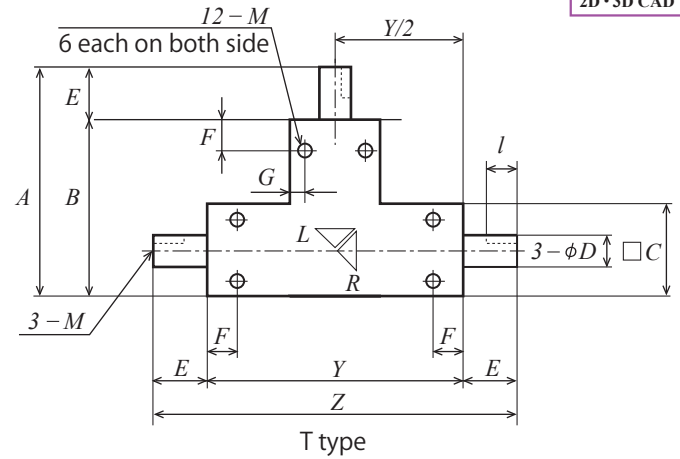
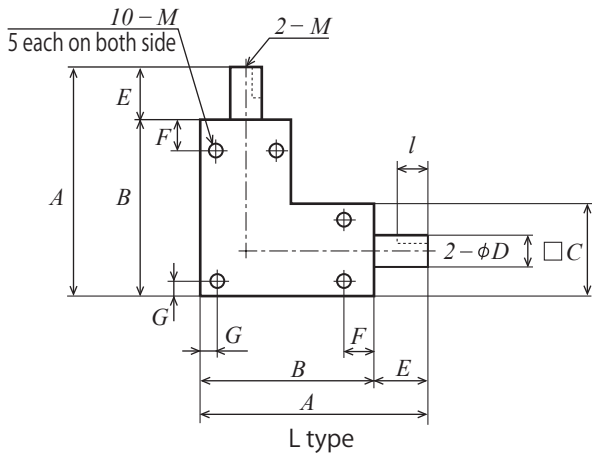
★ For customized specifications and additional machining (e.g., operating conditions, oil leak prevention, installation of a shaft of another diameter), consult with us.

| Catalogue number | Material |                             |        | Type | Gear ratio | Z   | Y   | □<br>C | A   | B   | Input/<br>output<br>shaft di-<br>ameter<br>φD(h7) | E  |
|------------------|----------|-----------------------------|--------|------|------------|-----|-----|--------|-----|-----|---------------------------------------------------|----|
|                  | Body     | Body surface treatment      | Shaft  |      |            |     |     |        |     |     |                                                   |    |
| BSH 70L — 001    | AL       | Alumite                     | SUS303 | L    | 1 : 1      | -   | -   | 27     | 70  | 54  | φ 6                                               | 16 |
| BSH 85L — 001    |          |                             |        |      |            | -   | -   | 32     | 85  | 64  | φ 8                                               | 21 |
| BSH 95L — 001    |          |                             |        |      |            | -   | -   | 36     | 95  | 72  | φ10                                               | 23 |
| BSH 115L — 001   | FC       | Ferrosoferric oxide coating | S45C   | L    | 1 : 1      | -   | -   | 45     | 115 | 90  | φ12                                               | 25 |
| BSH 120L — 001   |          |                             |        |      |            | -   | -   | 45     | 120 | 90  | φ15                                               | 30 |
| BSH 140L — 001   |          |                             |        |      |            | -   | -   | 55     | 140 | 110 | φ15                                               | 30 |
| BSH 145L — 001   |          |                             |        |      |            | -   | -   | 55     | 145 | 110 | φ20                                               | 35 |
| BSH 165L — 001   |          |                             |        |      |            | -   | -   | 65     | 165 | 130 | φ20                                               | 35 |
| BSH 170L — 001   |          |                             |        |      |            | -   | -   | 65     | 170 | 130 | φ25                                               | 40 |
| BSH 70T — 001    | AL       | Alumite                     | SUS303 | T    | 1 : 1      | 113 | 81  | 27     | 70  | 54  | φ 6                                               | 16 |
| BSH 85T — 001    |          |                             |        |      |            | 138 | 96  | 32     | 85  | 64  | φ 8                                               | 21 |
| BSH 95T — 001    |          |                             |        |      |            | 154 | 108 | 36     | 95  | 72  | φ10                                               | 23 |
| BSH 115T — 001   | FC       | Ferrosoferric oxide coating | S45C   | T    | 1 : 1      | 143 | 93  | 45     | 115 | 90  | φ12                                               | 25 |
| BSH 120T — 001   |          |                             |        |      |            | 153 | 93  | 45     | 120 | 90  | φ15                                               | 30 |
| BSH 140T — 001   |          |                             |        |      |            | 175 | 115 | 55     | 140 | 110 | φ15                                               | 30 |
| BSH 145T — 001   |          |                             |        |      |            | 185 | 115 | 55     | 145 | 110 | φ20                                               | 35 |

| Catalogue number |                | Allowable input torque for different input revolutions per minute (Unit: N · m) |        |        |         |         |         |         |         |
|------------------|----------------|---------------------------------------------------------------------------------|--------|--------|---------|---------|---------|---------|---------|
|                  |                | 250rpm                                                                          | 500rpm | 800rpm | 1000rpm | 1500rpm | 2000rpm | 2500rpm | 3000rpm |
| BSH 70L — 001    | BSH 70T — 001  | 0.89                                                                            | 0.89   | 0.89   | 0.89    | 0.86    | 0.81    | 0.77    | 0.73    |
| BSH 85L — 001    | BSH 85T — 001  | 1.95                                                                            | 1.95   | 1.95   | 1.95    | 1.81    | 1.69    | 1.59    | 1.50    |
| BSH 95L — 001    | BSH 95T — 001  | 3.68                                                                            | 3.68   | 3.68   | 3.58    | 3.30    | 3.04    | 2.85    | 2.77    |
| BSH 115L — 001   | BSH 115T — 001 | 5.23                                                                            | 5.23   | 5.15   | 5.01    | 4.69    | 4.40    | 4.25    | 4.13    |
| BSH 120L — 001   | BSH 120T — 001 | 5.23                                                                            | 5.23   | 5.15   | 5.01    | 4.69    | 4.40    | 4.25    | 4.13    |
| BSH 140L — 001   | BSH 140T — 001 | 13.30                                                                           | 13.30  | 12.62  | 12.17   | 11.18   | 10.70   | 10.30   | -       |
| BSH 145L — 001   | BSH 145T — 001 | 13.30                                                                           | 13.30  | 12.62  | 12.17   | 11.18   | 10.70   | 10.30   | -       |
| BSH 165L — 001   | -              | 26.15                                                                           | 25.63  | 23.93  | 22.86   | 21.25   | 20.26   | -       | -       |
| BSH 170L — 001   | -              | 26.15                                                                           | 25.63  | 23.93  | 22.86   | 21.25   | 20.26   | -       | -       |



2D • 3D CAD



| F  | G | Key groove |     |    | Mounting screw |       | Shaft end screw |       | Back-lash<br>( ' ) | Allowable<br>overhang<br>load<br>(N) | Allowable<br>thrust load<br>(N) | Weight<br>W(kg) | Catalogue number      |
|----|---|------------|-----|----|----------------|-------|-----------------|-------|--------------------|--------------------------------------|---------------------------------|-----------------|-----------------------|
|    |   | b          | t   | l  | M              | Depth | M               | Depth |                    |                                      |                                 |                 |                       |
| 9  | 4 | -          | -   | -  | 10-M4          | 6     | -               | -     | 15                 | 25                                   | 22                              | 0.2             | <b>BSH 70L – 001</b>  |
| 10 | 5 | 3          | 1.8 | 14 | 10-M5          | 7     | -               | -     |                    | 36                                   | 39                              | 0.4             | <b>BSH 85L – 001</b>  |
| 13 | 5 | 3          | 1.8 | 15 | 10-M5          | 8     | -               | -     |                    | 58                                   | 63                              | 0.5             | <b>BSH 95L – 001</b>  |
| 20 | 5 | 4          | 2.5 | 20 | 10-M5          | 12    | 2-M4            | 8     | 10                 | 83                                   | 70                              | 1.8             | <b>BSH 115L – 001</b> |
| 20 | 5 | 5          | 3.0 | 25 | 10-M5          | 12    | 2-M4            | 8     |                    | 83                                   | 70                              | 1.8             | <b>BSH 120L – 001</b> |
| 25 | 6 | 5          | 3.0 | 25 | 10-M6          | 13    | 2-M5            | 10    |                    | 166                                  | 135                             | 3.1             | <b>BSH 140L – 001</b> |
| 25 | 6 | 6          | 3.5 | 30 | 10-M6          | 13    | 2-M5            | 10    |                    | 166                                  | 135                             | 3.2             | <b>BSH 145L – 001</b> |
| 25 | 7 | 6          | 3.5 | 30 | 10-M6          | 14    | 2-M5            | 12    |                    | 245                                  | 212                             | 5.4             | <b>BSH 165L – 001</b> |
| 25 | 7 | 8          | 4.0 | 35 | 10-M6          | 14    | 2-M5            | 12    |                    | 245                                  | 212                             | 5.5             | <b>BSH 170L – 001</b> |
| 9  | 4 | -          | -   | -  | 12-M4          | 6     | -               | -     | 15                 | 25                                   | 22                              | 0.3             | <b>BSH 70T – 001</b>  |
| 10 | 5 | 3          | 1.8 | 14 | 12-M5          | 7     | -               | -     |                    | 36                                   | 39                              | 0.5             | <b>BSH 85T – 001</b>  |
| 13 | 5 | 3          | 1.8 | 15 | 12-M5          | 8     | -               | -     |                    | 58                                   | 63                              | 0.7             | <b>BSH 95T – 001</b>  |
| 20 | 5 | 4          | 2.5 | 20 | 12-M5          | 12    | 3-M4            | 8     | 10                 | 83                                   | 70                              | 2.0             | <b>BSH 115T – 001</b> |
| 20 | 5 | 5          | 3.0 | 25 | 12-M5          | 12    | 3-M4            | 8     |                    | 83                                   | 70                              | 2.0             | <b>BSH 120T – 001</b> |
| 25 | 6 | 5          | 3.0 | 25 | 12-M6          | 13    | 3-M5            | 10    |                    | 166                                  | 135                             | 3.4             | <b>BSH 140T – 001</b> |
| 25 | 6 | 6          | 3.5 | 30 | 12-M6          | 13    | 3-M5            | 10    |                    | 166                                  | 135                             | 3.5             | <b>BSH 145T – 001</b> |

## Standard T-shaped product

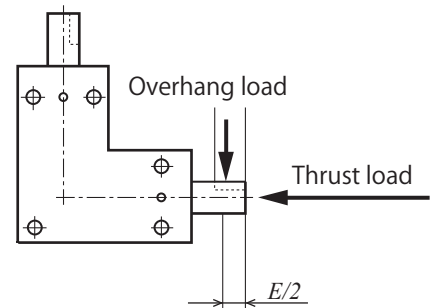
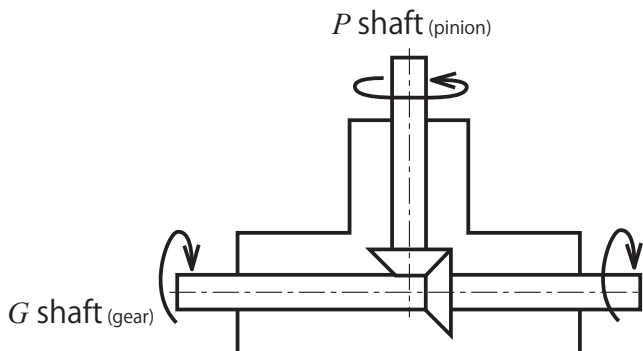
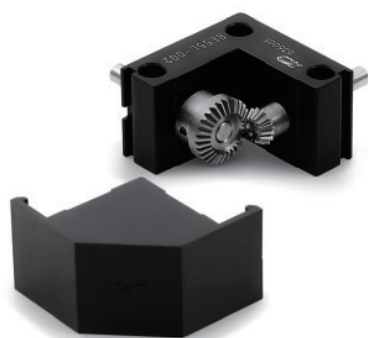


Fig. Overhang load position and thrust load



## Straight bevel gears used

| Catalogue number      | Pinion       | Gear         |
|-----------------------|--------------|--------------|
| BE40L-001             | m 0.5 × 20T  | m 0.5 × 20T  |
| BE55L-001             | m 0.8 × 20T  | m 0.8 × 20T  |
| BE70L-001A/BE70L-001B | m 1.0 × 20T  | m 1.0 × 20T  |
| BE88L-001A/BE88L-001B | m 1.5 × 20T  | m 1.5 × 20T  |
| BE55L-002             | m 0.6 × 14T  | m 0.6 × 28T  |
| BE70L-002A/BE70L-002B | m 0.8 × 13T  | m 0.8 × 26T  |
| BE88L-002A/BE88L-002B | m 1.25 × 13T | m 1.25 × 26T |

Type of gear used: Straight bevel gear

How to read notation: "m1.0 × 20T" means that the module is 1, and the number of teeth is 20.

Unit: mm

| Body material          | Body surface treatment | Input shaft material | Output shaft material | Lubrication method                  | Backlash             |
|------------------------|------------------------|----------------------|-----------------------|-------------------------------------|----------------------|
| Aluminum (A5056/A6063) | Black alumite          | SUS303               | SUS303                | Periodic greasing of tooth surfaces | Sensory inspection ① |

★ For the KG-BOX, the pinion gear is used as the input shaft, and the gear shaft is used as the output shaft.

★ S45C is used as the gear material. A plastic cover comes with the gearbox.

★ Difference between products with a catalogue number that ends with A and B: the B type has a larger shaft diameter than type A by 2 mm.

★ Mounting bolt holes 3-K can be used as pilot holes for tapping. (See the dimension table below and the blue text in the dimensional code table.)

① This is an economy type product. Sensory inspection is performed for backlash instead of detailed measurement.

| Catalogue number | Gear ratio |          |          |          | Input/<br>output<br>shaft<br>diameter |          |          |          |          |          |
|------------------|------------|----------|----------|----------|---------------------------------------|----------|----------|----------|----------|----------|
|                  | <i>u</i>   | <i>A</i> | <i>B</i> | <i>C</i> | $\phi D(h8)$                          | <i>E</i> | <i>F</i> | <i>G</i> | <i>H</i> | <i>I</i> |
| BE40 L - 001     | 1 : 1      | 40       | 30       | 10       | $\phi 4$                              | 10       | 5        | 4.5      | 20.5     | 15       |
| BE55 L - 001     |            | 55       | 40       | 13       | $\phi 5$                              | 15       | 6.5      | 5        | 28.5     | 21.5     |
| BE70 L - 001A    |            | 70       | 50       | 16       | $\phi 6$                              | 20       | 8        | 6        | 36       | 27       |
| BE70 L - 001B    |            | 70       | 50       | 16       | $\phi 8$                              | 20       | 8        | 6        | 36       | 27       |
| BE88 L - 001A    |            | 88       | 63       | 20       | $\phi 10$                             | 25       | 10       | 7        | 46       | 33       |
| BE88 L - 001B    |            | 88       | 63       | 20       | $\phi 12$                             | 25       | 10       | 7        | 46       | 33       |
| BE55 L - 002     | 1 : 2      | 55       | 40       | 13       | $\phi 5$                              | 15       | 6.5      | 5        | 28.5     | 21.5     |
| BE70 L - 002A    |            | 70       | 50       | 16       | $\phi 6$                              | 20       | 8        | 6        | 36       | 27       |
| BE70 L - 002B    |            | 70       | 50       | 16       | $\phi 8$                              | 20       | 8        | 6        | 36       | 27       |
| BE88 L - 002A    |            | 88       | 63       | 20       | $\phi 10$                             | 25       | 10       | 7        | 46       | 33       |
| BE88 L - 002B    |            | 88       | 63       | 20       | $\phi 12$                             | 25       | 10       | 7        | 46       | 33       |

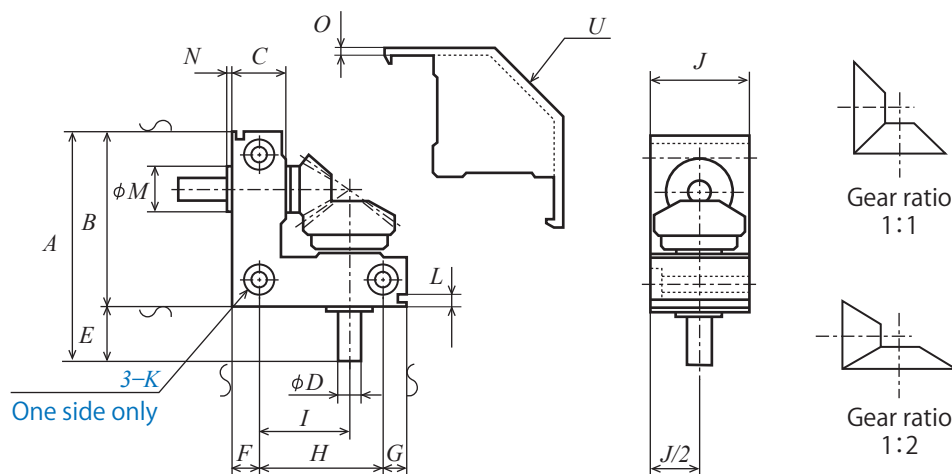
| Catalogue number | Allowable input torque for different input revolutions per minute (Unit: N·cm) |        |        |        |
|------------------|--------------------------------------------------------------------------------|--------|--------|--------|
|                  | 50rpm                                                                          | 100rpm | 250rpm | 500rpm |
| BE40 L - 001     | 9.8                                                                            | 9.7    | 9.4    | 9.0    |
| BE55 L - 001     | 38.6                                                                           | 38.0   | 36.5   | 34.3   |
| BE70 L - 001A    | 72.3                                                                           | 71.0   | 67.6   | 62.6   |
| BE70 L - 001B    | 72.3                                                                           | 71.0   | 67.6   | 62.6   |
| BE88 L - 001A    | 232.3                                                                          | 226.5  | 210.8  | 188.9  |
| BE88 L - 001B    | 232.3                                                                          | 226.5  | 210.8  | 188.9  |
| BE55 L - 002     | 10.5                                                                           | 10.4   | 10.2   | 9.9    |
| BE70 L - 002A    | 20.7                                                                           | 20.6   | 20.1   | 19.3   |
| BE70 L - 002B    | 20.7                                                                           | 20.6   | 20.1   | 19.3   |
| BE88 L - 002A    | 74.2                                                                           | 73.2   | 70.3   | 65.9   |
| BE88 L - 002B    | 74.2                                                                           | 73.2   | 70.3   | 65.9   |

表 1

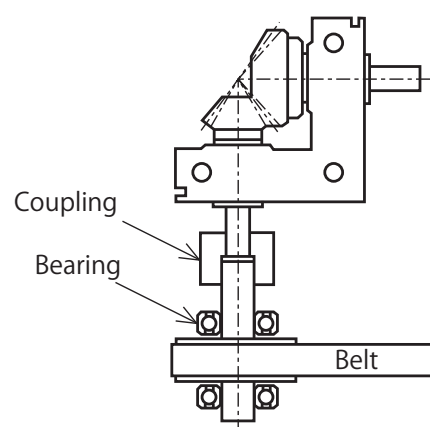
| Catalogue number | Drilled hole | Applicable hex socket bolt | For additional tapping | Allowable hole diameter for additional machining |
|------------------|--------------|----------------------------|------------------------|--------------------------------------------------|
| BE 40 L          | $\phi 3.4$   | M3                         | M4                     | Additional machining not allowed                 |
| BE 55 L          | $\phi 3.4$   | M3                         | M4                     | $\phi 5$ or less                                 |
| BE 70 L          | $\phi 4.3$   | M4                         | M5                     | $\phi 6$ or less                                 |
| BE 88 L          | $\phi 5.2$   | M5                         | M6                     | $\phi 8$ or less                                 |



2D • 3D CAD



| J  | Drilled hole and counterbore<br>3-K |                      |                   | L   | M   | N   | O   | U   | Weight<br>W(g) | Catalogue number |
|----|-------------------------------------|----------------------|-------------------|-----|-----|-----|-----|-----|----------------|------------------|
|    | Drilled hole                        | Counterbore diameter | Counterbore depth |     |     |     |     |     |                |                  |
| 18 | φ3.4                                | φ6.5                 | 3.5               | 2.5 | φ 7 | 2.1 | 1.7 | C13 | 30             | BE40 L – 001     |
| 25 | φ3.4                                | φ6.5                 | 3.5               | 4   | φ 9 | 1.8 | 1.9 | C16 | 85             | BE55 L – 001     |
| 30 | φ4.3                                | φ8                   | 4.5               | 4.5 | φ11 | 1.8 | 2.1 | C20 | 155            | BE70 L – 001A    |
| 30 | φ4.3                                | φ8                   | 4.5               | 4.5 | φ14 | 2   | 2.1 | C20 | 170            | BE70 L – 001B    |
| 40 | φ5.2                                | φ9.5                 | 5.5               | 5   | φ18 | 2   | 2.1 | C27 | 375            | BE88 L – 001A    |
| 40 | φ5.2                                | φ9.5                 | 5.5               | 5   | φ19 | 2.2 | 2.1 | C27 | 380            | BE88 L – 001B    |
| 25 | φ3.4                                | φ6.5                 | 3.5               | 4   | φ 9 | 1.8 | 1.9 | C16 | 80             | BE55 L – 002     |
| 30 | φ4.3                                | φ8                   | 4.5               | 4.5 | φ11 | 1.8 | 2.1 | C20 | 140            | BE70 L – 002A    |
| 30 | φ4.3                                | φ8                   | 4.5               | 4.5 | φ14 | 2   | 2.1 | C20 | 165            | BE70 L – 002B    |
| 40 | φ5.2                                | φ9.5                 | 5.5               | 5   | φ18 | 2   | 2.1 | C27 | 345            | BE88 L – 002A    |
| 40 | φ5.2                                | φ9.5                 | 5.5               | 5   | φ19 | 2.2 | 2.1 | C27 | 375            | BE88 L – 002B    |



Reference drawing 1





## Worms and worm wheels used

| Catalogue number | Worm       | Worm wheel  |
|------------------|------------|-------------|
| WS55R-020        | m 0.5 × 1T | m 0.5 × 20T |
| WS55R-030        | m 0.5 × 1T | m 0.5 × 30T |
| WS60R-040        | m 0.5 × 1T | m 0.5 × 40T |
| WS60R-050        | m 0.5 × 1T | m 0.5 × 50T |
| WS65R-020        | m 0.8 × 1T | m 0.8 × 20T |
| WS65R-030        | m 0.8 × 1T | m 0.8 × 30T |
| WS75R-040        | m 0.8 × 1T | m 0.8 × 40T |
| WS75R-050        | m 0.8 × 1T | m 0.8 × 50T |
| WS80R-010        | m 1.0 × 2T | m 1.0 × 20T |
| WS80R-020        | m 1.0 × 1T | m 1.0 × 20T |
| WS80R-030        | m 1.0 × 1T | m 1.0 × 30T |
| WS90R-040        | m 1.0 × 1T | m 1.0 × 40T |
| WS90R-050        | m 1.0 × 1T | m 1.0 × 50T |

Type of gear used: Worm and worm wheel

How to read notation: "m1.0 × 20T" means that the module is 1, and the number of teeth is 20.

Unit: mm

| Body material           | Body surface treatment | Input shaft material | Output shaft material | Lubrication method | Backlash   |
|-------------------------|------------------------|----------------------|-----------------------|--------------------|------------|
| Aluminum (A5052P/A5056) | Black alumite          | S45C                 | S45C                  | Oil lubrication    | 30' to 45' |

★ Our WS-BOX uses a worm shaft as the input shaft (φH) and a wheel shaft (φI) as the output shaft.

★ Our WS-BOX is designed based on the assumption that it will be used with the input shaft on bottom and the output shaft on top. When it is not used with the input shaft on bottom and the output shaft on top, the transfer torque must be 75% or less of the values specified in the "Allowable input torque table" and "Allowable output torque table."

★ The backlash is the value on the output shaft side when the input shaft is fixed. For the amount of backlash, see the sections describing the respective catalogue numbers.

★ Rotational direction of each shaft: For the W-BOX, when the input shaft is rotated clockwise with the shaft end facing front, the output shaft also rotates clockwise. The rotational direction can be reversed.

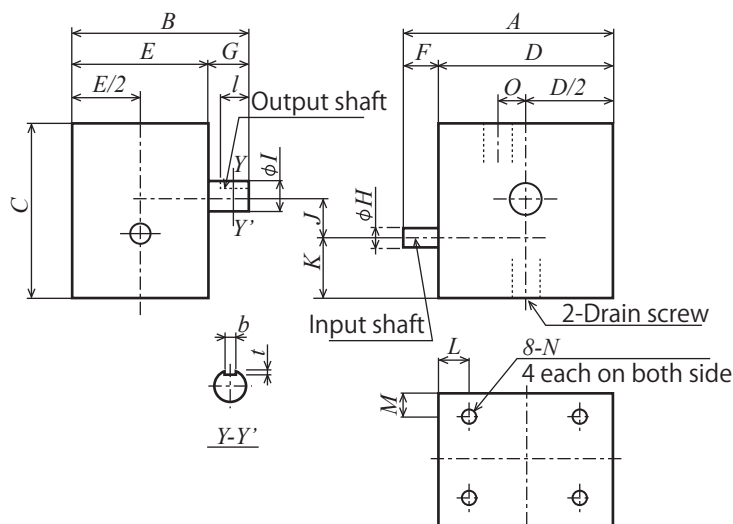
| Catalogue number | Gear ratio |    |    |  | Body size |    |    | Shaft length |    | Shaft diameter        |                        | Center distance |
|------------------|------------|----|----|--|-----------|----|----|--------------|----|-----------------------|------------------------|-----------------|
|                  |            |    |    |  | C         | D  | E  | F            | G  | Input shaft<br>φH(h7) | Output shaft<br>φI(h7) |                 |
| WS 55R — 020     | 1 : 20     | 55 | 45 |  | 45        | 45 | 35 | 10           | 10 | φ 5                   | φ 8                    | 9.5             |
| WS 55R — 030     | 1 : 30     | 55 | 45 |  | 45        | 45 | 35 | 10           | 10 | φ 5                   | φ 8                    | 12              |
| WS 60R — 040     | 1 : 40     | 60 | 50 |  | 55        | 50 | 40 | 10           | 10 | φ 5                   | φ 8                    | 14.5            |
| WS 60R — 050     | 1 : 50     | 60 | 50 |  | 55        | 50 | 40 | 10           | 10 | φ 5                   | φ 8                    | 17              |
| WS 65R — 020     | 1 : 20     | 65 | 55 |  | 55        | 50 | 40 | 15           | 15 | φ 6                   | φ 8                    | 13.2            |
| WS 65R — 030     | 1 : 30     | 65 | 55 |  | 55        | 50 | 40 | 15           | 15 | φ 6                   | φ 8                    | 17.2            |
| WS 75R — 040     | 1 : 40     | 75 | 60 |  | 70        | 60 | 45 | 15           | 15 | φ 6                   | φ10                    | 21.2            |
| WS 75R — 050     | 1 : 50     | 75 | 60 |  | 70        | 60 | 45 | 15           | 15 | φ 6                   | φ10                    | 25.2            |
| WS 80R — 010     | 1 : 10     | 80 | 65 |  | 70        | 60 | 45 | 20           | 20 | φ 8                   | φ10                    | 18              |
| WS 80R — 020     | 1 : 20     | 80 | 65 |  | 70        | 60 | 45 | 20           | 20 | φ 8                   | φ10                    | 18              |
| WS 80R — 030     | 1 : 30     | 80 | 65 |  | 70        | 60 | 45 | 20           | 20 | φ 8                   | φ12                    | 23              |
| WS 90R — 040     | 1 : 40     | 90 | 75 |  | 85        | 70 | 50 | 20           | 25 | φ 8                   | φ15                    | 28              |
| WS 90R — 050     | 1 : 50     | 90 | 75 |  | 85        | 70 | 50 | 20           | 25 | φ 8                   | φ15                    | 33              |

| Catalogue number | Allowable input torque for different input revolutions per minute (Unit: N·cm) |        |        |          |          |          |          |          |
|------------------|--------------------------------------------------------------------------------|--------|--------|----------|----------|----------|----------|----------|
|                  | 50rpm                                                                          | 100rpm | 500rpm | 1,000rpm | 1,500rpm | 2,000rpm | 2,500rpm | 3,000rpm |
| WS 55R — 020     | 4.0                                                                            | 3.5    | 2.0    | 1.5      | 1.2      | 1.0      | 0.9      | 0.9      |
| WS 55R — 030     | 5.7                                                                            | 4.9    | 3.0    | 2.2      | 1.8      | 1.6      | 1.4      | 1.3      |
| WS 60R — 040     | 7.3                                                                            | 6.3    | 4.0    | 3.0      | 2.5      | 2.1      | 1.9      | 1.8      |
| WS 60R — 050     | 8.9                                                                            | 7.7    | 4.9    | 3.7      | 3.0      | 2.7      | 2.2      | 2.2      |
| WS 65R — 020     | 9.9                                                                            | 8.5    | 5.1    | 3.9      | 3.1      | 2.7      | 2.5      | 2.3      |
| WS 65R — 030     | 14.1                                                                           | 12.3   | 7.6    | 5.7      | 4.8      | 4.2      | 3.7      | 3.5      |
| WS 75R — 040     | 18.0                                                                           | 15.8   | 9.9    | 7.5      | 6.3      | 5.5      | 5.0      | 4.6      |
| WS 75R — 050     | 21.9                                                                           | 18.9   | 12.3   | 9.3      | 7.9      | 6.9      | 6.3      | 5.8      |
| WS 80R — 010     | 34.5                                                                           | 29.7   | 16.9   | 12.7     | 10.4     | 9.1      | 8.1      | 7.3      |
| WS 80R — 020     | 24.9                                                                           | 21.4   | 12.0   | 8.9      | 7.2      | 6.3      | 5.6      | 5.1      |
| WS 80R — 030     | 35.2                                                                           | 30.6   | 17.8   | 13.1     | 10.8     | 9.5      | 8.5      | 7.8      |
| WS 90R — 040     | 45.1                                                                           | 39.0   | 23.3   | 17.2     | 14.3     | 12.6     | 11.3     | 10.4     |
| WS 90R — 050     | 54.7                                                                           | 47.4   | 28.6   | 21.4     | 17.7     | 15.6     | 14.1     | 12.9     |



2D • 3D CAD

| Recommended amount of lubricating oil (ml) | Catalogue number |
|--------------------------------------------|------------------|
| 3.0                                        | WS55R-020        |
| 2.3                                        | WS55R-030        |
| 4.5                                        | WS60R-040        |
| 2.5                                        | WS60R-050        |
| 4.2                                        | WS65R-020        |
| 4.5                                        | WS65R-030        |
| 6.5                                        | WS75R-040        |
| 7.0                                        | WS75R-050        |
| 9.0                                        | WS80R-010        |
| 7.0                                        | WS80R-020        |
| 8.5                                        | WS80R-030        |
| 15.0                                       | WS90R-040        |
| 19.0                                       | WS90R-050        |



| K    | L  | M | Mounting screw |       | Key groove |     |    | Drain screw | Backlash<br>( ' ) | Allowable overhang load<br>Output shaft<br>(N) | Allowable thrust load<br>Output shaft<br>(N) | Weight<br>W(kg) | Catalogue number |
|------|----|---|----------------|-------|------------|-----|----|-------------|-------------------|------------------------------------------------|----------------------------------------------|-----------------|------------------|
|      |    |   | 8-N            | Depth | b          | t   | l  |             |                   |                                                |                                              |                 |                  |
| 16.5 | 8  | 7 | 8-M3           | 6     | 3          | 1.8 | 8  | 0           | 45                | 24                                             | 4.4                                          | 0.23            | WS 55R – 020     |
| 16.5 | 8  | 7 | 8-M3           | 6     | 3          | 1.8 | 8  | 0           |                   | 24                                             | 6.3                                          | 0.23            | WS 55R – 030     |
| 20   | 8  | 8 | 8-M3           | 6     | 3          | 1.8 | 8  | 0           | 30                | 24                                             | 8.1                                          | 0.34            | WS 60R – 040     |
| 19   | 8  | 8 | 8-M3           | 6     | 3          | 1.8 | 8  | 8           |                   | 24                                             | 9.9                                          | 0.36            | WS 60R – 050     |
| 20.9 | 10 | 8 | 8-M4           | 6     | 3          | 1.8 | 12 | 0           | 45                | 20                                             | 9.5                                          | 0.36            | WS 65R – 020     |
| 18.9 | 10 | 8 | 8-M4           | 6     | 3          | 1.8 | 12 | 8           |                   | 20                                             | 13.6                                         | 0.38            | WS 65R – 030     |
| 24   | 10 | 8 | 8-M4           | 8     | 3          | 1.8 | 12 | 0           | 30                | 33                                             | 17.3                                         | 0.60            | WS 75R – 040     |
| 20   | 10 | 8 | 8-M4           | 8     | 3          | 1.8 | 12 | 15          |                   | 33                                             | 21.1                                         | 0.64            | WS 75R – 050     |
| 26   | 10 | 5 | 8-M5           | 10    | 3          | 1.8 | 15 | 0           | 45                | 24                                             | 21.6                                         | 0.61            | WS 80R – 010     |
| 26   | 10 | 5 | 8-M5           | 10    | 3          | 1.8 | 15 | 0           |                   | 24                                             | 15.6                                         | 0.61            | WS 80R – 020     |
| 23.5 | 10 | 5 | 8-M5           | 10    | 4          | 2.5 | 15 | 8           |                   | 44                                             | 22.0                                         | 0.65            | WS 80R – 030     |
| 28.5 | 10 | 5 | 8-M5           | 10    | 5          | 3   | 20 | 10          | 30                | 58                                             | 28.2                                         | 0.98            | WS 90R – 040     |
| 21   | 10 | 5 | 8-M5           | 10    | 5          | 3   | 20 | 17          |                   | 58                                             | 34.2                                         | 1.02            | WS 90R – 050     |

| Catalogue number | Allowable output torque for different input revolutions per minute (Unit: N·cm) |        |        |          |          |          |          |          |
|------------------|---------------------------------------------------------------------------------|--------|--------|----------|----------|----------|----------|----------|
|                  | 50rpm                                                                           | 100rpm | 500rpm | 1,000rpm | 1,500rpm | 2,000rpm | 2,500rpm | 3,000rpm |
| WS 55R – 020     | 27.8                                                                            | 25.2   | 18.0   | 14.7     | 13.0     | 11.7     | 10.8     | 10.0     |
| WS 55R – 030     | 59.3                                                                            | 54.2   | 39.6   | 32.7     | 29.7     | 26.6     | 24.4     | 23.0     |
| WS 60R – 040     | 101.7                                                                           | 92.8   | 69.4   | 57.7     | 51.3     | 46.9     | 43.5     | 41.1     |
| WS 60R – 050     | 153.0                                                                           | 140.2  | 106.9  | 89.3     | 79.2     | 72.9     | 67.7     | 63.9     |
| WS 65R – 020     | 84.5                                                                            | 75.9   | 53.4   | 44.5     | 37.8     | 35.0     | 32.4     | 30.6     |
| WS 65R – 030     | 179.3                                                                           | 164.2  | 119.5  | 98.2     | 86.8     | 79.3     | 73.6     | 69.2     |
| WS 75R – 040     | 306.0                                                                           | 281.4  | 207.0  | 172.6    | 153.6    | 139.0    | 129.9    | 122.4    |
| WS 75R – 050     | 465.2                                                                           | 424.5  | 319.5  | 266.4    | 238.4    | 217.8    | 202.2    | 192.5    |
| WS 80R – 010     | 191.7                                                                           | 171.1  | 112.8  | 90.5     | 77.5     | 69.3     | 63.0     | 58.4     |
| WS 80R – 020     | 192.4                                                                           | 174.6  | 120.5  | 98.2     | 85.7     | 78.2     | 72.0     | 67.1     |
| WS 80R – 030     | 409.1                                                                           | 374.0  | 265.7  | 218.2    | 191.7    | 175.2    | 162.8    | 152.8    |
| WS 90R – 040     | 697.4                                                                           | 638.0  | 463.9  | 382.7    | 337.5    | 309.6    | 288.2    | 271.1    |
| WS 90R – 050     | 1,056.7                                                                         | 968.1  | 713.2  | 591.9    | 522.9    | 479.7    | 447.4    | 421.7    |

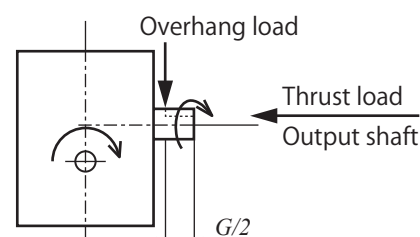


Fig. Overhang load position, thrust load, and shaft rotational direction

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITTER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES

# Anti-backlash spur gears

## Control-backlash spur gears

### NS series

### NSG series

### ASG series



\* These are samples

## How to Read Catalogue Numbers

**NSG 80 S 80 B + 08 10**

| Tooth finishing & Gear type                                                                                                                            | Module                                                                                                                                                              | Material                                                                                 | Number of teeth                                  | Shape                        | Hole finish                                                                                                                                                                   | Face width | Hole diameter |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|
| ASG : Tooth grinding<br>Control-backlash spur gear<br>NSG : Tooth grinding<br>Anti-backlash spur gear<br>NS : Tooth cutting<br>Anti-backlash spur gear | Represents the module size. When the module is less than 1, it indicates a value 100 times the actual module.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | ASG, NSG series<br>S : SCM435, 440<br>NS series<br>S : S45C<br>SU : SUS304<br>AL : A5056 | Example:<br>When the number of teeth is 80: "80" | B : Hub provided on one side | [-]: No screw holes provided, no key grooves provided,<br>ASG series: ground finish<br>[+]: One screw hole provided<br>NSG series: ground finish<br>NS series: turning finish | Unit: mm   | Unit: mm      |

**These are products that meets the need to eliminate backlash in line with the development of industries such as mechatronics and precision equipment.**

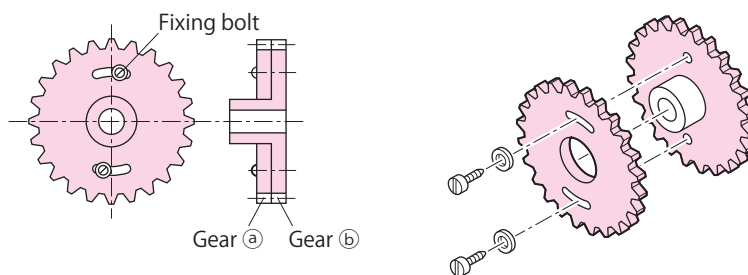
## Features of our standard Anti-backlash spur gears and Control-backlash spur gears

- 1) Mainly small module size.
- 2) Materials include aluminum, S45C, SCM435, SCM440 and SUS304.  
(Control-backlash spur gear is SCM435 or SCM440.)

| Catalogue number       | ASG                                                                                 | NSG                                                                                 | NS                                                                                  | NSU                                                                                   | NS                                                                                    |
|------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Shape                  |  |  |  |  |  |
| Page                   | P. 56                                                                               | P. 56                                                                               | P. 58                                                                               | P. 58                                                                                 | P. 58                                                                                 |
| Material               | SCM435, 440                                                                         | SCM435, 440                                                                         | S45C                                                                                | SUS304                                                                                | A5056                                                                                 |
| Module                 | m1 to 2                                                                             | m0.5 to 1                                                                           | m0.8 to 1                                                                           | m0.5                                                                                  | m0.5 to 1                                                                             |
| Mechanism parts        | Fixing bolts                                                                        | Arc spring / Coil spring                                                            | Coil spring                                                                         | Coil spring                                                                           | Arc spring                                                                            |
| Teeth process sequence | Grinding after Induction hardening                                                  | Grinding                                                                            | Soft nitriding after cutting                                                        | Teflon after cutting                                                                  | White alumite after cutting                                                           |

# Anti-backlash gear information

## 1. How to Use Control Backlash Gears (ASG Series)



### 1) Principle and assembly method

The control-backlash spur gear consists of gear (a), gear (b) and fixing bolts and is a gear mechanism by which the backlash can be adjusted to the minimum value or required value as it meshes with the mating gear. Loosen the fixing bolts and mesh gear (a) and gear (b) with the mating gear. To adjust the backlash, adjust the phases of gear (a) and gear (b) so that the target backlash is achieved with the mating gear over the whole circumference. Then, tighten the fixing bolts.

### 2) Ideal mating gears

SG series ground spur gears (The higher precision the mating gear has, the greater the effect the ASG series has.)

### 3) How to set the optimal backlash (Fig. 1)

- ① Loosen the fixing bolts and mesh gear (a) and gear (b) with the mating gear.
- ② Rotate gear (a) and gear (b) to adjust the backlash.
- ③ Tighten the fixing bolts to an appropriate torque. (For the tightening torque, refer to the relevant Japanese Industrial Standard (JIS).) Rotate the mating gear and control backlash gear once. If they do not rotate smoothly due to an insufficient backlash, adjust the backlash again.

#### To reduce the intermeshing backlash

The backlash may be reduced by adjusting the intermeshing between the control backlash gear and mating gear.

- ① Loosen the fixing bolts and mesh gear (a) and gear (b) with the mating gear.
- ② Adjust the phases of gear (a) and gear (b) to adjust the backlash.
- ③ Tighten the fixing bolts.

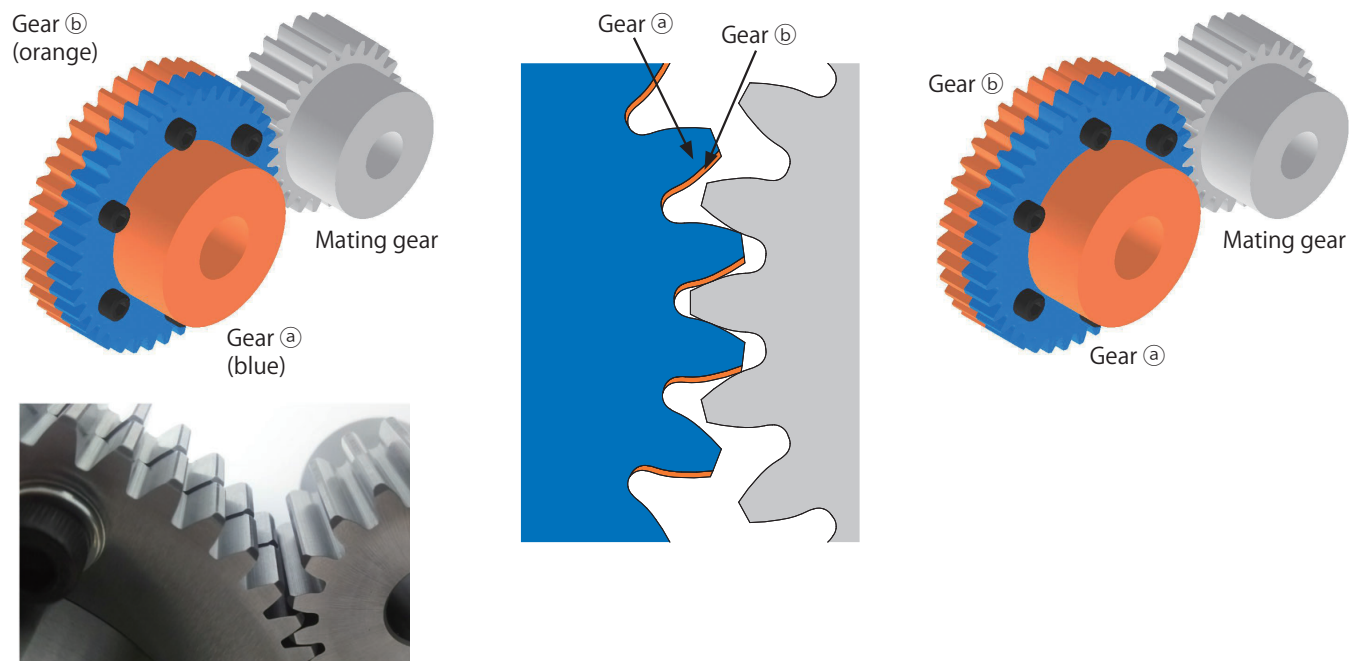


Fig. 1 How to set the optimal backlash



# Anti-backlash gear information

## 4) Prevention of loose fixing bolts and maintenance

After tightening the fixing bolts, mark them so that loose bolts can be found easily and visually. Check the tightening torque periodically and perform necessary maintenance.

## Cautions

### 1) Prevention of accidents

Tightening the fixing bolts without stopper spring washers or with an insufficient tightening torque may cause the fixing bolts to come off during operation, which is very dangerous. Be sure to check the fixing bolts before operation.

### 2) Why must the allowable transfer torque be observed?

Because the gears are secured with only a few bolts, if the allowable transfer torque is exceeded during operation, the control backlash gear cannot fulfill its function and could induce an accident or failure. Be sure to observe the allowable transfer torque. If there is a need to transmit a larger torque, consult us.

### 3) Backlash for anti-backlash spur gears

The inertia generated by rapid acceleration or deceleration may cause an error.

## 2. How to Use Anti-Backlash Spur Gears (NSG and NS Series)

| Type    | Spring used | Shape |
|---------|-------------|-------|
| BS type | Arc spring  |       |
| BW type | Coil spring |       |

### 1) Principle and assembly method

The anti-backlash spur gear consists of gear (a) and (b) and has a mechanism in which gear (a) and gear (b) are meshed with the mating gear to transmit the rotational force by spring force with "zero" backlash. Although the transmitted force is restricted by the spring force, the anti-backlash spur gear is used for low-load devices that require high-precision positioning and devices that rotate in the forward and reverse directions and are adversely affected by a backlash.

### 2) Ideal mating gears

NSG series: SG series and SGR series ground spur gears

NS series: S series spur gears, and RK series racks (Material: S45C, SUS304)

# Anti-backlash gear information

## 3) How to set the transfer torque

### ① Initial state

When the spring installed in the anti-backlash spur gear is in a free state, the teeth of gear ① and gear ② are out of phase. (Fig. 1)

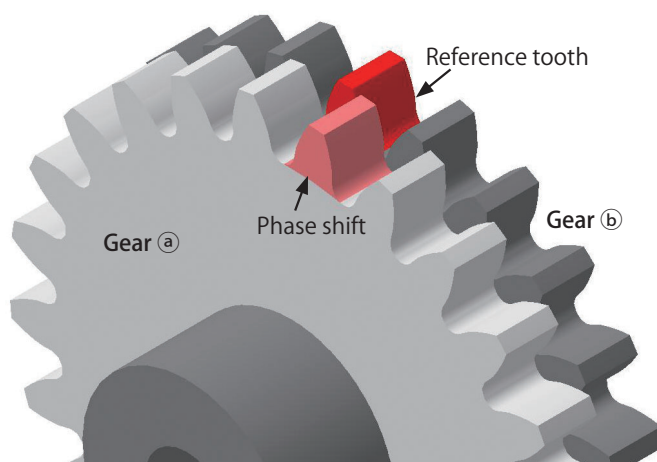


Fig. 1 Initial state

### ② Zero point for tooth positioning ( $n_0$ )

Considering the point at which the spring extends and the reference teeth of gear ① and gear ② align when gear ① is rotated with gear ② fixed as the zero point for tooth positioning ( $n_0$ ), use it as the reference position for setting the transfer torque. (Fig. 2)

Rotational direction of gear ① (tension direction of spring)  
- BS type: Direction of the arrow stamped on the lateral face  
- BW type: Direction that the spring extends

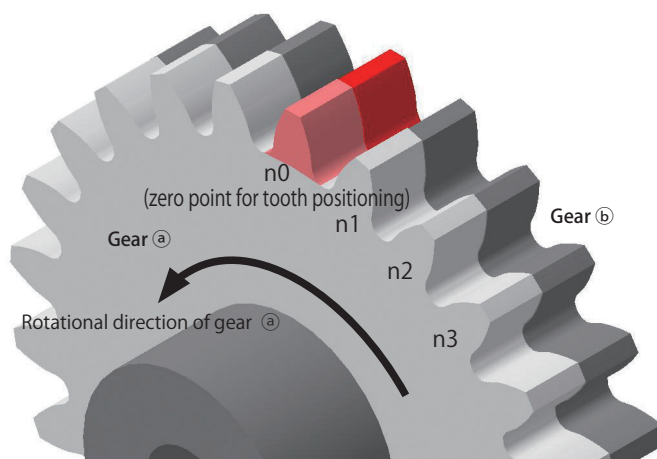


Fig. 2 Zero point for tooth positioning ( $n_0$ )

### ③ Selection of the pitch shift amount ( $n_1, n_2, n_3...$ )

Let the point at which the tooth next to the reference tooth of gear ① aligns with the reference tooth of gear ② when gear ① is rotated further by pitch shift amount  $n_1$  (Fig. 3), and the points at which the subsequent teeth of gear ① align with the reference tooth of gear ② be  $n_2, n_3, \dots$ . The relationship between the pitch shift amount and allowable transfer torque differs from one product to another. Confirm the allowable transfer torque table on the respective pages.

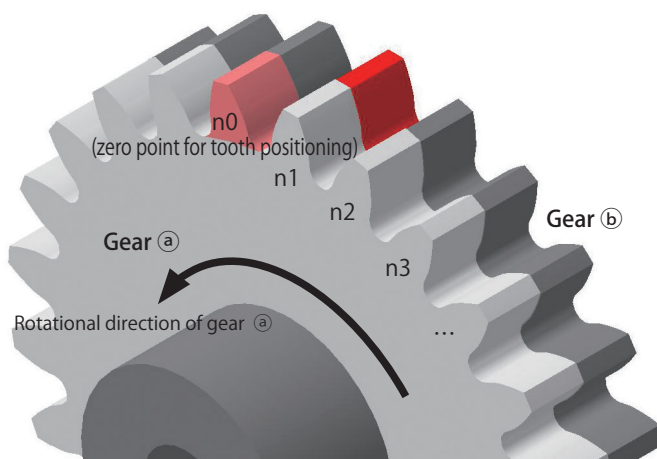


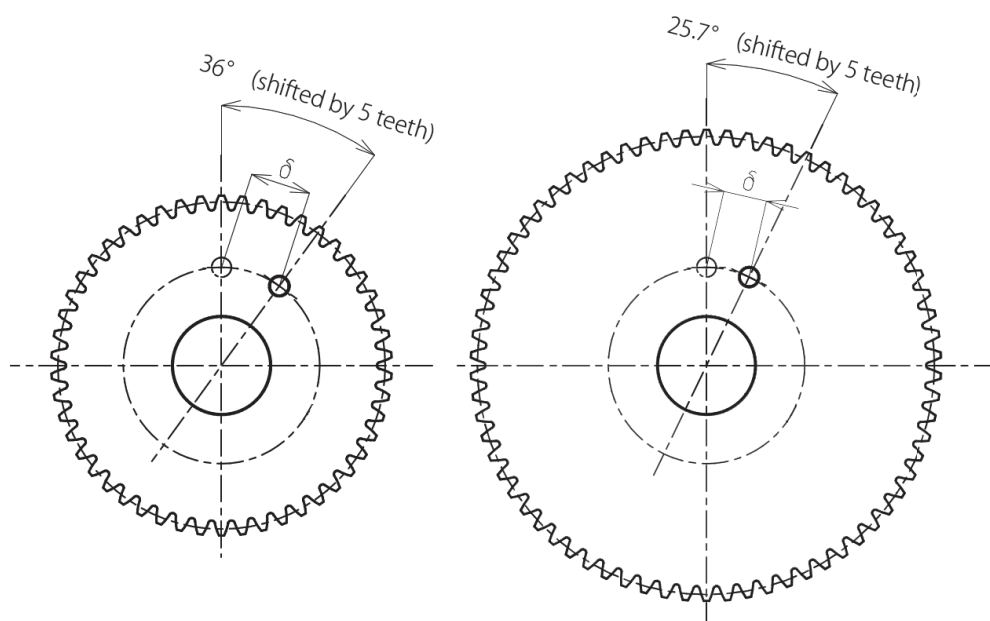
Fig. 3 Pitch shift

## 4) Why must the allowable transfer torque be observed?

The values specified in the allowable transfer torque table must be strictly observed.  
If the load torque exceeds the allowable transfer torque, backlash is generated.

# Anti-backlash gear information

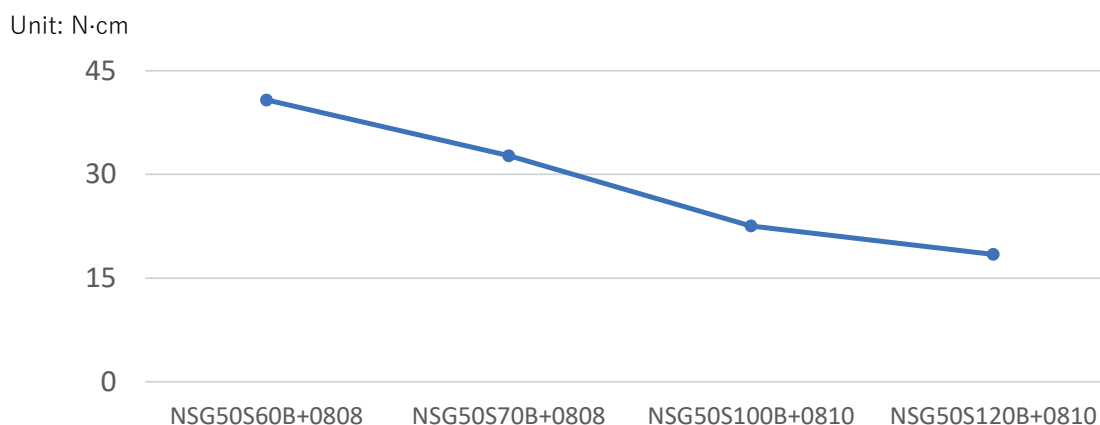
## 3. Cautions on the Allowable Transfer Torques of Some Anti-Backlash Spur Gears



$\delta$  : Elongation of spring (displacement)

(This is not an actual product drawing but is a schematic for some products prepared for explanation.)

Relationship between the number of teeth and allowable torque  
(Anti-backlash spur gears that have the same shift amount with different numbers of teeth.)



Generally, gears of the same specifications have an allowable transfer torque proportional to the number of teeth. However, some of our anti-backlash spur gears have an allowable transfer torque inversely proportional to the number of teeth for design reasons. The allowable transfer torque of an anti-backlash spur gear is determined by **the specifications of the spring (spring constant, installation location, and quantity)** and **the displacement of the spring (  $\delta$  )**, which depends on the number of teeth by which one gear is rotated with the other gear fixed.

In particular, when anti-backlash spur gears with different numbers of teeth are designed with springs of the same specifications (spring constant, installation location, and quantity), those with a smaller number of teeth have a larger allowable transfer torque. This is because anti-backlash spur gears with a smaller number of teeth have a larger tooth space split angle per tooth and therefore have a larger spring displacement (  $\delta$  ) if one gear is rotated with the other gear fixed by the same number of teeth. Therefore, when selecting a product, be sure to confirm the allowable transfer torque table.

★ Representative example: NSG series and Aluminum (A5056) gears of the NS series

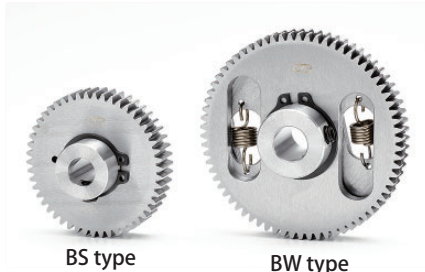


Unit: mm

| Accuracy of gears ① and ② before assembly | Material    | Pressure angle | Heat treatment               | Tooth surface hardness | Tooth surface machining |
|-------------------------------------------|-------------|----------------|------------------------------|------------------------|-------------------------|
| [JIS B 1702-1] Class N5                   | SCM435, 440 | 20°            | Induction hardening of teeth | HRC49 to 55            | Tooth surface grinding  |

- ★ No surface treatment is applied.
- ★ Observe the torque specified in the allowable transfer capability table so as to maintain the anti-backlash function.
- ★ For ASG series gears, gear ① and gear ② are secured with bolts after their positions are adjusted in order to control the backlash. \*For the tightening torque, refer to the relevant Japanese Industrial Standard (JIS).

| Catalogue number          | Module<br><i>m</i> | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>a</sub>(H7)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Fixing screw | Weight<br><i>W(kg)</i> |
|---------------------------|--------------------|-----------------------------|--------------------------------|--------------------------------------|------------------------|-------------------------------------------|--------------------------------------|------------------------------------|----------------------------|--------------|------------------------|
| <b>ASG1S 70B — 1012</b>   | 1                  | 70                          | φ 70                           | φ 72                                 | 10                     | φ 12                                      | φ 40                                 | 10                                 | 20                         | 6-M4-φ 54    | 0.39                   |
| <b>ASG1.5S 40B — 1515</b> | 1.5                | 40                          | φ 60                           | φ 63                                 | 15                     | φ 15                                      | φ 35                                 | 15                                 | 30                         | 6-M4-φ 46    | 0.41                   |
| <b>ASG1.5S 50B — 1520</b> |                    | 50                          | φ 75                           | φ 78                                 |                        | φ 20                                      | φ 45                                 |                                    |                            | 6-M5-φ 58    | 0.64                   |
| <b>ASG1.5S 60B — 1520</b> |                    | 60                          | φ 90                           | φ 93                                 |                        | φ 20                                      | φ 60                                 |                                    |                            | 6-M5-φ 74    | 1.02                   |
| <b>ASG2S 30B — 2015</b>   | 2                  | 30                          | φ 60                           | φ 64                                 | 20                     | φ 15                                      | φ 35                                 | 20                                 | 40                         | 6-M4-φ 45    | 0.54                   |
| <b>ASG2S 40B — 2020</b>   |                    | 40                          | φ 80                           | φ 84                                 |                        | φ 20                                      | φ 50                                 |                                    |                            | 6-M5-φ 62    | 1.01                   |
| <b>ASG2S 50B — 2020</b>   |                    | 50                          | φ 100                          | φ 104                                |                        | φ 20                                      | φ 60                                 |                                    |                            | 6-M6-φ 78    | 1.59                   |



Unit: mm

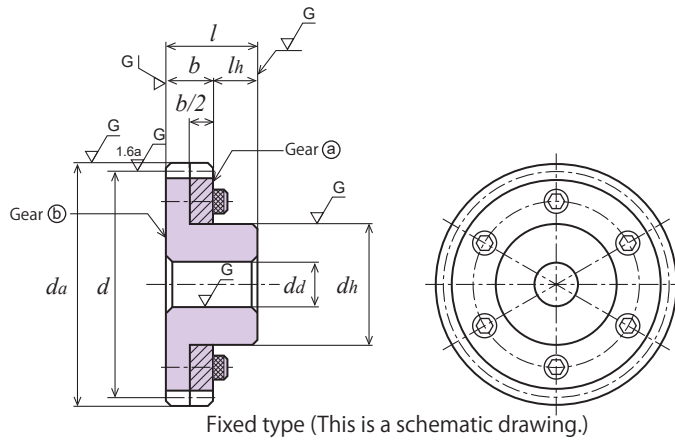
| Accuracy of gears ① and ② before assembly | Material    | Pressure angle | Heat treatment | Tooth surface hardness | Tooth surface machining |
|-------------------------------------------|-------------|----------------|----------------|------------------------|-------------------------|
| [JIS B 1702-1] Class N5                   | SCM435, 440 | 20°            | —              | —                      | Tooth surface grinding  |

- ★ No surface treatment is applied. Gears with a [4+] are provided with screw holes and set screws.
- ★ Observe the torque specified in the allowable transfer capability table so as to maintain the anti-backlash function. This value takes into consideration not only the factors of the gear itself but also the effect of the spring elasticity on the displacement.
- ★ For NSG series gears, a spring is used to mesh gear ① and gear ② with the mating gear, and the backlash is eliminated by the spring force.
- ★ The BS type uses an arc spring and the BW type uses a coil spring.
- ★ "n" in the allowable transfer torque table indicates the pitch shift amount. For details, refer to "How to Use Anti-Backlash Spur Gears."

| Catalogue number          | Module<br><i>m</i> | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Number of springs | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>a</sub>(H7)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Screw    |                      | Weight<br><i>W(g)</i> |
|---------------------------|--------------------|-----------------------------|--------------------------------|--------------------------------------|------|-------------------|------------------------|-------------------------------------------|--------------------------------------|------------------------------------|----------------------------|----------|----------------------|-----------------------|
|                           |                    |                             |                                |                                      |      |                   |                        |                                           |                                      |                                    |                            | <i>M</i> | <i>l<sub>s</sub></i> |                       |
| <b>NSG50S 60B + 0808</b>  | 0.5                | 60                          | φ 30                           | φ 31                                 | BS   | 1                 | 8                      | φ 8                                       | φ 16                                 | 8                                  | 16                         | M4       | 4                    | 45                    |
| <b>NSG50S 70B + 0808</b>  |                    | 70                          | φ 35                           | φ 36                                 |      |                   |                        | φ 8                                       | φ 16                                 |                                    |                            |          |                      | 61                    |
| <b>NSG50S 100B + 0810</b> |                    | 100                         | φ 50                           | φ 51                                 |      |                   |                        | φ 10                                      | φ 20                                 |                                    |                            |          |                      | 128                   |
| <b>NSG50S 120B + 0810</b> |                    | 120                         | φ 60                           | φ 61                                 |      |                   |                        | φ 10                                      | φ 20                                 |                                    |                            |          |                      | 182                   |
| <b>NSG80S 50B + 0810</b>  | 0.8                | 50                          | φ 40                           | φ 41.6                               | BW   | 2                 | 8                      | φ 10                                      | φ 20                                 | 10                                 | 18                         | M5       | 5                    | 87                    |
| <b>NSG80S 80B + 0810</b>  |                    | 80                          | φ 64                           | φ 65.6                               |      |                   |                        | φ 10                                      | φ 20                                 |                                    |                            |          |                      | 200                   |
| <b>NSG1S 50B + 1010</b>   | 1                  | 50                          | φ 50                           | φ 52                                 | BS   | 1                 | 10                     | φ 10                                      | φ 20                                 | 10                                 | 20                         | M6       | 5                    | 144                   |
| <b>NSG1S 60B + 1010</b>   |                    | 60                          | φ 60                           | φ 62                                 |      |                   |                        | φ 10                                      | φ 20                                 |                                    |                            |          |                      | 212                   |

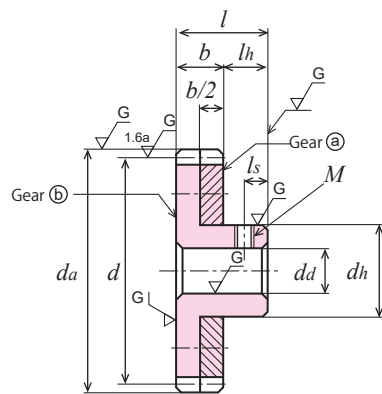


2D • 3D CAD

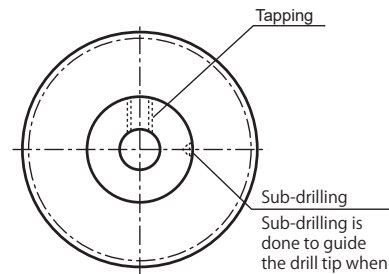


Fixed type (This is a schematic drawing.)

| Allowable transfer capability table for different revolutions per minute Bending strength (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute Surface durability (Unit: kW) |         |           |           |           |           |           | Catalogue number   |
|------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|--------------------|
| 400 rpm                                                                                              | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                    |
| 1.38                                                                                                 | 2.77    | 4.01      | 4.90      | 5.79      | 7.66      | 8.84      | 0.86                                                                                                   | 1.77    | 2.62      | 3.25      | 3.87      | 5.23      | 6.10      | ASG1S 70B — 1012   |
| 2.36                                                                                                 | 4.72    | 6.95      | 8.49      | 10.02     | 13.45     | 15.60     | 0.95                                                                                                   | 1.93    | 2.90      | 3.58      | 4.26      | 5.84      | 6.84      | ASG1.5S 40B — 1515 |
| 3.12                                                                                                 | 6.22    | 8.98      | 10.99     | 12.95     | 17.03     | 19.60     | 1.50                                                                                                   | 3.07    | 4.52      | 5.60      | 6.67      | 8.95      | 10.41     | ASG1.5S 50B — 1520 |
| 3.89                                                                                                 | 7.64    | 11.01     | 13.47     | 15.76     | 20.38     | 23.64     | 2.19                                                                                                   | 4.43    | 6.52      | 8.08      | 9.55      | 12.60     | 14.77     | ASG1.5S 60B — 1520 |
| 3.84                                                                                                 | 7.67    | 11.29     | 13.80     | 16.27     | 21.85     | 23.34     | 1.26                                                                                                   | 2.58    | 3.86      | 4.77      | 5.69      | 7.78      | 9.12      | ASG2S 30B — 2015   |
| 5.60                                                                                                 | 11.10   | 15.99     | 19.59     | 23.06     | 30.11     | 34.71     | 2.29                                                                                                   | 4.66    | 6.85      | 8.51      | 10.12     | 13.48     | 15.70     | ASG2S 40B — 2020   |
| 7.40                                                                                                 | 14.37   | 20.72     | 25.28     | 29.32     | 37.96     | 43.98     | 3.64                                                                                                   | 7.29    | 10.74     | 13.28     | 15.57     | 20.56     | 24.07     | ASG2S 50B — 2020   |



BS and BW types (This is a schematic drawing.)



Sub-drilling is done to guide the drill tip when drilling a pilot hole for tapping and pin insertion.

(Except the ASG and NSU series)

| Allowable transfer torque table for different shift amounts (Unit: N·cm) |       |       |       | Catalogue number   |
|--------------------------------------------------------------------------|-------|-------|-------|--------------------|
| n2                                                                       | n3    | n4    | n5    |                    |
| 13.33                                                                    | 21.18 | 31.08 | 40.79 | NSG50S 60B + 0808  |
| 10.86                                                                    | 16.35 | 24.83 | 32.72 | NSG50S 70B + 0808  |
| 8.16                                                                     | 12.91 | 17.81 | 22.55 | NSG50S 100B + 0810 |
| 7.25                                                                     | 10.39 | 15.29 | 18.43 | NSG50S 120B + 0810 |
| 14.12                                                                    | 25.36 | 32.68 | 42.09 | NSG80S 50B + 0810  |
| 46.44                                                                    | 56.48 | 66.73 | 76.98 | NSG80S 80B + 0810  |
| 18.14                                                                    | 27.29 | 35.13 | 47.85 | NSG1S 50B + 1010   |
| 16.86                                                                    | 23.92 | 31.77 | 40.99 | NSG1S 60B + 1010   |





Unit: mm

| Accuracy of gears ① and ② before assembly | Material | Pressure angle | Surface treatment | Tooth surface hardness |
|-------------------------------------------|----------|----------------|-------------------|------------------------|
| [JIS B 1702-1] Class N8                   | S45C     | 20°            | Soft nitriding    | MH v 450 or more       |

- ★ The allowable transfer capability table shows the torque values that you must observe in order to maintain the anti-backlash function. These values take into consideration not only the factors of the gear itself but also the effect of the spring elasticity on the displacement.
- ★ For NS series gears, a spring is used to mesh gear ① and gear ② with the mating gear, and the backlash is eliminated by the spring force.
- ★ The BW type uses a coil spring. Gears with a [+] are provided with screw holes and set screws (made of steel).
- ★ "n" in the allowable transfer torque table indicates the pitch shift amount. For details, refer to "How to Use Anti-Backlash Spur Gears."

| Catalogue number  | Module | Number of teeth | Reference diameter | Tip diameter | Type | Number of springs | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Screw |                | Weight |
|-------------------|--------|-----------------|--------------------|--------------|------|-------------------|------------|---------------|--------------|------------|----------------|-------|----------------|--------|
|                   |        |                 |                    |              |      |                   |            |               |              |            |                | M     | l <sub>s</sub> |        |
| NS80S 80B + 0810  | 0.8    | 80              | φ 64               | φ 65.6       | BW   | 2                 | 8          | φ10           | φ20          | 10         | 18             | M5    | 5              | 200    |
| NS80S 100B + 0810 |        | 100             | φ 80               | φ 81.6       |      | 2                 |            |               | φ24          |            |                |       |                | 324    |
| NS1S 70B + 1012   | 1      | 70              | φ 70               | φ 72         |      | 2                 | 10         | φ12           | φ24          | 10         | 20             | M6    |                | 298    |
| NS1S 100B + 1012  |        | 100             | φ100               | φ102         |      | 3                 |            |               | φ30          |            |                |       |                | 632    |
| NS1S 120B + 1012  |        | 120             | φ120               | φ122         |      | 3                 |            |               | φ30          |            |                |       |                | 903    |



Unit: mm

| Accuracy of gears ① and ② before assembly | Material | Pressure angle | Surface treatment | Tooth surface hardness |
|-------------------------------------------|----------|----------------|-------------------|------------------------|
| [JIS B 1702-1] Class N9                   | SUS304   | 20°            | Teflon            | —                      |

- ★ This allowable transfer capability table shows the torque values that you must observe in order to maintain the anti-backlash function. These values take into consideration not only the factors of the gear itself but also the effect of the spring elasticity on the displacement.
- ★ For NSU series gears, a spring is used to mesh gear ① and gear ② with the mating gear, and the backlash is eliminated by the spring force.
- ★ The BW type uses a coil spring. Gears with a [+] are provided with screw holes and set screws (made of steel).
- ★ "n" in the allowable transfer torque table indicates the pitch shift amount. For details, refer to "How to Use Anti-Backlash Spur Gears."
- ★ Teflon surface treatment is applied to prevent galling and ensure smooth sliding.

| Catalogue number   | Module   | Number of teeth | Reference diameter | Tip diameter         | Type | Number of springs | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Screw    |                      | Weight       |
|--------------------|----------|-----------------|--------------------|----------------------|------|-------------------|------------|---------------------------|----------------------|----------------------|----------------|----------|----------------------|--------------|
|                    | <i>m</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> |      |                   | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>M</i> | <i>l<sub>s</sub></i> | <i>W</i> (g) |
| NS50SU 60B + 0505  | 0.5      | 60              | φ30                | φ31                  | BW   | 2                 | 5          | φ 5                       | φ12                  | 8                    | 13             | M3       | 4                    | 32.3         |
| NS50SU 70B + 0508  |          | 70              | φ35                | φ36                  |      | 2                 |            | φ 8                       | φ16                  |                      |                | M3       |                      | 45.7         |
| NS50SU 80B + 0508  |          | 80              | φ40                | φ41                  |      | 3                 |            | φ 8                       | φ16                  |                      |                | M3       |                      | 57.4         |
| NS50SU 90B + 0510  |          | 90              | φ45                | φ46                  |      | 3                 |            | φ10                       | φ20                  |                      |                | M4       |                      | 74.9         |
| NS50SU 100B + 0510 |          | 100             | φ50                | φ51                  |      | 3                 |            | φ10                       | φ20                  |                      |                | M4       |                      | 89.7         |
| NS50SU 120B + 0510 |          | 120             | φ60                | φ61                  |      | 4                 |            | φ10                       | φ20                  |                      |                | M4       |                      | 123.9        |



Unit: mm

| Accuracy of gears ① and ② before assembly | Material | Pressure angle | Surface treatment | Tooth surface hardness |
|-------------------------------------------|----------|----------------|-------------------|------------------------|
| [JIS B 1702-1] Class N9                   | A5056    | 20°            | White alumite     | —                      |

- ★ This allowable transfer capability table shows the torque values that you must observe in order to maintain the anti-backlash function. These values take into consideration not only the factors of the gear itself but also the effect of the spring elasticity on the displacement.
- ★ For NS series gears, a spring is used to mesh gear ① and gear ② with the mating gear, and the backlash is eliminated by the spring force.
- ★ The BS type uses an arc spring. Gears with a [+] are provided with screw holes and set screws (made of steel).
- ★ "n" in the allowable transfer torque table indicates the pitch shift amount. For details, refer to "How to Use Anti-Backlash Spur Gears."

| Catalogue number   | Module   | Number of teeth | Reference diameter | Tip diameter         | Type | Number of springs | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Screw    |                      | Weight       |
|--------------------|----------|-----------------|--------------------|----------------------|------|-------------------|------------|---------------------------|----------------------|----------------------|----------------|----------|----------------------|--------------|
|                    | <i>m</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> |      |                   | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>M</i> | <i>l<sub>s</sub></i> | <i>W</i> (g) |
| NS50AL 60B + 0808  | 0.5      | 60              | φ 30               | φ 31                 | BS   | 1                 | 8          | φ 8                       | φ16                  | 8                    | 16             | M4       | 4                    | 16           |
| NS50AL 70B + 0808  |          | 70              | φ 35               | φ 36                 |      |                   |            | φ 8                       | φ16                  |                      |                |          |                      | 21           |
| NS50AL 80B + 0808  |          | 80              | φ 40               | φ 41                 |      |                   |            | φ 8                       | φ20                  |                      |                |          |                      | 30           |
| NS50AL 90B + 0810  |          | 90              | φ 45               | φ 46                 |      |                   |            | φ10                       | φ20                  |                      |                |          |                      | 36           |
| NS50AL 100B + 0810 | 0.8      | 100             | φ 50               | φ 51                 |      |                   | 8          | φ10                       | φ20                  | 10                   | 18             | M5       | 5                    | 44           |
| NS80AL 50B + 0810  |          | 50              | φ 40               | φ 41.6               |      |                   |            | φ10                       | φ20                  |                      |                |          |                      | 30           |
| NS1AL 50B + 1010   |          | 50              | φ 50               | φ 52                 |      |                   | 10         | φ10                       | φ20                  |                      | 20             | M6       | 5                    | 49           |
| NS1AL 60B + 1010   | 1        | 60              | φ 60               | φ 62                 |      |                   |            | φ10                       | φ20                  |                      |                |          |                      | 72           |

# NS

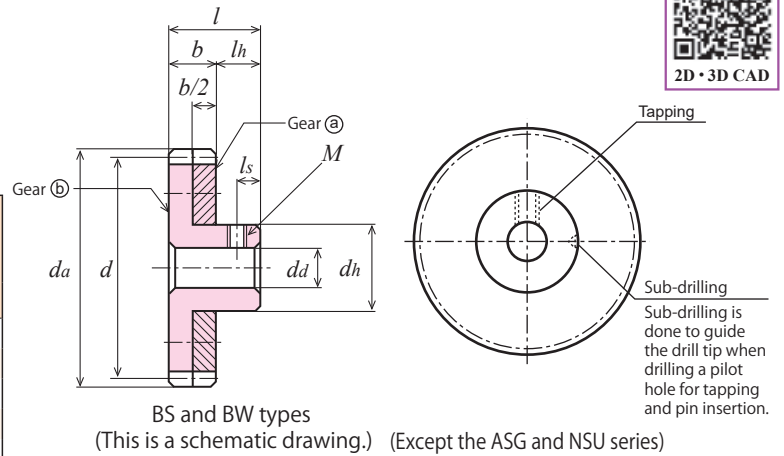
## Anti-backlash spur (s45c)

### Module 0.8/1

### (Full Depth Tooth)



| Allowable transfer torque table<br>for different shift amounts (Unit: N·cm) |        |        |        | Catalogue number  |
|-----------------------------------------------------------------------------|--------|--------|--------|-------------------|
| n2                                                                          | n3     | n4     | n5     |                   |
| 46.44                                                                       | 56.48  | 66.73  | 76.98  | NS80S 80B + 0810  |
| 47.59                                                                       | 61.19  | 74.53  | 87.33  | NS80S 100B + 0810 |
| 31.35                                                                       | 41.41  | -      | -      | NS1S 70B + 1012   |
| 74.19                                                                       | 103.29 | 122.90 | 145.78 | NS1S 100B + 1012  |
| 81.19                                                                       | 109.04 | 139.63 | 160.81 | NS1S 120B + 1012  |



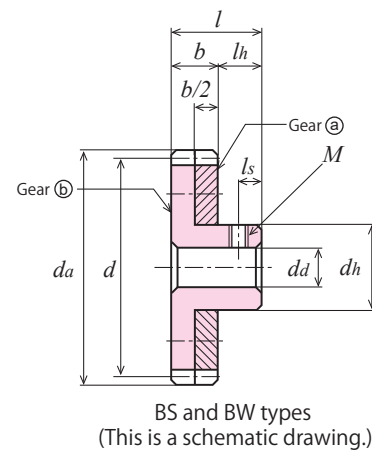
# NSU

## Anti-backlash spur (SUS304)

### Module 0.5

### (Full Depth Tooth)

| Allowable transfer torque table<br>for different shift amounts (Unit: N·cm) | Catalogue number          |
|-----------------------------------------------------------------------------|---------------------------|
| <i>n2</i>                                                                   |                           |
| 9.71                                                                        | <b>NS50SU 60B + 0505</b>  |
| 11.17                                                                       | <b>NS50SU 70B + 0508</b>  |
| 16.18                                                                       | <b>NS50SU 80B + 0508</b>  |
| 19.49                                                                       | <b>NS50SU 90B + 0510</b>  |
| 30.69                                                                       | <b>NS50SU 100B + 0510</b> |
| 39.85                                                                       | <b>NS50SU 120B + 0510</b> |



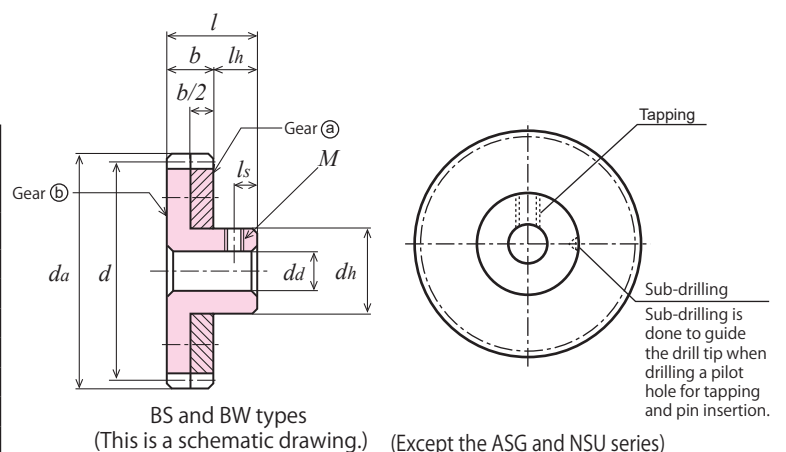
# NS

## Anti-backlash spur (A5056)

### Module 0.5/0.8/1

### (Full Depth Tooth)

| Allowable transfer torque table<br>for different shift amounts (Unit: N·cm) |       |       |       | Catalogue number   |
|-----------------------------------------------------------------------------|-------|-------|-------|--------------------|
| n2                                                                          | n3    | n4    | n5    |                    |
| 13.33                                                                       | 21.18 | 31.08 | 40.79 | NS50AL 60B + 0808  |
| 10.86                                                                       | 16.35 | 24.83 | 32.72 | NS50AL 70B + 0808  |
| 11.50                                                                       | 16.47 | 20.79 | 26.93 | NS50AL 80B + 0808  |
| 10.00                                                                       | 14.41 | 19.12 | 23.68 | NS50AL 90B + 0810  |
| 8.16                                                                        | 12.91 | 17.81 | 22.55 | NS50AL 100B + 0810 |
| 14.12                                                                       | 25.36 | 32.68 | 42.09 | NS80AL 50B + 0810  |
| 18.14                                                                       | 27.29 | 35.13 | 47.85 | NS1AL 50B + 1010   |
| 16.86                                                                       | 23.92 | 31.77 | 40.99 | NS1AL 60B + 1010   |



CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITTER GEARS

BEVEL GEARS

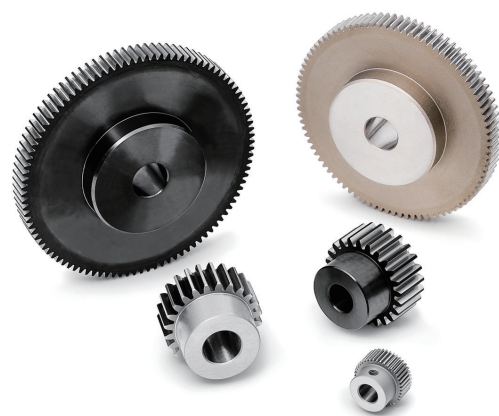
WORMS AND WORM  
WHEELS

REFERENCES

# Ground spur gears

## Spur gears

SG series  
SGR series  
S series



\* These are samples.

### How to Read Catalogue Numbers

**SG 50 S 50 B – 05 06 N**

| Gear type                                                                                                           | Module                                                                                                                                                              | Material                                             | Number of teeth                                  | Shape                                                        | Hole finish                                                                                                                                                                                                                  | Face width | Hole diameter | Type                                                |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|-----------------------------------------------------|
| SG : Ground spur gear<br>(Accuracy grade: JIS Class N5)<br>SGR : Ground spur gear<br>(Accuracy grade: JIS Class N6) | Represents the module size. When the module is less than 1, it indicates a value 100 times the actual module.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | SG Series<br>S: SCM435, 440<br>SGR Series<br>S: S45C | Example:<br>When the number of teeth is 50: "50" | L: Both side shaft are ground<br>B: Hub provided on one side | SG Series<br>[-]: No screw holes provided, no key grooves provided, ground finish<br>[*]: Two screw holes provided, ground finish<br>SGR Series<br>[-]: No screw hole provided, no key grooves provided, lathe turned finish | Unit: mm   | Unit: mm      | N: SG Series: Same shape and size as the SGR Series |

**S 1 S 25 A – 08 06 F**

| Gear type    | Module                                                                                                                                                              | Material                                                                                                                                                                         | Number of teeth                                  | Shape                                                                                                                                                                               | Hole finish                                                                                                                                                                                                                               | Face width | Hole diameter | Type                                    |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------|-----------------------------------------|
| S: Spur gear | Represents the module size. When the module is less than 1, it indicates a value 100 times the actual module.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | S : Carbon steel S45C<br>B : Brass C3604B, C3713P<br>SU : Stainless steel SUS304<br>BP : Acetal Blue POM<br>D : Acetal White POM<br>DB : Acetal White POM<br>Brass C3604 bushing | Example:<br>When the number of teeth is 25: "25" | A : No hub provided<br>B : Hub provided on one side<br>BF : Hub provided on one side (Product for additional machining)<br>L : Shafts provided on both sides<br>K : Cantilever gear | Lathe turning<br>[-]: No screw holes provided, no key grooves provided (except K1 and L1)<br>[+]: One screw hole provided<br>[*]: Two screw holes provided<br>[=]: Key groove provided<br>[#]: One key groove and one screw hole provided | Unit: mm   | Unit: mm      | F, N: Products for additional machining |

**"Use-friendly precision gears" that can be used in the field of mechatronics, including semiconductor production equipment, and for precision equipment and machine tools that require precise movements**

| Catalogue number | SG                                 | SGR                                | S            | S            | S                                      |
|------------------|------------------------------------|------------------------------------|--------------|--------------|----------------------------------------|
| Shape            |                                    |                                    |              |              |                                        |
| Page             | P. 66                              | P. 82                              | P. 94        | P. 136       | P. 146                                 |
| Material         | SCM435, 440                        | S45C                               | S45C         | SUS304       | Brass                                  |
| Module           | m0.5 to 3                          | m0.5 to 3                          | m0.5 to 3    | m0.5 to 2    | m 0.3 to 0.8                           |
| Accuracy grade   | JIS Class N5                       | JIS Class N6                       | JIS Class N8 | JIS Class N9 | JIS Class N9/ Outside of control range |
| Tooth treatment  | Grinding after Induction hardening | Grinding after Induction hardening | Cutting      | Cutting      | Cutting                                |

| Catalogue number | S                            | S                    | S                    | S                         |
|------------------|------------------------------|----------------------|----------------------|---------------------------|
| Shape            |                              |                      |                      |                           |
| Page             | P. 158                       | P. 160               | P. 170               | P. 176                    |
| Material         | White POM (w/ brass bushing) | Blue POM             | White POM            | White POM (w/ screw hole) |
| Module           | m 1                          | m0.5 to 3            | m0.5 to 1            | m0.5 to 1                 |
| Accuracy grade   | JIS Class N9 to 10 *         | JIS Class N9 to 10 * | JIS Class N9 to 10 * | JIS Class N9 to 10 *      |
| Tooth treatment  | Cutting                      | Cutting              | Cutting              | Cutting                   |

※ Accuracy at the time of manufacture.

# Ground spur gear and Spur gear information

## 1. Features of SG Series and SGR Series Ground Spur Gears

|            | Accuracy grade JIS B 1702-1 | Ground sections | Module     | Material    | Heat treatment               | Hardness    | Surface treatment     |
|------------|-----------------------------|-----------------|------------|-------------|------------------------------|-------------|-----------------------|
| SG Series  | Class N5                    | See Fig. 1.     | 0.5 to 3.0 | SCM435, 440 | Induction hardening of teeth | HRC49 to 55 | —                     |
| SGR Series | Class N6                    | See Fig. 2.     |            | S45C *1     |                              | HRC50 to 56 | Black oxide finish *2 |

\*1 S45C contains free-cutting material. \*2 No black oxide finish is applied to the tooth surfaces (ground surfaces).

The SG Series is a group of high-precision ground spur gears. The SGR series is an economy type for which only the tooth surfaces are ground.

SG series products whose catalogue number ends in N have enhanced gear performance with higher precision and strength than conventional SGR series products.

SG series products have the same gear dimensions and shape as SGR series products and can be replaced with SGR series products. The products of both series have been treated by induction hardening, and therefore, holes and hubs can be machined.

Ground sections of each series: 

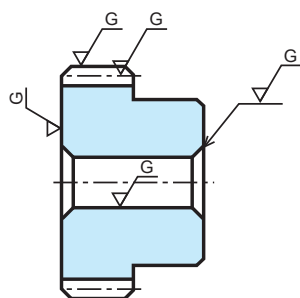


Fig. 1 SG Series

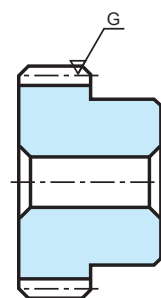


Fig. 2 SGR Series (Economy type)

## 2. Cautions on Machining SG Series Ground Spur Gears

We are always striving to offer high-precision, high-quality ground spur gears. However, machining may deteriorate the precision of the gears. If machining is required, keep the following points in mind.

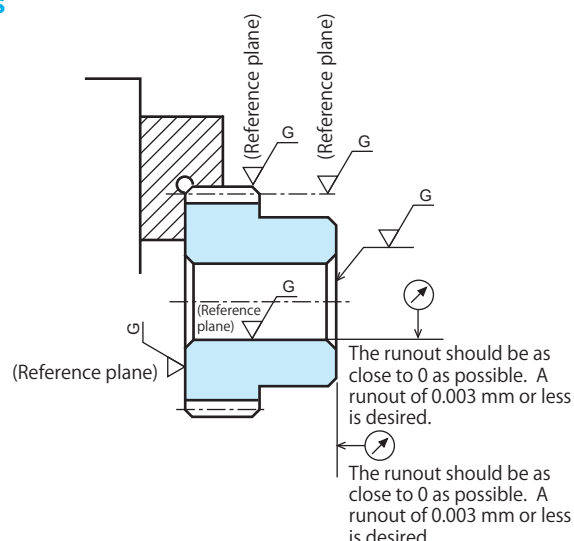
Also, refer to "Precautions for additional processing" in the KG-General Catalogue.

### 1) When machining holes (hole diameter) of SG ground spur gears

- ① Be sure to hold the outer circumference of the gear (tooth tips) with a soft jaw and scroll chuck and center the hole surface of the gear. The outer circumference and lateral faces have been finished by grinding. Centering is easy by holding the gear as shown in the figure.
- ② Only the tooth surfaces have been treated by hardening, but for small gears with a small module and a small number of teeth, the hardened layer may reach the bottom of the hole, resulting in poor machinability.
- ③ When machining gears, the maximum drilling diameter should be 60 to 70% of the hub diameter.

### 2) When machining other sections of SG ground spur gears

- ① Hold the gear in the same manner as when machining holes. When holding the hub with a chuck, be sure to center the hole surface as well.
- ② For gears having shafts on both sides (L type), note that the areas near the teeth (including the shafts) have been hardened by heat treatment.





## 3. Profile-shifted Gears

Profile-shifted gears are gears that have been machined by shifting the tooth cutter slightly from the reference circle in the radial direction. The following description is based on the intermeshing with the reference rack.

Explanation:

RD: Reference Diameter;

IPCD: Intermeshing Pitch Circle Diameter;

TCPCD: Tooth Cutting Pitch Circle Diameter

### 1) Gear with a rack shift coefficient of 0

Positional relationship between the tooth cutter and gear tooth cutting position (See Fig. 1.)

- ① Gear that has a rack shift coefficient ( $x$ ) of 0 when the pitch line of the tooth cutter (reference rack tooth profile) and the RD of the gear align with each other.
- ② RD of profile-shifted gear = TCPCD = IPCD with rack
- ③ Intermeshing center distance =  $\frac{\text{RD of pinion} + \text{RD of gear}}{2}$

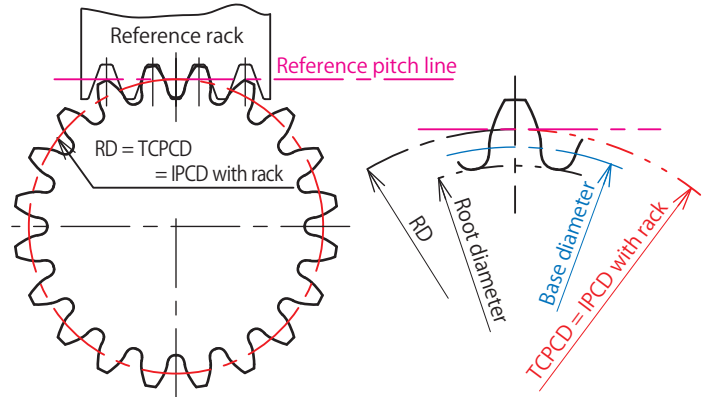


Fig. 1 Tooth profile with a rack shift coefficient ( $x$ ) of 0

### 2) Gear with positive (+) rack shift

Positional relationship between the tooth cutter and gear tooth cutting position (See Fig. 2.)

- ① Gear that has a positive (+) rack shift coefficient ( $x$ ) when the pitch line of the tooth cutter (reference rack tooth profile) is shifted outward from the RD of the gear. Standard spur gears (material: S45C) with modules ( $m$ ) of 1, 1.5, and 2 and 8 to 12 teeth have a positive rack shift coefficient ( $x$ ) of +0.5.
- ② RD of profile-shifted gear < TCPCD = IPCD with rack
- ③ Intermeshing center distance: See "4. Center Distance of Profile-Shifted-Spur Gears" of "Spur Gears - Information."

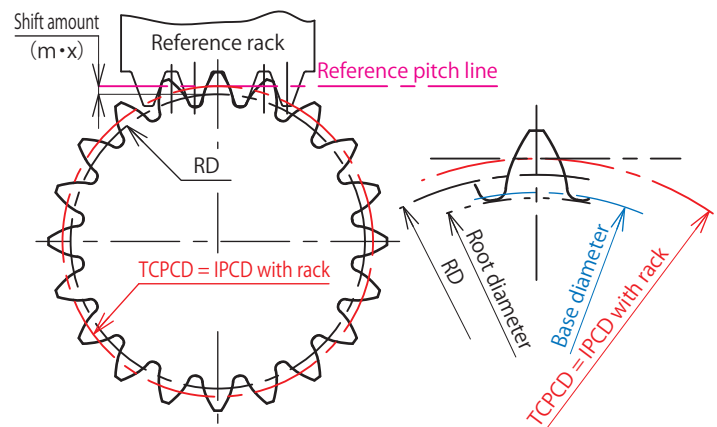


Fig. 2

Tooth profile with a positive (+) rack shift coefficient ( $x$ )

### 3) Gear with negative (-) rack shift

Positional relationship between the tooth cutter and gear tooth cutting position (See Fig. 3.)

- ① Gear that has a negative (-) rack shift coefficient ( $x$ ) when the pitch line of the tooth cutter (reference rack tooth profile) is shifted inward from the RD of the gear.
- ② RD of profile-shifted gear > TCPCD = IPCD with rack

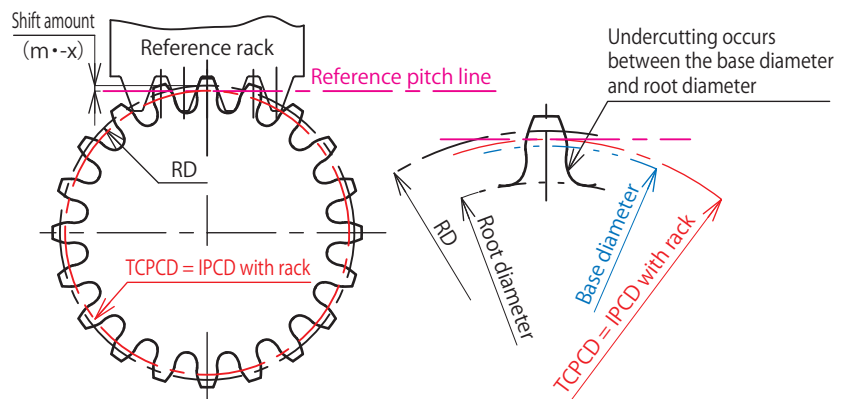


Fig. 3

Tooth profile with a negative (-) rack shift coefficient ( $x$ )

What are profile-shifted gears used mainly for?

- (1) Profile-shifted gears are used to prevent or reduce undercutting. When the root diameter is smaller than the base diameter, profile-shifted gears tend to have smaller tooth root strength (see Fig. 3). This phenomenon appears more remarkably with fewer teeth.
- (2) The contact distance can be adjusted.
- (3) Profile-shifted gears are also used to decrease the gear strength or reduce the meshing noise by adjusting the contact ratio.

What should be noted when using profile-shifted gears?

Complicated calculations are required to obtain the intermeshing center distance of a profile-shifted gear. When using our standard profile-shifted gears, see the table titled [Center Distance of Profile-Shifted-Spur Gears].

For more information, refer to our technical documents.

# Ground spur gear and Spur gear information

## "05 Tooth profile" specified by the DIN standard

Our standard spur gears (material: S45C) with 8 to 11 teeth adopt the "05 Tooth profile" specified by the DIN standard.

"05 Tooth profile" means that the rack shift coefficient is fixed at +0.5. With a "05 Tooth profile," in general, the bottom clearance is smaller, and therefore, the outside diameter is decreased by the product of the addendum reduction coefficient and module ( $k \cdot m$ ).

The following describes how to calculate the rack shift of our standard spur gears (with 8 to 11 teeth).

Contact pressure angle  $\alpha_w$  is expressed as follows:

$$\text{inv } \alpha_w = 2 \tan \alpha \left( \frac{x_1 + x_2}{z_1 + z_2} \right) + \text{inv } \alpha$$

Explanation

$z_1$  = Number of teeth of pinion

$z_2$  = Number of teeth of gear

$x_1$  = Rack shift coefficient of pinion

$x_2$  = Rack shift coefficient of gear

$\alpha_w$  = Pressure angle (tool pressure angle)

$\text{inv}$  = Involute function  $\text{inv } \alpha = \tan \alpha - \alpha$

(For the involute function table, refer to P. 164 to 167 in "Technical Data.")

Center distance modification coefficient  $y$  is expressed as follows:

$$y = \frac{z_1 + z_2}{2} \left( \frac{\cos \alpha}{\cos \alpha_w} - 1 \right)$$

The center distance  $a_s$  is expressed as follows:

$$a_s = \left( \frac{z_1 + z_2}{2} + y \right) m$$

Explanation

$m$  = Module

Intermeshing pitch circle diameters  $d'_1$  and  $d'_2$  are expressed respectively as follows:

$$d'_1 = 2 a_s \left( \frac{z_1}{z_1 + z_2} \right)$$

$$d'_2 = 2 a_s \left( \frac{z_2}{z_1 + z_2} \right)$$

Reference circle diameters  $d_1$  and  $d_2$  are also expressed respectively as follows:

$$d_1 = z_1 m$$

$$d_2 = z_2 m$$

Accordingly, the tip (outside) diameter  $d_{ax}$  is as follows:

$$d_{ax} = 2m \left( \frac{z+3}{2} - k \right)$$

Explanation

$k$  = Addendum reduction coefficient

The following equation results:

$$km = \left[ x_1 + x_2 - \frac{z_1 + z_2}{2} \left( \frac{\cos \alpha}{\cos \alpha_w} - 1 \right) \right] m$$

When the addendum of the tool is  $1.25m$ , the bottom clearance (minimum value) is  $0.21m$ .

When tooth 8 and tooth 8 mesh with each other, the center distance is as follows:

(Rack shift coefficient  $x = 0.5$ )

$$a_s / m = 8.7788 \text{ mm}$$

When tooth 10 and tooth 10 mesh with each other, the center distance is as follows:

(Rack shift coefficient  $x = 0.5$ )

$$a_s / m = 10.8043 \text{ mm}$$

The above calculation example shows the case where the module is 1 mm. For example, when the module is 2 mm and tooth 8 and tooth 8 mesh with each other, since  $a_s/m = 8.7788$  mm, center distance  $a_s$  is as follows:

$$a_s = 8.7788 \times 2$$

$$= 17.5576 \text{ mm}$$

Other standard gears can be used as the mating gear.

Excerpt from the Journal of JGMA (Japan Gear Manufacturers Association) Vol. 54, "German Gear Standards" (DIN 3994 and 3995)

# Ground spur gear and Spur gear information

## 4. Center Distance of Profile-Shifted Spur Gears

Center distance of a spur gear to be meshed with a profile-shifted gear (our standard product)

Recommended center distance in intermeshing with our profile-shifted gear (Unit: mm)

In the table below: The values in the table below indicate the center distance  $a_x$  between gears when the module is 1.

When the gear module changes, multiply the module by the value shown below.

Example: When the module is 2 and the number of teeth is 8, the center distance is  $8.779 \times 2$  (module).

(Currently, the rack shift coefficient  $x$  of our profile-shifted spur gear with module 1 or more is 0.5.)

| Number of teeth<br>Number of teeth | 8<br>(profile-shifted) | 9<br>(profile-shifted) | 10<br>(profile-shifted) | 11<br>(profile-shifted) |
|------------------------------------|------------------------|------------------------|-------------------------|-------------------------|
| 8 (profile-shifted)                | 8.779                  | 9.286                  | 9.792                   | 10.298                  |
| 9 (profile-shifted)                | 9.286                  | 9.792                  | 10.299                  | 10.804                  |
| 10 (profile-shifted)               | 9.792                  | 10.299                 | 10.804                  | 11.310                  |
| 11 (profile-shifted)               | 10.299                 | 10.804                 | 11.310                  | 11.815                  |
| 12                                 | 10.437                 | 10.939                 | 11.441                  | 11.943                  |
| 13                                 | 10.939                 | 11.441                 | 11.943                  | 12.445                  |
| 14                                 | 11.441                 | 11.942                 | 12.445                  | 12.946                  |
| 15                                 | 11.943                 | 12.445                 | 12.946                  | 13.448                  |
| 16                                 | 12.445                 | 12.946                 | 13.448                  | 13.949                  |
| 17                                 | 12.946                 | 13.448                 | 13.949                  | 14.451                  |
| 18                                 | 13.448                 | 13.949                 | 14.451                  | 14.952                  |
| 19                                 | 13.949                 | 14.451                 | 14.952                  | 15.453                  |
| 20                                 | 14.451                 | 14.952                 | 15.453                  | 15.954                  |
| 21                                 | 14.952                 | 15.453                 | 15.954                  | 16.455                  |
| 22                                 | 15.453                 | 15.954                 | 16.455                  | 16.956                  |
| 23                                 | 15.954                 | 16.455                 | 16.956                  | 17.457                  |
| 24                                 | 16.455                 | 16.956                 | 17.457                  | 17.958                  |
| 25                                 | 16.956                 | 17.457                 | 17.958                  | 18.459                  |
| 26                                 | 17.457                 | 17.958                 | 18.459                  | 18.960                  |
| 27                                 | 17.958                 | 18.459                 | 18.960                  | 19.461                  |
| 28                                 | 18.459                 | 18.960                 | 19.461                  | 19.962                  |
| 29                                 | 18.960                 | 19.461                 | 19.962                  | 20.463                  |
| 30                                 | 19.461                 | 19.962                 | 20.463                  | 20.963                  |
| 32                                 | 20.463                 | 20.963                 | 21.464                  | 21.965                  |
| 34                                 | 21.464                 | 21.965                 | 22.465                  | 22.966                  |
| 35                                 | 21.965                 | 22.465                 | 22.966                  | 23.467                  |
| 36                                 | 22.465                 | 22.966                 | 23.467                  | 23.967                  |
| 38                                 | 23.467                 | 23.967                 | 24.468                  | 24.968                  |
| 40                                 | 24.468                 | 24.968                 | 25.469                  | 25.969                  |
| 42                                 | 25.469                 | 25.969                 | 26.470                  | 26.970                  |
| 44                                 | 26.470                 | 26.970                 | 27.471                  | 27.971                  |

| Number of teeth<br>Number of teeth | 8<br>(profile-shifted) | 9<br>(profile-shifted) | 10<br>(profile-shifted) | 11<br>(profile-shifted) |
|------------------------------------|------------------------|------------------------|-------------------------|-------------------------|
| 45                                 | 26.970                 | 27.471                 | 27.971                  | 28.472                  |
| 46                                 | 27.471                 | 27.971                 | 28.472                  | 28.972                  |
| 48                                 | 28.472                 | 28.972                 | 29.473                  | 29.973                  |
| 50                                 | 29.473                 | 29.973                 | 30.473                  | 30.974                  |
| 52                                 | 30.473                 | 30.974                 | 31.474                  | 31.974                  |
| 54                                 | 31.474                 | 31.974                 | 32.475                  | 32.975                  |
| 55                                 | 31.974                 | 32.475                 | 32.975                  | 33.475                  |
| 56                                 | 32.475                 | 32.975                 | 33.475                  | 33.976                  |
| 58                                 | 33.475                 | 33.976                 | 34.476                  | 34.976                  |
| 60                                 | 34.476                 | 34.976                 | 35.477                  | 35.977                  |
| 62                                 | 35.477                 | 35.977                 | 36.477                  | 36.977                  |
| 64                                 | 36.477                 | 36.977                 | 37.478                  | 37.978                  |
| 65                                 | 36.977                 | 37.478                 | 37.978                  | 38.478                  |
| 66                                 | 37.478                 | 37.978                 | 38.478                  | 38.979                  |
| 68                                 | 38.478                 | 38.979                 | 39.479                  | 39.979                  |
| 70                                 | 39.479                 | 39.979                 | 40.479                  | 40.979                  |
| 72                                 | 40.479                 | 40.979                 | 41.480                  | 41.980                  |
| 75                                 | 41.980                 | 42.480                 | 42.980                  | 43.480                  |
| 80                                 | 44.481                 | 44.981                 | 45.481                  | 45.981                  |
| 84                                 | 46.482                 | 46.982                 | 47.482                  | 47.982                  |
| 85                                 | 46.982                 | 47.482                 | 47.982                  | 48.482                  |
| 90                                 | 49.483                 | 49.983                 | 50.483                  | 50.983                  |
| 95                                 | 51.983                 | 52.483                 | 52.984                  | 53.484                  |
| 96                                 | 52.483                 | 52.984                 | 53.484                  | 53.984                  |
| 100                                | 54.484                 | 54.984                 | 55.484                  | 55.985                  |
| 105                                | 56.985                 | 57.485                 | 57.985                  | 58.485                  |
| 108                                | 58.485                 | 58.985                 | 59.485                  | 59.985                  |
| 110                                | 59.485                 | 59.985                 | 60.485                  | 60.986                  |
| 112                                | 60.485                 | 60.986                 | 61.486                  | 61.986                  |
| 115                                | 61.986                 | 62.486                 | 62.986                  | 63.486                  |
| 120                                | 64.486                 | 64.987                 | 65.487                  | 65.987                  |

Assembly distance of a rack to be meshed with our profile-shifted spur gear

$$a = h'' + \frac{m \times z}{2} + xm$$

$a$  : Assembly distance (from the rack bottom to the spur gear center)

$h''$  : Rack datum line (See the production description pages for racks.)

$m$  : Module

$x$  : Rack shift coefficient

$z$  : Number of teeth

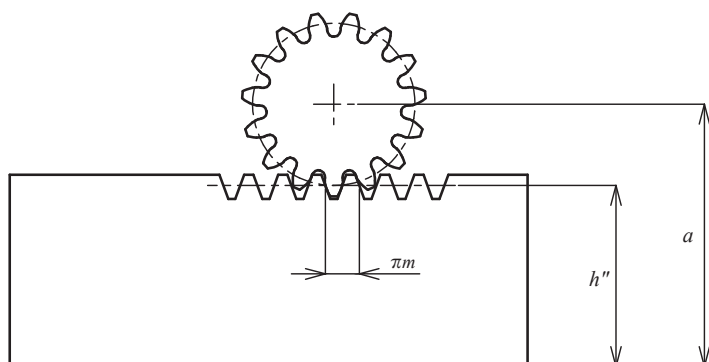
When the module is 1 or more and the number of teeth is 8 to 11:

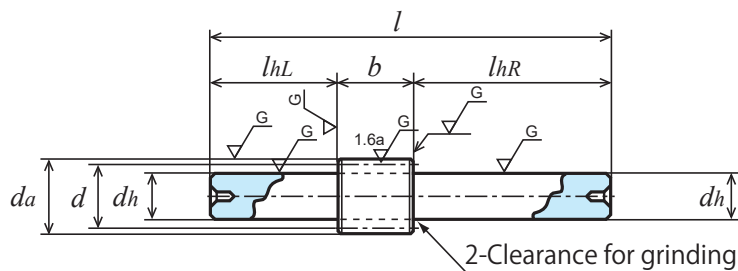
$$x = 0.5$$

When the module is 1 or more and the number of teeth is 12 or more:

$$x = 0$$

\* This is for our standard products.





L1 type

Unit: mm

| Accuracy Class    | Material   | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|------------|----------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N5 | SCM435/440 | 20°            | Induction hardening of teeth | HRC49 to 55            | See the table below |

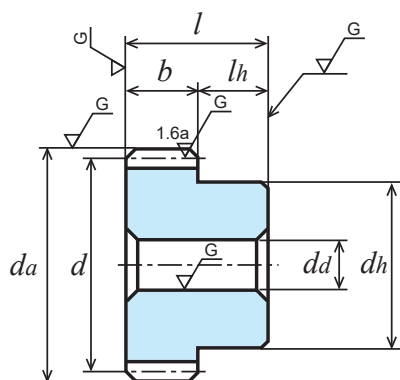
★ No surface treatment is applied. [\*] Two screw holes and set screws are provided.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

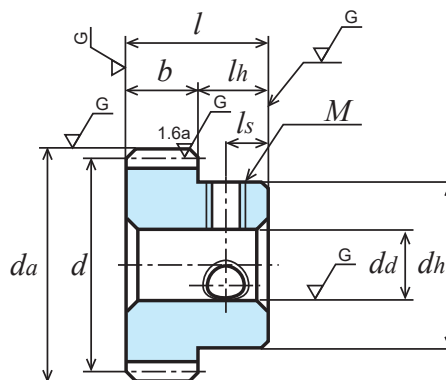
★ Products with module 0.5 have face widths of 5 mm and 8 mm.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

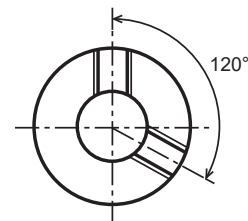
| Catalogue number          | Module<br><i>m</i> | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>da</i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>da(H7)</i> | Hub diameter<br><i>dh</i> | Hub length<br><i>lh</i> | Overall length<br><i>l</i> | Screw    |           | Weight<br><i>W(kg)</i> |
|---------------------------|--------------------|-----------------------------|--------------------------------|---------------------------|------|------------------------|--------------------------------|---------------------------|-------------------------|----------------------------|----------|-----------|------------------------|
|                           |                    |                             |                                |                           |      |                        |                                |                           |                         |                            | <i>M</i> | <i>ls</i> |                        |
| <b>SG50S 20L — 0806</b>   | 0.5                | 20                          | φ10                            | φ11                       | L1   | 8                      | -                              | φ 6 (h7)                  | L22 R50                 | 80                         | -        | -         | 0.021                  |
| <b>SG50S 28B — 0805</b>   |                    | 28                          | φ14                            | φ15                       | B1   | 8                      | φ 5                            | φ10                       | 8                       | 16                         | -        | -         | 0.012                  |
| <b>SG50S 30B — 0505N</b>  |                    | 30                          | φ15                            | φ16                       |      | 5                      | φ 5                            | φ12                       |                         | 13                         | -        | -         | 0.012                  |
| <b>SG50S 30B * 0806</b>   |                    | 30                          | φ15                            | φ16                       |      | 8                      | φ 6                            | φ12                       |                         | 16                         | 2-M3     | 4         | 0.014                  |
| <b>SG50S 36B — 0808</b>   |                    | 36                          | φ18                            | φ19                       |      | 8                      | φ 8                            | φ16                       |                         | 16                         | -        | -         | 0.022                  |
| <b>SG50S 40B — 0506N</b>  |                    | 40                          | φ20                            | φ21                       |      | 5                      | φ 6                            | φ15                       |                         | 13                         | -        | -         | 0.021                  |
| <b>SG50S 40B — 0806</b>   |                    | 40                          | φ20                            | φ21                       |      | 8                      | φ 6                            | φ16                       |                         | 16                         | -        | -         | 0.029                  |
| <b>SG50S 40B * 0808</b>   |                    | 40                          | φ20                            | φ21                       |      | 8                      | φ 8                            | φ16                       |                         | 16                         | 2-M4     | 4         | 0.026                  |
| <b>SG50S 50B — 0506N</b>  |                    | 50                          | φ25                            | φ26                       |      | 5                      | φ 6                            | φ18                       |                         | 13                         | -        | -         | 0.032                  |
| <b>SG50S 60B — 0506N</b>  |                    | 60                          | φ30                            | φ31                       |      | 5                      | φ 6                            | φ22                       |                         | 13                         | -        | -         | 0.049                  |
| <b>SG50S 70B — 0508N</b>  |                    | 70                          | φ35                            | φ36                       |      | 5                      | φ 8                            | φ25                       |                         | 13                         | -        | -         | 0.063                  |
| <b>SG50S 72B — 0808</b>   |                    | 72                          | φ36                            | φ37                       |      | 8                      | φ 8                            | φ25                       |                         | 16                         | -        | -         | 0.088                  |
| <b>SG50S 80B — 0508N</b>  |                    | 80                          | φ40                            | φ41                       |      | 5                      | φ 8                            | φ28                       |                         | 13                         | -        | -         | 0.083                  |
| <b>SG50S 90B — 0508N</b>  |                    | 90                          | φ45                            | φ46                       |      | 5                      | φ 8                            | φ32                       |                         | 13                         | -        | -         | 0.108                  |
| <b>SG50S 100B — 0510N</b> |                    | 100                         | φ50                            | φ51                       |      | 5                      | φ10                            | φ35                       |                         | 13                         | -        | -         | 0.130                  |
| <b>SG50S 120B — 0510N</b> |                    | 120                         | φ60                            | φ61                       |      | 5                      | φ10                            | φ42                       |                         | 13                         | -        | -         | 0.190                  |
| <b>SG80S 15L — 0806</b>   | 0.8                | 15                          | φ12                            | φ13.6                     | L1   | -                      | -                              | φ 6 (h7)                  | L22 R60                 | 90                         | -        | -         | 0.025                  |
| <b>SG80S 25B — 0806</b>   |                    | 25                          | φ20                            | φ21.6                     | B1   | 8                      | φ 6                            | φ16                       | 10                      | 18                         | -        | -         | 0.031                  |
| <b>SG80S 25B — 0805N</b>  |                    | 25                          | φ20                            | φ21.6                     |      |                        | φ 5                            | φ16                       |                         |                            | -        | -         | 0.033                  |
| <b>SG80S 30B — 0805N</b>  |                    | 30                          | φ24                            | φ25.6                     |      |                        | φ 5                            | φ20                       |                         |                            | -        | -         | 0.050                  |
| <b>SG80S 40B — 0810</b>   |                    | 40                          | φ32                            | φ33.6                     |      |                        | φ10                            | φ25                       |                         |                            | -        | -         | 0.077                  |
| <b>SG80S 40B — 0808N</b>  |                    | 40                          | φ32                            | φ33.6                     |      |                        | φ 8                            | φ25                       |                         |                            | -        | -         | 0.082                  |
| <b>SG80S 45B — 0810</b>   |                    | 45                          | φ36                            | φ37.6                     |      |                        | φ10                            | φ25                       |                         |                            | -        | -         | 0.091                  |
| <b>SG80S 50B — 0808N</b>  |                    | 50                          | φ40                            | φ41.6                     |      |                        | φ 8                            | φ28                       |                         |                            | -        | -         | 0.120                  |
| <b>SG80S 56B — 0810</b>   |                    | 56                          | φ44.8                          | φ46.4                     |      |                        | φ10                            | φ25                       |                         |                            | -        | -         | 0.126                  |
| <b>SG80S 60B — 0808N</b>  |                    | 60                          | φ48                            | φ49.6                     |      |                        | φ 8                            | φ28                       |                         |                            | -        | -         | 0.155                  |
| <b>SG80S 70B — 0808N</b>  |                    | 70                          | φ56                            | φ57.6                     |      |                        | φ 8                            | φ28                       |                         |                            | -        | -         | 0.196                  |
| <b>SG80S 80B — 0812</b>   |                    | 80                          | φ64                            | φ65.6                     |      |                        | φ12                            | φ30                       |                         |                            | -        | -         | 0.240                  |
| <b>SG80S 80B — 0808N</b>  |                    | 80                          | φ64                            | φ65.6                     |      |                        | φ 8                            | φ28                       |                         |                            | -        | -         | 0.243                  |
| <b>SG80S 90B — 0810N</b>  |                    | 90                          | φ72                            | φ73.6                     |      |                        | φ10                            | φ30                       |                         |                            | -        | -         | 0.300                  |
| <b>SG80S 100B — 0812N</b> |                    | 100                         | φ80                            | φ81.6                     |      |                        | φ12                            | φ40                       |                         |                            | -        | -         | 0.398                  |
| <b>SG80S 120B — 0812N</b> |                    | 120                         | φ96                            | φ97.6                     |      |                        | φ12                            | φ40                       |                         |                            | -        | -         | 0.534                  |



B1 type [-]

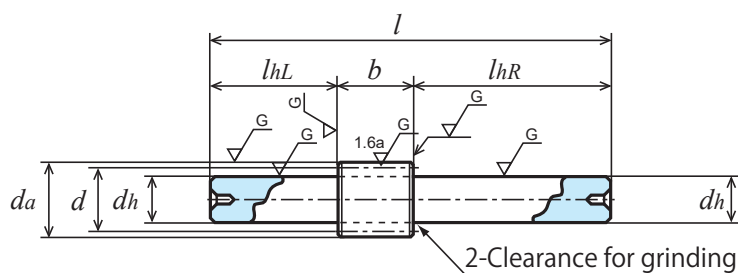


B1 type [\*]



| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number   |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|--------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                    |
| 0.10                                                                                                   | 0.21    | 0.32      | 0.40      | 0.48      | 0.67      | 0.81      | 0.025                                                                                                    | 0.050   | 0.076     | 0.095     | 0.115     | 0.161     | 0.194     | 0.02 to 0.06           | SG50S 20L – 0806   |
| 0.17                                                                                                   | 0.34    | 0.52      | 0.65      | 0.78      | 1.09      | 1.31      | 0.050                                                                                                    | 0.101   | 0.152     | 0.191     | 0.231     | 0.324     | 0.391     |                        | SG50S 28B – 0805   |
| 0.11                                                                                                   | 0.23    | 0.35      | 0.44      | 0.53      | 0.74      | 0.89      | 0.036                                                                                                    | 0.072   | 0.110     | 0.138     | 0.166     | 0.233     | 0.282     |                        | SG50S 30B – 0505N  |
| 0.19                                                                                                   | 0.38    | 0.57      | 0.71      | 0.86      | 1.19      | 1.43      | 0.057                                                                                                    | 0.116   | 0.176     | 0.221     | 0.266     | 0.374     | 0.451     |                        | SG50S 30B * 0806   |
| 0.24                                                                                                   | 0.48    | 0.73      | 0.91      | 1.09      | 1.52      | 1.83      | 0.084                                                                                                    | 0.169   | 0.256     | 0.322     | 0.389     | 0.546     | 0.661     |                        | SG50S 36B – 0808   |
| 0.17                                                                                                   | 0.34    | 0.52      | 0.65      | 0.78      | 1.09      | 1.30      | 0.065                                                                                                    | 0.131   | 0.199     | 0.250     | 0.302     | 0.425     | 0.513     |                        | SG50S 40B – 0506N  |
| 0.27                                                                                                   | 0.55    | 0.83      | 1.04      | 1.25      | 1.74      | 2.09      | 0.10                                                                                                     | 0.21    | 0.31      | 0.40      | 0.48      | 0.68      | 0.82      |                        | SG50S 40B – 0806   |
| 0.27                                                                                                   | 0.55    | 0.83      | 1.04      | 1.25      | 1.74      | 2.09      | 0.10                                                                                                     | 0.21    | 0.31      | 0.40      | 0.48      | 0.68      | 0.82      |                        | SG50S 40B * 0808   |
| 0.23                                                                                                   | 0.46    | 0.69      | 0.86      | 1.04      | 1.43      | 1.69      | 0.10                                                                                                     | 0.20    | 0.31      | 0.39      | 0.48      | 0.67      | 0.80      |                        | SG50S 50B – 0506N  |
| 0.28                                                                                                   | 0.57    | 0.86      | 1.08      | 1.29      | 1.76      | 2.07      | 0.15                                                                                                     | 0.30    | 0.46      | 0.58      | 0.70      | 0.97      | 1.15      |                        | SG50S 60B – 0506N  |
| 0.34                                                                                                   | 0.69    | 1.03      | 1.29      | 1.54      | 2.08      | 2.45      | 0.20                                                                                                     | 0.41    | 0.63      | 0.80      | 0.96      | 1.32      | 1.57      |                        | SG50S 70B – 0508N  |
| 0.57                                                                                                   | 1.14    | 1.17      | 2.14      | 2.55      | 3.43      | 4.04      | 0.35                                                                                                     | 0.71    | 1.08      | 1.36      | 1.63      | 2.23      | 2.66      |                        | SG50S 72B – 0808   |
| 0.40                                                                                                   | 0.80    | 1.21      | 1.51      | 1.78      | 2.39      | 2.83      | 0.27                                                                                                     | 0.55    | 0.84      | 1.06      | 1.26      | 1.72      | 2.05      |                        | SG50S 80B – 0508N  |
| 0.46                                                                                                   | 0.92    | 1.38      | 1.71      | 2.01      | 2.71      | 3.20      | 0.34                                                                                                     | 0.70    | 1.07      | 1.34      | 1.59      | 2.18      | 2.60      |                        | SG50S 90B – 0508N  |
| 0.52                                                                                                   | 1.04    | 1.55      | 1.91      | 2.25      | 3.02      | 3.56      | 0.43                                                                                                     | 0.88    | 1.33      | 1.65      | 1.97      | 2.70      | 3.21      |                        | SG50S 100B – 0510N |
| 0.63                                                                                                   | 1.27    | 1.88      | 2.29      | 2.71      | 3.64      | 4.22      | 0.63                                                                                                     | 1.28    | 1.93      | 2.38      | 2.84      | 3.89      | 4.56      |                        | SG50S 120B – 0510N |
| 0.17                                                                                                   | 0.35    | 0.52      | 0.66      | 0.79      | 1.10      | 1.32      | 0.036                                                                                                    | 0.075   | 0.11      | 0.13      | 0.16      | 0.23      | 0.28      |                        | SG80S 15L – 0806   |
| 0.38                                                                                                   | 0.76    | 1.14      | 1.43      | 1.71      | 2.38      | 2.85      | 0.104                                                                                                    | 0.211   | 0.31      | 0.40      | 0.48      | 0.68      | 0.82      |                        | SG80S 25B – 0806   |
| 0.38                                                                                                   | 0.76    | 1.14      | 1.43      | 1.71      | 2.38      | 2.85      | 0.104                                                                                                    | 0.211   | 0.31      | 0.40      | 0.48      | 0.68      | 0.82      |                        | SG80S 25B – 0805N  |
| 0.49                                                                                                   | 0.98    | 1.47      | 1.84      | 2.20      | 3.05      | 3.61      | 0.15                                                                                                     | 0.30    | 0.46      | 0.58      | 0.70      | 0.99      | 1.18      |                        | SG80S 30B – 0805N  |
| 0.71                                                                                                   | 1.43    | 2.14      | 2.68      | 3.21      | 4.34      | 5.10      | 0.27                                                                                                     | 0.55    | 0.84      | 1.06      | 1.29      | 1.76      | 2.10      |                        | SG80S 40B – 0810   |
| 0.71                                                                                                   | 1.43    | 2.14      | 2.68      | 3.21      | 4.34      | 5.10      | 0.27                                                                                                     | 0.55    | 0.84      | 1.06      | 1.29      | 1.76      | 2.10      |                        | SG80S 40B – 0808N  |
| 0.82                                                                                                   | 1.65    | 2.48      | 3.11      | 3.69      | 4.97      | 5.86      | 0.35                                                                                                     | 0.71    | 1.08      | 1.36      | 1.63      | 2.23      | 2.66      |                        | SG80S 45B – 0810   |
| 0.94                                                                                                   | 1.89    | 2.84      | 3.53      | 4.18      | 5.61      | 6.63      | 0.43                                                                                                     | 0.88    | 1.34      | 1.69      | 2.02      | 2.76      | 3.29      |                        | SG80S 50B – 0808N  |
| 1.08                                                                                                   | 2.17    | 3.29      | 4.02      | 4.74      | 6.38      | 7.52      | 0.55                                                                                                     | 1.12    | 1.70      | 2.13      | 2.53      | 3.47      | 4.13      |                        | SG80S 56B – 0810   |
| 1.18                                                                                                   | 2.36    | 3.54      | 4.34      | 5.12      | 6.89      | 8.11      | 0.63                                                                                                     | 1.29    | 1.97      | 2.44      | 2.90      | 3.98      | 4.74      |                        | SG80S 60B – 0808N  |
| 1.42                                                                                                   | 2.84    | 4.20      | 5.14      | 6.05      | 8.14      | 9.50      | 0.87                                                                                                     | 1.79    | 2.69      | 3.33      | 3.96      | 5.43      | 6.40      |                        | SG80S 70B – 0808N  |
| 1.66                                                                                                   | 3.32    | 4.85      | 5.92      | 6.99      | 9.34      | 10.80     | 1.15                                                                                                     | 2.36    | 3.52      | 4.34      | 5.18      | 7.06      | 8.25      |                        | SG80S 80B – 0812   |
| 1.66                                                                                                   | 3.32    | 4.85      | 5.92      | 6.99      | 9.34      | 10.80     | 1.15                                                                                                     | 2.36    | 3.52      | 4.34      | 5.18      | 7.06      | 8.25      |                        | SG80S 80B – 0808N  |
| 1.90                                                                                                   | 3.79    | 5.48      | 6.70      | 7.90      | 10.43     | 12.02     | 1.47                                                                                                     | 3.02    | 4.45      | 5.51      | 6.56      | 8.83      | 10.29     |                        | SG80S 90B – 0810N  |
| 2.14                                                                                                   | 4.23    | 6.10      | 7.48      | 8.80      | 11.49     | 13.25     | 1.83                                                                                                     | 3.73    | 5.48      | 6.80      | 8.09      | 10.78     | 12.56     |                        | SG80S 100B – 0812N |
| 2.62                                                                                                   | 5.11    | 7.36      | 8.99      | 10.47     | 13.54     | 15.70     | 2.68                                                                                                     | 5.37    | 7.92      | 9.80      | 11.53     | 15.20     | 17.82     |                        | SG80S 120B – 0812N |





L1 type

Unit: mm

| Accuracy Class    | Material   | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|------------|----------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N5 | SCM435/440 | 20°            | Induction hardening of teeth | HRC49 to 55            | See the table below |

★ No surface treatment is applied. [\*] Two screw holes and set screws are provided.

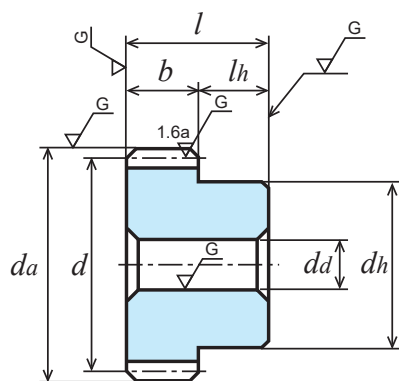
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

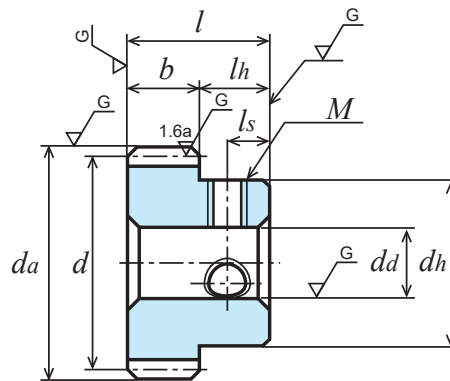
| Catalogue number        | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$da(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw |       | Weight<br>$W(kg)$ |
|-------------------------|------------------------|---------------------------|-----------------------|------|-------------------|---------------------------|-----------------------|---------------------|-----------------------|-------|-------|-------------------|
|                         |                        |                           |                       |      |                   |                           |                       |                     |                       | $M$   | $l_s$ |                   |
| <b>SG1S 14B — 1005N</b> | 14                     | $\phi 14$                 | $\phi 16$             | B1   | 10                | $\phi 5$                  | $\phi 11$             | 10                  | 20                    | -     | -     | 0.016             |
| <b>SG1S 15L — 1010</b>  | 15                     | $\phi 15$                 | $\phi 17$             | L1   |                   | -                         | $\phi 10(h7)$         | L25 R60             | 95                    | -     | -     | 0.066             |
| <b>SG1S 15B — 1006N</b> | 15                     | $\phi 15$                 | $\phi 17$             | B1   |                   | $\phi 6$                  | $\phi 12$             | 10                  | 20                    | -     | -     | 0.018             |
| <b>SG1S 16L — 1010</b>  | 16                     | $\phi 16$                 | $\phi 18$             | L1   |                   | -                         | $\phi 10(h7)$         | L25 R60             | 95                    | -     | -     | 0.068             |
| <b>SG1S 16B — 1006N</b> | 16                     | $\phi 16$                 | $\phi 18$             | B1   |                   | $\phi 6$                  | $\phi 13$             | 10                  | 20                    | -     | -     | 0.022             |
| <b>SG1S 17B — 1006</b>  | 17                     | $\phi 17$                 | $\phi 19$             | B1   |                   | $\phi 6$                  | $\phi 12$             | 10                  | 20                    | -     | -     | 0.022             |
| <b>SG1S 17B — 1006N</b> | 17                     | $\phi 17$                 | $\phi 19$             | B1   |                   | $\phi 6$                  | $\phi 14$             | 10                  | 20                    | -     | -     | 0.025             |
| <b>SG1S 18L — 1010</b>  | 18                     | $\phi 18$                 | $\phi 20$             | L1   |                   | -                         | $\phi 10(h7)$         | L25 R60             | 95                    | -     | -     | 0.072             |
| <b>SG1S 18B — 1006N</b> | 18                     | $\phi 18$                 | $\phi 20$             | B1   | 10                | $\phi 6$                  | $\phi 15$             | 10                  | 20                    | -     | -     | 0.029             |
| <b>SG1S 18B — 1008</b>  | 18                     | $\phi 18$                 | $\phi 20$             |      |                   | $\phi 8$                  | $\phi 15$             |                     |                       | -     | -     | 0.026             |
| <b>SG1S 19B — 1006N</b> | 19                     | $\phi 19$                 | $\phi 21$             |      |                   | $\phi 6$                  | $\phi 16$             |                     |                       | -     | -     | 0.034             |
| <b>SG1S 20B — 1006N</b> | 20                     | $\phi 20$                 | $\phi 22$             |      |                   | $\phi 6$                  | $\phi 16$             |                     |                       | -     | -     | 0.036             |
| <b>SG1S 20B — 1008</b>  | 20                     | $\phi 20$                 | $\phi 22$             |      |                   | $\phi 8$                  | $\phi 16$             |                     |                       | -     | -     | 0.032             |
| <b>SG1S 20B * 1010</b>  | 20                     | $\phi 20$                 | $\phi 22$             |      |                   | $\phi 10$                 | $\phi 16$             |                     |                       | 2-M4  | 5     | 0.028             |
| <b>SG1S 21B — 1008N</b> | 21                     | $\phi 21$                 | $\phi 23$             |      |                   | $\phi 8$                  | $\phi 18$             |                     |                       | -     | -     | 0.039             |
| <b>SG1S 22B — 1008N</b> | 22                     | $\phi 22$                 | $\phi 24$             |      |                   | $\phi 8$                  | $\phi 18$             |                     |                       | -     | -     | 0.042             |
| <b>SG1S 23B — 1008N</b> | 23                     | $\phi 23$                 | $\phi 25$             |      |                   | $\phi 8$                  | $\phi 20$             |                     |                       | -     | -     | 0.049             |
| <b>SG1S 24B — 1008N</b> | 24                     | $\phi 24$                 | $\phi 26$             |      |                   | $\phi 8$                  | $\phi 20$             |                     |                       | -     | -     | 0.052             |
| <b>SG1S 25B — 1008</b>  | 25                     | $\phi 25$                 | $\phi 27$             |      |                   | $\phi 8$                  | $\phi 20$             |                     |                       | -     | -     | 0.055             |
| <b>SG1S 26B — 1008N</b> | 26                     | $\phi 26$                 | $\phi 28$             |      |                   | $\phi 8$                  | $\phi 20$             |                     |                       | -     | -     | 0.058             |
| <b>SG1S 27B — 1008N</b> | 27                     | $\phi 27$                 | $\phi 29$             |      |                   | $\phi 8$                  | $\phi 20$             |                     |                       | -     | -     | 0.062             |
| <b>SG1S 28B — 1008N</b> | 28                     | $\phi 28$                 | $\phi 30$             |      |                   | $\phi 8$                  | $\phi 20$             |                     |                       | -     | -     | 0.065             |
| <b>SG1S 29B — 1008N</b> | 29                     | $\phi 29$                 | $\phi 31$             |      |                   | $\phi 8$                  | $\phi 25$             |                     |                       | -     | -     | 0.082             |
| <b>SG1S 30B — 1010</b>  | 30                     | $\phi 30$                 | $\phi 32$             |      |                   | $\phi 10$                 | $\phi 26$             |                     |                       | -     | -     | 0.084             |
| <b>SG1S 30B — 1010N</b> | 30                     | $\phi 30$                 | $\phi 32$             |      |                   | $\phi 10$                 | $\phi 25$             |                     |                       | -     | -     | 0.082             |
| <b>SG1S 32B — 1010N</b> | 32                     | $\phi 32$                 | $\phi 34$             |      |                   | $\phi 10$                 | $\phi 25$             |                     |                       | -     | -     | 0.089             |
| <b>SG1S 34B — 1010N</b> | 34                     | $\phi 34$                 | $\phi 36$             |      |                   | $\phi 10$                 | $\phi 25$             |                     |                       | -     | -     | 0.097             |
| <b>SG1S 35B — 1010</b>  | 35                     | $\phi 35$                 | $\phi 37$             |      |                   | $\phi 10$                 | $\phi 26$             |                     |                       | -     | -     | 0.104             |
| <b>SG1S 35B — 1010N</b> | 35                     | $\phi 35$                 | $\phi 37$             |      |                   | $\phi 10$                 | $\phi 25$             |                     |                       | -     | -     | 0.102             |
| <b>SG1S 36B — 1010</b>  | 36                     | $\phi 36$                 | $\phi 38$             |      |                   | $\phi 10$                 | $\phi 26$             |                     |                       | -     | -     | 0.109             |
| <b>SG1S 36B — 1010N</b> | 36                     | $\phi 36$                 | $\phi 38$             |      |                   | $\phi 10$                 | $\phi 25$             |                     |                       | -     | -     | 0.106             |
| <b>SG1S 38B — 1010N</b> | 38                     | $\phi 38$                 | $\phi 40$             |      |                   | $\phi 10$                 | $\phi 30$             |                     |                       | -     | -     | 0.132             |
| <b>SG1S 40B — 1010N</b> | 40                     | $\phi 40$                 | $\phi 42$             |      |                   | $\phi 10$                 | $\phi 30$             |                     |                       | -     | -     | 0.142             |
| <b>SG1S 42B — 1010N</b> | 42                     | $\phi 42$                 | $\phi 44$             |      |                   | $\phi 10$                 | $\phi 30$             |                     |                       | -     | -     | 0.152             |
| <b>SG1S 44B — 1010</b>  | 44                     | $\phi 44$                 | $\phi 46$             |      |                   | $\phi 10$                 | $\phi 35$             |                     |                       | -     | -     | 0.181             |
| <b>SG1S 44B — 1010N</b> | 44                     | $\phi 44$                 | $\phi 46$             |      |                   | $\phi 10$                 | $\phi 30$             |                     |                       | -     | -     | 0.163             |
| <b>SG1S 45B — 1010N</b> | 45                     | $\phi 45$                 | $\phi 47$             |      |                   | $\phi 10$                 | $\phi 30$             |                     |                       | -     | -     | 0.168             |
| <b>SG1S 45B — 1012</b>  | 45                     | $\phi 45$                 | $\phi 47$             |      |                   | $\phi 12$                 | $\phi 35$             |                     |                       | -     | -     | 0.182             |
| <b>SG1S 48B — 1010N</b> | 48                     | $\phi 48$                 | $\phi 50$             |      |                   | $\phi 10$                 | $\phi 30$             |                     |                       | -     | -     | 0.185             |
| <b>SG1S 48B — 1012</b>  | 48                     | $\phi 48$                 | $\phi 50$             |      |                   | $\phi 12$                 | $\phi 35$             |                     |                       | -     | -     | 0.199             |



2D • 3D CAD



B1 type [-]



B1 type [\*]

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                  |
| 0.30                                                                                                   | 0.61    | 0.92      | 1.15      | 1.38      | 1.92      | 2.30      | 0.062                                                                                                    | 0.12    | 0.19      | 0.23      | 0.28      | 0.40      | 0.48      | 0.04 to 0.08           | SG1S 14B – 1005N |
| 0.34                                                                                                   | 0.68    | 1.03      | 1.29      | 1.55      | 2.15      | 2.58      | 0.072                                                                                                    | 0.14    | 0.22      | 0.27      | 0.33      | 0.46      | 0.56      |                        | SG1S 15L – 1010  |
| 0.34                                                                                                   | 0.68    | 1.03      | 1.29      | 1.55      | 2.15      | 2.58      | 0.072                                                                                                    | 0.14    | 0.22      | 0.27      | 0.33      | 0.46      | 0.56      |                        | SG1S 15B – 1006N |
| 0.38                                                                                                   | 0.76    | 1.14      | 1.43      | 1.72      | 2.39      | 2.87      | 0.082                                                                                                    | 0.16    | 0.25      | 0.31      | 0.38      | 0.53      | 0.64      |                        | SG1S 16L – 1010  |
| 0.38                                                                                                   | 0.76    | 1.14      | 1.43      | 1.72      | 2.39      | 2.87      | 0.082                                                                                                    | 0.16    | 0.25      | 0.31      | 0.38      | 0.53      | 0.64      |                        | SG1S 16B – 1006N |
| 0.42                                                                                                   | 0.84    | 1.26      | 1.57      | 1.89      | 2.63      | 3.15      | 0.093                                                                                                    | 0.18    | 0.28      | 0.35      | 0.43      | 0.60      | 0.73      |                        | SG1S 17B – 1006  |
| 0.42                                                                                                   | 0.84    | 1.26      | 1.57      | 1.89      | 2.63      | 3.15      | 0.093                                                                                                    | 0.18    | 0.28      | 0.35      | 0.43      | 0.60      | 0.73      |                        | SG1S 17B – 1006N |
| 0.46                                                                                                   | 0.92    | 1.38      | 1.72      | 2.07      | 2.87      | 3.45      | 0.105                                                                                                    | 0.21    | 0.32      | 0.40      | 0.48      | 0.68      | 0.82      |                        | SG1S 18L – 1010  |
| 0.46                                                                                                   | 0.92    | 1.38      | 1.72      | 2.07      | 2.87      | 3.45      | 0.105                                                                                                    | 0.21    | 0.32      | 0.40      | 0.48      | 0.68      | 0.82      |                        | SG1S 18B – 1006N |
| 0.46                                                                                                   | 0.92    | 1.38      | 1.72      | 2.07      | 2.87      | 3.45      | 0.105                                                                                                    | 0.21    | 0.32      | 0.40      | 0.48      | 0.68      | 0.82      |                        | SG1S 18B – 1008  |
| 0.50                                                                                                   | 1.00    | 1.51      | 1.88      | 2.26      | 3.10      | 3.69      | 0.116                                                                                                    | 0.23    | 0.35      | 0.45      | 0.54      | 0.76      | 0.90      |                        | SG1S 19B – 1006N |
| 0.54                                                                                                   | 1.08    | 1.62      | 2.02      | 2.43      | 3.37      | 4.03      | 0.130                                                                                                    | 0.26    | 0.39      | 0.50      | 0.60      | 0.85      | 1.02      |                        | SG1S 20B – 1006N |
| 0.54                                                                                                   | 1.08    | 1.62      | 2.02      | 2.43      | 3.37      | 4.03      | 0.130                                                                                                    | 0.26    | 0.39      | 0.50      | 0.60      | 0.85      | 1.02      |                        | SG1S 20B – 1008  |
| 0.54                                                                                                   | 1.08    | 1.62      | 2.02      | 2.43      | 3.37      | 4.03      | 0.130                                                                                                    | 0.26    | 0.39      | 0.50      | 0.60      | 0.85      | 1.02      |                        | SG1S 20B * 1010  |
| 0.58                                                                                                   | 1.16    | 1.74      | 2.17      | 2.61      | 3.62      | 4.32      | 0.144                                                                                                    | 0.29    | 0.44      | 0.55      | 0.67      | 0.94      | 1.13      |                        | SG1S 21B – 1008N |
| 0.62                                                                                                   | 1.24    | 1.86      | 2.33      | 2.79      | 3.88      | 4.60      | 0.158                                                                                                    | 0.32    | 0.48      | 0.61      | 0.73      | 1.03      | 1.24      |                        | SG1S 22B – 1008N |
| 0.66                                                                                                   | 1.32    | 1.98      | 2.48      | 2.98      | 4.14      | 4.89      | 0.174                                                                                                    | 0.35    | 0.53      | 0.67      | 0.81      | 1.14      | 1.35      |                        | SG1S 23B – 1008N |
| 0.70                                                                                                   | 1.40    | 2.11      | 2.64      | 3.16      | 4.38      | 5.18      | 0.190                                                                                                    | 0.38    | 0.58      | 0.73      | 0.88      | 1.24      | 1.48      |                        | SG1S 24B – 1008N |
| 0.74                                                                                                   | 1.49    | 2.23      | 2.79      | 3.35      | 4.63      | 5.46      | 0.20                                                                                                     | 0.41    | 0.63      | 0.79      | 0.96      | 1.34      | 1.60      |                        | SG1S 25B – 1008  |
| 0.78                                                                                                   | 1.57    | 2.36      | 2.95      | 3.54      | 4.87      | 5.75      | 0.22                                                                                                     | 0.45    | 0.68      | 0.86      | 1.04      | 1.45      | 1.73      |                        | SG1S 26B – 1008N |
| 0.83                                                                                                   | 1.66    | 2.49      | 3.11      | 3.73      | 5.12      | 6.04      | 0.24                                                                                                     | 0.49    | 0.74      | 0.93      | 1.13      | 1.57      | 1.87      |                        | SG1S 27B – 1008N |
| 0.87                                                                                                   | 1.74    | 2.62      | 3.27      | 3.93      | 5.37      | 6.33      | 0.26                                                                                                     | 0.52    | 0.80      | 1.01      | 1.22      | 1.69      | 2.01      |                        | SG1S 28B – 1008N |
| 0.91                                                                                                   | 1.82    | 2.74      | 3.41      | 4.11      | 5.64      | 6.71      | 0.282                                                                                                    | 0.57    | 0.86      | 1.09      | 1.31      | 1.83      | 2.19      |                        | SG1S 29B – 1008N |
| 0.95                                                                                                   | 1.91    | 2.87      | 3.59      | 4.31      | 5.85      | 6.89      | 0.30                                                                                                     | 0.61    | 0.92      | 1.16      | 1.41      | 1.94      | 2.31      |                        | SG1S 30B – 1010  |
| 0.95                                                                                                   | 1.91    | 2.87      | 3.59      | 4.31      | 5.85      | 6.89      | 0.30                                                                                                     | 0.61    | 0.92      | 1.16      | 1.41      | 1.94      | 2.31      |                        | SG1S 30B – 1010N |
| 1.04                                                                                                   | 2.09    | 3.13      | 3.92      | 4.70      | 6.34      | 7.46      | 0.34                                                                                                     | 0.69    | 1.05      | 1.33      | 1.61      | 2.21      | 2.62      |                        | SG1S 32B – 1010N |
| 1.13                                                                                                   | 2.26    | 3.40      | 4.25      | 5.07      | 6.83      | 8.05      | 0.38                                                                                                     | 0.79    | 1.20      | 1.51      | 1.82      | 2.49      | 2.96      |                        | SG1S 34B – 1010N |
| 1.17                                                                                                   | 2.35    | 3.53      | 4.41      | 5.25      | 7.07      | 8.34      | 0.41                                                                                                     | 0.83    | 1.27      | 1.60      | 1.93      | 2.64      | 3.14      |                        | SG1S 35B – 1010  |
| 1.17                                                                                                   | 2.35    | 3.53      | 4.41      | 5.25      | 7.07      | 8.34      | 0.41                                                                                                     | 0.83    | 1.27      | 1.60      | 1.93      | 2.64      | 3.14      |                        | SG1S 35B – 1010N |
| 1.22                                                                                                   | 2.44    | 3.66      | 4.58      | 5.44      | 7.32      | 8.63      | 0.43                                                                                                     | 0.89    | 1.35      | 1.70      | 2.04      | 2.79      | 3.33      |                        | SG1S 36B – 1010  |
| 1.22                                                                                                   | 2.44    | 3.66      | 4.58      | 5.44      | 7.32      | 8.63      | 0.43                                                                                                     | 0.89    | 1.35      | 1.70      | 2.04      | 2.79      | 3.33      |                        | SG1S 36B – 1010N |
| 1.31                                                                                                   | 2.62    | 3.93      | 4.93      | 5.81      | 7.80      | 9.21      | 0.49                                                                                                     | 0.99    | 1.51      | 1.91      | 2.27      | 3.11      | 3.71      |                        | SG1S 38B – 1010N |
| 1.40                                                                                                   | 2.88    | 4.20      | 5.23      | 6.18      | 8.30      | 9.80      | 0.54                                                                                                     | 1.11    | 1.69      | 2.12      | 2.53      | 3.45      | 4.12      |                        | SG1S 40B – 1010N |
| 1.49                                                                                                   | 2.98    | 4.47      | 5.54      | 6.54      | 8.79      | 10.37     | 0.60                                                                                                     | 1.23    | 1.87      | 2.34      | 2.79      | 3.81      | 4.54      |                        | SG1S 42B – 1010N |
| 1.58                                                                                                   | 3.16    | 4.73      | 5.85      | 6.90      | 9.28      | 10.94     | 0.66                                                                                                     | 1.35    | 2.06      | 2.57      | 3.06      | 4.18      | 4.98      |                        | SG1S 44B – 1010  |
| 1.58                                                                                                   | 3.16    | 4.73      | 5.85      | 6.90      | 9.28      | 10.94     | 0.66                                                                                                     | 1.35    | 2.06      | 2.57      | 3.06      | 4.18      | 4.98      |                        | SG1S 44B – 1010N |
| 1.62                                                                                                   | 3.25    | 4.87      | 6.01      | 7.08      | 9.53      | 11.23     | 0.69                                                                                                     | 1.42    | 2.16      | 2.69      | 3.20      | 4.38      | 5.21      |                        | SG1S 45B – 1010N |
| 1.62                                                                                                   | 3.25    | 4.87      | 6.01      | 7.08      | 9.53      | 11.23     | 0.69                                                                                                     | 1.42    | 2.16      | 2.69      | 3.20      | 4.38      | 5.21      |                        | SG1S 45B – 1012  |
| 1.76                                                                                                   | 3.52    | 5.27      | 6.47      | 7.62      | 10.26     | 12.08     | 0.70                                                                                                     | 1.62    | 2.47      | 3.06      | 3.64      | 4.98      | 5.93      |                        | SG1S 48B – 1010N |
| 1.76                                                                                                   | 3.52    | 5.27      | 6.47      | 7.62      | 10.26     | 12.08     | 0.70                                                                                                     | 1.62    | 2.47      | 3.06      | 3.64      | 4.98      | 5.93      |                        | SG1S 48B – 1012  |



Unit: mm

| Accuracy Class    | Material   | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|------------|----------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N5 | SCM435/440 | 20°            | Induction hardening of teeth | HRC49 to 55            | See the table below |

★ No surface treatment is applied.

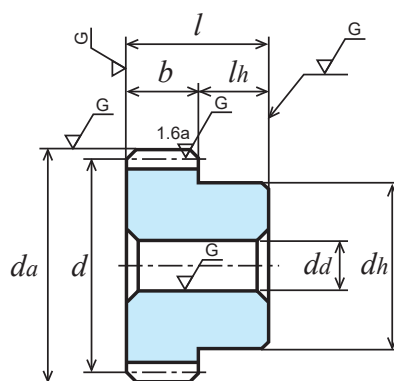
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number  | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(kg)$ |
|-------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-------------------|
| SG1S 50B – 1012   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 10                | $\phi 12$                  | $\phi 35$             | 10                  | 20                    | 0.21              |
| SG1S 50B – 1015   | 50                     | $\phi 50$                 | $\phi 52$             |      |                   | $\phi 15$                  | $\phi 35$             |                     |                       | 0.20              |
| SG1S 52B – 1012   | 52                     | $\phi 52$                 | $\phi 54$             |      |                   | $\phi 12$                  | $\phi 35$             |                     |                       | 0.23              |
| SG1S 54B – 1012   | 54                     | $\phi 54$                 | $\phi 56$             |      |                   | $\phi 12$                  | $\phi 35$             |                     |                       | 0.24              |
| SG1S 55B – 1012N  | 55                     | $\phi 55$                 | $\phi 57$             |      |                   | $\phi 12$                  | $\phi 35$             |                     |                       | 0.24              |
| SG1S 56B – 1012   | 56                     | $\phi 56$                 | $\phi 58$             |      |                   | $\phi 12$                  | $\phi 35$             |                     |                       | 0.25              |
| SG1S 60B – 1012   | 60                     | $\phi 60$                 | $\phi 62$             |      |                   | $\phi 12$                  | $\phi 40$             |                     |                       | 0.30              |
| SG1S 60B – 1015   | 60                     | $\phi 60$                 | $\phi 62$             |      |                   | $\phi 15$                  | $\phi 40$             |                     |                       | 0.29              |
| SG1S 60B – 1018   | 60                     | $\phi 60$                 | $\phi 62$             |      |                   | $\phi 18$                  | $\phi 40$             |                     |                       | 0.28              |
| SG1S 64B – 1012N  | 64                     | $\phi 64$                 | $\phi 66$             |      |                   | $\phi 12$                  | $\phi 40$             |                     |                       | 0.33              |
| SG1S 70B – 1012   | 70                     | $\phi 70$                 | $\phi 72$             |      |                   | $\phi 12$                  | $\phi 40$             |                     |                       | 0.38              |
| SG1S 75B – 1012N  | 75                     | $\phi 75$                 | $\phi 77$             |      |                   | $\phi 12$                  | $\phi 40$             |                     |                       | 0.43              |
| SG1S 80B – 1012   | 80                     | $\phi 80$                 | $\phi 82$             |      |                   | $\phi 12$                  | $\phi 45$             |                     |                       | 0.50              |
| SG1S 80B – 1020   | 80                     | $\phi 80$                 | $\phi 82$             |      |                   | $\phi 20$                  | $\phi 45$             |                     |                       | 0.47              |
| SG1S 80B – 1015N  | 80                     | $\phi 80$                 | $\phi 82$             |      |                   | $\phi 15$                  | $\phi 50$             |                     |                       | 0.52              |
| SG1S 90B – 1015   | 90                     | $\phi 90$                 | $\phi 92$             |      |                   | $\phi 15$                  | $\phi 50$             |                     |                       | 0.62              |
| SG1S 100B – 1015N | 100                    | $\phi 100$                | $\phi 102$            |      |                   | $\phi 15$                  | $\phi 50$             |                     |                       | 0.74              |
| SG1S 100B – 1020  | 100                    | $\phi 100$                | $\phi 102$            |      |                   | $\phi 20$                  | $\phi 50$             |                     |                       | 0.72              |
| SG1S 108B – 1015  | 108                    | $\phi 108$                | $\phi 110$            |      |                   | $\phi 15$                  | $\phi 50$             |                     |                       | 0.84              |
| SG1S 120B – 1015  | 120                    | $\phi 120$                | $\phi 122$            |      |                   | $\phi 15$                  | $\phi 50$             |                     |                       | 1.01              |



2D • 3D CAD



B1 type [-]

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number  |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|-------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                   |
| 1.85                                                                                                   | 3.70    | 5.53      | 6.78      | 7.98      | 10.75     | 12.64     | 0.86                                                                                                     | 1.76    | 2.68      | 3.32      | 3.94      | 5.41      | 6.43      | 0.04 to 0.08           | SG1S 50B – 1012   |
| 1.85                                                                                                   | 3.70    | 5.53      | 6.78      | 7.98      | 10.75     | 12.64     | 0.86                                                                                                     | 1.76    | 2.68      | 3.32      | 3.94      | 5.41      | 6.43      |                        | SG1S 50B – 1015   |
| 1.94                                                                                                   | 3.88    | 5.78      | 7.09      | 8.34      | 11.23     | 13.18     | 0.94                                                                                                     | 1.91    | 2.90      | 3.59      | 4.26      | 5.85      | 6.94      |                        | SG1S 52B – 1012   |
| 2.03                                                                                                   | 4.06    | 6.04      | 7.39      | 8.70      | 11.71     | 13.71     | 1.01                                                                                                     | 2.07    | 3.13      | 3.87      | 4.60      | 6.31      | 7.46      |                        | SG1S 54B – 1012   |
| 2.08                                                                                                   | 4.16    | 6.16      | 7.54      | 8.88      | 11.95     | 13.97     | 1.05                                                                                                     | 2.15    | 3.24      | 4.01      | 4.77      | 6.54      | 7.73      |                        | SG1S 55B – 1012N  |
| 2.12                                                                                                   | 4.25    | 6.29      | 7.70      | 9.06      | 12.19     | 14.23     | 1.09                                                                                                     | 2.23    | 3.36      | 4.16      | 4.95      | 6.78      | 8.00      |                        | SG1S 56B – 1012   |
| 2.31                                                                                                   | 4.62    | 6.79      | 8.30      | 9.79      | 13.14     | 15.24     | 1.26                                                                                                     | 2.58    | 3.86      | 4.77      | 5.69      | 7.78      | 9.12      |                        | SG1S 60B – 1012   |
| 2.31                                                                                                   | 4.62    | 6.79      | 8.30      | 9.79      | 13.14     | 15.24     | 1.26                                                                                                     | 2.58    | 3.86      | 4.77      | 5.69      | 7.78      | 9.12      |                        | SG1S 60B – 1015   |
| 2.31                                                                                                   | 4.62    | 6.79      | 8.30      | 9.79      | 13.14     | 15.24     | 1.26                                                                                                     | 2.58    | 3.86      | 4.77      | 5.69      | 7.78      | 9.12      |                        | SG1S 60B – 1018   |
| 2.49                                                                                                   | 4.99    | 7.29      | 8.90      | 10.51     | 14.04     | 16.24     | 1.44                                                                                                     | 2.95    | 4.39      | 5.43      | 6.47      | 8.82      | 10.31     |                        | SG1S 64B – 1012N  |
| 2.77                                                                                                   | 5.54    | 8.03      | 9.82      | 11.58     | 15.34     | 17.69     | 1.73                                                                                                     | 3.56    | 5.26      | 6.50      | 7.75      | 10.47     | 12.20     |                        | SG1S 70B – 1012   |
| 3.00                                                                                                   | 5.99    | 8.64      | 10.58     | 12.47     | 16.39     | 18.86     | 2.00                                                                                                     | 4.09    | 6.03      | 7.47      | 8.90      | 11.93     | 13.88     |                        | SG1S 75B – 1012N  |
| 3.24                                                                                                   | 6.42    | 9.25      | 11.33     | 13.34     | 17.42     | 20.08     | 2.29                                                                                                     | 4.66    | 6.85      | 8.51      | 10.12     | 13.48     | 15.70     |                        | SG1S 80B – 1012   |
| 3.24                                                                                                   | 6.42    | 9.25      | 11.33     | 13.34     | 17.42     | 20.08     | 2.29                                                                                                     | 4.66    | 6.85      | 8.51      | 10.12     | 13.48     | 15.70     |                        | SG1S 80B – 1020   |
| 3.24                                                                                                   | 6.42    | 9.25      | 11.33     | 13.34     | 17.42     | 20.08     | 2.29                                                                                                     | 4.66    | 6.85      | 8.51      | 10.12     | 13.48     | 15.70     |                        | SG1S 80B – 1015N  |
| 3.70                                                                                                   | 7.26    | 10.47     | 12.80     | 14.98     | 19.37     | 22.47     | 2.92                                                                                                     | 5.90    | 8.69      | 10.77     | 12.74     | 16.80     | 19.69     |                        | SG1S 90B – 1015   |
| 4.17                                                                                                   | 8.10    | 11.68     | 14.25     | 16.53     | 21.40     | 24.80     | 3.64                                                                                                     | 7.29    | 10.74     | 13.28     | 15.57     | 20.56     | 24.07     |                        | SG1S 100B – 1015N |
| 4.17                                                                                                   | 8.10    | 11.68     | 14.25     | 16.53     | 21.40     | 24.80     | 3.64                                                                                                     | 7.29    | 10.74     | 13.28     | 15.57     | 20.56     | 24.07     |                        | SG1S 100B – 1020  |
| 4.55                                                                                                   | 8.76    | 12.64     | 15.34     | 17.73     | 23.01     | 26.60     | 4.27                                                                                                     | 8.50    | 12.53     | 15.42     | 18.01     | 23.84     | 27.84     |                        | SG1S 108B – 1015  |
| 5.12                                                                                                   | 9.74    | 14.05     | 16.89     | 19.46     | 25.34     | 28.97     | 5.32                                                                                                     | 10.48   | 15.47     | 18.85     | 21.95     | 29.13     | 33.64     |                        | SG1S 120B – 1015  |



Unit: mm

| Accuracy Class    | Material   | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|------------|----------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N5 | SCM435/440 | 20°            | Induction hardening of teeth | HRC49 to 55            | See the table below |

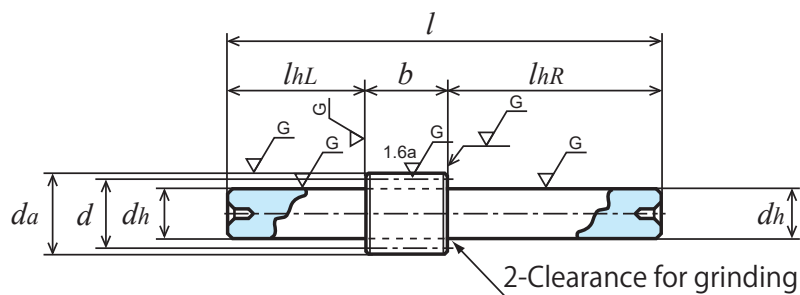
★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

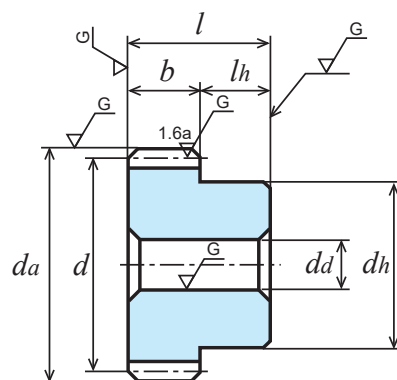
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number   | Number of<br>teeth | Reference<br>diameter | Tip<br>diameter      | Type | Face width | Hole<br>diameter          | Hub<br>diameter      | Hub length           | Overall<br>length | Weight        |
|--------------------|--------------------|-----------------------|----------------------|------|------------|---------------------------|----------------------|----------------------|-------------------|---------------|
|                    | <i>z</i>           | <i>d</i>              | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>a</sub></i> (H7) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>          | <i>W</i> (kg) |
| SG1.5S 14L — 1512  | 14                 | φ 21                  | φ 24                 | L1   | 15         | -                         | φ12 (h7)             | L25 R60              | 100               | 0.12          |
| SG1.5S 14B — 1510N | 14                 | φ 21                  | φ 24                 | B1   |            | φ10                       | φ17                  | 14                   | 29                | 0.05          |
| SG1.5S 15B — 1510N | 15                 | φ 22.5                | φ 25.5               |      |            | φ10                       | φ18                  | 14                   | 29                | 0.06          |
| SG1.5S 16B — 1510N | 16                 | φ 24                  | φ 27                 |      |            | φ10                       | φ20                  | 14                   | 29                | 0.07          |
| SG1.5S 17B — 1510N | 17                 | φ 25.5                | φ 28.5               |      |            | φ10                       | φ21                  | 14                   | 29                | 0.08          |
| SG1.5S 18B — 1510N | 18                 | φ 27                  | φ 30                 |      |            | φ10                       | φ22                  | 14                   | 29                | 0.09          |
| SG1.5S 19B — 1510N | 19                 | φ 28.5                | φ 31.5               |      |            | φ10                       | φ23                  | 14                   | 29                | 0.10          |
| SG1.5S 20B — 1510N | 20                 | φ 30                  | φ 33                 |      |            | φ10                       | φ24                  | 14                   | 29                | 0.12          |
| SG1.5S 21B — 1510N | 21                 | φ 31.5                | φ 34.5               |      |            | φ10                       | φ25                  | 14                   | 29                | 0.13          |
| SG1.5S 22B — 1512N | 22                 | φ 33                  | φ 36                 |      |            | φ12                       | φ26                  | 14                   | 29                | 0.13          |
| SG1.5S 23B — 1512N | 23                 | φ 34.5                | φ 37.5               |      |            | φ12                       | φ27                  | 14                   | 29                | 0.15          |
| SG1.5S 24B — 1515  | 24                 | φ 36                  | φ 39                 |      |            | φ15                       | φ30                  | 15                   | 30                | 0.16          |
| SG1.5S 24B — 1512N | 24                 | φ 36                  | φ 39                 |      |            | φ12                       | φ28                  | 14                   | 29                | 0.16          |
| SG1.5S 25B — 1512N | 25                 | φ 37.5                | φ 40.5               |      |            | φ12                       | φ30                  | 14                   | 29                | 0.18          |
| SG1.5S 26B — 1512N | 26                 | φ 39                  | φ 42                 |      |            | φ12                       | φ32                  | 14                   | 29                | 0.20          |
| SG1.5S 27B — 1515N | 27                 | φ 40.5                | φ 43.5               |      |            | φ15                       | φ34                  | 14                   | 29                | 0.21          |
| SG1.5S 28B — 1515N | 28                 | φ 42                  | φ 45                 |      |            | φ15                       | φ36                  | 14                   | 29                | 0.23          |
| SG1.5S 29B — 1515N | 29                 | φ 43.5                | φ 46.5               |      |            | φ15                       | φ37                  | 14                   | 29                | 0.25          |
| SG1.5S 30B — 1515  | 30                 | φ 45                  | φ 48                 |      |            | φ15                       | φ35                  | 15                   | 30                | 0.26          |
| SG1.5S 30B — 1515N | 30                 | φ 45                  | φ 48                 |      |            | φ15                       | φ38                  | 14                   | 29                | 0.27          |
| SG1.5S 32B — 1515N | 32                 | φ 48                  | φ 51                 |      |            | φ15                       | φ40                  | 14                   | 29                | 0.31          |
| SG1.5S 34B — 1515N | 34                 | φ 51                  | φ 54                 |      |            | φ15                       | φ42                  | 14                   | 29                | 0.35          |
| SG1.5S 35B — 1515N | 35                 | φ 52.5                | φ 55.5               |      |            | φ15                       | φ42                  | 14                   | 29                | 0.37          |
| SG1.5S 36B — 1515N | 36                 | φ 54                  | φ 57                 |      |            | φ15                       | φ45                  | 14                   | 29                | 0.40          |
| SG1.5S 38B — 1515N | 38                 | φ 57                  | φ 60                 |      |            | φ15                       | φ45                  | 14                   | 29                | 0.44          |





L1 type



B1 type [-]

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number   |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|--------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                    |
| 1.03                                                                                                   | 2.07    | 3.11      | 3.89      | 4.67      | 6.49      | 7.73      | 0.21                                                                                                     | 0.43    | 0.66      | 0.83      | 1.00      | 1.41      | 1.69      | 0.06 to 0.12           | SG1.5S 14L – 1512  |
| 1.03                                                                                                   | 2.07    | 3.11      | 3.89      | 4.67      | 6.49      | 7.73      | 0.21                                                                                                     | 0.43    | 0.66      | 0.83      | 1.00      | 1.41      | 1.69      |                        | SG1.5S 14B – 1510N |
| 1.16                                                                                                   | 2.32    | 3.49      | 4.36      | 5.23      | 7.27      | 8.61      | 0.24                                                                                                     | 0.50    | 0.76      | 0.96      | 1.16      | 1.63      | 1.95      |                        | SG1.5S 15B – 1510N |
| 1.29                                                                                                   | 2.58    | 3.87      | 4.84      | 5.81      | 8.04      | 9.50      | 0.28                                                                                                     | 0.57    | 0.87      | 1.09      | 1.32      | 1.86      | 2.20      |                        | SG1.5S 16B – 1510N |
| 1.42                                                                                                   | 2.84    | 4.26      | 5.33      | 6.39      | 8.81      | 10.40     | 0.32                                                                                                     | 0.65    | 0.99      | 1.24      | 1.50      | 2.10      | 2.50      |                        | SG1.5S 17B – 1510N |
| 1.55                                                                                                   | 3.11    | 4.66      | 5.82      | 6.99      | 9.58      | 11.30     | 0.36                                                                                                     | 0.74    | 1.12      | 1.41      | 1.70      | 2.36      | 2.81      |                        | SG1.5S 18B – 1510N |
| 1.68                                                                                                   | 3.38    | 5.06      | 6.33      | 7.59      | 10.36     | 12.21     | 0.40                                                                                                     | 0.83    | 1.25      | 1.58      | 1.90      | 2.63      | 3.13      |                        | SG1.5S 19B – 1510N |
| 1.82                                                                                                   | 3.65    | 5.47      | 6.84      | 8.20      | 11.14     | 13.11     | 0.45                                                                                                     | 0.92    | 1.39      | 1.75      | 2.12      | 2.92      | 3.47      |                        | SG1.5S 20B – 1510N |
| 1.96                                                                                                   | 3.92    | 5.88      | 7.35      | 8.80      | 11.91     | 14.02     | 0.50                                                                                                     | 1.01    | 1.54      | 1.94      | 2.18      | 3.22      | 3.82      |                        | SG1.5S 21B – 1510N |
| 2.10                                                                                                   | 4.20    | 6.29      | 7.87      | 9.41      | 12.69     | 14.94     | 0.55                                                                                                     | 1.11    | 1.69      | 2.14      | 2.57      | 3.53      | 4.19      |                        | SG1.5S 22B – 1512N |
| 2.24                                                                                                   | 4.47    | 6.71      | 8.39      | 10.00     | 13.47     | 15.87     | 0.60                                                                                                     | 1.22    | 1.86      | 2.35      | 2.62      | 3.85      | 4.59      |                        | SG1.5S 23B – 1512N |
| 2.38                                                                                                   | 4.75    | 7.13      | 8.91      | 10.59     | 14.25     | 16.80     | 0.66                                                                                                     | 1.34    | 2.03      | 2.56      | 3.07      | 4.19      | 5.00      |                        | SG1.5S 24B – 1515  |
| 2.38                                                                                                   | 4.75    | 7.13      | 8.91      | 10.59     | 14.25     | 16.80     | 0.66                                                                                                     | 1.34    | 2.03      | 2.56      | 3.07      | 4.19      | 5.00      |                        | SG1.5S 24B – 1512N |
| 2.52                                                                                                   | 5.04    | 7.55      | 9.44      | 11.18     | 15.02     | 17.74     | 0.72                                                                                                     | 1.45    | 2.21      | 2.79      | 3.33      | 4.55      | 5.42      |                        | SG1.5S 25B – 1512N |
| 2.66                                                                                                   | 5.32    | 7.98      | 9.96      | 11.77     | 15.81     | 18.67     | 0.78                                                                                                     | 1.58    | 2.40      | 3.02      | 3.60      | 4.92      | 5.87      |                        | SG1.5S 26B – 1512N |
| 2.80                                                                                                   | 5.61    | 8.41      | 10.46     | 12.36     | 16.61     | 19.61     | 0.84                                                                                                     | 1.71    | 2.60      | 3.26      | 3.88      | 5.31      | 6.33      |                        | SG1.5S 27B – 1515N |
| 2.95                                                                                                   | 5.90    | 8.84      | 10.97     | 12.96     | 17.41     | 20.54     | 0.90                                                                                                     | 1.84    | 2.80      | 3.51      | 4.18      | 5.71      | 6.81      |                        | SG1.5S 28B – 1515N |
| 3.09                                                                                                   | 6.18    | 9.27      | 11.47     | 13.54     | 18.20     | 21.46     | 0.97                                                                                                     | 1.98    | 3.01      | 3.77      | 4.49      | 6.13      | 7.31      |                        | SG1.5S 29B – 1515N |
| 3.24                                                                                                   | 6.47    | 9.71      | 11.98     | 14.13     | 19.00     | 22.39     | 1.04                                                                                                     | 2.12    | 3.23      | 4.03      | 4.80      | 6.57      | 7.82      |                        | SG1.5S 30B – 1515  |
| 3.24                                                                                                   | 6.47    | 9.71      | 11.98     | 14.13     | 19.00     | 22.39     | 1.04                                                                                                     | 2.12    | 3.23      | 4.03      | 4.80      | 6.57      | 7.82      |                        | SG1.5S 30B – 1515N |
| 3.53                                                                                                   | 7.06    | 10.59     | 12.99     | 15.30     | 20.59     | 24.24     | 1.19                                                                                                     | 2.43    | 3.70      | 4.59      | 5.45      | 7.47      | 8.89      |                        | SG1.5S 32B – 1515N |
| 3.83                                                                                                   | 7.65    | 11.42     | 13.99     | 16.47     | 22.18     | 26.08     | 1.35                                                                                                     | 2.75    | 4.18      | 5.18      | 6.15      | 8.44      | 10.03     |                        | SG1.5S 34B – 1515N |
| 3.97                                                                                                   | 7.95    | 11.83     | 14.49     | 17.05     | 22.97     | 26.94     | 1.43                                                                                                     | 2.93    | 4.43      | 5.49      | 6.52      | 8.94      | 10.60     |                        | SG1.5S 35B – 1515N |
| 4.12                                                                                                   | 8.25    | 12.25     | 15.00     | 17.64     | 23.76     | 27.81     | 1.52                                                                                                     | 3.10    | 4.69      | 5.80      | 6.90      | 9.46      | 11.19     |                        | SG1.5S 36B – 1515N |
| 4.42                                                                                                   | 8.85    | 13.08     | 15.99     | 18.84     | 25.33     | 29.51     | 1.70                                                                                                     | 3.47    | 5.23      | 6.46      | 7.69      | 10.54     | 12.41     |                        | SG1.5S 38B – 1515N |



Unit: mm

| Accuracy Class    | Material   | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|------------|----------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N5 | SCM435/440 | 20°            | Induction hardening of teeth | HRC49 to 55            | See the table below |

★ No surface treatment is applied.

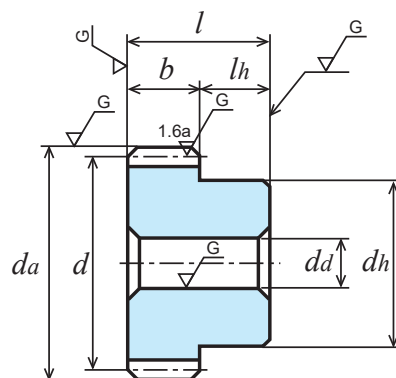
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number           | Number of teeth | Reference diameter | Tip diameter | Type | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Weight  |
|----------------------------|-----------------|--------------------|--------------|------|------------|---------------|--------------|------------|----------------|---------|
|                            | $z$             | $d$                | $d_a$        |      | $b$        | $d_i(H7)$     | $d_h$        | $l_h$      | $l$            | $W(kg)$ |
| <b>SG1.5S 40B — 1515</b>   | 40              | φ 60               | φ 63         | B1   | 15         | φ15           | φ40          | 15         | 30             | 0.44    |
| <b>SG1.5S 40B — 1515N</b>  | 40              | φ 60               | φ 63         |      |            | φ15           | φ50          | 14         | 29             | 0.51    |
| <b>SG1.5S 42B — 1515N</b>  | 42              | φ 63               | φ 66         |      |            | φ15           | φ50          | 14         | 29             | 0.54    |
| <b>SG1.5S 44B — 1515N</b>  | 44              | φ 66               | φ 69         |      |            | φ15           | φ50          | 14         | 29             | 0.58    |
| <b>SG1.5S 45B — 1518N</b>  | 45              | φ 67.5             | φ 70.5       |      |            | φ18           | φ50          | 14         | 29             | 0.58    |
| <b>SG1.5S 48B — 1518N</b>  | 48              | φ 72               | φ 75         |      |            | φ18           | φ50          | 14         | 29             | 0.64    |
| <b>SG1.5S 50B — 1520</b>   | 50              | φ 75               | φ 78         |      |            | φ20           | φ50          | 15         | 30             | 0.67    |
| <b>SG1.5S 50B — 1518N</b>  | 50              | φ 75               | φ 78         |      |            | φ18           | φ60          | 14         | 29             | 0.77    |
| <b>SG1.5S 55B — 1518N</b>  | 55              | φ 82.5             | φ 85.5       |      |            | φ18           | φ60          | 14         | 29             | 0.88    |
| <b>SG1.5S 56B — 1518N</b>  | 56              | φ 84               | φ 87         |      |            | φ18           | φ60          | 14         | 29             | 0.91    |
| <b>SG1.5S 60B — 1520N</b>  | 60              | φ 90               | φ 93         |      |            | φ20           | φ60          | 14         | 29             | 0.99    |
| <b>SG1.5S 64B — 1520N</b>  | 64              | φ 96               | φ 99         |      |            | φ20           | φ60          | 14         | 29             | 1.09    |
| <b>SG1.5S 70B — 1520</b>   | 70              | φ105               | φ108         |      |            | φ20           | φ60          | 15         | 30             | 1.27    |
| <b>SG1.5S 70B — 1520N</b>  | 70              | φ105               | φ108         |      |            | φ20           | φ60          | 14         | 29             | 1.26    |
| <b>SG1.5S 72B — 1520</b>   | 72              | φ108               | φ111         |      |            | φ20           | φ60          | 15         | 30             | 1.33    |
| <b>SG1.5S 75B — 1520N</b>  | 75              | φ112.5             | φ115.5       |      |            | φ20           | φ60          | 14         | 29             | 1.41    |
| <b>SG1.5S 80B — 1520</b>   | 80              | φ120               | φ123         |      |            | φ20           | φ60          | 15         | 30             | 1.58    |
| <b>SG1.5S 80B — 1520N</b>  | 80              | φ120               | φ123         |      |            | φ20           | φ70          | 14         | 29             | 1.68    |
| <b>SG1.5S 90B — 1520N</b>  | 90              | φ135               | φ138         |      |            | φ20           | φ70          | 14         | 29             | 2.04    |
| <b>SG1.5S 100B — 1520N</b> | 100             | φ150               | φ153         |      |            | φ20           | φ70          | 14         | 29             | 2.43    |
| <b>SG1.5S 120B — 1525</b>  | 120             | φ180               | φ183         |      |            | φ25           | φ70          | 15         | 30             | 3.31    |



2D • 3D CAD



B1 type [-]

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number           |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|----------------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                            |
| 4.72                                                                                                   | 9.45    | 13.90     | 16.98     | 20.03     | 26.90     | 31.19     | 1.89                                                                                                     | 3.87    | 5.79      | 7.16      | 8.53      | 11.67     | 13.69     | 0.06 to 0.12           | <b>SG1.5S 40B – 1515</b>   |
| 4.72                                                                                                   | 9.45    | 13.90     | 16.98     | 20.03     | 26.90     | 31.19     | 1.89                                                                                                     | 3.87    | 5.79      | 7.16      | 8.53      | 11.67     | 13.69     |                        | <b>SG1.5S 40B – 1515N</b>  |
| 5.03                                                                                                   | 10.05   | 14.72     | 17.97     | 21.22     | 28.40     | 32.85     | 2.09                                                                                                     | 4.28    | 6.39      | 7.89      | 9.41      | 12.83     | 15.01     |                        | <b>SG1.5S 42B – 1515N</b>  |
| 5.33                                                                                                   | 10.66   | 15.55     | 18.99     | 22.42     | 29.83     | 34.46     | 2.30                                                                                                     | 4.72    | 7.02      | 8.67      | 10.34     | 14.03     | 16.38     |                        | <b>SG1.5S 44B – 1515N</b>  |
| 5.48                                                                                                   | 10.96   | 15.94     | 19.47     | 22.98     | 30.55     | 35.27     | 2.41                                                                                                     | 4.94    | 7.33      | 9.06      | 10.81     | 14.65     | 17.10     |                        | <b>SG1.5S 45B – 1518N</b>  |
| 5.94                                                                                                   | 11.87   | 17.16     | 20.98     | 24.74     | 32.67     | 37.64     | 2.76                                                                                                     | 5.66    | 8.34      | 10.32     | 12.30     | 16.56     | 19.29     |                        | <b>SG1.5S 48B – 1518N</b>  |
| 6.24                                                                                                   | 12.44   | 17.96     | 21.99     | 25.91     | 34.07     | 39.20     | 3.00                                                                                                     | 6.14    | 9.04      | 11.21     | 13.34     | 17.90     | 20.82     |                        | <b>SG1.5S 50B – 1520</b>   |
| 6.24                                                                                                   | 12.44   | 17.96     | 21.99     | 25.91     | 34.07     | 39.20     | 3.00                                                                                                     | 6.14    | 9.04      | 11.21     | 13.34     | 17.90     | 20.82     |                        | <b>SG1.5S 50B – 1518N</b>  |
| 7.01                                                                                                   | 13.87   | 19.98     | 24.48     | 28.79     | 37.47     | 43.26     | 3.66                                                                                                     | 7.44    | 10.94     | 13.57     | 16.14     | 21.42     | 25.00     |                        | <b>SG1.5S 55B – 1518N</b>  |
| 7.17                                                                                                   | 14.15   | 20.39     | 24.97     | 29.36     | 38.14     | 44.07     | 3.80                                                                                                     | 7.71    | 11.35     | 14.07     | 16.72     | 22.15     | 25.88     |                        | <b>SG1.5S 56B – 1518N</b>  |
| 7.79                                                                                                   | 15.29   | 22.03     | 26.94     | 31.52     | 40.76     | 47.28     | 4.39                                                                                                     | 8.86    | 13.04     | 16.15     | 19.11     | 25.19     | 29.54     |                        | <b>SG1.5S 60B – 1520N</b>  |
| 8.41                                                                                                   | 16.41   | 23.65     | 28.88     | 33.62     | 43.48     | 50.43     | 5.02                                                                                                     | 10.08   | 14.85     | 18.37     | 21.61     | 28.51     | 33.41     |                        | <b>SG1.5S 64B – 1520N</b>  |
| 9.35                                                                                                   | 18.07   | 26.06     | 31.71     | 36.68     | 47.56     | 55.02     | 6.05                                                                                                     | 12.05   | 17.77     | 21.91     | 25.62     | 33.87     | 39.60     |                        | <b>SG1.5S 70B – 1520</b>   |
| 9.35                                                                                                   | 18.07   | 26.06     | 31.71     | 36.68     | 47.56     | 55.02     | 6.05                                                                                                     | 12.05   | 17.77     | 21.91     | 25.62     | 33.87     | 39.60     |                        | <b>SG1.5S 70B – 1520N</b>  |
| 9.67                                                                                                   | 18.62   | 26.86     | 32.60     | 37.68     | 48.90     | 56.52     | 6.41                                                                                                     | 12.75   | 18.80     | 23.12     | 27.02     | 35.75     | 41.76     |                        | <b>SG1.5S 72B – 1520</b>   |
| 10.14                                                                                                  | 19.44   | 28.05     | 33.92     | 39.16     | 50.88     | 58.74     | 6.98                                                                                                     | 13.82   | 20.40     | 25.00     | 29.18     | 38.65     | 45.08     |                        | <b>SG1.5S 75B – 1520N</b>  |
| 10.93                                                                                                  | 20.80   | 30.01     | 36.08     | 41.57     | 54.12     | 61.89     | 7.99                                                                                                     | 15.72   | 23.20     | 28.27     | 32.93     | 43.70     | 50.47     |                        | <b>SG1.5S 80B – 1520</b>   |
| 10.93                                                                                                  | 20.80   | 30.01     | 36.08     | 41.57     | 54.12     | 61.89     | 7.99                                                                                                     | 15.72   | 23.20     | 28.27     | 32.93     | 43.70     | 50.47     |                        | <b>SG1.5S 80B – 1520N</b>  |
| 12.49                                                                                                  | 23.55   | 33.71     | 40.22     | 46.39     | 60.33     | 67.34     | 10.21                                                                                                    | 19.93   | 29.21     | 35.32     | 41.18     | 54.56     | 61.49     |                        | <b>SG1.5S 90B – 1520N</b>  |
| 14.03                                                                                                  | 26.28   | 37.20     | 44.20     | 51.28     | 65.34     | 72.38     | 12.68                                                                                                    | 24.63   | 35.71     | 43.00     | 50.42     | 65.43     | 73.16     |                        | <b>SG1.5S 100B – 1520N</b> |
| 16.94                                                                                                  | 31.61   | 43.79     | 52.40     | 60.57     | 73.96     | -         | 18.29                                                                                                    | 35.47   | 50.34     | 61.03     | 71.27     | 88.54     | -         |                        | <b>SG1.5S 120B – 1525</b>  |



Unit: mm

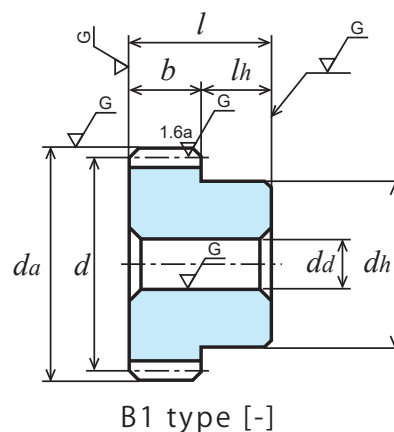
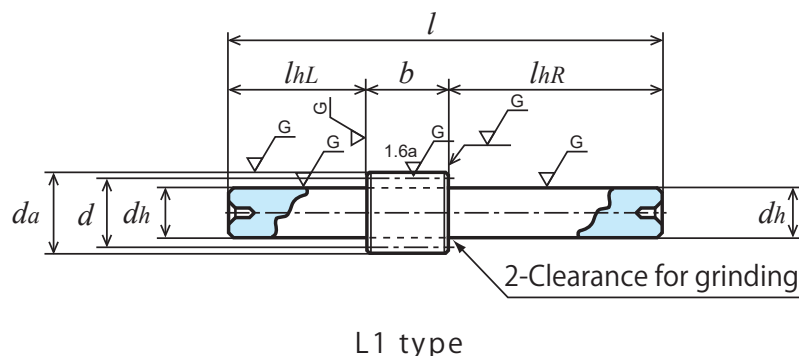
| Accuracy Class    | Material   | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|------------|----------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N5 | SCM435/440 | 20°            | Induction hardening of teeth | HRC49 to 55            | See the table below |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number  | Number of teeth | Reference diameter | Tip diameter         | Type | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Weight        |
|-------------------|-----------------|--------------------|----------------------|------|------------|---------------------------|----------------------|----------------------|----------------|---------------|
|                   | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>a</sub></i> (H7) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>W</i> (kg) |
| SG2S 14B — 2012N  | 14              | φ 28               | φ 32                 | B1   | 20         | φ12                       | φ22                  | 16                   | 36             | 0.11          |
| SG2S 15B — 2012   | 15              | φ 30               | φ 34                 | B1   |            | φ12                       | φ22                  | 20                   | 40             | 0.13          |
| SG2S 15B — 2012N  | 15              | φ 30               | φ 34                 | B1   |            | φ12                       | φ24                  | 16                   | 36             | 0.14          |
| SG2S 16L — 2015   | 16              | φ 32               | φ 36                 | L1   |            | -                         | φ15 (h7)             | L25 R60              | 105            | 0.24          |
| SG2S 16B — 2012N  | 16              | φ 32               | φ 36                 | B1   |            | φ12                       | φ26                  | 16                   | 36             | 0.16          |
| SG2S 17B — 2012N  | 17              | φ 34               | φ 38                 |      |            | φ12                       | φ28                  | 16                   | 36             | 0.19          |
| SG2S 18B — 2012N  | 18              | φ 36               | φ 40                 |      |            | φ12                       | φ30                  | 16                   | 36             | 0.22          |
| SG2S 19B — 2012N  | 19              | φ 38               | φ 42                 |      |            | φ12                       | φ31                  | 16                   | 36             | 0.24          |
| SG2S 20B — 2015N  | 20              | φ 40               | φ 44                 |      |            | φ15                       | φ32                  | 16                   | 36             | 0.25          |
| SG2S 21B — 2015N  | 21              | φ 42               | φ 46                 |      |            | φ15                       | φ34                  | 16                   | 36             | 0.28          |
| SG2S 22B — 2015N  | 22              | φ 44               | φ 48                 |      |            | φ15                       | φ36                  | 16                   | 36             | 0.32          |
| SG2S 23B — 2015N  | 23              | φ 46               | φ 50                 |      |            | φ15                       | φ37                  | 16                   | 36             | 0.35          |
| SG2S 24B — 2015N  | 24              | φ 48               | φ 52                 |      |            | φ15                       | φ38                  | 16                   | 36             | 0.38          |
| SG2S 25B — 2015N  | 25              | φ 50               | φ 54                 |      |            | φ15                       | φ40                  | 16                   | 36             | 0.42          |
| SG2S 26B — 2015N  | 26              | φ 52               | φ 56                 |      |            | φ15                       | φ42                  | 16                   | 36             | 0.46          |
| SG2S 27B — 2015N  | 27              | φ 54               | φ 58                 |      |            | φ15                       | φ44                  | 16                   | 36             | 0.50          |
| SG2S 28B — 2015N  | 28              | φ 56               | φ 60                 |      |            | φ15                       | φ45                  | 16                   | 36             | 0.54          |
| SG2S 29B — 2015N  | 29              | φ 58               | φ 62                 |      |            | φ15                       | φ48                  | 16                   | 36             | 0.59          |
| SG2S 30B — 2018N  | 30              | φ 60               | φ 64                 |      |            | φ18                       | φ50                  | 16                   | 36             | 0.62          |
| SG2S 32B — 2020   | 32              | φ 64               | φ 68                 |      |            | φ20                       | φ50                  | 20                   | 40             | 0.71          |
| SG2S 32B — 2018N  | 32              | φ 64               | φ 68                 |      |            | φ18                       | φ50                  | 16                   | 36             | 0.68          |
| SG2S 34B — 2018N  | 34              | φ 68               | φ 72                 |      |            | φ18                       | φ50                  | 16                   | 36             | 0.74          |
| SG2S 35B — 2018N  | 35              | φ 70               | φ 74                 |      |            | φ18                       | φ50                  | 16                   | 36             | 0.78          |
| SG2S 36B — 2018N  | 36              | φ 72               | φ 76                 |      |            | φ18                       | φ50                  | 16                   | 36             | 0.81          |
| SG2S 38B — 2018N  | 38              | φ 76               | φ 80                 |      |            | φ18                       | φ50                  | 16                   | 36             | 0.89          |
| SG2S 40B — 2020   | 40              | φ 80               | φ 84                 |      |            | φ20                       | φ60                  | 20                   | 40             | 1.13          |
| SG2S 40B — 2020N  | 40              | φ 80               | φ 84                 |      |            | φ20                       | φ60                  | 16                   | 36             | 1.06          |
| SG2S 42B — 2020N  | 42              | φ 84               | φ 88                 |      |            | φ20                       | φ60                  | 16                   | 36             | 1.14          |
| SG2S 44B — 2020N  | 44              | φ 88               | φ 92                 |      |            | φ20                       | φ60                  | 16                   | 36             | 1.22          |
| SG2S 45B — 2020N  | 45              | φ 90               | φ 94                 |      |            | φ20                       | φ60                  | 16                   | 36             | 1.27          |
| SG2S 48B — 2020N  | 48              | φ 96               | φ100                 |      |            | φ20                       | φ60                  | 16                   | 36             | 1.40          |
| SG2S 50B — 2020   | 50              | φ100               | φ104                 |      |            | φ20                       | φ60                  | 20                   | 40             | 1.57          |
| SG2S 50B — 2025N  | 50              | φ100               | φ104                 |      |            | φ25                       | φ60                  | 16                   | 36             | 1.45          |
| SG2S 55B — 2025N  | 55              | φ110               | φ114                 |      |            | φ25                       | φ60                  | 16                   | 36             | 1.71          |
| SG2S 56B — 2025N  | 56              | φ112               | φ116                 |      |            | φ25                       | φ60                  | 16                   | 36             | 1.76          |
| SG2S 60B — 2025   | 60              | φ120               | φ124                 |      |            | φ25                       | φ70                  | 20                   | 40             | 2.21          |
| SG2S 60B — 2025N  | 60              | φ120               | φ124                 |      |            | φ25                       | φ65                  | 16                   | 36             | 2.05          |
| SG2S 64B — 2025N  | 64              | φ128               | φ132                 |      |            | φ25                       | φ65                  | 16                   | 36             | 2.30          |
| SG2S 70B — 2025N  | 70              | φ140               | φ144                 |      |            | φ25                       | φ70                  | 16                   | 36             | 2.76          |
| SG2S 72B — 2025N  | 72              | φ144               | φ148                 |      |            | φ25                       | φ70                  | 16                   | 36             | 2.90          |
| SG2S 75B — 2025N  | 75              | φ150               | φ154                 |      |            | φ25                       | φ70                  | 16                   | 36             | 3.12          |
| SG2S 80B — 2025   | 80              | φ160               | φ164                 |      |            | φ25                       | φ80                  | 20                   | 40             | 3.77          |
| SG2S 80B — 2025N  | 80              | φ160               | φ164                 |      |            | φ25                       | φ80                  | 16                   | 36             | 3.65          |
| SG2S 90B — 2025   | 90              | φ180               | φ184                 |      |            | φ25                       | φ80                  | 20                   | 40             | 4.60          |
| SG2S 90B — 2025N  | 90              | φ180               | φ184                 |      |            | φ25                       | φ80                  | 16                   | 36             | 4.49          |
| SG2S 100B — 2025N | 100             | φ200               | φ204                 |      |            | φ25                       | φ80                  | 16                   | 36             | 5.42          |



| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number  |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|-------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                   |
| 2.46                                                                                                   | 4.92    | 7.39      | 9.23      | 11.08     | 15.13     | 17.84     | 0.52                                                                                                     | 1.06    | 1.60      | 2.02      | 2.44      | 3.39      | 4.03      | 0.08 to 0.16           | SG2S 14B – 2012N  |
| 2.76                                                                                                   | 5.52    | 8.28      | 10.35     | 12.42     | 16.85     | 19.84     | 0.60                                                                                                     | 1.22    | 1.85      | 2.33      | 2.82      | 3.89      | 4.62      |                        | SG2S 15B – 2012   |
| 2.76                                                                                                   | 5.52    | 8.28      | 10.35     | 12.42     | 16.85     | 19.84     | 0.60                                                                                                     | 1.22    | 1.85      | 2.33      | 2.82      | 3.89      | 4.62      |                        | SG2S 15B – 2012N  |
| 3.06                                                                                                   | 6.12    | 9.19      | 11.48     | 13.77     | 18.58     | 21.86     | 0.69                                                                                                     | 1.39    | 2.12      | 2.67      | 3.23      | 4.42      | 5.25      |                        | SG2S 16L – 2015   |
| 3.06                                                                                                   | 6.12    | 9.19      | 11.48     | 13.77     | 18.58     | 21.86     | 0.69                                                                                                     | 1.39    | 2.12      | 2.67      | 3.23      | 4.42      | 5.25      |                        | SG2S 16B – 2012N  |
| 3.37                                                                                                   | 6.74    | 10.11     | 12.63     | 15.08     | 20.32     | 23.94     | 0.78                                                                                                     | 1.58    | 2.40      | 3.08      | 3.65      | 4.99      | 5.94      |                        | SG2S 17B – 2012N  |
| 3.68                                                                                                   | 7.36    | 11.04     | 13.80     | 16.40     | 22.06     | 26.02     | 0.88                                                                                                     | 1.78    | 2.71      | 3.41      | 4.09      | 5.59      | 6.66      |                        | SG2S 18B – 2012N  |
| 4.00                                                                                                   | 8.00    | 12.00     | 14.97     | 17.74     | 23.85     | 28.14     | 0.98                                                                                                     | 1.99    | 3.03      | 3.81      | 4.56      | 6.23      | 7.43      |                        | SG2S 19B – 2012N  |
| 4.32                                                                                                   | 8.64    | 12.96     | 16.15     | 19.08     | 25.63     | 30.25     | 1.09                                                                                                     | 2.22    | 3.37      | 4.24      | 5.05      | 6.90      | 8.23      |                        | SG2S 20B – 2015N  |
| 4.64                                                                                                   | 9.29    | 13.93     | 17.29     | 20.41     | 27.43     | 32.36     | 1.21                                                                                                     | 2.45    | 3.73      | 4.68      | 5.57      | 7.62      | 9.08      |                        | SG2S 21B – 2015N  |
| 4.97                                                                                                   | 9.94    | 14.92     | 18.44     | 21.75     | 29.25     | 34.47     | 1.33                                                                                                     | 2.70    | 4.11      | 5.14      | 6.11      | 8.37      | 9.97      |                        | SG2S 22B – 2015N  |
| 5.30                                                                                                   | 10.61   | 15.91     | 19.59     | 23.09     | 31.06     | 36.59     | 1.45                                                                                                     | 2.96    | 4.51      | 5.62      | 6.68      | 9.15      | 10.89     |                        | SG2S 23B – 2015N  |
| 5.63                                                                                                   | 11.27   | 16.90     | 20.73     | 24.42     | 32.87     | 38.68     | 1.59                                                                                                     | 3.24    | 4.93      | 6.12      | 7.27      | 9.97      | 11.86     |                        | SG2S 24B – 2015N  |
| 5.97                                                                                                   | 11.94   | 17.84     | 21.88     | 25.76     | 34.68     | 40.79     | 1.73                                                                                                     | 3.52    | 5.36      | 6.64      | 7.89      | 10.82     | 12.86     |                        | SG2S 25B – 2015N  |
| 6.31                                                                                                   | 12.61   | 18.79     | 23.03     | 27.09     | 36.49     | 42.84     | 1.87                                                                                                     | 3.82    | 5.80      | 7.18      | 8.53      | 11.70     | 13.88     |                        | SG2S 26B – 2015N  |
| 6.65                                                                                                   | 13.29   | 19.75     | 24.17     | 28.44     | 38.30     | 44.83     | 2.03                                                                                                     | 4.14    | 6.25      | 7.74      | 9.19      | 12.62     | 14.92     |                        | SG2S 27B – 2015N  |
| 6.99                                                                                                   | 13.98   | 20.70     | 25.32     | 29.82     | 40.11     | 46.80     | 2.18                                                                                                     | 4.66    | 6.73      | 8.32      | 9.90      | 13.57     | 16.00     |                        | SG2S 28B – 2015N  |
| 7.33                                                                                                   | 14.66   | 21.64     | 26.45     | 31.18     | 41.89     | 48.74     | 2.35                                                                                                     | 4.91    | 7.22      | 8.92      | 10.62     | 14.55     | 17.11     |                        | SG2S 29B – 2015N  |
| 7.67                                                                                                   | 15.35   | 22.59     | 27.59     | 32.55     | 43.69     | 50.68     | 2.52                                                                                                     | 5.15    | 7.72      | 9.55      | 11.37     | 15.56     | 18.25     |                        | SG2S 30B – 2018N  |
| 8.37                                                                                                   | 16.76   | 24.48     | 29.87     | 35.28     | 47.14     | 54.51     | 2.88                                                                                                     | 5.90    | 8.79      | 10.85     | 12.95     | 17.64     | 20.62     |                        | SG2S 32B – 2020   |
| 8.37                                                                                                   | 16.76   | 24.48     | 29.87     | 35.28     | 47.14     | 54.51     | 2.88                                                                                                     | 5.90    | 8.79      | 10.85     | 12.95     | 17.64     | 20.62     |                        | SG2S 32B – 2018N  |
| 9.07                                                                                                   | 18.14   | 26.36     | 32.21     | 38.01     | 50.49     | 58.27     | 3.27                                                                                                     | 6.69    | 9.92      | 12.27     | 14.63     | 19.81     | 23.11     |                        | SG2S 34B – 2018N  |
| 9.42                                                                                                   | 18.84   | 27.30     | 33.38     | 39.37     | 52.14     | 60.13     | 3.47                                                                                                     | 7.11    | 10.51     | 13.00     | 15.50     | 20.93     | 24.40     |                        | SG2S 35B – 2018N  |
| 9.77                                                                                                   | 19.54   | 28.24     | 34.54     | 40.73     | 53.78     | 61.97     | 3.68                                                                                                     | 7.54    | 11.12     | 13.76     | 16.40     | 22.08     | 25.72     |                        | SG2S 36B – 2018N  |
| 10.48                                                                                                  | 20.87   | 30.11     | 36.87     | 43.43     | 57.03     | 65.60     | 4.12                                                                                                     | 8.41    | 12.38     | 15.35     | 18.27     | 24.47     | 28.45     |                        | SG2S 38B – 2018N  |
| 11.20                                                                                                  | 22.20   | 31.97     | 39.19     | 46.12     | 60.23     | 69.43     | 4.58                                                                                                     | 9.32    | 13.71     | 17.01     | 20.24     | 26.95     | 31.41     |                        | SG2S 40B – 2020   |
| 11.20                                                                                                  | 22.20   | 31.97     | 39.19     | 46.12     | 60.23     | 69.43     | 4.58                                                                                                     | 9.32    | 13.71     | 17.01     | 20.24     | 26.95     | 31.41     |                        | SG2S 40B – 2020N  |
| 11.91                                                                                                  | 23.52   | 33.89     | 41.49     | 48.80     | 63.37     | 73.24     | 5.07                                                                                                     | 10.28   | 15.13     | 18.76     | 22.30     | 29.54     | 34.50     |                        | SG2S 42B – 2020N  |
| 12.62                                                                                                  | 24.82   | 35.77     | 43.76     | 51.30     | 66.42     | 76.96     | 5.58                                                                                                     | 11.29   | 16.62     | 20.59     | 24.40     | 32.22     | 37.73     |                        | SG2S 44B – 2020N  |
| 12.99                                                                                                  | 25.48   | 36.72     | 44.90     | 52.55     | 67.94     | 78.82     | 5.85                                                                                                     | 11.81   | 17.38     | 21.53     | 25.47     | 33.59     | 39.39     |                        | SG2S 45B – 2020N  |
| 14.07                                                                                                  | 27.44   | 39.56     | 48.31     | 56.23     | 72.72     | 84.34     | 6.69                                                                                                     | 13.44   | 19.80     | 24.49     | 28.82     | 38.01     | 44.55     |                        | SG2S 48B – 2020N  |
| 14.80                                                                                                  | 28.74   | 41.44     | 50.56     | 58.64     | 75.93     | 87.96     | 7.28                                                                                                     | 14.58   | 21.49     | 26.56     | 31.15     | 41.12     | 48.14     |                        | SG2S 50B – 2020   |
| 14.80                                                                                                  | 28.74   | 41.44     | 50.56     | 58.64     | 75.93     | 87.96     | 7.28                                                                                                     | 14.58   | 21.49     | 26.56     | 31.15     | 41.12     | 48.14     |                        | SG2S 50B – 2025N  |
| 16.63                                                                                                  | 31.97   | 46.10     | 55.87     | 64.54     | 83.80     | 96.81     | 8.88                                                                                                     | 17.63   | 26.01     | 31.93     | 37.30     | 49.37     | 57.63     |                        | SG2S 55B – 2025N  |
| 16.99                                                                                                  | 32.61   | 47.03     | 56.90     | 65.70     | 85.35     | 98.55     | 9.22                                                                                                     | 18.27   | 26.96     | 33.05     | 38.58     | 51.10     | 59.61     |                        | SG2S 56B – 2025N  |
| 18.46                                                                                                  | 35.16   | 50.71     | 60.97     | 70.25     | 91.46     | 104.57    | 10.65                                                                                                    | 20.95   | 30.93     | 37.69     | 43.91     | 58.26     | 67.29     |                        | SG2S 60B – 2025   |
| 18.46                                                                                                  | 35.16   | 50.71     | 60.97     | 70.25     | 91.46     | 104.57    | 10.65                                                                                                    | 20.95   | 30.93     | 37.69     | 43.91     | 58.26     | 67.29     |                        | SG2S 60B – 2025N  |
| 19.94                                                                                                  | 37.77   | 54.34     | 64.96     | 74.72     | 97.43     | 109.96    | 12.18                                                                                                    | 23.87   | 35.16     | 42.59     | 49.53     | 65.82     | 75.02     |                        | SG2S 64B – 2025N  |
| 22.17                                                                                                  | 41.66   | 59.39     | 70.76     | 81.78     | 105.82    | 117.59    | 14.69                                                                                                    | 28.59   | 41.75     | 50.41     | 58.89     | 77.64     | 87.09     |                        | SG2S 70B – 2025N  |
| 22.90                                                                                                  | 42.94   | 61.04     | 72.65     | 84.09     | 108.14    | 120.01    | 15.58                                                                                                    | 30.26   | 44.06     | 53.14     | 62.17     | 81.44     | 91.23     |                        | SG2S 72B – 2025N  |
| 23.95                                                                                                  | 44.86   | 63.49     | 75.44     | 87.52     | 111.53    | 123.54    | 16.91                                                                                                    | 32.84   | 47.61     | 57.34     | 67.23     | 87.25     | 97.54     |                        | SG2S 75B – 2025N  |
| 25.68                                                                                                  | 48.04   | 67.49     | 80.31     | 93.15     | 116.96    | -         | 19.26                                                                                                    | 37.38   | 53.80     | 64.88     | 76.04     | 97.20     | -         |                        | SG2S 80B – 2025   |
| 25.68                                                                                                  | 48.04   | 67.49     | 80.31     | 93.15     | 116.96    | -         | 19.26                                                                                                    | 37.38   | 53.80     | 64.88     | 76.04     | 97.20     | -         |                        | SG2S 80B – 2025N  |
| 29.06                                                                                                  | 54.23   | 75.12     | 89.89     | 103.90    | 126.88    | -         | 24.39                                                                                                    | 47.29   | 67.12     | 81.37     | 95.03     | 118.05    | -         |                        | SG2S 90B – 2025   |
| 29.06                                                                                                  | 54.23   | 75.12     | 89.89     | 103.90    | 126.88    | -         | 24.39                                                                                                    | 47.29   | 67.12     | 81.37     | 95.03     | 118.05    | -         |                        | SG2S 90B – 2025N  |
| 32.41                                                                                                  | 60.17   | 82.79     | 99.19     | 113.41    | -         | -         | 30.11                                                                                                    | 58.13   | 81.94     | 99.45     | 114.85    | -         | -         |                        | SG2S 100B – 2025N |





Unit: mm

| Accuracy Class    | Material   | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|------------|----------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N5 | SCM435/440 | 20°            | Induction hardening of teeth | HRC49 to 55            | See the table below |

★ No surface treatment is applied.

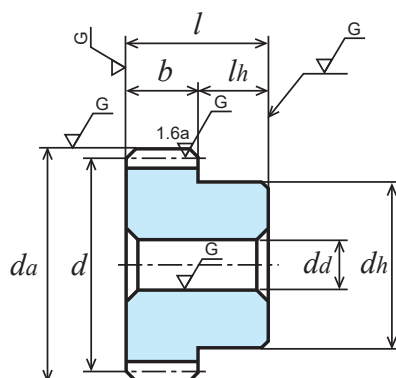
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number          | Number of teeth | Reference diameter | Tip diameter | Type | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Weight  |
|---------------------------|-----------------|--------------------|--------------|------|------------|---------------|--------------|------------|----------------|---------|
|                           | $z$             | $d$                | $d_a$        |      | $b$        | $d_d(H7)$     | $d_h$        | $l_h$      | $l$            | $W(kg)$ |
| <b>SG2.5S 14B – 2515N</b> | 14              | φ 35               | φ 40         | B1   | 25         | φ15           | φ28          | 18         | 43             | 0.22    |
| <b>SG2.5S 15B – 2515N</b> | 15              | φ 37.5             | φ 42.5       |      |            | φ15           | φ30          |            |                | 0.26    |
| <b>SG2.5S 16B – 2515N</b> | 16              | φ 40               | φ 45         |      |            | φ15           | φ32          |            |                | 0.30    |
| <b>SG2.5S 18B – 2515N</b> | 18              | φ 45               | φ 50         |      |            | φ15           | φ38          |            |                | 0.41    |
| <b>SG2.5S 20B – 2518N</b> | 20              | φ 50               | φ 55         |      |            | φ18           | φ40          |            |                | 0.48    |
| <b>SG2.5S 24B – 2518N</b> | 24              | φ 60               | φ 65         |      |            | φ18           | φ48          |            |                | 0.72    |
| <b>SG2.5S 25B – 2520N</b> | 25              | φ 62.5             | φ 67.5       |      |            | φ20           | φ50          |            |                | 0.77    |
| <b>SG2.5S 28B – 2520N</b> | 28              | φ 70               | φ 75         |      |            | φ20           | φ60          |            |                | 1.05    |
| <b>SG2.5S 30B – 2520N</b> | 30              | φ 75               | φ 80         |      |            | φ20           | φ65          |            |                | 1.23    |
| <b>SG2.5S 32B – 2520N</b> | 32              | φ 80               | φ 85         |      |            | φ20           | φ70          |            |                | 1.42    |
| <b>SG2.5S 35B – 2520N</b> | 35              | φ 87.5             | φ 92.5       |      |            | φ20           | φ70          |            |                | 1.62    |
| <b>SG2.5S 36B – 2520N</b> | 36              | φ 90               | φ 95         |      |            | φ20           | φ70          |            |                | 1.69    |
| <b>SG2.5S 40B – 2525N</b> | 40              | φ100               | φ105         |      |            | φ25           | φ70          |            |                | 1.92    |
| <b>SG2.5S 45B – 2525N</b> | 45              | φ112.5             | φ117.5       |      |            | φ25           | φ75          |            |                | 2.41    |
| <b>SG2.5S 48B – 2525N</b> | 48              | φ120               | φ125         |      |            | φ25           | φ75          |            |                | 2.68    |
| <b>SG2.5S 50B – 2525N</b> | 50              | φ125               | φ130         |      |            | φ25           | φ80          |            |                | 2.95    |
| <b>SG2.5S 55B – 2525N</b> | 55              | φ137.5             | φ142.5       |      |            | φ25           | φ80          |            |                | 3.46    |
| <b>SG2.5S 56B – 2525N</b> | 56              | φ140               | φ145         |      |            | φ25           | φ80          |            |                | 3.57    |
| <b>SG2.5S 60B – 2525N</b> | 60              | φ150               | φ155         |      |            | φ25           | φ80          |            |                | 4.01    |
| <b>SG2.5S 64B – 2525N</b> | 64              | φ160               | φ165         |      |            | φ25           | φ80          |            |                | 4.49    |
| <b>SG2.5S 70B – 2525N</b> | 70              | φ175               | φ180         |      |            | φ25           | φ80          |            |                | 5.26    |
| <b>SG2.5S 72B – 2525N</b> | 72              | φ180               | φ185         |      |            | φ25           | φ85          |            |                | 5.63    |
| <b>SG2.5S 75B – 2525N</b> | 75              | φ187.5             | φ192.5       |      |            | φ25           | φ90          |            |                | 6.15    |
| <b>SG2.5S 80B – 2525N</b> | 80              | φ200               | φ205         |      |            | φ25           | φ90          |            |                | 6.90    |



2D • 3D CAD



B1 type [-]

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number   |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|--------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                    |
| 4.81                                                                                                   | 9.62    | 14.42     | 18.03     | 21.48     | 28.91     | 34.08     | 1.03                                                                                                     | 2.10    | 3.19      | 4.02      | 4.83      | 6.61      | 7.87      | 0.1 to 0.2             | SG2.5S 14B – 2515N |
| 5.39                                                                                                   | 10.78   | 16.17     | 20.21     | 23.93     | 32.14     | 37.95     | 1.19                                                                                                     | 2.42    | 3.68      | 4.65      | 5.55      | 7.58      | 9.04      |                        | SG2.5S 15B – 2515N |
| 5.98                                                                                                   | 11.96   | 17.94     | 22.35     | 26.40     | 35.46     | 41.86     | 1.36                                                                                                     | 2.77    | 4.21      | 5.30      | 6.32      | 8.63      | 10.29     |                        | SG2.5S 16B – 2515N |
| 7.19                                                                                                   | 14.38   | 21.57     | 26.60     | 31.38     | 42.19     | 49.72     | 1.74                                                                                                     | 3.54    | 5.39      | 6.72      | 7.99      | 10.94     | 13.03     |                        | SG2.5S 18B – 2515N |
| 8.44                                                                                                   | 16.88   | 25.23     | 30.94     | 36.42     | 49.04     | 57.68     | 2.16                                                                                                     | 4.41    | 6.69      | 8.30      | 9.86      | 13.52     | 16.07     |                        | SG2.5S 20B – 2518N |
| 11.00                                                                                                  | 22.01   | 32.39     | 39.57     | 46.67     | 62.66     | 72.67     | 3.15                                                                                                     | 6.44    | 9.66      | 11.93     | 14.22     | 19.45     | 22.81     |                        | SG2.5S 24B – 2518N |
| 11.66                                                                                                  | 23.32   | 34.18     | 41.73     | 49.27     | 65.97     | 76.34     | 3.43                                                                                                     | 7.02    | 10.48     | 12.94     | 15.43     | 21.07     | 24.64     |                        | SG2.5S 25B – 2520N |
| 13.65                                                                                                  | 27.30   | 39.56     | 48.36     | 57.05     | 75.55     | 87.13     | 4.34                                                                                                     | 8.89    | 13.14     | 16.26     | 19.37     | 26.16     | 30.51     |                        | SG2.5S 28B – 2520N |
| 14.99                                                                                                  | 29.87   | 43.11     | 52.78     | 62.19     | 81.77     | 94.10     | 5.00                                                                                                     | 10.23   | 15.07     | 18.68     | 22.24     | 29.83     | 34.70     |                        | SG2.5S 30B – 2520N |
| 16.34                                                                                                  | 32.40   | 46.67     | 57.20     | 67.33     | 87.92     | 101.35    | 5.72                                                                                                     | 11.65   | 17.13     | 21.26     | 25.30     | 33.69     | 39.26     |                        | SG2.5S 32B – 2520N |
| 18.40                                                                                                  | 36.19   | 52.15     | 63.81     | 74.84     | 96.92     | 112.26    | 6.89                                                                                                     | 13.95   | 20.53     | 25.44     | 30.17     | 39.85     | 46.65     |                        | SG2.5S 35B – 2520N |
| 19.09                                                                                                  | 37.45   | 53.97     | 66.00     | 77.24     | 99.87     | 115.86    | 7.31                                                                                                     | 14.76   | 21.73     | 26.92     | 31.84     | 41.99     | 49.24     |                        | SG2.5S 36B – 2520N |
| 21.87                                                                                                  | 42.47   | 61.23     | 74.71     | 86.65     | 112.19    | 129.97    | 9.10                                                                                                     | 18.22   | 26.86     | 33.20     | 38.93     | 51.40     | 60.18     |                        | SG2.5S 40B – 2525N |
| 25.36                                                                                                  | 48.64   | 70.16     | 84.85     | 97.96     | 127.28    | 146.94    | 11.63                                                                                                    | 23.04   | 34.00     | 41.67     | 48.64     | 64.42     | 75.14     |                        | SG2.5S 45B – 2525N |
| 27.48                                                                                                  | 52.33   | 75.48     | 90.76     | 104.57    | 136.13    | 155.65    | 13.31                                                                                                    | 26.19   | 38.67     | 47.12     | 54.88     | 72.83     | 84.11     |                        | SG2.5S 48B – 2525N |
| 28.90                                                                                                  | 54.85   | 79.00     | 94.63     | 108.89    | 141.94    | 160.97    | 14.49                                                                                                    | 28.44   | 41.94     | 50.91     | 59.22     | 78.68     | 90.11     |                        | SG2.5S 50B – 2525N |
| 32.47                                                                                                  | 61.12   | 87.29     | 104.08    | 120.17    | 156.12    | 173.61    | 17.69                                                                                                    | 34.47   | 50.42     | 60.92     | 71.11     | 94.11     | 105.66    |                        | SG2.5S 55B – 2525N |
| 33.19                                                                                                  | 62.36   | 88.91     | 105.93    | 122.43    | 158.43    | 176.03    | 18.36                                                                                                    | 35.74   | 52.18     | 63.02     | 73.62     | 97.04     | 108.86    |                        | SG2.5S 56B – 2525N |
| 35.94                                                                                                  | 67.32   | 95.27     | 113.22    | 131.34    | 167.37    | 185.40    | 21.14                                                                                                    | 41.06   | 59.51     | 71.67     | 84.04     | 109.06    | 121.93    |                        | SG2.5S 60B – 2525N |
| 38.61                                                                                                  | 72.24   | 101.49    | 120.77    | 140.07    | 175.88    | -         | 24.07                                                                                                    | 46.72   | 67.25     | 81.09     | 95.05     | 121.50    | -         |                        | SG2.5S 64B – 2525N |
| 42.59                                                                                                  | 79.53   | 110.56    | 132.11    | 152.83    | 187.90    | -         | 28.82                                                                                                    | 55.88   | 79.59     | 96.37     | 112.64    | 140.91    | -         |                        | SG2.5S 70B – 2525N |
| 43.91                                                                                                  | 81.94   | 113.52    | 135.82    | 157.00    | 191.72    | -         | 30.49                                                                                                    | 59.11   | 83.90     | 101.71    | 118.78    | 147.57    | -         |                        | SG2.5S 72B – 2525N |
| 45.87                                                                                                  | 85.53   | 117.88    | 141.33    | 163.16    | 197.29    | -         | 33.09                                                                                                    | 64.11   | 90.53     | 109.96    | 128.25    | 157.71    | -         |                        | SG2.5S 75B – 2525N |
| 49.13                                                                                                  | 91.20   | 125.49    | 150.35    | 171.91    | -         | -         | 37.64                                                                                                    | 72.66   | 102.43    | 124.31    | 143.57    | -         | -         |                        | SG2.5S 80B – 2525N |



Unit: mm

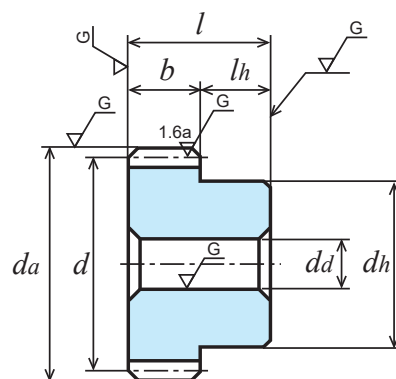
| Accuracy Class    | Material   | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|------------|----------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N5 | SCM435/440 | 20°            | Induction hardening of teeth | HRC49 to 55            | See the table below |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>a</sub>(H7)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Weight<br><i>W(kg)</i> |
|------------------|-----------------------------|--------------------------------|--------------------------------------|------|------------------------|-------------------------------------------|--------------------------------------|------------------------------------|----------------------------|------------------------|
| SG3S 14B — 3016N | 14                          | φ 42                           | φ 48                                 | B1   | 30                     | φ16                                       | φ 34                                 | 20                                 | 50                         | 0.39                   |
| SG3S 15B — 3016N | 15                          | φ 45                           | φ 51                                 |      |                        | φ16                                       | φ 36                                 |                                    |                            | 0.46                   |
| SG3S 16B — 3016N | 16                          | φ 48                           | φ 54                                 |      |                        | φ16                                       | φ 38                                 |                                    |                            | 0.53                   |
| SG3S 18B — 3016N | 18                          | φ 54                           | φ 60                                 |      |                        | φ16                                       | φ 40                                 |                                    |                            | 0.66                   |
| SG3S 20B — 3020N | 20                          | φ 60                           | φ 66                                 |      |                        | φ20                                       | φ 50                                 |                                    |                            | 0.85                   |
| SG3S 24B — 3020N | 24                          | φ 72                           | φ 78                                 |      |                        | φ20                                       | φ 58                                 |                                    |                            | 1.25                   |
| SG3S 25B — 3020N | 25                          | φ 75                           | φ 81                                 |      |                        | φ20                                       | φ 60                                 |                                    |                            | 1.36                   |
| SG3S 28B — 3020N | 28                          | φ 84                           | φ 90                                 |      |                        | φ20                                       | φ 70                                 |                                    |                            | 1.79                   |
| SG3S 30B — 3025N | 30                          | φ 90                           | φ 96                                 |      |                        | φ25                                       | φ 75                                 |                                    |                            | 2.00                   |
| SG3S 32B — 3025N | 32                          | φ 96                           | φ102                                 |      |                        | φ25                                       | φ 75                                 |                                    |                            | 2.21                   |
| SG3S 35B — 3025N | 35                          | φ105                           | φ111                                 |      |                        | φ25                                       | φ 80                                 |                                    |                            | 2.64                   |
| SG3S 36B — 3025N | 36                          | φ108                           | φ114                                 |      |                        | φ25                                       | φ 80                                 |                                    |                            | 2.75                   |
| SG3S 40B — 3030  | 40                          | φ120                           | φ126                                 |      |                        | φ30                                       | φ 70                                 |                                    |                            | 3.00                   |
| SG3S 40B — 3025N | 40                          | φ120                           | φ126                                 |      |                        | φ25                                       | φ 80                                 |                                    |                            | 3.26                   |
| SG3S 45B — 3025N | 45                          | φ135                           | φ141                                 |      |                        | φ25                                       | φ 80                                 |                                    |                            | 3.97                   |
| SG3S 48B — 3025N | 48                          | φ144                           | φ150                                 |      |                        | φ25                                       | φ 85                                 |                                    |                            | 4.53                   |
| SG3S 50B — 3030N | 50                          | φ150                           | φ156                                 |      |                        | φ30                                       | φ 85                                 |                                    |                            | 4.78                   |
| SG3S 55B — 3030N | 55                          | φ165                           | φ171                                 |      |                        | φ30                                       | φ 90                                 |                                    |                            | 5.76                   |
| SG3S 56B — 3030N | 56                          | φ168                           | φ174                                 |      |                        | φ30                                       | φ 90                                 |                                    |                            | 5.94                   |
| SG3S 60B — 3030N | 60                          | φ180                           | φ186                                 |      |                        | φ30                                       | φ100                                 |                                    |                            | 6.95                   |
| SG3S 64B — 3030N | 64                          | φ192                           | φ198                                 |      |                        | φ30                                       | φ100                                 |                                    |                            | 7.77                   |
| SG3S 70B — 3030N | 70                          | φ210                           | φ216                                 |      |                        | φ30                                       | φ100                                 |                                    |                            | 9.11                   |
| SG3S 72B — 3030N | 72                          | φ216                           | φ222                                 |      |                        | φ30                                       | φ100                                 |                                    |                            | 9.59                   |
| SG3S 75B — 3030N | 75                          | φ225                           | φ231                                 |      |                        | φ30                                       | φ100                                 |                                    |                            | 10.32                  |
| SG3S 80B — 3030N | 80                          | φ240                           | φ246                                 |      |                        | φ30                                       | φ100                                 |                                    |                            | 11.61                  |



B1 type [-]

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                  |
| 8.31                                                                                                   | 16.62   | 24.93     | 30.93     | 36.51     | 49.07     | 57.88     | 1.81                                                                                                     | 3.68    | 5.60      | 7.02      | 8.36      | 11.43     | 13.62     | 0.12 to 0.24           | SG3S 14B – 3016N |
| 9.31                                                                                                   | 18.62   | 27.93     | 34.46     | 40.64     | 54.65     | 64.40     | 2.08                                                                                                     | 4.25    | 6.47      | 8.06      | 9.59      | 13.13     | 15.64     |                        | SG3S 15B – 3016N |
| 10.33                                                                                                  | 20.67   | 30.99     | 38.02     | 44.79     | 60.28     | 70.95     | 2.38                                                                                                     | 4.86    | 7.40      | 9.17      | 10.91     | 14.95     | 17.78     |                        | SG3S 16B – 3016N |
| 12.42                                                                                                  | 24.84   | 36.90     | 45.18     | 53.16     | 71.59     | 83.78     | 3.04                                                                                                     | 6.21    | 9.38      | 11.61     | 13.79     | 18.92     | 22.39     |                        | SG3S 18B – 3016N |
| 14.59                                                                                                  | 29.17   | 42.93     | 52.45     | 61.87     | 83.06     | 96.33     | 3.78                                                                                                     | 7.73    | 11.59     | 14.32     | 17.06     | 23.34     | 27.37     |                        | SG3S 20B – 3020N |
| 19.01                                                                                                  | 38.01   | 54.95     | 67.21     | 79.24     | 104.65    | 120.57    | 5.52                                                                                                     | 11.31   | 16.68     | 20.65     | 24.60     | 33.13     | 38.59     |                        | SG3S 24B – 3020N |
| 20.15                                                                                                  | 40.15   | 57.96     | 70.95     | 83.59     | 109.93    | 126.49    | 6.01                                                                                                     | 12.28   | 18.09     | 22.41     | 26.69     | 35.79     | 41.64     |                        | SG3S 25B – 3020N |
| 23.59                                                                                                  | 46.57   | 67.09     | 82.15     | 96.61     | 125.47    | 145.00    | 7.60                                                                                                     | 15.42   | 22.69     | 28.14     | 33.45     | 44.30     | 51.76     |                        | SG3S 28B – 3020N |
| 25.90                                                                                                  | 50.82   | 73.23     | 89.55     | 104.80    | 135.50    | 157.19    | 8.77                                                                                                     | 17.71   | 26.08     | 32.30     | 38.21     | 50.39     | 59.08     |                        | SG3S 30B – 3025N |
| 28.24                                                                                                  | 55.08   | 79.39     | 96.95     | 112.84    | 145.94    | 169.26    | 10.03                                                                                                    | 20.15   | 29.69     | 36.74     | 43.23     | 57.01     | 66.83     |                        | SG3S 32B – 3025N |
| 31.79                                                                                                  | 61.43   | 88.58     | 107.77    | 124.68    | 161.66    | 187.02    | 12.09                                                                                                    | 24.10   | 35.54     | 43.81     | 51.24     | 67.75     | 79.19     |                        | SG3S 35B – 3025N |
| 32.98                                                                                                  | 63.54   | 91.64     | 111.22    | 128.56    | 166.83    | 192.84    | 12.82                                                                                                    | 25.49   | 37.60     | 46.25     | 54.04     | 71.51     | 83.51     |                        | SG3S 36B – 3025N |
| 37.79                                                                                                  | 71.94   | 103.77    | 124.77    | 143.76    | 187.16    | 214.00    | 15.97                                                                                                    | 31.43   | 46.40     | 56.54     | 65.86     | 87.40     | 100.93    |                        | SG3S 40B – 3030  |
| 37.79                                                                                                  | 71.94   | 103.77    | 124.77    | 143.76    | 187.16    | 214.00    | 15.97                                                                                                    | 31.43   | 46.40     | 56.54     | 65.86     | 87.40     | 100.93    |                        | SG3S 40B – 3025N |
| 43.83                                                                                                  | 82.62   | 118.23    | 141.06    | 162.71    | 211.59    | 236.20    | 20.43                                                                                                    | 39.86   | 58.41     | 70.63     | 82.36     | 109.12    | 122.99    |                        | SG3S 45B – 3025N |
| 47.47                                                                                                  | 89.00   | 126.51    | 150.58    | 174.29    | 224.14    | 248.74    | 23.37                                                                                                    | 45.39   | 66.08     | 79.71     | 93.26     | 122.16    | 136.84    |                        | SG3S 48B – 3025N |
| 49.77                                                                                                  | 93.24   | 131.94    | 156.80    | 181.90    | 231.80    | 256.76    | 25.37                                                                                                    | 49.27   | 71.42     | 86.01     | 100.85    | 130.87    | 146.32    |                        | SG3S 50B – 3030N |
| 55.48                                                                                                  | 103.74  | 145.22    | 173.05    | 200.54    | 250.00    | -         | 30.73                                                                                                    | 59.63   | 85.52     | 103.27    | 120.93    | 153.45    | -         |                        | SG3S 55B – 3030N |
| 56.62                                                                                                  | 105.82  | 147.83    | 176.30    | 204.19    | 253.49    | -         | 31.86                                                                                                    | 61.82   | 88.47     | 106.92    | 125.14    | 158.10    | -         |                        | SG3S 56B – 3030N |
| 61.14                                                                                                  | 114.10  | 158.07    | 189.13    | 218.62    | 266.97    | -         | 36.59                                                                                                    | 70.93   | 100.68    | 122.05    | 142.54    | 177.08    | -         |                        | SG3S 60B – 3030N |
| 65.63                                                                                                  | 122.26  | 168.12    | 201.71    | 232.50    | -         | -         | 41.63                                                                                                    | 80.62   | 113.58    | 138.05    | 160.74    | -         | -         |                        | SG3S 64B – 3030N |
| 72.29                                                                                                  | 133.62  | 184.00    | 220.08    | 249.18    | -         | -         | 49.78                                                                                                    | 95.73   | 135.04    | 163.59    | 187.06    | -         | -         |                        | SG3S 70B – 3030N |
| 74.50                                                                                                  | 137.34  | 189.20    | 226.08    | 254.51    | -         | -         | 52.66                                                                                                    | 101.01  | 142.56    | 172.51    | 196.11    | -         | -         |                        | SG3S 72B – 3030N |
| 77.78                                                                                                  | 142.85  | 196.93    | 234.96    | 262.28    | -         | -         | 57.11                                                                                                    | 109.17  | 154.16    | 186.25    | 209.93    | -         | -         |                        | SG3S 75B – 3030N |
| 83.22                                                                                                  | 151.85  | 209.58    | 247.54    | 274.71    | -         | -         | 64.93                                                                                                    | 123.36  | 174.37    | 208.50    | 233.57    | -         | -         |                        | SG3S 80B – 3030N |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Surface treatment ① | Backlash ②          |
|-------------------|----------|----------------|------------------------------|------------------------|---------------------|---------------------|
| [JIS B 1702-1] N6 | S45C     | 20°            | Induction hardening of teeth | HRC50 to 56            | Black oxide finish  | See the table below |

① A black oxide finish is applied to the gear surface, but not the tooth surfaces.

② This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

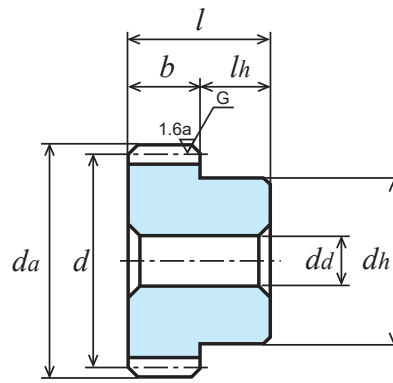
★ The allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

| Catalogue number          | Module<br><i>m</i> | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>a</sub></i> (H7) | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Weight<br><i>W</i> (kg) |
|---------------------------|--------------------|-----------------------------|--------------------------------|--------------------------------------|------|------------------------|--------------------------------------------|--------------------------------------|------------------------------------|----------------------------|-------------------------|
| <b>SGR50S 30B – 0505</b>  | 0.5                | 30                          | φ15                            | φ16                                  | B1   | 5                      | φ 5                                        | φ12                                  | 8                                  | 13                         | 0.012                   |
| <b>SGR50S 40B – 0506</b>  |                    | 40                          | φ20                            | φ21                                  |      |                        | φ 6                                        | φ15                                  |                                    |                            | 0.021                   |
| <b>SGR50S 50B – 0506</b>  |                    | 50                          | φ25                            | φ26                                  |      |                        | φ 6                                        | φ18                                  |                                    |                            | 0.032                   |
| <b>SGR50S 60B – 0506</b>  |                    | 60                          | φ30                            | φ31                                  |      |                        | φ 6                                        | φ22                                  |                                    |                            | 0.049                   |
| <b>SGR50S 70B – 0508</b>  |                    | 70                          | φ35                            | φ36                                  |      |                        | φ 8                                        | φ25                                  |                                    |                            | 0.063                   |
| <b>SGR50S 80B – 0508</b>  |                    | 80                          | φ40                            | φ41                                  |      |                        | φ 8                                        | φ28                                  |                                    |                            | 0.083                   |
| <b>SGR50S 90B – 0508</b>  |                    | 90                          | φ45                            | φ46                                  |      |                        | φ 8                                        | φ32                                  |                                    |                            | 0.108                   |
| <b>SGR50S 100B – 0510</b> |                    | 100                         | φ50                            | φ51                                  |      |                        | φ10                                        | φ35                                  |                                    |                            | 0.129                   |
| <b>SGR50S 120B – 0510</b> |                    | 120                         | φ60                            | φ61                                  |      |                        | φ10                                        | φ42                                  |                                    |                            | 0.190                   |
| <b>SGR80S 25B – 0805</b>  | 0.8                | 25                          | φ20                            | φ21.6                                |      | 8                      | φ 5                                        | φ16                                  | 10                                 | 18                         | 0.033                   |
| <b>SGR80S 30B – 0805</b>  |                    | 30                          | φ24                            | φ25.6                                |      |                        | φ 5                                        | φ20                                  |                                    |                            | 0.050                   |
| <b>SGR80S 40B – 0808</b>  |                    | 40                          | φ32                            | φ33.6                                |      |                        | φ 8                                        | φ25                                  |                                    |                            | 0.082                   |
| <b>SGR80S 50B – 0808</b>  |                    | 50                          | φ40                            | φ41.6                                |      |                        | φ 8                                        | φ28                                  |                                    |                            | 0.12                    |
| <b>SGR80S 60B – 0808</b>  |                    | 60                          | φ48                            | φ49.6                                |      |                        | φ 8                                        | φ28                                  |                                    |                            | 0.155                   |
| <b>SGR80S 70B – 0808</b>  |                    | 70                          | φ56                            | φ57.6                                |      |                        | φ 8                                        | φ28                                  |                                    |                            | 0.196                   |
| <b>SGR80S 80B – 0808</b>  |                    | 80                          | φ64                            | φ65.6                                |      |                        | φ 8                                        | φ28                                  |                                    |                            | 0.243                   |
| <b>SGR80S 90B – 0810</b>  |                    | 90                          | φ72                            | φ73.6                                |      |                        | φ10                                        | φ30                                  |                                    |                            | 0.300                   |
| <b>SGR80S 100B – 0812</b> |                    | 100                         | φ80                            | φ81.6                                |      |                        | φ12                                        | φ40                                  |                                    |                            | 0.398                   |
| <b>SGR80S 120B – 0812</b> |                    | 120                         | φ96                            | φ97.6                                |      |                        | φ12                                        | φ40                                  |                                    |                            | 0.537                   |





2D • 3D CAD



B1 type

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number   |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|--------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                    |
| 0.080                                                                                                  | 0.161   | 0.241     | 0.299     | 0.355     | 0.480     | 0.565     | 0.023                                                                                                    | 0.049   | 0.075     | 0.093     | 0.112     | 0.154     | 0.183     | 0.02 to 0.08           | SGR50S 30B — 0505  |
| 0.117                                                                                                  | 0.234   | 0.346     | 0.427     | 0.504     | 0.677     | 0.795     | 0.043                                                                                                    | 0.089   | 0.135     | 0.168     | 0.200     | 0.272     | 0.323     |                        | SGR50S 40B — 0506  |
| 0.154                                                                                                  | 0.308   | 0.450     | 0.552     | 0.651     | 0.872     | 1.031     | 0.069                                                                                                    | 0.142   | 0.212     | 0.263     | 0.313     | 0.425     | 0.507     |                        | SGR50S 50B — 0506  |
| 0.192                                                                                                  | 0.380   | 0.553     | 0.676     | 0.793     | 1.071     | 1.263     | 0.101                                                                                                    | 0.207   | 0.307     | 0.379     | 0.448     | 0.614     | 0.730     |                        | SGR50S 60B — 0506  |
| 0.230                                                                                                  | 0.451   | 0.653     | 0.796     | 0.938     | 1.266     | 1.495     | 0.140                                                                                                    | 0.283   | 0.417     | 0.514     | 0.610     | 0.836     | 0.995     |                        | SGR50S 70B — 0508  |
| 0.269                                                                                                  | 0.521   | 0.751     | 0.916     | 1.083     | 1.460     | 1.725     | 0.186                                                                                                    | 0.371   | 0.544     | 0.670     | 0.799     | 1.092     | 1.301     |                        | SGR50S 80B — 0508  |
| 0.308                                                                                                  | 0.590   | 0.846     | 1.037     | 1.225     | 1.652     | 1.950     | 0.238                                                                                                    | 0.470   | 0.687     | 0.850     | 1.012     | 1.385     | 1.647     |                        | SGR50S 90B — 0508  |
| 0.346                                                                                                  | 0.658   | 0.943     | 1.158     | 1.366     | 1.844     | 2.173     | 0.296                                                                                                    | 0.580   | 0.847     | 1.051     | 1.249     | 1.711     | 2.032     |                        | SGR50S 100B — 0510 |
| 0.419                                                                                                  | 0.790   | 1.139     | 1.395     | 1.648     | 2.219     | 2.580     | 0.429                                                                                                    | 0.834   | 1.224     | 1.513     | 1.802     | 2.461     | 2.886     |                        | SGR50S 120B — 0510 |
| 0.257                                                                                                  | 0.500   | 0.761     | 0.937     | 1.108     | 1.487     | 1.748     | 0.069                                                                                                    | 0.144   | 0.216     | 0.269     | 0.320     | 0.436     | 0.517     | 0.02 to 0.08           | SGR80S 25B — 0805  |
| 0.329                                                                                                  | 0.659   | 0.964     | 1.184     | 1.396     | 1.867     | 2.210     | 0.102                                                                                                    | 0.210   | 0.313     | 0.388     | 0.461     | 0.626     | 0.747     |                        | SGR80S 30B — 0805  |
| 0.479                                                                                                  | 0.943   | 1.369     | 1.672     | 1.961     | 2.653     | 3.127     | 0.186                                                                                                    | 0.378   | 0.559     | 0.689     | 0.815     | 1.118     | 1.328     |                        | SGR80S 40B — 0808  |
| 0.632                                                                                                  | 1.224   | 1.764     | 2.150     | 2.544     | 3.427     | 4.051     | 0.297                                                                                                    | 0.593   | 0.871     | 1.072     | 1.279     | 1.747     | 2.083     |                        | SGR80S 50B — 0808  |
| 0.788                                                                                                  | 1.501   | 2.149     | 2.641     | 3.117     | 4.207     | 4.960     | 0.436                                                                                                    | 0.856   | 1.248     | 1.549     | 1.843     | 2.523     | 2.998     |                        | SGR80S 60B — 0808  |
| 0.937                                                                                                  | 1.772   | 2.549     | 3.125     | 3.686     | 4.972     | 5.814     | 0.597                                                                                                    | 1.164   | 1.704     | 2.110     | 2.509     | 3.433     | 4.047     |                        | SGR80S 70B — 0808  |
| 1.085                                                                                                  | 2.037   | 2.943     | 3.599     | 4.257     | 5.706     | 6.618     | 0.783                                                                                                    | 1.516   | 2.229     | 2.753     | 3.283     | 4.464     | 5.219     |                        | SGR80S 80B — 0808  |
| 1.230                                                                                                  | 2.293   | 3.326     | 4.076     | 4.813     | 6.383     | 7.378     | 0.995                                                                                                    | 1.911   | 2.822     | 3.492     | 4.157     | 5.593     | 6.517     |                        | SGR80S 90B — 0810  |
| 1.374                                                                                                  | 2.563   | 3.706     | 4.550     | 5.364     | 7.040     | 8.082     | 1.230                                                                                                    | 2.366   | 3.481     | 4.316     | 5.129     | 6.830     | 7.903     |                        | SGR80S 100B — 0812 |
| 1.657                                                                                                  | 3.094   | 4.476     | 5.477     | 6.391     | 8.252     | 9.311     | 1.774                                                                                                    | 3.415   | 5.028     | 6.213     | 7.308     | 9.573     | 10.888    |                        | SGR80S 120B — 0812 |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Surface treatment ① | Backlash ②          |
|-------------------|----------|----------------|------------------------------|------------------------|---------------------|---------------------|
| [JIS B 1702-1] N6 | S45C     | 20°            | Induction hardening of teeth | HRC50 to 56            | Black oxide finish  | See the table below |

① A black oxide finish is applied to the gear surface, but not the tooth surfaces.

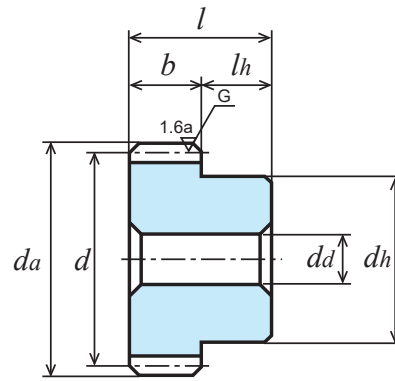
② This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

★ The allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

| Catalogue number  | Number of teeth | Reference diameter | Tip diameter | Type | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Weight  |
|-------------------|-----------------|--------------------|--------------|------|------------|---------------|--------------|------------|----------------|---------|
|                   | $z$             | $d$                | $d_a$        |      | $b$        | $d_a(H7)$     | $d_h$        | $l_h$      | $l$            | $W(kg)$ |
| SGR1S 14B — 1005  | 14              | $\phi 14$          | $\phi 16$    | B1   | 10         | $\phi 5$      | $\phi 11$    | 10         | 20             | 0.016   |
| SGR1S 15B — 1006  | 15              | $\phi 15$          | $\phi 17$    |      |            | $\phi 6$      | $\phi 12$    |            |                | 0.018   |
| SGR1S 16B — 1006  | 16              | $\phi 16$          | $\phi 18$    |      |            | $\phi 6$      | $\phi 13$    |            |                | 0.022   |
| SGR1S 17B — 1006  | 17              | $\phi 17$          | $\phi 19$    |      |            | $\phi 6$      | $\phi 14$    |            |                | 0.025   |
| SGR1S 18B — 1006  | 18              | $\phi 18$          | $\phi 20$    |      |            | $\phi 6$      | $\phi 15$    |            |                | 0.029   |
| SGR1S 19B — 1006  | 19              | $\phi 19$          | $\phi 21$    |      |            | $\phi 6$      | $\phi 16$    |            |                | 0.034   |
| SGR1S 20B — 1006  | 20              | $\phi 20$          | $\phi 22$    |      |            | $\phi 6$      | $\phi 16$    |            |                | 0.036   |
| SGR1S 21B — 1008  | 21              | $\phi 21$          | $\phi 23$    |      |            | $\phi 8$      | $\phi 18$    |            |                | 0.039   |
| SGR1S 22B — 1008  | 22              | $\phi 22$          | $\phi 24$    |      |            | $\phi 8$      | $\phi 18$    |            |                | 0.042   |
| SGR1S 23B — 1008  | 23              | $\phi 23$          | $\phi 25$    |      |            | $\phi 8$      | $\phi 20$    |            |                | 0.049   |
| SGR1S 24B — 1008  | 24              | $\phi 24$          | $\phi 26$    |      |            | $\phi 8$      | $\phi 20$    |            |                | 0.052   |
| SGR1S 25B — 1008  | 25              | $\phi 25$          | $\phi 27$    |      |            | $\phi 8$      | $\phi 20$    |            |                | 0.055   |
| SGR1S 26B — 1008  | 26              | $\phi 26$          | $\phi 28$    |      |            | $\phi 8$      | $\phi 20$    |            |                | 0.058   |
| SGR1S 27B — 1008  | 27              | $\phi 27$          | $\phi 29$    |      |            | $\phi 8$      | $\phi 20$    |            |                | 0.062   |
| SGR1S 28B — 1008  | 28              | $\phi 28$          | $\phi 30$    |      |            | $\phi 8$      | $\phi 20$    |            |                | 0.065   |
| SGR1S 29B — 1008  | 29              | $\phi 29$          | $\phi 31$    |      |            | $\phi 8$      | $\phi 25$    |            |                | 0.082   |
| SGR1S 30B — 1010  | 30              | $\phi 30$          | $\phi 32$    |      |            | $\phi 10$     | $\phi 25$    |            |                | 0.082   |
| SGR1S 32B — 1010  | 32              | $\phi 32$          | $\phi 34$    |      |            | $\phi 10$     | $\phi 25$    |            |                | 0.089   |
| SGR1S 34B — 1010  | 34              | $\phi 34$          | $\phi 36$    |      |            | $\phi 10$     | $\phi 25$    |            |                | 0.097   |
| SGR1S 35B — 1010  | 35              | $\phi 35$          | $\phi 37$    |      |            | $\phi 10$     | $\phi 25$    |            |                | 0.102   |
| SGR1S 36B — 1010  | 36              | $\phi 36$          | $\phi 38$    |      |            | $\phi 10$     | $\phi 25$    |            |                | 0.106   |
| SGR1S 38B — 1010  | 38              | $\phi 38$          | $\phi 40$    |      |            | $\phi 10$     | $\phi 30$    |            |                | 0.132   |
| SGR1S 40B — 1010  | 40              | $\phi 40$          | $\phi 42$    |      |            | $\phi 10$     | $\phi 30$    |            |                | 0.142   |
| SGR1S 42B — 1010  | 42              | $\phi 42$          | $\phi 44$    |      |            | $\phi 10$     | $\phi 30$    |            |                | 0.152   |
| SGR1S 44B — 1010  | 44              | $\phi 44$          | $\phi 46$    |      |            | $\phi 10$     | $\phi 30$    |            |                | 0.163   |
| SGR1S 45B — 1010  | 45              | $\phi 45$          | $\phi 47$    |      |            | $\phi 10$     | $\phi 30$    |            |                | 0.168   |
| SGR1S 48B — 1010  | 48              | $\phi 48$          | $\phi 50$    |      |            | $\phi 10$     | $\phi 30$    |            |                | 0.185   |
| SGR1S 50B — 1012  | 50              | $\phi 50$          | $\phi 52$    |      |            | $\phi 12$     | $\phi 35$    |            |                | 0.212   |
| SGR1S 55B — 1012  | 55              | $\phi 55$          | $\phi 57$    |      |            | $\phi 12$     | $\phi 35$    |            |                | 0.244   |
| SGR1S 56B — 1012  | 56              | $\phi 56$          | $\phi 58$    |      |            | $\phi 12$     | $\phi 35$    |            |                | 0.251   |
| SGR1S 60B — 1012  | 60              | $\phi 60$          | $\phi 62$    |      |            | $\phi 12$     | $\phi 40$    |            |                | 0.303   |
| SGR1S 64B — 1012  | 64              | $\phi 64$          | $\phi 66$    |      |            | $\phi 12$     | $\phi 40$    |            |                | 0.333   |
| SGR1S 70B — 1012  | 70              | $\phi 70$          | $\phi 72$    |      |            | $\phi 12$     | $\phi 40$    |            |                | 0.383   |
| SGR1S 75B — 1012  | 75              | $\phi 75$          | $\phi 77$    |      |            | $\phi 12$     | $\phi 40$    |            |                | 0.428   |
| SGR1S 80B — 1015  | 80              | $\phi 80$          | $\phi 82$    |      |            | $\phi 15$     | $\phi 50$    |            |                | 0.520   |
| SGR1S 90B — 1015  | 90              | $\phi 90$          | $\phi 92$    |      |            | $\phi 15$     | $\phi 50$    |            |                | 0.626   |
| SGR1S 100B — 1015 | 100             | $\phi 100$         | $\phi 102$   |      |            | $\phi 15$     | $\phi 50$    |            |                | 0.743   |
| SGR1S 120B — 1015 | 120             | $\phi 120$         | $\phi 122$   |      |            | $\phi 15$     | $\phi 50$    |            |                | 1.014   |



2D • 3D CAD



B1 type

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number  |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|-------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                   |
| 0.21                                                                                                   | 0.41    | 0.62      | 0.77      | 0.91      | 1.23      | 1.45      | 0.04                                                                                                     | 0.09    | 0.13      | 0.16      | 0.20      | 0.27      | 0.32      | 0.08 to 0.16           | SGR1S 14B – 1005  |
| 0.23                                                                                                   | 0.47    | 0.70      | 0.87      | 1.03      | 1.39      | 1.64      | 0.05                                                                                                     | 0.10    | 0.15      | 0.19      | 0.22      | 0.31      | 0.37      |                        | SGR1S 15B – 1006  |
| 0.26                                                                                                   | 0.52    | 0.78      | 0.96      | 1.14      | 1.54      | 1.81      | 0.05                                                                                                     | 0.11    | 0.17      | 0.21      | 0.26      | 0.35      | 0.42      |                        | SGR1S 16B – 1006  |
| 0.29                                                                                                   | 0.57    | 0.85      | 1.05      | 1.25      | 1.68      | 1.98      | 0.06                                                                                                     | 0.13    | 0.19      | 0.24      | 0.29      | 0.40      | 0.47      |                        | SGR1S 17B – 1006  |
| 0.31                                                                                                   | 0.62    | 0.93      | 1.15      | 1.36      | 1.82      | 2.14      | 0.07                                                                                                     | 0.14    | 0.22      | 0.27      | 0.32      | 0.44      | 0.52      |                        | SGR1S 18B – 1006  |
| 0.34                                                                                                   | 0.68    | 1.01      | 1.24      | 1.46      | 1.97      | 2.31      | 0.08                                                                                                     | 0.16    | 0.24      | 0.30      | 0.36      | 0.49      | 0.58      |                        | SGR1S 19B – 1006  |
| 0.37                                                                                                   | 0.73    | 1.08      | 1.33      | 1.57      | 2.11      | 2.48      | 0.09                                                                                                     | 0.18    | 0.27      | 0.34      | 0.40      | 0.55      | 0.65      |                        | SGR1S 20B – 1006  |
| 0.39                                                                                                   | 0.78    | 1.16      | 1.42      | 1.68      | 2.25      | 2.66      | 0.10                                                                                                     | 0.20    | 0.30      | 0.37      | 0.44      | 0.60      | 0.71      |                        | SGR1S 21B – 1008  |
| 0.42                                                                                                   | 0.84    | 1.23      | 1.52      | 1.79      | 2.40      | 2.83      | 0.11                                                                                                     | 0.22    | 0.33      | 0.41      | 0.49      | 0.66      | 0.78      |                        | SGR1S 22B – 1008  |
| 0.45                                                                                                   | 0.89    | 1.31      | 1.61      | 1.90      | 2.54      | 3.00      | 0.12                                                                                                     | 0.24    | 0.36      | 0.45      | 0.53      | 0.72      | 0.86      |                        | SGR1S 23B – 1008  |
| 0.47                                                                                                   | 0.95    | 1.39      | 1.70      | 2.01      | 2.69      | 3.18      | 0.13                                                                                                     | 0.26    | 0.39      | 0.49      | 0.58      | 0.78      | 0.93      |                        | SGR1S 24B – 1008  |
| 0.50                                                                                                   | 1.00    | 1.47      | 1.80      | 2.12      | 2.84      | 3.35      | 0.14                                                                                                     | 0.29    | 0.43      | 0.53      | 0.63      | 0.85      | 1.01      |                        | SGR1S 25B – 1008  |
| 0.53                                                                                                   | 1.06    | 1.54      | 1.89      | 2.23      | 2.99      | 3.53      | 0.15                                                                                                     | 0.31    | 0.46      | 0.57      | 0.68      | 0.92      | 1.10      |                        | SGR1S 26B – 1008  |
| 0.56                                                                                                   | 1.11    | 1.62      | 1.98      | 2.33      | 3.14      | 3.71      | 0.16                                                                                                     | 0.33    | 0.50      | 0.61      | 0.73      | 0.99      | 1.18      |                        | SGR1S 27B – 1008  |
| 0.59                                                                                                   | 1.16    | 1.70      | 2.08      | 2.44      | 3.29      | 3.88      | 0.18                                                                                                     | 0.36    | 0.53      | 0.66      | 0.78      | 1.07      | 1.27      |                        | SGR1S 28B – 1008  |
| 0.62                                                                                                   | 1.22    | 1.77      | 2.17      | 2.55      | 3.43      | 4.05      | 0.19                                                                                                     | 0.39    | 0.57      | 0.71      | 0.84      | 1.15      | 1.37      |                        | SGR1S 29B – 1008  |
| 0.64                                                                                                   | 1.27    | 1.85      | 2.26      | 2.66      | 3.58      | 4.23      | 0.20                                                                                                     | 0.41    | 0.61      | 0.76      | 0.90      | 1.23      | 1.46      |                        | SGR1S 30B – 1010  |
| 0.70                                                                                                   | 1.38    | 2.00      | 2.45      | 2.87      | 3.88      | 4.58      | 0.23                                                                                                     | 0.47    | 0.70      | 0.86      | 1.02      | 1.40      | 1.66      |                        | SGR1S 32B – 1010  |
| 0.76                                                                                                   | 1.49    | 2.16      | 2.63      | 3.10      | 4.18      | 4.93      | 0.26                                                                                                     | 0.53    | 0.79      | 0.97      | 1.15      | 1.58      | 1.88      |                        | SGR1S 34B – 1010  |
| 0.79                                                                                                   | 1.54    | 2.23      | 2.72      | 3.21      | 4.33      | 5.11      | 0.28                                                                                                     | 0.57    | 0.84      | 1.03      | 1.22      | 1.67      | 1.99      |                        | SGR1S 35B – 1010  |
| 0.82                                                                                                   | 1.60    | 2.31      | 2.81      | 3.32      | 4.48      | 5.29      | 0.30                                                                                                     | 0.60    | 0.88      | 1.09      | 1.29      | 1.77      | 2.11      |                        | SGR1S 36B – 1010  |
| 0.88                                                                                                   | 1.70    | 2.46      | 2.99      | 3.54      | 4.77      | 5.64      | 0.33                                                                                                     | 0.67    | 0.98      | 1.21      | 1.44      | 1.97      | 2.35      |                        | SGR1S 38B – 1010  |
| 0.94                                                                                                   | 1.81    | 2.61      | 3.18      | 3.77      | 5.07      | 6.00      | 0.37                                                                                                     | 0.74    | 1.09      | 1.34      | 1.60      | 2.18      | 2.60      |                        | SGR1S 40B – 1010  |
| 1.00                                                                                                   | 1.92    | 2.76      | 3.37      | 3.99      | 5.37      | 6.35      | 0.41                                                                                                     | 0.82    | 1.20      | 1.48      | 1.76      | 2.41      | 2.87      |                        | SGR1S 42B – 1010  |
| 1.06                                                                                                   | 2.03    | 2.91      | 3.56      | 4.21      | 5.67      | 6.70      | 0.45                                                                                                     | 0.90    | 1.32      | 1.63      | 1.94      | 2.65      | 3.15      |                        | SGR1S 44B – 1010  |
| 1.09                                                                                                   | 2.08    | 2.98      | 3.66      | 4.32      | 5.82      | 6.87      | 0.48                                                                                                     | 0.94    | 1.37      | 1.70      | 2.02      | 2.77      | 3.30      |                        | SGR1S 45B – 1010  |
| 1.18                                                                                                   | 2.24    | 3.21      | 3.94      | 4.65      | 6.27      | 7.40      | 0.55                                                                                                     | 1.07    | 1.56      | 1.94      | 2.30      | 3.15      | 3.75      | 0.1 to 0.18            | SGR1S 48B – 1010  |
| 1.23                                                                                                   | 2.34    | 3.36      | 4.13      | 4.87      | 6.57      | 7.74      | 0.59                                                                                                     | 1.16    | 1.70      | 2.10      | 2.50      | 3.42      | 4.06      |                        | SGR1S 50B – 1012  |
| 1.38                                                                                                   | 2.61    | 3.75      | 4.59      | 5.42      | 7.31      | 8.56      | 0.72                                                                                                     | 1.40    | 2.05      | 2.54      | 3.02      | 4.14      | 4.89      |                        | SGR1S 55B – 1012  |
| 1.41                                                                                                   | 2.66    | 3.82      | 4.69      | 5.53      | 7.45      | 8.72      | 0.75                                                                                                     | 1.46    | 2.13      | 2.64      | 3.14      | 4.29      | 5.06      |                        | SGR1S 56B – 1012  |
| 1.52                                                                                                   | 2.86    | 4.13      | 5.05      | 5.97      | 8.04      | 9.35      | 0.86                                                                                                     | 1.67    | 2.45      | 3.03      | 3.60      | 4.92      | 5.77      |                        | SGR1S 60B – 1012  |
| 1.63                                                                                                   | 3.07    | 4.43      | 5.42      | 6.41      | 8.59      | 9.97      | 0.98                                                                                                     | 1.90    | 2.79      | 3.44      | 4.10      | 5.58      | 6.52      |                        | SGR1S 64B – 1012  |
| 1.81                                                                                                   | 3.37    | 4.88      | 5.98      | 7.06      | 9.39      | 10.87     | 1.18                                                                                                     | 2.26    | 3.34      | 4.13      | 4.91      | 6.63      | 7.73      |                        | SGR1S 70B – 1012  |
| 1.95                                                                                                   | 3.63    | 5.25      | 6.44      | 7.60      | 10.05     | 11.60     | 1.35                                                                                                     | 2.60    | 3.83      | 4.74      | 5.64      | 7.56      | 8.79      |                        | SGR1S 75B – 1012  |
| 2.09                                                                                                   | 3.89    | 5.62      | 6.90      | 8.14      | 10.68     | 12.26     | 1.54                                                                                                     | 2.96    | 4.35      | 5.40      | 6.41      | 8.54      | 9.88      | 0.12 to 0.20           | SGR1S 80B – 1015  |
| 2.36                                                                                                   | 4.40    | 6.37      | 7.80      | 9.15      | 11.90     | 13.48     | 1.95                                                                                                     | 3.75    | 5.52      | 6.83      | 8.07      | 10.65     | 12.16     |                        | SGR1S 90B – 1015  |
| 2.63                                                                                                   | 4.91    | 7.11      | 8.69      | 10.11     | 12.98     | 14.62     | 2.41                                                                                                     | 4.63    | 6.82      | 8.42      | 9.88      | 12.87     | 14.61     |                        | SGR1S 100B – 1015 |
| 3.16                                                                                                   | 5.91    | 8.56      | 10.32     | 11.93     | 14.93     | 17.01     | 3.46                                                                                                     | 6.67    | 9.82      | 11.96     | 13.94     | 17.69     | 20.32     |                        | SGR1S 120B – 1015 |



Unit: mm

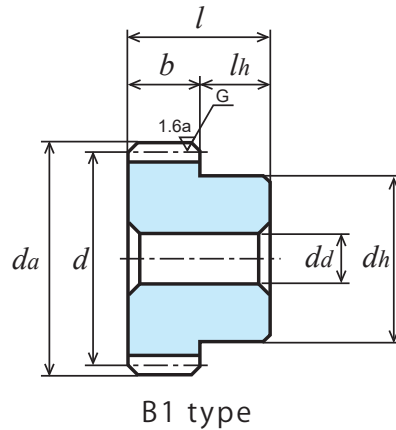
| Accuracy Class    | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Surface treatment ① | Backlash ②          |
|-------------------|----------|----------------|------------------------------|------------------------|---------------------|---------------------|
| [JIS B 1702-1] N6 | S45C     | 20°            | Induction hardening of teeth | HRC50 to 56            | Black oxide finish  | See the table below |

① A black oxide finish is applied to the gear surface, but not the tooth surfaces.

② This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

★ The allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

| Catalogue number           | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>a</sub>(H7)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Weight<br><i>W(kg)</i> |
|----------------------------|-----------------------------|--------------------------------|--------------------------------------|------|------------------------|-------------------------------------------|--------------------------------------|------------------------------------|----------------------------|------------------------|
| <b>SGR1.5S 14B — 1510</b>  | 14                          | φ 21                           | φ 24                                 | B1   | 15                     | φ 10                                      | φ 17                                 | 14                                 | 29                         | 0.05                   |
| <b>SGR1.5S 15B — 1510</b>  | 15                          | φ 22.5                         | φ 25.5                               |      |                        | φ 10                                      | φ 18                                 |                                    |                            | 0.06                   |
| <b>SGR1.5S 16B — 1510</b>  | 16                          | φ 24                           | φ 27                                 |      |                        | φ 10                                      | φ 20                                 |                                    |                            | 0.07                   |
| <b>SGR1.5S 17B — 1510</b>  | 17                          | φ 25.5                         | φ 28.5                               |      |                        | φ 10                                      | φ 21                                 |                                    |                            | 0.08                   |
| <b>SGR1.5S 18B — 1510</b>  | 18                          | φ 27                           | φ 30                                 |      |                        | φ 10                                      | φ 22                                 |                                    |                            | 0.09                   |
| <b>SGR1.5S 19B — 1510</b>  | 19                          | φ 28.5                         | φ 31.5                               |      |                        | φ 10                                      | φ 23                                 |                                    |                            | 0.10                   |
| <b>SGR1.5S 20B — 1510</b>  | 20                          | φ 30                           | φ 33                                 |      |                        | φ 10                                      | φ 24                                 |                                    |                            | 0.12                   |
| <b>SGR1.5S 21B — 1510</b>  | 21                          | φ 31.5                         | φ 34.5                               |      |                        | φ 10                                      | φ 25                                 |                                    |                            | 0.13                   |
| <b>SGR1.5S 22B — 1512</b>  | 22                          | φ 33                           | φ 36                                 |      |                        | φ 12                                      | φ 26                                 |                                    |                            | 0.13                   |
| <b>SGR1.5S 23B — 1512</b>  | 23                          | φ 34.5                         | φ 37.5                               |      |                        | φ 12                                      | φ 27                                 |                                    |                            | 0.15                   |
| <b>SGR1.5S 24B — 1512</b>  | 24                          | φ 36                           | φ 39                                 |      |                        | φ 12                                      | φ 28                                 |                                    |                            | 0.16                   |
| <b>SGR1.5S 25B — 1512</b>  | 25                          | φ 37.5                         | φ 40.5                               |      |                        | φ 12                                      | φ 30                                 |                                    |                            | 0.18                   |
| <b>SGR1.5S 26B — 1512</b>  | 26                          | φ 39                           | φ 42                                 |      |                        | φ 12                                      | φ 32                                 |                                    |                            | 0.20                   |
| <b>SGR1.5S 27B — 1515</b>  | 27                          | φ 40.5                         | φ 43.5                               |      |                        | φ 15                                      | φ 34                                 |                                    |                            | 0.21                   |
| <b>SGR1.5S 28B — 1515</b>  | 28                          | φ 42                           | φ 45                                 |      |                        | φ 15                                      | φ 36                                 |                                    |                            | 0.23                   |
| <b>SGR1.5S 29B — 1515</b>  | 29                          | φ 43.5                         | φ 46.5                               |      |                        | φ 15                                      | φ 37                                 |                                    |                            | 0.25                   |
| <b>SGR1.5S 30B — 1515</b>  | 30                          | φ 45                           | φ 48                                 |      |                        | φ 15                                      | φ 38                                 |                                    |                            | 0.27                   |
| <b>SGR1.5S 32B — 1515</b>  | 32                          | φ 48                           | φ 51                                 |      |                        | φ 15                                      | φ 40                                 |                                    |                            | 0.31                   |
| <b>SGR1.5S 34B — 1515</b>  | 34                          | φ 51                           | φ 54                                 |      |                        | φ 15                                      | φ 42                                 |                                    |                            | 0.35                   |
| <b>SGR1.5S 35B — 1515</b>  | 35                          | φ 52.5                         | φ 55.5                               |      |                        | φ 15                                      | φ 42                                 |                                    |                            | 0.37                   |
| <b>SGR1.5S 36B — 1515</b>  | 36                          | φ 54                           | φ 57                                 |      |                        | φ 15                                      | φ 45                                 |                                    |                            | 0.40                   |
| <b>SGR1.5S 38B — 1515</b>  | 38                          | φ 57                           | φ 60                                 |      |                        | φ 15                                      | φ 45                                 |                                    |                            | 0.44                   |
| <b>SGR1.5S 40B — 1515</b>  | 40                          | φ 60                           | φ 63                                 |      |                        | φ 15                                      | φ 50                                 |                                    |                            | 0.51                   |
| <b>SGR1.5S 42B — 1515</b>  | 42                          | φ 63                           | φ 66                                 |      |                        | φ 15                                      | φ 50                                 |                                    |                            | 0.54                   |
| <b>SGR1.5S 44B — 1515</b>  | 44                          | φ 66                           | φ 69                                 |      |                        | φ 15                                      | φ 50                                 |                                    |                            | 0.58                   |
| <b>SGR1.5S 45B — 1518</b>  | 45                          | φ 67.5                         | φ 70.5                               |      |                        | φ 18                                      | φ 50                                 |                                    |                            | 0.58                   |
| <b>SGR1.5S 48B — 1518</b>  | 48                          | φ 72                           | φ 75                                 |      |                        | φ 18                                      | φ 50                                 |                                    |                            | 0.64                   |
| <b>SGR1.5S 50B — 1518</b>  | 50                          | φ 75                           | φ 78                                 |      |                        | φ 18                                      | φ 60                                 |                                    |                            | 0.77                   |
| <b>SGR1.5S 55B — 1518</b>  | 55                          | φ 82.5                         | φ 85.5                               |      |                        | φ 18                                      | φ 60                                 |                                    |                            | 0.88                   |
| <b>SGR1.5S 56B — 1518</b>  | 56                          | φ 84                           | φ 87                                 |      |                        | φ 18                                      | φ 60                                 |                                    |                            | 0.91                   |
| <b>SGR1.5S 60B — 1520</b>  | 60                          | φ 90                           | φ 93                                 |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 0.99                   |
| <b>SGR1.5S 64B — 1520</b>  | 64                          | φ 96                           | φ 99                                 |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.09                   |
| <b>SGR1.5S 70B — 1520</b>  | 70                          | φ 105                          | φ 108                                |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.26                   |
| <b>SGR1.5S 75B — 1520</b>  | 75                          | φ 112.5                        | φ 115.5                              |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.41                   |
| <b>SGR1.5S 80B — 1520</b>  | 80                          | φ 120                          | φ 123                                |      |                        | φ 20                                      | φ 70                                 |                                    |                            | 1.68                   |
| <b>SGR1.5S 90B — 1520</b>  | 90                          | φ 135                          | φ 138                                |      |                        | φ 20                                      | φ 70                                 |                                    |                            | 2.04                   |
| <b>SGR1.5S 100B — 1520</b> | 100                         | φ 150                          | φ 153                                |      |                        | φ 20                                      | φ 70                                 |                                    |                            | 2.43                   |



| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number    |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|---------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                     |
| 0.69                                                                                                   | 1.39    | 2.05      | 2.52      | 2.98      | 3.99      | 4.70      | 0.14                                                                                                     | 0.30    | 0.45      | 0.56      | 0.66      | 0.90      | 1.07      | 0.08 to 0.16           | SGR1.5S 14B – 1510  |
| 0.79                                                                                                   | 1.57    | 2.31      | 2.84      | 3.35      | 4.48      | 5.30      | 0.17                                                                                                     | 0.34    | 0.52      | 0.64      | 0.76      | 1.03      | 1.23      |                        | SGR1.5S 15B – 1510  |
| 0.88                                                                                                   | 1.75    | 2.57      | 3.15      | 3.71      | 4.97      | 5.88      | 0.19                                                                                                     | 0.39    | 0.59      | 0.73      | 0.87      | 1.18      | 1.40      |                        | SGR1.5S 16B – 1510  |
| 0.96                                                                                                   | 1.92    | 2.81      | 3.44      | 4.05      | 5.43      | 6.42      | 0.22                                                                                                     | 0.45    | 0.66      | 0.82      | 0.98      | 1.33      | 1.58      |                        | SGR1.5S 17B – 1510  |
| 1.05                                                                                                   | 2.09    | 3.05      | 3.74      | 4.39      | 5.90      | 6.98      | 0.25                                                                                                     | 0.50    | 0.75      | 0.92      | 1.09      | 1.49      | 1.78      |                        | SGR1.5S 18B – 1510  |
| 1.14                                                                                                   | 2.26    | 3.30      | 4.03      | 4.74      | 6.38      | 7.53      | 0.27                                                                                                     | 0.56    | 0.83      | 1.03      | 1.22      | 1.66      | 1.98      |                        | SGR1.5S 19B – 1510  |
| 1.23                                                                                                   | 2.43    | 3.54      | 4.33      | 5.08      | 6.86      | 8.09      | 0.31                                                                                                     | 0.62    | 0.92      | 1.14      | 1.35      | 1.84      | 2.19      |                        | SGR1.5S 20B – 1510  |
| 1.32                                                                                                   | 2.60    | 3.78      | 4.62      | 5.42      | 7.33      | 8.64      | 0.34                                                                                                     | 0.69    | 1.02      | 1.25      | 1.48      | 2.03      | 2.41      |                        | SGR1.5S 21B – 1510  |
| 1.42                                                                                                   | 2.78    | 4.03      | 4.92      | 5.78      | 7.81      | 9.21      | 0.37                                                                                                     | 0.75    | 1.12      | 1.37      | 1.63      | 2.23      | 2.65      |                        | SGR1.5S 22B – 1512  |
| 1.51                                                                                                   | 2.95    | 4.27      | 5.21      | 6.13      | 8.28      | 9.77      | 0.41                                                                                                     | 0.83    | 1.22      | 1.50      | 1.78      | 2.44      | 2.90      |                        | SGR1.5S 23B – 1512  |
| 1.60                                                                                                   | 3.12    | 4.52      | 5.50      | 6.49      | 8.76      | 10.35     | 0.45                                                                                                     | 0.90    | 1.33      | 1.63      | 1.94      | 2.65      | 3.16      |                        | SGR1.5S 24B – 1512  |
| 1.70                                                                                                   | 3.30    | 4.76      | 5.79      | 6.85      | 9.23      | 10.92     | 0.49                                                                                                     | 0.98    | 1.44      | 1.77      | 2.11      | 2.88      | 3.43      |                        | SGR1.5S 25B – 1512  |
| 1.79                                                                                                   | 3.47    | 5.01      | 6.09      | 7.21      | 9.72      | 11.49     | 0.53                                                                                                     | 1.06    | 1.55      | 1.91      | 2.28      | 3.11      | 3.71      |                        | SGR1.5S 26B – 1512  |
| 1.89                                                                                                   | 3.64    | 5.25      | 6.40      | 7.57      | 10.20     | 12.06     | 0.57                                                                                                     | 1.14    | 1.67      | 2.06      | 2.46      | 3.36      | 4.00      |                        | SGR1.5S 27B – 1515  |
| 1.98                                                                                                   | 3.82    | 5.50      | 6.71      | 7.93      | 10.69     | 12.63     | 0.62                                                                                                     | 1.23    | 1.80      | 2.22      | 2.65      | 3.62      | 4.31      |                        | SGR1.5S 28B – 1515  |
| 2.08                                                                                                   | 3.99    | 5.73      | 7.02      | 8.29      | 11.18     | 13.20     | 0.67                                                                                                     | 1.32    | 1.93      | 2.38      | 2.84      | 3.88      | 4.62      | 0.10 to 0.18           | SGR1.5S 29B – 1515  |
| 2.17                                                                                                   | 4.16    | 5.98      | 7.32      | 8.65      | 11.67     | 13.77     | 0.71                                                                                                     | 1.41    | 2.06      | 2.55      | 3.04      | 4.16      | 4.94      |                        | SGR1.5S 30B – 1515  |
| 2.37                                                                                                   | 4.51    | 6.46      | 7.94      | 9.37      | 12.64     | 14.90     | 0.82                                                                                                     | 1.61    | 2.34      | 2.90      | 3.46      | 4.73      | 5.62      |                        | SGR1.5S 32B – 1515  |
| 2.56                                                                                                   | 4.85    | 6.96      | 8.55      | 10.08     | 13.61     | 16.03     | 0.93                                                                                                     | 1.81    | 2.65      | 3.28      | 3.90      | 5.34      | 6.34      |                        | SGR1.5S 34B – 1515  |
| 2.65                                                                                                   | 5.03    | 7.22      | 8.86      | 10.44     | 14.10     | 16.57     | 0.98                                                                                                     | 1.92    | 2.81      | 3.48      | 4.14      | 5.66      | 6.71      |                        | SGR1.5S 35B – 1515  |
| 2.75                                                                                                   | 5.20    | 7.47      | 9.16      | 10.80     | 14.58     | 17.10     | 1.04                                                                                                     | 2.03    | 2.97      | 3.68      | 4.37      | 5.99      | 7.08      |                        | SGR1.5S 36B – 1515  |
| 2.93                                                                                                   | 5.54    | 7.97      | 9.77      | 11.53     | 15.54     | 18.15     | 1.16                                                                                                     | 2.26    | 3.31      | 4.10      | 4.88      | 6.67      | 7.85      |                        | SGR1.5S 38B – 1515  |
| 3.12                                                                                                   | 5.88    | 8.48      | 10.38     | 12.26     | 16.50     | 19.19     | 1.29                                                                                                     | 2.50    | 3.67      | 4.54      | 5.41      | 7.39      | 8.66      |                        | SGR1.5S 40B – 1515  |
| 3.31                                                                                                   | 6.21    | 8.97      | 10.97     | 12.98     | 17.42     | 20.21     | 1.42                                                                                                     | 2.76    | 4.05      | 5.00      | 5.96      | 8.12      | 9.50      |                        | SGR1.5S 42B – 1515  |
| 3.50                                                                                                   | 6.55    | 9.47      | 11.59     | 13.70     | 18.31     | 21.22     | 1.56                                                                                                     | 3.02    | 4.45      | 5.49      | 6.55      | 8.88      | 10.37     |                        | SGR1.5S 44B – 1515  |
| 3.59                                                                                                   | 6.71    | 9.72      | 11.89     | 14.06     | 18.75     | 21.72     | 1.64                                                                                                     | 3.16    | 4.65      | 5.75      | 6.85      | 9.27      | 10.82     |                        | SGR1.5S 45B – 1518  |
| 3.87                                                                                                   | 7.21    | 10.46     | 12.82     | 15.13     | 20.07     | 23.20     | 1.87                                                                                                     | 3.58    | 5.29      | 6.55      | 7.80      | 10.49     | 12.22     |                        | SGR1.5S 48B – 1518  |
| 4.06                                                                                                   | 7.56    | 10.95     | 13.43     | 15.85     | 20.93     | 24.17     | 2.03                                                                                                     | 3.89    | 5.74      | 7.11      | 8.46      | 11.33     | 13.19     |                        | SGR1.5S 50B – 1518  |
| 4.52                                                                                                   | 8.43    | 12.18     | 14.95     | 17.62     | 23.05     | 26.37     | 2.46                                                                                                     | 4.72    | 6.95      | 8.61      | 10.23     | 13.57     | 15.65     |                        | SGR1.5S 55B – 1518  |
| 4.61                                                                                                   | 8.60    | 12.43     | 15.25     | 17.97     | 23.46     | 26.79     | 2.55                                                                                                     | 4.90    | 7.21      | 8.92      | 10.60     | 14.04     | 16.16     |                        | SGR1.5S 56B – 1518  |
| 4.98                                                                                                   | 9.29    | 13.43     | 16.46     | 19.30     | 25.10     | 28.43     | 2.92                                                                                                     | 5.62    | 8.28      | 10.24     | 12.11     | 15.98     | 18.24     | 0.12 to 0.20           | SGR1.5S 60B – 1520  |
| 5.34                                                                                                   | 9.97    | 14.42     | 17.65     | 20.59     | 26.59     | 30.00     | 3.33                                                                                                     | 6.40    | 9.43      | 11.65     | 13.70     | 17.95     | 20.42     |                        | SGR1.5S 64B – 1520  |
| 5.88                                                                                                   | 10.99   | 15.90     | 19.38     | 22.49     | 28.69     | 32.25     | 3.98                                                                                                     | 7.66    | 11.28     | 13.90     | 16.25     | 21.03     | 23.83     |                        | SGR1.5S 70B – 1520  |
| 6.33                                                                                                   | 11.82   | 17.11     | 20.75     | 24.03     | 30.36     | 34.03     | 4.56                                                                                                     | 8.79    | 12.95     | 15.86     | 18.52     | 23.73     | 26.81     |                        | SGR1.5S 75B – 1520  |
| 6.77                                                                                                   | 12.65   | 18.31     | 22.09     | 25.54     | 31.95     | 36.39     | 5.19                                                                                                     | 10.00   | 14.73     | 17.94     | 20.91     | 26.54     | 30.47     |                        | SGR1.5S 80B – 1520  |
| 7.62                                                                                                   | 14.33   | 20.59     | 24.66     | 28.27     | 34.91     | 41.59     | 6.54                                                                                                     | 12.68   | 18.55     | 22.43     | 25.92     | 32.48     | 39.00     | 0.12 to 0.20           | SGR1.5S 90B – 1520  |
| 8.49                                                                                                   | 16.00   | 22.75     | 27.14     | 30.74     | 39.04     | 46.85     | 8.07                                                                                                     | 15.67   | 22.69     | 27.33     | 31.21     | 40.21     | 48.63     |                        | SGR1.5S 100B – 1520 |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Surface treatment ① | Backlash ②          |
|-------------------|----------|----------------|------------------------------|------------------------|---------------------|---------------------|
| [JIS B 1702-1] N6 | S45C     | 20°            | Induction hardening of teeth | HRC50 to 56            | Black oxide finish  | See the table below |

① A black oxide finish is applied to the gear surface, but not the tooth surfaces.

② This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

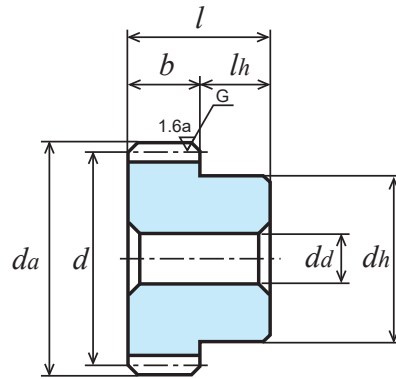
★ The allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

| Catalogue number  | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>a</sub>(H7)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Weight<br><i>W(kg)</i> |
|-------------------|-----------------------------|--------------------------------|--------------------------------------|------|------------------------|-------------------------------------------|--------------------------------------|------------------------------------|----------------------------|------------------------|
| SGR2S 14B — 2012  | 14                          | φ 28                           | φ 32                                 | B1   | 20                     | φ 12                                      | φ 22                                 | 16                                 | 36                         | 0.11                   |
| SGR2S 15B — 2012  | 15                          | φ 30                           | φ 34                                 |      |                        | φ 12                                      | φ 24                                 |                                    |                            | 0.14                   |
| SGR2S 16B — 2012  | 16                          | φ 32                           | φ 36                                 |      |                        | φ 12                                      | φ 26                                 |                                    |                            | 0.16                   |
| SGR2S 17B — 2012  | 17                          | φ 34                           | φ 38                                 |      |                        | φ 12                                      | φ 28                                 |                                    |                            | 0.19                   |
| SGR2S 18B — 2012  | 18                          | φ 36                           | φ 40                                 |      |                        | φ 12                                      | φ 30                                 |                                    |                            | 0.22                   |
| SGR2S 19B — 2012  | 19                          | φ 38                           | φ 42                                 |      |                        | φ 12                                      | φ 31                                 |                                    |                            | 0.24                   |
| SGR2S 20B — 2015  | 20                          | φ 40                           | φ 44                                 |      |                        | φ 15                                      | φ 32                                 |                                    |                            | 0.25                   |
| SGR2S 21B — 2015  | 21                          | φ 42                           | φ 46                                 |      |                        | φ 15                                      | φ 34                                 |                                    |                            | 0.28                   |
| SGR2S 22B — 2015  | 22                          | φ 44                           | φ 48                                 |      |                        | φ 15                                      | φ 36                                 |                                    |                            | 0.32                   |
| SGR2S 23B — 2015  | 23                          | φ 46                           | φ 50                                 |      |                        | φ 15                                      | φ 37                                 |                                    |                            | 0.35                   |
| SGR2S 24B — 2015  | 24                          | φ 48                           | φ 52                                 |      |                        | φ 15                                      | φ 38                                 |                                    |                            | 0.38                   |
| SGR2S 25B — 2015  | 25                          | φ 50                           | φ 54                                 |      |                        | φ 15                                      | φ 40                                 |                                    |                            | 0.42                   |
| SGR2S 26B — 2015  | 26                          | φ 52                           | φ 56                                 |      |                        | φ 15                                      | φ 42                                 |                                    |                            | 0.46                   |
| SGR2S 27B — 2015  | 27                          | φ 54                           | φ 58                                 |      |                        | φ 15                                      | φ 44                                 |                                    |                            | 0.50                   |
| SGR2S 28B — 2015  | 28                          | φ 56                           | φ 60                                 |      |                        | φ 15                                      | φ 45                                 |                                    |                            | 0.54                   |
| SGR2S 29B — 2015  | 29                          | φ 58                           | φ 62                                 |      |                        | φ 15                                      | φ 48                                 |                                    |                            | 0.59                   |
| SGR2S 30B — 2018  | 30                          | φ 60                           | φ 64                                 |      |                        | φ 18                                      | φ 50                                 |                                    |                            | 0.62                   |
| SGR2S 32B — 2018  | 32                          | φ 64                           | φ 68                                 |      |                        | φ 18                                      | φ 50                                 |                                    |                            | 0.68                   |
| SGR2S 34B — 2018  | 34                          | φ 68                           | φ 72                                 |      |                        | φ 18                                      | φ 50                                 |                                    |                            | 0.74                   |
| SGR2S 35B — 2018  | 35                          | φ 70                           | φ 74                                 |      |                        | φ 18                                      | φ 50                                 |                                    |                            | 0.78                   |
| SGR2S 36B — 2018  | 36                          | φ 72                           | φ 76                                 |      |                        | φ 18                                      | φ 50                                 |                                    |                            | 0.81                   |
| SGR2S 38B — 2018  | 38                          | φ 76                           | φ 80                                 |      |                        | φ 18                                      | φ 50                                 |                                    |                            | 0.89                   |
| SGR2S 40B — 2020  | 40                          | φ 80                           | φ 84                                 |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.06                   |
| SGR2S 42B — 2020  | 42                          | φ 84                           | φ 88                                 |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.14                   |
| SGR2S 44B — 2020  | 44                          | φ 88                           | φ 92                                 |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.22                   |
| SGR2S 45B — 2020  | 45                          | φ 90                           | φ 94                                 |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.27                   |
| SGR2S 48B — 2020  | 48                          | φ 96                           | φ 100                                |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.40                   |
| SGR2S 50B — 2025  | 50                          | φ 100                          | φ 104                                |      |                        | φ 25                                      | φ 60                                 |                                    |                            | 1.45                   |
| SGR2S 55B — 2025  | 55                          | φ 110                          | φ 114                                |      |                        | φ 25                                      | φ 60                                 |                                    |                            | 1.71                   |
| SGR2S 56B — 2025  | 56                          | φ 112                          | φ 116                                |      |                        | φ 25                                      | φ 60                                 |                                    |                            | 1.76                   |
| SGR2S 60B — 2025  | 60                          | φ 120                          | φ 124                                |      |                        | φ 25                                      | φ 65                                 |                                    |                            | 2.05                   |
| SGR2S 64B — 2025  | 64                          | φ 128                          | φ 132                                |      |                        | φ 25                                      | φ 65                                 |                                    |                            | 2.30                   |
| SGR2S 70B — 2025  | 70                          | φ 140                          | φ 144                                |      |                        | φ 25                                      | φ 70                                 |                                    |                            | 2.76                   |
| SGR2S 72B — 2025  | 72                          | φ 144                          | φ 148                                |      |                        | φ 25                                      | φ 70                                 |                                    |                            | 2.90                   |
| SGR2S 75B — 2025  | 75                          | φ 150                          | φ 154                                |      |                        | φ 25                                      | φ 70                                 |                                    |                            | 3.12                   |
| SGR2S 80B — 2025  | 80                          | φ 160                          | φ 164                                |      |                        | φ 25                                      | φ 80                                 |                                    |                            | 3.65                   |
| SGR2S 90B — 2025  | 90                          | φ 180                          | φ 184                                |      |                        | φ 25                                      | φ 80                                 |                                    |                            | 4.49                   |
| SGR2S 100B — 2025 | 100                         | φ 200                          | φ 204                                |      |                        | φ 25                                      | φ 80                                 |                                    |                            | 5.42                   |





2D • 3D CAD



B1 type

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number  |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|-------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                   |
| 1.64                                                                                                   | 3.26    | 4.75      | 5.82      | 6.84      | 9.20      | 10.86     | 0.35                                                                                                     | 0.72    | 1.07      | 1.32      | 1.57      | 2.14      | 2.55      | 0.10 to 0.20           | SGR2S 14B – 2012  |
| 1.86                                                                                                   | 3.68    | 5.35      | 6.54      | 7.68      | 10.37     | 12.23     | 0.41                                                                                                     | 0.83    | 1.23      | 1.52      | 1.79      | 2.46      | 2.92      |                        | SGR2S 15B – 2012  |
| 2.08                                                                                                   | 4.09    | 5.94      | 7.25      | 8.50      | 11.50     | 13.55     | 0.47                                                                                                     | 0.95    | 1.40      | 1.72      | 2.04      | 2.80      | 3.32      |                        | SGR2S 16B – 2012  |
| 2.28                                                                                                   | 4.47    | 6.49      | 7.91      | 9.30      | 12.57     | 14.83     | 0.53                                                                                                     | 1.07    | 1.58      | 1.94      | 2.30      | 3.16      | 3.75      |                        | SGR2S 17B – 2012  |
| 2.49                                                                                                   | 4.86    | 7.04      | 8.57      | 10.11     | 13.64     | 16.11     | 0.60                                                                                                     | 1.20    | 1.77      | 2.17      | 2.59      | 3.54      | 4.21      |                        | SGR2S 18B – 2012  |
| 2.71                                                                                                   | 5.26    | 7.59      | 9.23      | 10.93     | 14.72     | 17.41     | 0.67                                                                                                     | 1.34    | 1.97      | 2.42      | 2.88      | 3.94      | 4.70      |                        | SGR2S 19B – 2012  |
| 2.92                                                                                                   | 5.65    | 8.15      | 9.93      | 11.74     | 15.82     | 18.70     | 0.74                                                                                                     | 1.48    | 2.18      | 2.68      | 3.20      | 4.37      | 5.21      |                        | SGR2S 20B – 2015  |
| 3.14                                                                                                   | 6.04    | 8.70      | 10.62     | 12.56     | 16.92     | 19.99     | 0.82                                                                                                     | 1.64    | 2.40      | 2.96      | 3.53      | 4.82      | 5.74      |                        | SGR2S 21B – 2015  |
| 3.35                                                                                                   | 6.44    | 9.25      | 11.32     | 13.38     | 18.03     | 21.29     | 0.91                                                                                                     | 1.80    | 2.63      | 3.25      | 3.87      | 5.30      | 6.30      |                        | SGR2S 22B – 2015  |
| 3.57                                                                                                   | 6.83    | 9.80      | 12.02     | 14.19     | 19.14     | 22.58     | 1.00                                                                                                     | 1.97    | 2.87      | 3.56      | 4.23      | 5.79      | 6.89      |                        | SGR2S 23B – 2015  |
| 3.79                                                                                                   | 7.23    | 10.35     | 12.72     | 15.01     | 20.32     | 23.88     | 1.09                                                                                                     | 2.14    | 3.12      | 3.87      | 4.61      | 6.31      | 7.50      | 0.12 to 0.22           | SGR2S 24B – 2015  |
| 4.01                                                                                                   | 7.62    | 10.93     | 13.42     | 15.83     | 21.36     | 25.17     | 1.19                                                                                                     | 2.32    | 3.39      | 4.20      | 5.00      | 6.85      | 9.03      |                        | SGR2S 25B – 2015  |
| 4.23                                                                                                   | 8.02    | 11.50     | 14.12     | 16.64     | 22.48     | 26.43     | 1.28                                                                                                     | 2.51    | 3.67      | 4.55      | 5.40      | 7.40      | 8.78      |                        | SGR2S 26B – 2015  |
| 4.44                                                                                                   | 8.41    | 12.08     | 14.82     | 17.47     | 23.59     | 27.66     | 1.39                                                                                                     | 2.71    | 3.96      | 4.91      | 5.83      | 7.98      | 9.44      |                        | SGR2S 27B – 2015  |
| 4.66                                                                                                   | 8.80    | 12.66     | 15.52     | 18.31     | 24.70     | 28.88     | 1.49                                                                                                     | 2.91    | 4.26      | 5.28      | 6.27      | 8.58      | 10.12     |                        | SGR2S 28B – 2015  |
| 4.87                                                                                                   | 9.19    | 13.24     | 16.21     | 19.14     | 25.79     | 30.08     | 1.60                                                                                                     | 3.12    | 4.57      | 5.66      | 6.73      | 9.21      | 10.82     |                        | SGR2S 29B – 2015  |
| 5.09                                                                                                   | 9.58    | 13.81     | 16.91     | 19.98     | 26.90     | 31.28     | 1.72                                                                                                     | 3.34    | 4.90      | 6.05      | 7.21      | 9.85      | 11.54     |                        | SGR2S 30B – 2018  |
| 5.52                                                                                                   | 10.36   | 14.97     | 18.30     | 21.65     | 29.02     | 33.66     | 1.96                                                                                                     | 3.79    | 5.57      | 6.88      | 8.21      | 11.16     | 13.05     |                        | SGR2S 32B – 2018  |
| 5.95                                                                                                   | 11.13   | 16.12     | 19.73     | 23.32     | 31.09     | 35.99     | 2.22                                                                                                     | 4.27    | 6.29      | 7.78      | 9.27      | 12.54     | 14.63     |                        | SGR2S 34B – 2018  |
| 6.17                                                                                                   | 11.52   | 16.69     | 20.44     | 24.15     | 32.11     | 37.15     | 2.35                                                                                                     | 4.52    | 6.67      | 8.25      | 9.82      | 13.25     | 15.45     |                        | SGR2S 35B – 2018  |
| 6.39                                                                                                   | 11.90   | 17.26     | 21.16     | 24.98     | 33.13     | 38.29     | 2.49                                                                                                     | 4.78    | 7.06      | 8.73      | 10.39     | 13.98     | 16.29     | 0.14 to 0.24           | SGR2S 36B – 2018  |
| 6.82                                                                                                   | 12.71   | 18.41     | 22.58     | 26.64     | 35.14     | 40.55     | 2.77                                                                                                     | 5.33    | 7.86      | 9.74      | 11.58     | 15.50     | 18.03     |                        | SGR2S 38B – 2018  |
| 7.25                                                                                                   | 13.52   | 19.55     | 23.99     | 28.29     | 37.13     | 42.62     | 3.08                                                                                                     | 5.92    | 8.70      | 10.79     | 12.82     | 17.08     | 19.76     |                        | SGR2S 40B – 2020  |
| 7.68                                                                                                   | 14.32   | 20.70     | 25.39     | 29.91     | 39.06     | 44.59     | 3.39                                                                                                     | 6.53    | 9.61      | 11.90     | 14.13     | 18.72     | 21.54     |                        | SGR2S 42B – 2020  |
| 8.10                                                                                                   | 15.12   | 21.86     | 26.79     | 31.47     | 40.98     | 46.54     | 3.73                                                                                                     | 7.17    | 10.55     | 13.06     | 15.46     | 20.43     | 23.38     |                        | SGR2S 44B – 2020  |
| 8.32                                                                                                   | 15.52   | 22.44     | 27.49     | 32.24     | 41.93     | 47.49     | 3.90                                                                                                     | 7.50    | 11.04     | 13.66     | 16.15     | 21.30     | 24.32     |                        | SGR2S 45B – 2020  |
| 8.95                                                                                                   | 16.71   | 24.17     | 29.58     | 34.52     | 44.57     | 50.29     | 4.44                                                                                                     | 8.54    | 12.57     | 15.53     | 18.27     | 23.93     | 27.22     |                        | SGR2S 48B – 2020  |
| 9.37                                                                                                   | 17.51   | 25.32     | 30.96     | 36.01     | 46.24     | 52.09     | 4.81                                                                                                     | 9.27    | 13.64     | 16.85     | 19.75     | 25.73     | 29.22     |                        | SGR2S 50B – 2025  |
| 10.42                                                                                                  | 19.47   | 28.18     | 34.23     | 39.67     | 50.27     | 56.40     | 5.82                                                                                                     | 11.21   | 16.51     | 20.26     | 23.67     | 30.42     | 34.41     |                        | SGR2S 55B – 2025  |
| 10.63                                                                                                  | 19.86   | 28.74     | 34.87     | 40.39     | 51.05     | 57.23     | 6.03                                                                                                     | 11.62   | 17.12     | 20.97     | 24.48     | 31.40     | 35.48     |                        | SGR2S 56B – 2025  |
| 11.45                                                                                                  | 21.42   | 31.00     | 37.39     | 43.22     | 54.09     | 61.60     | 6.92                                                                                                     | 13.33   | 19.64     | 23.92     | 27.88     | 35.39     | 40.63     | 0.14 to 0.24           | SGR2S 60B – 2025  |
| 12.27                                                                                                  | 23.01   | 33.22     | 39.86     | 45.97     | 56.99     | 66.51     | 7.86                                                                                                     | 15.19   | 22.32     | 27.04     | 31.43     | 39.54     | 46.51     |                        | SGR2S 64B – 2025  |
| 13.48                                                                                                  | 25.38   | 36.34     | 43.47     | 49.63     | 61.58     | 73.89     | 9.37                                                                                                     | 18.19   | 26.51     | 32.03     | 36.86     | 46.39     | 56.12     |                        | SGR2S 70B – 2025  |
| 13.88                                                                                                  | 26.17   | 37.36     | 44.65     | 50.81     | 63.63     | 76.36     | 9.91                                                                                                     | 19.25   | 27.98     | 33.77     | 38.74     | 49.21     | 59.53     |                        | SGR2S 72B – 2025  |
| 14.51                                                                                                  | 27.34   | 38.88     | 46.39     | 52.55     | 66.73     | 80.07     | 10.76                                                                                                    | 20.90   | 30.25     | 36.45     | 41.62     | 53.61     | 64.85     |                        | SGR2S 75B – 2025  |
| 15.56                                                                                                  | 29.28   | 41.36     | 49.05     | 55.35     | 71.89     | -         | 12.26                                                                                                    | 23.78   | 34.19     | 40.95     | 46.57     | 61.37     | -         |                        | SGR2S 80B – 2025  |
| 17.62                                                                                                  | 33.07   | 46.11     | 53.92     | 60.54     | 82.16     | -         | 15.54                                                                                                    | 30.08   | 42.69     | 50.41     | 57.05     | 78.55     | -         |                        | SGR2S 90B – 2025  |
| 19.66                                                                                                  | 36.73   | 50.51     | 58.50     | 66.63     | -         | -         | 19.20                                                                                                    | 36.98   | 51.77     | 60.55     | 69.51     | -         | -         |                        | SGR2S 100B – 2025 |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Surface treatment ① | Backlash ②          |
|-------------------|----------|----------------|------------------------------|------------------------|---------------------|---------------------|
| [JIS B 1702-1] N6 | S45C     | 20°            | Induction hardening of teeth | HRC50 to 56            | Black oxide finish  | See the table below |

① A black oxide finish is applied to the gear surface, but not the tooth surfaces.

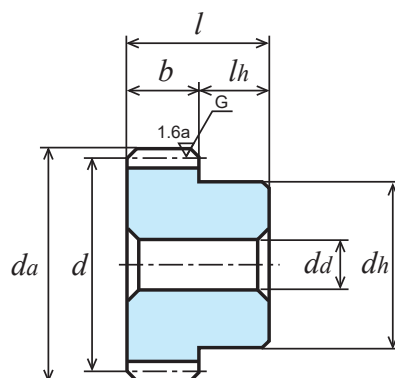
② This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

★ The allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

| Catalogue number          | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>a</sub>(H7)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Weight<br><i>W(kg)</i> |
|---------------------------|-----------------------------|--------------------------------|--------------------------------------|------|------------------------|-------------------------------------------|--------------------------------------|------------------------------------|----------------------------|------------------------|
| <b>SGR2.5S 14B — 2515</b> | 14                          | φ 35                           | φ 40                                 | B1   | 25                     | φ15                                       | φ28                                  | 18                                 | 43                         | 0.22                   |
| <b>SGR2.5S 15B — 2515</b> | 15                          | φ 37.5                         | φ 42.5                               |      |                        | φ15                                       | φ30                                  |                                    |                            | 0.26                   |
| <b>SGR2.5S 16B — 2515</b> | 16                          | φ 40                           | φ 45                                 |      |                        | φ15                                       | φ32                                  |                                    |                            | 0.30                   |
| <b>SGR2.5S 18B — 2515</b> | 18                          | φ 45                           | φ 50                                 |      |                        | φ15                                       | φ38                                  |                                    |                            | 0.41                   |
| <b>SGR2.5S 20B — 2518</b> | 20                          | φ 50                           | φ 55                                 |      |                        | φ18                                       | φ40                                  |                                    |                            | 0.48                   |
| <b>SGR2.5S 24B — 2518</b> | 24                          | φ 60                           | φ 65                                 |      |                        | φ18                                       | φ48                                  |                                    |                            | 0.72                   |
| <b>SGR2.5S 25B — 2520</b> | 25                          | φ 62.5                         | φ 67.5                               |      |                        | φ20                                       | φ50                                  |                                    |                            | 0.77                   |
| <b>SGR2.5S 28B — 2520</b> | 28                          | φ 70                           | φ 75                                 |      |                        | φ20                                       | φ60                                  |                                    |                            | 1.05                   |
| <b>SGR2.5S 30B — 2520</b> | 30                          | φ 75                           | φ 80                                 |      |                        | φ20                                       | φ65                                  |                                    |                            | 1.23                   |
| <b>SGR2.5S 32B — 2520</b> | 32                          | φ 80                           | φ 85                                 |      |                        | φ20                                       | φ70                                  |                                    |                            | 1.42                   |
| <b>SGR2.5S 35B — 2520</b> | 35                          | φ 87.5                         | φ 92.5                               |      |                        | φ20                                       | φ70                                  |                                    |                            | 1.62                   |
| <b>SGR2.5S 36B — 2520</b> | 36                          | φ 90                           | φ 95                                 |      |                        | φ20                                       | φ70                                  |                                    |                            | 1.69                   |
| <b>SGR2.5S 40B — 2525</b> | 40                          | φ100                           | φ105                                 |      |                        | φ25                                       | φ70                                  |                                    |                            | 1.92                   |
| <b>SGR2.5S 45B — 2525</b> | 45                          | φ112.5                         | φ117.5                               |      |                        | φ25                                       | φ75                                  |                                    |                            | 2.41                   |
| <b>SGR2.5S 48B — 2525</b> | 48                          | φ120                           | φ125                                 |      |                        | φ25                                       | φ75                                  |                                    |                            | 2.68                   |
| <b>SGR2.5S 50B — 2525</b> | 50                          | φ125                           | φ130                                 |      |                        | φ25                                       | φ80                                  |                                    |                            | 2.95                   |
| <b>SGR2.5S 55B — 2525</b> | 55                          | φ137.5                         | φ142.5                               |      |                        | φ25                                       | φ80                                  |                                    |                            | 3.46                   |
| <b>SGR2.5S 56B — 2525</b> | 56                          | φ140                           | φ145                                 |      |                        | φ25                                       | φ80                                  |                                    |                            | 3.57                   |
| <b>SGR2.5S 60B — 2525</b> | 60                          | φ150                           | φ155                                 |      |                        | φ25                                       | φ80                                  |                                    |                            | 4.01                   |
| <b>SGR2.5S 64B — 2525</b> | 64                          | φ160                           | φ165                                 |      |                        | φ25                                       | φ80                                  |                                    |                            | 4.49                   |
| <b>SGR2.5S 70B — 2525</b> | 70                          | φ175                           | φ180                                 |      |                        | φ25                                       | φ80                                  |                                    |                            | 5.26                   |
| <b>SGR2.5S 72B — 2525</b> | 72                          | φ180                           | φ185                                 |      |                        | φ25                                       | φ85                                  |                                    |                            | 5.63                   |
| <b>SGR2.5S 75B — 2525</b> | 75                          | φ187.5                         | φ192.5                               |      |                        | φ25                                       | φ90                                  |                                    |                            | 6.15                   |
| <b>SGR2.5S 80B — 2525</b> | 80                          | φ200                           | φ205                                 |      |                        | φ25                                       | φ90                                  |                                    |                            | 6.90                   |



2D • 3D CAD



B1 type

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number   |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|--------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                    |
| 3.21                                                                                                   | 6.28    | 9.09      | 11.07     | 13.05     | 17.61     | 20.79     | 0.70                                                                                                     | 1.42    | 2.09      | 2.57      | 3.05      | 4.18      | 4.98      | 0.10 to 0.20           | SGR2.5S 14B – 2515 |
| 3.64                                                                                                   | 7.08    | 10.22     | 12.44     | 14.71     | 19.82     | 23.43     | 0.81                                                                                                     | 1.63    | 2.40      | 2.94      | 3.51      | 4.80      | 5.72      |                        | SGR2.5S 15B – 2515 |
| 4.06                                                                                                   | 7.86    | 11.55     | 13.80     | 16.32     | 21.99     | 26.00     | 0.93                                                                                                     | 1.86    | 2.76      | 3.35      | 4.00      | 5.46      | 6.51      |                        | SGR2.5S 16B – 2515 |
| 4.87                                                                                                   | 9.33    | 13.39     | 16.40     | 19.38     | 26.13     | 30.84     | 1.19                                                                                                     | 2.35    | 3.44      | 4.25      | 5.06      | 6.93      | 8.24      |                        | SGR2.5S 18B – 2515 |
| 5.69                                                                                                   | 10.82   | 15.51     | 19.05     | 22.46     | 30.32     | 35.73     | 1.48                                                                                                     | 2.90    | 4.24      | 5.26      | 6.25      | 8.56      | 10.16     |                        | SGR2.5S 20B – 2518 |
| 7.32                                                                                                   | 13.78   | 19.87     | 24.33     | 28.74     | 38.69     | 45.00     | 2.15                                                                                                     | 4.17    | 6.12      | 7.57      | 9.01      | 12.31     | 14.43     | 0.12 to 0.22           | SGR2.5S 24B – 2518 |
| 7.73                                                                                                   | 14.52   | 20.97     | 25.65     | 30.33     | 40.73     | 47.27     | 2.33                                                                                                     | 4.52    | 6.64      | 8.21      | 9.78      | 13.33     | 15.60     |                        | SGR2.5S 25B – 2520 |
| 8.97                                                                                                   | 16.73   | 24.25     | 29.70     | 35.09     | 46.66     | 53.98     | 2.94                                                                                                     | 5.65    | 8.34      | 10.31     | 12.28     | 16.57     | 19.32     |                        | SGR2.5S 28B – 2520 |
| 9.79                                                                                                   | 18.24   | 26.42     | 32.40     | 38.24     | 50.51     | 58.31     | 3.38                                                                                                     | 6.49    | 9.57      | 11.85     | 14.10     | 18.89     | 21.98     |                        | SGR2.5S 30B – 2520 |
| 10.61                                                                                                  | 19.78   | 28.60     | 35.11     | 41.39     | 54.32     | 62.36     | 3.85                                                                                                     | 7.39    | 10.88     | 13.49     | 16.03     | 21.34     | 24.70     |                        | SGR2.5S 32B – 2520 |
| 11.84                                                                                                  | 22.09   | 31.94     | 39.16     | 46.01     | 59.93     | 68.10     | 4.61                                                                                                     | 8.86    | 13.04     | 16.14     | 19.12     | 25.26     | 28.94     |                        | SGR2.5S 35B – 2520 |
| 12.67                                                                                                  | 23.64   | 34.19     | 41.89     | 49.12     | 63.87     | 72.36     | 4.87                                                                                                     | 9.37    | 13.79     | 17.06     | 20.17     | 26.61     | 30.38     |                        | SGR2.5S 36B – 2520 |
| 13.88                                                                                                  | 25.92   | 37.49     | 45.84     | 53.31     | 68.46     | 77.12     | 6.02                                                                                                     | 11.58   | 17.06     | 21.06     | 24.69     | 32.16     | 36.52     |                        | SGR2.5S 40B – 2525 |
| 15.88                                                                                                  | 29.68   | 42.96     | 52.10     | 60.33     | 76.21     | 85.42     | 7.61                                                                                                     | 14.65   | 21.59     | 26.44     | 30.86     | 39.55     | 44.69     | 0.14 to 0.24           | SGR2.5S 45B – 2525 |
| 17.08                                                                                                  | 31.93   | 46.22     | 55.75     | 64.44     | 80.64     | 91.85     | 8.64                                                                                                     | 16.66   | 24.55     | 29.90     | 34.84     | 44.24     | 50.79     |                        | SGR2.5S 48B – 2525 |
| 17.87                                                                                                  | 33.47   | 48.38     | 58.15     | 67.13     | 83.50     | 96.56     | 9.37                                                                                                     | 18.10   | 26.63     | 32.32     | 37.61     | 47.46     | 55.32     |                        | SGR2.5S 50B – 2525 |
| 19.82                                                                                                  | 37.30   | 53.49     | 64.02     | 73.24     | 90.33     | 108.41    | 11.31                                                                                                    | 21.93   | 32.02     | 38.70     | 44.63     | 55.84     | 67.55     |                        | SGR2.5S 55B – 2525 |
| 20.20                                                                                                  | 38.06   | 54.49     | 65.17     | 74.41     | 92.32     | 110.78    | 11.71                                                                                                    | 22.74   | 33.14     | 40.03     | 46.07     | 57.99     | 70.15     |                        | SGR2.5S 56B – 2525 |
| 21.81                                                                                                  | 41.09   | 58.43     | 69.71     | 78.97     | 100.27    | 120.32    | 13.45                                                                                                    | 26.12   | 37.81     | 45.56     | 52.02     | 67.01     | 81.06     |                        | SGR2.5S 60B – 2525 |
| 23.43                                                                                                  | 44.09   | 62.28     | 73.86     | 83.34     | 108.25    | -         | 15.32                                                                                                    | 29.73   | 42.74     | 51.19     | 58.22     | 76.71     | -         |                        | SGR2.5S 64B – 2525 |
| 25.85                                                                                                  | 48.56   | 67.92     | 79.69     | 89.58     | 120.27    | -         | 18.36                                                                                                    | 35.55   | 50.62     | 59.97     | 67.96     | 92.56     | -         |                        | SGR2.5S 70B – 2525 |
| 26.65                                                                                                  | 50.03   | 69.76     | 81.57     | 91.59     | 124.29    | -         | 19.43                                                                                                    | 37.60   | 53.36     | 63.01     | 71.32     | 98.18     | -         |                        | SGR2.5S 72B – 2525 |
| 27.85                                                                                                  | 52.23   | 72.48     | 84.32     | 94.51     | 130.32    | -         | 21.09                                                                                                    | 40.78   | 57.60     | 67.67     | 76.45     | 106.95    | -         |                        | SGR2.5S 75B – 2525 |
| 29.83                                                                                                  | 55.73   | 76.65     | 88.76     | 101.10    | -         | -         | 24.00                                                                                                    | 46.22   | 64.72     | 75.68     | 86.89     | -         | -         |                        | SGR2.5S 80B – 2525 |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Surface treatment ① | Backlash ②          |
|-------------------|----------|----------------|------------------------------|------------------------|---------------------|---------------------|
| [JIS B 1702-1] N6 | S45C     | 20°            | Induction hardening of teeth | HRC50 to 56            | Black oxide finish  | See the table below |

① A black oxide finish is applied to the gear surface, but not the tooth surfaces.

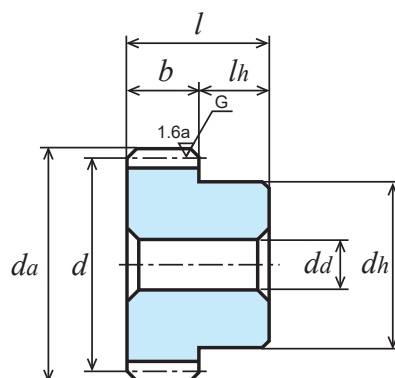
② This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

★ The allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

| Catalogue number        | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>a</sub>(H7)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Weight<br><i>W(kg)</i> |
|-------------------------|-----------------------------|--------------------------------|--------------------------------------|------|------------------------|-------------------------------------------|--------------------------------------|------------------------------------|----------------------------|------------------------|
| <b>SGR3S 14B — 3016</b> | 14                          | φ 42                           | φ 48                                 | B1   | 30                     | φ 16                                      | φ 34                                 | 20                                 | 50                         | 0.39                   |
| <b>SGR3S 15B — 3016</b> | 15                          | φ 45                           | φ 51                                 |      |                        | φ 16                                      | φ 36                                 |                                    |                            | 0.46                   |
| <b>SGR3S 16B — 3016</b> | 16                          | φ 48                           | φ 54                                 |      |                        | φ 16                                      | φ 38                                 |                                    |                            | 0.53                   |
| <b>SGR3S 18B — 3016</b> | 18                          | φ 54                           | φ 60                                 |      |                        | φ 16                                      | φ 40                                 |                                    |                            | 0.66                   |
| <b>SGR3S 20B — 3020</b> | 20                          | φ 60                           | φ 66                                 |      |                        | φ 20                                      | φ 50                                 |                                    |                            | 0.85                   |
| <b>SGR3S 24B — 3020</b> | 24                          | φ 72                           | φ 78                                 |      |                        | φ 20                                      | φ 58                                 |                                    |                            | 1.25                   |
| <b>SGR3S 25B — 3020</b> | 25                          | φ 75                           | φ 81                                 |      |                        | φ 20                                      | φ 60                                 |                                    |                            | 1.36                   |
| <b>SGR3S 28B — 3020</b> | 28                          | φ 84                           | φ 90                                 |      |                        | φ 20                                      | φ 70                                 |                                    |                            | 1.79                   |
| <b>SGR3S 30B — 3025</b> | 30                          | φ 90                           | φ 96                                 |      |                        | φ 25                                      | φ 75                                 |                                    |                            | 2.00                   |
| <b>SGR3S 32B — 3025</b> | 32                          | φ 96                           | φ 102                                |      |                        | φ 25                                      | φ 75                                 |                                    |                            | 2.21                   |
| <b>SGR3S 35B — 3025</b> | 35                          | φ 105                          | φ 111                                |      |                        | φ 25                                      | φ 80                                 |                                    |                            | 2.64                   |
| <b>SGR3S 36B — 3025</b> | 36                          | φ 108                          | φ 114                                |      |                        | φ 25                                      | φ 80                                 |                                    |                            | 2.75                   |
| <b>SGR3S 40B — 3025</b> | 40                          | φ 120                          | φ 126                                |      |                        | φ 25                                      | φ 80                                 |                                    |                            | 3.26                   |
| <b>SGR3S 45B — 3025</b> | 45                          | φ 135                          | φ 141                                |      |                        | φ 25                                      | φ 80                                 |                                    |                            | 3.97                   |
| <b>SGR3S 48B — 3025</b> | 48                          | φ 144                          | φ 150                                |      |                        | φ 25                                      | φ 85                                 |                                    |                            | 4.53                   |
| <b>SGR3S 50B — 3030</b> | 50                          | φ 150                          | φ 156                                |      |                        | φ 30                                      | φ 85                                 |                                    |                            | 4.78                   |
| <b>SGR3S 55B — 3030</b> | 55                          | φ 165                          | φ 171                                |      |                        | φ 30                                      | φ 90                                 |                                    |                            | 5.76                   |
| <b>SGR3S 56B — 3030</b> | 56                          | φ 168                          | φ 174                                |      |                        | φ 30                                      | φ 90                                 |                                    |                            | 5.94                   |
| <b>SGR3S 60B — 3030</b> | 60                          | φ 180                          | φ 186                                |      |                        | φ 30                                      | φ 100                                |                                    |                            | 6.95                   |
| <b>SGR3S 64B — 3030</b> | 64                          | φ 192                          | φ 198                                |      |                        | φ 30                                      | φ 100                                |                                    |                            | 7.77                   |
| <b>SGR3S 70B — 3030</b> | 70                          | φ 210                          | φ 216                                |      |                        | φ 30                                      | φ 100                                |                                    |                            | 9.11                   |
| <b>SGR3S 72B — 3030</b> | 72                          | φ 216                          | φ 222                                |      |                        | φ 30                                      | φ 100                                |                                    |                            | 9.59                   |
| <b>SGR3S 75B — 3030</b> | 75                          | φ 225                          | φ 231                                |      |                        | φ 30                                      | φ 100                                |                                    |                            | 10.32                  |
| <b>SGR3S 80B — 3030</b> | 80                          | φ 240                          | φ 246                                |      |                        | φ 30                                      | φ 100                                |                                    |                            | 11.61                  |

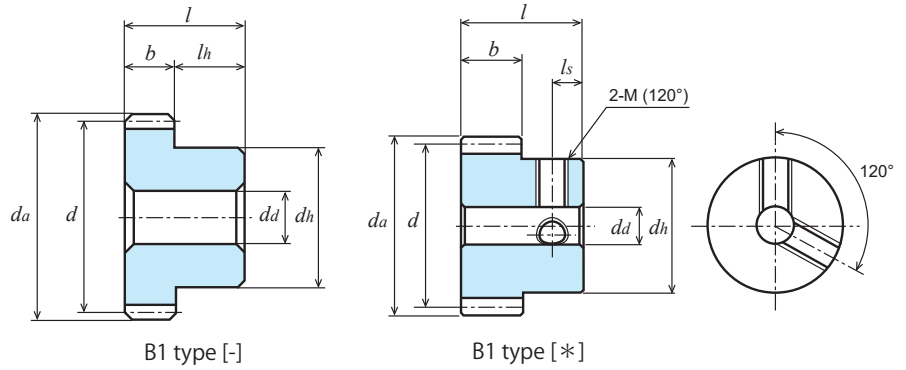


2D • 3D CAD



B1 type

| Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |         |           |           |           |           |           | Allowable transfer capability table for different revolutions per minute, Surface durability, (Unit: kW) |         |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number |
|--------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|----------------------------------------------------------------------------------------------------------|---------|-----------|-----------|-----------|-----------|-----------|------------------------|------------------|
| 400 rpm                                                                                                | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm | 400 rpm                                                                                                  | 800 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,500 rpm | 3,000 rpm |                        |                  |
| 5.55                                                                                                   | 10.69   | 15.39     | 18.79     | 22.22     | 29.94     | 35.37     | 1.24                                                                                                     | 2.46    | 3.60      | 4.44      | 5.29      | 7.23      | 8.61      | 0.10 to 0.20           | SGR3S 14B – 3016 |
| 6.29                                                                                                   | 12.04   | 17.29     | 21.18     | 25.02     | 33.74     | 39.82     | 1.43                                                                                                     | 2.82    | 4.12      | 5.10      | 6.07      | 8.31      | 9.89      |                        | SGR3S 15B – 3016 |
| 7.01                                                                                                   | 13.36   | 19.13     | 23.51     | 27.74     | 37.44     | 44.13     | 1.64                                                                                                     | 3.21    | 4.68      | 5.81      | 6.91      | 9.46      | 11.24     |                        | SGR3S 16B – 3016 |
| 8.36                                                                                                   | 15.83   | 22.75     | 27.90     | 32.89     | 44.40     | 52.07     | 2.08                                                                                                     | 4.06    | 5.94      | 7.36      | 8.74      | 11.98     | 14.16     | 0.12 to 0.22           | SGR3S 18B – 3016 |
| 9.73                                                                                                   | 18.33   | 26.42     | 32.35     | 38.21     | 51.45     | 59.84     | 2.58                                                                                                     | 5.01    | 7.35      | 9.08      | 10.81     | 14.77     | 17.32     |                        | SGR3S 20B – 3020 |
| 12.49                                                                                                  | 23.28   | 33.77     | 41.38     | 48.86     | 64.80     | 74.98     | 3.73                                                                                                     | 7.17    | 10.58     | 13.55     | 15.59     | 20.97     | 24.44     |                        | SGR3S 24B – 3020 |
| 13.19                                                                                                  | 24.58   | 35.61     | 43.67     | 51.53     | 68.07     | 78.59     | 4.05                                                                                                     | 7.79    | 11.48     | 14.22     | 16.92     | 22.67     | 26.38     |                        | SGR3S 25B – 3020 |
| 15.27                                                                                                  | 28.49   | 41.19     | 50.53     | 59.52     | 77.73     | 88.75     | 5.09                                                                                                     | 9.79    | 14.41     | 17.85     | 21.20     | 28.08     | 32.32     |                        | SGR3S 28B – 3020 |
| 16.66                                                                                                  | 31.08   | 44.95     | 55.07     | 64.57     | 83.97     | 95.12     | 5.85                                                                                                     | 11.25   | 16.56     | 20.49     | 24.22     | 31.95     | 36.49     |                        | SGR3S 30B – 3025 |
| 18.04                                                                                                  | 33.68   | 48.71     | 59.61     | 69.55     | 89.80     | 101.33    | 6.66                                                                                                     | 12.81   | 18.86     | 23.30     | 27.41     | 35.90     | 40.83     |                        | SGR3S 32B – 3025 |
| 20.11                                                                                                  | 37.56   | 54.34     | 66.26     | 76.88     | 98.07     | 110.25    | 7.96                                                                                                     | 15.32   | 22.57     | 27.79     | 32.51     | 42.06     | 47.67     | 0.14 to 0.24           | SGR3S 35B – 3025 |
| 20.79                                                                                                  | 38.84   | 56.21     | 68.39     | 79.29     | 100.74    | 113.12    | 8.42                                                                                                     | 16.21   | 23.88     | 29.34     | 34.29     | 44.19     | 50.02     |                        | SGR3S 36B – 3025 |
| 23.52                                                                                                  | 43.98   | 63.65     | 76.77     | 88.74     | 111.05    | 126.48    | 10.37                                                                                                    | 20.00   | 29.46     | 35.89     | 41.81     | 53.08     | 60.95     |                        | SGR3S 40B – 3025 |
| 26.85                                                                                                  | 50.49   | 72.54     | 86.88     | 99.60     | 123.01    | 146.54    | 13.09                                                                                                    | 25.36   | 37.09     | 44.86     | 51.84     | 64.95     | 78.00     |                        | SGR3S 45B – 3025 |
| 28.85                                                                                                  | 54.39   | 77.66     | 92.80     | 105.61    | 132.26    | 158.71    | 14.86                                                                                                    | 28.88   | 41.97     | 50.65     | 58.11     | 73.82     | 89.30     |                        | SGR3S 48B – 3025 |
| 30.24                                                                                                  | 56.98   | 81.02     | 96.67     | 109.51    | 139.05    | 166.86    | 16.14                                                                                                    | 31.35   | 45.37     | 54.67     | 62.42     | 80.41     | 97.27     |                        | SGR3S 50B – 3030 |
| 33.71                                                                                                  | 63.40   | 89.26     | 105.47    | 118.86    | 156.10    | -         | 19.57                                                                                                    | 37.93   | 54.36     | 64.87     | 73.69     | 98.18     | -         |                        | SGR3S 55B – 3030 |
| 34.40                                                                                                  | 64.68   | 90.88     | 107.15    | 120.66    | 159.52    | -         | 20.29                                                                                                    | 39.32   | 56.25     | 66.97     | 76.02     | 101.96    | -         |                        | SGR3S 56B – 3030 |
| 37.15                                                                                                  | 69.75   | 97.25     | 113.71    | 127.68    | 173.26    | -         | 23.31                                                                                                    | 45.12   | 64.04     | 75.61     | 85.58     | 117.82    | -         |                        | SGR3S 60B – 3030 |
| 39.89                                                                                                  | 74.75   | 103.42    | 120.01    | 134.68    | -         | -         | 26.54                                                                                                    | 51.28   | 72.21     | 84.62     | 95.72     | -         | -         |                        | SGR3S 64B – 3030 |
| 43.95                                                                                                  | 81.77   | 111.67    | 129.00    | 149.63    | -         | -         | 31.76                                                                                                    | 60.91   | 84.68     | 98.78     | 115.49    | -         | -         |                        | SGR3S 70B – 3030 |
| 45.29                                                                                                  | 84.07   | 114.33    | 131.88    | 154.63    | -         | -         | 33.59                                                                                                    | 64.28   | 88.99     | 103.66    | 122.51    | -         | -         |                        | SGR3S 72B – 3030 |
| 47.29                                                                                                  | 87.48   | 118.24    | 136.10    | 162.14    | -         | -         | 36.44                                                                                                    | 69.49   | 95.60     | 111.13    | 133.45    | -         | -         |                        | SGR3S 75B – 3030 |
| 50.62                                                                                                  | 93.07   | 124.54    | 145.58    | 174.69    | -         | -         | 41.44                                                                                                    | 78.55   | 106.99    | 126.30    | 152.77    | -         | -         |                        | SGR3S 80B – 3030 |



Unit: mm

B1 type [-]

B1 type [\*]

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. [\*] Two screw holes and set screws are provided.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

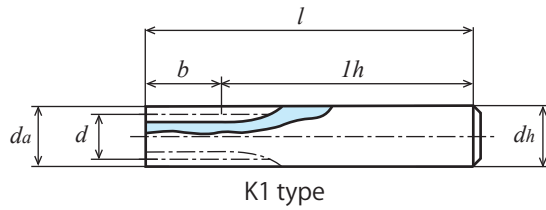
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw     |       | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-----------|-------|------------------|
|                  |                        |                           |                       |      |                   |                            |                       |                     |                       | 2-M(120°) | $l_s$ |                  |
| S50S 10K — 1006  | 10                     | $\phi 5$                  | $\phi 6$              | K1   | 10                | -                          | $\phi 6$              | 45                  | 55                    | -         | -     | 11.5             |
| S50S 12K — 1007  | 12                     | $\phi 6$                  | $\phi 7$              | K1   | 10                | -                          | $\phi 7$              | 45                  | 55                    | -         | -     | 15.8             |
| S50S 15K * 0803  | 15                     | $\phi 7.5$                | $\phi 8.5$            | K2   | 8                 | $\phi 3(H8)$               | $\phi 8.5$            | 10                  | 18                    | 2-M3      | 3     | 6.0              |
| S50S 16K * 0803  | 16                     | $\phi 8$                  | $\phi 9$              | K2   | 8                 | $\phi 3(H8)$               | $\phi 9$              | 10                  | 18                    | 2-M3      | 3     | 6.9              |
| S50S 18K * 0804  | 18                     | $\phi 9$                  | $\phi 10$             | K2   | 8                 | $\phi 4(H8)$               | $\phi 10$             | 10                  | 18                    | 2-M3      | 3     | 8.1              |
| S50S 20K * 0804  | 20                     | $\phi 10$                 | $\phi 11$             | K2   | 8                 | $\phi 4(H8)$               | $\phi 11$             | 10                  | 18                    | 2-M3      | 3     | 10.3             |
| S50S 22K * 0804  | 22                     | $\phi 11$                 | $\phi 12$             | K2   | 8                 | $\phi 4(H8)$               | $\phi 12$             | 10                  | 18                    | 2-M3      | 3     | 12.7             |
| S50S 24K * 0804  | 24                     | $\phi 12$                 | $\phi 13$             | K2   | 8                 | $\phi 4(H8)$               | $\phi 13$             | 10                  | 18                    | 2-M3      | 3     | 15.4             |
| S50S 25B * 0804  | 25                     | $\phi 12.5$               | $\phi 13.5$           | B1   | 8                 | $\phi 4(H8)$               | $\phi 10$             | 8                   | 16                    | 2-M3      | 4     | 10.8             |
| S50S 26B * 0804  | 26                     | $\phi 13$                 | $\phi 14$             | B1   | 8                 | $\phi 4(H8)$               | $\phi 10$             | 8                   | 16                    | 2-M3      | 4     | 11.4             |
| S50S 28B * 0804  | 28                     | $\phi 14$                 | $\phi 15$             | B1   | 8                 | $\phi 4(H8)$               | $\phi 10$             | 8                   | 16                    | 2-M3      | 4     | 12.8             |
| S50S 30B * 0805  | 30                     | $\phi 15$                 | $\phi 16$             | B1   | 8                 | $\phi 5(H8)$               | $\phi 12$             | 8                   | 16                    | 2-M3      | 4     | 15.4             |
| S50S 32B * 0505  | 32                     | $\phi 16$                 | $\phi 17$             | B1   | 5                 | $\phi 5$                   | $\phi 12$             | 8                   | 13                    | 2-M3      | 4     | 12.7             |
| S50S 35B * 0505  | 35                     | $\phi 17.5$               | $\phi 18.5$           | B1   | 5                 | $\phi 5$                   | $\phi 12$             | 8                   | 13                    | 2-M3      | 4     | 14.2             |
| S50S 36B * 0505  | 36                     | $\phi 18$                 | $\phi 19$             | B1   | 5                 | $\phi 5$                   | $\phi 12$             | 8                   | 13                    | 2-M3      | 4     | 14.8             |
| S50S 40BF — 0504 | 40                     | $\phi 20$                 | $\phi 21$             | B1   | 5                 | $\phi 4(H8)$               | $\phi 15$             | 8                   | 13                    | -         | -     | 22.1             |
| S50S 40B * 0505  | 40                     | $\phi 20$                 | $\phi 21$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 21.0             |
| S50S 42B * 0505  | 42                     | $\phi 21$                 | $\phi 22$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 22.3             |
| S50S 44B * 0505  | 44                     | $\phi 22$                 | $\phi 23$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 23.6             |
| S50S 45B * 0505  | 45                     | $\phi 22.5$               | $\phi 23.5$           | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 24.3             |
| S50S 48B * 0505  | 48                     | $\phi 24$                 | $\phi 25$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 26.4             |
| S50S 50B * 0505  | 50                     | $\phi 25$                 | $\phi 26$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 27.9             |
| S50S 52B * 0505  | 52                     | $\phi 26$                 | $\phi 27$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 29.5             |
| S50S 54B * 0505  | 54                     | $\phi 27$                 | $\phi 28$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 31.1             |
| S50S 55B * 0505  | 55                     | $\phi 27.5$               | $\phi 28.5$           | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 32.0             |
| S50S 56B * 0505  | 56                     | $\phi 28$                 | $\phi 29$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 8                   | 13                    | 2-M3      | 4     | 32.8             |
| S50S 60B * 0506  | 60                     | $\phi 30$                 | $\phi 31$             | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 39.9             |
| S50S 64B * 0506  | 64                     | $\phi 32$                 | $\phi 33$             | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 43.7             |
| S50S 70B * 0506  | 70                     | $\phi 35$                 | $\phi 36$             | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 49.9             |
| S50S 72B * 0506  | 72                     | $\phi 36$                 | $\phi 37$             | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 52.1             |
| S50S 75B * 0506  | 75                     | $\phi 37.5$               | $\phi 38.5$           | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 55.5             |
| S50S 80BF — 0506 | 80                     | $\phi 40$                 | $\phi 41$             | B1   | 5                 | $\phi 6$                   | $\phi 28$             | 8                   | 13                    | -         | -     | 85.0             |
| S50S 80B * 0508  | 80                     | $\phi 40$                 | $\phi 41$             | B1   | 5                 | $\phi 8$                   | $\phi 22$             | 8                   | 13                    | 2-M4      | 4     | 67.0             |
| S50S 90B * 0508  | 90                     | $\phi 45$                 | $\phi 46$             | B1   | 5                 | $\phi 8$                   | $\phi 22$             | 8                   | 13                    | 2-M4      | 4     | 80.1             |
| S50S 96B * 0508  | 96                     | $\phi 48$                 | $\phi 49$             | B1   | 5                 | $\phi 8$                   | $\phi 22$             | 8                   | 13                    | 2-M4      | 4     | 88.7             |

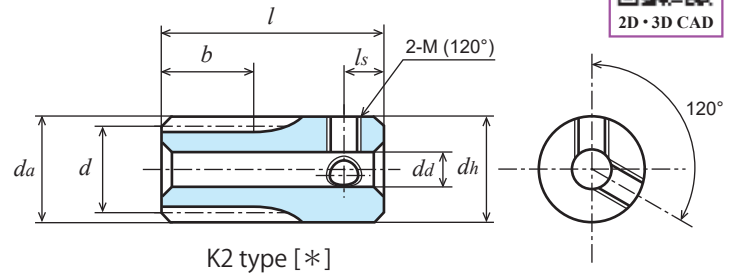




2D • 3D CAD



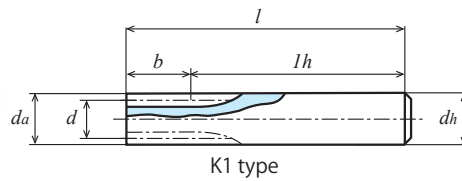
K1 type



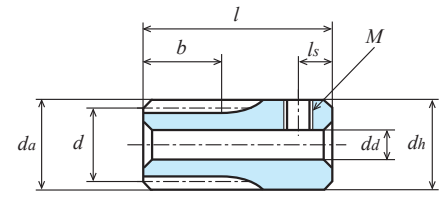
K2 type [\*]

| Catalogue number        | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw     |       | Weight<br>$W(g)$ |
|-------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-----------|-------|------------------|
|                         |                        |                           |                       |      |                   |                            |                       |                     |                       | 2-M(120°) | $l_s$ |                  |
| <b>S50S 100B * 0508</b> | 100                    | $\phi 50$                 | $\phi 51$             | B1   | 5                 | $\phi 8$                   | $\phi 25$             | 8                   | 13                    | 2-M4      | 4     | 101.4            |
| <b>S50S 110B * 0508</b> | 110                    | $\phi 55$                 | $\phi 56$             | B1   | 5                 | $\phi 8$                   | $\phi 25$             | 8                   | 13                    | 2-M4      | 4     | 117.6            |
| <b>S50S 120B * 0508</b> | 120                    | $\phi 60$                 | $\phi 61$             | B1   | 5                 | $\phi 8$                   | $\phi 25$             | 8                   | 13                    | 2-M4      | 4     | 135.4            |

| Catalogue number        | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                         | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S50S 10K — 1006</b>  | 0.62                                                                                                     | 6.19   | 12.38  | 24.77  | 49.53  | 74.30    | 92.87    |
| <b>S50S 12K — 1007</b>  | 0.85                                                                                                     | 8.49   | 16.98  | 33.96  | 67.91  | 101.87   | 127.33   |
| <b>S50S 15K * 0803</b>  | 0.99                                                                                                     | 9.92   | 19.84  | 39.68  | 79.37  | 119.05   | 148.81   |
| <b>S50S 16K * 0803</b>  | 1.10                                                                                                     | 11.01  | 22.02  | 44.04  | 88.08  | 132.12   | 165.15   |
| <b>S50S 18K * 0804</b>  | 1.32                                                                                                     | 13.24  | 26.47  | 52.94  | 105.88 | 158.82   | 198.53   |
| <b>S50S 20K * 0804</b>  | 1.55                                                                                                     | 15.54  | 31.08  | 62.16  | 124.32 | 186.48   | 233.10   |
| <b>S50S 22K * 0804</b>  | 1.79                                                                                                     | 17.88  | 35.76  | 71.52  | 143.04 | 214.57   | 268.21   |
| <b>S50S 24K * 0804</b>  | 2.03                                                                                                     | 20.26  | 40.52  | 81.04  | 162.07 | 243.11   | 303.88   |
| <b>S50S 25B * 0804</b>  | 2.15                                                                                                     | 21.46  | 42.93  | 85.86  | 172.72 | 257.57   | 321.97   |
| <b>S50S 26B * 0804</b>  | 2.27                                                                                                     | 22.68  | 45.36  | 90.71  | 181.43 | 272.14   | 339.11   |
| <b>S50S 28B * 0804</b>  | 2.51                                                                                                     | 25.13  | 50.26  | 100.52 | 201.03 | 301.55   | 371.39   |
| <b>S50S 30B * 0805</b>  | 2.76                                                                                                     | 27.59  | 55.18  | 110.37 | 220.74 | 331.11   | 403.12   |
| <b>S50S 32B * 0505</b>  | 1.88                                                                                                     | 18.81  | 37.61  | 75.22  | 150.44 | 225.49   | 271.63   |
| <b>S50S 35B * 0505</b>  | 2.12                                                                                                     | 21.17  | 42.34  | 84.68  | 169.36 | 250.30   | 300.66   |
| <b>S50S 36B * 0505</b>  | 2.20                                                                                                     | 21.96  | 43.93  | 87.85  | 175.71 | 258.48   | 310.20   |
| <b>S50S40BF — 0504</b>  | 2.51                                                                                                     | 25.13  | 50.26  | 100.53 | 201.05 | 290.27   | 347.13   |
| <b>S50S 40B * 0505</b>  | 2.52                                                                                                     | 25.16  | 50.32  | 100.65 | 201.29 | 290.74   | 347.65   |
| <b>S50S 42B * 0505</b>  | 2.68                                                                                                     | 26.77  | 53.55  | 107.09 | 214.19 | 306.59   | 365.96   |
| <b>S50S 44B * 0505</b>  | 2.84                                                                                                     | 28.37  | 56.75  | 113.49 | 226.99 | 322.02   | 383.71   |
| <b>S50S 45B * 0505</b>  | 2.92                                                                                                     | 29.18  | 58.37  | 116.74 | 233.47 | 329.75   | 392.59   |
| <b>S50S 48B * 0505</b>  | 3.16                                                                                                     | 31.63  | 63.25  | 126.50 | 252.80 | 352.63   | 418.79   |
| <b>S50S 50B * 0505</b>  | 3.33                                                                                                     | 33.26  | 66.52  | 133.04 | 264.20 | 367.63   | 435.89   |
| <b>S50S 52B * 0505</b>  | 3.49                                                                                                     | 34.90  | 69.80  | 139.60 | 275.51 | 382.44   | 452.72   |
| <b>S50S 54B * 0505</b>  | 3.65                                                                                                     | 36.54  | 73.08  | 146.17 | 286.71 | 397.03   | 469.26   |
| <b>S50S 55B * 0505</b>  | 3.74                                                                                                     | 37.37  | 74.73  | 149.46 | 292.27 | 404.26   | 477.43   |
| <b>S50S 56B * 0505</b>  | 3.82                                                                                                     | 38.19  | 76.38  | 152.76 | 297.80 | 411.43   | 485.53   |
| <b>S50S 60B * 0506</b>  | 4.15                                                                                                     | 41.50  | 83.00  | 165.99 | 319.68 | 439.63   | 517.25   |
| <b>S50S 64B * 0506</b>  | 4.48                                                                                                     | 44.82  | 89.64  | 179.28 | 341.14 | 467.04   | 547.92   |
| <b>S50S 70B * 0506</b>  | 4.98                                                                                                     | 49.82  | 99.65  | 199.30 | 372.55 | 506.74   | 592.05   |
| <b>S50S 72B * 0506</b>  | 5.15                                                                                                     | 51.50  | 102.99 | 205.99 | 382.81 | 519.61   | 606.27   |
| <b>S50S 75B * 0506</b>  | 5.40                                                                                                     | 54.01  | 108.02 | 216.04 | 398.01 | 538.57   | 627.16   |
| <b>S50S80BF — 0506</b>  | 5.78                                                                                                     | 57.80  | 115.61 | 231.21 | 419.70 | 565.46   | 662.85   |
| <b>S50S 80B * 0508</b>  | 5.82                                                                                                     | 58.21  | 116.42 | 232.85 | 422.85 | 569.31   | 668.04   |
| <b>S50S 90B * 0508</b>  | 6.66                                                                                                     | 66.56  | 133.13 | 266.25 | 470.10 | 626.91   | 752.57   |
| <b>S50S 96B * 0508</b>  | 7.16                                                                                                     | 71.63  | 143.26 | 286.28 | 497.59 | 660.77   | 802.70   |
| <b>S50S 100B * 0508</b> | 7.50                                                                                                     | 75.01  | 150.02 | 297.93 | 515.45 | 688.64   | 835.69   |
| <b>S50S 110B * 0508</b> | 8.35                                                                                                     | 83.48  | 166.96 | 326.48 | 558.60 | 757.32   | 916.71   |
| <b>S50S 120B * 0508</b> | 9.20                                                                                                     | 91.98  | 183.95 | 354.27 | 599.68 | 824.59   | 995.68   |



K1 type



K2 type [+]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. Gears with a [+] are provided with one screw hole and set screw.

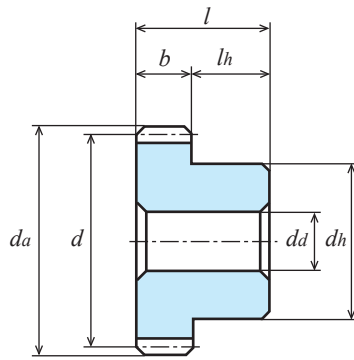
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

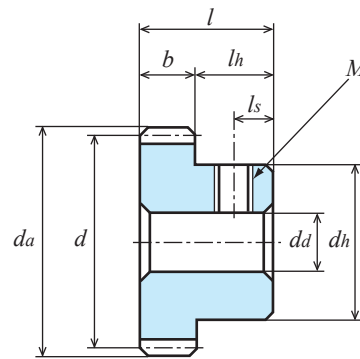
| Catalogue number        | Module<br><i>m</i> | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>da</i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>da(H7)</i> | Hub diameter<br><i>dh</i> | Hub length<br><i>lh</i> | Overall length<br><i>l</i> | Screw    |           | Weight<br><i>W(g)</i> |
|-------------------------|--------------------|-----------------------------|--------------------------------|---------------------------|------|------------------------|--------------------------------|---------------------------|-------------------------|----------------------------|----------|-----------|-----------------------|
|                         |                    |                             |                                |                           |      |                        |                                |                           |                         |                            | <i>M</i> | <i>ls</i> |                       |
| <b>S75S 10K — 0809</b>  | 0.75               | 10                          | φ 7.5                          | φ 9                       | K1   | 8                      | —                              | φ 9                       | 47                      | 55                         | —        | —         | 26.3                  |
| <b>S75S 12K — 0811</b>  |                    | 12                          | φ 9                            | φ 10.5                    | K1   | 8                      | —                              | φ 11                      | 47                      | 55                         | —        | —         | 39.1                  |
| <b>S75S 14K + 0805</b>  |                    | 14                          | φ 10.5                         | φ 12                      | K2   | 8                      | φ 5(H8)                        | φ 12                      | 12                      | 20                         | M3       | 3         | 12.9                  |
| <b>S75S 15K + 0805</b>  |                    | 15                          | φ 11.25                        | φ 12.75                   | K2   | 8                      | φ 5(H8)                        | φ 12.75                   | 12                      | 20                         | M3       | 3         | 15.0                  |
| <b>S75S 16B + 0805</b>  |                    | 16                          | φ 12                           | φ 13.5                    | B1   | 8                      | φ 5(H8)                        | φ 10                      | 7                       | 15                         | M4       | 3.5       | 8.9                   |
| <b>S75S 18B + 0805</b>  |                    | 18                          | φ 13.5                         | φ 15                      | B1   | 8                      | φ 5(H8)                        | φ 11                      | 7                       | 15                         | M4       | 3.5       | 11.7                  |
| <b>S75S 20B + 0806</b>  |                    | 20                          | φ 15                           | φ 16.5                    | B1   | 8                      | φ 6                            | φ 12                      | 7                       | 15                         | M4       | 3.5       | 13.8                  |
| <b>S75S 24B + 0806</b>  |                    | 24                          | φ 18                           | φ 19.5                    | B1   | 8                      | φ 6                            | φ 14                      | 7                       | 15                         | M4       | 3.5       | 20.8                  |
| <b>S75S 28B + 0806</b>  |                    | 28                          | φ 21                           | φ 22.5                    | B1   | 8                      | φ 6                            | φ 14                      | 7                       | 15                         | M4       | 3.5       | 26.6                  |
| <b>S75S 30B + 0806</b>  |                    | 30                          | φ 22.5                         | φ 24                      | B1   | 8                      | φ 6                            | φ 15                      | 7                       | 15                         | M4       | 3.5       | 31.0                  |
| <b>S75S 32B + 0606</b>  |                    | 32                          | φ 24                           | φ 25.5                    | B1   | 6                      | φ 6                            | φ 15                      | 9                       | 15                         | M4       | 4         | 30.1                  |
| <b>S75S 35B + 0606</b>  |                    | 35                          | φ 26.25                        | φ 27.75                   | B1   | 6                      | φ 6                            | φ 18                      | 9                       | 15                         | M4       | 4         | 39.7                  |
| <b>S75S 36B + 0606</b>  |                    | 36                          | φ 27                           | φ 28.5                    | B1   | 6                      | φ 6                            | φ 18                      | 9                       | 15                         | M4       | 4         | 41.2                  |
| <b>S75S 40B + 0606</b>  |                    | 40                          | φ 30                           | φ 31.5                    | B1   | 6                      | φ 6                            | φ 20                      | 9                       | 15                         | M4       | 4         | 51.7                  |
| <b>S75S 45B + 0606</b>  |                    | 45                          | φ 33.75                        | φ 35.25                   | B1   | 6                      | φ 6                            | φ 20                      | 9                       | 15                         | M4       | 4         | 60.5                  |
| <b>S75S 48B + 0606</b>  |                    | 48                          | φ 36                           | φ 37.5                    | B1   | 6                      | φ 6                            | φ 20                      | 9                       | 15                         | M4       | 4         | 66.3                  |
| <b>S75S 50B + 0606</b>  |                    | 50                          | φ 37.5                         | φ 39                      | B1   | 6                      | φ 6                            | φ 20                      | 9                       | 15                         | M4       | 4         | 70.4                  |
| <b>S75S 56B + 0606</b>  |                    | 56                          | φ 42                           | φ 43.5                    | B1   | 6                      | φ 6                            | φ 20                      | 9                       | 15                         | M4       | 4         | 83.6                  |
| <b>S75S 60B + 0606</b>  |                    | 60                          | φ 45                           | φ 46.5                    | B1   | 6                      | φ 6                            | φ 22                      | 9                       | 15                         | M4       | 4         | 97.9                  |
| <b>S75S 64B + 0606</b>  |                    | 64                          | φ 48                           | φ 49.5                    | B1   | 6                      | φ 6                            | φ 22                      | 9                       | 15                         | M4       | 4         | 108.2                 |
| <b>S75S 70B + 0606</b>  |                    | 70                          | φ 52.5                         | φ 54                      | B1   | 6                      | φ 6                            | φ 22                      | 9                       | 15                         | M4       | 4         | 124.9                 |
| <b>S75S 72B + 0606</b>  |                    | 72                          | φ 54                           | φ 55.5                    | B1   | 6                      | φ 6                            | φ 25                      | 9                       | 15                         | M4       | 4         | 138.5                 |
| <b>S75S 80B + 0608</b>  |                    | 80                          | φ 60                           | φ 61.5                    | B1   | 6                      | φ 8                            | φ 25                      | 9                       | 15                         | M4       | 4         | 161.3                 |
| <b>S75S 90B + 0608</b>  |                    | 90                          | φ 67.5                         | φ 69                      | B1   | 6                      | φ 8                            | φ 30                      | 9                       | 15                         | M4       | 4         | 211.8                 |
| <b>S75S 100B + 0608</b> |                    | 100                         | φ 75                           | φ 76.5                    | B1   | 6                      | φ 8                            | φ 30                      | 9                       | 15                         | M4       | 4         | 251.3                 |
| <b>S75S 120B + 0608</b> |                    | 120                         | φ 90                           | φ 91.5                    | B1   | 6                      | φ 8                            | φ 30                      | 9                       | 15                         | M4       | 4         | 342.9                 |
| <b>S80S 25BF — 0805</b> | 0.8                | 25                          | φ 20                           | φ 21.6                    | B1   | 8                      | φ 5(H8)                        | φ 16                      | 10                      | 18                         | —        | —         | 32.5                  |
| <b>S80S 30BF — 0805</b> |                    | 30                          | φ 24                           | φ 25.6                    | B1   | 8                      | φ 5(H8)                        | φ 20                      | 10                      | 18                         | —        | —         | 50.1                  |
| <b>S80S 40BF — 0806</b> |                    | 40                          | φ 32                           | φ 33.6                    | B1   | 8                      | φ 6(H8)                        | φ 25                      | 10                      | 18                         | —        | —         | 84.7                  |
| <b>S80S 50BF — 0806</b> |                    | 50                          | φ 40                           | φ 41.6                    | B1   | 8                      | φ 6(H8)                        | φ 28                      | 10                      | 18                         | —        | —         | 122.9                 |
| <b>S80S 60BF — 0806</b> |                    | 60                          | φ 48                           | φ 49.6                    | B1   | 8                      | φ 6(H8)                        | φ 34                      | 10                      | 18                         | —        | —         | 180.5                 |
| <b>S80S 70BF — 0808</b> |                    | 70                          | φ 56                           | φ 57.6                    | B1   | 8                      | φ 8                            | φ 40                      | 10                      | 18                         | —        | —         | 245.7                 |



2D • 3D CAD



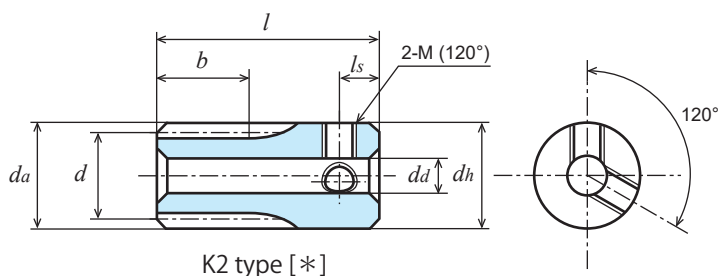
B1 type [-]



B1 type [+]

| Catalogue number         | Module<br><i>m</i> | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>da</i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>da(H7)</i> | Hub diameter<br><i>dh</i> | Hub length<br><i>lh</i> | Overall length<br><i>l</i> | Screw    |           | Weight<br><i>W(g)</i> |
|--------------------------|--------------------|-----------------------------|--------------------------------|---------------------------|------|------------------------|--------------------------------|---------------------------|-------------------------|----------------------------|----------|-----------|-----------------------|
|                          |                    |                             |                                |                           |      |                        |                                |                           |                         |                            | <i>M</i> | <i>ls</i> |                       |
| <b>S80S 80BF — 0808</b>  | 0.8                | 80                          | φ64                            | φ65.6                     | B1   | 8                      | φ 8                            | φ45                       | 10                      | 18                         | -        | -         | 319.2                 |
| <b>S80S 90BF — 0808</b>  |                    | 90                          | φ72                            | φ73.6                     | B1   | 8                      | φ 8                            | φ50                       | 10                      | 18                         | -        | -         | 402.1                 |
| <b>S80S 100BF — 0810</b> |                    | 100                         | φ80                            | φ81.6                     | B1   | 8                      | φ10                            | φ60                       | 10                      | 18                         | -        | -         | 525.8                 |
| <b>S80S 120BF — 0810</b> |                    | 120                         | φ96                            | φ97.6                     | B1   | 8                      | φ10                            | φ70                       | 10                      | 18                         | -        | -         | 744.7                 |

| Catalogue number        | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |          |          |          |          |
|-------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|----------|----------|----------|----------|
|                         | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm   | 800rpm   | 1,200rpm | 1,500rpm |
| <b>S75S 10K — 0809</b>  | 1.10                                                                                                     | 11.07  | 22.14  | 44.29    | 88.59    | 132.88   | 166.10   |
| <b>S75S 12K — 0811</b>  | 1.53                                                                                                     | 15.28  | 30.56  | 61.12    | 122.24   | 183.36   | 229.20   |
| <b>S75S 14K + 0805</b>  | 1.99                                                                                                     | 19.92  | 39.84  | 79.67    | 159.35   | 239.02   | 298.77   |
| <b>S75S 15K + 0805</b>  | 2.23                                                                                                     | 22.32  | 44.64  | 89.29    | 178.58   | 267.86   | 334.83   |
| <b>S75S 16B + 0805</b>  | 2.48                                                                                                     | 24.77  | 49.54  | 99.09    | 198.18   | 297.27   | 371.59   |
| <b>S75S 18B + 0805</b>  | 2.98                                                                                                     | 29.78  | 59.56  | 119.12   | 238.23   | 357.35   | 442.68   |
| <b>S75S 20B + 0806</b>  | 3.50                                                                                                     | 34.97  | 69.93  | 139.86   | 279.72   | 419.58   | 510.83   |
| <b>S75S 24B + 0806</b>  | 4.56                                                                                                     | 45.58  | 91.17  | 182.33   | 364.66   | 536.45   | 643.79   |
| <b>S75S 28B + 0806</b>  | 5.65                                                                                                     | 56.54  | 113.08 | 226.16   | 452.32   | 647.45   | 772.83   |
| <b>S75S 30B + 0806</b>  | 6.21                                                                                                     | 62.08  | 124.17 | 248.66   | 496.66   | 701.46   | 835.14   |
| <b>S75S 32B + 0606</b>  | 5.08                                                                                                     | 50.78  | 101.55 | 203.10   | 405.88   | 566.16   | 672.37   |
| <b>S75S 35B + 0606</b>  | 5.72                                                                                                     | 57.16  | 114.32 | 228.63   | 450.54   | 625.02   | 739.59   |
| <b>S75S 36B + 0606</b>  | 5.93                                                                                                     | 59.30  | 118.60 | 237.20   | 465.26   | 644.30   | 761.51   |
| <b>S75S 40B + 0606</b>  | 6.79                                                                                                     | 67.94  | 135.87 | 271.74   | 523.34   | 719.70   | 846.78   |
| <b>S75S 45B + 0606</b>  | 7.88                                                                                                     | 78.80  | 157.59 | 315.19   | 593.54   | 809.50   | 947.38   |
| <b>S75S 48B + 0606</b>  | 8.54                                                                                                     | 85.39  | 170.78 | 341.55   | 634.74   | 861.57   | 1,005.26 |
| <b>S75S 50B + 0606</b>  | 8.98                                                                                                     | 89.80  | 179.60 | 359.20   | 661.75   | 895.45   | 1,042.75 |
| <b>S75S 56B + 0606</b>  | 10.31                                                                                                    | 103.12 | 206.23 | 412.46   | 740.57   | 993.21   | 1,176.28 |
| <b>S75S 60B + 0606</b>  | 11.20                                                                                                    | 112.05 | 224.09 | 448.18   | 791.32   | 1,055.28 | 1,266.80 |
| <b>S75S 64B + 0606</b>  | 12.10                                                                                                    | 121.01 | 242.03 | 483.67   | 840.68   | 1,116.37 | 1,356.16 |
| <b>S75S 70B + 0606</b>  | 13.45                                                                                                    | 134.52 | 269.05 | 530.18   | 912.13   | 1,227.65 | 1,487.91 |
| <b>S75S 72B + 0606</b>  | 13.90                                                                                                    | 139.04 | 278.08 | 545.45   | 935.29   | 1,264.36 | 1,531.23 |
| <b>S75S 80B + 0608</b>  | 15.72                                                                                                    | 157.17 | 314.34 | 605.38   | 1,024.75 | 1,409.08 | 1,701.45 |
| <b>S75S 90B + 0608</b>  | 17.97                                                                                                    | 179.72 | 359.44 | 676.87   | 1,128.44 | 1,583.37 | 1,911.84 |
| <b>S75S 100B + 0608</b> | 20.25                                                                                                    | 202.52 | 405.04 | 746.20   | 1,239.53 | 1,753.91 | 2,124.81 |
| <b>S75S 120B + 0608</b> | 24.83                                                                                                    | 248.33 | 496.67 | 876.93   | 1,484.26 | 2,095.89 | 2,535.81 |
| <b>S80S 25BF — 0805</b> | 5.52                                                                                                     | 55.18  | 110.37 | 220.74   | 441.48   | 637.09   | 761.80   |
| <b>S80S 30BF — 0805</b> | 7.07                                                                                                     | 70.68  | 141.37 | 282.73   | 565.46   | 848.19   | 936.16   |
| <b>S80S 40BF — 0806</b> | 10.28                                                                                                    | 102.83 | 205.66 | 411.32   | 782.43   | 1,071.87 | 1,256.58 |
| <b>S80S 50BF — 0806</b> | 13.57                                                                                                    | 135.71 | 271.42 | 542.84   | 985.16   | 1,326.95 | 1,556.59 |
| <b>S80S60BF — 0806</b>  | 16.90                                                                                                    | 169.01 | 338.02 | 675.62   | 1,174.49 | 1,559.42 | 1,894.30 |
| <b>S80S70BF — 0808</b>  | 20.27                                                                                                    | 202.73 | 405.46 | 790.39   | 1,349.57 | 1,834.61 | 2,219.44 |
| <b>S80S80BF — 0808</b>  | 23.68                                                                                                    | 236.76 | 473.52 | 900.97   | 1,512.09 | 2,102.26 | 2,535.16 |
| <b>S80S90BF — 0808</b>  | 27.05                                                                                                    | 270.48 | 540.96 | 1,005.69 | 1,663.72 | 2,358.61 | 2,854.02 |
| <b>S80S100BF — 0810</b> | 30.47                                                                                                    | 304.72 | 609.44 | 1,106.63 | 1,850.53 | 2,609.92 | 3,168.16 |
| <b>S80S120BF — 0810</b> | 37.33                                                                                                    | 373.31 | 746.20 | 1,296.79 | 2,210.75 | 3,123.87 | 3,771.32 |



K2 type [\*]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.04 to 0.10 |

★ No surface treatment is applied. [\*] Two screw holes and set screws are provided. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

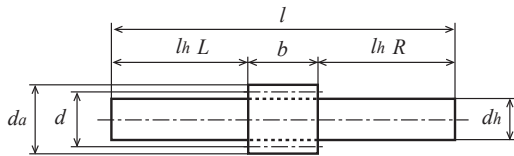
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

★ [Profile-shifted] is a profile-shifted gear with a rack shift coefficient x of 0.5.

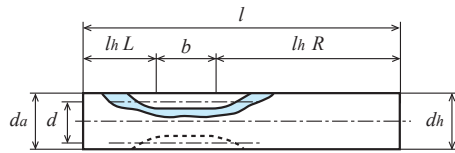
| Catalogue number       | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>d<sub>a</sub></i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>d<sub>a</sub>(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw     |                      | Weight<br><i>W(g)</i> |
|------------------------|-----------------------------|----------------------------------------|-----------------------------------------|------|---------------------------|----------------------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|-----------|----------------------|-----------------------|
|                        |                             |                                        |                                         |      |                           |                                              |                                         |                                       |                               |                                                       | 2-M(120°) | <i>l<sub>s</sub></i> |                       |
| <b>S1S 8L — 1210F</b>  | 8                           | [Profile-shifted]                      | φ10.64                                  | L2   | 12                        | -                                            | φ10.64                                  | L16 R32                               | 60                            | -                                                     | -         | -                    | 39.5                  |
| <b>S1S 10L — 1208</b>  | 10                          | [Profile-shifted]                      | φ12.66                                  | L1   | 12                        | -                                            | φ 8 (h9)                                | L16 R32                               | 60                            | -                                                     | -         | -                    | 27.9                  |
| <b>S1S 10L — 1212F</b> | 10                          | [Profile-shifted]                      | φ12.66                                  | L2   | 12                        | -                                            | φ12.66                                  | L16 R32                               | 60                            | -                                                     | -         | -                    | 56.4                  |
| <b>S1S 12K * 1206</b>  | 12                          | φ12                                    | φ14                                     | K2   | 12                        | φ6(H8)                                       | φ14                                     | 18                                    | 30                            | -                                                     | 2-M4      | 5                    | 25.1                  |
| <b>S1S 13K * 1206</b>  | 13                          | φ13                                    | φ15                                     | K2   | 12                        | φ6(H8)                                       | φ15                                     | 18                                    | 30                            | -                                                     | 2-M4      | 5                    | 30.1                  |
| <b>S1S 14A — 0805F</b> | 14                          | φ14                                    | φ16                                     | A1   | 8                         | φ5                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 8.4                   |
| <b>S1S 14A — 0806</b>  | 14                          | φ14                                    | φ16                                     | A1   | 8                         | φ6                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 7.9                   |
| <b>S1S 14A — 1206</b>  | 14                          | φ14                                    | φ16                                     | A1   | 12                        | φ6                                           | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 11.8                  |
| <b>S1S 14B — 0805</b>  | 14                          | φ14                                    | φ16                                     | B1   | 8                         | φ5(H8)                                       | φ11                                     | 8                                     | 16                            | -                                                     | -         | -                    | 13.0                  |
| <b>S1S 14K * 0806</b>  | 14                          | φ14                                    | φ16                                     | K2   | 8                         | φ6(H8)                                       | φ16                                     | 17                                    | 25                            | -                                                     | 2-M4      | 4                    | 30.1                  |
| <b>S1S 14K * 1206</b>  | 14                          | φ14                                    | φ16                                     | K2   | 12                        | φ6(H8)                                       | φ16                                     | 18                                    | 30                            | -                                                     | 2-M5      | 5                    | 35.0                  |
| <b>S1S 15A — 0805F</b> | 15                          | φ15                                    | φ17                                     | A1   | 8                         | φ5                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 9.9                   |
| <b>S1S 15A — 0806</b>  | 15                          | φ15                                    | φ17                                     | A1   | 8                         | φ6                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 9.3                   |
| <b>S1S 15A — 1206</b>  | 15                          | φ15                                    | φ17                                     | A1   | 12                        | φ6                                           | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 14.0                  |
| <b>S1S 15B — 0805</b>  | 15                          | φ15                                    | φ17                                     | B1   | 8                         | φ5(H8)                                       | φ12                                     | 8                                     | 16                            | -                                                     | -         | -                    | 15.7                  |
| <b>S1S 15B — 1005</b>  | 15                          | φ15                                    | φ17                                     | B1   | 10                        | φ5(H8)                                       | φ12                                     | 10                                    | 20                            | -                                                     | -         | -                    | 19.68                 |
| <b>S1S 15K * 0806</b>  | 15                          | φ15                                    | φ17                                     | K2   | 8                         | φ6(H8)                                       | φ17                                     | 17                                    | 25                            | -                                                     | 2-M4      | 4                    | 35.0                  |
| <b>S1S 15K * 1206</b>  | 15                          | φ15                                    | φ17                                     | K2   | 12                        | φ6(H8)                                       | φ17                                     | 18                                    | 30                            | -                                                     | 2-M5      | 5                    | 40.7                  |
| <b>S1S 16A — 0805F</b> | 16                          | φ16                                    | φ18                                     | A1   | 8                         | φ5                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 11.4                  |
| <b>S1S 16A — 0806</b>  | 16                          | φ16                                    | φ18                                     | A1   | 8                         | φ6                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 10.9                  |
| <b>S1S 16A — 1208</b>  | 16                          | φ16                                    | φ18                                     | A1   | 12                        | φ8                                           | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 14.2                  |
| <b>S1S 16B — 0805</b>  | 16                          | φ16                                    | φ18                                     | B1   | 8                         | φ5(H8)                                       | φ13                                     | 8                                     | 16                            | -                                                     | -         | -                    | 18.5                  |
| <b>S1S 16B — 1005</b>  | 16                          | φ16                                    | φ18                                     | B1   | 10                        | φ5(H8)                                       | φ13                                     | 10                                    | 20                            | -                                                     | -         | -                    | 23.13                 |
| <b>S1S 16K * 0806</b>  | 16                          | φ16                                    | φ18                                     | K2   | 8                         | φ6(H8)                                       | φ18                                     | 17                                    | 25                            | -                                                     | 2-M4      | 4                    | 40.0                  |
| <b>S1S 16K * 0808</b>  | 16                          | φ16                                    | φ18                                     | K2   | 8                         | φ8(H8)                                       | φ18                                     | 17                                    | 25                            | -                                                     | 2-M4      | 4                    | 35.9                  |
| <b>S1S 16K * 1208</b>  | 16                          | φ16                                    | φ18                                     | K2   | 12                        | φ8(H8)                                       | φ18                                     | 18                                    | 30                            | -                                                     | 2-M5      | 5                    | 41.8                  |
| <b>S1S 17A — 0805F</b> | 17                          | φ17                                    | φ19                                     | A1   | 8                         | φ5                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 13.0                  |
| <b>S1S 17B — 0805</b>  | 17                          | φ17                                    | φ19                                     | B1   | 8                         | φ5(H8)                                       | φ14                                     | 8                                     | 16                            | -                                                     | -         | -                    | 21.5                  |
| <b>S1S 17K * 0808</b>  | 17                          | φ17                                    | φ19                                     | K2   | 8                         | φ8(H8)                                       | φ19                                     | 17                                    | 25                            | -                                                     | 2-M4      | 4                    | 41.3                  |
| <b>S1S 17K * 1208</b>  | 17                          | φ17                                    | φ19                                     | K2   | 12                        | φ8(H8)                                       | φ19                                     | 18                                    | 30                            | -                                                     | 2-M5      | 5                    | 48.2                  |
| <b>S1S 18A — 0805F</b> | 18                          | φ18                                    | φ20                                     | A1   | 8                         | φ5                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 14.8                  |
| <b>S1S 18A — 0806</b>  | 18                          | φ18                                    | φ20                                     | A1   | 8                         | φ6                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 14.2                  |
| <b>S1S 18B * 0806</b>  | 18                          | φ18                                    | φ20                                     | B1   | 8                         | φ6                                           | φ14                                     | 8                                     | 16                            | -                                                     | 2-M4      | 4                    | 21.5                  |
| <b>S1S 18B — 1006</b>  | 18                          | φ18                                    | φ20                                     | B1   | 10                        | φ6(H8)                                       | φ15                                     | 10                                    | 20                            | -                                                     | -         | -                    | 29.43                 |
| <b>S1S 18B * 1008</b>  | 18                          | φ18                                    | φ20                                     | B1   | 10                        | φ8                                           | φ15                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 25.1                  |
| <b>S1S 18K * 1208</b>  | 18                          | φ18                                    | φ20                                     | K2   | 12                        | φ8(H8)                                       | φ20                                     | 18                                    | 30                            | -                                                     | 2-M4      | 4                    | 55.6                  |
| <b>S1S 19A — 0806F</b> | 19                          | φ19                                    | φ21                                     | A1   | 8                         | φ6                                           | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 16.0                  |
| <b>S1S 19A — 1208F</b> | 19                          | φ19                                    | φ21                                     | A1   | 12                        | φ8                                           | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 22.0                  |



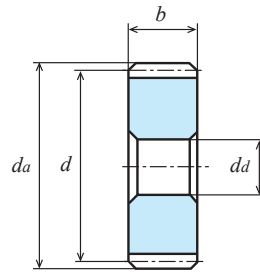
2D • 3D CAD



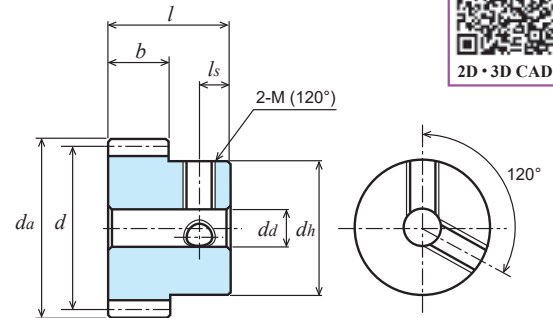
L1 type



L2 type



A1 type [-]

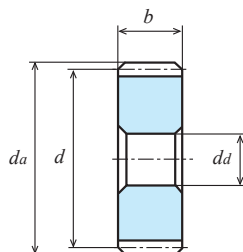
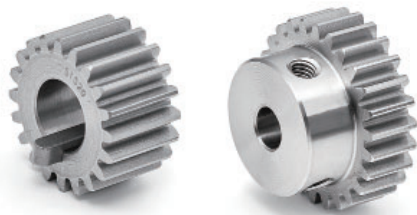


B1 type [\*]

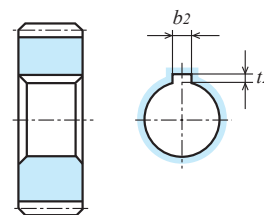
| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw     |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-----------|-------|------------------|
|                        |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | 2-M(120°) | $l_s$ |                  |
| <b>S1S 19B — 0806F</b> | 19                     | $\phi 19$                 | $\phi 21$             | B1   | 8                 | $\phi 6$                   | $\phi 16$             | 8                   | 16                    | -                              | -         | -     | 26.9             |
| <b>S1S 20A — 0806F</b> | 20                     | $\phi 20$                 | $\phi 22$             | A1   | 8                 | $\phi 6$                   | -                     | -                   | 8                     | -                              | -         | -     | 18.0             |
| <b>S1S 20A — 0808</b>  | 20                     | $\phi 20$                 | $\phi 22$             | A1   | 8                 | $\phi 8$                   | -                     | -                   | 8                     | -                              | -         | -     | 15.0             |
| <b>S1S 20A — 1208F</b> | 20                     | $\phi 20$                 | $\phi 22$             | A1   | 12                | $\phi 8$                   | -                     | -                   | 12                    | -                              | -         | -     | 24.9             |
| <b>S1S 20A = 1210</b>  | 20                     | $\phi 20$                 | $\phi 22$             | A1   | 12                | $\phi 10$                  | -                     | -                   | 12                    | $3 \times 1.4$                 | -         | -     | 19.2             |
| <b>S1S 20B — 0806F</b> | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 8                 | $\phi 6$                   | $\phi 16$             | 8                   | 16                    | -                              | -         | -     | 28.8             |
| <b>S1S 20B * 0806</b>  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 8                 | $\phi 6$                   | $\phi 16$             | 8                   | 16                    | -                              | 2-M4      | 4     | 28.0             |
| <b>S1S 20B * 0808</b>  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 8                 | $\phi 8$                   | $\phi 16$             | 8                   | 16                    | -                              | 2-M4      | 4     | 25.4             |
| <b>S1S 20BF — 1005</b> | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 10                | $\phi 5(H8)$               | $\phi 16$             | 10                  | 20                    | -                              | -         | -     | 37.0             |
| <b>S1S 20B * 1008</b>  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 10                | $\phi 8$                   | $\phi 16$             | 10                  | 20                    | -                              | 2-M5      | 5     | 31.5             |
| <b>S1S 20B — 1206F</b> | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 12                | $\phi 6(H8)$               | $\phi 16$             | 8                   | 20                    | -                              | -         | -     | 37.8             |
| <b>S1S 20B * 1206</b>  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 12                | $\phi 6(H8)$               | $\phi 16$             | 8                   | 20                    | -                              | 2-M4      | 4     | 37.0             |
| <b>S1S 20B * 1208</b>  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 12                | $\phi 8$                   | $\phi 16$             | 8                   | 20                    | -                              | 2-M4      | 4     | 33.7             |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: W) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N-m) |
|------------------------|-------------------|-------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                 | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |                                                               |
| 8                      | 12                | 3.21                                                                                                  | 32.15  | 64.29  | 128.58 | 257.16 | 385.74   | 482.18   | 3.07                                                          |
| 10                     | 12                | 4.43                                                                                                  | 44.29  | 88.59  | 177.17 | 354.34 | 531.52   | 664.40   | 4.22                                                          |
| 12                     | 12                | 4.07                                                                                                  | 40.75  | 81.49  | 162.99 | 325.97 | 488.96   | 611.20   | 3.89                                                          |
| 13                     | 12                | 4.68                                                                                                  | 46.85  | 93.69  | 187.38 | 374.77 | 562.15   | 700.48   | 4.47                                                          |
| 14                     | 8                 | 3.54                                                                                                  | 35.41  | 70.82  | 141.64 | 283.28 | 424.92   | 523.34   | 3.38                                                          |
| 14                     | 12                | 5.31                                                                                                  | 53.12  | 106.23 | 212.46 | 424.92 | 637.38   | 785.01   | 5.07                                                          |
| 15                     | 8                 | 3.97                                                                                                  | 39.68  | 79.37  | 158.73 | 317.47 | 476.20   | 579.76   | 3.78                                                          |
| 15                     | 10                | 4.50                                                                                                  | 45.03  | 90.06  | 180.11 | 360.22 | 540.33   | 675.41   | 4.30                                                          |
| 15                     | 12                | 5.95                                                                                                  | 59.53  | 119.05 | 238.10 | 476.20 | 714.30   | 869.64   | 5.68                                                          |
| 16                     | 8                 | 4.40                                                                                                  | 44.04  | 88.08  | 176.16 | 352.32 | 528.05   | 636.11   | 4.20                                                          |
| 16                     | 10                | 5.03                                                                                                  | 50.26  | 100.53 | 201.05 | 402.11 | 603.16   | 753.95   | 4.80                                                          |
| 16                     | 12                | 6.61                                                                                                  | 66.06  | 132.12 | 264.24 | 528.48 | 792.08   | 954.16   | 6.30                                                          |
| 17                     | 8                 | 4.85                                                                                                  | 48.46  | 96.92  | 193.84 | 387.68 | 575.64   | 692.11   | 4.62                                                          |
| 17                     | 12                | 7.27                                                                                                  | 72.69  | 145.38 | 290.76 | 581.53 | 863.46   | 1,038.17 | 6.94                                                          |
| 18                     | 8                 | 5.29                                                                                                  | 52.94  | 105.88 | 217.76 | 423.52 | 623.05   | 747.71   | 5.06                                                          |
| 18                     | 10                | 6.62                                                                                                  | 66.18  | 132.35 | 264.7  | 529.41 | 778.81   | 934.63   | 6.32                                                          |
| 18                     | 12                | 7.94                                                                                                  | 79.41  | 158.82 | 317.64 | 635.29 | 934.57   | 1,121.56 | 7.58                                                          |
| 19                     | 8                 | 6.68                                                                                                  | 66.81  | 133.62 | 267.24 | 534.47 | 765.05   | 913.19   | 6.38                                                          |
| 19                     | 12                | 10.02                                                                                                 | 100.21 | 200.43 | 400.86 | 801.71 | 1,147.57 | 1,369.79 | 9.57                                                          |
| 20                     | 8                 | 6.22                                                                                                  | 62.16  | 124.32 | 248.64 | 497.28 | 718.27   | 858.87   | 5.93                                                          |
| 20                     | 10                | 7.82                                                                                                  | 78.22  | 156.44 | 312.89 | 625.78 | 904.74   | 1,080.66 | 7.47                                                          |
| 20                     | 12                | 9.32                                                                                                  | 93.24  | 186.48 | 372.96 | 745.92 | 1,077.41 | 1,288.30 | 8.90                                                          |





A1 type [-]



A1 type [=]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.04 to 0.10 |

★ No surface treatment is applied. [\*] Two screw holes and set screws are provided. Gears with a [=] are provided with key grooves and keys.

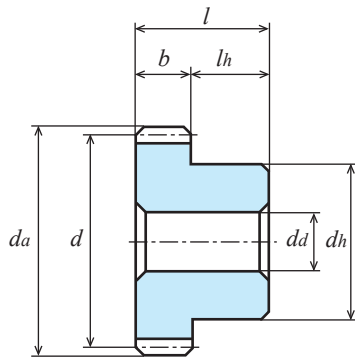
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

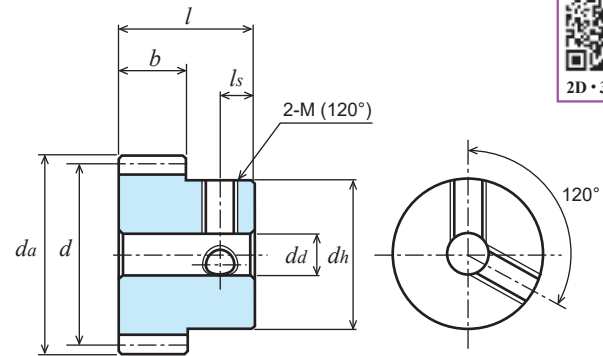
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>da</i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>da</i> (H7) | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw     |                      | Weight<br><i>W</i> (g) |
|------------------|-----------------------------|----------------------------------------|------------------------------|------|---------------------------|------------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|-----------|----------------------|------------------------|
|                  |                             |                                        |                              |      |                           |                                    |                                         |                                       |                               |                                                       | 2-M(120°) | <i>l<sub>s</sub></i> |                        |
| S1S 21A — 0806F  | 21                          | φ21                                    | φ23                          | A1   | 8                         | φ6                                 | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 19.1                   |
| S1S 21B — 0806F  | 21                          | φ21                                    | φ23                          | B1   | 8                         | φ6                                 | φ18                                     | 8                                     | 16                            | -                                                     | -         | -                    | 33.3                   |
| S1S 21B — 1208F  | 21                          | φ21                                    | φ23                          | B1   | 12                        | φ8                                 | φ18                                     | 8                                     | 20                            | -                                                     | -         | -                    | 48.6                   |
| S1S 22A — 0806F  | 22                          | φ22                                    | φ24                          | A1   | 8                         | φ6                                 | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 22.1                   |
| S1S 22A — 1210F  | 22                          | φ22                                    | φ24                          | A1   | 12                        | φ10                                | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 28.4                   |
| S1S 22B — 0806F  | 22                          | φ22                                    | φ24                          | B1   | 8                         | φ6                                 | φ18                                     | 8                                     | 16                            | -                                                     | -         | -                    | 36.3                   |
| S1S 22B — 1208F  | 22                          | φ22                                    | φ24                          | B1   | 12                        | φ8                                 | φ18                                     | 8                                     | 20                            | -                                                     | -         | -                    | 43.9                   |
| S1S 23A — 0806F  | 23                          | φ23                                    | φ25                          | A1   | 8                         | φ6                                 | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 24.3                   |
| S1S 23B — 0806F  | 23                          | φ23                                    | φ25                          | B1   | 8                         | φ6                                 | φ20                                     | 8                                     | 16                            | -                                                     | -         | -                    | 42.3                   |
| S1S 23B — 1208F  | 23                          | φ23                                    | φ25                          | B1   | 12                        | φ8                                 | φ20                                     | 8                                     | 20                            | -                                                     | -         | -                    | 51.0                   |
| S1S 24A — 0806F  | 24                          | φ24                                    | φ26                          | A1   | 8                         | φ6                                 | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 26.6                   |
| S1S 24A — 0808   | 24                          | φ24                                    | φ26                          | A1   | 8                         | φ8                                 | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 25.3                   |
| S1S 24A — 1208F  | 24                          | φ24                                    | φ26                          | A1   | 12                        | φ8                                 | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 37.9                   |
| S1S 24A = 1210   | 24                          | φ24                                    | φ26                          | A1   | 12                        | φ10                                | -                                       | -                                     | 12                            | 3 × 1.4                                               | -         | -                    | 34.8                   |
| S1S 24B — 0806   | 24                          | φ24                                    | φ26                          | B1   | 8                         | φ6                                 | φ16                                     | 8                                     | 16                            | -                                                     | -         | -                    | 37.5                   |
| S1S 24B * 0806   | 24                          | φ24                                    | φ26                          | B1   | 8                         | φ6                                 | φ16                                     | 8                                     | 16                            | -                                                     | 2-M4      | 4                    | 36.7                   |
| S1S 24B * 0808   | 24                          | φ24                                    | φ26                          | B1   | 8                         | φ8                                 | φ16                                     | 8                                     | 16                            | -                                                     | 2-M4      | 4                    | 34.1                   |
| S1S 24B — 1006   | 24                          | φ24                                    | φ26                          | B1   | 10                        | φ6(H8)                             | φ20                                     | 10                                    | 20                            | -                                                     | -         | -                    | 55.77                  |
| S1S 24B * 1008   | 24                          | φ24                                    | φ26                          | B1   | 10                        | φ8                                 | φ20                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 50.7                   |
| S1S 24B — 1208F  | 24                          | φ24                                    | φ26                          | B1   | 12                        | φ8                                 | φ20                                     | 8                                     | 20                            | -                                                     | -         | -                    | 54.5                   |
| S1S 24B * 1208   | 24                          | φ24                                    | φ26                          | B1   | 12                        | φ8                                 | φ20                                     | 8                                     | 20                            | -                                                     | 2-M4      | 4                    | 53.5                   |
| S1S 24B * 1210   | 24                          | φ24                                    | φ26                          | B1   | 12                        | φ10                                | φ20                                     | 8                                     | 20                            | -                                                     | 2-M5      | 4                    | 48.7                   |
| S1S 25A — 0806F  | 25                          | φ25                                    | φ27                          | A1   | 8                         | φ6                                 | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 29.1                   |
| S1S 25A — 0808   | 25                          | φ25                                    | φ27                          | A1   | 8                         | φ8                                 | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 27.7                   |
| S1S 25A = 0810   | 25                          | φ25                                    | φ27                          | A1   | 8                         | φ10                                | -                                       | -                                     | 8                             | 3 × 1.4                                               | -         | -                    | 25.6                   |
| S1S 25A — 1208F  | 25                          | φ25                                    | φ27                          | A1   | 12                        | φ8                                 | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 41.5                   |
| S1S 25A = 1210   | 25                          | φ25                                    | φ27                          | A1   | 12                        | φ10                                | -                                       | -                                     | 12                            | 3 × 1.4                                               | -         | -                    | 38.5                   |
| S1S 25B — 0806   | 25                          | φ25                                    | φ27                          | B1   | 8                         | φ6                                 | φ16                                     | 8                                     | 16                            | -                                                     | -         | -                    | 39.9                   |
| S1S 25B * 0806   | 25                          | φ25                                    | φ27                          | B1   | 8                         | φ6                                 | φ16                                     | 8                                     | 16                            | -                                                     | 2-M4      | 4                    | 39.1                   |
| S1S 25B * 0808   | 25                          | φ25                                    | φ27                          | B1   | 8                         | φ8                                 | φ16                                     | 8                                     | 16                            | -                                                     | 2-M4      | 4                    | 36.5                   |
| S1S 25BF — 1005  | 25                          | φ25                                    | φ27                          | B1   | 10                        | φ5(H8)                             | φ20                                     | 10                                    | 20                            | -                                                     | -         | -                    | 59.7                   |
| S1S 25B — 1006   | 25                          | φ25                                    | φ27                          | B1   | 10                        | φ6(H8)                             | φ20                                     | 10                                    | 20                            | -                                                     | -         | -                    | 58.79                  |
| S1S 25B * 1008   | 25                          | φ25                                    | φ27                          | B1   | 10                        | φ8                                 | φ20                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 53.8                   |
| S1S 25B — 1208F  | 25                          | φ25                                    | φ27                          | B1   | 12                        | φ8                                 | φ20                                     | 8                                     | 20                            | -                                                     | -         | -                    | 58.1                   |
| S1S 25B * 1208   | 25                          | φ25                                    | φ27                          | B1   | 12                        | φ8                                 | φ20                                     | 8                                     | 20                            | -                                                     | 2-M4      | 4                    | 57.1                   |
| S1S 25B * 1210   | 25                          | φ25                                    | φ27                          | B1   | 12                        | φ10                                | φ20                                     | 8                                     | 20                            | -                                                     | 2-M5      | 4                    | 52.4                   |
| S1S 26A — 0806F  | 26                          | φ26                                    | φ28                          | A1   | 8                         | φ6                                 | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 31.6                   |
| S1S 26A — 1208F  | 26                          | φ26                                    | φ28                          | A1   | 12                        | φ8                                 | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 45.3                   |
| S1S 26B — 0806F  | 26                          | φ26                                    | φ28                          | B1   | 8                         | φ6                                 | φ22                                     | 8                                     | 16                            | -                                                     | -         | -                    | 53.7                   |
| S1S 26B — 1208F  | 26                          | φ26                                    | φ28                          | B1   | 12                        | φ8                                 | φ22                                     | 8                                     | 20                            | -                                                     | -         | -                    | 66.0                   |





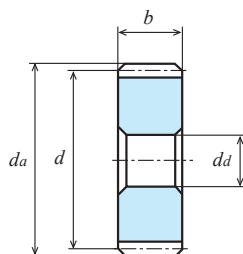
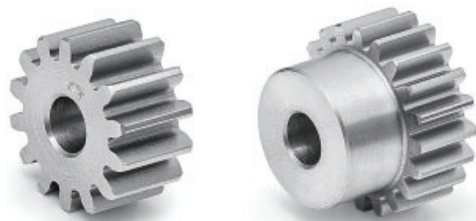
B1 type [-]



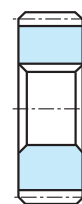
B1 type [\*]

| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw            |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|------------------|-------|------------------|
|                        |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | $2-M(120^\circ)$ | $l_s$ |                  |
| <b>S1S 27B — 0806F</b> | 27                     | $\phi 27$                 | $\phi 29$             | B1   | 8                 | $\phi 6$                   | $\phi 24$             | 8                   | 16                    | -                              | -                | -     | 60.8             |
| <b>S1S 27B — 1208F</b> | 27                     | $\phi 27$                 | $\phi 29$             | B1   | 12                | $\phi 8$                   | $\phi 24$             | 8                   | 20                    | -                              | -                | -     | 74.5             |
| <b>S1S 28A — 0806F</b> | 28                     | $\phi 28$                 | $\phi 30$             | A1   | 8                 | $\phi 6$                   | -                     | -                   | 8                     | -                              | -                | -     | 36.9             |
| <b>S1S 28A — 0808</b>  | 28                     | $\phi 28$                 | $\phi 30$             | A1   | 8                 | $\phi 8$                   | -                     | -                   | 8                     | -                              | -                | -     | 35.5             |
| <b>S1S 28B — 0806</b>  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 8                 | $\phi 6$                   | $\phi 20$             | 8                   | 16                    | -                              | -                | -     | 54.9             |
| <b>S1S 28B * 0806</b>  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 8                 | $\phi 6$                   | $\phi 20$             | 8                   | 16                    | -                              | 2-M4             | 4     | 53.7             |
| <b>S1S 28B * 0808</b>  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 8                 | $\phi 8$                   | $\phi 20$             | 8                   | 16                    | -                              | 2-M4             | 4     | 51.1             |
| <b>S1S 28B * 0810</b>  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 8                 | $\phi 10$                  | $\phi 20$             | 8                   | 16                    | -                              | 2-M5             | 4     | 52.0             |
| <b>S1S 28B * 1010</b>  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 10                | $\phi 10$                  | $\phi 24$             | 10                  | 20                    | -                              | 2-M5             | 5     | 69.7             |
| <b>S1S 28B — 1210F</b> | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 12                | $\phi 10$                  | $\phi 24$             | 8                   | 20                    | -                              | -                | -     | 74.1             |
| <b>S1S 28B * 1212</b>  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 12                | $\phi 12$                  | $\phi 24$             | 8                   | 20                    | -                              | 2-M5             | 4     | 67.1             |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: W) |        |        |        |          |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |
|------------------------|-------------------|-------------------------------------------------------------------------------------------------------|--------|--------|--------|----------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                 | 100rpm | 200rpm | 400rpm | 800rpm   | 1,200rpm | 1,500rpm |                                                               |
| 21                     | 8                 | 6.68                                                                                                  | 66.81  | 133.62 | 267.24 | 534.47   | 765.05   | 913.19   | 6.38                                                          |
| 21                     | 12                | 10.02                                                                                                 | 100.21 | 200.43 | 400.86 | 801.71   | 1,147.57 | 1,369.79 | 9.56                                                          |
| 22                     | 8                 | 7.15                                                                                                  | 71.52  | 143.04 | 286.09 | 572.18   | 811.72   | 967.23   | 6.82                                                          |
| 22                     | 12                | 10.73                                                                                                 | 107.28 | 214.57 | 429.13 | 858.27   | 1,217.58 | 1,450.84 | 10.24                                                         |
| 23                     | 8                 | 7.63                                                                                                  | 76.28  | 152.56 | 305.11 | 610.23   | 858.05   | 1,020.71 | 7.28                                                          |
| 23                     | 12                | 11.44                                                                                                 | 114.42 | 228.84 | 457.67 | 915.34   | 1,287.07 | 1,531.06 | 10.92                                                         |
| 24                     | 8                 | 8.10                                                                                                  | 81.04  | 162.07 | 324.14 | 647.77   | 903.58   | 1,073.09 | 7.73                                                          |
| 24                     | 10                | 10.13                                                                                                 | 101.29 | 202.59 | 405.18 | 809.71   | 1,129.47 | 1,341.36 | 9.67                                                          |
| 24                     | 12                | 12.16                                                                                                 | 121.55 | 243.11 | 486.21 | 971.65   | 1,355.36 | 1,609.63 | 11.60                                                         |
| 25                     | 8                 | 8.59                                                                                                  | 85.86  | 171.72 | 343.43 | 686.86   | 949.04   | 1,125.25 | 8.19                                                          |
| 25                     | 10                | 10.78                                                                                                 | 107.75 | 215.50 | 431.01 | 855.31   | 1,189.99 | 1,412.09 | 10.29                                                         |
| 25                     | 12                | 12.88                                                                                                 | 128.79 | 257.57 | 515.15 | 1,023.05 | 1,423.56 | 1,687.87 | 12.29                                                         |
| 26                     | 8                 | 9.07                                                                                                  | 90.71  | 181.43 | 362.85 | 716.14   | 994.08   | 1,176.77 | 8.66                                                          |
| 26                     | 12                | 13.61                                                                                                 | 136.07 | 272.14 | 544.28 | 1,074.21 | 1,491.12 | 1,765.15 | 12.99                                                         |
| 27                     | 8                 | 9.56                                                                                                  | 95.60  | 191.20 | 382.40 | 750.06   | 1,038.69 | 1,227.65 | 9.12                                                          |
| 27                     | 12                | 14.34                                                                                                 | 143.40 | 286.80 | 573.60 | 1,125.09 | 1,558.03 | 1,841.47 | 13.69                                                         |
| 28                     | 8                 | 10.05                                                                                                 | 100.52 | 201.03 | 402.06 | 783.81   | 1,082.86 | 1,277.89 | 9.59                                                          |
| 28                     | 10                | 12.56                                                                                                 | 125.65 | 251.29 | 502.58 | 979.76   | 1,353.58 | 1,597.36 | 11.99                                                         |
| 28                     | 12                | 15.08                                                                                                 | 150.77 | 301.55 | 603.10 | 1,175.71 | 1,624.29 | 1,916.83 | 14.39                                                         |



A1 type [-]



A1 type [=]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.04 to 0.10 |

★ No surface treatment is applied. [\*] Two screw holes and set screws are provided. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

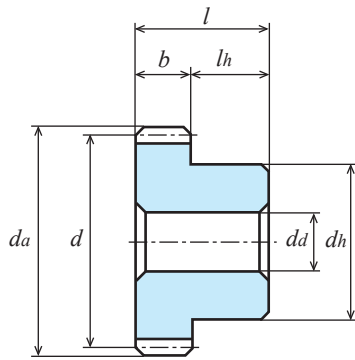
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

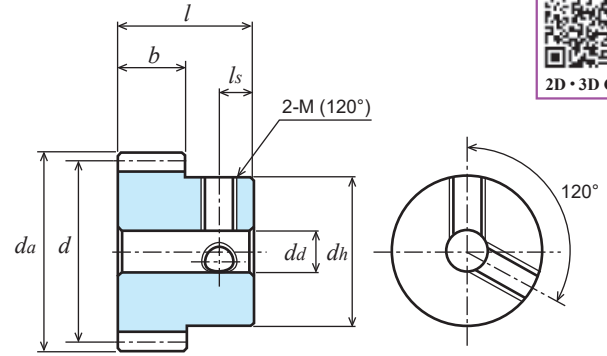
| Catalogue number       | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>da</i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>da(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw     |                      | Weight<br><i>W(g)</i> |
|------------------------|-----------------------------|----------------------------------------|------------------------------|------|---------------------------|-----------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|-----------|----------------------|-----------------------|
|                        |                             |                                        |                              |      |                           |                                   |                                         |                                       |                               |                                                       | 2-M(120°) | <i>l<sub>s</sub></i> |                       |
| <b>S1S 30A — 0808F</b> | 30                          | φ30                                    | φ32                          | A1   | 8                         | φ 8                               | -                                       | -                                     | 8                             | -                                                     | -         | -                    | 41.2                  |
| <b>S1S 30A = 1010</b>  | 30                          | φ30                                    | φ32                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | 3 × 1.4                                               | -         | -                    | 49.0                  |
| <b>S1S 30A — 1208F</b> | 30                          | φ30                                    | φ32                          | A1   | 12                        | φ 8                               | -                                       | -                                     | 12                            | -                                                     | -         | -                    | 61.9                  |
| <b>S1S 30A = 1212</b>  | 30                          | φ30                                    | φ32                          | A1   | 12                        | φ12                               | -                                       | -                                     | 12                            | 4 × 1.8                                               | -         | -                    | 55.3                  |
| <b>S1S 30B — 0806</b>  | 30                          | φ30                                    | φ32                          | B1   | 8                         | φ 6                               | φ24                                     | 8                                     | 16                            | -                                                     | -         | -                    | 69.3                  |
| <b>S1S 30B * 0806</b>  | 30                          | φ30                                    | φ32                          | B1   | 8                         | φ 6                               | φ24                                     | 8                                     | 16                            | -                                                     | 2-M4      | 4                    | 67.8                  |
| <b>S1S 30B * 0808</b>  | 30                          | φ30                                    | φ32                          | B1   | 8                         | φ 8                               | φ24                                     | 8                                     | 16                            | -                                                     | 2-M4      | 4                    | 65.2                  |
| <b>S1S 30B * 0810</b>  | 30                          | φ30                                    | φ32                          | B1   | 8                         | φ10                               | φ24                                     | 8                                     | 16                            | -                                                     | 2-M5      | 4                    | 61.1                  |
| <b>S1S 30B * 0812</b>  | 30                          | φ30                                    | φ32                          | B1   | 8                         | φ12                               | φ24                                     | 8                                     | 16                            | -                                                     | 2-M5      | 4                    | 57.1                  |
| <b>S1S 30B * 1010</b>  | 30                          | φ30                                    | φ32                          | B1   | 10                        | φ10                               | φ25                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 79.8                  |
| <b>S1S 30B — 1210</b>  | 30                          | φ30                                    | φ32                          | B1   | 12                        | φ10                               | φ24                                     | 8                                     | 20                            | -                                                     | -         | -                    | 82.7                  |
| <b>S1S 30B * 1210</b>  | 30                          | φ30                                    | φ32                          | B1   | 12                        | φ10                               | φ24                                     | 8                                     | 20                            | -                                                     | 2-M5      | 4                    | 80.9                  |
| <b>S1S 30B * 1212</b>  | 30                          | φ30                                    | φ32                          | B1   | 12                        | φ12                               | φ24                                     | 8                                     | 20                            | -                                                     | 2-M5      | 4                    | 75.7                  |
| <b>S1S 32A — 0608F</b> | 32                          | φ32                                    | φ34                          | A1   | 6                         | φ 8                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 35.5                  |
| <b>S1S 32A — 1008F</b> | 32                          | φ32                                    | φ34                          | A1   | 10                        | φ 8                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 59.2                  |
| <b>S1S 32A = 1012</b>  | 32                          | φ32                                    | φ34                          | A1   | 10                        | φ12                               | -                                       | -                                     | 10                            | 4 × 1.8                                               | -         | -                    | 53.7                  |
| <b>S1S 32B — 0606</b>  | 32                          | φ32                                    | φ34                          | B1   | 6                         | φ 6                               | φ24                                     | 10                                    | 16                            | -                                                     | -         | -                    | 69.9                  |
| <b>S1S 32B * 0606</b>  | 32                          | φ32                                    | φ34                          | B1   | 6                         | φ 6                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M4      | 4                    | 68.4                  |
| <b>S1S 32B * 0608</b>  | 32                          | φ32                                    | φ34                          | B1   | 6                         | φ 8                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M4      | 4                    | 65.8                  |
| <b>S1S 32B * 0612</b>  | 32                          | φ32                                    | φ34                          | B1   | 6                         | φ12                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 57.7                  |
| <b>S1S 32B — 1010</b>  | 32                          | φ32                                    | φ34                          | B1   | 10                        | φ10                               | φ24                                     | 10                                    | 20                            | -                                                     | -         | -                    | 86.4                  |
| <b>S1S 32B * 1010</b>  | 32                          | φ32                                    | φ34                          | B1   | 10                        | φ10                               | φ24                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 84.5                  |
| <b>S1S 32B * 1012</b>  | 32                          | φ32                                    | φ34                          | B1   | 10                        | φ12                               | φ24                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 79.4                  |
| <b>S1S 34A — 0608F</b> | 34                          | φ34                                    | φ36                          | A1   | 6                         | φ 8                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 40.4                  |
| <b>S1S 34A — 1008F</b> | 34                          | φ34                                    | φ36                          | A1   | 10                        | φ 8                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 67.3                  |
| <b>S1S 34B — 0606F</b> | 34                          | φ34                                    | φ36                          | B1   | 6                         | φ 6                               | φ28                                     | 10                                    | 16                            | -                                                     | -         | -                    | 87.6                  |
| <b>S1S 34B — 1010F</b> | 34                          | φ34                                    | φ36                          | B1   | 10                        | φ10                               | φ28                                     | 10                                    | 20                            | -                                                     | -         | -                    | 107.3                 |
| <b>S1S 35A — 0608F</b> | 35                          | φ35                                    | φ37                          | A1   | 6                         | φ 8                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 43.0                  |
| <b>S1S 35A — 1008F</b> | 35                          | φ35                                    | φ37                          | A1   | 10                        | φ 8                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 71.6                  |
| <b>S1S 35B — 0606</b>  | 35                          | φ35                                    | φ37                          | B1   | 6                         | φ 6                               | φ24                                     | 10                                    | 16                            | -                                                     | -         | -                    | 77.3                  |
| <b>S1S 35B * 0606</b>  | 35                          | φ35                                    | φ37                          | B1   | 6                         | φ 6                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M4      | 4                    | 75.8                  |
| <b>S1S 35B * 0608</b>  | 35                          | φ35                                    | φ37                          | B1   | 6                         | φ 8                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M4      | 4                    | 73.2                  |
| <b>S1S 35B * 0610</b>  | 35                          | φ35                                    | φ37                          | B1   | 6                         | φ10                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 69.2                  |
| <b>S1S 35B * 0612</b>  | 35                          | φ35                                    | φ37                          | B1   | 6                         | φ12                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 65.1                  |
| <b>S1S 35B — 1010F</b> | 35                          | φ35                                    | φ37                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 118.7                 |
| <b>S1S 35B * 1010</b>  | 35                          | φ35                                    | φ37                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 116.1                 |
| <b>S1S 35B * 1012</b>  | 35                          | φ35                                    | φ37                          | B1   | 10                        | φ12                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 111.0                 |
| <b>S1S 35B * 1015</b>  | 35                          | φ35                                    | φ37                          | B1   | 10                        | φ15                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 101.4                 |



2D • 3D CAD



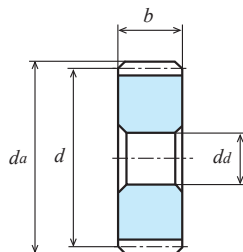
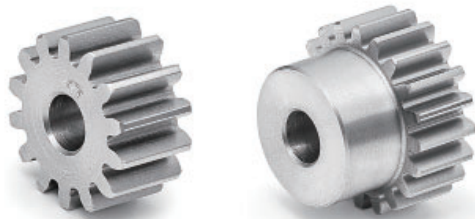
B1 type [-]



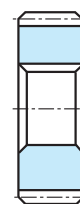
B1 type [\*]

| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$\phi d(H7)$ | Hub diameter<br>$\phi d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw     |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|-------------------------------|----------------------------|---------------------|-----------------------|--------------------------------|-----------|-------|------------------|
|                        |                        |                           |                       |      |                   |                               |                            |                     |                       |                                | 2-M(120°) | $l_s$ |                  |
| <b>S1S 36A — 0608F</b> | 36                     | $\phi 36$                 | $\phi 38$             | A1   | 6                 | $\phi 8$                      | -                          | -                   | 6                     | -                              | -         | -     | 45.6             |
| <b>S1S 36A — 1008F</b> | 36                     | $\phi 36$                 | $\phi 38$             | A1   | 10                | $\phi 8$                      | -                          | -                   | 10                    | -                              | -         | -     | 76.0             |
| <b>S1S 36A = 1010</b>  | 36                     | $\phi 36$                 | $\phi 38$             | A1   | 10                | $\phi 10$                     | -                          | -                   | 10                    | 3 × 1.4                        | -         | -     | 73.4             |
| <b>S1S 36B — 0608</b>  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 6                 | $\phi 8$                      | $\phi 24$                  | 10                  | 16                    | -                              | -         | -     | 77.2             |
| <b>S1S 36B * 0608</b>  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 6                 | $\phi 8$                      | $\phi 24$                  | 10                  | 16                    | -                              | 2-M4      | 4     | 75.9             |
| <b>S1S 36B * 0610</b>  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 6                 | $\phi 10$                     | $\phi 24$                  | 10                  | 16                    | -                              | 2-M5      | 5     | 71.8             |
| <b>S1S 36B * 0612</b>  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 6                 | $\phi 12$                     | $\phi 24$                  | 10                  | 16                    | -                              | 2-M5      | 5     | 67.7             |
| <b>S1S 36B — 1010F</b> | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 10                | $\phi 10$                     | $\phi 30$                  | 10                  | 20                    | -                              | -         | -     | 123.1            |
| <b>S1S 36B * 1010</b>  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 10                | $\phi 10$                     | $\phi 30$                  | 10                  | 20                    | -                              | 2-M5      | 5     | 120.5            |
| <b>S1S 36B * 1012</b>  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 10                | $\phi 12$                     | $\phi 30$                  | 10                  | 20                    | -                              | 2-M5      | 5     | 115.4            |
| <b>S1S 36B * 1015</b>  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 10                | $\phi 15$                     | $\phi 30$                  | 10                  | 20                    | -                              | 2-M5      | 5     | 105.8            |
| <b>S1S 38A — 1008F</b> | 38                     | $\phi 38$                 | $\phi 40$             | A1   | 10                | $\phi 8$                      | -                          | -                   | 10                    | -                              | -         | -     | 85.1             |
| <b>S1S 38B — 0608F</b> | 38                     | $\phi 38$                 | $\phi 40$             | B1   | 6                 | $\phi 8$                      | $\phi 25$                  | 10                  | 16                    | -                              | -         | -     | 85.6             |
| <b>S1S 38B — 1010F</b> | 38                     | $\phi 38$                 | $\phi 40$             | B1   | 10                | $\phi 10$                     | $\phi 30$                  | 10                  | 20                    | -                              | -         | -     | 132.2            |

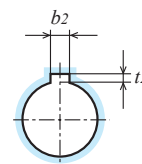
| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |          |          |          | Allowable torque for input<br>revolutions per minute (Unit: N·m) |  |
|------------------------|-------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|----------|----------|----------|------------------------------------------------------------------|--|
|                        |                   | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm   | 1,200rpm | 1,500rpm | 100rpm                                                           |  |
| <b>30</b>              | <b>8</b>          | 11.04                                                                                                    | 110.37 | 220.74 | 441.48 | 850.22   | 1,169.22 | 1,375.68 | 10.54                                                            |  |
| <b>30</b>              | <b>10</b>         | 13.81                                                                                                    | 138.12 | 276.24 | 552.48 | 1,063.91 | 1,462.66 | 1,721.52 | 13.19                                                            |  |
| <b>30</b>              | <b>12</b>         | 16.56                                                                                                    | 165.55 | 331.11 | 662.22 | 1,275.33 | 1,753.83 | 2,063.52 | 15.80                                                            |  |
| <b>32</b>              | <b>6</b>          | 9.03                                                                                                     | 90.27  | 180.53 | 361.07 | 687.05   | 940.61   | 1,103.51 | 8.62                                                             |  |
| <b>32</b>              | <b>10</b>         | 15.04                                                                                                    | 150.45 | 300.89 | 601.78 | 1,145.09 | 1,567.69 | 1,839.19 | 14.36                                                            |  |
| <b>34</b>              | <b>6</b>          | 9.78                                                                                                     | 97.82  | 195.64 | 391.27 | 735.73   | 1,002.88 | 1,173.30 | 9.34                                                             |  |
| <b>34</b>              | <b>10</b>         | 16.30                                                                                                    | 163.03 | 326.06 | 652.12 | 1,226.22 | 1,671.47 | 1,955.49 | 15.56                                                            |  |
| <b>35</b>              | <b>6</b>          | 10.16                                                                                                    | 101.61 | 203.23 | 406.46 | 759.80   | 1,033.48 | 1,207.46 | 9.70                                                             |  |
| <b>35</b>              | <b>10</b>         | 16.94                                                                                                    | 169.36 | 338.72 | 677.43 | 1,266.33 | 1,722.47 | 2,012.43 | 16.17                                                            |  |
| <b>36</b>              | <b>6</b>          | 10.54                                                                                                    | 105.42 | 210.85 | 421.69 | 783.68   | 1,063.73 | 1,241.14 | 10.06                                                            |  |
| <b>36</b>              | <b>10</b>         | 17.57                                                                                                    | 175.71 | 351.41 | 702.82 | 1,306.12 | 1,772.88 | 2,068.56 | 16.77                                                            |  |
| <b>38</b>              | <b>6</b>          | 11.31                                                                                                    | 113.08 | 226.15 | 452.31 | 830.87   | 1,123.15 | 1,307.07 | 10.79                                                            |  |
| <b>38</b>              | <b>10</b>         | 18.85                                                                                                    | 188.46 | 376.92 | 753.85 | 1,384.78 | 1,871.91 | 2,178.45 | 17.99                                                            |  |



A1 type [-]



A1 type [=]



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.04 to 0.10 |

★ No surface treatment is applied. [\*] Two screw holes and set screws are provided. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

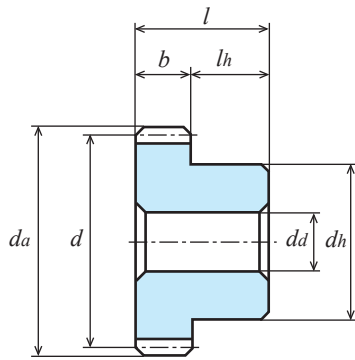
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

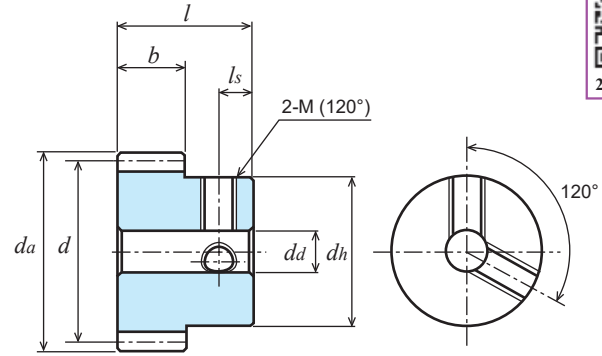
| Catalogue number | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>da</i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>da(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw     |                      | Weight<br><i>W(g)</i> |
|------------------|-----------------------------|----------------------------------------|------------------------------|------|---------------------------|-----------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|-----------|----------------------|-----------------------|
|                  |                             |                                        |                              |      |                           |                                   |                                         |                                       |                               |                                                       | 2-M(120°) | <i>l<sub>s</sub></i> |                       |
| S1S 40A — 0608F  | 40                          | φ40                                    | φ42                          | A1   | 6                         | φ 8                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 56.8                  |
| S1S 40A = 0610   | 40                          | φ40                                    | φ42                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | 3 × 1.4                                               | -         | -                    | 55.3                  |
| S1S 40A = 0612   | 40                          | φ40                                    | φ42                          | A1   | 6                         | φ12                               | -                                       | -                                     | 6                             | 4 × 1.8                                               | -         | -                    | 53.5                  |
| S1S 40A — 1008F  | 40                          | φ40                                    | φ42                          | A1   | 10                        | φ 8                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 94.7                  |
| S1S 40A = 1010   | 40                          | φ40                                    | φ42                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | 3 × 1.4                                               | -         | -                    | 92.2                  |
| S1S 40A = 1012   | 40                          | φ40                                    | φ42                          | A1   | 10                        | φ12                               | -                                       | -                                     | 10                            | 4 × 1.8                                               | -         | -                    | 89.2                  |
| S1S 40B — 0608   | 40                          | φ40                                    | φ42                          | B1   | 6                         | φ 8                               | φ24                                     | 10                                    | 16                            | -                                                     | -         | -                    | 88.4                  |
| S1S 40B * 0608   | 40                          | φ40                                    | φ42                          | B1   | 6                         | φ 8                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M4      | 4                    | 87.1                  |
| S1S 40B * 0610   | 40                          | φ40                                    | φ42                          | B1   | 6                         | φ10                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 83.1                  |
| S1S 40B * 0612   | 40                          | φ40                                    | φ42                          | B1   | 6                         | φ12                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 79.0                  |
| S1S 40BF — 1006  | 40                          | φ40                                    | φ42                          | B1   | 10                        | φ6(H8)                            | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 149.1                 |
| S1S 40B — 1010F  | 40                          | φ40                                    | φ42                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 141.8                 |
| S1S 40B * 1010   | 40                          | φ40                                    | φ42                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 139.3                 |
| S1S 40B * 1012   | 40                          | φ40                                    | φ42                          | B1   | 10                        | φ12                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 134.1                 |
| S1S 40B * 1015   | 40                          | φ40                                    | φ42                          | B1   | 10                        | φ15                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 124.5                 |
| S1S 42A — 1008F  | 42                          | φ42                                    | φ44                          | A1   | 10                        | φ 8                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 104.8                 |
| S1S 42B — 0608F  | 42                          | φ42                                    | φ44                          | B1   | 6                         | φ 8                               | φ28                                     | 10                                    | 16                            | -                                                     | -         | -                    | 107.3                 |
| S1S 42B — 1010F  | 42                          | φ42                                    | φ44                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 151.9                 |
| S1S 44A — 0608F  | 44                          | φ44                                    | φ46                          | A1   | 6                         | φ 8                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 69.3                  |
| S1S 44A — 1008F  | 44                          | φ44                                    | φ46                          | A1   | 10                        | φ 8                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 115.4                 |
| S1S 44B — 0608F  | 44                          | φ44                                    | φ46                          | B1   | 6                         | φ 8                               | φ28                                     | 10                                    | 16                            | -                                                     | -         | -                    | 113.6                 |
| S1S 44B — 1010F  | 44                          | φ44                                    | φ46                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 162.5                 |
| S1S 45A — 0608F  | 45                          | φ45                                    | φ47                          | A1   | 6                         | φ 8                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 72.5                  |
| S1S 45A = 0610   | 45                          | φ45                                    | φ47                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | 3 × 1.4                                               | -         | -                    | 71.0                  |
| S1S 45A — 1008F  | 45                          | φ45                                    | φ47                          | A1   | 10                        | φ 8                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 120.9                 |
| S1S 45A = 1015   | 45                          | φ45                                    | φ47                          | A1   | 10                        | φ15                               | -                                       | -                                     | 10                            | 5 × 2.3                                               | -         | -                    | 110.1                 |
| S1S 45B — 0608   | 45                          | φ45                                    | φ47                          | B1   | 6                         | φ 8                               | φ24                                     | 10                                    | 16                            | -                                                     | -         | -                    | 104.2                 |
| S1S 45B * 0608   | 45                          | φ45                                    | φ47                          | B1   | 6                         | φ 8                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M4      | 4                    | 102.9                 |
| S1S 45B * 0610   | 45                          | φ45                                    | φ47                          | B1   | 6                         | φ10                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 98.8                  |
| S1S 45B * 0612   | 45                          | φ45                                    | φ47                          | B1   | 6                         | φ12                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 94.7                  |
| S1S 45B — 1010F  | 45                          | φ45                                    | φ47                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 168.0                 |
| S1S 45B * 1010   | 45                          | φ45                                    | φ47                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 165.5                 |
| S1S 45B * 1012   | 45                          | φ45                                    | φ47                          | B1   | 10                        | φ12                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 160.3                 |
| S1S 46A — 1010F  | 46                          | φ46                                    | φ48                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 124.3                 |
| S1S 46B — 0608F  | 46                          | φ46                                    | φ48                          | B1   | 6                         | φ 8                               | φ30                                     | 10                                    | 16                            | -                                                     | -         | -                    | 127.5                 |
| S1S 46B — 1010F  | 46                          | φ46                                    | φ48                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 173.6                 |
| S1S 48A — 0608F  | 48                          | φ48                                    | φ50                          | A1   | 6                         | φ 8                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 82.9                  |
| S1S 48A = 0610   | 48                          | φ48                                    | φ50                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | 3 × 1.4                                               | -         | -                    | 81.3                  |
| S1S 48A = 0612   | 48                          | φ48                                    | φ50                          | A1   | 6                         | φ12                               | -                                       | -                                     | 6                             | 4 × 1.8                                               | -         | -                    | 79.6                  |
| S1S 48A — 1010F  | 48                          | φ48                                    | φ50                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 135.9                 |
| S1S 48A = 1015   | 48                          | φ48                                    | φ50                          | A1   | 10                        | φ15                               | -                                       | -                                     | 10                            | 5 × 2.3                                               | -         | -                    | 127.3                 |



2D • 3D CAD



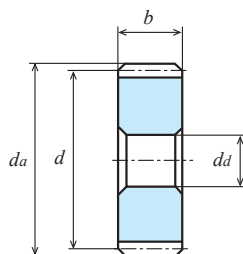
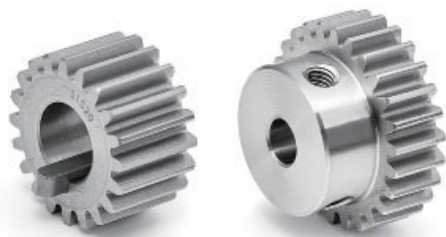
B1 type [-]



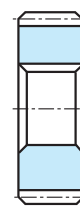
B1 type [\*]

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw            |       | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|------------------|-------|------------------|
|                  |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | $2-M(120^\circ)$ | $l_s$ |                  |
| S1S 48B — 0608   | 48                     | $\phi 48$                 | $\phi 50$             | B1   | 6                 | $\phi 8$                   | $\phi 24$             | 10                  | 16                    | -                              | -                | -     | 114.5            |
| S1S 48B * 0608   | 48                     | $\phi 48$                 | $\phi 50$             | B1   | 6                 | $\phi 8$                   | $\phi 24$             | 10                  | 16                    | -                              | 2-M4             | 4     | 113.2            |
| S1S 48B * 0610   | 48                     | $\phi 48$                 | $\phi 50$             | B1   | 6                 | $\phi 10$                  | $\phi 24$             | 10                  | 16                    | -                              | 2-M5             | 5     | 109.1            |
| S1S 48B — 1010   | 48                     | $\phi 48$                 | $\phi 50$             | B1   | 10                | $\phi 10$                  | $\phi 30$             | 10                  | 20                    | -                              | -                | -     | 185.3            |
| S1S 48B * 1012   | 48                     | $\phi 48$                 | $\phi 50$             | B1   | 10                | $\phi 12$                  | $\phi 30$             | 10                  | 20                    | -                              | 2-M5             | 5     | 177.5            |
| S1S 48B * 1015   | 48                     | $\phi 48$                 | $\phi 50$             | B1   | 10                | $\phi 15$                  | $\phi 30$             | 10                  | 20                    | -                              | 2-M5             | 5     | 167.9            |
| S1S 50A — 0610F  | 50                     | $\phi 50$                 | $\phi 52$             | A1   | 6                 | $\phi 10$                  | -                     | -                   | 6                     | -                              | -                | -     | 88.8             |
| S1S 50A — 1008F  | 50                     | $\phi 50$                 | $\phi 52$             | A1   | 10                | $\phi 8$                   | -                     | -                   | 10                    | -                              | -                | -     | 150.2            |
| S1S 50B — 0608   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 6                 | $\phi 8$                   | $\phi 24$             | 10                  | 16                    | -                              | -                | -     | 121.8            |
| S1S 50B * 0608   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 6                 | $\phi 8$                   | $\phi 24$             | 10                  | 16                    | -                              | 2-M4             | 4     | 120.4            |
| S1S 50B * 0610   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 6                 | $\phi 10$                  | $\phi 24$             | 10                  | 16                    | -                              | 2-M5             | 5     | 116.4            |
| S1S 50B * 0612   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 6                 | $\phi 12$                  | $\phi 24$             | 10                  | 16                    | -                              | 2-M5             | 5     | 112.3            |
| S1S 50B — 1010   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 10                | $\phi 10$                  | $\phi 30$             | 10                  | 20                    | -                              | -                | -     | 197.4            |
| S1S 50B * 1010   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 10                | $\phi 10$                  | $\phi 30$             | 10                  | 20                    | -                              | 2-M5             | 5     | 194.8            |
| S1S 50B * 1012   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 10                | $\phi 12$                  | $\phi 30$             | 10                  | 20                    | -                              | 2-M5             | 5     | 189.6            |
| S1S 50B * 1015   | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 10                | $\phi 15$                  | $\phi 30$             | 10                  | 20                    | -                              | 2-M5             | 5     | 180.0            |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: W) |        |        |          |          |          |          | Allowable torque for input revolutions per minute (Unit: N-m) |  |
|------------------------|-------------------|-------------------------------------------------------------------------------------------------------|--------|--------|----------|----------|----------|----------|---------------------------------------------------------------|--|
|                        |                   | 10rpm                                                                                                 | 100rpm | 200rpm | 400rpm   | 800rpm   | 1,200rpm | 1,500rpm | 100rpm                                                        |  |
| 40                     | 6                 | 12.08                                                                                                 | 120.78 | 241.55 | 483.10   | 877.30   | 1,181.18 | 1,386.01 | 11.53                                                         |  |
| 40                     | 10                | 20.08                                                                                                 | 200.84 | 401.69 | 803.38   | 1,459.31 | 1,964.04 | 2,304.26 | 19.18                                                         |  |
| 42                     | 6                 | 12.85                                                                                                 | 128.51 | 257.02 | 514.05   | 922.98   | 1,237.83 | 1,465.99 | 12.27                                                         |  |
| 42                     | 10                | 21.42                                                                                                 | 214.19 | 428.37 | 856.75   | 1,538.29 | 2,063.06 | 2,443.32 | 20.45                                                         |  |
| 44                     | 6                 | 13.62                                                                                                 | 136.19 | 272.39 | 544.77   | 967.23   | 1,292.26 | 1,544.38 | 13.00                                                         |  |
| 44                     | 10                | 22.70                                                                                                 | 226.99 | 453.98 | 907.95   | 1,612.04 | 2,153.77 | 2,573.97 | 21.67                                                         |  |
| 45                     | 6                 | 14.01                                                                                                 | 140.08 | 280.17 | 560.34   | 989.34   | 1,319.35 | 1,583.81 | 13.37                                                         |  |
| 45                     | 10                | 23.35                                                                                                 | 233.47 | 466.95 | 933.89   | 1,648.90 | 2,198.92 | 2,639.68 | 22.29                                                         |  |
| 46                     | 6                 | 14.40                                                                                                 | 143.98 | 287.96 | 575.93   | 1,011.26 | 1,346.11 | 1,623.07 | 13.74                                                         |  |
| 46                     | 10                | 24.00                                                                                                 | 239.97 | 479.94 | 959.88   | 1,685.44 | 2,243.51 | 2,705.12 | 22.91                                                         |  |
| 48                     | 6                 | 15.0                                                                                                  | 150.0  | 300.0  | 600.0    | 1,050.0  | 1,400.0  | 1,700.0  | 14.32                                                         |  |
| 48                     | 10                | 25.0                                                                                                  | 250.0  | 500.0  | 1,010.0  | 1,750.0  | 2,330.0  | 2,830.0  | 23.87                                                         |  |
| 50                     | 6                 | 15.00                                                                                                 | 150.00 | 310.00 | 630.00   | 1,090.00 | 1,460.00 | 1,770.00 | 14.32                                                         |  |
| 50                     | 10                | 26.00                                                                                                 | 260.00 | 530.00 | 1,050.00 | 1,820.00 | 2,430.00 | 2,950.00 | 24.83                                                         |  |



A1 type [-]



A1 type [=]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.04 to 0.10 |

★ No surface treatment is applied. [\*] Two screw holes and set screws are provided. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

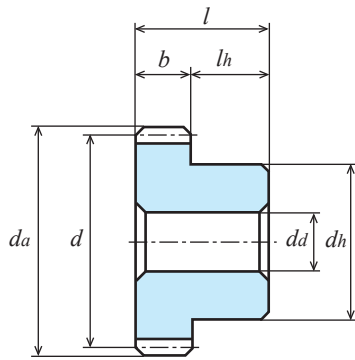
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number       | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>da</i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>da(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw     |                      | Weight<br><i>W(g)</i> |
|------------------------|-----------------------------|----------------------------------------|------------------------------|------|---------------------------|-----------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|-----------|----------------------|-----------------------|
|                        |                             |                                        |                              |      |                           |                                   |                                         |                                       |                               |                                                       | 2-M(120°) | <i>l<sub>s</sub></i> |                       |
| <b>S1S 52A — 0610F</b> | 52                          | φ52                                    | φ54                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 96.3                  |
| <b>S1S 52A — 1010F</b> | 52                          | φ52                                    | φ54                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 160.5                 |
| <b>S1S 52B — 0610F</b> | 52                          | φ52                                    | φ54                          | B1   | 6                         | φ10                               | φ40                                     | 10                                    | 16                            | -                                                     | -         | -                    | 188.8                 |
| <b>S1S 52B — 1010F</b> | 52                          | φ52                                    | φ54                          | B1   | 10                        | φ10                               | φ46                                     | 10                                    | 20                            | -                                                     | -         | -                    | 284.8                 |
| <b>S1S 54A — 0610F</b> | 54                          | φ54                                    | φ56                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 104.2                 |
| <b>S1S 54A — 1010F</b> | 54                          | φ54                                    | φ56                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 173.6                 |
| <b>S1S 54B — 0610F</b> | 54                          | φ54                                    | φ56                          | B1   | 6                         | φ10                               | φ40                                     | 10                                    | 16                            | -                                                     | -         | -                    | 196.7                 |
| <b>S1S 54B — 1010F</b> | 54                          | φ54                                    | φ56                          | B1   | 10                        | φ10                               | φ46                                     | 10                                    | 20                            | -                                                     | -         | -                    | 297.9                 |
| <b>S1S 55A — 0610F</b> | 55                          | φ55                                    | φ57                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 108.2                 |
| <b>S1S 55B — 1010F</b> | 55                          | φ55                                    | φ57                          | B1   | 10                        | φ10                               | φ46                                     | 10                                    | 20                            | -                                                     | -         | -                    | 304.6                 |
| <b>S1S 56A — 0610F</b> | 56                          | φ56                                    | φ58                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 112.3                 |
| <b>S1S 56A — 1010F</b> | 56                          | φ56                                    | φ58                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 187.2                 |
| <b>S1S 56B — 0610</b>  | 56                          | φ56                                    | φ58                          | B1   | 6                         | φ10                               | φ24                                     | 10                                    | 16                            | -                                                     | -         | -                    | 141.7                 |
| <b>S1S 56B * 0610</b>  | 56                          | φ56                                    | φ58                          | B1   | 6                         | φ10                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 139.9                 |
| <b>S1S 56B * 0612</b>  | 56                          | φ56                                    | φ58                          | B1   | 6                         | φ12                               | φ24                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 135.8                 |
| <b>S1S 56B — 1010</b>  | 56                          | φ56                                    | φ58                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 236.7                 |
| <b>S1S 56B * 1010</b>  | 56                          | φ56                                    | φ58                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 234.0                 |
| <b>S1S 56B * 1015</b>  | 56                          | φ56                                    | φ58                          | B1   | 10                        | φ15                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 219.3                 |
| <b>S1S 58A — 0610F</b> | 58                          | φ58                                    | φ60                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 114.6                 |
| <b>S1S 58B — 0610F</b> | 58                          | φ58                                    | φ60                          | B1   | 6                         | φ10                               | φ40                                     | 10                                    | 16                            | -                                                     | -         | -                    | 213.2                 |
| <b>S1S 58B — 1010F</b> | 58                          | φ58                                    | φ60                          | B1   | 10                        | φ10                               | φ50                                     | 10                                    | 20                            | -                                                     | -         | -                    | 361.5                 |
| <b>S1S 60A — 0610F</b> | 60                          | φ60                                    | φ62                          | A1   | 6                         | φ10                               | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 129.5                 |
| <b>S1S 60A — 1010F</b> | 60                          | φ60                                    | φ62                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 215.8                 |
| <b>S1S 60A = 1010</b>  | 60                          | φ60                                    | φ62                          | A1   | 10                        | φ10                               | -                                       | -                                     | 10                            | 3 × 1.4                                               | -         | -                    | 215.5                 |
| <b>S1S 60A = 1012</b>  | 60                          | φ60                                    | φ62                          | A1   | 10                        | φ12                               | -                                       | -                                     | 10                            | 4 × 1.8                                               | -         | -                    | 212.5                 |
| <b>S1S 60A = 1015</b>  | 60                          | φ60                                    | φ62                          | A1   | 10                        | φ15                               | -                                       | -                                     | 10                            | 5 × 2.3                                               | -         | -                    | 207.2                 |
| <b>S1S 60B — 0610</b>  | 60                          | φ60                                    | φ62                          | B1   | 6                         | φ10                               | φ30                                     | 10                                    | 16                            | -                                                     | -         | -                    | 178.9                 |
| <b>S1S 60B * 0610</b>  | 60                          | φ60                                    | φ62                          | B1   | 6                         | φ10                               | φ30                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 176.3                 |
| <b>S1S 60B * 0612</b>  | 60                          | φ60                                    | φ62                          | B1   | 6                         | φ12                               | φ30                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 172.2                 |
| <b>S1S 60B * 0615</b>  | 60                          | φ60                                    | φ62                          | B1   | 6                         | φ15                               | φ30                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 164.6                 |
| <b>S1S 60BF — 1008</b> | 60                          | φ60                                    | φ62                          | B1   | 10                        | φ 8                               | φ42                                     | 10                                    | 20                            | -                                                     | -         | -                    | 321.9                 |
| <b>S1S 60B — 1010</b>  | 60                          | φ60                                    | φ62                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | -         | -                    | 265.3                 |
| <b>S1S 60B * 1010</b>  | 60                          | φ60                                    | φ62                          | B1   | 10                        | φ10                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 262.7                 |
| <b>S1S 60B * 1012</b>  | 60                          | φ60                                    | φ62                          | B1   | 10                        | φ12                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 257.5                 |
| <b>S1S 60B * 1015</b>  | 60                          | φ60                                    | φ62                          | B1   | 10                        | φ15                               | φ30                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 247.9                 |

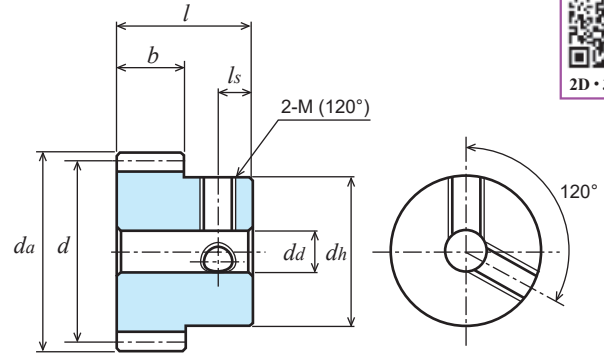




2D • 3D CAD



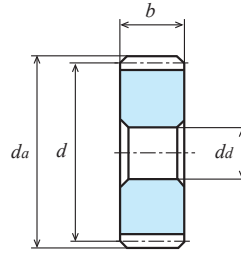
B1 type [-]



B1 type [\*]

| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw     |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-----------|-------|------------------|
|                        |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | 2-M(120°) | $l_s$ |                  |
| <b>S1S 62A — 0610F</b> | 62                     | $\phi 62$                 | $\phi 64$             | A1   | 6                 | $\phi 10$                  | -                     | -                   | 6                     | -                              | -         | -     | 138.5            |
| <b>S1S 62B — 0610F</b> | 62                     | $\phi 62$                 | $\phi 64$             | B1   | 6                 | $\phi 10$                  | $\phi 40$             | 10                  | 16                    | -                              | -         | -     | 231.0            |
| <b>S1S 62B — 1010F</b> | 62                     | $\phi 62$                 | $\phi 64$             | B1   | 10                | $\phi 10$                  | $\phi 50$             | 10                  | 20                    | -                              | -         | -     | 378.8            |
| <b>S1S 64A — 0610F</b> | 64                     | $\phi 64$                 | $\phi 66$             | A1   | 6                 | $\phi 10$                  | -                     | -                   | 6                     | -                              | -         | -     | 147.8            |
| <b>S1S 64A — 1010F</b> | 64                     | $\phi 64$                 | $\phi 66$             | A1   | 10                | $\phi 10$                  | -                     | -                   | 10                    | -                              | -         | -     | 246.4            |
| <b>S1S 64B — 0610</b>  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | -                              | -         | -     | 177.3            |
| <b>S1S 64B * 0610</b>  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | -                              | 2-M5      | 5     | 175.5            |
| <b>S1S 64B * 0612</b>  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 6                 | $\phi 12$                  | $\phi 30$             | 10                  | 16                    | -                              | 2-M5      | 5     | 171.4            |
| <b>S1S 64B — 1010</b>  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 10                | $\phi 10$                  | $\phi 30$             | 10                  | 20                    | -                              | -         | -     | 295.9            |
| <b>S1S 64B * 1010</b>  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 10                | $\phi 10$                  | $\phi 30$             | 10                  | 20                    | -                              | 2-M5      | 5     | 293.3            |
| <b>S1S 64B * 1015</b>  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 10                | $\phi 15$                  | $\phi 30$             | 10                  | 20                    | -                              | 2-M5      | 5     | 278.5            |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |
| <b>52</b>              | <b>6</b>          | 0.016                                                                                                  | 0.16   | 0.33   | 0.66   | 1.13   | 1.53     | 1.85     | 15.27                                                         |
| <b>52</b>              | <b>10</b>         | 0.027                                                                                                  | 0.27   | 0.55   | 1.10   | 1.89   | 2.55     | 3.09     | 25.78                                                         |
| <b>54</b>              | <b>6</b>          | 0.017                                                                                                  | 0.17   | 0.35   | 0.68   | 1.17   | 1.59     | 1.93     | 16.23                                                         |
| <b>54</b>              | <b>10</b>         | 0.029                                                                                                  | 0.29   | 0.58   | 1.14   | 1.96   | 2.65     | 3.21     | 27.69                                                         |
| <b>55</b>              | <b>6</b>          | 0.017                                                                                                  | 0.17   | 0.35   | 0.70   | 1.20   | 1.62     | 1.96     | 16.23                                                         |
| <b>55</b>              | <b>10</b>         | 0.029                                                                                                  | 0.29   | 0.59   | 1.16   | 2.00   | 2.71     | 3.28     | 27.69                                                         |
| <b>56</b>              | <b>6</b>          | 0.018                                                                                                  | 0.18   | 0.36   | 0.71   | 1.22   | 1.65     | 2.00     | 17.18                                                         |
| <b>56</b>              | <b>10</b>         | 0.030                                                                                                  | 0.30   | 0.61   | 1.19   | 2.03   | 2.76     | 3.34     | 28.64                                                         |
| <b>58</b>              | <b>6</b>          | 0.019                                                                                                  | 0.19   | 0.38   | 0.74   | 1.25   | 1.72     | 2.08     | 18.14                                                         |
| <b>58</b>              | <b>10</b>         | 0.031                                                                                                  | 0.31   | 0.63   | 1.23   | 2.09   | 2.87     | 3.47     | 29.60                                                         |
| <b>60</b>              | <b>6</b>          | 0.019                                                                                                  | 0.19   | 0.39   | 0.76   | 1.29   | 1.78     | 2.15     | 18.14                                                         |
| <b>60</b>              | <b>10</b>         | 0.033                                                                                                  | 0.330  | 0.660  | 1.270  | 2.150  | 2.960    | 3.570    | 31.51                                                         |
| <b>62</b>              | <b>6</b>          | 0.020                                                                                                  | 0.20   | 0.41   | 0.79   | 1.33   | 1.84     | 2.22     | 19.09                                                         |
| <b>62</b>              | <b>10</b>         | 0.034                                                                                                  | 0.34   | 0.69   | 1.32   | 2.22   | 3.08     | 3.71     | 32.46                                                         |
| <b>64</b>              | <b>6</b>          | 0.021                                                                                                  | 0.21   | 0.43   | 0.81   | 1.37   | 1.91     | 2.30     | 20.05                                                         |
| <b>64</b>              | <b>10</b>         | 0.035                                                                                                  | 0.35   | 0.71   | 1.36   | 2.29   | 3.18     | 3.83     | 33.42                                                         |



A1 type [-]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.04 to 0.10 |

★ No surface treatment is applied. [\*] Two screw holes and set screws are provided. Gears with a [-] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

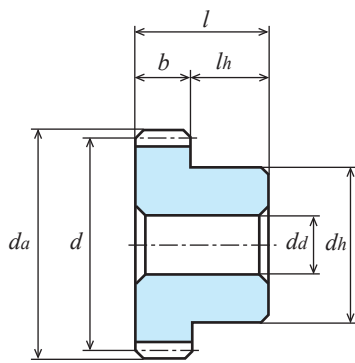
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

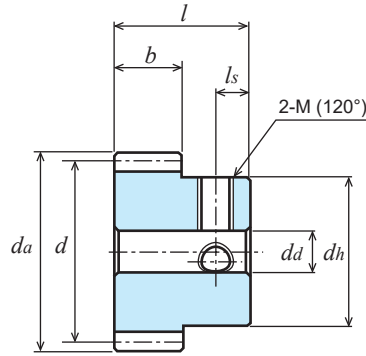
| Catalogue number | Number of teeth<br>$z$ | Refer-<br>ence<br>diameter<br>$d$ | Tip<br>diameter<br>$d_a$ | Type | Face<br>width<br>$b$ | Hole<br>diameter<br>$d_d(H7)$ | Hub<br>diameter<br>$d_h$ | Hub<br>length<br>$l_h$ | Overall<br>length<br>$l$ | Key<br>groove<br>$b_2 \times t_2$ | Screw     |       | Weight<br>$W(g)$ |
|------------------|------------------------|-----------------------------------|--------------------------|------|----------------------|-------------------------------|--------------------------|------------------------|--------------------------|-----------------------------------|-----------|-------|------------------|
|                  |                        |                                   |                          |      |                      |                               |                          |                        |                          |                                   | 2-M(120°) | $l_s$ |                  |
| S1S 65A — 0610F  | 65                     | φ65                               | φ67                      | A1   | 6                    | φ10                           | -                        | -                      | 6                        | -                                 | -         | -     | 152.6            |
| S1S 65A — 1010F  | 65                     | φ65                               | φ67                      | A1   | 10                   | φ10                           | -                        | -                      | 10                       | -                                 | -         | -     | 254.3            |
| S1S 65B — 0610F  | 65                     | φ65                               | φ67                      | B1   | 6                    | φ10                           | φ40                      | 10                     | 16                       | -                                 | -         | -     | 245.1            |
| S1S 65B — 1010F  | 65                     | φ65                               | φ67                      | B1   | 10                   | φ10                           | φ50                      | 10                     | 20                       | -                                 | -         | -     | 402.3            |
| S1S 68A — 0610F  | 68                     | φ68                               | φ70                      | A1   | 6                    | φ10                           | -                        | -                      | 6                        | -                                 | -         | -     | 167.4            |
| S1S 68A — 1010F  | 68                     | φ68                               | φ70                      | A1   | 10                   | φ10                           | -                        | -                      | 10                       | -                                 | -         | -     | 278.9            |
| S1S 68B — 0610F  | 68                     | φ68                               | φ70                      | B1   | 6                    | φ10                           | φ40                      | 10                     | 16                       | -                                 | -         | -     | 259.8            |
| S1S 70A — 0610F  | 70                     | φ70                               | φ72                      | A1   | 6                    | φ10                           | -                        | -                      | 6                        | -                                 | -         | -     | 177.6            |
| S1S 70A — 1010F  | 70                     | φ70                               | φ72                      | A1   | 10                   | φ10                           | -                        | -                      | 10                       | -                                 | -         | -     | 295.9            |
| S1S 70B — 0610F  | 70                     | φ70                               | φ72                      | B1   | 6                    | φ10                           | φ40                      | 10                     | 16                       | -                                 | -         | -     | 270.0            |
| S1S 70B — 1010F  | 70                     | φ70                               | φ72                      | B1   | 10                   | φ10                           | φ50                      | 10                     | 20                       | -                                 | -         | -     | 442.9            |
| S1S 72A — 0610F  | 72                     | φ72                               | φ74                      | A1   | 6                    | φ10                           | -                        | -                      | 6                        | -                                 | -         | -     | 188.1            |
| S1S 72A — 1010F  | 72                     | φ72                               | φ74                      | A1   | 10                   | φ10                           | -                        | -                      | 10                       | -                                 | -         | -     | 313.4            |
| S1S 72B — 0610   | 72                     | φ72                               | φ74                      | B1   | 6                    | φ10                           | φ30                      | 10                     | 16                       | -                                 | -         | -     | 217.6            |
| S1S 72B * 0610   | 72                     | φ72                               | φ74                      | B1   | 6                    | φ10                           | φ30                      | 10                     | 16                       | -                                 | 2-M5      | 5     | 215.7            |
| S1S 72B — 1010   | 72                     | φ72                               | φ74                      | B1   | 10                   | φ10                           | φ30                      | 10                     | 20                       | -                                 | -         | -     | 363.0            |
| S1S 72B * 1010   | 72                     | φ72                               | φ74                      | B1   | 10                   | φ10                           | φ30                      | 10                     | 20                       | -                                 | 2-M5      | 5     | 360.4            |
| S1S 72B * 1015   | 72                     | φ72                               | φ74                      | B1   | 10                   | φ15                           | φ30                      | 10                     | 20                       | -                                 | 2-M5      | 5     | 345.6            |
| S1S 75A — 0610F  | 75                     | φ75                               | φ77                      | A1   | 6                    | φ10                           | -                        | -                      | 6                        | -                                 | -         | -     | 204.4            |
| S1S 75A — 1010F  | 75                     | φ75                               | φ77                      | A1   | 10                   | φ10                           | -                        | -                      | 10                       | -                                 | -         | -     | 340.6            |
| S1S 75B — 0610F  | 75                     | φ75                               | φ77                      | B1   | 6                    | φ10                           | φ40                      | 10                     | 16                       | -                                 | -         | -     | 296.9            |
| S1S 75B — 1010F  | 75                     | φ75                               | φ77                      | B1   | 10                   | φ10                           | φ50                      | 10                     | 20                       | -                                 | -         | -     | 488.6            |
| S1S 80A — 0610F  | 80                     | φ80                               | φ82                      | A1   | 6                    | φ10                           | -                        | -                      | 6                        | -                                 | -         | -     | 233.1            |
| S1S 80A — 1010F  | 80                     | φ80                               | φ82                      | A1   | 10                   | φ10                           | -                        | -                      | 10                       | -                                 | -         | -     | 388.4            |
| S1S 80A = 1012   | 80                     | φ80                               | φ82                      | A1   | 10                   | φ12                           | -                        | -                      | 10                       | 4 × 1.8                           | -         | -     | 385.1            |
| S1S 80A = 1015   | 80                     | φ80                               | φ82                      | A1   | 10                   | φ15                           | -                        | -                      | 10                       | 5 × 2.3                           | -         | -     | 379.8            |
| S1S 80B — 0610   | 80                     | φ80                               | φ82                      | B1   | 6                    | φ10                           | φ30                      | 10                     | 16                       | -                                 | -         | -     | 282.6            |
| S1S 80B * 0610   | 80                     | φ80                               | φ82                      | B1   | 6                    | φ10                           | φ30                      | 10                     | 16                       | -                                 | 2-M5      | 5     | 279.9            |
| S1S 80B * 0612   | 80                     | φ80                               | φ82                      | B1   | 6                    | φ12                           | φ30                      | 10                     | 16                       | -                                 | 2-M5      | 5     | 275.9            |
| S1S 80B * 0615   | 80                     | φ80                               | φ82                      | B1   | 6                    | φ15                           | φ30                      | 10                     | 16                       | -                                 | 2-M5      | 5     | 268.3            |
| S1S 80BF — 1010  | 80                     | φ80                               | φ82                      | B1   | 10                   | φ10                           | φ60                      | 10                     | 20                       | -                                 | -         | -     | 603.1            |
| S1S 80B — 1010   | 80                     | φ80                               | φ82                      | B1   | 10                   | φ10                           | φ32                      | 10                     | 20                       | -                                 | -         | -     | 445.7            |
| S1S 80B * 1010   | 80                     | φ80                               | φ82                      | B1   | 10                   | φ10                           | φ32                      | 10                     | 20                       | -                                 | 2-M5      | 5     | 442.8            |
| S1S 80B * 1012   | 80                     | φ80                               | φ82                      | B1   | 10                   | φ12                           | φ32                      | 10                     | 20                       | -                                 | 2-M5      | 5     | 437.6            |
| S1S 80B * 1015   | 80                     | φ80                               | φ82                      | B1   | 10                   | φ15                           | φ32                      | 10                     | 20                       | -                                 | 2-M5      | 5     | 428.0            |
| S1S 80B * 1016   | 80                     | φ80                               | φ82                      | B1   | 10                   | φ16                           | φ32                      | 10                     | 20                       | -                                 | 2-M5      | 5     | 424.3            |
| S1S 84B — 0610F  | 84                     | φ84                               | φ86                      | B1   | 6                    | φ10                           | φ50                      | 10                     | 16                       | -                                 | -         | -     | 405.3            |
| S1S 84B — 1010F  | 84                     | φ84                               | φ86                      | B1   | 10                   | φ10                           | φ50                      | 10                     | 20                       | -                                 | -         | -     | 576.8            |



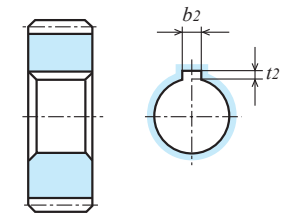
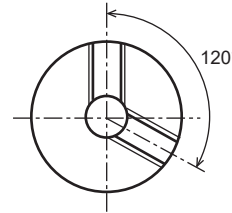
2D • 3D CAD



B1 type [-]



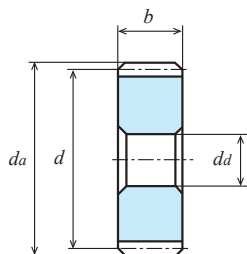
B1 type [\*]



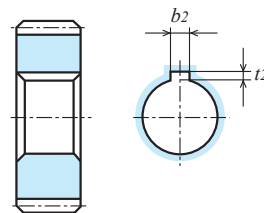
A1 type [=]

| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw     |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-----------|-------|------------------|
|                        |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | 2-M(120°) | $l_s$ |                  |
| <b>S1S 85A — 0610F</b> | 85                     | $\phi 85$                 | $\phi 87$             | A1   | 6                 | $\phi 10$                  | -                     | -                   | 6                     | -                              | -         | -     | 263.6            |
| <b>S1S 85B — 1010F</b> | 85                     | $\phi 85$                 | $\phi 87$             | B1   | 10                | $\phi 10$                  | $\phi 50$             | 10                  | 20                    | -                              | -         | -     | 587.3            |
| <b>S1S 90A — 0610F</b> | 90                     | $\phi 90$                 | $\phi 92$             | A1   | 6                 | $\phi 10$                  | -                     | -                   | 6                     | -                              | -         | -     | 295.9            |
| <b>S1S 90A — 1010F</b> | 90                     | $\phi 90$                 | $\phi 92$             | A1   | 10                | $\phi 10$                  | -                     | -                   | 10                    | -                              | -         | -     | 493.2            |
| <b>S1S 90B — 0610F</b> | 90                     | $\phi 90$                 | $\phi 92$             | B1   | 6                 | $\phi 10$                  | $\phi 50$             | 10                  | 16                    | -                              | -         | -     | 443.9            |
| <b>S1S 90BF — 1010</b> | 90                     | $\phi 90$                 | $\phi 92$             | B1   | 10                | $\phi 10$                  | $\phi 65$             | 10                  | 20                    | -                              | -         | -     | 746.3            |
| <b>S1S 90B — 1010F</b> | 90                     | $\phi 90$                 | $\phi 92$             | B1   | 10                | $\phi 10$                  | $\phi 50$             | 10                  | 20                    | -                              | -         | -     | 641.2            |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N-m) |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |
| 65                     | 6                 | 0.021                                                                                                  | 0.21   | 0.43   | 0.83   | 1.39   | 1.94     | 2.34     | 20.05                                                         |
| 65                     | 10                | 0.036                                                                                                  | 0.36   | 0.73   | 1.38   | 2.32   | 3.23     | 3.90     | 34.37                                                         |
| 68                     | 6                 | 0.023                                                                                                  | 0.23   | 0.46   | 0.86   | 1.44   | 2.03     | 2.45     | 21.96                                                         |
| 68                     | 10                | 0.038                                                                                                  | 0.38   | 0.77   | 1.44   | 2.41   | 3.38     | 4.09     | 36.28                                                         |
| 70                     | 6                 | 0.023                                                                                                  | 0.23   | 0.47   | 0.94   | 1.48   | 2.09     | 2.53     | 21.96                                                         |
| 70                     | 10                | 0.040                                                                                                  | 0.400  | 0.790  | 1.480  | 2.460  | 3.470    | 4.190    | 38.20                                                         |
| 72                     | 6                 | 0.024                                                                                                  | 0.24   | 0.49   | 0.91   | 1.52   | 2.15     | 2.60     | 22.91                                                         |
| 72                     | 10                | 0.041                                                                                                  | 0.41   | 0.82   | 1.53   | 2.53   | 3.59     | 4.34     | 39.15                                                         |
| 75                     | 6                 | 0.025                                                                                                  | 0.25   | 0.51   | 0.95   | 1.58   | 2.24     | 2.72     | 23.87                                                         |
| 75                     | 10                | 0.043                                                                                                  | 0.43   | 0.86   | 1.59   | 2.64   | 3.74     | 4.53     | 41.06                                                         |
| 80                     | 6                 | 0.027                                                                                                  | 0.27   | 0.55   | 1.01   | 1.69   | 2.39     | 2.90     | 25.78                                                         |
| 80                     | 10                | 0.046                                                                                                  | 0.460  | 0.920  | 1.680  | 2.810  | 3.960    | 4.810    | 43.93                                                         |
| 84                     | 6                 | 0.029                                                                                                  | 0.29   | 0.59   | 1.06   | 1.78   | 2.51     | 3.04     | 27.69                                                         |
| 84                     | 10                | 0.049                                                                                                  | 0.49   | 0.98   | 1.76   | 2.96   | 4.19     | 5.07     | 46.79                                                         |
| 85                     | 6                 | 0.029                                                                                                  | 0.29   | 0.59   | 1.07   | 1.80   | 2.54     | 3.08     | 27.69                                                         |
| 85                     | 10                | 0.049                                                                                                  | 0.49   | 0.99   | 1.78   | 3.00   | 4.24     | 5.13     | 46.79                                                         |
| 90                     | 6                 | 0.031                                                                                                  | 0.31   | 0.63   | 1.12   | 1.90   | 2.69     | 3.26     | 29.60                                                         |
| 90                     | 10                | 0.053                                                                                                  | 0.530  | 1.060  | 1.870  | 3.160  | 4.460    | 5.400    | 50.61                                                         |



A1 type [-]



A1 type [=]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.04 to 0.10 |

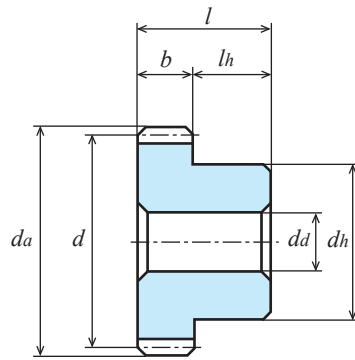
★ No surface treatment is applied. [\*] Two screw holes and set screws are provided. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

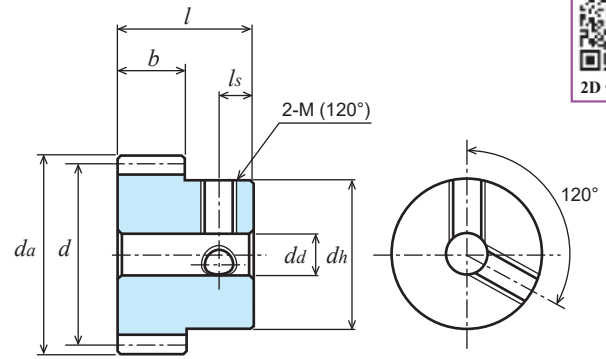
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number        | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>d<sub>a</sub></i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>d<sub>a</sub>(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw     |                      | Weight<br><i>W(g)</i> |
|-------------------------|-----------------------------|----------------------------------------|-----------------------------------------|------|---------------------------|----------------------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|-----------|----------------------|-----------------------|
|                         |                             |                                        |                                         |      |                           |                                              |                                         |                                       |                               |                                                       | 2-M(120°) | <i>l<sub>s</sub></i> |                       |
| <b>S1S 96A — 0610F</b>  | 96                          | φ 96                                   | φ 98                                    | A1   | 6                         | φ10                                          | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 337.2                 |
| <b>S1S 96A — 1010F</b>  | 96                          | φ 96                                   | φ 98                                    | A1   | 10                        | φ10                                          | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 562.0                 |
| <b>S1S 96B — 0610F</b>  | 96                          | φ 96                                   | φ 98                                    | B1   | 6                         | φ10                                          | φ50                                     | 10                                    | 16                            | -                                                     | -         | -                    | 485.2                 |
| <b>S1S 96B — 1010F</b>  | 96                          | φ 96                                   | φ 98                                    | B1   | 10                        | φ10                                          | φ50                                     | 10                                    | 20                            | -                                                     | -         | -                    | 710.0                 |
| <b>S1S 100A — 0610F</b> | 100                         | φ100                                   | φ102                                    | A1   | 6                         | φ10                                          | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 366.2                 |
| <b>S1S 100A = 0612</b>  | 100                         | φ100                                   | φ102                                    | A1   | 6                         | φ12                                          | -                                       | -                                     | 6                             | 4 × 1.8                                               | -         | -                    | 364.3                 |
| <b>S1S 100A — 1010F</b> | 100                         | φ100                                   | φ102                                    | A1   | 10                        | φ10                                          | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 610.4                 |
| <b>S1S 100B — 0610</b>  | 100                         | φ100                                   | φ102                                    | B1   | 6                         | φ10                                          | φ30                                     | 10                                    | 16                            | -                                                     | -         | -                    | 415.8                 |
| <b>S1S 100B * 0610</b>  | 100                         | φ100                                   | φ102                                    | B1   | 6                         | φ10                                          | φ30                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 413.2                 |
| <b>S1S 100B * 0612</b>  | 100                         | φ100                                   | φ102                                    | B1   | 6                         | φ12                                          | φ30                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 409.1                 |
| <b>S1S 100B * 0615</b>  | 100                         | φ100                                   | φ102                                    | B1   | 6                         | φ15                                          | φ30                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 401.5                 |
| <b>S1S 100B — 1012</b>  | 100                         | φ100                                   | φ102                                    | B1   | 10                        | φ12                                          | φ36                                     | 10                                    | 20                            | -                                                     | -         | -                    | 679.1                 |
| <b>S1S 100B * 1015</b>  | 100                         | φ100                                   | φ102                                    | B1   | 10                        | φ15                                          | φ36                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 666.4                 |
| <b>S1S 105A — 1010F</b> | 105                         | φ105                                   | φ107                                    | A1   | 10                        | φ10                                          | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 673.6                 |
| <b>S1S 110A — 0610F</b> | 110                         | φ110                                   | φ112                                    | A1   | 6                         | φ10                                          | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 443.9                 |
| <b>S1S 110A — 1010F</b> | 110                         | φ110                                   | φ112                                    | A1   | 10                        | φ10                                          | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 739.8                 |
| <b>S1S 110B — 0610F</b> | 110                         | φ110                                   | φ112                                    | B1   | 6                         | φ10                                          | φ50                                     | 10                                    | 16                            | -                                                     | -         | -                    | 591.9                 |
| <b>S1S 115A — 0610F</b> | 115                         | φ115                                   | φ117                                    | A1   | 6                         | φ10                                          | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 485.5                 |
| <b>S1S 120A — 0610F</b> | 120                         | φ120                                   | φ122                                    | A1   | 6                         | φ10                                          | -                                       | -                                     | 6                             | -                                                     | -         | -                    | 529.0                 |
| <b>S1S 120A — 1010F</b> | 120                         | φ120                                   | φ122                                    | A1   | 10                        | φ10                                          | -                                       | -                                     | 10                            | -                                                     | -         | -                    | 881.6                 |
| <b>S1S 120A = 1012</b>  | 120                         | φ120                                   | φ122                                    | A1   | 10                        | φ12                                          | -                                       | -                                     | 10                            | 4 × 1.8                                               | -         | -                    | 878.4                 |
| <b>S1S 120B — 0610</b>  | 120                         | φ120                                   | φ122                                    | B1   | 6                         | φ10                                          | φ30                                     | 10                                    | 16                            | -                                                     | -         | -                    | 578.7                 |
| <b>S1S 120B * 0610</b>  | 120                         | φ120                                   | φ122                                    | B1   | 6                         | φ10                                          | φ30                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 576.1                 |
| <b>S1S 120B * 0612</b>  | 120                         | φ120                                   | φ122                                    | B1   | 6                         | φ12                                          | φ30                                     | 10                                    | 16                            | -                                                     | 2-M5      | 5                    | 572.0                 |
| <b>S1S 120B — 1012</b>  | 120                         | φ120                                   | φ122                                    | B1   | 10                        | φ12                                          | φ36                                     | 10                                    | 20                            | -                                                     | -         | -                    | 950.6                 |
| <b>S1S 120B * 1012</b>  | 120                         | φ120                                   | φ122                                    | B1   | 10                        | φ12                                          | φ36                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 947.4                 |
| <b>S1S 120B * 1015</b>  | 120                         | φ120                                   | φ122                                    | B1   | 10                        | φ15                                          | φ36                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 937.8                 |
| <b>S1S 120B * 1016</b>  | 120                         | φ120                                   | φ122                                    | B1   | 10                        | φ16                                          | φ36                                     | 10                                    | 20                            | -                                                     | 2-M5      | 5                    | 934.1                 |

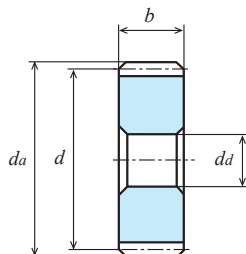


B1 type [-]

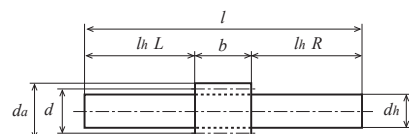


B1 type [\*]

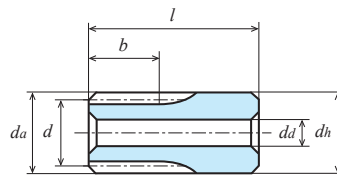
| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |
| 96                     | 6                 | 0.034                                                                                                  | 0.34   | 0.68   | 1.19   | 2.03   | 2.87     | 3.47     | 32.46                                                         |
| 96                     | 10                | 0.057                                                                                                  | 0.57   | 1.14   | 1.99   | 3.39   | 4.79     | 5.78     | 54.43                                                         |
| 100                    | 6                 | 0.036                                                                                                  | 0.36   | 0.71   | 1.23   | 2.11   | 2.99     | 3.61     | 34.37                                                         |
| 100                    | 10                | 0.060                                                                                                  | 0.600  | 1.180  | 2.040  | 3.500  | 4.950    | 5.970    | 57.30                                                         |
| 105                    | 10                | 0.063                                                                                                  | 0.63   | 1.24   | 2.14   | 3.70   | 5.23     | 6.33     | 60.16                                                         |
| 110                    | 6                 | 0.040                                                                                                  | 0.40   | 0.78   | 1.34   | 2.32   | 3.28     | 4.00     | 38.19                                                         |
| 110                    | 10                | 0.066                                                                                                  | 0.66   | 1.30   | 2.23   | 3.87   | 5.47     | 6.67     | 63.02                                                         |
| 115                    | 6                 | 0.042                                                                                                  | 0.42   | 0.81   | 1.39   | 2.42   | 3.42     | 4.21     | 40.10                                                         |
| 120                    | 6                 | 0.044                                                                                                  | 0.44   | 0.85   | 1.43   | 2.52   | 3.56     | 4.41     | 42.01                                                         |
| 120                    | 10                | 0.073                                                                                                  | 0.730  | 1.400  | 2.380  | 4.160  | 5.890    | 7.290    | 69.71                                                         |



A1 type [-]



L1 type



K2 type [-]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.06 to 0.15 |

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

★ [Profile-shifted] is a profile-shifted gear with an rack shift coefficient  $x$  of 0.5.

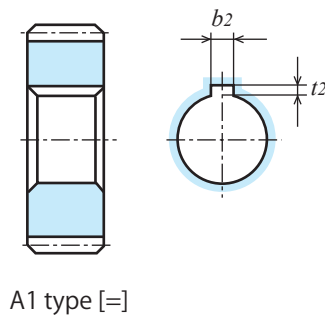
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number         | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$da(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw |       | Weight<br>$W(g)$ |
|--------------------------|------------------------|---------------------------|-----------------------|------|-------------------|---------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-------|-------|------------------|
|                          |                        |                           |                       |      |                   |                           |                       |                     |                       |                                | $M$   | $l_s$ |                  |
| <b>S1.5S 8L — 1809</b>   | 8                      | [Profile-shifted]         | $\phi 15.96$          | L1   | 18                | -                         | $\phi 9(h9)$          | L24 R48             | 90                    | -                              | -     | -     | 56.2             |
| <b>S1.5S 10L — 1812</b>  | 10                     | [Profile-shifted]         | $\phi 19$             | L1   | 18                | -                         | $\phi 12(h9)$         | L24 R48             | 90                    | -                              | -     | -     | 94.1             |
| <b>S1.5S 12K — 1808</b>  | 12                     | $\phi 18$                 | $\phi 21$             | K2   | 18                | $\phi 8(H8)$              | $\phi 21$             | 22                  | 40                    | -                              | -     | -     | 80.0             |
| <b>S1.5S 13K — 1808</b>  | 13                     | $\phi 19.5$               | $\phi 22.5$           | K2   | 18                | $\phi 8(H8)$              | $\phi 22.5$           | 22                  | 40                    | -                              | -     | -     | 95.1             |
| <b>S1.5S 14K — 1808</b>  | 14                     | $\phi 21$                 | $\phi 24$             | K2   | 18                | $\phi 8(H8)$              | $\phi 24$             | 22                  | 40                    | -                              | -     | -     | 111.3            |
| <b>S1.5S 15A — 1208</b>  | 15                     | $\phi 22.5$               | $\phi 25.5$           | A1   | 12                | $\phi 8$                  | -                     | -                   | 12                    | -                              | -     | -     | 32.7             |
| <b>S1.5S 15A — 1808</b>  | 15                     | $\phi 22.5$               | $\phi 25.5$           | A1   | 18                | $\phi 8$                  | -                     | -                   | 18                    | -                              | -     | -     | 49.1             |
| <b>S1.5S 15B — 1208</b>  | 15                     | $\phi 22.5$               | $\phi 25.5$           | B1   | 12                | $\phi 8$                  | $\phi 18$             | 10                  | 22                    | -                              | -     | -     | 48.8             |
| <b>S1.5S 15B — 1608N</b> | 15                     | $\phi 22.5$               | $\phi 25.5$           | B1   | 16                | $\phi 8(H8)$              | $\phi 17$             | 10                  | 26                    | -                              | -     | -     | 57.5             |
| <b>S1.5S 16A — 1208</b>  | 16                     | $\phi 24$                 | $\phi 27$             | A1   | 12                | $\phi 8$                  | -                     | -                   | 12                    | -                              | -     | -     | 37.9             |
| <b>S1.5S 16A — 1608</b>  | 16                     | $\phi 24$                 | $\phi 27$             | A1   | 16                | $\phi 8$                  | -                     | -                   | 16                    | -                              | -     | -     | 50.5             |
| <b>S1.5S 16B — 1208</b>  | 16                     | $\phi 24$                 | $\phi 27$             | B1   | 12                | $\phi 8$                  | $\phi 20$             | 10                  | 22                    | -                              | -     | -     | 58.6             |
| <b>S1.5S 16B — 1608N</b> | 16                     | $\phi 24$                 | $\phi 27$             | B1   | 16                | $\phi 8(H8)$              | $\phi 18$             | 10                  | 26                    | -                              | -     | -     | 66.6             |
| <b>S1.5S 16B — 1808N</b> | 16                     | $\phi 24$                 | $\phi 27$             | B1   | 18                | $\phi 8(H8)$              | $\phi 20$             | 10                  | 28                    | -                              | -     | -     | 77.6             |
| <b>S1.5S 17B — 1208F</b> | 17                     | $\phi 25.5$               | $\phi 28.5$           | B1   | 12                | $\phi 8$                  | $\phi 20$             | 10                  | 22                    | -                              | -     | -     | 64.1             |
| <b>S1.5S 17B — 1808</b>  | 17                     | $\phi 25.5$               | $\phi 28.5$           | B1   | 18                | $\phi 8(H8)$              | $\phi 20$             | 10                  | 28                    | -                              | -     | -     | 85.8             |
| <b>S1.5S 18A — 1210F</b> | 18                     | $\phi 27$                 | $\phi 30$             | A1   | 12                | $\phi 10$                 | -                     | -                   | 12                    | -                              | -     | -     | 46.5             |
| <b>S1.5S 18A — 1610F</b> | 18                     | $\phi 27$                 | $\phi 30$             | A1   | 16                | $\phi 10$                 | -                     | -                   | 16                    | -                              | -     | -     | 62.1             |
| <b>S1.5S 18A — 1810F</b> | 18                     | $\phi 27$                 | $\phi 30$             | A1   | 18                | $\phi 10$                 | -                     | -                   | 18                    | -                              | -     | -     | 69.8             |
| <b>S1.5S 18B — 1210F</b> | 18                     | $\phi 27$                 | $\phi 30$             | B1   | 12                | $\phi 10$                 | $\phi 22$             | 10                  | 22                    | -                              | -     | -     | 70.2             |
| <b>S1.5S 18B — 1610</b>  | 18                     | $\phi 27$                 | $\phi 30$             | B1   | 16                | $\phi 10$                 | $\phi 21$             | 10                  | 26                    | -                              | -     | -     | 83.1             |
| <b>S1.5S 18B — 1810</b>  | 18                     | $\phi 27$                 | $\phi 30$             | B1   | 18                | $\phi 10$                 | $\phi 22$             | 10                  | 28                    | -                              | -     | -     | 93.5             |
| <b>S1.5S 19A — 1210F</b> | 19                     | $\phi 28.5$               | $\phi 31.5$           | A1   | 12                | $\phi 10$                 | -                     | -                   | 12                    | -                              | -     | -     | 52.7             |
| <b>S1.5S 19B — 1210F</b> | 19                     | $\phi 28.5$               | $\phi 31.5$           | B1   | 12                | $\phi 10$                 | $\phi 24$             | 10                  | 22                    | -                              | -     | -     | 82.0             |
| <b>S1.5S 20A — 1010F</b> | 20                     | $\phi 30$                 | $\phi 33$             | A1   | 10                | $\phi 10$                 | -                     | -                   | 10                    | -                              | -     | -     | 49.3             |
| <b>S1.5S 20A — 1210F</b> | 20                     | $\phi 30$                 | $\phi 33$             | A1   | 12                | $\phi 10$                 | -                     | -                   | 12                    | -                              | -     | -     | 59.2             |
| <b>S1.5S 20A = 1212</b>  | 20                     | $\phi 30$                 | $\phi 33$             | A1   | 12                | $\phi 12$                 | -                     | -                   | 12                    | $4 \times 1.8$                 | -     | -     | 55.3             |
| <b>S1.5S 20A = 1215</b>  | 20                     | $\phi 30$                 | $\phi 33$             | A1   | 12                | $\phi 15$                 | -                     | -                   | 12                    | $5 \times 2.3$                 | -     | -     | 48.9             |
| <b>S1.5S 20A — 1610F</b> | 20                     | $\phi 30$                 | $\phi 33$             | A1   | 16                | $\phi 10$                 | -                     | -                   | 16                    | -                              | -     | -     | 78.9             |
| <b>S1.5S 20A — 1810F</b> | 20                     | $\phi 30$                 | $\phi 33$             | A1   | 18                | $\phi 10$                 | -                     | -                   | 18                    | -                              | -     | -     | 88.8             |
| <b>S1.5S 20A = 1812</b>  | 20                     | $\phi 30$                 | $\phi 33$             | A1   | 18                | $\phi 12$                 | -                     | -                   | 18                    | $4 \times 1.8$                 | -     | -     | 82.9             |
| <b>S1.5S 20B — 1010F</b> | 20                     | $\phi 30$                 | $\phi 33$             | B1   | 10                | $\phi 10$                 | $\phi 24$             | 10                  | 20                    | -                              | -     | -     | 78.7             |
| <b>S1.5S 20B — 1210F</b> | 20                     | $\phi 30$                 | $\phi 33$             | B1   | 12                | $\phi 10$                 | $\phi 25$             | 10                  | 22                    | -                              | -     | -     | 91.6             |
| <b>S1.5S 20B # 1212</b>  | 20                     | $\phi 30$                 | $\phi 33$             | B1   | 12                | $\phi 12$                 | $\phi 25$             | 10                  | 22                    | $4 \times 1.8$                 | M3    | 5     | 84.2             |
| <b>S1.5S 20B — 1610</b>  | 20                     | $\phi 30$                 | $\phi 33$             | B1   | 16                | $\phi 10$                 | $\phi 24$             | 10                  | 26                    | -                              | -     | -     | 111.4            |
| <b>S1.5S 20B — 1810</b>  | 20                     | $\phi 30$                 | $\phi 33$             | B1   | 18                | $\phi 10$                 | $\phi 25$             | 10                  | 28                    | -                              | -     | -     | 121.2            |
| <b>S1.5S 20B # 1812</b>  | 20                     | $\phi 30$                 | $\phi 33$             | B1   | 18                | $\phi 12$                 | $\phi 25$             | 10                  | 28                    | $4 \times 1.8$                 | M3    | 5     | 111.8            |

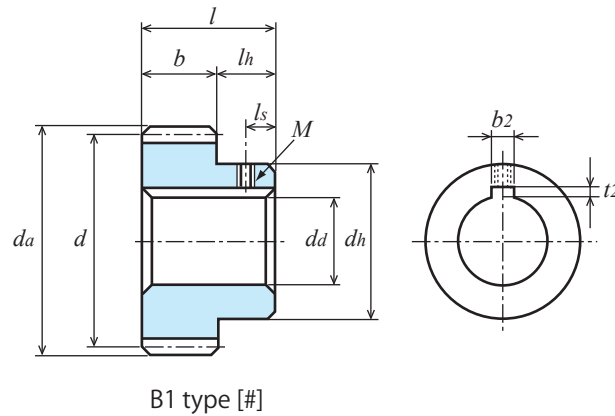




2D • 3D CAD



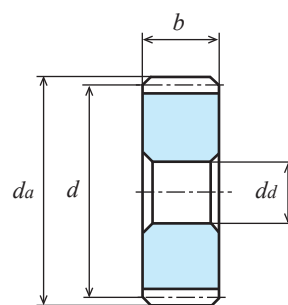
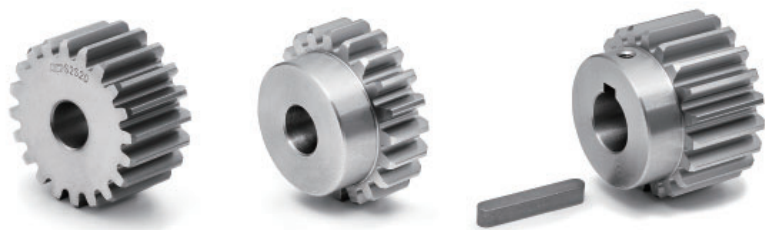
A1 type [=]



B1 type [#]

| Catalogue number         | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>da</i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>da</i> (H7) | Hub diameter<br><i>dh</i> | Hub length<br><i>lh</i> | Overall length<br><i>l</i> | Key groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw    |           | Weight<br><i>W</i> (g) |
|--------------------------|-----------------------------|--------------------------------|---------------------------|------|------------------------|---------------------------------|---------------------------|-------------------------|----------------------------|----------------------------------------------------|----------|-----------|------------------------|
|                          |                             |                                |                           |      |                        |                                 |                           |                         |                            |                                                    | <i>M</i> | <i>ls</i> |                        |
| <b>S1.5S 23B – 1210F</b> | 23                          | φ34.5                          | φ37.5                     | B1   | 12                     | φ10                             | φ26                       | 10                      | 22                         | -                                                  | -        | -         | 116.2                  |
| <b>S1.5S 24A – 1010F</b> | 24                          | φ36                            | φ39                       | A1   | 10                     | φ10                             | -                         | -                       | 10                         | -                                                  | -        | -         | 73.7                   |
| <b>S1.5S 24A – 1210F</b> | 24                          | φ36                            | φ39                       | A1   | 12                     | φ10                             | -                         | -                       | 12                         | -                                                  | -        | -         | 88.5                   |
| <b>S1.5S 24A = 1212</b>  | 24                          | φ36                            | φ39                       | A1   | 12                     | φ12                             | -                         | -                       | 12                         | 4 × 1.8                                            | -        | -         | 84.6                   |
| <b>S1.5S 24A – 1812F</b> | 24                          | φ36                            | φ39                       | A1   | 18                     | φ12                             | -                         | -                       | 18                         | -                                                  | -        | -         | 127.8                  |
| <b>S1.5S 24A = 1816</b>  | 24                          | φ36                            | φ39                       | A1   | 18                     | φ16                             | -                         | -                       | 18                         | 5 × 2.3                                            | -        | -         | 113.8                  |
| <b>S1.5S 24B – 1010F</b> | 24                          | φ36                            | φ39                       | B1   | 10                     | φ10                             | φ30                       | 10                      | 20                         | -                                                  | -        | -         | 123.1                  |
| <b>S1.5S 24B – 1210F</b> | 24                          | φ36                            | φ39                       | B1   | 12                     | φ10                             | φ30                       | 10                      | 22                         | -                                                  | -        | -         | 137.8                  |
| <b>S1.5S 24B # 1212</b>  | 24                          | φ36                            | φ39                       | B1   | 12                     | φ12                             | φ30                       | 10                      | 22                         | 4 × 1.8                                            | M3       | 5         | 130.4                  |
| <b>S1.5S 24B – 1812</b>  | 24                          | φ36                            | φ39                       | B1   | 18                     | φ12                             | φ30                       | 10                      | 28                         | -                                                  | -        | -         | 174.6                  |

| Number of teeth<br><i>z</i> | Face width<br><i>b</i> | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |  |
|-----------------------------|------------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|--|
|                             |                        | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |  |
| 8                           | 18                     | 0.010                                                                                                  | 0.108  | 0.216  | 0.433  | 0.867  | 1.301    | 1.619    | 10.31                                                         |  |
| 10                          | 18                     | 0.014                                                                                                  | 0.149  | 0.299  | 0.598  | 1.197  | 1.791    | 2.156    | 14.22                                                         |  |
| 12                          | 18                     | 0.013                                                                                                  | 0.137  | 0.275  | 0.550  | 1.100  | 1.618    | 1.942    | 13.08                                                         |  |
| 13                          | 18                     | 0.015                                                                                                  | 0.158  | 0.316  | 0.632  | 1.264  | 1.835    | 2.196    | 15.08                                                         |  |
| 14                          | 18                     | 0.017                                                                                                  | 0.179  | 0.358  | 0.717  | 1.434  | 2.052    | 2.450    | 17.09                                                         |  |
| 15                          | 12                     | 0.013                                                                                                  | 0.133  | 0.267  | 0.535  | 1.071  | 1.513    | 1.801    | 12.70                                                         |  |
| 15                          | 16                     | 0.017                                                                                                  | 0.178  | 0.357  | 0.714  | 1.428  | 2.017    | 2.402    | 16.99                                                         |  |
| 15                          | 18                     | 0.020                                                                                                  | 0.200  | 0.401  | 0.803  | 1.607  | 2.269    | 2.702    | 19.09                                                         |  |
| 16                          | 12                     | 0.014                                                                                                  | 0.148  | 0.297  | 0.594  | 1.188  | 1.657    | 1.968    | 14.13                                                         |  |
| 16                          | 16                     | 0.019                                                                                                  | 0.198  | 0.396  | 0.792  | 1.584  | 2.209    | 2.624    | 18.90                                                         |  |
| 16                          | 18                     | 0.022                                                                                                  | 0.222  | 0.445  | 0.891  | 1.782  | 2.485    | 2.952    | 21.20                                                         |  |
| 17                          | 12                     | 0.016                                                                                                  | 0.164  | 0.327  | 0.654  | 1.295  | 1.800    | 2.133    | 15.66                                                         |  |
| 17                          | 18                     | 0.024                                                                                                  | 0.245  | 0.490  | 0.981  | 1.942  | 2.700    | 3.198    | 23.39                                                         |  |
| 18                          | 12                     | 0.017                                                                                                  | 0.178  | 0.357  | 0.714  | 1.401  | 1.941    | 2.294    | 16.99                                                         |  |
| 18                          | 16                     | 0.023                                                                                                  | 0.238  | 0.476  | 0.952  | 1.869  | 2.588    | 3.059    | 22.72                                                         |  |
| 18                          | 18                     | 0.026                                                                                                  | 0.268  | 0.536  | 1.072  | 2.102  | 2.911    | 3.441    | 25.59                                                         |  |
| 19                          | 12                     | 0.019                                                                                                  | 0.194  | 0.388  | 0.776  | 1.509  | 2.083    | 2.456    | 18.52                                                         |  |
| 20                          | 10                     | 0.017                                                                                                  | 0.174  | 0.349  | 0.699  | 1.346  | 1.852    | 2.179    | 16.61                                                         |  |
| 20                          | 12                     | 0.020                                                                                                  | 0.209  | 0.419  | 0.839  | 1.616  | 2.222    | 2.614    | 19.95                                                         |  |
| 20                          | 16                     | 0.027                                                                                                  | 0.279  | 0.559  | 1.118  | 2.154  | 2.963    | 3.486    | 26.64                                                         |  |
| 20                          | 18                     | 0.031                                                                                                  | 0.314  | 0.629  | 1.258  | 2.424  | 3.333    | 3.922    | 29.98                                                         |  |
| 23                          | 12                     | 0.025                                                                                                  | 0.257  | 0.514  | 1.029  | 1.930  | 2.628    | 3.073    | 24.54                                                         |  |
| 24                          | 10                     | 0.022                                                                                                  | 0.227  | 0.455  | 0.911  | 1.694  | 2.299    | 2.683    | 21.67                                                         |  |
| 24                          | 12                     | 0.027                                                                                                  | 0.273  | 0.546  | 1.093  | 2.033  | 2.759    | 3.219    | 26.07                                                         |  |
| 24                          | 18                     | 0.041                                                                                                  | 0.410  | 0.820  | 1.640  | 3.049  | 4.139    | 4.829    | 39.15                                                         |  |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.06 to 0.15 |

A1 type [-]

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

Gears with a [=] are provided with key grooves and keys.

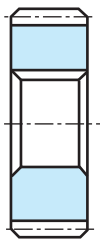
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

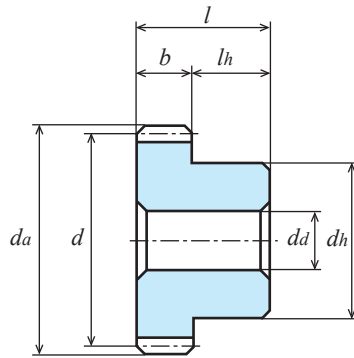
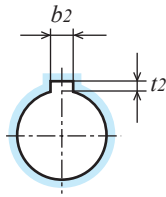
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

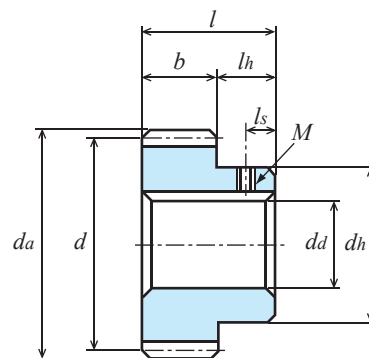
| Catalogue number         | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>d<sub>a</sub></i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>d<sub>a</sub>(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw    |                      | Weight<br><i>W(g)</i> |
|--------------------------|-----------------------------|----------------------------------------|-----------------------------------------|------|---------------------------|----------------------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|----------|----------------------|-----------------------|
|                          |                             |                                        |                                         |      |                           |                                              |                                         |                                       |                               |                                                       | <i>M</i> | <i>l<sub>s</sub></i> |                       |
| <b>S1.5S 25A — 1010F</b> | 25                          | φ37.5                                  | φ40.5                                   | A1   | 10                        | φ10                                          | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 80.5                  |
| <b>S1.5S 25A — 1210F</b> | 25                          | φ37.5                                  | φ40.5                                   | A1   | 12                        | φ10                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 96.6                  |
| <b>S1.5S 25A = 1212</b>  | 25                          | φ37.5                                  | φ40.5                                   | A1   | 12                        | φ12                                          | -                                       | -                                     | 12                            | 4 × 1.8                                               | -        | -                    | 92.7                  |
| <b>S1.5S 25A = 1816</b>  | 25                          | φ37.5                                  | φ40.5                                   | A1   | 18                        | φ16                                          | -                                       | -                                     | 18                            | 5 × 2.3                                               | -        | -                    | 126.0                 |
| <b>S1.5S 25B — 1010F</b> | 25                          | φ37.5                                  | φ40.5                                   | B1   | 10                        | φ10                                          | φ30                                     | 10                                    | 20                            | -                                                     | -        | -                    | 129.9                 |
| <b>S1.5S 25B — 1210</b>  | 25                          | φ37.5                                  | φ40.5                                   | B1   | 12                        | φ10                                          | φ30                                     | 10                                    | 22                            | -                                                     | -        | -                    | 146.1                 |
| <b>S1.5S 25B # 1215</b>  | 25                          | φ37.5                                  | φ40.5                                   | B1   | 12                        | φ15                                          | φ30                                     | 10                                    | 22                            | 5 × 2.3                                               | M4       | 5                    | 126.7                 |
| <b>S1.5S 25B — 1612</b>  | 25                          | φ37.5                                  | φ40.5                                   | B1   | 16                        | φ12                                          | φ30                                     | 10                                    | 26                            | -                                                     | -        | -                    | 171.2                 |
| <b>S1.5S 25B — 1812</b>  | 25                          | φ37.5                                  | φ40.5                                   | B1   | 18                        | φ12                                          | φ32                                     | 10                                    | 28                            | -                                                     | -        | -                    | 194.5                 |
| <b>S1.5S 26A — 1210F</b> | 26                          | φ39                                    | φ42                                     | A1   | 12                        | φ10                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 105.1                 |
| <b>S1.5S 26A — 1812F</b> | 26                          | φ39                                    | φ42                                     | A1   | 18                        | φ12                                          | -                                       | -                                     | 18                            | -                                                     | -        | -                    | 152.8                 |
| <b>S1.5S 26B — 1210F</b> | 26                          | φ39                                    | φ42                                     | B1   | 12                        | φ10                                          | φ32                                     | 10                                    | 22                            | -                                                     | -        | -                    | 162.1                 |
| <b>S1.5S 26B — 1812</b>  | 26                          | φ39                                    | φ42                                     | B1   | 18                        | φ12                                          | φ32                                     | 10                                    | 28                            | -                                                     | -        | -                    | 207.2                 |
| <b>S1.5S 27A — 1210F</b> | 27                          | φ40.5                                  | φ43.5                                   | A1   | 12                        | φ10                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 114.0                 |
| <b>S1.5S 27B — 1210F</b> | 27                          | φ40.5                                  | φ43.5                                   | B1   | 12                        | φ10                                          | φ32                                     | 10                                    | 22                            | -                                                     | -        | -                    | 170.9                 |
| <b>S1.5S 28A — 1012F</b> | 28                          | φ42                                    | φ45                                     | A1   | 10                        | φ12                                          | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 99.9                  |
| <b>S1.5S 28A — 1210F</b> | 28                          | φ42                                    | φ45                                     | A1   | 12                        | φ10                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 123.1                 |
| <b>S1.5S 28A — 1612F</b> | 28                          | φ42                                    | φ45                                     | A1   | 16                        | φ12                                          | -                                       | -                                     | 16                            | -                                                     | -        | -                    | 159.8                 |
| <b>S1.5S 28A — 1812F</b> | 28                          | φ42                                    | φ45                                     | A1   | 18                        | φ12                                          | -                                       | -                                     | 18                            | -                                                     | -        | -                    | 179.8                 |
| <b>S1.5S 28B — 1010F</b> | 28                          | φ42                                    | φ45                                     | B1   | 10                        | φ10                                          | φ36                                     | 10                                    | 20                            | -                                                     | -        | -                    | 176.3                 |
| <b>S1.5S 28B — 1210</b>  | 28                          | φ42                                    | φ45                                     | B1   | 12                        | φ10                                          | φ30                                     | 10                                    | 22                            | -                                                     | -        | -                    | 172.5                 |
| <b>S1.5S 28B # 1212</b>  | 28                          | φ42                                    | φ45                                     | B1   | 12                        | φ12                                          | φ30                                     | 10                                    | 22                            | 4 × 1.8                                               | M3       | 5                    | 165.0                 |
| <b>S1.5S 28B — 1812</b>  | 28                          | φ42                                    | φ45                                     | B1   | 18                        | φ12                                          | φ36                                     | 10                                    | 28                            | -                                                     | -        | -                    | 251.0                 |
| <b>S1.5S 28B # 1815</b>  | 28                          | φ42                                    | φ45                                     | B1   | 18                        | φ15                                          | φ36                                     | 10                                    | 28                            | 5 × 2.3                                               | M4       | 5                    | 233.8                 |
| <b>S1.5S 29B — 1812</b>  | 29                          | φ43.5                                  | φ46.5                                   | B1   | 18                        | φ12                                          | φ38                                     | 10                                    | 28                            | -                                                     | -        | -                    | 274.3                 |
| <b>S1.5S 30A — 1012F</b> | 30                          | φ45                                    | φ48                                     | A1   | 10                        | φ12                                          | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 116.0                 |
| <b>S1.5S 30A — 1210F</b> | 30                          | φ45                                    | φ48                                     | A1   | 12                        | φ10                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 142.4                 |
| <b>S1.5S 30A = 1215</b>  | 30                          | φ45                                    | φ48                                     | A1   | 12                        | φ15                                          | -                                       | -                                     | 12                            | 5 × 2.3                                               | -        | -                    | 132.1                 |
| <b>S1.5S 30A — 1614F</b> | 30                          | φ45                                    | φ48                                     | A1   | 16                        | φ14                                          | -                                       | -                                     | 16                            | -                                                     | -        | -                    | 180.4                 |
| <b>S1.5S 30A — 1814F</b> | 30                          | φ45                                    | φ48                                     | A1   | 18                        | φ14                                          | -                                       | -                                     | 18                            | -                                                     | -        | -                    | 203.0                 |
| <b>S1.5S 30A = 1818</b>  | 30                          | φ45                                    | φ48                                     | A1   | 18                        | φ18                                          | -                                       | -                                     | 18                            | 6 × 2.8                                               | -        | -                    | 186.4                 |
| <b>S1.5S 30B — 1010F</b> | 30                          | φ45                                    | φ48                                     | B1   | 10                        | φ10                                          | φ38                                     | 10                                    | 20                            | -                                                     | -        | -                    | 201.5                 |
| <b>S1.5S 30B — 1210</b>  | 30                          | φ45                                    | φ48                                     | B1   | 12                        | φ10                                          | φ30                                     | 10                                    | 22                            | -                                                     | -        | -                    | 191.9                 |
| <b>S1.5S 30B # 1212</b>  | 30                          | φ45                                    | φ48                                     | B1   | 12                        | φ12                                          | φ30                                     | 10                                    | 22                            | 4 × 1.8                                               | M3       | 5                    | 184.3                 |
| <b>S1.5S 30B # 1215</b>  | 30                          | φ45                                    | φ48                                     | B1   | 12                        | φ15                                          | φ30                                     | 10                                    | 22                            | 5 × 2.3                                               | M4       | 5                    | 172.5                 |
| <b>S1.5S 30B — 1612</b>  | 30                          | φ45                                    | φ48                                     | B1   | 16                        | φ12                                          | φ38                                     | 10                                    | 26                            | -                                                     | -        | -                    | 265.9                 |
| <b>S1.5S 30B — 1812</b>  | 30                          | φ45                                    | φ48                                     | B1   | 18                        | φ12                                          | φ40                                     | 10                                    | 28                            | -                                                     | -        | -                    | 298.7                 |



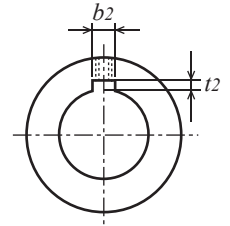
A1 type [=]



B1 type [-]

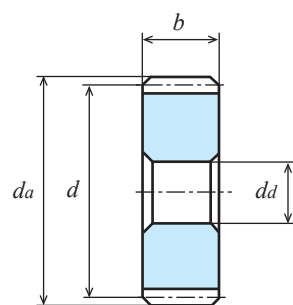
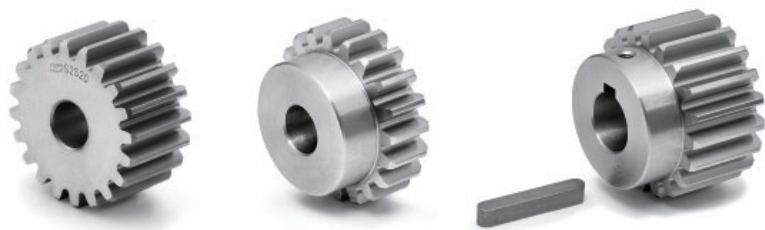


B1 type [#]



| Catalogue number         | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw |       | Weight<br>$W(g)$ |
|--------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-------|-------|------------------|
|                          |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | $M$   | $l_s$ |                  |
| <b>S1.5S 32A — 1010F</b> | 32                     | $\phi 48$                 | $\phi 51$             | A1   | 10                | $\phi 10$                  | -                     | -                   | 10                    | -                              | -     | -     | 135.9            |
| <b>S1.5S 32A — 1614F</b> | 32                     | $\phi 48$                 | $\phi 51$             | A1   | 16                | $\phi 14$                  | -                     | -                   | 16                    | -                              | -     | -     | 207.9            |
| <b>S1.5S 32B — 1010</b>  | 32                     | $\phi 48$                 | $\phi 51$             | B1   | 10                | $\phi 10$                  | $\phi 30$             | 10                  | 20                    | -                              | -     | -     | 185.3            |
| <b>S1.5S 32B — 1612</b>  | 32                     | $\phi 48$                 | $\phi 51$             | B1   | 16                | $\phi 12$                  | $\phi 40$             | 10                  | 26                    | -                              | -     | -     | 303.0            |
| <b>S1.5S 34A — 1012F</b> | 34                     | $\phi 51$                 | $\phi 54$             | A1   | 10                | $\phi 12$                  | -                     | -                   | 10                    | -                              | -     | -     | 151.5            |
| <b>S1.5S 34B — 1010F</b> | 34                     | $\phi 51$                 | $\phi 54$             | B1   | 10                | $\phi 10$                  | $\phi 44$             | 10                  | 20                    | -                              | -     | -     | 267.4            |
| <b>S1.5S 35A — 1614F</b> | 35                     | $\phi 52.5$               | $\phi 55.5$           | A1   | 16                | $\phi 14$                  | -                     | -                   | 16                    | -                              | -     | -     | 252.6            |
| <b>S1.5S 35B — 1010F</b> | 35                     | $\phi 52.5$               | $\phi 55.5$           | B1   | 10                | $\phi 10$                  | $\phi 44$             | 10                  | 20                    | -                              | -     | -     | 277.0            |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N-m) |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |
| 25                     | 10                | 0.024                                                                                                  | 0.241  | 0.482  | 0.965  | 1.779  | 2.407    | 2.803    | 23.01                                                         |
| 25                     | 12                | 0.028                                                                                                  | 0.289  | 0.579  | 1.159  | 2.135  | 2.889    | 3.364    | 27.59                                                         |
| 25                     | 16                | 0.038                                                                                                  | 0.386  | 0.772  | 1.545  | 2.847  | 3.852    | 4.486    | 36.86                                                         |
| 25                     | 18                | 0.043                                                                                                  | 0.434  | 0.869  | 1.738  | 3.203  | 4.334    | 4.047    | 41.44                                                         |
| 26                     | 12                | 0.030                                                                                                  | 0.306  | 0.612  | 1.224  | 2.236  | 3.017    | 3.524    | 29.22                                                         |
| 26                     | 18                | 0.045                                                                                                  | 0.459  | 0.918  | 1.836  | 3.355  | 4.526    | 5.286    | 43.83                                                         |
| 27                     | 12                | 0.032                                                                                                  | 0.322  | 0.645  | 1.290  | 2.337  | 3.143    | 3.697    | 30.75                                                         |
| 28                     | 10                | 0.028                                                                                                  | 0.282  | 0.565  | 1.130  | 2.030  | 2.722    | 3.224    | 26.73                                                         |
| 28                     | 12                | 0.033                                                                                                  | 0.339  | 0.678  | 1.356  | 2.436  | 3.267    | 3.869    | 32.37                                                         |
| 28                     | 16                | 0.045                                                                                                  | 0.452  | 0.904  | 1.809  | 3.248  | 4.356    | 5.159    | 43.16                                                         |
| 28                     | 18                | 0.050                                                                                                  | 0.508  | 1.017  | 2.035  | 3.654  | 4.901    | 5.804    | 48.51                                                         |
| 29                     | 18                | 0.053                                                                                                  | 0.533  | 1.067  | 2.135  | 3.802  | 5.084    | 6.063    | 50.89                                                         |
| 30                     | 10                | 0.031                                                                                                  | 0.310  | 0.620  | 1.241  | 2.192  | 2.923    | 3.509    | 29.60                                                         |
| 30                     | 12                | 0.037                                                                                                  | 0.372  | 0.744  | 1.489  | 2.630  | 3.508    | 4.211    | 35.52                                                         |
| 30                     | 16                | 0.049                                                                                                  | 0.496  | 0.993  | 1.986  | 3.507  | 4.677    | 5.615    | 47.36                                                         |
| 30                     | 18                | 0.055                                                                                                  | 0.558  | 1.117  | 2.234  | 3.946  | 5.262    | 6.317    | 53.28                                                         |
| 32                     | 10                | 0.033                                                                                                  | 0.338  | 0.677  | 1.352  | 2.351  | 3.122    | 3.793    | 32.27                                                         |
| 32                     | 16                | 0.054                                                                                                  | 0.541  | 1.083  | 2.164  | 3.762  | 4.996    | 6.069    | 51.66                                                         |
| 34                     | 10                | 0.036                                                                                                  | 0.366  | 0.733  | 1.452  | 2.507  | 3.359    | 4.074    | 34.95                                                         |
| 35                     | 10                | 0.038                                                                                                  | 0.381  | 0.762  | 1.501  | 2.583  | 3.477    | 4.214    | 36.38                                                         |
| 35                     | 16                | 0.060                                                                                                  | 0.609  | 1.219  | 2.402  | 4.133  | 5.563    | 6.743    | 58.15                                                         |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.06 to 0.15 |

A1 type [-]

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

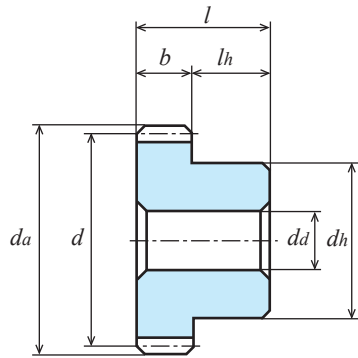
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

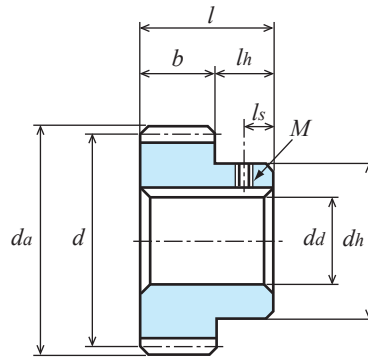
| Catalogue number         | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>da</i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>dd(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw    |                      | Weight<br><i>W(g)</i> |
|--------------------------|-----------------------------|----------------------------------------|------------------------------|------|---------------------------|-----------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|----------|----------------------|-----------------------|
|                          |                             |                                        |                              |      |                           |                                   |                                         |                                       |                               |                                                       | <i>M</i> | <i>l<sub>s</sub></i> |                       |
| <b>S1.5S 36A — 1012F</b> | 36                          | φ54                                    | φ57                          | A1   | 10                        | φ12                               | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 170.9                 |
| <b>S1.5S 36A — 1614F</b> | 36                          | φ54                                    | φ57                          | A1   | 16                        | φ14                               | -                                       | -                                     | 16                            | -                                                     | -        | -                    | 268.3                 |
| <b>S1.5S 36B — 1010</b>  | 36                          | φ54                                    | φ57                          | B1   | 10                        | φ10                               | φ32                                     | 10                                    | 20                            | -                                                     | -        | -                    | 230.7                 |
| <b>S1.5S 36B # 1012</b>  | 36                          | φ54                                    | φ57                          | B1   | 10                        | φ12                               | φ32                                     | 10                                    | 20                            | 4 × 1.8                                               | M3       | 5                    | 223.8                 |
| <b>S1.5S 36B — 1612</b>  | 36                          | φ54                                    | φ57                          | B1   | 16                        | φ12                               | φ40                                     | 10                                    | 26                            | -                                                     | -        | -                    | 363.5                 |
| <b>S1.5S 38B — 1012F</b> | 38                          | φ57                                    | φ60                          | B1   | 10                        | φ12                               | φ50                                     | 10                                    | 20                            | -                                                     | -        | -                    | 336.7                 |
| <b>S1.5S 38B — 1612</b>  | 38                          | φ57                                    | φ60                          | B1   | 16                        | φ12                               | φ50                                     | 10                                    | 26                            | -                                                     | -        | -                    | 451.8                 |
| <b>S1.5S 40A — 1012F</b> | 40                          | φ60                                    | φ63                          | A1   | 10                        | φ12                               | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 213.1                 |
| <b>S1.5S 40A = 1016</b>  | 40                          | φ60                                    | φ63                          | A1   | 10                        | φ16                               | -                                       | -                                     | 10                            | 5 × 2.3                                               | -        | -                    | 205.3                 |
| <b>S1.5S 40A — 1614F</b> | 40                          | φ60                                    | φ63                          | A1   | 16                        | φ14                               | -                                       | -                                     | 16                            | -                                                     | -        | -                    | 335.8                 |
| <b>S1.5S 40B — 1012</b>  | 40                          | φ60                                    | φ63                          | B1   | 10                        | φ12                               | φ36                                     | 10                                    | 20                            | -                                                     | -        | -                    | 284.3                 |
| <b>S1.5S 40B # 1015</b>  | 40                          | φ60                                    | φ63                          | B1   | 10                        | φ15                               | φ36                                     | 10                                    | 20                            | 5 × 2.3                                               | M4       | 5                    | 271.8                 |
| <b>S1.5S 40B # 1018</b>  | 40                          | φ60                                    | φ63                          | B1   | 10                        | φ18                               | φ36                                     | 10                                    | 20                            | 6 × 2.8                                               | M5       | 5                    | 258.6                 |
| <b>S1.5S 40B — 1612</b>  | 40                          | φ60                                    | φ63                          | B1   | 16                        | φ12                               | φ40                                     | 10                                    | 26                            | -                                                     | -        | -                    | 431.0                 |
| <b>S1.5S 42B — 1012F</b> | 42                          | φ63                                    | φ66                          | B1   | 10                        | φ12                               | φ50                                     | 10                                    | 20                            | -                                                     | -        | -                    | 381.1                 |
| <b>S1.5S 42B — 1612</b>  | 42                          | φ63                                    | φ66                          | B1   | 16                        | φ12                               | φ50                                     | 10                                    | 26                            | -                                                     | -        | -                    | 522.9                 |
| <b>S1.5S 44A — 1012F</b> | 44                          | φ66                                    | φ69                          | A1   | 10                        | φ12                               | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 259.7                 |
| <b>S1.5S 44A — 1612F</b> | 44                          | φ66                                    | φ69                          | A1   | 16                        | φ12                               | -                                       | -                                     | 16                            | -                                                     | -        | -                    | 415.5                 |
| <b>S1.5S 44B — 1012F</b> | 44                          | φ66                                    | φ69                          | B1   | 10                        | φ12                               | φ50                                     | 10                                    | 20                            | -                                                     | -        | -                    | 404.9                 |
| <b>S1.5S 44B — 1612</b>  | 44                          | φ66                                    | φ69                          | B1   | 16                        | φ12                               | φ50                                     | 10                                    | 26                            | -                                                     | -        | -                    | 561.1                 |
| <b>S1.5S 45A — 1012F</b> | 45                          | φ67.5                                  | φ70.5                        | A1   | 10                        | φ12                               | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 272.0                 |
| <b>S1.5S 45B — 1012F</b> | 45                          | φ67.5                                  | φ70.5                        | B1   | 10                        | φ12                               | φ50                                     | 10                                    | 20                            | -                                                     | -        | -                    | 417.3                 |
| <b>S1.5S 46A — 1012F</b> | 46                          | φ69                                    | φ72                          | A1   | 10                        | φ12                               | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 284.7                 |
| <b>S1.5S 46B — 1012F</b> | 46                          | φ69                                    | φ72                          | B1   | 10                        | φ12                               | φ50                                     | 10                                    | 20                            | -                                                     | -        | -                    | 429.9                 |
| <b>S1.5S 48A — 1014F</b> | 48                          | φ72                                    | φ75                          | A1   | 10                        | φ14                               | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 307.5                 |
| <b>S1.5S 48A — 1616F</b> | 48                          | φ72                                    | φ75                          | A1   | 16                        | φ16                               | -                                       | -                                     | 16                            | -                                                     | -        | -                    | 486.1                 |
| <b>S1.5S 48B — 1012</b>  | 48                          | φ72                                    | φ75                          | B1   | 10                        | φ12                               | φ36                                     | 10                                    | 20                            | -                                                     | -        | -                    | 382.0                 |
| <b>S1.5S 48B — 1612</b>  | 48                          | φ72                                    | φ75                          | B1   | 16                        | φ12                               | φ40                                     | 10                                    | 26                            | -                                                     | -        | -                    | 587.3                 |
| <b>S1.5S 50A — 1014F</b> | 50                          | φ75                                    | φ78                          | A1   | 10                        | φ14                               | -                                       | -                                     | 10                            | -                                                     | -        | -                    | 334.7                 |
| <b>S1.5S 50A — 1616F</b> | 50                          | φ75                                    | φ78                          | A1   | 16                        | φ16                               | -                                       | -                                     | 16                            | -                                                     | -        | -                    | 529.6                 |
| <b>S1.5S 50B — 1012</b>  | 50                          | φ75                                    | φ78                          | B1   | 10                        | φ12                               | φ40                                     | 10                                    | 20                            | -                                                     | -        | -                    | 428.0                 |
| <b>S1.5S 50B # 1015</b>  | 50                          | φ75                                    | φ78                          | B1   | 10                        | φ15                               | φ40                                     | 10                                    | 20                            | 5 × 2.3                                               | M4       | 5                    | 415.3                 |
| <b>S1.5S 50B # 1018</b>  | 50                          | φ75                                    | φ78                          | B1   | 10                        | φ18                               | φ40                                     | 10                                    | 20                            | 6 × 2.8                                               | M5       | 5                    | 402.1                 |
| <b>S1.5S 50B — 1615</b>  | 50                          | φ75                                    | φ78                          | B1   | 16                        | φ15                               | φ50                                     | 10                                    | 26                            | -                                                     | -        | -                    | 673.4                 |



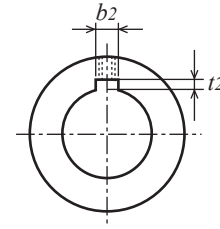
2D • 3D CAD



B1 type [-]

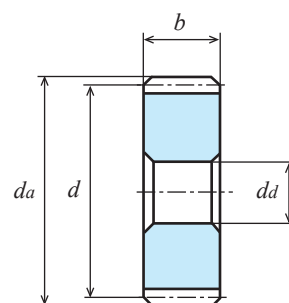
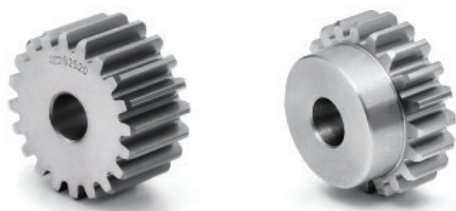


B1 type [#]



| Catalogue number         | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>da</i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>da(H7)</i> | Hub diameter<br><i>dh</i> | Hub length<br><i>lh</i> | Overall length<br><i>l</i> | Key groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw    |           | Weight<br><i>W(g)</i> |
|--------------------------|-----------------------------|--------------------------------|---------------------------|------|------------------------|--------------------------------|---------------------------|-------------------------|----------------------------|----------------------------------------------------|----------|-----------|-----------------------|
|                          |                             |                                |                           |      |                        |                                |                           |                         |                            |                                                    | <i>M</i> | <i>ls</i> |                       |
| <b>S1.5S 52A – 1014F</b> | 52                          | φ78                            | φ81                       | A1   | 10                     | φ14                            | -                         | -                       | 10                         | -                                                  | -        | -         | 363.0                 |
| <b>S1.5S 52A – 1616F</b> | 52                          | φ78                            | φ81                       | A1   | 16                     | φ16                            | -                         | -                       | 16                         | -                                                  | -        | -         | 574.9                 |
| <b>S1.5S 52B – 1616</b>  | 52                          | φ78                            | φ81                       | B1   | 16                     | φ16                            | φ60                       | 10                      | 26                         | -                                                  | -        | -         | 781.6                 |
| <b>S1.5S 54B – 1616</b>  | 54                          | φ81                            | φ84                       | B1   | 16                     | φ16                            | φ60                       | 10                      | 26                         | -                                                  | -        | -         | 828.7                 |

| Number of teeth<br><i>z</i> | Face width<br><i>b</i> | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |  |
|-----------------------------|------------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|--|
|                             |                        | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |  |
| 36                          | 10                     | 0.039                                                                                                  | 0.395  | 0.790  | 1.550  | 2.659  | 3.594    | 4.353    | 37.72                                                         |  |
| 36                          | 16                     | 0.063                                                                                                  | 0.632  | 1.265  | 2.481  | 4.254  | 5.751    | 6.966    | 60.35                                                         |  |
| 38                          | 10                     | 0.042                                                                                                  | 0.424  | 0.848  | 1.648  | 2.807  | 3.828    | 4.629    | 40.49                                                         |  |
| 38                          | 16                     | 0.067                                                                                                  | 0.678  | 1.356  | 2.637  | 4.492  | 6.125    | 7.407    | 64.74                                                         |  |
| 40                          | 10                     | 0.045                                                                                                  | 0.452  | 0.905  | 1.744  | 2.952  | 4.060    | 4.902    | 43.16                                                         |  |
| 40                          | 16                     | 0.072                                                                                                  | 0.724  | 1.449  | 2.791  | 4.724  | 6.496    | 7.844    | 69.13                                                         |  |
| 42                          | 10                     | 0.048                                                                                                  | 0.481  | 0.963  | 1.839  | 3.094  | 4.290    | 5.173    | 45.93                                                         |  |
| 42                          | 16                     | 0.077                                                                                                  | 0.771  | 1.542  | 2.943  | 4.951  | 6.864    | 8.276    | 73.62                                                         |  |
| 44                          | 10                     | 0.051                                                                                                  | 0.510  | 1.021  | 1.932  | 3.230  | 4.515    | 5.448    | 48.70                                                         |  |
| 44                          | 16                     | 0.080                                                                                                  | 0.820  | 1.630  | 3.090  | 5.170  | 7.220    | 8.720    | 78.30                                                         |  |
| 45                          | 10                     | 0.052                                                                                                  | 0.525  | 1.050  | 1.978  | 3.298  | 4.628    | 5.588    | 50.13                                                         |  |
| 46                          | 10                     | 0.053                                                                                                  | 0.539  | 1.079  | 2.024  | 3.365  | 4.740    | 5.727    | 51.47                                                         |  |
| 48                          | 10                     | 0.05                                                                                                   | 0.56   | 1.13   | 2.11   | 3.50   | 4.96     | 6.00     | 53.47                                                         |  |
| 48                          | 16                     | 0.09                                                                                                   | 0.91   | 1.82   | 3.39   | 5.60   | 7.94     | 9.61     | 86.90                                                         |  |
| 50                          | 10                     | 0.059                                                                                                  | 0.59   | 1.19   | 2.20   | 3.66   | 5.18     | 6.28     | 56.34                                                         |  |
| 50                          | 16                     | 0.096                                                                                                  | 0.96   | 1.92   | 3.53   | 5.86   | 8.30     | 10.05    | 91.67                                                         |  |
| 52                          | 10                     | 0.062                                                                                                  | 0.62   | 1.25   | 2.29   | 3.82   | 5.40     | 6.55     | 59.20                                                         |  |
| 52                          | 16                     | 0.101                                                                                                  | 1.01   | 2.01   | 3.67   | 6.12   | 8.65     | 10.49    | 96.45                                                         |  |
| 54                          | 16                     | 0.105                                                                                                  | 1.05   | 2.10   | 3.81   | 6.38   | 9.00     | 10.92    | 100.27                                                        |  |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.06 to 0.15 |

A1 type [-]

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

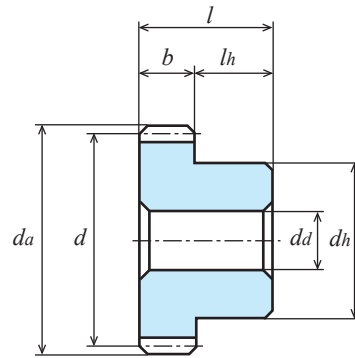
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number          | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(kg)$ |
|---------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-------------------|
| <b>S1.5S 55A — 1616F</b>  | 55                     | $\phi$ 82.5               | $\phi$ 85.5           | A1   | 16                | $\phi$ 16                  | -                     | -                   | 16                    | 0.65              |
| <b>S1.5S 56A — 1616F</b>  | 56                     | $\phi$ 84                 | $\phi$ 87             | A1   | 16                | $\phi$ 16                  | -                     | -                   | 16                    | 0.67              |
| <b>S1.5S 56B — 1616</b>   | 56                     | $\phi$ 84                 | $\phi$ 87             | B1   | 16                | $\phi$ 16                  | $\phi$ 50             | 10                  | 26                    | 0.81              |
| <b>S1.5S 58B — 1014F</b>  | 58                     | $\phi$ 87                 | $\phi$ 90             | B1   | 10                | $\phi$ 14                  | $\phi$ 50             | 10                  | 20                    | 0.60              |
| <b>S1.5S 60A — 1014F</b>  | 60                     | $\phi$ 90                 | $\phi$ 93             | A1   | 10                | $\phi$ 14                  | -                     | -                   | 10                    | 0.49              |
| <b>S1.5S 60A — 1616F</b>  | 60                     | $\phi$ 90                 | $\phi$ 93             | A1   | 16                | $\phi$ 16                  | -                     | -                   | 16                    | 0.77              |
| <b>S1.5S 60B — 1014</b>   | 60                     | $\phi$ 90                 | $\phi$ 93             | B1   | 10                | $\phi$ 14                  | $\phi$ 40             | 10                  | 20                    | 0.57              |
| <b>S1.5S 64A — 1014F</b>  | 64                     | $\phi$ 96                 | $\phi$ 99             | A1   | 10                | $\phi$ 14                  | -                     | -                   | 10                    | 0.56              |
| <b>S1.5S 64B — 1014</b>   | 64                     | $\phi$ 96                 | $\phi$ 99             | B1   | 10                | $\phi$ 14                  | $\phi$ 40             | 10                  | 20                    | 0.64              |
| <b>S1.5S 68B — 1014F</b>  | 68                     | $\phi$ 102                | $\phi$ 105            | B1   | 10                | $\phi$ 14                  | $\phi$ 50             | 10                  | 20                    | 0.77              |
| <b>S1.5S 70B — 1616</b>   | 70                     | $\phi$ 105                | $\phi$ 108            | B1   | 16                | $\phi$ 16                  | $\phi$ 50             | 10                  | 26                    | 1.20              |
| <b>S1.5S 72A — 1016F</b>  | 72                     | $\phi$ 108                | $\phi$ 111            | A1   | 10                | $\phi$ 16                  | -                     | -                   | 10                    | 0.70              |
| <b>S1.5S 72A — 1618F</b>  | 72                     | $\phi$ 108                | $\phi$ 111            | A1   | 16                | $\phi$ 18                  | -                     | -                   | 16                    | 1.12              |
| <b>S1.5S 72B — 1016</b>   | 72                     | $\phi$ 108                | $\phi$ 111            | B1   | 10                | $\phi$ 16                  | $\phi$ 40             | 10                  | 20                    | 0.79              |
| <b>S1.5S 75B — 1016F</b>  | 75                     | $\phi$ 112.5              | $\phi$ 115.5          | B1   | 10                | $\phi$ 16                  | $\phi$ 50             | 10                  | 20                    | 0.90              |
| <b>S1.5S 75B — 1618</b>   | 75                     | $\phi$ 112.5              | $\phi$ 115.5          | B1   | 16                | $\phi$ 18                  | $\phi$ 60             | 10                  | 26                    | 1.42              |
| <b>S1.5S 80A — 1618F</b>  | 80                     | $\phi$ 120                | $\phi$ 123            | A1   | 16                | $\phi$ 18                  | -                     | -                   | 16                    | 1.39              |
| <b>S1.5S 80B — 1016</b>   | 80                     | $\phi$ 120                | $\phi$ 123            | B1   | 10                | $\phi$ 16                  | $\phi$ 40             | 10                  | 20                    | 0.96              |
| <b>S1.5S 90A — 1622F</b>  | 90                     | $\phi$ 135                | $\phi$ 138            | A1   | 16                | $\phi$ 22                  | -                     | -                   | 16                    | 1.75              |
| <b>S1.5S 90B — 1618</b>   | 90                     | $\phi$ 135                | $\phi$ 138            | B1   | 16                | $\phi$ 18                  | $\phi$ 70             | 10                  | 26                    | 2.05              |
| <b>S1.5S 100A — 1016F</b> | 100                    | $\phi$ 150                | $\phi$ 153            | A1   | 10                | $\phi$ 16                  | -                     | -                   | 10                    | 1.37              |
| <b>S1.5S 100A — 1618F</b> | 100                    | $\phi$ 150                | $\phi$ 153            | A1   | 16                | $\phi$ 18                  | -                     | -                   | 16                    | 2.19              |
| <b>S1.5S 100B — 1016</b>  | 100                    | $\phi$ 150                | $\phi$ 153            | B1   | 10                | $\phi$ 16                  | $\phi$ 40             | 10                  | 20                    | 1.46              |
| <b>S1.5S 100B — 1618</b>  | 100                    | $\phi$ 150                | $\phi$ 153            | B1   | 16                | $\phi$ 18                  | $\phi$ 50             | 10                  | 26                    | 2.32              |



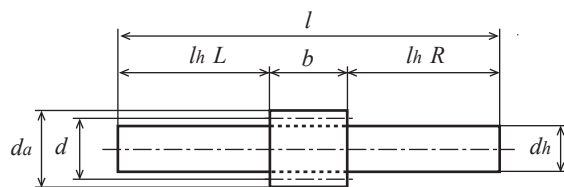


2D • 3D CAD

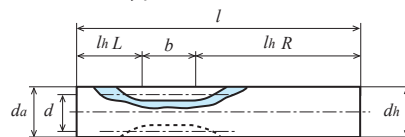


B1 type [-]

| Number of teeth<br><i>z</i> | Face width<br><i>b</i> | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |
|-----------------------------|------------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                             |                        | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |
| 55                          | 16                     | 0.108                                                                                                  | 1.08   | 2.15   | 3.88   | 6.51   | 9.18     | 11.14    | 103.13                                                        |
| 56                          | 16                     | 0.110                                                                                                  | 1.10   | 2.20   | 3.95   | 6.64   | 9.37     | 11.35    | 105.04                                                        |
| 58                          | 10                     | 0.071                                                                                                  | 0.71   | 1.43   | 2.55   | 4.30   | 6.07     | 7.36     | 67.80                                                         |
| 60                          | 10                     | 0.074                                                                                                  | 0.74   | 1.49   | 2.63   | 4.46   | 6.30     | 7.62     | 70.66                                                         |
| 60                          | 16                     | 0.120                                                                                                  | 1.20   | 2.39   | 4.22   | 7.14   | 10.09    | 12.20    | 114.59                                                        |
| 64                          | 10                     | 0.080                                                                                                  | 0.80   | 1.61   | 2.80   | 4.77   | 6.74     | 8.15     | 76.39                                                         |
| 68                          | 10                     | 0.087                                                                                                  | 0.87   | 1.72   | 2.96   | 5.08   | 7.19     | 8.67     | 83.08                                                         |
| 70                          | 16                     | 0.143                                                                                                  | 1.43   | 2.83   | 4.86   | 8.38   | 11.85    | 14.35    | 136.56                                                        |
| 72                          | 10                     | 0.092                                                                                                  | 0.93   | 1.82   | 3.12   | 5.39   | 7.62     | 9.27     | 88.81                                                         |
| 72                          | 16                     | 0.148                                                                                                  | 1.48   | 2.91   | 4.99   | 8.62   | 12.19    | 14.83    | 141.33                                                        |
| 75                          | 10                     | 0.097                                                                                                  | 0.97   | 1.89   | 3.23   | 5.61   | 7.94     | 9.72     | 92.63                                                         |
| 75                          | 16                     | 0.156                                                                                                  | 1.56   | 3.03   | 5.17   | 8.98   | 12.71    | 15.56    | 148.97                                                        |
| 80                          | 10                     | 0.10                                                                                                   | 1.05   | 2.02   | 3.42   | 5.98   | 8.47     | 10.48    | 100.27                                                        |
| 80                          | 16                     | 0.17                                                                                                   | 1.68   | 3.23   | 5.47   | 9.57   | 13.55    | 16.76    | 160.43                                                        |
| 90                          | 16                     | 0.19                                                                                                   | 1.92   | 3.61   | 6.02   | 10.79  | 15.34    | -        | 183.35                                                        |
| 100                         | 10                     | 0.14                                                                                                   | 1.35   | 2.49   | 4.13   | 7.49   | 10.80    | -        | 128.92                                                        |
| 100                         | 16                     | 0.22                                                                                                   | 2.16   | 3.98   | 6.61   | 11.98  | 17.28    | -        | 206.27                                                        |



L1 type



L2 type

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.08 to 0.20 |

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

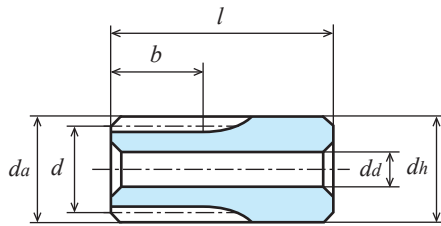
★ [Profile-shifted] is a profile-shifted gear with an rack shift coefficient x of 0.5.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

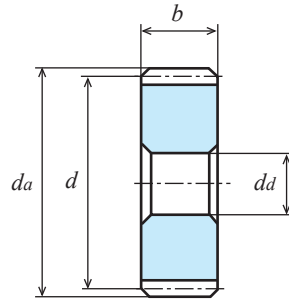
| Catalogue number       | Number of teeth<br>$z$ | Refer-<br>ence<br>diameter<br>$d$ | Tip<br>diameter<br>$d_a$ | Type | Face<br>width<br>$b$ | Hole<br>diameter<br>$da(H7)$ | Hub<br>diameter<br>$d_h$ | Hub<br>length<br>$l_h$ | Overall<br>length<br>$l$ | Key<br>groove<br>$b_2 \times t_2$ | Screw |       | Weight<br>$W(g)$ |
|------------------------|------------------------|-----------------------------------|--------------------------|------|----------------------|------------------------------|--------------------------|------------------------|--------------------------|-----------------------------------|-------|-------|------------------|
|                        |                        |                                   |                          |      |                      |                              |                          |                        |                          |                                   | $M$   | $l_s$ |                  |
| <b>S2S 8L — 2221F</b>  | 8                      | [Profile-shifted]                 | $\phi 21.28$             | L2   | 22                   | -                            | $\phi 21.28$             | L32 R64                | 118                      | -                                 | -     | -     | 312.0            |
| <b>S2S 10L — 2216</b>  | 10                     | [Profile-shifted]                 | $\phi 25.33$             | L1   | 22                   | -                            | $\phi 16(h9)$            | L32 R64                | 118                      | -                                 | -     | -     | 217.2            |
| <b>S2S 12K — 2210</b>  | 12                     | $\phi 24$                         | $\phi 28$                | K2   | 22                   | $\phi 10(H8)$                | $\phi 28$                | 28                     | 50                       | -                                 | -     | -     | 182.6            |
| <b>S2S 13K — 2210F</b> | 13                     | $\phi 26$                         | $\phi 30$                | K2   | 22                   | $\phi 10(H8)$                | $\phi 30$                | 28                     | 50                       | -                                 | -     | -     | 216.2            |
| <b>S2S 14A — 1410</b>  | 14                     | $\phi 28$                         | $\phi 32$                | A1   | 14                   | $\phi 10$                    | -                        | -                      | 14                       | -                                 | -     | -     | 59.0             |
| <b>S2S 14A — 2010</b>  | 14                     | $\phi 28$                         | $\phi 32$                | A1   | 20                   | $\phi 10$                    | -                        | -                      | 20                       | -                                 | -     | -     | 84.3             |
| <b>S2S 14B — 1410N</b> | 14                     | $\phi 28$                         | $\phi 32$                | B1   | 14                   | $\phi 10$                    | $\phi 22$                | 10                     | 24                       | -                                 | -     | -     | 82.8             |
| <b>S2S 14B — 2010N</b> | 14                     | $\phi 28$                         | $\phi 32$                | B1   | 20                   | $\phi 10(H8)$                | $\phi 22$                | 10                     | 30                       | -                                 | -     | -     | 108.1            |
| <b>S2S 15A — 1410</b>  | 15                     | $\phi 30$                         | $\phi 34$                | A1   | 14                   | $\phi 10$                    | -                        | -                      | 14                       | -                                 | -     | -     | 69.5             |
| <b>S2S 15A — 2010</b>  | 15                     | $\phi 30$                         | $\phi 34$                | A1   | 20                   | $\phi 10$                    | -                        | -                      | 20                       | -                                 | -     | -     | 98.7             |
| <b>S2S 15A — 2210</b>  | 15                     | $\phi 30$                         | $\phi 34$                | A1   | 22                   | $\phi 10$                    | -                        | -                      | 22                       | -                                 | -     | -     | 108.5            |
| <b>S2S 15B — 1410N</b> | 15                     | $\phi 30$                         | $\phi 34$                | B1   | 14                   | $\phi 10$                    | $\phi 24$                | 10                     | 24                       | -                                 | -     | -     | 98.5             |
| <b>S2S 15B — 2010N</b> | 15                     | $\phi 30$                         | $\phi 34$                | B1   | 20                   | $\phi 10(H8)$                | $\phi 24$                | 10                     | 30                       | -                                 | -     | -     | 128.1            |
| <b>S2S 15B — 2210N</b> | 15                     | $\phi 30$                         | $\phi 34$                | B1   | 22                   | $\phi 10(H8)$                | $\phi 24$                | 10                     | 32                       | -                                 | -     | -     | 138.0            |
| <b>S2S 16A — 1412</b>  | 16                     | $\phi 32$                         | $\phi 36$                | A1   | 14                   | $\phi 12$                    | -                        | -                      | 14                       | -                                 | -     | -     | 76.0             |
| <b>S2S 16B — 1412N</b> | 16                     | $\phi 32$                         | $\phi 36$                | B1   | 14                   | $\phi 12$                    | $\phi 26$                | 10                     | 24                       | -                                 | -     | -     | 108.8            |
| <b>S2S 17B — 2212</b>  | 17                     | $\phi 34$                         | $\phi 38$                | B1   | 22                   | $\phi 12$                    | $\phi 28$                | 10                     | 32                       | -                                 | -     | -     | 176.8            |
| <b>S2S 18A — 1212F</b> | 18                     | $\phi 36$                         | $\phi 40$                | A1   | 12                   | $\phi 12$                    | -                        | -                      | 12                       | -                                 | -     | -     | 85.2             |
| <b>S2S 18A — 1412F</b> | 18                     | $\phi 36$                         | $\phi 40$                | A1   | 14                   | $\phi 12$                    | -                        | -                      | 14                       | -                                 | -     | -     | 99.4             |
| <b>S2S 18A — 2012F</b> | 18                     | $\phi 36$                         | $\phi 40$                | A1   | 20                   | $\phi 12$                    | -                        | -                      | 20                       | -                                 | -     | -     | 142.1            |
| <b>S2S 18A — 2212F</b> | 18                     | $\phi 36$                         | $\phi 40$                | A1   | 22                   | $\phi 12$                    | -                        | -                      | 22                       | -                                 | -     | -     | 156.3            |
| <b>S2S 18A = 2215</b>  | 18                     | $\phi 36$                         | $\phi 40$                | A1   | 22                   | $\phi 15$                    | -                        | -                      | 22                       | $5 \times 2.3$                    | -     | -     | 143.3            |
| <b>S2S 18B — 1412</b>  | 18                     | $\phi 36$                         | $\phi 40$                | B1   | 14                   | $\phi 12$                    | $\phi 30$                | 10                     | 24                       | -                                 | -     | -     | 146.1            |
| <b>S2S 18B # 1415</b>  | 18                     | $\phi 36$                         | $\phi 40$                | B1   | 14                   | $\phi 15$                    | $\phi 30$                | 10                     | 24                       | $5 \times 2.3$                    | M4    | 5     | 131.6            |
| <b>S2S 19B — 1412</b>  | 19                     | $\phi 38$                         | $\phi 42$                | B1   | 14                   | $\phi 12$                    | $\phi 32$                | 10                     | 24                       | -                                 | -     | -     | 166.6            |



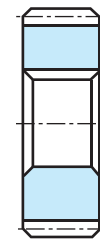
2D • 3D CAD



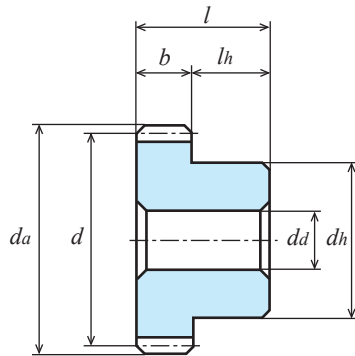
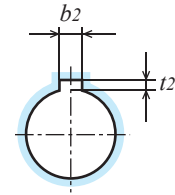
K2 type [-]



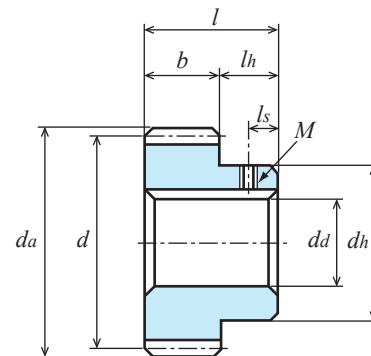
A1 type [-]



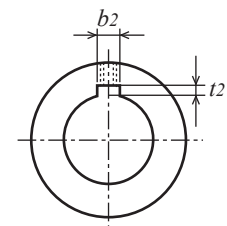
A1 type [=]



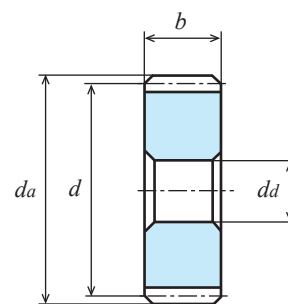
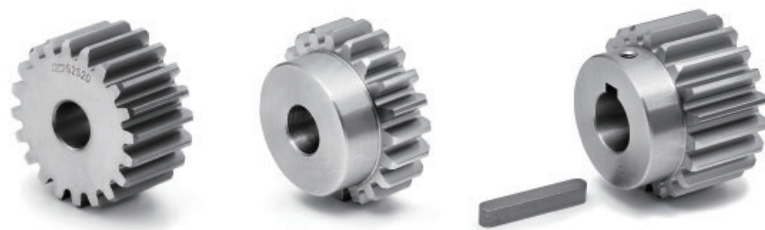
B1 type [-]



B1 type [#]



| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input<br>revolutions per minute (Unit: N·m) |
|------------------------|-------------------|-----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|------------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                     | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                           |
| 8                      | 22                | 0.023                                                                                                     | 0.235  | 0.471  | 0.942  | 1.885  | 2.785    | 3.345    | 22.44                                                            |
| 10                     | 22                | 0.032                                                                                                     | 0.325  | 0.650  | 1.300  | 2.600  | 3.702    | 4.414    | 31.03                                                            |
| 12                     | 22                | 0.029                                                                                                     | 0.298  | 0.597  | 1.195  | 2.388  | 3.331    | 3.956    | 28.45                                                            |
| 13                     | 22                | 0.034                                                                                                     | 0.343  | 0.687  | 1.374  | 2.712  | 3.764    | 4.456    | 32.75                                                            |
| 14                     | 14                | 0.024                                                                                                     | 0.247  | 0.495  | 0.991  | 1.932  | 2.670    | 3.151    | 23.58                                                            |
| 14                     | 20                | 0.035                                                                                                     | 0.354  | 0.708  | 1.416  | 2.761  | 3.814    | 4.501    | 33.80                                                            |
| 15                     | 14                | 0.027                                                                                                     | 0.277  | 0.555  | 1.111  | 2.139  | 2.942    | 3.462    | 26.45                                                            |
| 15                     | 20                | 0.039                                                                                                     | 0.396  | 0.793  | 1.587  | 3.056  | 4.203    | 4.946    | 37.81                                                            |
| 15                     | 22                | 0.043                                                                                                     | 0.436  | 0.873  | 1.746  | 3.362  | 4.624    | 5.440    | 41.63                                                            |
| 16                     | 14                | 0.030                                                                                                     | 0.308  | 0.616  | 1.233  | 2.346  | 3.212    | 3.768    | 29.41                                                            |
| 17                     | 22                | 0.053                                                                                                     | 0.533  | 1.066  | 2.132  | 4.009  | 5.465    | 6.393    | 50.89                                                            |
| 18                     | 12                | 0.031                                                                                                     | 0.317  | 0.635  | 1.270  | 2.361  | 3.205    | 3.739    | 30.27                                                            |
| 18                     | 14                | 0.037                                                                                                     | 0.370  | 0.741  | 1.482  | 2.754  | 3.739    | 4.362    | 35.33                                                            |
| 18                     | 20                | 0.052                                                                                                     | 0.529  | 1.058  | 2.117  | 3.935  | 5.341    | 6.232    | 50.51                                                            |
| 18                     | 22                | 0.058                                                                                                     | 0.582  | 1.164  | 2.329  | 4.328  | 5.875    | 6.855    | 55.57                                                            |
| 19                     | 14                | 0.040                                                                                                     | 0.403  | 0.806  | 1.611  | 2.960  | 4.001    | 4.656    | 38.48                                                            |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.08 to 0.20 |

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

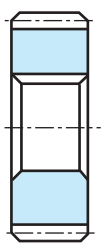
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

A1 type [-]

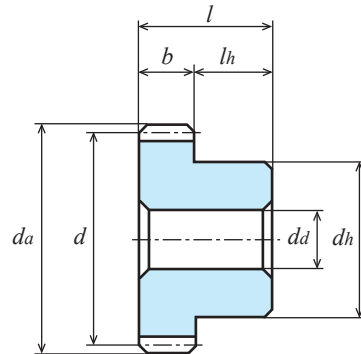
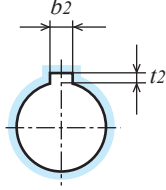
| Catalogue number | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>d<sub>a</sub></i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>da(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw    |                      | Weight<br><i>W(g)</i> |
|------------------|-----------------------------|----------------------------------------|-----------------------------------------|------|---------------------------|-----------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|----------|----------------------|-----------------------|
|                  |                             |                                        |                                         |      |                           |                                   |                                         |                                       |                               |                                                       | <i>M</i> | <i>l<sub>s</sub></i> |                       |
| S2S 20A — 1212F  | 20                          | φ40                                    | φ44                                     | A1   | 12                        | φ12                               | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 107.7                 |
| S2S 20A — 1412F  | 20                          | φ40                                    | φ44                                     | A1   | 14                        | φ12                               | -                                       | -                                     | 14                            | -                                                     | -        | -                    | 125.7                 |
| S2S 20A — 2012F  | 20                          | φ40                                    | φ44                                     | A1   | 20                        | φ12                               | -                                       | -                                     | 20                            | -                                                     | -        | -                    | 179.5                 |
| S2S 20A — 2212F  | 20                          | φ40                                    | φ44                                     | A1   | 22                        | φ12                               | -                                       | -                                     | 22                            | -                                                     | -        | -                    | 197.5                 |
| S2S 20A = 2215   | 20                          | φ40                                    | φ44                                     | A1   | 22                        | φ15                               | -                                       | -                                     | 22                            | 5 × 2.3                                               | -        | -                    | 184.5                 |
| S2S 20B — 1212   | 20                          | φ40                                    | φ44                                     | B1   | 12                        | φ12                               | φ33                                     | 10                                    | 22                            | -                                                     | -        | -                    | 162.1                 |
| S2S 20B — 1412   | 20                          | φ40                                    | φ44                                     | B1   | 14                        | φ12                               | φ32                                     | 10                                    | 24                            | -                                                     | -        | -                    | 180.0                 |
| S2S 20B # 1415   | 20                          | φ40                                    | φ44                                     | B1   | 14                        | φ15                               | φ32                                     | 10                                    | 24                            | 5 × 2.3                                               | M4       | 5                    | 165.4                 |
| S2S 20BF — 2008  | 20                          | φ40                                    | φ44                                     | B1   | 20                        | φ8(H8)                            | φ34                                     | 20                                    | 40                            | -                                                     | -        | -                    | 321.1                 |
| S2S 20B — 2012N  | 20                          | φ40                                    | φ44                                     | B1   | 20                        | φ12                               | φ34                                     | 10                                    | 30                            | -                                                     | -        | -                    | 242.1                 |
| S2S 20B — 2212   | 20                          | φ40                                    | φ44                                     | B1   | 22                        | φ12                               | φ34                                     | 10                                    | 32                            | -                                                     | -        | -                    | 260.1                 |
| S2S 20B # 2215   | 20                          | φ40                                    | φ44                                     | B1   | 22                        | φ15                               | φ34                                     | 10                                    | 32                            | 5 × 2.3                                               | M4       | 5                    | 240.6                 |
| S2S 20B # 2220   | 20                          | φ40                                    | φ44                                     | B1   | 22                        | φ20                               | φ34                                     | 10                                    | 32                            | 6 × 2.8                                               | M4       | 5                    | 204.9                 |
| S2S 21B — 2212   | 21                          | φ42                                    | φ46                                     | B1   | 22                        | φ12                               | φ36                                     | 10                                    | 32                            | -                                                     | -        | -                    | 290.9                 |
| S2S 22B — 2212   | 22                          | φ44                                    | φ48                                     | B1   | 22                        | φ12                               | φ38                                     | 10                                    | 32                            | -                                                     | -        | -                    | 323.4                 |
| S2S 24A — 1214F  | 24                          | φ48                                    | φ52                                     | A1   | 12                        | φ14                               | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 156.0                 |
| S2S 24A — 1412F  | 24                          | φ48                                    | φ52                                     | A1   | 14                        | φ12                               | -                                       | -                                     | 14                            | -                                                     | -        | -                    | 186.4                 |
| S2S 24A — 2014F  | 24                          | φ48                                    | φ52                                     | A1   | 20                        | φ14                               | -                                       | -                                     | 20                            | -                                                     | -        | -                    | 259.9                 |
| S2S 24A — 2214F  | 24                          | φ48                                    | φ52                                     | A1   | 22                        | φ14                               | -                                       | -                                     | 22                            | -                                                     | -        | -                    | 285.9                 |
| S2S 24A = 2220   | 24                          | φ48                                    | φ52                                     | A1   | 22                        | φ20                               | -                                       | -                                     | 22                            | 6 × 2.8                                               | -        | -                    | 255.4                 |
| S2S 24B — 1214   | 24                          | φ48                                    | φ52                                     | B1   | 12                        | φ14                               | φ40                                     | 10                                    | 22                            | -                                                     | -        | -                    | 207.1                 |
| S2S 24B — 1414   | 24                          | φ48                                    | φ52                                     | B1   | 14                        | φ14                               | φ32                                     | 10                                    | 24                            | -                                                     | -        | -                    | 233.2                 |
| S2S 24B — 2014N  | 24                          | φ48                                    | φ52                                     | B1   | 20                        | φ14                               | φ42                                     | 10                                    | 30                            | -                                                     | -        | -                    | 356.8                 |
| S2S 24B — 2214   | 24                          | φ48                                    | φ52                                     | B1   | 22                        | φ14                               | φ40                                     | 10                                    | 32                            | -                                                     | -        | -                    | 372.7                 |
| S2S 25A — 1414F  | 25                          | φ50                                    | φ54                                     | A1   | 14                        | φ14                               | -                                       | -                                     | 14                            | -                                                     | -        | -                    | 198.9                 |
| S2S 25A = 1416   | 25                          | φ50                                    | φ54                                     | A1   | 14                        | φ16                               | -                                       | -                                     | 14                            | 5 × 2.3                                               | -        | -                    | 192.4                 |
| S2S 25A — 2014F  | 25                          | φ50                                    | φ54                                     | A1   | 20                        | φ14                               | -                                       | -                                     | 20                            | -                                                     | -        | -                    | 284.1                 |
| S2S 25A — 2214F  | 25                          | φ50                                    | φ54                                     | A1   | 22                        | φ14                               | -                                       | -                                     | 22                            | -                                                     | -        | -                    | 312.5                 |
| S2S 25B — 1214   | 25                          | φ50                                    | φ54                                     | B1   | 12                        | φ14                               | φ42                                     | 10                                    | 22                            | -                                                     | -        | -                    | 221.7                 |
| S2S 25B — 1414   | 25                          | φ50                                    | φ54                                     | B1   | 14                        | φ14                               | φ32                                     | 10                                    | 24                            | -                                                     | -        | -                    | 250.1                 |
| S2S 25BF — 2008  | 25                          | φ50                                    | φ54                                     | B1   | 20                        | φ8(H8)                            | φ40                                     | 20                                    | 40                            | -                                                     | -        | -                    | 486.2                 |
| S2S 25B — 2014N  | 25                          | φ50                                    | φ54                                     | B1   | 20                        | φ14                               | φ44                                     | 10                                    | 30                            | -                                                     | -        | -                    | 391.6                 |
| S2S 25B — 2214   | 25                          | φ50                                    | φ54                                     | B1   | 22                        | φ14                               | φ40                                     | 10                                    | 32                            | -                                                     | -        | -                    | 399.3                 |
| S2S 25B # 2220   | 25                          | φ50                                    | φ54                                     | B1   | 22                        | φ20                               | φ40                                     | 10                                    | 32                            | 6 × 2.8                                               | M5       | 5                    | 353.9                 |



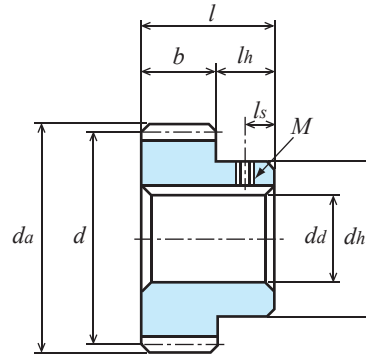
2D • 3D CAD



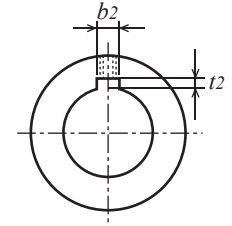
A1 type [=]



B1 type [-]



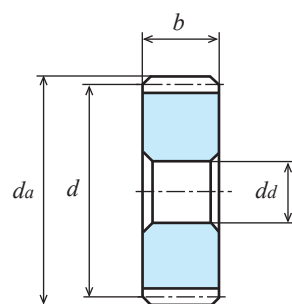
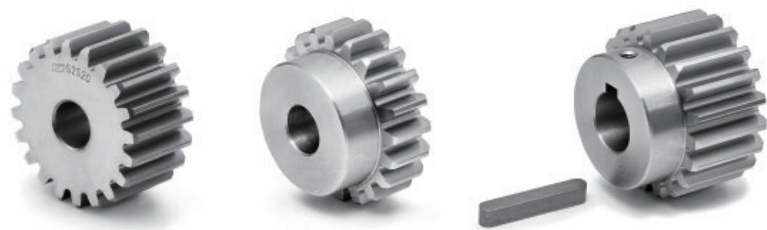
B1 type [#]



| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-------|-------|------------------|
|                        |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | $M$   | $l_s$ |                  |
| <b>S2S 28A – 1214F</b> | 28                     | $\phi 56$                 | $\phi 60$             | A1   | 12                | $\phi 14$                  | -                     | -                   | 12                    | -                              | -     | -     | 217.5            |
| <b>S2S 28A – 1414F</b> | 28                     | $\phi 56$                 | $\phi 60$             | A1   | 14                | $\phi 14$                  | -                     | -                   | 14                    | -                              | -     | -     | 253.8            |
| <b>S2S 28A = 1415</b>  | 28                     | $\phi 56$                 | $\phi 60$             | A1   | 14                | $\phi 15$                  | -                     | -                   | 14                    | $5 \times 2.3$                 | -     | -     | 250.0            |
| <b>S2S 28A = 1416</b>  | 28                     | $\phi 56$                 | $\phi 60$             | A1   | 14                | $\phi 16$                  | -                     | -                   | 14                    | $5 \times 2.3$                 | -     | -     | 247.3            |
| <b>S2S 28A – 2216F</b> | 28                     | $\phi 56$                 | $\phi 60$             | A1   | 22                | $\phi 16$                  | -                     | -                   | 22                    | -                              | -     | -     | 390.6            |
| <b>S2S 28B – 1214</b>  | 28                     | $\phi 56$                 | $\phi 60$             | B1   | 12                | $\phi 14$                  | $\phi 48$             | 10                  | 22                    | -                              | -     | -     | 304.3            |
| <b>S2S 28B – 1414</b>  | 28                     | $\phi 56$                 | $\phi 60$             | B1   | 14                | $\phi 14$                  | $\phi 40$             | 10                  | 24                    | -                              | -     | -     | 340.6            |
| <b>S2S 28B # 1415</b>  | 28                     | $\phi 56$                 | $\phi 60$             | B1   | 14                | $\phi 15$                  | $\phi 40$             | 10                  | 24                    | $5 \times 2.3$                 | M4    | 5     | 333.3            |
| <b>S2S 28B – 2016N</b> | 28                     | $\phi 56$                 | $\phi 60$             | B1   | 20                | $\phi 16$                  | $\phi 50$             | 10                  | 30                    | -                              | -     | -     | 493.8            |
| <b>S2S 28B – 2216</b>  | 28                     | $\phi 56$                 | $\phi 60$             | B1   | 22                | $\phi 16$                  | $\phi 50$             | 10                  | 32                    | -                              | -     | -     | 529.3            |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| 20                     | 12                | 0.037                                                                                                  | 0.372  | 0.745  | 1.491  | 2.709  | 3.647    | 4.280    |
| 20                     | 14                | 0.043                                                                                                  | 0.435  | 0.870  | 1.740  | 3.160  | 4.255    | 4.993    |
| 20                     | 20                | 0.063                                                                                                  | 0.630  | 1.250  | 2.500  | 4.550  | 6.120    | 7.190    |
| 20                     | 22                | 0.068                                                                                                  | 0.683  | 1.367  | 2.735  | 4.966  | 6.687    | 7.846    |
| 21                     | 22                | 0.073                                                                                                  | 0.73   | 1.47   | 2.94   | 5.28   | 7.08     | 8.38     |
| 22                     | 22                | 0.078                                                                                                  | 0.79   | 1.57   | 3.15   | 5.59   | 7.47     | 8.92     |
| 24                     | 12                | 0.048                                                                                                  | 0.49   | 0.97   | 1.94   | 3.377  | 4.49     | 5.45     |
| 24                     | 14                | 0.056                                                                                                  | 0.57   | 1.14   | 2.27   | 3.940  | 5.23     | 6.36     |
| 24                     | 20                | 0.081                                                                                                  | 0.81   | 1.62   | 3.24   | 5.63   | 7.48     | 9.08     |
| 24                     | 22                | 0.089                                                                                                  | 0.89   | 1.78   | 3.56   | 6.19   | 8.22     | 9.99     |
| 25                     | 12                | 0.051                                                                                                  | 0.52   | 1.03   | 2.05   | 3.54   | 4.73     | 5.74     |
| 25                     | 14                | 0.060                                                                                                  | 0.60   | 1.20   | 2.39   | 4.13   | 5.52     | 6.70     |
| 25                     | 20                | 0.086                                                                                                  | 0.860  | 1.720  | 3.420  | 5.920  | 7.910    | 9.600    |
| 25                     | 22                | 0.094                                                                                                  | 0.94   | 1.89   | 3.75   | 6.49   | 8.67     | 10.52    |
| 28                     | 12                | 0.060                                                                                                  | 0.60   | 1.21   | 2.35   | 4.01   | 5.46     | 6.60     |
| 28                     | 14                | 0.070                                                                                                  | 0.70   | 1.41   | 2.74   | 4.68   | 6.37     | 7.70     |
| 28                     | 20                | 0.101                                                                                                  | 1.01   | 2.01   | 3.92   | 6.69   | 9.10     | 11.01    |
| 28                     | 22                | 0.111                                                                                                  | 1.11   | 2.21   | 4.31   | 7.36   | 10.01    | 12.11    |

| Allowable torque for input revolutions per minute (Unit: N·m) |
|---------------------------------------------------------------|
| 100rpm                                                        |
| 35.52                                                         |
| 41.54                                                         |
| 60.16                                                         |
| 65.22                                                         |
| 69.71                                                         |
| 75.44                                                         |
| 46.79                                                         |
| 54.43                                                         |
| 77.35                                                         |
| 84.99                                                         |
| 49.65                                                         |
| 57.29                                                         |
| 82.13                                                         |
| 89.76                                                         |
| 57.29                                                         |
| 66.84                                                         |
| 96.45                                                         |
| 106.00                                                        |



A1 type [-]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.08 to 0.20 |

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

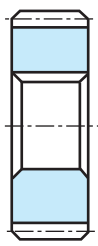
For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

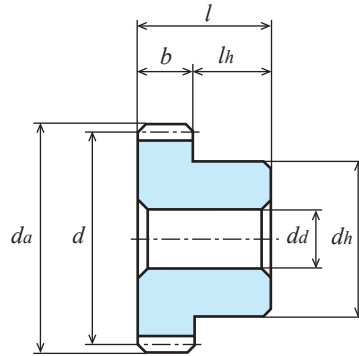
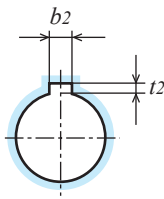
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number       | Number of teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>d<sub>a</sub></i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>da(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw    |                      | Weight<br><i>W(g)</i> |
|------------------------|-----------------------------|----------------------------------------|-----------------------------------------|------|---------------------------|-----------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|----------|----------------------|-----------------------|
|                        |                             |                                        |                                         |      |                           |                                   |                                         |                                       |                               |                                                       | <i>M</i> | <i>l<sub>s</sub></i> |                       |
| <b>S2S 30A — 1216F</b> | 30                          | φ60                                    | φ64                                     | A1   | 12                        | φ16                               | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 247.4                 |
| <b>S2S 30A — 1414F</b> | 30                          | φ60                                    | φ64                                     | A1   | 14                        | φ14                               | -                                       | -                                     | 14                            | -                                                     | -        | -                    | 293.8                 |
| <b>S2S 30A — 2016F</b> | 30                          | φ60                                    | φ64                                     | A1   | 20                        | φ16                               | -                                       | -                                     | 20                            | -                                                     | -        | -                    | 412.3                 |
| <b>S2S 30A = 2020</b>  | 30                          | φ60                                    | φ64                                     | A1   | 20                        | φ20                               | -                                       | -                                     | 20                            | 6 × 2.8                                               | -        | -                    | 391.9                 |
| <b>S2S 30A — 2216F</b> | 30                          | φ60                                    | φ64                                     | A1   | 22                        | φ16                               | -                                       | -                                     | 22                            | -                                                     | -        | -                    | 453.6                 |
| <b>S2S 30B — 1214</b>  | 30                          | φ60                                    | φ64                                     | B1   | 12                        | φ14                               | φ52                                     | 10                                    | 22                            | -                                                     | -        | -                    | 338.6                 |
| <b>S2S 30B — 1414</b>  | 30                          | φ60                                    | φ64                                     | B1   | 14                        | φ14                               | φ40                                     | 10                                    | 24                            | -                                                     | -        | -                    | 380.6                 |
| <b>S2S 30B # 1415</b>  | 30                          | φ60                                    | φ64                                     | B1   | 14                        | φ15                               | φ40                                     | 10                                    | 24                            | 5 × 2.3                                               | M4       | 5                    | 373.3                 |
| <b>S2S 30B — 2018N</b> | 30                          | φ60                                    | φ64                                     | B1   | 20                        | φ18                               | φ54                                     | 10                                    | 30                            | -                                                     | -        | -                    | 564.1                 |
| <b>S2S 30B — 2216</b>  | 30                          | φ60                                    | φ64                                     | B1   | 22                        | φ16                               | φ50                                     | 10                                    | 32                            | -                                                     | -        | -                    | 592.3                 |
| <b>S2S 30B # 2220</b>  | 30                          | φ60                                    | φ64                                     | B1   | 22                        | φ20                               | φ50                                     | 10                                    | 32                            | 6 × 2.8                                               | M5       | 5                    | 558.1                 |
| <b>S2S 32A — 1214F</b> | 32                          | φ64                                    | φ68                                     | A1   | 12                        | φ14                               | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 288.5                 |
| <b>S2S 32A — 2016F</b> | 32                          | φ64                                    | φ68                                     | A1   | 20                        | φ16                               | -                                       | -                                     | 20                            | -                                                     | -        | -                    | 473.5                 |
| <b>S2S 32B — 1214</b>  | 32                          | φ64                                    | φ68                                     | B1   | 12                        | φ14                               | φ40                                     | 10                                    | 22                            | -                                                     | -        | -                    | 375.3                 |
| <b>S2S 32B — 2016</b>  | 32                          | φ64                                    | φ68                                     | B1   | 20                        | φ16                               | φ50                                     | 10                                    | 30                            | -                                                     | -        | -                    | 621.2                 |
| <b>S2S 32B # 2020</b>  | 32                          | φ64                                    | φ68                                     | B1   | 20                        | φ20                               | φ50                                     | 10                                    | 30                            | 6 × 2.8                                               | M5       | 5                    | 580.1                 |
| <b>S2S 35A — 1216F</b> | 35                          | φ70                                    | φ74                                     | A1   | 12                        | φ16                               | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 343.6                 |
| <b>S2S 35A — 2020F</b> | 35                          | φ70                                    | φ74                                     | A1   | 20                        | φ20                               | -                                       | -                                     | 20                            | -                                                     | -        | -                    | 554.9                 |
| <b>S2S 35B — 1214</b>  | 35                          | φ70                                    | φ74                                     | B1   | 12                        | φ14                               | φ60                                     | 10                                    | 22                            | -                                                     | -        | -                    | 558.3                 |
| <b>S2S 35B — 2016</b>  | 35                          | φ70                                    | φ74                                     | B1   | 20                        | φ16                               | φ60                                     | 10                                    | 30                            | -                                                     | -        | -                    | 779.3                 |
| <b>S2S 36A — 1216F</b> | 36                          | φ72                                    | φ76                                     | A1   | 12                        | φ16                               | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 360.0                 |
| <b>S2S 36A — 2016F</b> | 36                          | φ72                                    | φ76                                     | A1   | 20                        | φ16                               | -                                       | -                                     | 20                            | -                                                     | -        | -                    | 610.0                 |
| <b>S2S 36B — 1214</b>  | 36                          | φ72                                    | φ76                                     | B1   | 12                        | φ14                               | φ40                                     | 10                                    | 22                            | -                                                     | -        | -                    | 460.0                 |
| <b>S2S 36B # 1215</b>  | 36                          | φ72                                    | φ76                                     | B1   | 12                        | φ15                               | φ40                                     | 10                                    | 22                            | 5 × 2.3                                               | M4       | 5                    | 450.0                 |
| <b>S2S 36B # 1220</b>  | 36                          | φ72                                    | φ76                                     | B1   | 12                        | φ20                               | φ40                                     | 10                                    | 22                            | 6 × 2.8                                               | M5       | 5                    | 420.0                 |
| <b>S2S 36B — 2016</b>  | 36                          | φ72                                    | φ76                                     | B1   | 20                        | φ16                               | φ50                                     | 10                                    | 30                            | -                                                     | -        | -                    | 750.0                 |
| <b>S2S 36B # 2020</b>  | 36                          | φ72                                    | φ76                                     | B1   | 20                        | φ20                               | φ50                                     | 10                                    | 30                            | 6 × 2.8                                               | M5       | 5                    | 710.0                 |
| <b>S2S 38B — 1214</b>  | 38                          | φ76                                    | φ80                                     | B1   | 12                        | φ14                               | φ60                                     | 10                                    | 22                            | -                                                     | -        | -                    | 620.0                 |
| <b>S2S 40A — 1216F</b> | 40                          | φ80                                    | φ84                                     | A1   | 12                        | φ16                               | -                                       | -                                     | 12                            | -                                                     | -        | -                    | 0.45(kg)              |
| <b>S2S 40A = 1220</b>  | 40                          | φ80                                    | φ84                                     | A1   | 12                        | φ20                               | -                                       | -                                     | 12                            | 6 × 2.8                                               | -        | -                    | 0.44(kg)              |
| <b>S2S 40A — 2016F</b> | 40                          | φ80                                    | φ84                                     | A1   | 20                        | φ16                               | -                                       | -                                     | 20                            | -                                                     | -        | -                    | 0.76(kg)              |
| <b>S2S 40A = 2025</b>  | 40                          | φ80                                    | φ84                                     | A1   | 20                        | φ25                               | -                                       | -                                     | 20                            | 8 × 3.3                                               | -        | -                    | 0.71(kg)              |
| <b>S2S 40B — 1214</b>  | 40                          | φ80                                    | φ84                                     | B1   | 12                        | φ14                               | φ40                                     | 10                                    | 22                            | -                                                     | -        | -                    | 0.55(kg)              |
| <b>S2S 40B # 1215</b>  | 40                          | φ80                                    | φ84                                     | B1   | 12                        | φ15                               | φ40                                     | 10                                    | 22                            | 5 × 2.3                                               | M4       | 5                    | 0.54(kg)              |
| <b>S2S 40B # 1218</b>  | 40                          | φ80                                    | φ84                                     | B1   | 12                        | φ18                               | φ40                                     | 10                                    | 22                            | 6 × 2.8                                               | M5       | 5                    | 0.52(kg)              |
| <b>S2S 40B # 1220</b>  | 40                          | φ80                                    | φ84                                     | B1   | 12                        | φ20                               | φ40                                     | 10                                    | 22                            | 6 × 2.8                                               | M5       | 5                    | 0.51(kg)              |
| <b>S2S 40BF — 2010</b> | 40                          | φ80                                    | φ84                                     | B1   | 20                        | φ10(H8)                           | φ60                                     | 20                                    | 40                            | -                                                     | -        | -                    | 1.2 (kg)              |
| <b>S2S 40B — 2016</b>  | 40                          | φ80                                    | φ84                                     | B1   | 20                        | φ16                               | φ50                                     | 10                                    | 30                            | -                                                     | -        | -                    | 0.90(kg)              |

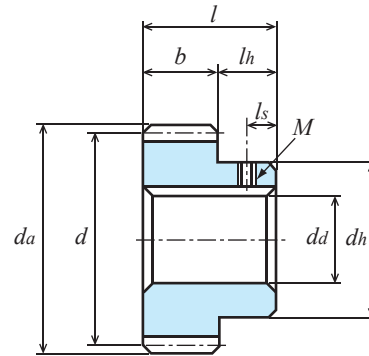




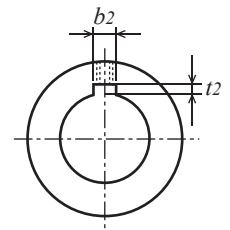
A1 type [=]



B1 type [-]

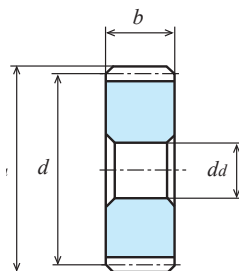


B1 type [#]

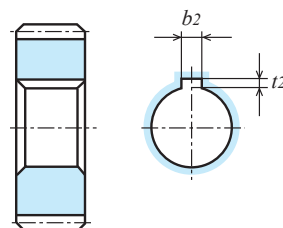


| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$dd(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|---------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-------|-------|------------------|
|                        |                        |                           |                       |      |                   |                           |                       |                     |                       |                                | $M$   | $l_s$ |                  |
| <b>S2S 42B – 1214</b>  | 42                     | $\phi 84$                 | $\phi 88$             | B1   | 12                | $\phi 14$                 | $\phi 60$             | 10                  | 22                    | -                              | -     | -     | 0.72             |
| <b>S2S 44B – 1214</b>  | 44                     | $\phi 88$                 | $\phi 92$             | B1   | 12                | $\phi 14$                 | $\phi 60$             | 10                  | 22                    | -                              | -     | -     | 0.77             |
| <b>S2S 45A – 1218F</b> | 45                     | $\phi 90$                 | $\phi 94$             | A1   | 12                | $\phi 18$                 | -                     | -                   | 12                    | -                              | -     | -     | 0.58             |
| <b>S2S 45A – 2020F</b> | 45                     | $\phi 90$                 | $\phi 94$             | A1   | 20                | $\phi 20$                 | -                     | -                   | 20                    | -                              | -     | -     | 0.95             |
| <b>S2S 45B – 1214</b>  | 45                     | $\phi 90$                 | $\phi 94$             | B1   | 12                | $\phi 14$                 | $\phi 60$             | 10                  | 22                    | -                              | -     | -     | 0.80             |
| <b>S2S 45B – 2016</b>  | 45                     | $\phi 90$                 | $\phi 94$             | B1   | 20                | $\phi 16$                 | $\phi 60$             | 10                  | 30                    | -                              | -     | -     | 1.17             |
| <b>S2S 46B – 1214</b>  | 46                     | $\phi 92$                 | $\phi 96$             | B1   | 12                | $\phi 14$                 | $\phi 60$             | 10                  | 22                    | -                              | -     | -     | 0.82             |
| <b>S2S 46B – 2016</b>  | 46                     | $\phi 92$                 | $\phi 96$             | B1   | 20                | $\phi 16$                 | $\phi 60$             | 10                  | 30                    | -                              | -     | -     | 1.22             |
| <b>S2S 48A – 2018F</b> | 48                     | $\phi 96$                 | $\phi 100$            | A1   | 20                | $\phi 18$                 | -                     | -                   | 20                    | -                              | -     | -     | 1.10             |
| <b>S2S 48B – 1216</b>  | 48                     | $\phi 96$                 | $\phi 100$            | B1   | 12                | $\phi 16$                 | $\phi 40$             | 10                  | 22                    | -                              | -     | -     | 0.75             |
| <b>S2S 48B – 2018</b>  | 48                     | $\phi 96$                 | $\phi 100$            | B1   | 20                | $\phi 18$                 | $\phi 50$             | 10                  | 30                    | -                              | -     | -     | 1.23             |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |
| 30                     | 12                | 0.066                                                                                                  | 0.66   | 1.32   | 2.55   | 4.32   | 5.94     | 7.17     | 63.02                                                         |
| 30                     | 14                | 0.077                                                                                                  | 0.77   | 1.55   | 2.98   | 5.04   | 6.93     | 8.36     | 73.53                                                         |
| 30                     | 20                | 0.110                                                                                                  | 1.100  | 2.210  | 4.260  | 7.200  | 9.900    | 11.960   | 105.05                                                        |
| 30                     | 22                | 0.121                                                                                                  | 1.21   | 2.43   | 4.68   | 7.92   | 10.88    | 13.14    | 115.55                                                        |
| 32                     | 12                | 0.072                                                                                                  | 0.72   | 1.44   | 2.75   | 4.61   | 6.41     | 7.73     | 68.75                                                         |
| 32                     | 20                | 0.120                                                                                                  | 1.20   | 2.41   | 4.58   | 7.69   | 10.69    | 12.89    | 114.59                                                        |
| 35                     | 12                | 0.081                                                                                                  | 0.81   | 1.63   | 3.04   | 5.04   | 7.12     | 8.61     | 77.35                                                         |
| 35                     | 20                | 0.135                                                                                                  | 1.35   | 2.71   | 5.07   | 8.40   | 11.87    | 14.35    | 128.92                                                        |
| 36                     | 12                | 0.084                                                                                                  | 0.84   | 1.69   | 3.13   | 5.19   | 7.35     | 8.90     | 80.21                                                         |
| 36                     | 20                | 0.141                                                                                                  | 1.41   | 2.81   | 5.22   | 8.64   | 12.26    | 14.83    | 134.65                                                        |
| 38                     | 12                | 0.090                                                                                                  | 0.90   | 1.81   | 3.32   | 5.53   | 7.82     | 9.47     | 85.94                                                         |
| 40                     | 12                | 0.10                                                                                                   | 0.97   | 1.93   | 3.51   | 5.87   | 8.28     | 10.05    | 92.63                                                         |
| 40                     | 20                | 0.160                                                                                                  | 1.610  | 3.210  | 5.840  | 9.760  | 13.760   | 16.700   | 153.75                                                        |
| 42                     | 12                | 0.10                                                                                                   | 1.03   | 2.06   | 3.69   | 6.20   | 8.75     | 10.61    | 98.36                                                         |
| 44                     | 12                | 0.11                                                                                                   | 1.09   | 2.18   | 3.87   | 6.53   | 9.22     | 11.17    | 104.09                                                        |
| 45                     | 12                | 0.11                                                                                                   | 1.12   | 2.24   | 3.96   | 6.70   | 9.46     | 11.44    | 106.95                                                        |
| 45                     | 20                | 0.19                                                                                                   | 1.87   | 3.74   | 6.60   | 11.16  | 15.76    | 19.07    | 178.57                                                        |
| 46                     | 12                | 0.12                                                                                                   | 1.15   | 2.30   | 4.05   | 6.86   | 9.69     | 11.72    | 109.82                                                        |
| 46                     | 20                | 0.19                                                                                                   | 1.92   | 3.84   | 6.74   | 11.44  | 16.15    | 19.53    | 183.35                                                        |
| 48                     | 12                | 0.12                                                                                                   | 1.21   | 2.43   | 4.22   | 7.19   | 10.16    | 12.27    | 115.55                                                        |
| 48                     | 20                | 0.20                                                                                                   | 2.02   | 4.04   | 7.03   | 11.98  | 16.93    | 20.45    | 192.90                                                        |



A1 type [-]



A1 type [=]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.08 to 0.20 |

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

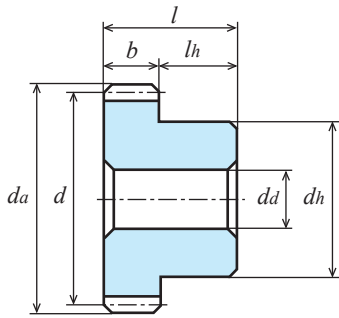
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

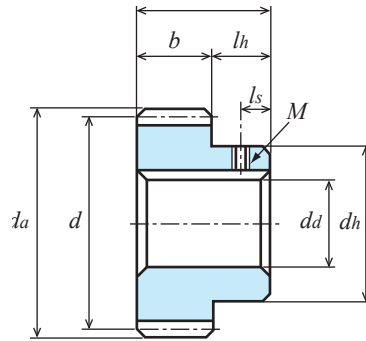
| Catalogue number       | Num-<br>ber of<br>teeth<br><i>z</i> | Refer-<br>ence<br>diameter<br><i>d</i> | Tip<br>diameter<br><i>d<sub>a</sub></i> | Type | Face<br>width<br><i>b</i> | Hole<br>diameter<br><i>d<sub>a</sub>(H7)</i> | Hub<br>diameter<br><i>d<sub>h</sub></i> | Hub<br>length<br><i>l<sub>h</sub></i> | Overall<br>length<br><i>l</i> | Key<br>groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Screw    |                      | Dimen-<br>sion of<br>Rim<br><i>d<sub>i</sub></i> | Thick-<br>ness of<br>Web<br><i>b<sub>w</sub></i> | Weight<br><i>W(kg)</i> |
|------------------------|-------------------------------------|----------------------------------------|-----------------------------------------|------|---------------------------|----------------------------------------------|-----------------------------------------|---------------------------------------|-------------------------------|-------------------------------------------------------|----------|----------------------|--------------------------------------------------|--------------------------------------------------|------------------------|
|                        |                                     |                                        |                                         |      |                           |                                              |                                         |                                       |                               |                                                       | <i>M</i> | <i>l<sub>s</sub></i> |                                                  |                                                  |                        |
| <b>S2S 50A — 1218F</b> | 50                                  | φ100                                   | φ104                                    | A1   | 12                        | φ18                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 0.72                   |
| <b>S2S 50A = 1220</b>  | 50                                  | φ100                                   | φ104                                    | A1   | 12                        | φ20                                          | -                                       | -                                     | 12                            | 6 × 2.8                                               | -        | -                    | -                                                | -                                                | 0.71                   |
| <b>S2S 50A — 2018F</b> | 50                                  | φ100                                   | φ104                                    | A1   | 20                        | φ18                                          | -                                       | -                                     | 20                            | -                                                     | -        | -                    | -                                                | -                                                | 1.19                   |
| <b>S2S 50B — 1216</b>  | 50                                  | φ100                                   | φ104                                    | B1   | 12                        | φ16                                          | φ50                                     | 10                                    | 22                            | -                                                     | -        | -                    | -                                                | -                                                | 0.86                   |
| <b>S2S 50B # 1220</b>  | 50                                  | φ100                                   | φ104                                    | B1   | 12                        | φ20                                          | φ50                                     | 10                                    | 22                            | 6 × 2.8                                               | M5       | 5                    | -                                                | -                                                | 0.84                   |
| <b>S2S 50BF — 2012</b> | 50                                  | φ100                                   | φ104                                    | B1   | 20                        | φ12(H8)                                      | φ70                                     | 20                                    | 40                            | -                                                     | -        | -                    | -                                                | -                                                | 1.8                    |
| <b>S2S 50B — 2018</b>  | 50                                  | φ100                                   | φ104                                    | B1   | 20                        | φ18                                          | φ60                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 1.40                   |
| <b>S2S 50B # 2020</b>  | 50                                  | φ100                                   | φ104                                    | B1   | 20                        | φ20                                          | φ60                                     | 10                                    | 30                            | 6 × 2.8                                               | M5       | 5                    | -                                                | -                                                | 1.38                   |
| <b>S2S 50B # 2025</b>  | 50                                  | φ100                                   | φ104                                    | B1   | 20                        | φ25                                          | φ60                                     | 10                                    | 30                            | 8 × 3.3                                               | M6       | 5                    | -                                                | -                                                | 1.33                   |
| <b>S2S 52B — 2018</b>  | 52                                  | φ104                                   | φ108                                    | B1   | 20                        | φ18                                          | φ60                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 1.50                   |
| <b>S2S 55B — 2018</b>  | 55                                  | φ110                                   | φ114                                    | B1   | 20                        | φ18                                          | φ60                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 1.66                   |
| <b>S2S 56A — 1218F</b> | 56                                  | φ112                                   | φ116                                    | A1   | 12                        | φ18                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 0.90                   |
| <b>S2S 56A — 2020F</b> | 56                                  | φ112                                   | φ116                                    | A1   | 20                        | φ20                                          | -                                       | -                                     | 20                            | -                                                     | -        | -                    | -                                                | -                                                | 1.50                   |
| <b>S2S 56B — 1216</b>  | 56                                  | φ112                                   | φ116                                    | B1   | 12                        | φ16                                          | φ50                                     | 10                                    | 22                            | -                                                     | -        | -                    | -                                                | -                                                | 1.05                   |
| <b>S2S 56B — 2018</b>  | 56                                  | φ112                                   | φ116                                    | B1   | 20                        | φ18                                          | φ60                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 1.71                   |
| <b>S2S 60A — 1220F</b> | 60                                  | φ120                                   | φ124                                    | A1   | 12                        | φ20                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 1.04                   |
| <b>S2S 60A — 2018F</b> | 60                                  | φ120                                   | φ124                                    | A1   | 20                        | φ18                                          | -                                       | -                                     | 20                            | -                                                     | -        | -                    | -                                                | -                                                | 1.74                   |
| <b>S2S 60B — 1216</b>  | 60                                  | φ120                                   | φ124                                    | B1   | 12                        | φ16                                          | φ50                                     | 10                                    | 22                            | -                                                     | -        | -                    | -                                                | -                                                | 1.19                   |
| <b>S2S 60B # 1220</b>  | 60                                  | φ120                                   | φ124                                    | B3   | 12                        | φ20                                          | φ50                                     | 10                                    | 22                            | 6 × 2.8                                               | M5       | 5                    | φ102                                             | 6                                                | 1.16                   |
| <b>S2S 60BF — 2012</b> | 60                                  | φ120                                   | φ124                                    | B1   | 20                        | φ12(H8)                                      | φ85                                     | 20                                    | 40                            | -                                                     | -        | -                    | -                                                | -                                                | 2.62                   |
| <b>S2S 60B — 2018</b>  | 60                                  | φ120                                   | φ124                                    | B1   | 20                        | φ18                                          | φ60                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 1.94                   |
| <b>S2S 64A — 1220F</b> | 64                                  | φ128                                   | φ132                                    | A1   | 12                        | φ20                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 1.18                   |
| <b>S2S 64B — 1216</b>  | 64                                  | φ128                                   | φ132                                    | B1   | 12                        | φ16                                          | φ50                                     | 10                                    | 22                            | -                                                     | -        | -                    | -                                                | -                                                | 1.33                   |
| <b>S2S 64B — 2018</b>  | 64                                  | φ128                                   | φ132                                    | B1   | 20                        | φ18                                          | φ60                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 2.18                   |
| <b>S2S 65A — 1218F</b> | 65                                  | φ130                                   | φ134                                    | A1   | 12                        | φ18                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 1.23                   |
| <b>S2S 70A — 1220F</b> | 70                                  | φ140                                   | φ144                                    | A1   | 12                        | φ20                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 1.42                   |
| <b>S2S 70A — 2018F</b> | 70                                  | φ140                                   | φ144                                    | A1   | 20                        | φ18                                          | -                                       | -                                     | 20                            | -                                                     | -        | -                    | -                                                | -                                                | 2.38                   |
| <b>S2S 70B — 2018</b>  | 70                                  | φ140                                   | φ144                                    | B1   | 20                        | φ18                                          | φ70                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 2.66                   |
| <b>S2S 72A — 1220F</b> | 72                                  | φ144                                   | φ148                                    | A1   | 12                        | φ20                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 1.51                   |
| <b>S2S 72B — 2020</b>  | 72                                  | φ144                                   | φ148                                    | B1   | 20                        | φ20                                          | φ60                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 2.71                   |
| <b>S2S 75A — 1218F</b> | 75                                  | φ150                                   | φ154                                    | A1   | 12                        | φ18                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 1.64                   |
| <b>S2S 75A — 2020F</b> | 75                                  | φ150                                   | φ154                                    | A1   | 20                        | φ20                                          | -                                       | -                                     | 20                            | -                                                     | -        | -                    | -                                                | -                                                | 2.73                   |
| <b>S2S 75B — 2020</b>  | 75                                  | φ150                                   | φ154                                    | B1   | 20                        | φ20                                          | φ70                                     | 10                                    | 30                            | -                                                     | -        | -                    | -                                                | -                                                | 3.00                   |
| <b>S2S 80A — 1220F</b> | 80                                  | φ160                                   | φ164                                    | A1   | 12                        | φ20                                          | -                                       | -                                     | 12                            | -                                                     | -        | -                    | -                                                | -                                                | 1.86                   |
| <b>S2S 80A — 2018F</b> | 80                                  | φ160                                   | φ164                                    | A1   | 20                        | φ18                                          | -                                       | -                                     | 20                            | -                                                     | -        | -                    | -                                                | -                                                | 3.12                   |



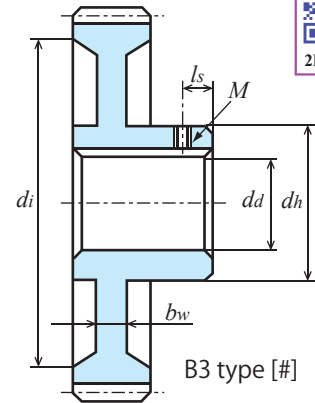
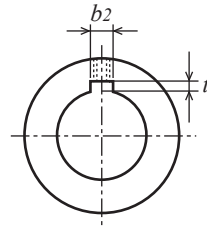
2D • 3D CAD



B1 type [-]



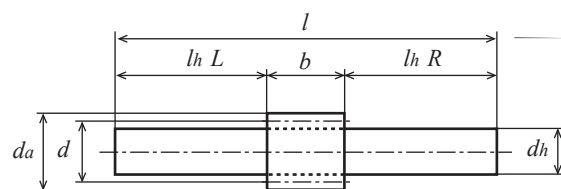
B1 type [#]



B3 type [#]

| Catalogue number        | Number of teeth | Reference diameter | Tip diameter | Type | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Key groove       | Screw |       | Dimension of Rim | Thick-ness of Web | Weight  |
|-------------------------|-----------------|--------------------|--------------|------|------------|---------------|--------------|------------|----------------|------------------|-------|-------|------------------|-------------------|---------|
|                         | $z$             | $d$                | $d_a$        |      | $b$        | $d_i(H7)$     | $d_h$        | $l_h$      | $l$            | $b_2 \times t_2$ | $M$   | $l_s$ | $d_i$            | $b_w$             | $W(kg)$ |
| <b>S2S 80B — 1218</b>   | 80              | φ160               | φ164         | B1   | 12         | φ18           | φ 50         | 10         | 22             | -                | -     | -     | -                | -                 | 2.01    |
| <b>S2S 80BF — 2015</b>  | 80              | φ160               | φ164         | B1   | 20         | φ15           | φ115         | 20         | 40             | -                | -     | -     | -                | -                 | 4.72    |
| <b>S2S 80B — 2020</b>   | 80              | φ160               | φ164         | B1   | 20         | φ20           | φ 60         | 10         | 30             | -                | -     | -     | -                | -                 | 3.31    |
| <b>S2S 85A — 2020F</b>  | 85              | φ170               | φ174         | A1   | 20         | φ20           | -            | -          | 20             | -                | -     | -     | -                | -                 | 3.51    |
| <b>S2S 85B — 2020</b>   | 85              | φ170               | φ174         | B1   | 20         | φ20           | φ 70         | 10         | 30             | -                | -     | -     | -                | -                 | 3.79    |
| <b>S2S 90A — 1218F</b>  | 90              | φ180               | φ184         | A1   | 12         | φ18           | -            | -          | 12             | -                | -     | -     | -                | -                 | 2.37    |
| <b>S2S 90A — 2020F</b>  | 90              | φ180               | φ184         | A1   | 20         | φ20           | -            | -          | 20             | -                | -     | -     | -                | -                 | 3.95    |
| <b>S2S 90B — 1218</b>   | 90              | φ180               | φ184         | B1   | 12         | φ18           | φ 60         | 10         | 22             | -                | -     | -     | -                | -                 | 2.58    |
| <b>S2S 90B — 2020</b>   | 90              | φ180               | φ184         | B1   | 20         | φ20           | φ 80         | 10         | 30             | -                | -     | -     | -                | -                 | 4.32    |
| <b>S2S 100A — 1220F</b> | 100             | φ200               | φ204         | A1   | 12         | φ20           | -            | -          | 12             | -                | -     | -     | -                | -                 | 2.93    |
| <b>S2S 100A — 2018F</b> | 100             | φ200               | φ204         | A1   | 20         | φ18           | -            | -          | 20             | -                | -     | -     | -                | -                 | 4.89    |
| <b>S2S 100B — 1218</b>  | 100             | φ200               | φ204         | B1   | 12         | φ18           | φ 50         | 10         | 22             | -                | -     | -     | -                | -                 | 3.07    |
| <b>S2S 100B # 1220</b>  | 100             | φ200               | φ204         | B3   | 12         | φ20           | φ 50         | 10         | 22             | 6 × 2.8          | M5    | 5     | φ182             | 6                 | 1.95    |
| <b>S2S 100B — 2020</b>  | 100             | φ200               | φ204         | B1   | 20         | φ20           | φ 60         | 10         | 30             | -                | -     | -     | -                | -                 | 5.08    |

| Number of teeth | Face width | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          |  | Allowable torque for input revolutions per minute (Unit: N·m) |  |
|-----------------|------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|--|---------------------------------------------------------------|--|
|                 |            | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |  | 100rpm                                                        |  |
| 50              | 12         | 0.13                                                                                                   | 1.28   | 2.54   | 4.39   | 7.52   | 10.62    | 12.81    |  | 122.23                                                        |  |
| 50              | 20         | 0.210                                                                                                  | 2.120  | 4.210  | 7.280  | 12.470 | 17.630   | 21.270   |  | 202.45                                                        |  |
| 52              | 20         | 0.22                                                                                                   | 2.23   | 4.41   | 7.59   | 13.06  | 18.47    | 22.34    |  | 212.95                                                        |  |
| 55              | 20         | 0.24                                                                                                   | 2.39   | 4.68   | 8.00   | 13.86  | 19.61    | 23.91    |  | 228.23                                                        |  |
| 56              | 12         | 0.15                                                                                                   | 1.47   | 2.86   | 4.88   | 8.47   | 11.99    | 14.67    |  | 140.38                                                        |  |
| 56              | 20         | 0.24                                                                                                   | 2.44   | 4.76   | 8.13   | 14.12  | 19.98    | 24.44    |  | 233.01                                                        |  |
| 60              | 12         | 0.16                                                                                                   | 1.59   | 3.07   | 5.19   | 9.10   | 12.88    | 15.94    |  | 151.84                                                        |  |
| 60              | 20         | 0.260                                                                                                  | 2.640  | 5.090  | 8.610  | 15.080 | 21.350   | 26.410   |  | 252.11                                                        |  |
| 64              | 12         | 0.17                                                                                                   | 1.72   | 3.27   | 5.50   | 9.75   | 13.77    | -        |  | 164.25                                                        |  |
| 64              | 20         | 0.29                                                                                                   | 2.87   | 5.46   | 9.16   | 16.25  | 22.95    | -        |  | 274.07                                                        |  |
| 65              | 12         | 0.18                                                                                                   | 1.75   | 3.33   | 5.57   | 9.91   | 14.02    | -        |  | 167.12                                                        |  |
| 70              | 12         | 0.19                                                                                                   | 1.91   | 3.58   | 5.93   | 10.71  | 15.31    | -        |  | 182.39                                                        |  |
| 70              | 20         | 0.320                                                                                                  | 3.170  | 5.920  | 9.820  | 17.740 | 25.350   | -        |  | 302.73                                                        |  |
| 72              | 12         | 0.20                                                                                                   | 1.98   | 3.67   | 6.08   | 11.03  | 15.82    | -        |  | 189.08                                                        |  |
| 72              | 20         | 0.33                                                                                                   | 3.30   | 6.12   | 10.13  | 18.38  | 26.37    | -        |  | 315.14                                                        |  |
| 75              | 12         | 0.21                                                                                                   | 2.07   | 3.82   | 6.35   | 11.50  | 16.59    | -        |  | 197.67                                                        |  |
| 75              | 20         | 0.35                                                                                                   | 3.46   | 6.37   | 10.58  | 19.14  | 27.65    | -        |  | 330.42                                                        |  |
| 80              | 12         | 0.22                                                                                                   | 2.24   | 4.06   | 6.79   | 12.28  | -        | -        |  | 213.91                                                        |  |
| 80              | 20         | 0.370                                                                                                  | 3.700  | 6.720  | 11.230 | 20.310 | -        | -        |  | 353.34                                                        |  |
| 85              | 20         | 0.40                                                                                                   | 3.99   | 7.14   | 12.02  | 21.71  | -        | -        |  | 381.03                                                        |  |
| 90              | 12         | 0.26                                                                                                   | 2.56   | 4.51   | 7.64   | 13.77  | -        | -        |  | 244.47                                                        |  |
| 90              | 20         | 0.420                                                                                                  | 4.230  | 7.460  | 12.630 | 22.780 | -        | -        |  | 403.95                                                        |  |
| 100             | 12         | 0.29                                                                                                   | 2.86   | 4.95   | 8.48   | 15.36  | -        | -        |  | 273.12                                                        |  |
| 100             | 20         | 0.480                                                                                                  | 4.730  | 8.180  | 14.010 | 25.390 | -        | -        |  | 451.70                                                        |  |



L1 type

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①  |
|-------------------|----------|----------------|----------------|------------------------|-------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.1 to 0.25 |

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

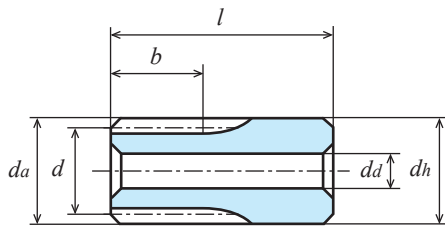
★ [Profile-shifted] is a profile-shifted gear with an rack shift coefficient  $x$  of 0.5.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

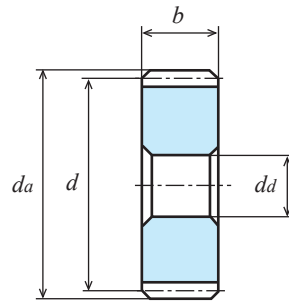
| Catalogue number         | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$da(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw |       | Weight<br>$W(g)$ |
|--------------------------|------------------------|---------------------------|-----------------------|------|-------------------|---------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-------|-------|------------------|
|                          |                        |                           |                       |      |                   |                           |                       |                     |                       |                                | $M$   | $l_s$ |                  |
| <b>S2.5S 10L — 2820</b>  | 10                     | [Profile-shifted]         | $\phi 31.66$          | L1   | 28                | -                         | $\phi 20(h9)$         | L40 R80             | 148                   | -                              | -     | -     | 403.8            |
| <b>S2.5S 12K — 2812</b>  | 12                     | $\phi 30$                 | $\phi 35$             | K2   | 28                | $\phi 12(H8)$             | $\phi 35$             | 32                  | 60                    | -                              | -     | -     | 343.8            |
| <b>S2.5S 14B — 1612N</b> | 14                     | $\phi 35$                 | $\phi 40$             | B1   | 16                | $\phi 12$                 | $\phi 27$             | 12                  | 28                    | -                              | -     | -     | 150.0            |
| <b>S2.5S 14B — 1812N</b> | 14                     | $\phi 35$                 | $\phi 40$             | B1   | 18                | $\phi 12$                 | $\phi 28$             | 12                  | 30                    | -                              | -     | -     | 167.4            |
| <b>S2.5S 16A — 1612</b>  | 16                     | $\phi 40$                 | $\phi 45$             | A1   | 16                | $\phi 12$                 | -                     | -                   | 16                    | -                              | -     | -     | 143.6            |
| <b>S2.5S 16A — 2812</b>  | 16                     | $\phi 40$                 | $\phi 45$             | A1   | 28                | $\phi 12$                 | -                     | -                   | 28                    | -                              | -     | -     | 251.4            |
| <b>S2.5S 16B — 1812N</b> | 16                     | $\phi 40$                 | $\phi 45$             | B1   | 18                | $\phi 12$                 | $\phi 32$             | 12                  | 30                    | -                              | -     | -     | 226.8            |
| <b>S2.5S 18A — 1612</b>  | 18                     | $\phi 45$                 | $\phi 50$             | A1   | 16                | $\phi 12$                 | -                     | -                   | 16                    | -                              | -     | -     | 185.6            |
| <b>S2.5S 18B — 1612N</b> | 18                     | $\phi 45$                 | $\phi 50$             | B1   | 16                | $\phi 12$                 | $\phi 36$             | 12                  | 28                    | -                              | -     | -     | 271.0            |
| <b>S2.5S 18B — 1814N</b> | 18                     | $\phi 45$                 | $\phi 50$             | B1   | 18                | $\phi 14$                 | $\phi 36$             | 12                  | 30                    | -                              | -     | -     | 284.5            |
| <b>S2.5S 20A — 1612F</b> | 20                     | $\phi 50$                 | $\phi 55$             | A1   | 16                | $\phi 12$                 | -                     | -                   | 16                    | -                              | -     | -     | 232.4            |
| <b>S2.5S 20A — 1812F</b> | 20                     | $\phi 50$                 | $\phi 55$             | A1   | 18                | $\phi 12$                 | -                     | -                   | 18                    | -                              | -     | -     | 261.5            |
| <b>S2.5S 20A — 2514F</b> | 20                     | $\phi 50$                 | $\phi 55$             | A1   | 25                | $\phi 14$                 | -                     | -                   | 25                    | -                              | -     | -     | 355.1            |
| <b>S2.5S 20A — 2814F</b> | 20                     | $\phi 50$                 | $\phi 55$             | A1   | 28                | $\phi 14$                 | -                     | -                   | 28                    | -                              | -     | -     | 397.7            |
| <b>S2.5S 20A = 2825</b>  | 20                     | $\phi 50$                 | $\phi 55$             | A1   | 28                | $\phi 25$                 | -                     | -                   | 28                    | $8 \times 3.3$                 | -     | -     | 317.9            |
| <b>S2.5S 20B — 1812</b>  | 20                     | $\phi 50$                 | $\phi 55$             | B1   | 18                | $\phi 12$                 | $\phi 40$             | 12                  | 30                    | -                              | -     | -     | 369.4            |
| <b>S2.5S 20B # 1820</b>  | 20                     | $\phi 50$                 | $\phi 55$             | B1   | 18                | $\phi 20$                 | $\phi 40$             | 12                  | 30                    | $6 \times 2.8$                 | M5    | 6     | 317.2            |
| <b>S2.5S 20B — 2814</b>  | 20                     | $\phi 50$                 | $\phi 55$             | B1   | 28                | $\phi 14$                 | $\phi 42$             | 12                  | 40                    | -                              | -     | -     | 514.1            |
| <b>S2.5S 20B # 2825</b>  | 20                     | $\phi 50$                 | $\phi 55$             | B1   | 28                | $\phi 25$                 | $\phi 42$             | 12                  | 40                    | $8 \times 3.3$                 | M5    | 6     | 399.3            |
| <b>S2.5S 24A — 1814F</b> | 24                     | $\phi 60$                 | $\phi 65$             | A1   | 18                | $\phi 14$                 | -                     | -                   | 18                    | -                              | -     | -     | 377.8            |
| <b>S2.5S 24A = 1820</b>  | 24                     | $\phi 60$                 | $\phi 65$             | A1   | 18                | $\phi 20$                 | -                     | -                   | 18                    | $6 \times 2.8$                 | -     | -     | 352.8            |
| <b>S2.5S 24A — 2814F</b> | 24                     | $\phi 60$                 | $\phi 65$             | A1   | 28                | $\phi 14$                 | -                     | -                   | 28                    | -                              | -     | -     | 587.6            |
| <b>S2.5S 24B — 1614</b>  | 24                     | $\phi 60$                 | $\phi 65$             | B1   | 16                | $\phi 14$                 | $\phi 50$             | 12                  | 28                    | -                              | -     | -     | 506.6            |
| <b>S2.5S 24B — 1814</b>  | 24                     | $\phi 60$                 | $\phi 65$             | B1   | 18                | $\phi 14$                 | $\phi 40$             | 12                  | 30                    | -                              | -     | -     | 482.0            |
| <b>S2.5S 24B — 2515</b>  | 24                     | $\phi 60$                 | $\phi 65$             | B1   | 25                | $\phi 15$                 | $\phi 50$             | 12                  | 37                    | -                              | -     | -     | 689.0            |
| <b>S2.5S 25A = 1820</b>  | 25                     | $\phi 62.5$               | $\phi 67.5$           | A1   | 18                | $\phi 20$                 | -                     | -                   | 18                    | $6 \times 2.8$                 | -     | -     | 386.7            |
| <b>S2.5S 28A — 1614F</b> | 28                     | $\phi 70$                 | $\phi 75$             | A1   | 16                | $\phi 14$                 | -                     | -                   | 16                    | -                              | -     | -     | 460.0            |
| <b>S2.5S 28A — 1814F</b> | 28                     | $\phi 70$                 | $\phi 75$             | A1   | 18                | $\phi 14$                 | -                     | -                   | 18                    | -                              | -     | -     | 520.0            |
| <b>S2.5S 28B — 1814</b>  | 28                     | $\phi 70$                 | $\phi 75$             | B1   | 18                | $\phi 14$                 | $\phi 40$             | 12                  | 30                    | -                              | -     | -     | 630.0            |
| <b>S2.5S 28B # 1820</b>  | 28                     | $\phi 70$                 | $\phi 75$             | B1   | 18                | $\phi 20$                 | $\phi 40$             | 12                  | 30                    | $6 \times 2.8$                 | M5    | 6     | 580.0            |
| <b>S2.5S 30A — 2518F</b> | 30                     | $\phi 75$                 | $\phi 80$             | A1   | 25                | $\phi 18$                 | -                     | -                   | 25                    | -                              | -     | -     | 0.82(kg)         |
| <b>S2.5S 30B — 1814</b>  | 30                     | $\phi 75$                 | $\phi 80$             | B1   | 18                | $\phi 14$                 | $\phi 40$             | 12                  | 30                    | -                              | -     | -     | 0.71(kg)         |
| <b>S2.5S 30B — 2816</b>  | 30                     | $\phi 75$                 | $\phi 80$             | B1   | 28                | $\phi 16$                 | $\phi 50$             | 12                  | 40                    | -                              | -     | -     | 1.09(kg)         |



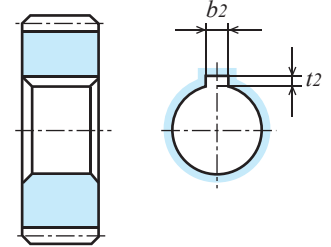
2D • 3D CAD



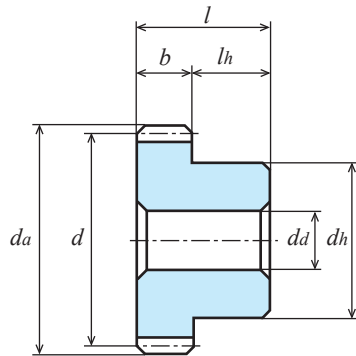
K2 type [-]



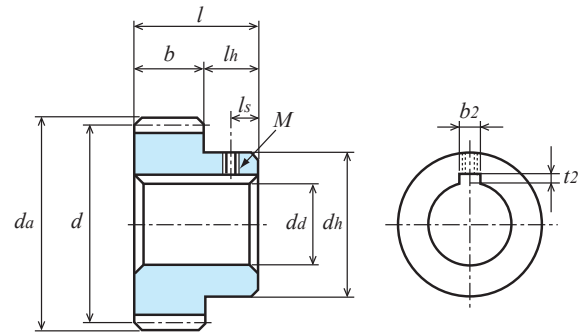
A1 type [-]



A1 type [=]

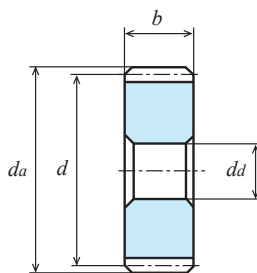
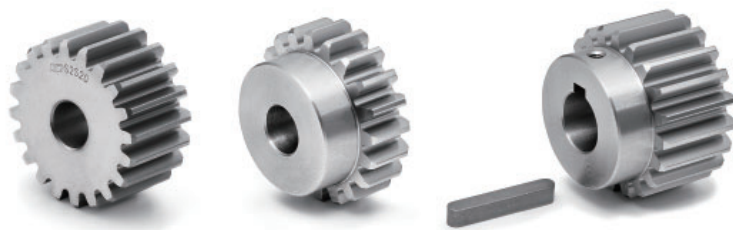


B1 type [-]

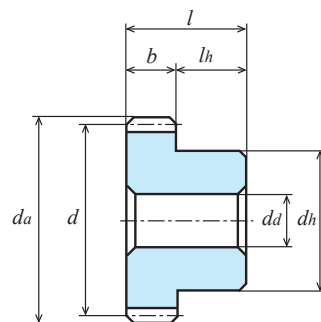


B1 type [#]

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input<br>revolutions per minute (Unit: N·m) |  |
|------------------------|-------------------|-----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|------------------------------------------------------------------|--|
|                        |                   | 10rpm                                                                                                     | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                           |  |
| 10                     | 28                | 0.064                                                                                                     | 0.64   | 1.29   | 2.58   | 5.07   | 7.02     | 8.29     | 61.11                                                            |  |
| 12                     | 28                | 0.059                                                                                                     | 0.59   | 1.18   | 2.37   | 4.57   | 6.29     | 7.40     | 56.34                                                            |  |
| 14                     | 16                | 0.044                                                                                                     | 0.44   | 0.88   | 1.77   | 3.30   | 4.50     | 5.25     | 42.01                                                            |  |
| 14                     | 18                | 0.049                                                                                                     | 0.49   | 0.99   | 1.99   | 3.72   | 5.06     | 5.91     | 46.79                                                            |  |
| 16                     | 16                | 0.055                                                                                                     | 0.55   | 1.10   | 2.20   | 3.99   | 5.38     | 6.31     | 52.52                                                            |  |
| 16                     | 18                | 0.061                                                                                                     | 0.61   | 1.23   | 2.47   | 4.49   | 6.05     | 7.10     | 58.25                                                            |  |
| 16                     | 28                | 0.096                                                                                                     | 0.96   | 1.93   | 3.85   | 7.00   | 9.42     | 11.06    | 91.67                                                            |  |
| 18                     | 16                | 0.066                                                                                                     | 0.66   | 1.32   | 2.64   | 4.67   | 6.23     | 7.48     | 63.02                                                            |  |
| 18                     | 18                | 0.074                                                                                                     | 0.74   | 1.48   | 2.97   | 5.25   | 7.01     | 8.41     | 70.66                                                            |  |
| 20                     | 16                | 0.077                                                                                                     | 0.78   | 1.55   | 3.09   | 5.34   | 7.13     | 8.66     | 74.48                                                            |  |
| 20                     | 18                | 0.087                                                                                                     | 0.87   | 1.75   | 3.47   | 6.01   | 8.03     | 9.74     | 83.08                                                            |  |
| 20                     | 25                | 0.122                                                                                                     | 1.220  | 2.450  | 4.860  | 8.400  | 11.230   | 13.620   | 116.51                                                           |  |
| 20                     | 28                | 0.136                                                                                                     | 1.36   | 2.72   | 5.40   | 9.34   | 12.48    | 15.15    | 129.87                                                           |  |
| 24                     | 16                | 0.101                                                                                                     | 1.01   | 2.03   | 3.90   | 6.60   | 9.08     | 10.97    | 96.45                                                            |  |
| 24                     | 18                | 0.114                                                                                                     | 1.14   | 2.28   | 4.39   | 7.43   | 10.22    | 12.34    | 108.86                                                           |  |
| 24                     | 25                | 0.158                                                                                                     | 1.58   | 3.17   | 6.10   | 10.32  | 14.19    | 17.13    | 150.88                                                           |  |
| 24                     | 28                | 0.177                                                                                                     | 1.77   | 3.55   | 6.83   | 11.56  | 15.89    | 19.19    | 169.02                                                           |  |
| 25                     | 18                | 0.121                                                                                                     | 1.21   | 2.41   | 4.62   | 7.77   | 10.76    | 12.98    | 115.55                                                           |  |
| 28                     | 16                | 0.13                                                                                                      | 1.26   | 2.51   | 4.70   | 7.79   | 11.01    | 13.30    | 120.32                                                           |  |
| 28                     | 18                | 0.14                                                                                                      | 1.41   | 2.83   | 5.28   | 8.77   | 12.38    | 14.97    | 134.65                                                           |  |
| 30                     | 18                | 0.16                                                                                                      | 1.55   | 3.10   | 5.72   | 9.50   | 13.44    | 16.28    | 148.02                                                           |  |
| 30                     | 25                | 0.220                                                                                                     | 2.160  | 4.320  | 7.950  | 13.210 | 18.690   | 22.640   | 206.27                                                           |  |
| 30                     | 28                | 0.24                                                                                                      | 2.41   | 4.82   | 8.89   | 14.77  | 20.91    | 25.33    | 230.14                                                           |  |



A1 type [-]



B1 type [-]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ① |
|-------------------|----------|----------------|----------------|------------------------|------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.1 ~ 0.25 |

★ No surface treatment is applied. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

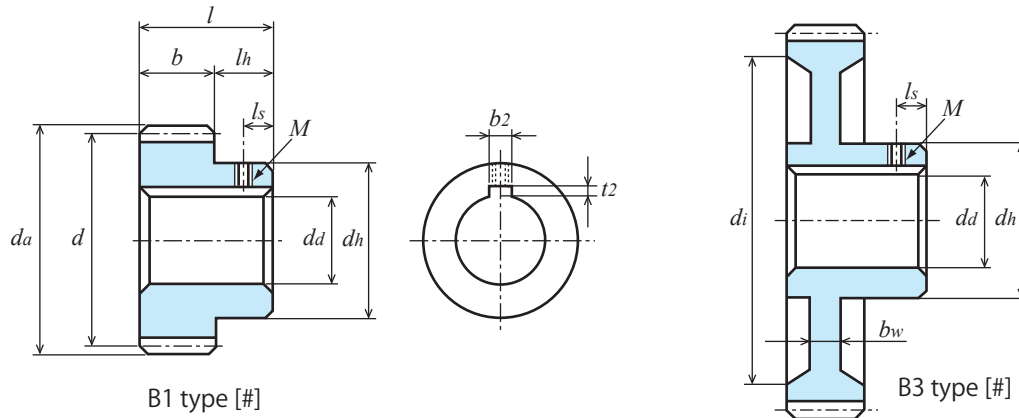
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number         | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw |       | Dimension of Rim<br>$d_i$ | Thick-ness of Web<br>$b_w$ | Weight<br>$W(kg)$ |
|--------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-------|-------|---------------------------|----------------------------|-------------------|
|                          |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | $M$   | $l_s$ |                           |                            |                   |
| <b>S2.5S 32A — 1616F</b> | 32                     | $\phi 80$                 | $\phi 85$             | A1   | 16                | $\phi 16$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 0.61              |
| <b>S2.5S 32A — 2518F</b> | 32                     | $\phi 80$                 | $\phi 85$             | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 0.94              |
| <b>S2.5S 32B — 1616</b>  | 32                     | $\phi 80$                 | $\phi 85$             | B1   | 16                | $\phi 16$                  | $\phi 50$             | 12                  | 28                    | -                              | -     | -     | -                         | -                          | 0.77              |
| <b>S2.5S 32B — 2516</b>  | 32                     | $\phi 80$                 | $\phi 85$             | B1   | 25                | $\phi 16$                  | $\phi 60$             | 12                  | 37                    | -                              | -     | -     | -                         | -                          | 1.20              |
| <b>S2.5S 36A — 1616F</b> | 36                     | $\phi 90$                 | $\phi 95$             | A1   | 16                | $\phi 16$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 0.77              |
| <b>S2.5S 36A — 2518F</b> | 36                     | $\phi 90$                 | $\phi 95$             | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 1.20              |
| <b>S2.5S 36B — 1616</b>  | 36                     | $\phi 90$                 | $\phi 95$             | B1   | 16                | $\phi 16$                  | $\phi 50$             | 12                  | 28                    | -                              | -     | -     | -                         | -                          | 0.94              |
| <b>S2.5S 36B — 2518</b>  | 36                     | $\phi 90$                 | $\phi 95$             | B1   | 25                | $\phi 18$                  | $\phi 60$             | 12                  | 37                    | -                              | -     | -     | -                         | -                          | 1.44              |
| <b>S2.5S 40A — 1616F</b> | 40                     | $\phi 100$                | $\phi 105$            | A1   | 16                | $\phi 16$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 0.96              |
| <b>S2.5S 40A — 2518F</b> | 40                     | $\phi 100$                | $\phi 105$            | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 1.49              |
| <b>S2.5S 40B — 1616</b>  | 40                     | $\phi 100$                | $\phi 105$            | B1   | 16                | $\phi 16$                  | $\phi 50$             | 12                  | 28                    | -                              | -     | -     | -                         | -                          | 1.13              |
| <b>S2.5S 40B # 1620</b>  | 40                     | $\phi 100$                | $\phi 105$            | B1   | 16                | $\phi 20$                  | $\phi 50$             | 12                  | 28                    | $6 \times 2.8$                 | M5    | 6     | -                         | -                          | 1.10              |
| <b>S2.5S 40B # 1625</b>  | 40                     | $\phi 100$                | $\phi 105$            | B1   | 16                | $\phi 25$                  | $\phi 50$             | 12                  | 28                    | $8 \times 3.3$                 | M6    | 6     | -                         | -                          | 1.06              |
| <b>S2.5S 40BF — 2512</b> | 40                     | $\phi 100$                | $\phi 105$            | B1   | 25                | $\phi 12(H8)$              | $\phi 70$             | 20                  | 45                    | -                              | -     | -     | -                         | -                          | 2.1               |
| <b>S2.5S 40B — 2518</b>  | 40                     | $\phi 100$                | $\phi 105$            | B1   | 25                | $\phi 18$                  | $\phi 60$             | 12                  | 37                    | -                              | -     | -     | -                         | -                          | 1.73              |
| <b>S2.5S 40B # 2525</b>  | 40                     | $\phi 100$                | $\phi 105$            | B1   | 25                | $\phi 25$                  | $\phi 60$             | 12                  | 37                    | $8 \times 3.3$                 | M6    | 6     | -                         | -                          | 1.66              |
| <b>S2.5S 48A — 1616F</b> | 48                     | $\phi 120$                | $\phi 125$            | A1   | 16                | $\phi 16$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 1.40              |
| <b>S2.5S 48A — 2518F</b> | 48                     | $\phi 120$                | $\phi 125$            | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 2.17              |
| <b>S2.5S 48B — 1616</b>  | 48                     | $\phi 120$                | $\phi 125$            | B1   | 16                | $\phi 16$                  | $\phi 50$             | 12                  | 28                    | -                              | -     | -     | -                         | -                          | 1.56              |
| <b>S2.5S 48B — 2518</b>  | 48                     | $\phi 120$                | $\phi 125$            | B1   | 25                | $\phi 18$                  | $\phi 60$             | 12                  | 37                    | -                              | -     | -     | -                         | -                          | 2.41              |
| <b>S2.5S 50A — 1616F</b> | 50                     | $\phi 125$                | $\phi 130$            | A1   | 16                | $\phi 16$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 1.52              |
| <b>S2.5S 50A — 2518F</b> | 50                     | $\phi 125$                | $\phi 130$            | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 2.36              |
| <b>S2.5S 50B — 2518</b>  | 50                     | $\phi 125$                | $\phi 130$            | B1   | 25                | $\phi 18$                  | $\phi 60$             | 12                  | 37                    | -                              | -     | -     | -                         | -                          | 2.60              |
| <b>S2.5S 56A — 2518F</b> | 56                     | $\phi 140$                | $\phi 145$            | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 2.97              |
| <b>S2.5S 56B — 1618</b>  | 56                     | $\phi 140$                | $\phi 145$            | B1   | 16                | $\phi 18$                  | $\phi 60$             | 12                  | 28                    | -                              | -     | -     | -                         | -                          | 2.15              |
| <b>S2.5S 60A — 1616F</b> | 60                     | $\phi 150$                | $\phi 155$            | A1   | 16                | $\phi 16$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 2.19              |
| <b>S2.5S 60A — 2518F</b> | 60                     | $\phi 150$                | $\phi 155$            | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 3.42              |
| <b>S2.5S 60B — 1618</b>  | 60                     | $\phi 150$                | $\phi 155$            | B1   | 16                | $\phi 18$                  | $\phi 60$             | 12                  | 28                    | -                              | -     | -     | -                         | -                          | 2.43              |
| <b>S2.5S 60B — 2520</b>  | 60                     | $\phi 150$                | $\phi 155$            | B1   | 25                | $\phi 20$                  | $\phi 70$             | 12                  | 37                    | -                              | -     | -     | -                         | -                          | 3.74              |
| <b>S2.5S 64A — 1616F</b> | 64                     | $\phi 160$                | $\phi 165$            | A1   | 16                | $\phi 16$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 2.50              |
| <b>S2.5S 64A — 2518F</b> | 64                     | $\phi 160$                | $\phi 165$            | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 3.90              |
| <b>S2.5S 70BF — 2520</b> | 70                     | $\phi 175$                | $\phi 180$            | B1   | 25                | $\phi 20$                  | $\phi 125$            | 20                  | 45                    | -                              | -     | -     | -                         | -                          | 6.52              |
| <b>S2.5S 72A — 1616F</b> | 72                     | $\phi 180$                | $\phi 185$            | A1   | 16                | $\phi 16$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 3.17              |
| <b>S2.5S 72A — 2518F</b> | 72                     | $\phi 180$                | $\phi 185$            | A1   | 25                | $\phi 18$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 4.94              |





2D • 3D CAD

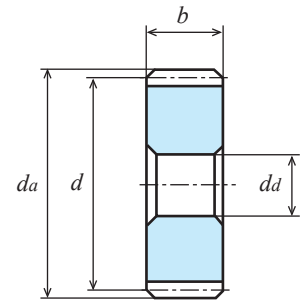
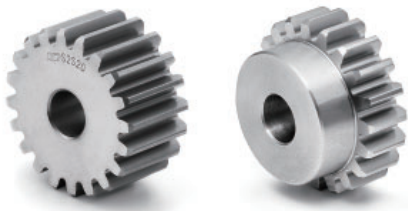


B1 type [#]

B3 type [#]

| Catalogue number         | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Screw |       | Dimension of Rim<br>$d_i$ | Thick-ness of Web<br>$b_w$ | Weight<br>$W(kg)$ |
|--------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|--------------------------------|-------|-------|---------------------------|----------------------------|-------------------|
|                          |                        |                           |                       |      |                   |                            |                       |                     |                       |                                | $M$   | $l_s$ |                           |                            |                   |
| <b>S2.5S 80A – 1618F</b> | 80                     | $\phi 200$                | $\phi 205$            | A1   | 16                | $\phi 18$                  | -                     | -                   | 16                    | -                              | -     | -     | -                         | -                          | 3.91              |
| <b>S2.5S 80A – 2520F</b> | 80                     | $\phi 200$                | $\phi 205$            | A1   | 25                | $\phi 20$                  | -                     | -                   | 25                    | -                              | -     | -     | -                         | -                          | 6.10              |
| <b>S2.5S 80B – 2522</b>  | 80                     | $\phi 200$                | $\phi 205$            | B1   | 25                | $\phi 22$                  | $\phi 70$             | 12                  | 37                    | -                              | -     | -     | -                         | -                          | 6.42              |
| <b>S2.5S 80B # 2535</b>  | 80                     | $\phi 200$                | $\phi 205$            | B3   | 25                | $\phi 35$                  | $\phi 70$             | 12                  | 37                    | $10 \times 3.3$                | M8    | 6     | $\phi 177$                | 13                         | 4.37              |

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |  |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|--|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |  |
| 32                     | 16                | 0.15                                                                                                   | 1.50   | 3.01   | 5.46   | 9.13   | 12.89    | 15.64    | 143.24                                                        |  |
| 32                     | 25                | 0.24                                                                                                   | 2.35   | 4.70   | 8.54   | 14.27  | 20.14    | 24.44    | 224.41                                                        |  |
| 36                     | 16                | 0.18                                                                                                   | 1.76   | 3.51   | 6.20   | 10.50  | 14.83    | 17.94    | 168.07                                                        |  |
| 36                     | 25                | 0.27                                                                                                   | 2.75   | 5.49   | 9.69   | 16.41  | 23.17    | 28.03    | 262.61                                                        |  |
| 40                     | 16                | 0.20                                                                                                   | 2.01   | 4.00   | 6.92   | 11.85  | 16.74    | 20.19    | 191.94                                                        |  |
| 40                     | 25                | 0.310                                                                                                  | 3.140  | 6.230  | 10.780 | 18.470 | 26.100   | 31.480   | 299.86                                                        |  |
| 48                     | 16                | 0.25                                                                                                   | 2.53   | 4.87   | 8.25   | 14.45  | 20.45    | 25.30    | 341.60                                                        |  |
| 48                     | 25                | 0.40                                                                                                   | 3.95   | 7.61   | 12.89  | 22.58  | 31.95    | 39.53    | 377.21                                                        |  |
| 50                     | 16                | 0.27                                                                                                   | 2.66   | 5.09   | 8.56   | 15.12  | 21.36    | 26.61    | 254.02                                                        |  |
| 50                     | 25                | 0.410                                                                                                  | 4.140  | 7.910  | 13.330 | 23.530 | 33.230   | 41.400   | 395.36                                                        |  |
| 56                     | 16                | 0.31                                                                                                   | 3.06   | 5.71   | 9.47   | 17.11  | 24.44    | -        | 292.22                                                        |  |
| 56                     | 25                | 0.48                                                                                                   | 4.77   | 8.92   | 14.80  | 26.73  | 38.19    | -        | 455.52                                                        |  |
| 60                     | 16                | 0.33                                                                                                   | 3.32   | 6.12   | 10.16  | 18.41  | 26.56    | -        | 317.05                                                        |  |
| 60                     | 25                | 0.52                                                                                                   | 5.19   | 9.56   | 15.87  | 28.76  | 41.50    | -        | 495.63                                                        |  |
| 64                     | 16                | 0.36                                                                                                   | 3.59   | 6.51   | 10.89  | 19.69  | -        | -        | 342.83                                                        |  |
| 64                     | 25                | 0.56                                                                                                   | 5.60   | 10.17  | 17.01  | 30.77  | -        | -        | 534.78                                                        |  |
| 70                     | 25                | 0.620                                                                                                  | 6.190  | 11.000 | 18.560 | 33.500 | -        | -        | 591.13                                                        |  |
| 72                     | 16                | 0.41                                                                                                   | 4.12   | 7.27   | 12.31  | 22.20  | -        | -        | 393.44                                                        |  |
| 72                     | 25                | 0.64                                                                                                   | 6.44   | 11.37  | 19.24  | 34.69  | -        | -        | 615.00                                                        |  |
| 80                     | 16                | 0.47                                                                                                   | 4.62   | 8.00   | 13.70  | 24.84  | -        | -        | 441.19                                                        |  |
| 80                     | 25                | 0.720                                                                                                  | 7.170  | 12.410 | 21.260 | 38.530 | -        | -        | 684.71                                                        |  |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①  |
|-------------------|----------|----------------|----------------|------------------------|-------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.12 to 0.3 |

A1 type [-]

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

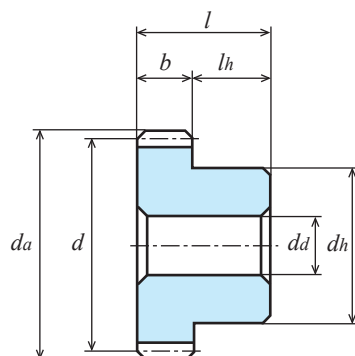
★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number       | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>da</i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>da(H7)</i> | Hub diameter<br><i>dh</i> | Hub length<br><i>lh</i> | Overall length<br><i>l</i> | Weight<br><i>W(kg)</i> |
|------------------------|-----------------------------|--------------------------------|---------------------------|------|------------------------|--------------------------------|---------------------------|-------------------------|----------------------------|------------------------|
| <b>S3S 14A — 3516</b>  | 14                          | φ42                            | φ 48                      | A1   | 35                     | φ16                            | -                         | -                       | 35                         | 0.33                   |
| <b>S3S 15A — 3016</b>  | 15                          | φ45                            | φ 51                      | A1   | 30                     | φ16                            | -                         | -                       | 30                         | 0.33                   |
| <b>S3S 16B — 2216N</b> | 16                          | φ48                            | φ 54                      | B1   | 22                     | φ16                            | φ40                       | 13                      | 35                         | 0.39                   |
| <b>S3S 16B — 3016N</b> | 16                          | φ48                            | φ 54                      | B1   | 30                     | φ16                            | φ40                       | 13                      | 43                         | 0.49                   |
| <b>S3S 18A — 2216</b>  | 18                          | φ54                            | φ 60                      | A1   | 22                     | φ16                            | -                         | -                       | 22                         | 0.36                   |
| <b>S3S 18A — 3016</b>  | 18                          | φ54                            | φ 60                      | A1   | 30                     | φ16                            | -                         | -                       | 30                         | 0.49                   |
| <b>S3S 18B — 3018N</b> | 18                          | φ54                            | φ 60                      | B1   | 30                     | φ18                            | φ46                       | 13                      | 43                         | 0.62                   |
| <b>S3S 20A — 2216F</b> | 20                          | φ60                            | φ 66                      | A1   | 22                     | φ16                            | -                         | -                       | 22                         | 0.45                   |
| <b>S3S 20A — 3018F</b> | 20                          | φ60                            | φ 66                      | A1   | 30                     | φ18                            | -                         | -                       | 30                         | 0.61                   |
| <b>S3S 20B — 2218</b>  | 20                          | φ60                            | φ 66                      | B1   | 22                     | φ18                            | φ40                       | 13                      | 35                         | 0.55                   |
| <b>S3S 20B — 3018N</b> | 20                          | φ60                            | φ 66                      | B1   | 30                     | φ18                            | φ52                       | 13                      | 43                         | 0.80                   |
| <b>S3S 24A — 2216F</b> | 24                          | φ72                            | φ 78                      | A1   | 22                     | φ16                            | -                         | -                       | 22                         | 0.67                   |
| <b>S3S 24A — 3018F</b> | 24                          | φ72                            | φ 78                      | A1   | 30                     | φ18                            | -                         | -                       | 30                         | 0.90                   |
| <b>S3S 24A — 3518F</b> | 24                          | φ72                            | φ 78                      | A1   | 35                     | φ18                            | -                         | -                       | 35                         | 1.05                   |
| <b>S3S 24B — 3020N</b> | 24                          | φ72                            | φ 78                      | B1   | 30                     | φ20                            | φ60                       | 13                      | 43                         | 1.14                   |
| <b>S3S 25A — 2218F</b> | 25                          | φ75                            | φ 81                      | A1   | 22                     | φ18                            | -                         | -                       | 22                         | 0.72                   |
| <b>S3S 25A — 3018F</b> | 25                          | φ75                            | φ 81                      | A1   | 30                     | φ18                            | -                         | -                       | 30                         | 0.98                   |
| <b>S3S 25A — 3520F</b> | 25                          | φ75                            | φ 81                      | A1   | 35                     | φ20                            | -                         | -                       | 35                         | 1.13                   |
| <b>S3S 25B — 2220</b>  | 25                          | φ75                            | φ 81                      | B1   | 22                     | φ20                            | φ50                       | 13                      | 35                         | 0.88                   |
| <b>S3S 25B — 3020N</b> | 25                          | φ75                            | φ 81                      | B1   | 30                     | φ20                            | φ60                       | 13                      | 43                         | 1.22                   |
| <b>S3S 28A — 2218F</b> | 28                          | φ84                            | φ 90                      | A1   | 22                     | φ18                            | -                         | -                       | 22                         | 0.91                   |
| <b>S3S 28A — 3020F</b> | 28                          | φ84                            | φ 90                      | A1   | 30                     | φ20                            | -                         | -                       | 30                         | 1.23                   |
| <b>S3S 28B — 2220</b>  | 28                          | φ84                            | φ 90                      | B1   | 22                     | φ20                            | φ50                       | 13                      | 35                         | 1.07                   |
| <b>S3S 28B — 3022N</b> | 28                          | φ84                            | φ 90                      | B1   | 30                     | φ22                            | φ60                       | 13                      | 43                         | 1.47                   |
| <b>S3S 30A — 2220F</b> | 30                          | φ90                            | φ 96                      | A1   | 22                     | φ20                            | -                         | -                       | 22                         | 1.04                   |
| <b>S3S 30A — 3022F</b> | 30                          | φ90                            | φ 96                      | A1   | 30                     | φ22                            | -                         | -                       | 30                         | 1.41                   |
| <b>S3S 30B — 2218</b>  | 30                          | φ90                            | φ 96                      | B1   | 22                     | φ18                            | φ50                       | 13                      | 35                         | 1.23                   |
| <b>S3S 30B — 3022N</b> | 30                          | φ90                            | φ 96                      | B1   | 30                     | φ22                            | φ60                       | 13                      | 43                         | 1.66                   |
| <b>S3S 32A — 2020F</b> | 32                          | φ96                            | φ102                      | A1   | 20                     | φ20                            | -                         | -                       | 20                         | 1.09                   |
| <b>S3S 32A — 3022F</b> | 32                          | φ96                            | φ102                      | A1   | 30                     | φ22                            | -                         | -                       | 30                         | 1.62                   |
| <b>S3S 32B — 2018</b>  | 32                          | φ96                            | φ102                      | B1   | 20                     | φ18                            | φ50                       | 13                      | 33                         | 1.27                   |
| <b>S3S 32B — 3025N</b> | 32                          | φ96                            | φ102                      | B1   | 30                     | φ25                            | φ65                       | 13                      | 43                         | 1.88                   |
| <b>S3S 32B — 3220</b>  | 32                          | φ96                            | φ102                      | B1   | 32                     | φ20                            | φ60                       | 13                      | 45                         | 2.00                   |

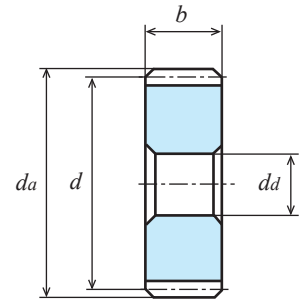
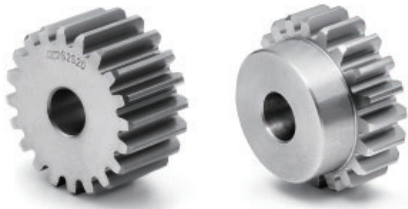


2D • 3D CAD



B1 type [-]

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N-m) |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |
| 14                     | 35                | 0.139                                                                                                  | 1.39   | 2.79   | 5.58   | 10.01  | 13.43    | 15.91    | 132.74                                                        |
| 15                     | 30                | 0.134                                                                                                  | 1.34   | 2.68   | 5.36   | 9.46   | 12.61    | 15.14    | 127.96                                                        |
| 16                     | 22                | 0.11                                                                                                   | 1.09   | 2.18   | 4.36   | 7.57   | 10.06    | 12.22    | 104.09                                                        |
| 16                     | 30                | 0.15                                                                                                   | 1.49   | 2.97   | 5.94   | 10.33  | 13.71    | 16.66    | 142.29                                                        |
| 18                     | 22                | 0.13                                                                                                   | 1.31   | 2.62   | 5.14   | 8.81   | 11.91    | 14.43    | 125.10                                                        |
| 18                     | 30                | 0.18                                                                                                   | 1.79   | 3.57   | 7.01   | 12.02  | 16.25    | 19.68    | 170.93                                                        |
| 20                     | 22                | 0.15                                                                                                   | 1.54   | 3.08   | 5.93   | 10.03  | 13.79    | 16.65    | 147.06                                                        |
| 20                     | 30                | 0.210                                                                                                  | 2.110  | 4.230  | 8.140  | 13.780 | 18.950   | 22.880   | 201.50                                                        |
| 24                     | 22                | 0.20                                                                                                   | 2.01   | 4.01   | 7.45   | 12.33  | 17.49    | 21.16    | 191.94                                                        |
| 24                     | 30                | 0.27                                                                                                   | 2.73   | 5.47   | 10.17  | 16.82  | 23.85    | 28.85    | 260.70                                                        |
| 24                     | 35                | 0.32                                                                                                   | 3.19   | 6.38   | 11.86  | 19.62  | 27.82    | 33.66    | 304.63                                                        |
| 25                     | 22                | 0.21                                                                                                   | 2.12   | 4.25   | 7.83   | 13.01  | 18.40    | 22.29    | 202.45                                                        |
| 25                     | 30                | 0.290                                                                                                  | 2.910  | 5.820  | 10.710 | 17.800 | 25.180   | 30.510   | 277.90                                                        |
| 25                     | 35                | 0.34                                                                                                   | 3.38   | 6.76   | 12.46  | 20.69  | 29.28    | 35.47    | 322.78                                                        |
| 28                     | 22                | 0.25                                                                                                   | 2.49   | 4.98   | 8.93   | 15.01  | 21.18    | 25.68    | 237.78                                                        |
| 28                     | 30                | 0.34                                                                                                   | 3.39   | 6.78   | 12.18  | 20.47  | 28.89    | 35.02    | 323.73                                                        |
| 30                     | 22                | 0.27                                                                                                   | 2.73   | 5.46   | 9.65   | 16.33  | 23.05    | 27.89    | 260.70                                                        |
| 30                     | 30                | 0.370                                                                                                  | 3.730  | 7.460  | 13.170 | 22.290 | 31.470   | 38.070   | 356.20                                                        |
| 32                     | 20                | 0.27                                                                                                   | 2.71   | 5.41   | 9.41   | 16.03  | 22.65    | 27.36    | 258.79                                                        |
| 32                     | 30                | 0.41                                                                                                   | 4.06   | 8.12   | 14.11  | 24.05  | 33.98    | 41.04    | 387.71                                                        |
| 32                     | 32                | 0.43                                                                                                   | 4.33   | 8.66   | 15.05  | 25.66  | 36.25    | 43.78    | 413.50                                                        |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①  |
|-------------------|----------|----------------|----------------|------------------------|-------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      | 0.12 to 0.3 |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).  
For the unit conversion method, refer to P. 20 in "References."

★ KG standard products have different transfer capabilities depending on whether the face width is "Standard" (for light loads) or "Wide" (for heavy loads).

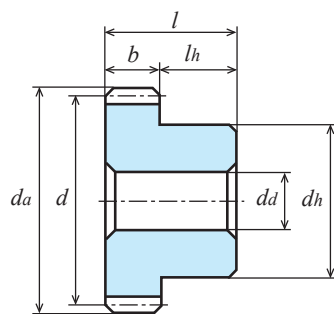
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

A1 type [-]

| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H7)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(kg)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-------------------|
| <b>S3S 36A — 2020F</b> | 36                     | φ108                      | φ114                  | A1   | 20                | φ20                        | -                     | -                   | 20                    | 1.39              |
| <b>S3S 36B — 2020</b>  | 36                     | φ108                      | φ114                  | B1   | 20                | φ20                        | φ50                   | 13                  | 33                    | 1.56              |
| <b>S3S 40A — 2020F</b> | 40                     | φ120                      | φ126                  | A1   | 20                | φ20                        | -                     | -                   | 20                    | 1.73              |
| <b>S3S 40A — 3222F</b> | 40                     | φ120                      | φ126                  | A1   | 32                | φ22                        | -                     | -                   | 32                    | 2.75              |
| <b>S3S 40B — 2020</b>  | 40                     | φ120                      | φ126                  | B1   | 20                | φ20                        | φ50                   | 13                  | 33                    | 1.90              |
| <b>S3S 40B — 3025N</b> | 40                     | φ120                      | φ126                  | B1   | 30                | φ25                        | φ70                   | 13                  | 43                    | 2.89              |
| <b>S3S 40B — 3222</b>  | 40                     | φ120                      | φ126                  | B1   | 32                | φ22                        | φ60                   | 13                  | 45                    | 3.00              |
| <b>S3S 48A — 2020F</b> | 48                     | φ144                      | φ150                  | A1   | 20                | φ20                        | -                     | -                   | 20                    | 2.51              |
| <b>S3S 48A — 3222F</b> | 48                     | φ144                      | φ150                  | A1   | 32                | φ22                        | -                     | -                   | 32                    | 4.00              |
| <b>S3S 48B — 2020</b>  | 48                     | φ144                      | φ150                  | B1   | 20                | φ20                        | φ50                   | 13                  | 33                    | 2.68              |
| <b>S3S 48B — 3025N</b> | 48                     | φ144                      | φ150                  | B1   | 30                | φ25                        | φ80                   | 13                  | 43                    | 4.19              |
| <b>S3S 50A — 2020F</b> | 50                     | φ150                      | φ156                  | A1   | 20                | φ20                        | -                     | -                   | 20                    | 2.73              |
| <b>S3S 50A — 3222F</b> | 50                     | φ150                      | φ156                  | A1   | 32                | φ22                        | -                     | -                   | 32                    | 4.34              |
| <b>S3S 50B — 2020</b>  | 50                     | φ150                      | φ156                  | B1   | 20                | φ20                        | φ60                   | 13                  | 33                    | 2.98              |
| <b>S3S 50B — 3025N</b> | 50                     | φ150                      | φ156                  | B1   | 30                | φ25                        | φ80                   | 13                  | 43                    | 4.51              |
| <b>S3S 56A — 3222F</b> | 56                     | φ168                      | φ174                  | A1   | 32                | φ22                        | -                     | -                   | 32                    | 5.47              |
| <b>S3S 60A — 2020F</b> | 60                     | φ180                      | φ186                  | A1   | 20                | φ20                        | -                     | -                   | 20                    | 3.95              |
| <b>S3S 60A — 3222F</b> | 60                     | φ180                      | φ186                  | A1   | 32                | φ22                        | -                     | -                   | 32                    | 6.30              |
| <b>S3S 60B — 2022</b>  | 60                     | φ180                      | φ186                  | B1   | 20                | φ22                        | φ60                   | 13                  | 33                    | 4.19              |

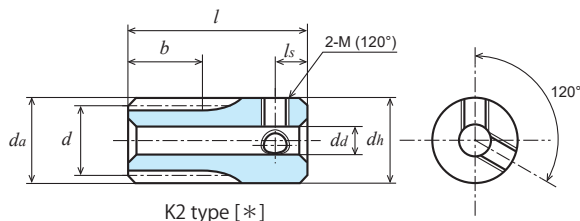


2D • 3D CAD



B1 type [-]

| Number of teeth<br>$z$ | Face width<br>$b$ | Allowable transfer capability table for different revolutions per minute, Bending strength, (Unit: kW) |        |        |        |        |          |          | Allowable torque for input revolutions per minute (Unit: N·m) |
|------------------------|-------------------|--------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|---------------------------------------------------------------|
|                        |                   | 10rpm                                                                                                  | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm | 100rpm                                                        |
| 36                     | 20                | 0.32                                                                                                   | 3.16   | 6.20   | 10.64  | 18.39  | 26.00    | 31.63    | 301.77                                                        |
| 40                     | 20                | 0.36                                                                                                   | 3.62   | 6.98   | 11.81  | 20.69  | 29.29    | 36.23    | 345.69                                                        |
| 40                     | 30                | 0.540                                                                                                  | 5.420  | 10.440 | 17.680 | 30.970 | 43.830   | 54.230   | 517.59                                                        |
| 40                     | 32                | 0.58                                                                                                   | 5.80   | 11.16  | 18.90  | 33.11  | 46.86    | 57.97    | 553.88                                                        |
| 48                     | 20                | 0.46                                                                                                   | 4.55   | 8.46   | 14.00  | 25.40  | 36.43    | -        | 434.51                                                        |
| 48                     | 30                | 0.68                                                                                                   | 6.83   | 12.69  | 21.01  | 38.10  | 54.65    | -        | 652.24                                                        |
| 48                     | 32                | 0.73                                                                                                   | 7.29   | 13.54  | 22.41  | 40.64  | 58.29    | -        | 696.17                                                        |
| 50                     | 20                | 0.48                                                                                                   | 4.79   | 8.82   | 14.66  | 26.56  | 38.31    | -        | 457.43                                                        |
| 50                     | 30                | 0.720                                                                                                  | 7.150  | 13.180 | 21.890 | 39.670 | 57.230   | -        | 682.80                                                        |
| 50                     | 32                | 0.77                                                                                                   | 7.66   | 14.12  | 23.45  | 42.49  | 61.30    | -        | 731.50                                                        |
| 56                     | 32                | 0.88                                                                                                   | 8.80   | 15.80  | 26.54  | 47.95  | -        | -        | 840.37                                                        |
| 60                     | 20                | 0.60                                                                                                   | 5.98   | 10.55  | 17.86  | 32.20  | -        | -        | 571.07                                                        |
| 60                     | 32                | 0.96                                                                                                   | 9.56   | 16.88  | 28.57  | 51.52  | -        | -        | 912.95                                                        |



K2 type [\*]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 | SUS304   | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. Gears with a [\*] are provided with two screw holes. No set screws are provided.

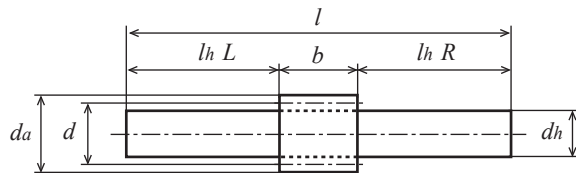
★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

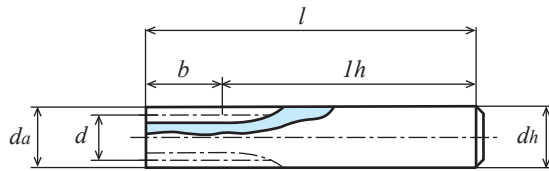
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number  | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H8)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw     |       | Weight<br>$W(g)$ |
|-------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-----------|-------|------------------|
|                   |                        |                           |                       |      |                   |                            |                       |                     |                       | 2-M(120°) | $l_s$ |                  |
| S50SU 10K — 1006  | 10                     | $\phi 5$                  | $\phi 6$              | K1   | 10                | -                          | $\phi 6$              | 45                  | 55                    | -         | -     | 11.7             |
| S50SU 12K — 1007  | 12                     | $\phi 6$                  | $\phi 7$              | K1   | 10                | -                          | $\phi 7$              | 45                  | 55                    | -         | -     | 16.0             |
| S50SU 14K — 1008  | 14                     | $\phi 7$                  | $\phi 8$              | K1   | 10                | -                          | $\phi 8$              | 45                  | 55                    | -         | -     | 21.0             |
| S50SU 15K — 1008  | 15                     | $\phi 7.5$                | $\phi 8.5$            | K1   | 10                | -                          | $\phi 8.5$            | 45                  | 55                    | -         | -     | 23.8             |
| S50SU 16K * 0804  | 16                     | $\phi 8$                  | $\phi 9$              | K2   | 8                 | $\phi 4$                   | $\phi 9$              | 10                  | 18                    | 2-M3      | 3     | 6.2              |
| S50SU 16L — 0805  | 16                     | $\phi 8$                  | $\phi 9$              | L1   | 8                 | -                          | $\phi 5 (h9)$         | L22 R50             | 80                    | -         | -     | 14.4             |
| S50SU 18K * 0804  | 18                     | $\phi 9$                  | $\phi 10$             | K2   | 8                 | $\phi 4$                   | $\phi 10$             | 10                  | 18                    | 2-M3      | 3     | 8.2              |
| S50SU 18L — 0806  | 18                     | $\phi 9$                  | $\phi 10$             | L1   | 8                 | -                          | $\phi 6 (h9)$         | L22 R50             | 80                    | -         | -     | 20.2             |
| S50SU 20K * 0804  | 20                     | $\phi 10$                 | $\phi 11$             | K2   | 8                 | $\phi 4$                   | $\phi 11$             | 10                  | 18                    | 2-M3      | 3     | 10.4             |
| S50SU 20L — 0806  | 20                     | $\phi 10$                 | $\phi 11$             | L1   | 8                 | -                          | $\phi 6 (h9)$         | L22 R50             | 80                    | -         | -     | 21.1             |
| S50SU 24K * 0805  | 24                     | $\phi 12$                 | $\phi 13$             | K2   | 8                 | $\phi 5$                   | $\phi 13$             | 10                  | 18                    | 2-M3      | 3     | 14.5             |
| S50SU 25K * 0805  | 25                     | $\phi 12.5$               | $\phi 13.5$           | K2   | 8                 | $\phi 5$                   | $\phi 13.5$           | 10                  | 18                    | 2-M3      | 3     | 15.9             |
| S50SU 28K * 0805  | 28                     | $\phi 14$                 | $\phi 15$             | K2   | 8                 | $\phi 5$                   | $\phi 15$             | 10                  | 18                    | 2-M3      | 3     | 20.5             |
| S50SU 30K * 0806  | 30                     | $\phi 15$                 | $\phi 16$             | K2   | 8                 | $\phi 6$                   | $\phi 16$             | 10                  | 18                    | 2-M3      | 3     | 22.7             |
| S50SU 32B * 0506  | 32                     | $\phi 16$                 | $\phi 17$             | B1   | 5                 | $\phi 6$                   | $\phi 12$             | 8                   | 13                    | 2-M3      | 4     | 12.0             |
| S50SU 36B * 0506  | 36                     | $\phi 18$                 | $\phi 19$             | B1   | 5                 | $\phi 6$                   | $\phi 12$             | 8                   | 13                    | 2-M3      | 4     | 14.1             |
| S50SU 40B * 0506  | 40                     | $\phi 20$                 | $\phi 21$             | B1   | 5                 | $\phi 6$                   | $\phi 15$             | 8                   | 13                    | 2-M4      | 4     | 20.0             |
| S50SU 45B * 0506  | 45                     | $\phi 22.5$               | $\phi 23.5$           | B1   | 5                 | $\phi 6$                   | $\phi 15$             | 8                   | 13                    | 2-M4      | 4     | 23.3             |
| S50SU 48B * 0506  | 48                     | $\phi 24$                 | $\phi 25$             | B1   | 5                 | $\phi 6$                   | $\phi 15$             | 8                   | 13                    | 2-M4      | 4     | 25.5             |
| S50SU 50B * 0506  | 50                     | $\phi 25$                 | $\phi 26$             | B1   | 5                 | $\phi 6$                   | $\phi 15$             | 8                   | 13                    | 2-M4      | 4     | 27.0             |
| S50SU 54B * 0506  | 54                     | $\phi 27$                 | $\phi 28$             | B1   | 5                 | $\phi 6$                   | $\phi 15$             | 8                   | 13                    | 2-M4      | 4     | 30.3             |
| S50SU 56B * 0506  | 56                     | $\phi 28$                 | $\phi 29$             | B1   | 5                 | $\phi 6$                   | $\phi 15$             | 8                   | 13                    | 2-M4      | 4     | 32.0             |
| S50SU 60B * 0508  | 60                     | $\phi 30$                 | $\phi 31$             | B1   | 5                 | $\phi 8$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 38.2             |
| S50SU 64B * 0508  | 64                     | $\phi 32$                 | $\phi 33$             | B1   | 5                 | $\phi 8$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 42.0             |
| S50SU 70B * 0508  | 70                     | $\phi 35$                 | $\phi 36$             | B1   | 5                 | $\phi 8$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 48.3             |
| S50SU 72B * 0508  | 72                     | $\phi 36$                 | $\phi 37$             | B1   | 5                 | $\phi 8$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 50.5             |
| S50SU 75B * 0508  | 75                     | $\phi 37.5$               | $\phi 38.5$           | B1   | 5                 | $\phi 8$                   | $\phi 18$             | 8                   | 13                    | 2-M4      | 4     | 53.9             |
| S50SU 80B * 0510  | 80                     | $\phi 40$                 | $\phi 41$             | B1   | 5                 | $\phi 10$                  | $\phi 22$             | 8                   | 13                    | 2-M5      | 4     | 64.3             |
| S50SU 90B * 0510  | 90                     | $\phi 45$                 | $\phi 46$             | B1   | 5                 | $\phi 10$                  | $\phi 22$             | 8                   | 13                    | 2-M5      | 4     | 77.5             |
| S50SU 100B * 0510 | 100                    | $\phi 50$                 | $\phi 51$             | B1   | 5                 | $\phi 10$                  | $\phi 25$             | 8                   | 13                    | 2-M5      | 4     | 98.9             |
| S50SU 120B * 0510 | 120                    | $\phi 60$                 | $\phi 61$             | B1   | 5                 | $\phi 10$                  | $\phi 25$             | 8                   | 13                    | 2-M5      | 4     | 133.2            |

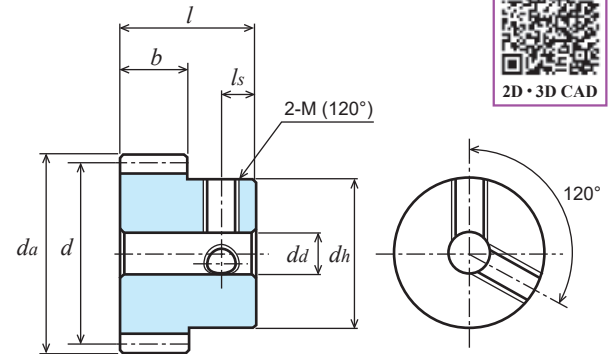




L1 type



K1 type

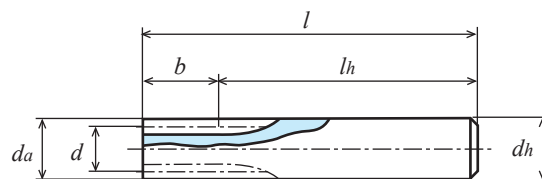


B1 type [\*]



2D • 3D CAD

| Catalogue number  | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                   | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S50SU 10K — 1006  | 0.30                                                                                                     | 3.03   | 6.06   | 12.12  | 24.24  | 36.37    | 45.46    |
| S50SU 12K — 1007  | 0.42                                                                                                     | 4.24   | 8.49   | 16.98  | 33.96  | 50.93    | 63.67    |
| S50SU 14K — 1008  | 0.55                                                                                                     | 5.53   | 11.07  | 22.13  | 44.26  | 66.39    | 82.99    |
| S50SU 15K — 1008  | 0.62                                                                                                     | 6.20   | 12.40  | 24.80  | 49.60  | 74.41    | 93.01    |
| S50SU 16K * 0804  | 0.55                                                                                                     | 5.50   | 11.01  | 22.02  | 44.04  | 66.06    | 82.57    |
| S50SU 16L — 0805  | 0.55                                                                                                     | 5.50   | 11.01  | 22.02  | 44.04  | 66.06    | 82.57    |
| S50SU 18K * 0804  | 0.66                                                                                                     | 6.62   | 13.24  | 26.47  | 52.94  | 79.41    | 99.26    |
| S50SU 18L — 0806  | 0.66                                                                                                     | 6.62   | 13.24  | 26.47  | 52.94  | 79.41    | 99.26    |
| S50SU 20K * 0804  | 0.78                                                                                                     | 7.77   | 15.54  | 31.08  | 62.16  | 93.24    | 116.55   |
| S50SU 20L — 0806  | 0.78                                                                                                     | 7.77   | 15.54  | 31.08  | 62.16  | 93.24    | 116.55   |
| S50SU 24K * 0805  | 1.01                                                                                                     | 10.13  | 20.26  | 40.52  | 81.04  | 121.55   | 151.94   |
| S50SU 25K * 0805  | 1.07                                                                                                     | 10.73  | 21.46  | 42.93  | 85.86  | 128.79   | 160.96   |
| S50SU 28K * 0805  | 1.26                                                                                                     | 12.56  | 25.13  | 50.26  | 100.52 | 150.77   | 185.69   |
| S50SU 30K * 0806  | 1.38                                                                                                     | 13.80  | 27.59  | 55.18  | 110.37 | 165.55   | 201.56   |
| S50SU 32B * 0506  | 0.94                                                                                                     | 9.40   | 18.81  | 37.61  | 75.22  | 112.74   | 135.81   |
| S50SU 36B * 0506  | 1.10                                                                                                     | 10.98  | 21.96  | 43.93  | 87.85  | 129.24   | 155.10   |
| S50SU 40B * 0506  | 1.26                                                                                                     | 12.58  | 25.16  | 50.32  | 100.65 | 145.37   | 173.83   |
| S50SU 45B * 0506  | 1.46                                                                                                     | 14.59  | 29.18  | 58.37  | 116.74 | 164.87   | 196.29   |
| S50SU 48B * 0506  | 1.58                                                                                                     | 15.81  | 31.63  | 63.25  | 126.40 | 176.32   | 209.39   |
| S50SU 50B * 0506  | 1.66                                                                                                     | 16.63  | 33.26  | 66.52  | 132.10 | 183.82   | 217.95   |
| S50SU 54B * 0506  | 1.83                                                                                                     | 18.27  | 36.54  | 73.08  | 143.35 | 198.52   | 234.63   |
| S50SU 56B * 0506  | 1.91                                                                                                     | 19.10  | 38.19  | 76.38  | 148.90 | 205.71   | 242.76   |
| S50SU 60B * 0508  | 2.07                                                                                                     | 20.75  | 41.50  | 83.00  | 159.84 | 219.81   | 258.63   |
| S50SU 64B * 0508  | 2.24                                                                                                     | 22.41  | 44.82  | 89.64  | 170.57 | 233.52   | 273.96   |
| S50SU 70B * 0508  | 2.49                                                                                                     | 24.91  | 49.82  | 99.65  | 186.27 | 253.37   | 296.02   |
| S50SU 72B * 0508  | 2.57                                                                                                     | 25.75  | 51.50  | 102.99 | 191.40 | 259.80   | 303.14   |
| S50SU 75B * 0508  | 2.70                                                                                                     | 27.01  | 54.01  | 108.02 | 199.00 | 269.28   | 313.58   |
| S50SU 80B * 0510  | 2.91                                                                                                     | 29.11  | 58.21  | 116.42 | 211.43 | 284.66   | 334.02   |
| S50SU 90B * 0510  | 3.33                                                                                                     | 33.28  | 66.56  | 133.13 | 235.05 | 313.46   | 376.29   |
| S50SU 100B * 0510 | 3.75                                                                                                     | 37.50  | 75.01  | 148.96 | 257.73 | 344.32   | 417.84   |
| S50SU 120B * 0510 | 4.60                                                                                                     | 45.99  | 91.98  | 177.13 | 299.84 | 412.29   | 497.84   |



K1 type

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 | SUS304   | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. Gears with a [+] are provided with one screw holes. No set screws are provided.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

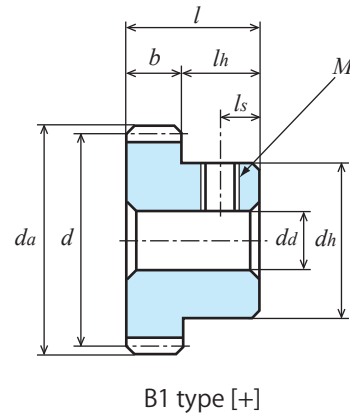
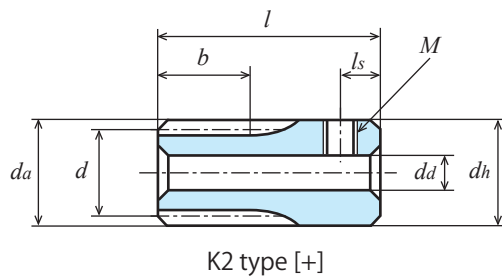
For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

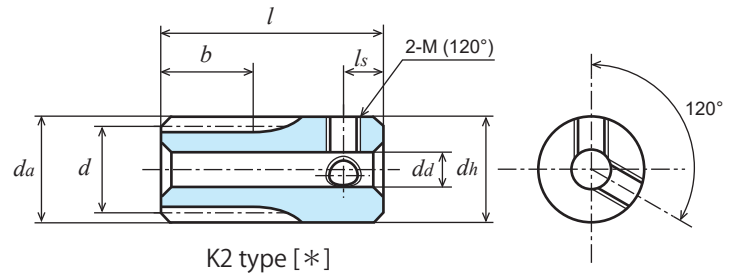
| Catalogue number        | Number of teeth<br>$z$ | Refer-<br>ence<br>diameter<br>$d$ | Tip<br>diameter<br>$d_a$ | Type | Face<br>width<br>$b$ | Hole<br>diameter<br>$d_a(H8)$ | Hub<br>diameter<br>$d_h$ | Hub<br>length<br>$l_h$ | Overall<br>length<br>$l$ | Screw |       | Weight<br>$W(g)$ |
|-------------------------|------------------------|-----------------------------------|--------------------------|------|----------------------|-------------------------------|--------------------------|------------------------|--------------------------|-------|-------|------------------|
|                         |                        |                                   |                          |      |                      |                               |                          |                        |                          | $M$   | $l_s$ |                  |
| <b>S75SU 10K — 0809</b> | 10                     | $\phi$ 7.5                        | $\phi$ 9                 | K1   | 8                    | -                             | $\phi$ 9                 | 47                     | 55                       | -     | -     | 26.5             |
| <b>S75SU 14K + 0805</b> | 14                     | $\phi$ 10.5                       | $\phi$ 12                | K2   | 8                    | $\phi$ 5                      | $\phi$ 12                | 12                     | 20                       | M3    | 3     | 13.0             |
| <b>S75SU 15K + 0805</b> | 15                     | $\phi$ 11.25                      | $\phi$ 12.75             | K2   | 8                    | $\phi$ 5                      | $\phi$ 12.75             | 12                     | 20                       | M3    | 3     | 15.2             |
| <b>S75SU 16B + 0805</b> | 16                     | $\phi$ 12                         | $\phi$ 13.5              | B1   | 8                    | $\phi$ 5                      | $\phi$ 10                | 7                      | 15                       | M3    | 3.5   | 9.1              |
| <b>S75SU 20B + 0806</b> | 20                     | $\phi$ 15                         | $\phi$ 16.5              | B1   | 8                    | $\phi$ 6                      | $\phi$ 12                | 7                      | 15                       | M4    | 3.5   | 13.9             |
| <b>S75SU 22B + 0806</b> | 22                     | $\phi$ 16.5                       | $\phi$ 18                | B1   | 8                    | $\phi$ 6                      | $\phi$ 12                | 7                      | 15                       | M4    | 3.5   | 16.3             |
| <b>S75SU 24B + 0806</b> | 24                     | $\phi$ 18                         | $\phi$ 19.5              | B1   | 8                    | $\phi$ 6                      | $\phi$ 14                | 7                      | 15                       | M4    | 3.5   | 21.0             |
| <b>S75SU 25B + 0806</b> | 25                     | $\phi$ 18.75                      | $\phi$ 20.25             | B1   | 8                    | $\phi$ 6                      | $\phi$ 14                | 7                      | 15                       | M4    | 3.5   | 22.4             |
| <b>S75SU 26B + 0806</b> | 26                     | $\phi$ 19.5                       | $\phi$ 21                | B1   | 8                    | $\phi$ 6                      | $\phi$ 14                | 7                      | 15                       | M4    | 3.5   | 23.8             |
| <b>S75SU 28B + 0806</b> | 28                     | $\phi$ 21                         | $\phi$ 22.5              | B1   | 8                    | $\phi$ 6                      | $\phi$ 14                | 7                      | 15                       | M4    | 3.5   | 26.9             |
| <b>S75SU 48B + 0606</b> | 48                     | $\phi$ 36                         | $\phi$ 37.5              | B1   | 6                    | $\phi$ 6                      | $\phi$ 20                | 9                      | 15                       | M4    | 4     | 67.0             |



2D • 3D CAD



| Catalogue number        | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                         | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S75SU 10K – 0809</b> | 0.55                                                                                                     | 5.46   | 10.91  | 21.82  | 43.64  | 65.46    | 81.83    |
| <b>S75SU 14K + 0805</b> | 1.00                                                                                                     | 9.96   | 19.92  | 39.84  | 79.67  | 119.51   | 149.39   |
| <b>S75SU 15K + 0805</b> | 1.12                                                                                                     | 11.16  | 22.32  | 44.64  | 89.29  | 133.93   | 167.41   |
| <b>S75SU 16B + 0805</b> | 1.24                                                                                                     | 12.39  | 24.77  | 49.54  | 99.09  | 148.63   | 185.79   |
| <b>S75SU 20B + 0806</b> | 1.75                                                                                                     | 17.48  | 34.97  | 69.93  | 139.86 | 209.79   | 255.42   |
| <b>S75SU 22B + 0806</b> | 2.01                                                                                                     | 20.12  | 40.23  | 80.46  | 160.93 | 240.07   | 288.91   |
| <b>S75SU 24B + 0806</b> | 2.28                                                                                                     | 22.79  | 45.58  | 91.17  | 182.33 | 268.23   | 321.89   |
| <b>S75SU 25B + 0806</b> | 2.41                                                                                                     | 24.15  | 48.30  | 96.59  | 193.18 | 282.23   | 338.23   |
| <b>S75SU 26B + 0806</b> | 2.55                                                                                                     | 25.51  | 51.03  | 102.05 | 204.11 | 296.15   | 354.44   |
| <b>S75SU 28B + 0806</b> | 2.83                                                                                                     | 28.27  | 56.54  | 113.08 | 226.16 | 323.73   | 386.41   |
| <b>S75SU 48B + 0606</b> | 4.27                                                                                                     | 42.69  | 85.39  | 170.78 | 317.37 | 430.79   | 502.63   |



K2 type [\*]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 | SUS304   | 20°            | —              | —                      | 0.02 to 0.06 |

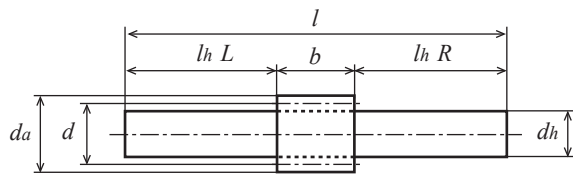
★ No surface treatment is applied. Gears with a [\*] are provided with two screw holes. No set screws are provided.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

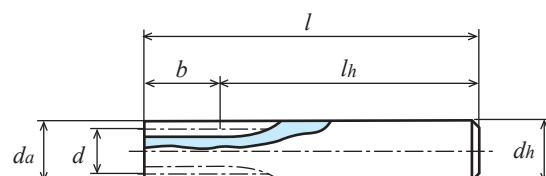
For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

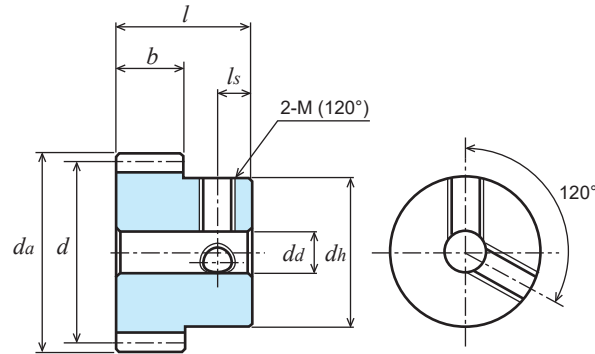
| Catalogue number         | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H8)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw     |       | Weight<br>$W(g)$ |
|--------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-----------|-------|------------------|
|                          |                        |                           |                       |      |                   |                            |                       |                     |                       | 2-M(120°) | $l_s$ |                  |
| <b>S80SU 10K — 1010</b>  | 10                     | $\phi 8$                  | $\phi 9.6$            | K1   | 10                | -                          | $\phi 10$             | 50                  | 60                    | -         | -     | 35.1             |
| <b>S80SU 12K — 1012</b>  | 12                     | $\phi 9.6$                | $\phi 11.2$           | K1   | 10                | -                          | $\phi 12$             | 50                  | 60                    | -         | -     | 50.6             |
| <b>S80SU 14K * 0704</b>  | 14                     | $\phi 11.2$               | $\phi 12.8$           | K2   | 7                 | $\phi 4$                   | $\phi 12.8$           | 13                  | 20                    | 2-M3      | 3     | 16.3             |
| <b>S80SU 15K * 0704</b>  | 15                     | $\phi 12$                 | $\phi 13.6$           | K2   | 7                 | $\phi 4$                   | $\phi 13.6$           | 13                  | 20                    | 2-M3      | 3     | 18.8             |
| <b>S80SU 16L — 0706</b>  | 16                     | $\phi 12.8$               | $\phi 14.4$           | L1   | 7                 | -                          | $\phi 6(h9)$          | L28 R60             | 95                    | -         | -     | 26.9             |
| <b>S80SU 16B * 0504</b>  | 16                     | $\phi 12.8$               | $\phi 14.4$           | B1   | 5                 | $\phi 4$                   | $\phi 10$             | 7                   | 12                    | 2-M3      | 3     | 8.0              |
| <b>S80SU 16B * 0704</b>  | 16                     | $\phi 12.8$               | $\phi 14.4$           | B1   | 7                 | $\phi 4$                   | $\phi 10$             | 7                   | 14                    | 2-M3      | 3     | 9.8              |
| <b>S80SU 18B * 0704</b>  | 18                     | $\phi 14.4$               | $\phi 16$             | B1   | 7                 | $\phi 4$                   | $\phi 10$             | 7                   | 14                    | 2-M3      | 3     | 11.7             |
| <b>S80SU 20L — 0710</b>  | 20                     | $\phi 16$                 | $\phi 17.6$           | L1   | 7                 | -                          | $\phi 10(h9)$         | L28 R60             | 95                    | -         | -     | 66.0             |
| <b>S80SU 20B * 0504</b>  | 20                     | $\phi 16$                 | $\phi 17.6$           | B1   | 5                 | $\phi 4$                   | $\phi 10$             | 7                   | 12                    | 2-M3      | 3     | 10.9             |
| <b>S80SU 20B * 0704</b>  | 20                     | $\phi 16$                 | $\phi 17.6$           | B1   | 7                 | $\phi 4$                   | $\phi 10$             | 7                   | 14                    | 2-M3      | 3     | 13.9             |
| <b>S80SU 22B * 0504</b>  | 22                     | $\phi 17.6$               | $\phi 19.2$           | B1   | 5                 | $\phi 4$                   | $\phi 10$             | 7                   | 12                    | 2-M3      | 3     | 12.5             |
| <b>S80SU 22B * 0704</b>  | 22                     | $\phi 17.6$               | $\phi 19.2$           | B1   | 7                 | $\phi 4$                   | $\phi 10$             | 7                   | 14                    | 2-M3      | 3     | 16.2             |
| <b>S80SU 24B * 0505</b>  | 24                     | $\phi 19.2$               | $\phi 20.8$           | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 7                   | 12                    | 2-M4      | 4     | 18.6             |
| <b>S80SU 24B * 0705</b>  | 24                     | $\phi 19.2$               | $\phi 20.8$           | B1   | 7                 | $\phi 5$                   | $\phi 15$             | 7                   | 14                    | 2-M4      | 4     | 22.9             |
| <b>S80SU 25B * 0505</b>  | 25                     | $\phi 20$                 | $\phi 21.6$           | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 7                   | 12                    | 2-M4      | 4     | 19.6             |
| <b>S80SU 25B * 0705</b>  | 25                     | $\phi 20$                 | $\phi 21.6$           | B1   | 7                 | $\phi 5$                   | $\phi 15$             | 7                   | 14                    | 2-M4      | 4     | 24.2             |
| <b>S80SU 28B * 0505</b>  | 28                     | $\phi 22.4$               | $\phi 24$             | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 7                   | 12                    | 2-M4      | 4     | 22.7             |
| <b>S80SU 28B * 0705</b>  | 28                     | $\phi 22.4$               | $\phi 24$             | B1   | 7                 | $\phi 5$                   | $\phi 15$             | 7                   | 14                    | 2-M4      | 4     | 28.7             |
| <b>S80SU 30B * 0505</b>  | 30                     | $\phi 24$                 | $\phi 25.6$           | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 7                   | 12                    | 2-M4      | 4     | 25.0             |
| <b>S80SU 30B * 0705</b>  | 30                     | $\phi 24$                 | $\phi 25.6$           | B1   | 7                 | $\phi 5$                   | $\phi 15$             | 7                   | 14                    | 2-M4      | 4     | 31.9             |
| <b>S80SU 32B * 0505</b>  | 32                     | $\phi 25.6$               | $\phi 27.2$           | B1   | 5                 | $\phi 5$                   | $\phi 15$             | 9                   | 14                    | 2-M4      | 4     | 30.0             |
| <b>S80SU 36B * 0506</b>  | 36                     | $\phi 28.8$               | $\phi 30.4$           | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 9                   | 14                    | 2-M4      | 4     | 39.9             |
| <b>S80SU 40B * 0506</b>  | 40                     | $\phi 32$                 | $\phi 33.6$           | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 9                   | 14                    | 2-M4      | 4     | 45.9             |
| <b>S80SU 45B * 0506</b>  | 45                     | $\phi 36$                 | $\phi 37.6$           | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 9                   | 14                    | 2-M4      | 4     | 54.4             |
| <b>S80SU 48B * 0506</b>  | 48                     | $\phi 38.4$               | $\phi 40$             | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 9                   | 14                    | 2-M4      | 4     | 59.9             |
| <b>S80SU 50B * 0506</b>  | 50                     | $\phi 40$                 | $\phi 41.6$           | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 9                   | 14                    | 2-M4      | 4     | 63.9             |
| <b>S80SU 54B * 0506</b>  | 54                     | $\phi 43.2$               | $\phi 44.8$           | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 9                   | 14                    | 2-M4      | 4     | 72.1             |
| <b>S80SU 60B * 0506</b>  | 60                     | $\phi 48$                 | $\phi 49.6$           | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 9                   | 14                    | 2-M4      | 4     | 85.8             |
| <b>S80SU 64B * 0506</b>  | 64                     | $\phi 51.2$               | $\phi 52.8$           | B1   | 5                 | $\phi 6$                   | $\phi 18$             | 9                   | 14                    | 2-M4      | 4     | 95.7             |
| <b>S80SU 70B * 0508</b>  | 70                     | $\phi 56$                 | $\phi 57.6$           | B1   | 5                 | $\phi 8$                   | $\phi 28$             | 9                   | 14                    | 2-M4      | 4     | 134.4            |
| <b>S80SU 72B * 0508</b>  | 72                     | $\phi 57.6$               | $\phi 59.2$           | B1   | 5                 | $\phi 8$                   | $\phi 28$             | 9                   | 14                    | 2-M4      | 4     | 140.0            |
| <b>S80SU 80B * 0508</b>  | 80                     | $\phi 64$                 | $\phi 65.6$           | B1   | 5                 | $\phi 8$                   | $\phi 28$             | 9                   | 14                    | 2-M4      | 4     | 164.3            |
| <b>S80SU 90B * 0508</b>  | 90                     | $\phi 72$                 | $\phi 73.6$           | B1   | 5                 | $\phi 8$                   | $\phi 28$             | 9                   | 14                    | 2-M4      | 4     | 198.1            |
| <b>S80SU 100B * 0508</b> | 100                    | $\phi 80$                 | $\phi 81.6$           | B1   | 5                 | $\phi 8$                   | $\phi 28$             | 9                   | 14                    | 2-M4      | 4     | 236.0            |
| <b>S80SU 100B * 0510</b> | 100                    | $\phi 80$                 | $\phi 81.6$           | B1   | 5                 | $\phi 10$                  | $\phi 28$             | 9                   | 14                    | 2-M4      | 4     | 233.0            |



L1 type



K1 type

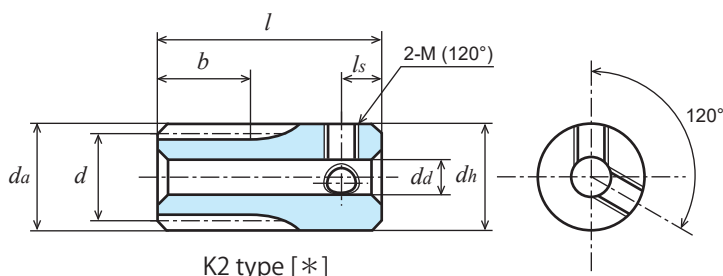
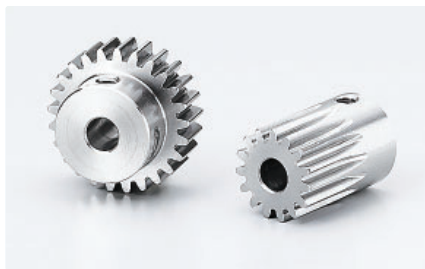


B1 type [※]



2D • 3D CAD

| Catalogue number  | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                   | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S80SU 10K — 1010  | 0.78                                                                                                     | 7.76   | 15.52  | 31.03  | 62.07  | 93.10    | 116.37   |
| S80SU 12K — 1012  | 1.09                                                                                                     | 10.87  | 21.73  | 43.46  | 86.93  | 130.39   | 162.99   |
| S80SU 14K * 0704  | 0.99                                                                                                     | 9.91   | 19.83  | 39.66  | 79.32  | 118.98   | 148.72   |
| S80SU 15K * 0704  | 1.11                                                                                                     | 11.11  | 22.22  | 44.45  | 88.89  | 133.34   | 166.67   |
| S80SU 16L — 0706  | 1.23                                                                                                     | 12.33  | 24.66  | 49.32  | 98.65  | 147.97   | 184.82   |
| S80SU 16B * 0504  | 0.88                                                                                                     | 8.81   | 17.62  | 35.23  | 70.46  | 105.70   | 132.01   |
| S80SU 16B * 0704  | 1.23                                                                                                     | 12.33  | 24.66  | 49.32  | 98.65  | 147.97   | 184.82   |
| S80SU 18B * 0704  | 1.48                                                                                                     | 14.82  | 29.65  | 59.29  | 118.59 | 177.88   | 218.07   |
| S80SU 20L — 0710  | 1.74                                                                                                     | 17.40  | 34.81  | 69.62  | 139.24 | 208.69   | 251.40   |
| S80SU 20B * 0504  | 1.24                                                                                                     | 12.43  | 24.86  | 49.73  | 99.46  | 149.07   | 179.57   |
| S80SU 20B * 0704  | 1.74                                                                                                     | 17.40  | 34.81  | 69.62  | 139.24 | 208.69   | 251.40   |
| S80SU 22B * 0504  | 1.43                                                                                                     | 14.30  | 28.61  | 57.22  | 114.44 | 168.97   | 202.93   |
| S80SU 22B * 0704  | 2.00                                                                                                     | 20.03  | 40.05  | 80.10  | 160.21 | 236.56   | 284.10   |
| S80SU 24B * 0505  | 1.62                                                                                                     | 16.21  | 32.41  | 64.83  | 129.66 | 188.65   | 225.90   |
| S80SU 24B * 0705  | 2.27                                                                                                     | 22.69  | 45.38  | 90.76  | 181.52 | 264.10   | 316.25   |
| S80SU 25B * 0505  | 1.72                                                                                                     | 17.17  | 34.34  | 68.69  | 137.37 | 198.42   | 237.26   |
| S80SU 25B * 0705  | 2.40                                                                                                     | 24.04  | 48.08  | 96.16  | 192.32 | 277.79   | 332.16   |
| S80SU 28B * 0505  | 2.10                                                                                                     | 20.10  | 40.21  | 80.41  | 160.83 | 227.34   | 270.71   |
| S80SU 28B * 0705  | 2.81                                                                                                     | 28.14  | 56.29  | 112.58 | 225.16 | 318.28   | 379.00   |
| S80SU 30B * 0505  | 2.21                                                                                                     | 22.07  | 44.15  | 88.30  | 176.45 | 246.13   | 292.31   |
| S80SU 30B * 0705  | 3.09                                                                                                     | 30.90  | 61.81  | 123.61 | 247.03 | 344.58   | 409.23   |
| S80SU 32B * 0505  | 2.41                                                                                                     | 24.07  | 48.14  | 96.28  | 190.50 | 264.69   | 313.54   |
| S80SU 36B * 0506  | 2.81                                                                                                     | 28.11  | 56.23  | 112.45 | 218.15 | 300.82   | 354.57   |
| S80SU 40B * 0506  | 3.22                                                                                                     | 32.21  | 64.41  | 128.83 | 245.14 | 335.60   | 393.73   |
| S80SU 45B * 0506  | 3.74                                                                                                     | 37.36  | 74.71  | 149.42 | 277.69 | 376.92   | 439.78   |
| S80SU 48B * 0506  | 4.05                                                                                                     | 40.48  | 80.96  | 161.92 | 296.75 | 400.82   | 466.79   |
| S80SU 50B * 0506  | 4.26                                                                                                     | 42.57  | 85.14  | 170.29 | 309.24 | 416.36   | 488.56   |
| S80SU 54B * 0506  | 4.68                                                                                                     | 46.77  | 93.55  | 187.10 | 333.68 | 446.48   | 531.67   |
| S80SU 60B * 0506  | 5.31                                                                                                     | 53.12  | 106.24 | 212.30 | 369.00 | 490.02   | 595.27   |
| S80SU 64B * 0506  | 5.74                                                                                                     | 57.37  | 114.74 | 227.01 | 391.70 | 525.18   | 636.94   |
| S80SU 70B * 0508  | 6.38                                                                                                     | 63.77  | 127.55 | 248.65 | 424.50 | 577.17   | 698.30   |
| S80SU 72B * 0508  | 6.59                                                                                                     | 65.92  | 131.83 | 255.75 | 435.12 | 594.31   | 718.46   |
| S80SU 80B * 0508  | 7.45                                                                                                     | 74.51  | 149.02 | 283.56 | 476.06 | 661.79   | 797.82   |
| S80SU 90B * 0508  | 8.52                                                                                                     | 85.20  | 170.40 | 316.67 | 523.99 | 742.92   | 898.85   |
| S80SU 100B * 0508 | 9.60                                                                                                     | 96.01  | 192.03 | 348.72 | 582.97 | 822.44   | 998.20   |
| S80SU 100B * 0510 | 9.60                                                                                                     | 96.01  | 192.03 | 348.72 | 582.97 | 822.44   | 998.20   |



K2 type [\*]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 | SUS304   | 20°            | —              | —                      | 0.06 to 0.12 |

★ No surface treatment is applied. Gears with a [\*] are provided with two screw holes. No set screws are provided.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

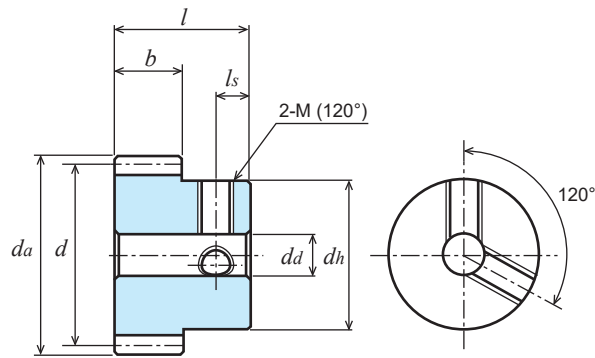
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H8)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw     |       | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-----------|-------|------------------|
|                  |                        |                           |                       |      |                   |                            |                       |                     |                       | 2-M(120°) | $l_s$ |                  |
| S1SU 14K * 0806  | 14                     | $\phi 14$                 | $\phi 16$             | K2   | 8                 | $\phi 6$                   | $\phi 16$             | 17                  | 25                    | 2-M4      | 4     | 30.4             |
| S1SU 15K * 0806  | 15                     | $\phi 15$                 | $\phi 17$             | K2   | 8                 | $\phi 6$                   | $\phi 17$             | 17                  | 25                    | 2-M4      | 4     | 35.3             |
| S1SU 16K * 0806  | 16                     | $\phi 16$                 | $\phi 18$             | K2   | 8                 | $\phi 6$                   | $\phi 18$             | 17                  | 25                    | 2-M4      | 4     | 40.5             |
| S1SU 17B * 0806  | 17                     | $\phi 17$                 | $\phi 19$             | B1   | 8                 | $\phi 6$                   | $\phi 14$             | 8                   | 16                    | 2-M4      | 4     | 19.9             |
| S1SU 18B * 0806  | 18                     | $\phi 18$                 | $\phi 20$             | B1   | 8                 | $\phi 6$                   | $\phi 14$             | 8                   | 16                    | 2-M4      | 4     | 21.7             |
| S1SU 18B * 1006  | 18                     | $\phi 18$                 | $\phi 20$             | B1   | 10                | $\phi 6$                   | $\phi 14$             | 10                  | 20                    | 2-M4      | 4     | 27.2             |
| S1SU 20B * 0806  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 8                 | $\phi 6$                   | $\phi 16$             | 8                   | 16                    | 2-M4      | 4     | 28.3             |
| S1SU 20B * 1006  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 10                | $\phi 6$                   | $\phi 16$             | 10                  | 20                    | 2-M4      | 4     | 35.5             |
| S1SU 22B * 0806  | 22                     | $\phi 22$                 | $\phi 24$             | B1   | 8                 | $\phi 6$                   | $\phi 18$             | 8                   | 16                    | 2-M4      | 4     | 35.7             |
| S1SU 24B * 0806  | 24                     | $\phi 24$                 | $\phi 26$             | B1   | 8                 | $\phi 6$                   | $\phi 18$             | 8                   | 16                    | 2-M4      | 4     | 40.3             |
| S1SU 24B * 1006  | 24                     | $\phi 24$                 | $\phi 26$             | B1   | 10                | $\phi 6$                   | $\phi 18$             | 10                  | 20                    | 2-M4      | 4     | 50.6             |
| S1SU 25B * 0806  | 25                     | $\phi 25$                 | $\phi 27$             | B1   | 8                 | $\phi 6$                   | $\phi 18$             | 8                   | 16                    | 2-M4      | 4     | 42.7             |
| S1SU 25B * 1006  | 25                     | $\phi 25$                 | $\phi 27$             | B1   | 10                | $\phi 6$                   | $\phi 20$             | 10                  | 20                    | 2-M4      | 4     | 58.2             |
| S1SU 26B * 0806  | 26                     | $\phi 26$                 | $\phi 28$             | B1   | 8                 | $\phi 6$                   | $\phi 20$             | 8                   | 16                    | 2-M4      | 4     | 48.9             |
| S1SU 28B * 0806  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 8                 | $\phi 6$                   | $\phi 20$             | 8                   | 16                    | 2-M4      | 4     | 54.2             |
| S1SU 28B * 1006  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 10                | $\phi 6$                   | $\phi 20$             | 10                  | 20                    | 2-M4      | 4     | 68.1             |
| S1SU 30B * 0806  | 30                     | $\phi 30$                 | $\phi 32$             | B1   | 8                 | $\phi 6$                   | $\phi 24$             | 8                   | 16                    | 2-M4      | 4     | 68.5             |
| S1SU 30B * 1006  | 30                     | $\phi 30$                 | $\phi 32$             | B1   | 10                | $\phi 6$                   | $\phi 24$             | 10                  | 20                    | 2-M4      | 4     | 86.0             |
| S1SU 32B * 0606  | 32                     | $\phi 32$                 | $\phi 34$             | B1   | 6                 | $\phi 6$                   | $\phi 24$             | 10                  | 16                    | 2-M4      | 4     | 69.1             |
| S1SU 34B * 0606  | 34                     | $\phi 34$                 | $\phi 36$             | B1   | 6                 | $\phi 6$                   | $\phi 24$             | 10                  | 16                    | 2-M4      | 4     | 74.0             |
| S1SU 35B * 0606  | 35                     | $\phi 35$                 | $\phi 37$             | B1   | 6                 | $\phi 6$                   | $\phi 24$             | 10                  | 16                    | 2-M4      | 4     | 76.6             |
| S1SU 36B * 0608  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 6                 | $\phi 8$                   | $\phi 24$             | 10                  | 16                    | 2-M4      | 4     | 76.6             |
| S1SU 40B * 0608  | 40                     | $\phi 40$                 | $\phi 42$             | B1   | 6                 | $\phi 8$                   | $\phi 28$             | 10                  | 16                    | 2-M4      | 4     | 100.6            |
| S1SU 44B * 0608  | 44                     | $\phi 44$                 | $\phi 46$             | B1   | 6                 | $\phi 8$                   | $\phi 28$             | 10                  | 16                    | 2-M4      | 4     | 113.1            |
| S1SU 50B * 0608  | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 6                 | $\phi 8$                   | $\phi 28$             | 10                  | 16                    | 2-M4      | 4     | 134.2            |
| S1SU 54B * 0608  | 54                     | $\phi 54$                 | $\phi 56$             | B1   | 6                 | $\phi 8$                   | $\phi 28$             | 10                  | 16                    | 2-M5      | 5     | 148.8            |
| S1SU 60B * 0610  | 60                     | $\phi 60$                 | $\phi 62$             | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | 2-M5      | 5     | 178.0            |
| S1SU 64B * 0610  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | 2-M5      | 5     | 196.5            |
| S1SU 70B * 0610  | 70                     | $\phi 70$                 | $\phi 72$             | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | 2-M5      | 5     | 226.6            |
| S1SU 72B * 0610  | 72                     | $\phi 72$                 | $\phi 74$             | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | 2-M5      | 5     | 237.2            |
| S1SU 80B * 0610  | 80                     | $\phi 80$                 | $\phi 82$             | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | 2-M5      | 5     | 282.6            |
| S1SU 90B * 0610  | 90                     | $\phi 90$                 | $\phi 92$             | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | 2-M5      | 5     | 346.1            |
| S1SU 100B * 0610 | 100                    | $\phi 100$                | $\phi 102$            | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | 2-M5      | 5     | 417.1            |
| S1SU 120B * 0610 | 120                    | $\phi 120$                | $\phi 122$            | B1   | 6                 | $\phi 10$                  | $\phi 30$             | 10                  | 16                    | 2-M5      | 5     | 581.6            |



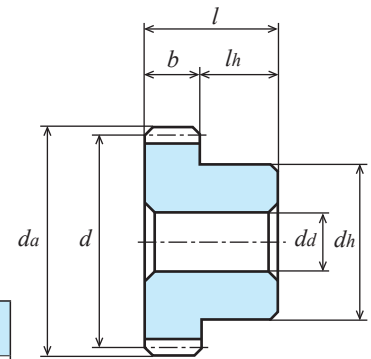


2D • 3D CAD



B1 type [\*]

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |          |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|----------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm   | 1,200rpm | 1,500rpm |
| S1SU 14K * 0806  | 1.77                                                                                                     | 17.71  | 35.41  | 70.82  | 141.64   | 212.46   | 261.67   |
| S1SU 15K * 0806  | 1.98                                                                                                     | 19.84  | 39.68  | 79.37  | 158.73   | 238.10   | 289.88   |
| S1SU 16K * 0806  | 2.20                                                                                                     | 22.02  | 44.04  | 88.08  | 176.16   | 264.03   | 318.05   |
| S1SU 17B * 0806  | 2.42                                                                                                     | 24.23  | 48.46  | 96.92  | 193.84   | 287.82   | 346.06   |
| S1SU 18B * 0806  | 2.65                                                                                                     | 26.47  | 52.94  | 105.88 | 211.76   | 311.52   | 373.85   |
| S1SU 18B * 1006  | 3.31                                                                                                     | 33.09  | 66.18  | 132.35 | 264.70   | 389.40   | 467.32   |
| S1SU 20B * 0806  | 3.11                                                                                                     | 31.08  | 62.16  | 124.32 | 248.64   | 359.14   | 429.43   |
| S1SU 20B * 1006  | 3.89                                                                                                     | 38.85  | 77.70  | 155.40 | 310.80   | 448.92   | 536.79   |
| S1SU 22B * 0806  | 3.58                                                                                                     | 35.76  | 71.52  | 143.04 | 286.09   | 405.86   | 483.62   |
| S1SU 24B * 0806  | 4.05                                                                                                     | 40.52  | 81.04  | 162.07 | 323.88   | 451.79   | 536.54   |
| S1SU 24B * 1006  | 5.06                                                                                                     | 50.65  | 101.29 | 202.59 | 404.85   | 564.74   | 670.68   |
| S1SU 25B * 0806  | 4.29                                                                                                     | 42.93  | 85.86  | 171.72 | 341.02   | 474.52   | 562.62   |
| S1SU 25B * 1006  | 5.37                                                                                                     | 53.66  | 107.32 | 214.65 | 426.27   | 593.15   | 703.28   |
| S1SU 26B * 0806  | 4.54                                                                                                     | 45.36  | 90.71  | 181.43 | 358.07   | 497.04   | 588.38   |
| S1SU 28B * 0806  | 5.03                                                                                                     | 50.26  | 100.52 | 201.03 | 391.90   | 541.43   | 638.95   |
| S1SU 28B * 1006  | 6.28                                                                                                     | 62.82  | 125.65 | 251.29 | 489.88   | 676.79   | 798.68   |
| S1SU 30B * 0806  | 5.52                                                                                                     | 55.18  | 110.37 | 220.74 | 425.11   | 584.61   | 687.84   |
| S1SU 30B * 1006  | 6.90                                                                                                     | 68.98  | 137.96 | 275.92 | 531.39   | 730.76   | 859.80   |
| S1SU 32B * 0606  | 4.51                                                                                                     | 45.13  | 90.27  | 180.53 | 343.53   | 470.31   | 551.76   |
| S1SU 34B * 0606  | 4.89                                                                                                     | 48.91  | 97.82  | 195.64 | 367.87   | 501.44   | 586.65   |
| S1SU 35B * 0606  | 5.08                                                                                                     | 50.81  | 101.61 | 203.23 | 379.90   | 516.74   | 603.73   |
| S1SU 36B * 0608  | 5.27                                                                                                     | 52.71  | 105.42 | 210.85 | 391.84   | 531.86   | 620.57   |
| S1SU 40B * 0608  | 6.04                                                                                                     | 60.39  | 120.78 | 241.55 | 438.65   | 590.59   | 693.00   |
| S1SU 44B * 0608  | 6.81                                                                                                     | 68.10  | 136.19 | 272.39 | 483.61   | 646.13   | 772.19   |
| S1SU 50B * 0608  | 7.98                                                                                                     | 79.82  | 159.65 | 317.05 | 548.54   | 732.84   | 889.33   |
| S1SU 54B * 0608  | 8.77                                                                                                     | 87.70  | 175.40 | 344.05 | 589.94   | 797.50   | 965.84   |
| S1SU 60B * 0610  | 9.96                                                                                                     | 99.60  | 199.19 | 383.62 | 649.37   | 892.91   | 1,078.17 |
| S1SU 64B * 0610  | 10.76                                                                                                    | 107.57 | 215.14 | 409.37 | 687.26   | 955.40   | 1,151.78 |
| S1SU 70B * 0610  | 11.96                                                                                                    | 119.58 | 239.15 | 447.06 | 741.67   | 1,047.46 | 1,266.18 |
| S1SU 72B * 0610  | 12.36                                                                                                    | 123.59 | 247.19 | 459.37 | 760.11   | 1,077.69 | 1,303.88 |
| S1SU 80B * 0610  | 13.97                                                                                                    | 139.71 | 279.42 | 507.42 | 848.29   | 1,196.75 | 1,452.49 |
| S1SU 90B * 0610  | 15.98                                                                                                    | 159.75 | 319.50 | 564.12 | 954.81   | 1,348.27 | 1,631.26 |
| S1SU 100B * 0610 | 18.00                                                                                                    | 180.02 | 357.51 | 618.54 | 1,059.38 | 1,497.28 | 1,806.04 |
| S1SU 120B * 0610 | 22.07                                                                                                    | 220.74 | 425.12 | 719.62 | 1,260.58 | 1,784.16 | 2,207.42 |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 | SUS304   | 20°            | —              | —                      | 0.09 to 0.18 |

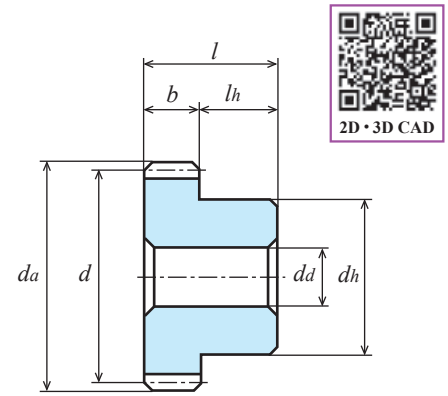
★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).  
For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number          | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H8)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|---------------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|------------------|
| <b>S1.5SU 15B — 1208</b>  | 15                     | φ22.5                     | φ25.5                 | B1   | 12                | φ 8                        | φ18                   | 10                  | 22                    | 49.3             |
| <b>S1.5SU 16B — 1208</b>  | 16                     | φ24                       | φ27                   | B1   | 12                | φ 8                        | φ20                   | 10                  | 22                    | 59.2             |
| <b>S1.5SU 16B — 1608N</b> | 16                     | φ24                       | φ27                   | B1   | 16                | φ 8                        | φ20                   | 10                  | 26                    | 72.0             |
| <b>S1.5SU 18B — 1210</b>  | 18                     | φ27                       | φ30                   | B1   | 12                | φ10                        | φ22                   | 10                  | 22                    | 70.9             |
| <b>S1.5SU 20B — 1210</b>  | 20                     | φ30                       | φ33                   | B1   | 12                | φ10                        | φ25                   | 10                  | 22                    | 92.5             |
| <b>S1.5SU 20B — 1610N</b> | 20                     | φ30                       | φ33                   | B1   | 16                | φ10                        | φ25                   | 10                  | 26                    | 112.4            |
| <b>S1.5SU 24B — 1210</b>  | 24                     | φ36                       | φ39                   | B1   | 12                | φ10                        | φ30                   | 10                  | 22                    | 139.2            |
| <b>S1.5SU 25B — 1610N</b> | 25                     | φ37.5                     | φ40.5                 | B1   | 16                | φ10                        | φ30                   | 10                  | 26                    | 180.0            |
| <b>S1.5SU 28B — 1210</b>  | 28                     | φ42                       | φ45                   | B1   | 12                | φ10                        | φ30                   | 10                  | 22                    | 174.2            |
| <b>S1.5SU 30B — 1210</b>  | 30                     | φ45                       | φ48                   | B1   | 12                | φ10                        | φ30                   | 10                  | 22                    | 193.7            |
| <b>S1.5SU 30B — 1610N</b> | 30                     | φ45                       | φ48                   | B1   | 16                | φ10                        | φ30                   | 10                  | 26                    | 241.7            |
| <b>S1.5SU 32B — 1010</b>  | 32                     | φ48                       | φ51                   | B1   | 10                | φ10                        | φ30                   | 10                  | 20                    | 187.1            |
| <b>S1.5SU 36B — 1010</b>  | 36                     | φ54                       | φ57                   | B1   | 10                | φ10                        | φ30                   | 10                  | 20                    | 225.2            |
| <b>S1.5SU 40B — 1012</b>  | 40                     | φ60                       | φ63                   | B1   | 10                | φ12                        | φ36                   | 10                  | 20                    | 287.0            |
| <b>S1.5SU 48B — 1012</b>  | 48                     | φ72                       | φ75                   | B1   | 10                | φ12                        | φ36                   | 10                  | 20                    | 385.7            |
| <b>S1.5SU 50B — 1012</b>  | 50                     | φ 75                      | φ 78                  | B1   | 10                | φ12                        | φ42                   | 10                  | 20                    | 442.3            |
| <b>S1.5SU 60B — 1014</b>  | 60                     | φ 90                      | φ 93                  | B1   | 10                | φ14                        | φ50                   | 10                  | 20                    | 635.8            |
| <b>S1.5SU 80B — 1016</b>  | 80                     | φ120                      | φ123                  | B1   | 10                | φ16                        | φ60                   | 10                  | 20                    | 1,089.0          |
| <b>S1.5SU 100B — 1016</b> | 100                    | φ150                      | φ153                  | B1   | 10                | φ16                        | φ60                   | 10                  | 20                    | 1,594.0          |

| Catalogue number          | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |          |          |          |          |          |
|---------------------------|----------------------------------------------------------------------------------------------------------|--------|----------|----------|----------|----------|----------|
|                           | 10rpm                                                                                                    | 100rpm | 200rpm   | 400rpm   | 800rpm   | 1,200rpm | 1,500rpm |
| <b>S1.5SU 15B — 1208</b>  | 6.70                                                                                                     | 66.97  | 133.93   | 267.86   | 535.73   | 756.63   | 900.82   |
| <b>S1.5SU 16B — 1208</b>  | 7.43                                                                                                     | 74.32  | 148.63   | 297.27   | 594.06   | 828.66   | 984.12   |
| <b>S1.5SU 16B — 1608N</b> | 9.91                                                                                                     | 99.09  | 198.18   | 396.36   | 792.08   | 1,104.88 | 1,312.16 |
| <b>S1.5SU 18B — 1210</b>  | 8.93                                                                                                     | 89.34  | 178.67   | 357.35   | 700.93   | 970.64   | 1,147.22 |
| <b>S1.5SU 20B — 1210</b>  | 10.49                                                                                                    | 104.90 | 209.79   | 419.58   | 808.06   | 1,111.24 | 1,307.46 |
| <b>S1.5SU 20B — 1610N</b> | 13.99                                                                                                    | 139.86 | 279.72   | 559.44   | 1,077.41 | 1,481.65 | 1,743.28 |
| <b>S1.5SU 24B — 1210</b>  | 13.67                                                                                                    | 136.75 | 273.50   | 546.99   | 1,016.53 | 1,379.79 | 1,609.91 |
| <b>S1.5SU 25B — 1610N</b> | 19.32                                                                                                    | 193.18 | 386.36   | 772.72   | 1,423.55 | 1,926.29 | 2,243.17 |
| <b>S1.5SU 28B — 1210</b>  | 16.96                                                                                                    | 169.62 | 339.24   | 678.48   | 1,218.22 | 1,633.80 | 1,934.94 |
| <b>S1.5SU 30B — 1210</b>  | 18.62                                                                                                    | 186.25 | 372.50   | 744.99   | 1,315.37 | 1,754.13 | 2,105.74 |
| <b>S1.5SU 30B — 1610N</b> | 24.83                                                                                                    | 248.33 | 496.66   | 993.32   | 1,753.83 | 2,338.85 | 2,807.65 |
| <b>S1.5SU 32B — 1010</b>  | 16.93                                                                                                    | 169.25 | 338.50   | 676.46   | 1,175.77 | 1,561.35 | 1,896.72 |
| <b>S1.5SU 36B — 1010</b>  | 19.77                                                                                                    | 197.67 | 395.34   | 775.44   | 1,329.66 | 1,797.47 | 2,176.88 |
| <b>S1.5SU 40B — 1012</b>  | 22.65                                                                                                    | 226.45 | 452.91   | 872.24   | 1,476.48 | 2,030.22 | 2,451.46 |
| <b>S1.5SU 48B — 1012</b>  | 28.46                                                                                                    | 284.63 | 569.25   | 1,057.90 | 1,750.48 | 2,481.86 | 3,002.75 |
| <b>S1.5SU 50B — 1012</b>  | 29.93                                                                                                    | 299.34 | 598.67   | 1,102.91 | 1,832.09 | 2,592.36 | 3,140.56 |
| <b>S1.5SU 60B — 1014</b>  | 37.35                                                                                                    | 373.48 | 746.97   | 1,318.86 | 2,232.26 | 3,152.13 | 3,813.74 |
| <b>S1.5SU 80B — 1016</b>  | 52.39                                                                                                    | 523.90 | 1,008.96 | 1,707.93 | 2,991.84 | 4,234.47 | 5,239.02 |
| <b>S1.5SU 100B — 1016</b> | 67.51                                                                                                    | 675.07 | 1,243.66 | 2,065.89 | 3,743.17 | 5,400.57 | -        |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 | SUS304   | 20°            | —              | —                      | 0.12 to 0.24 |

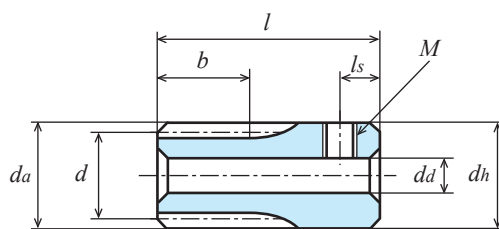
★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).  
For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number        | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_h$ (H8) | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|-------------------------|------------------------|---------------------------|-----------------------|------|-------------------|-----------------------------|-----------------------|---------------------|-----------------------|------------------|
| <b>S2SU 15B — 1410N</b> | 15                     | $\phi$ 30                 | $\phi$ 34             | B1   | 14                | $\phi$ 10                   | $\phi$ 22             | 10                  | 24                    | 93.7             |
| <b>S2SU 20B — 1412N</b> | 20                     | $\phi$ 40                 | $\phi$ 44             | B1   | 14                | $\phi$ 12                   | $\phi$ 30             | 10                  | 24                    | 174.0            |
| <b>S2SU 30B — 1414N</b> | 30                     | $\phi$ 60                 | $\phi$ 64             | B1   | 14                | $\phi$ 14                   | $\phi$ 40             | 10                  | 24                    | 384.3            |
| <b>S2SU 32B — 1214N</b> | 32                     | $\phi$ 64                 | $\phi$ 68             | B1   | 12                | $\phi$ 14                   | $\phi$ 45             | 10                  | 22                    | 405.4            |
| <b>S2SU 40B — 1214N</b> | 40                     | $\phi$ 80                 | $\phi$ 84             | B1   | 12                | $\phi$ 14                   | $\phi$ 50             | 10                  | 22                    | 607.2            |
| <b>S2SU 45B — 1214N</b> | 45                     | $\phi$ 90                 | $\phi$ 94             | B1   | 12                | $\phi$ 14                   | $\phi$ 60             | 10                  | 22                    | 802.7            |
| <b>S2SU 50B — 1215N</b> | 50                     | $\phi$ 100                | $\phi$ 104            | B1   | 12                | $\phi$ 15                   | $\phi$ 60             | 10                  | 22                    | 0.94(kg)         |
| <b>S2SU 55B — 1215N</b> | 55                     | $\phi$ 110                | $\phi$ 114            | B1   | 12                | $\phi$ 15                   | $\phi$ 60             | 10                  | 22                    | 1.10(kg)         |
| <b>S2SU 60B — 1215N</b> | 60                     | $\phi$ 120                | $\phi$ 124            | B1   | 12                | $\phi$ 15                   | $\phi$ 60             | 10                  | 22                    | 1.27(kg)         |

| Catalogue number        | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: kW) |        |        |        |        |          |          |
|-------------------------|-----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                         | 10rpm                                                                                                     | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S2SU 15B — 1410N</b> | 0.014                                                                                                     | 0.139  | 0.278  | 0.556  | 1.070  | 1.471    | 1.731    |
| <b>S2SU 20B — 1412N</b> | 0.022                                                                                                     | 0.218  | 0.435  | 0.870  | 1.580  | 2.128    | 2.497    |
| <b>S2SU 30B — 1414N</b> | 0.039                                                                                                     | 0.386  | 0.773  | 1.488  | 2.519  | 3.463    | 4.182    |
| <b>S2SU 32B — 1214N</b> | 0.036                                                                                                     | 0.361  | 0.722  | 1.374  | 2.307  | 3.207    | 3.866    |
| <b>S2SU 40B — 1214N</b> | 0.048                                                                                                     | 0.483  | 0.966  | 1.754  | 2.933  | 4.138    | 5.023    |
| <b>S2SU 45B — 1214N</b> | 0.056                                                                                                     | 0.560  | 1.121  | 1.979  | 3.349  | 4.729    | 5.722    |
| <b>S2SU 50B — 1215N</b> | 0.063                                                                                                     | 0.64   | 1.27   | 2.19   | 3.76   | 5.31     | 6.41     |
| <b>S2SU 55B — 1215N</b> | 0.071                                                                                                     | 0.72   | 1.40   | 2.40   | 4.16   | 5.88     | 7.17     |
| <b>S2SU 60B — 1215N</b> | 0.079                                                                                                     | 0.80   | 1.53   | 2.60   | 4.55   | 6.44     | 7.97     |



K2 type [ + ]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 | C3604B   | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. Gears with a [ + ] are provided with one screw holes. No set screws are provided.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

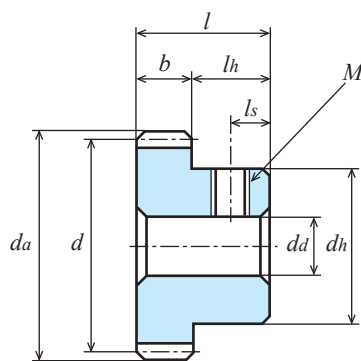
For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number        | Number of teeth<br>$z$ | Refer-<br>ence<br>diameter<br>$d$ | Tip<br>diameter<br>$d_a$ | Type | Face<br>width<br>$b$ | Hole<br>diameter<br>$d_a(H8)$ | Hub<br>diameter<br>$d_h$ | Hub<br>length<br>$l_h$ | Overall<br>length<br>$l$ | Screw |       | Weight<br>$W(g)$ |
|-------------------------|------------------------|-----------------------------------|--------------------------|------|----------------------|-------------------------------|--------------------------|------------------------|--------------------------|-------|-------|------------------|
|                         |                        |                                   |                          |      |                      |                               |                          |                        |                          | $M$   | $l_s$ |                  |
| <b>S30B 14K + 0402</b>  | 14                     | $\phi$ 4.2                        | $\phi$ 4.8               | K2   | 4                    | $\phi$ 2                      | $\phi$ 5                 | 8                      | 12                       | M1.6  | 2.5   | 1.5              |
| <b>S30B 15K + 0402</b>  | 15                     | $\phi$ 4.5                        | $\phi$ 5.1               | K2   | 4                    | $\phi$ 2                      | $\phi$ 5.5               | 8                      | 12                       | M1.6  | 2.5   | 1.8              |
| <b>S30B 16K + 0402</b>  | 16                     | $\phi$ 4.8                        | $\phi$ 5.4               | K2   | 4                    | $\phi$ 2                      | $\phi$ 5.5               | 8                      | 12                       | M1.6  | 2.5   | 1.9              |
| <b>S30B 18K + 0402</b>  | 18                     | $\phi$ 5.4                        | $\phi$ 6                 | K2   | 4                    | $\phi$ 2                      | $\phi$ 6                 | 8                      | 12                       | M2    | 2.5   | 2.3              |
| <b>S30B 20B + 0302</b>  | 20                     | $\phi$ 6                          | $\phi$ 6.6               | B1   | 3.2                  | $\phi$ 2                      | $\phi$ 5                 | 4.8                    | 8                        | M1.6  | 2.5   | 1.3              |
| <b>S30B 24B + 0302</b>  | 24                     | $\phi$ 7.2                        | $\phi$ 7.8               | B1   | 3.2                  | $\phi$ 2                      | $\phi$ 6                 | 4.8                    | 8                        | M2    | 2.5   | 2.0              |
| <b>S30B 25B + 0302</b>  | 25                     | $\phi$ 7.5                        | $\phi$ 8.1               | B1   | 3.2                  | $\phi$ 2                      | $\phi$ 6                 | 4.8                    | 8                        | M2    | 2.5   | 2.1              |
| <b>S30B 28B + 0302</b>  | 28                     | $\phi$ 8.4                        | $\phi$ 9                 | B1   | 3.2                  | $\phi$ 2                      | $\phi$ 7                 | 4.8                    | 8                        | M2    | 2.5   | 2.8              |
| <b>S30B 30B + 0302</b>  | 30                     | $\phi$ 9                          | $\phi$ 9.6               | B1   | 3.2                  | $\phi$ 2                      | $\phi$ 8                 | 4.8                    | 8                        | M2    | 2.5   | 3.5              |
| <b>S30B 32B + 0202</b>  | 32                     | $\phi$ 9.6                        | $\phi$ 10.2              | B1   | 2                    | $\phi$ 2                      | $\phi$ 8                 | 6                      | 8                        | M2    | 3     | 3.5              |
| <b>S30B 35B + 0202</b>  | 35                     | $\phi$ 10.5                       | $\phi$ 11.1              | B1   | 2                    | $\phi$ 2                      | $\phi$ 8                 | 6                      | 8                        | M2    | 3     | 3.8              |
| <b>S30B 36B + 0203</b>  | 36                     | $\phi$ 10.8                       | $\phi$ 11.4              | B1   | 2                    | $\phi$ 3                      | $\phi$ 9                 | 6                      | 8                        | M3    | 3     | 4.2              |
| <b>S30B 40B + 0203</b>  | 40                     | $\phi$ 12                         | $\phi$ 12.6              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 5.3              |
| <b>S30B 45B + 0203</b>  | 45                     | $\phi$ 13.5                       | $\phi$ 14.1              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 5.8              |
| <b>S30B 48B + 0203</b>  | 48                     | $\phi$ 14.4                       | $\phi$ 15                | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 6.1              |
| <b>S30B 50B + 0203</b>  | 50                     | $\phi$ 15                         | $\phi$ 15.6              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 6.4              |
| <b>S30B 56B + 0203</b>  | 56                     | $\phi$ 16.8                       | $\phi$ 17.4              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 7.1              |
| <b>S30B 60B + 0203</b>  | 60                     | $\phi$ 18                         | $\phi$ 18.6              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 7.7              |
| <b>S30B 64B + 0203</b>  | 64                     | $\phi$ 19.2                       | $\phi$ 19.8              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 8.3              |
| <b>S30B 70B + 0203</b>  | 70                     | $\phi$ 21                         | $\phi$ 21.6              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 9.3              |
| <b>S30B 72B + 0203</b>  | 72                     | $\phi$ 21.6                       | $\phi$ 22.2              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 9.6              |
| <b>S30B 75B + 0203</b>  | 75                     | $\phi$ 22.5                       | $\phi$ 23.1              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 10.1             |
| <b>S30B 80B + 0203</b>  | 80                     | $\phi$ 24                         | $\phi$ 24.6              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 11.1             |
| <b>S30B 90B + 0203</b>  | 90                     | $\phi$ 27                         | $\phi$ 27.6              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 13.1             |
| <b>S30B 96B + 0203</b>  | 96                     | $\phi$ 28.8                       | $\phi$ 29.4              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 14.4             |
| <b>S30B 100B + 0203</b> | 100                    | $\phi$ 30                         | $\phi$ 30.6              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 15.4             |
| <b>S30B 108B + 0203</b> | 108                    | $\phi$ 32.4                       | $\phi$ 33                | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 17.4             |
| <b>S30B 120B + 0203</b> | 120                    | $\phi$ 36                         | $\phi$ 36.6              | B1   | 2                    | $\phi$ 3                      | $\phi$ 10                | 6                      | 8                        | M3    | 3     | 20.7             |

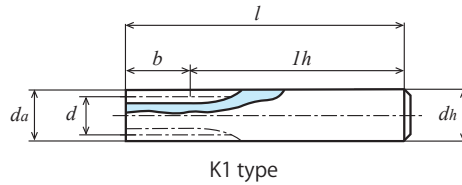


2D • 3D CAD

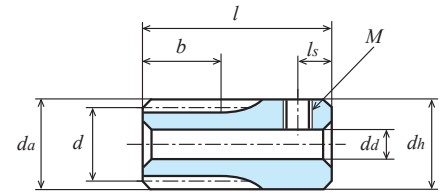


B1 type [±]

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S30B 14K + 0402  | 0.03                                                                                                     | 0.32   | 0.64   | 1.27   | 2.55   | 3.82     | 4.78     |
| S30B 15K + 0402  | 0.04                                                                                                     | 0.36   | 0.71   | 1.43   | 2.86   | 4.29     | 5.36     |
| S30B 16K + 0402  | 0.04                                                                                                     | 0.40   | 0.79   | 1.59   | 3.17   | 4.76     | 5.95     |
| S30B 18K + 0402  | 0.05                                                                                                     | 0.48   | 0.95   | 1.91   | 3.81   | 5.72     | 7.15     |
| S30B 20B + 0302  | 0.04                                                                                                     | 0.45   | 0.90   | 1.79   | 3.58   | 5.37     | 6.71     |
| S30B 24B + 0302  | 0.06                                                                                                     | 0.58   | 1.17   | 2.33   | 4.67   | 7.00     | 8.75     |
| S30B 25B + 0302  | 0.06                                                                                                     | 0.62   | 1.24   | 2.47   | 4.95   | 7.42     | 9.27     |
| S30B 28B + 0302  | 0.07                                                                                                     | 0.72   | 1.45   | 2.89   | 5.79   | 8.68     | 10.86    |
| S30B 30B + 0302  | 0.08                                                                                                     | 0.79   | 1.59   | 3.18   | 6.36   | 9.54     | 11.92    |
| S30B 32B + 0202  | 0.05                                                                                                     | 0.54   | 1.08   | 2.17   | 4.33   | 6.50     | 8.12     |
| S30B 35B + 0202  | 0.06                                                                                                     | 0.61   | 1.22   | 2.44   | 4.88   | 7.32     | 9.15     |
| S30B 36B + 0203  | 0.06                                                                                                     | 0.63   | 1.27   | 2.53   | 5.06   | 7.59     | 9.49     |
| S30B 40B + 0203  | 0.07                                                                                                     | 0.72   | 1.45   | 2.90   | 5.80   | 8.70     | 10.87    |
| S30B 45B + 0203  | 0.08                                                                                                     | 0.84   | 1.68   | 3.36   | 6.72   | 10.09    | 12.49    |
| S30B 48B + 0203  | 0.09                                                                                                     | 0.91   | 1.82   | 3.64   | 7.29   | 10.93    | 13.40    |
| S30B 50B + 0203  | 0.10                                                                                                     | 0.96   | 1.92   | 3.83   | 7.66   | 11.49    | 13.99    |
| S30B 56B + 0203  | 0.11                                                                                                     | 1.10   | 2.20   | 4.40   | 8.80   | 13.09    | 15.74    |
| S30B 60B + 0203  | 0.12                                                                                                     | 1.20   | 2.39   | 4.78   | 9.56   | 14.07    | 16.88    |
| S30B 64B + 0203  | 0.13                                                                                                     | 1.29   | 2.58   | 5.16   | 10.33  | 15.02    | 17.99    |
| S30B 70B + 0203  | 0.14                                                                                                     | 1.43   | 2.87   | 5.74   | 11.48  | 16.43    | 19.61    |
| S30B 72B + 0203  | 0.15                                                                                                     | 1.48   | 2.97   | 5.93   | 11.87  | 16.89    | 20.14    |
| S30B 75B + 0203  | 0.16                                                                                                     | 1.56   | 3.11   | 6.22   | 12.44  | 17.58    | 20.92    |
| S30B 80B + 0203  | 0.17                                                                                                     | 1.68   | 3.35   | 6.71   | 13.40  | 18.69    | 22.20    |
| S30B 90B + 0203  | 0.19                                                                                                     | 1.92   | 3.83   | 7.67   | 15.04  | 20.83    | 24.62    |
| S30B 96B + 0203  | 0.21                                                                                                     | 2.06   | 4.13   | 8.25   | 16.01  | 22.07    | 26.02    |
| S30B 100B + 0203 | 0.22                                                                                                     | 2.16   | 4.32   | 8.64   | 16.64  | 22.89    | 26.93    |
| S30B 108B + 0203 | 0.24                                                                                                     | 2.36   | 4.71   | 9.42   | 17.88  | 24.46    | 28.68    |
| S30B 120B + 0203 | 0.26                                                                                                     | 2.65   | 5.30   | 10.60  | 19.69  | 26.73    | 31.19    |



K1 type



K2 type [+]

Unit: mm

| Accuracy Class ②                            | Material      | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|---------------------------------------------|---------------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9/ Outside of control range | C3713P、C3604B | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. Gears with a [+] are provided with one screw holes. No set screws are provided.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).  
For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

② B1, K1, and K2 type: JIS Class N9 / B2 type: Outside of accuracy control range

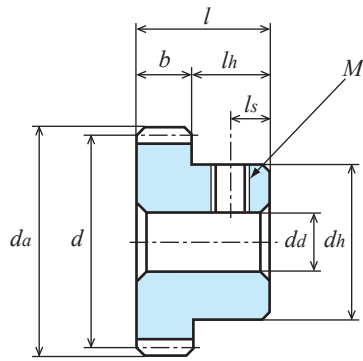
★ For the A1 type, refer to next page.

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H8)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw |       | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-------|-------|------------------|
|                  |                        |                           |                       |      |                   |                            |                       |                     |                       | $M$   | $l_s$ |                  |
| S50B 10K — 1006  | 10                     | $\phi 5$                  | $\phi 6$              | K1   | 10                | —                          | $\phi 6$              | 45                  | 55                    | —     | —     | 12.5             |
| S50B 12K — 1007  | 12                     | $\phi 6$                  | $\phi 7$              | K1   | 10                | —                          | $\phi 7$              | 45                  | 55                    | —     | —     | 17.1             |
| S50B 14K — 1008  | 14                     | $\phi 7$                  | $\phi 8$              | K1   | 10                | —                          | $\phi 8$              | 45                  | 55                    | —     | —     | 22.5             |
| S50B 15K + 0803  | 15                     | $\phi 7.5$                | $\phi 8.5$            | K2   | 8                 | $\phi 3$                   | $\phi 9$              | 10                  | 18                    | M3    | 3     | 7.2              |
| S50B 16K + 0803  | 16                     | $\phi 8$                  | $\phi 9$              | K2   | 8                 | $\phi 3$                   | $\phi 9$              | 10                  | 18                    | M3    | 3     | 7.6              |
| S50B 18K + 0803  | 18                     | $\phi 9$                  | $\phi 10$             | K2   | 8                 | $\phi 3$                   | $\phi 10$             | 10                  | 18                    | M3    | 3     | 9.7              |
| S50B 20K + 0803  | 20                     | $\phi 10$                 | $\phi 11$             | K2   | 8                 | $\phi 3$                   | $\phi 11$             | 10                  | 18                    | M3    | 3     | 12.2             |
| S50B 20B + 0303  | 20                     | $\phi 10$                 | $\phi 11$             | B1   | 3                 | $\phi 3$                   | $\phi 8.2$            | 5                   | 8                     | M3    | 2.5   | 3.8              |
| S50B 24B + 0303  | 24                     | $\phi 12$                 | $\phi 13$             | B1   | 3                 | $\phi 3$                   | $\phi 10$             | 5                   | 8                     | M3    | 2.5   | 5.6              |
| S50B 25B + 0303  | 25                     | $\phi 12.5$               | $\phi 13.5$           | B1   | 3                 | $\phi 3$                   | $\phi 10$             | 5                   | 8                     | M3    | 2.5   | 5.8              |
| S50B 26B + 0303  | 26                     | $\phi 13$                 | $\phi 14$             | B1   | 3                 | $\phi 3$                   | $\phi 10$             | 5                   | 8                     | M3    | 2.5   | 6.1              |
| S50B 28B + 0303  | 28                     | $\phi 14$                 | $\phi 15$             | B1   | 3                 | $\phi 3$                   | $\phi 10$             | 5                   | 8                     | M3    | 2.5   | 6.6              |
| S50B 30B + 0303  | 30                     | $\phi 15$                 | $\phi 16$             | B1   | 3                 | $\phi 3$                   | $\phi 10$             | 5                   | 8                     | M3    | 2.5   | 7.2              |
| S50B 32B + 0303  | 32                     | $\phi 16$                 | $\phi 17$             | B1   | 3                 | $\phi 3$                   | $\phi 10$             | 5                   | 8                     | M3    | 2.5   | 7.8              |
| S50B 35B + 0303  | 35                     | $\phi 17.5$               | $\phi 18.5$           | B1   | 3                 | $\phi 3$                   | $\phi 10$             | 5                   | 8                     | M3    | 2.5   | 8.8              |
| S50B 36B + 0303  | 36                     | $\phi 18$                 | $\phi 19$             | B1   | 3                 | $\phi 3$                   | $\phi 10$             | 5                   | 8                     | M3    | 2.5   | 9.2              |
| S50B 40B + 0203  | 40                     | $\phi 20$                 | $\phi 21$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 8.1              |
| S50B 42B + 0203  | 42                     | $\phi 21$                 | $\phi 22$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 8.6              |
| S50B 45B + 0203  | 45                     | $\phi 22.5$               | $\phi 23.5$           | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 9.5              |
| S50B 48B + 0203  | 48                     | $\phi 24$                 | $\phi 25$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 10.4             |
| S50B 50B + 0203  | 50                     | $\phi 25$                 | $\phi 26$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 11.1             |
| S50B 55B + 0203  | 55                     | $\phi 27.5$               | $\phi 28.5$           | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 12.8             |
| S50B 56B + 0203  | 56                     | $\phi 28$                 | $\phi 29$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 13.2             |
| S50B 58B + 0203  | 58                     | $\phi 29$                 | $\phi 30$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 14.0             |
| S50B 60B + 0203  | 60                     | $\phi 30$                 | $\phi 31$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 14.8             |
| S50B 64B + 0203  | 64                     | $\phi 32$                 | $\phi 33$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 16.4             |
| S50B 65B + 0203  | 65                     | $\phi 32.5$               | $\phi 33.5$           | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 16.8             |
| S50B 68B + 0203  | 68                     | $\phi 34$                 | $\phi 35$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 18.2             |
| S50B 70B + 0203  | 70                     | $\phi 35$                 | $\phi 36$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 19.1             |
| S50B 72B + 0203  | 72                     | $\phi 36$                 | $\phi 37$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 20.0             |
| S50B 75B + 0203  | 75                     | $\phi 37.5$               | $\phi 38.5$           | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 21.5             |
| S50B 80B + 0203  | 80                     | $\phi 40$                 | $\phi 41$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 24.1             |
| S50B 84B + 0203  | 84                     | $\phi 42$                 | $\phi 43$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 26.3             |
| S50B 85B + 0203  | 85                     | $\phi 42.5$               | $\phi 43.5$           | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 26.9             |
| S50B 90B + 0203  | 90                     | $\phi 45$                 | $\phi 46$             | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 29.8             |
| S50B 95B + 0203  | 95                     | $\phi 47.5$               | $\phi 48.5$           | B2   | 2                 | $\phi 3$                   | $\phi 10$             | 5                   | 7.5                   | M3    | 2.5   | 32.9             |
| S50B 100B + 0203 | 100                    | $\phi 50$                 | $\phi 51$             | B2   | 2                 | $\phi 3$                   | $\phi 15$             | 7                   | 9.5                   | M3    | 3.5   | 36.1             |
| S50B 105B + 0203 | 105                    | $\phi 52.5$               | $\phi 53.5$           | B2   | 2                 | $\phi 3$                   | $\phi 15$             | 7                   | 9.5                   | M3    | 3.5   | 39.5             |
| S50B 110B + 0203 | 110                    | $\phi 55$                 | $\phi 56$             | B2   | 2                 | $\phi 3$                   | $\phi 15$             | 7                   | 9.5                   | M3    | 3.5   | 43.1             |



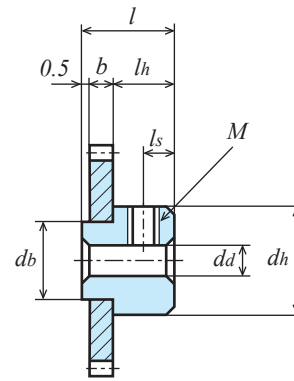


2D • 3D CAD



B1 type [ + ]

$db$  is the same size as  $dd$  with the same number of teeth of the A1 type.



B2 type (Hub caulking)

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S50B 10K – 1006  | 0.12                                                                                                     | 1.21   | 2.42   | 4.85   | 9.70   | 14.55    | 18.18    |
| S50B 12K – 1007  | 0.17                                                                                                     | 1.70   | 3.40   | 6.79   | 13.58  | 20.37    | 25.47    |
| S50B 14K – 1008  | 0.22                                                                                                     | 2.21   | 4.43   | 8.85   | 17.71  | 26.56    | 33.20    |
| S50B 15K + 0803  | 0.20                                                                                                     | 1.98   | 3.97   | 7.94   | 15.87  | 23.81    | 29.76    |
| S50B 16K + 0803  | 0.22                                                                                                     | 2.20   | 4.40   | 8.81   | 17.62  | 26.42    | 33.03    |
| S50B 18K + 0803  | 0.26                                                                                                     | 2.65   | 5.29   | 10.59  | 21.18  | 31.76    | 39.71    |
| S50B 20K + 0803  | 0.31                                                                                                     | 3.11   | 6.22   | 12.43  | 24.86  | 37.30    | 46.62    |
| S50B 20B + 0303  | 0.12                                                                                                     | 1.17   | 2.33   | 4.66   | 9.32   | 13.99    | 17.48    |
| S50B 24B + 0303  | 0.15                                                                                                     | 1.52   | 3.04   | 6.08   | 12.16  | 18.23    | 22.79    |
| S50B 25B + 0303  | 0.16                                                                                                     | 1.61   | 3.22   | 6.44   | 12.88  | 19.32    | 24.15    |
| S50B 26B + 0303  | 0.17                                                                                                     | 1.70   | 3.40   | 6.80   | 13.61  | 20.41    | 25.43    |
| S50B 28B + 0303  | 0.19                                                                                                     | 1.88   | 3.77   | 7.54   | 15.08  | 22.62    | 27.85    |
| S50B 30B + 0303  | 0.21                                                                                                     | 2.07   | 4.14   | 8.28   | 16.56  | 24.83    | 30.23    |
| S50B 32B + 0303  | 0.23                                                                                                     | 2.26   | 4.51   | 9.03   | 18.05  | 27.06    | 32.60    |
| S50B 35B + 0303  | 0.25                                                                                                     | 2.54   | 5.08   | 10.16  | 20.32  | 30.04    | 36.08    |
| S50B 36B + 0303  | 0.26                                                                                                     | 2.64   | 5.27   | 10.54  | 21.08  | 31.02    | 37.22    |
| S50B 40B + 0203  | 0.20                                                                                                     | 2.01   | 4.03   | 8.05   | 16.10  | 23.26    | 27.81    |
| S50B 42B + 0203  | 0.21                                                                                                     | 2.14   | 4.28   | 8.57   | 17.13  | 24.53    | 29.28    |
| S50B 45B + 0203  | 0.23                                                                                                     | 2.33   | 4.67   | 9.34   | 18.68  | 26.38    | 31.41    |
| S50B 48B + 0203  | 0.25                                                                                                     | 2.53   | 5.06   | 10.12  | 20.22  | 28.21    | 33.50    |
| S50B 50B + 0203  | 0.27                                                                                                     | 2.66   | 5.32   | 10.64  | 21.14  | 29.41    | 34.87    |
| S50B 55B + 0203  | 0.30                                                                                                     | 2.99   | 5.98   | 11.96  | 23.38  | 32.34    | 38.19    |
| S50B 56B + 0203  | 0.31                                                                                                     | 3.06   | 6.11   | 12.22  | 23.82  | 32.91    | 38.84    |
| S50B 58B + 0203  | 0.32                                                                                                     | 3.19   | 6.37   | 12.75  | 24.70  | 34.05    | 40.12    |
| S50B 60B + 0203  | 0.33                                                                                                     | 3.32   | 6.64   | 13.28  | 25.57  | 35.17    | 41.38    |
| S50B 64B + 0203  | 0.36                                                                                                     | 3.59   | 7.17   | 14.34  | 27.29  | 37.36    | 43.83    |
| S50B 65B + 0203  | 0.37                                                                                                     | 3.65   | 7.30   | 14.61  | 27.72  | 37.90    | 44.43    |
| S50B 68B + 0203  | 0.39                                                                                                     | 3.85   | 7.70   | 15.41  | 28.97  | 39.50    | 46.21    |
| S50B 70B + 0203  | 0.40                                                                                                     | 3.99   | 7.97   | 15.94  | 29.80  | 40.54    | 47.36    |
| S50B 72B + 0203  | 0.41                                                                                                     | 4.12   | 8.24   | 16.48  | 30.62  | 41.57    | 48.50    |
| S50B 75B + 0203  | 0.43                                                                                                     | 4.32   | 8.64   | 17.28  | 31.84  | 43.09    | 50.17    |
| S50B 80B + 0203  | 0.47                                                                                                     | 4.66   | 9.31   | 18.63  | 33.83  | 45.55    | 53.44    |
| S50B 84B + 0203  | 0.49                                                                                                     | 4.92   | 9.84   | 19.68  | 35.34  | 47.40    | 56.14    |
| S50B 85B + 0203  | 0.50                                                                                                     | 4.99   | 9.98   | 19.95  | 35.72  | 47.87    | 56.82    |
| S50B 90B + 0203  | 0.53                                                                                                     | 5.33   | 10.65  | 21.30  | 37.61  | 50.15    | 60.21    |
| S50B 95B + 0203  | 0.57                                                                                                     | 5.66   | 11.33  | 22.65  | 39.44  | 52.36    | 63.55    |
| S50B 100B + 0203 | 0.60                                                                                                     | 6.00   | 12.00  | 23.83  | 41.24  | 55.09    | 66.86    |
| S50B 105B + 0203 | 0.63                                                                                                     | 6.34   | 12.68  | 24.98  | 42.98  | 57.85    | 70.12    |
| S50B 110B + 0203 | 0.67                                                                                                     | 6.68   | 13.36  | 26.12  | 44.69  | 60.59    | 73.34    |



Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|--------------------------|----------|----------------|----------------|------------------------|--------------|
| Outside of control range | C3713P   | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The allowable transfer capability table was a reference value under accurately assembly conditions. Please assemble based on the theoretical value of the distance between centers.

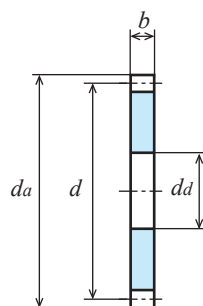
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

② A1 type is Outside of accuracy control range.

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$<br>(0 ~ +0.1) | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw |       | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|--------------------------------------|-----------------------|---------------------|-----------------------|-------|-------|------------------|
|                  |                        |                           |                       |      |                   |                                      |                       |                     |                       | $M$   | $l_s$ |                  |
| S50B 40A — 0208  | 40                     | φ20                       | φ21                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 4.5              |
| S50B 42A — 0208  | 42                     | φ21                       | φ22                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 5.0              |
| S50B 45A — 0208  | 45                     | φ22.5                     | φ23.5                 | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 5.9              |
| S50B 48A — 0208  | 48                     | φ24                       | φ25                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 6.8              |
| S50B 50A — 0208  | 50                     | φ25                       | φ26                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 7.5              |
| S50B 55A — 0208  | 55                     | φ27.5                     | φ28.5                 | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 9.2              |
| S50B 56A — 0208  | 56                     | φ28                       | φ29                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 9.6              |
| S50B 58A — 0208  | 58                     | φ29                       | φ30                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 10.4             |
| S50B 60A — 0208  | 60                     | φ30                       | φ31                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 11.2             |
| S50B 64A — 0208  | 64                     | φ32                       | φ33                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 12.8             |
| S50B 65A — 0208  | 65                     | φ32.5                     | φ33.5                 | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 12.3             |
| S50B 68A — 0208  | 68                     | φ34                       | φ35                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 14.6             |
| S50B 70A — 0208  | 70                     | φ35                       | φ36                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 15.5             |
| S50B 72A — 0208  | 72                     | φ36                       | φ37                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 16.5             |
| S50B 75A — 0208  | 75                     | φ37.5                     | φ38.5                 | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 17.9             |
| S50B 80A — 0208  | 80                     | φ40                       | φ41                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 20.5             |
| S50B 84A — 0208  | 84                     | φ42                       | φ43                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 22.7             |
| S50B 85A — 0208  | 85                     | φ42.5                     | φ43.5                 | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 23.3             |
| S50B 90A — 0208  | 90                     | φ45                       | φ46                   | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 26.2             |
| S50B 95A — 0208  | 95                     | φ47.5                     | φ48.5                 | A1   | 2                 | φ 8                                  | -                     | -                   | 2                     | -     | -     | 29.3             |
| S50B 100A — 0212 | 100                    | φ50                       | φ51                   | A1   | 2                 | φ12                                  | -                     | -                   | 2                     | -     | -     | 32.5             |
| S50B 105A — 0212 | 105                    | φ52.5                     | φ53.5                 | A1   | 2                 | φ12                                  | -                     | -                   | 2                     | -     | -     | 36.0             |
| S50B 110A — 0212 | 110                    | φ55                       | φ56                   | A1   | 2                 | φ12                                  | -                     | -                   | 2                     | -     | -     | 39.5             |

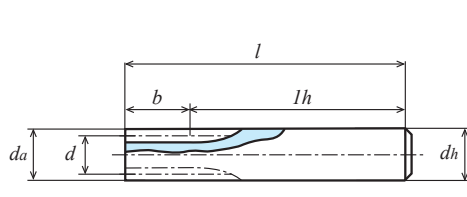


2D • 3D CAD

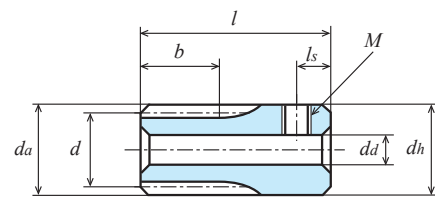


A1 type

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S50B 40A – 0208  | 0.20                                                                                                     | 2.01   | 4.03   | 8.05   | 16.10  | 23.26    | 27.81    |
| S50B 42A – 0208  | 0.21                                                                                                     | 2.14   | 4.28   | 8.57   | 17.13  | 24.53    | 29.28    |
| S50B 45A – 0208  | 0.23                                                                                                     | 2.33   | 4.67   | 9.34   | 18.68  | 26.38    | 31.41    |
| S50B 48A – 0208  | 0.25                                                                                                     | 2.53   | 5.06   | 10.12  | 20.22  | 28.21    | 33.50    |
| S50B 50A – 0208  | 0.27                                                                                                     | 2.66   | 5.32   | 10.64  | 21.14  | 29.41    | 34.87    |
| S50B 55A – 0208  | 0.30                                                                                                     | 2.99   | 5.98   | 11.96  | 23.38  | 32.34    | 38.19    |
| S50B 56A – 0208  | 0.31                                                                                                     | 3.06   | 6.11   | 12.22  | 23.82  | 32.91    | 38.84    |
| S50B 58A – 0208  | 0.32                                                                                                     | 3.19   | 6.37   | 12.75  | 24.70  | 34.05    | 40.12    |
| S50B 60A – 0208  | 0.33                                                                                                     | 3.32   | 6.64   | 13.28  | 25.57  | 35.17    | 41.38    |
| S50B 64A – 0208  | 0.36                                                                                                     | 3.59   | 7.17   | 14.34  | 27.29  | 37.36    | 43.83    |
| S50B 65A – 0208  | 0.37                                                                                                     | 3.65   | 7.30   | 14.61  | 27.72  | 37.90    | 44.43    |
| S50B 68A – 0208  | 0.39                                                                                                     | 3.85   | 7.70   | 15.41  | 28.97  | 39.50    | 46.21    |
| S50B 70A – 0208  | 0.40                                                                                                     | 3.99   | 7.97   | 15.94  | 29.80  | 40.54    | 47.36    |
| S50B 72A – 0208  | 0.41                                                                                                     | 4.12   | 8.24   | 16.48  | 30.62  | 41.57    | 48.50    |
| S50B 75A – 0208  | 0.43                                                                                                     | 4.32   | 8.64   | 17.28  | 31.84  | 43.09    | 50.17    |
| S50B 80A – 0208  | 0.47                                                                                                     | 4.66   | 9.31   | 18.63  | 33.83  | 45.55    | 53.44    |
| S50B 84A – 0208  | 0.49                                                                                                     | 4.92   | 9.84   | 19.68  | 35.34  | 47.40    | 56.14    |
| S50B 85A – 0208  | 0.50                                                                                                     | 4.99   | 9.98   | 19.95  | 35.72  | 47.87    | 56.82    |
| S50B 90A – 0208  | 0.53                                                                                                     | 5.33   | 10.65  | 21.30  | 37.61  | 50.15    | 60.21    |
| S50B 95A – 0208  | 0.57                                                                                                     | 5.66   | 11.33  | 22.65  | 39.44  | 52.36    | 63.55    |
| S50B 100A – 0212 | 0.60                                                                                                     | 6.00   | 12.00  | 23.83  | 41.24  | 55.09    | 66.86    |
| S50B 105A – 0212 | 0.63                                                                                                     | 6.34   | 12.68  | 24.98  | 42.98  | 57.85    | 70.12    |
| S50B 110A – 0212 | 0.67                                                                                                     | 6.68   | 13.36  | 26.12  | 44.69  | 60.59    | 73.34    |



K1 type



K2 type [+]

Unit: mm

| Accuracy Class ②                             | Material       | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|----------------------------------------------|----------------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 / Outside of control range | C3713P, C3604B | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. Gears with a [+] are provided with one screw holes and set screws are provided.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

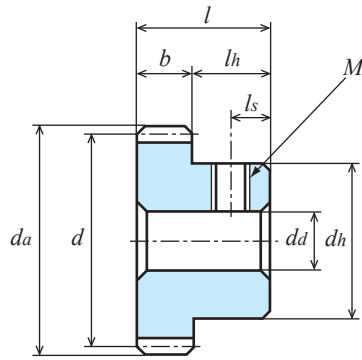
② B1, K1, and K2 type: JIS Class N9 / B2 type: Outside of accuracy control range

★ For the A1 type, refer to next page.

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_a(H8)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw |       | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|---------------------|-----------------------|-------|-------|------------------|
|                  |                        |                           |                       |      |                   |                            |                       |                     |                       | $M$   | $l_s$ |                  |
| S75B 10K — 0809  | 10                     | $\phi 7.5$                | $\phi 9$              | K1   | 8                 | —                          | $\phi 9$              | 47                  | 55                    | —     | —     | 28.4             |
| S75B 12K — 0811  | 12                     | $\phi 9$                  | $\phi 10.5$           | K1   | 8                 | —                          | $\phi 11$             | 47                  | 55                    | —     | —     | 42.3             |
| S75B 14K + 0805  | 14                     | $\phi 10.5$               | $\phi 12$             | K2   | 8                 | $\phi 5$                   | $\phi 12$             | 12                  | 20                    | M3    | 3     | 13.9             |
| S75B 15K + 0805  | 15                     | $\phi 11.25$              | $\phi 12.75$          | K2   | 8                 | $\phi 5$                   | $\phi 12.75$          | 12                  | 20                    | M3    | 3     | 16.3             |
| S75B 16K + 0805  | 16                     | $\phi 12$                 | $\phi 13.5$           | K2   | 8                 | $\phi 5$                   | $\phi 13.5$           | 12                  | 20                    | M3    | 3     | 18.8             |
| S75B 16B + 0305  | 16                     | $\phi 12$                 | $\phi 13.5$           | B1   | 3                 | $\phi 5$                   | $\phi 10$             | 7                   | 10                    | M3    | 3.5   | 5.8              |
| S75B 18B + 0305  | 18                     | $\phi 13.5$               | $\phi 15$             | B1   | 3                 | $\phi 5$                   | $\phi 11$             | 7                   | 10                    | M3    | 3.5   | 7.5              |
| S75B 20K + 0805  | 20                     | $\phi 15$                 | $\phi 16.5$           | K2   | 8                 | $\phi 5$                   | $\phi 16.5$           | 12                  | 20                    | M3    | 3     | 30.2             |
| S75B 20B + 0306  | 20                     | $\phi 15$                 | $\phi 16.5$           | B1   | 3                 | $\phi 6$                   | $\phi 12$             | 7                   | 10                    | M4    | 3.5   | 8.6              |
| S75B 24B + 0306  | 24                     | $\phi 18$                 | $\phi 19.5$           | B1   | 3                 | $\phi 6$                   | $\phi 14$             | 7                   | 10                    | M4    | 3.5   | 11.7             |
| S75B 25B + 0306  | 25                     | $\phi 18.75$              | $\phi 20.25$          | B1   | 3                 | $\phi 6$                   | $\phi 14$             | 7                   | 10                    | M4    | 3.5   | 12.3             |
| S75B 26B + 0306  | 26                     | $\phi 19.5$               | $\phi 21$             | B1   | 3                 | $\phi 6$                   | $\phi 14$             | 7                   | 10                    | M4    | 3.5   | 12.9             |
| S75B 28B + 0306  | 28                     | $\phi 21$                 | $\phi 22.5$           | B1   | 3                 | $\phi 6$                   | $\phi 14$             | 7                   | 10                    | M4    | 3.5   | 14.1             |
| S75B 30B + 0306  | 30                     | $\phi 22.5$               | $\phi 24$             | B1   | 3                 | $\phi 6$                   | $\phi 15$             | 7                   | 10                    | M4    | 3.5   | 16.7             |
| S75B 32B + 0306  | 32                     | $\phi 24$                 | $\phi 25.5$           | B1   | 3                 | $\phi 6$                   | $\phi 15$             | 7                   | 10                    | M4    | 3.5   | 18.1             |
| S75B 35B + 0306  | 35                     | $\phi 26.25$              | $\phi 27.75$          | B1   | 3                 | $\phi 6$                   | $\phi 18$             | 7                   | 10                    | M4    | 3.5   | 24.9             |
| S75B 36B + 0306  | 36                     | $\phi 27$                 | $\phi 28.5$           | B1   | 3                 | $\phi 6$                   | $\phi 18$             | 7                   | 10                    | M4    | 3.5   | 25.7             |
| S75B 40B + 0306  | 40                     | $\phi 30$                 | $\phi 31.5$           | B1   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10                    | M4    | 3.5   | 33.8             |
| S75B 42B + 0306  | 42                     | $\phi 31.5$               | $\phi 33$             | B1   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10                    | M4    | 3.5   | 35.6             |
| S75B 45B + 0306  | 45                     | $\phi 33.75$              | $\phi 35.25$          | B1   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10                    | M4    | 3.5   | 38.6             |
| S75B 48B + 0306  | 48                     | $\phi 36$                 | $\phi 37.5$           | B1   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10                    | M4    | 3.5   | 41.7             |
| S75B 50B + 0306  | 50                     | $\phi 37.5$               | $\phi 39$             | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 43.8             |
| S75B 55B + 0306  | 55                     | $\phi 41.25$              | $\phi 42.75$          | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 49.7             |
| S75B 56B + 0306  | 56                     | $\phi 42$                 | $\phi 43.5$           | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 50.9             |
| S75B 58B + 0306  | 58                     | $\phi 43.5$               | $\phi 45$             | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 53.5             |
| S75B 60B + 0306  | 60                     | $\phi 45$                 | $\phi 46.5$           | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 56.2             |
| S75B 62B + 0306  | 62                     | $\phi 46.5$               | $\phi 48$             | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 58.9             |
| S75B 64B + 0306  | 64                     | $\phi 48$                 | $\phi 49.5$           | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 61.8             |
| S75B 66B + 0306  | 66                     | $\phi 49.5$               | $\phi 51$             | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 64.7             |
| S75B 68B + 0306  | 68                     | $\phi 51$                 | $\phi 52.5$           | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 67.7             |
| S75B 70B + 0306  | 70                     | $\phi 52.5$               | $\phi 54$             | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 70.8             |
| S75B 72B + 0306  | 72                     | $\phi 54$                 | $\phi 55.5$           | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 74.0             |
| S75B 75B + 0306  | 75                     | $\phi 56.25$              | $\phi 57.75$          | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 79.0             |
| S75B 80B + 0306  | 80                     | $\phi 60$                 | $\phi 61.5$           | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 87.7             |
| S75B 85B + 0306  | 85                     | $\phi 63.75$              | $\phi 65.25$          | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 97.0             |
| S75B 90B + 0306  | 90                     | $\phi 67.5$               | $\phi 69$             | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 106.9            |
| S75B 95B + 0306  | 95                     | $\phi 71.25$              | $\phi 72.75$          | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 117.3            |
| S75B 100B + 0306 | 100                    | $\phi 75$                 | $\phi 76.5$           | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 128.3            |
| S75B 105B + 0306 | 105                    | $\phi 78.75$              | $\phi 80.25$          | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 139.8            |
| S75B 110B + 0306 | 110                    | $\phi 82.5$               | $\phi 84$             | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 151.9            |
| S75B 115B + 0306 | 115                    | $\phi 86.25$              | $\phi 87.75$          | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 164.6            |
| S75B 120B + 0306 | 120                    | $\phi 90$                 | $\phi 91.5$           | B2   | 3                 | $\phi 6$                   | $\phi 20$             | 7                   | 10.5                  | M4    | 3.5   | 177.8            |

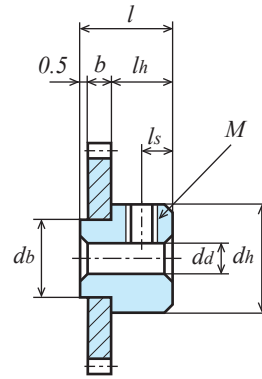


2D • 3D CAD



B1 type [ + ]

$db$  is the same size as  $dd$  with the same number of teeth of the A1 type.



B2 type (Hub caulking)

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S75B 10K – 0809  | 0.22                                                                                                     | 2.18   | 4.36   | 8.73   | 17.46  | 26.18    | 32.73    |
| S75B 12K – 0811  | 0.31                                                                                                     | 3.06   | 6.11   | 12.22  | 24.45  | 36.67    | 45.84    |
| S75B 14K + 0805  | 0.40                                                                                                     | 3.98   | 7.97   | 15.93  | 31.87  | 47.80    | 59.75    |
| S75B 15K + 0805  | 0.45                                                                                                     | 4.46   | 8.93   | 17.86  | 35.72  | 53.57    | 66.97    |
| S75B 16K + 0805  | 0.50                                                                                                     | 4.95   | 9.91   | 19.82  | 39.64  | 59.45    | 74.32    |
| S75B 16B + 0305  | 0.19                                                                                                     | 1.86   | 3.72   | 7.43   | 14.86  | 22.30    | 27.87    |
| S75B 18B + 0305  | 0.22                                                                                                     | 2.23   | 4.47   | 8.93   | 17.87  | 26.80    | 33.20    |
| S75B 20K + 0805  | 0.70                                                                                                     | 6.99   | 13.99  | 27.97  | 55.94  | 83.92    | 102.17   |
| S75B 20B + 0306  | 0.26                                                                                                     | 2.62   | 5.24   | 10.49  | 20.98  | 31.47    | 38.31    |
| S75B 24B + 0306  | 0.34                                                                                                     | 3.42   | 6.84   | 13.67  | 27.35  | 40.23    | 48.28    |
| S75B 25B + 0306  | 0.36                                                                                                     | 3.62   | 7.24   | 14.49  | 28.98  | 42.33    | 50.74    |
| S75B 26B + 0306  | 0.38                                                                                                     | 3.83   | 7.65   | 15.31  | 30.62  | 44.42    | 53.17    |
| S75B 28B + 0306  | 0.42                                                                                                     | 4.24   | 8.48   | 16.96  | 33.92  | 48.56    | 57.96    |
| S75B 30B + 0306  | 0.47                                                                                                     | 4.66   | 9.31   | 18.62  | 37.25  | 52.61    | 62.64    |
| S75B 32B + 0306  | 0.51                                                                                                     | 5.08   | 10.16  | 20.31  | 40.59  | 56.62    | 67.24    |
| S75B 35B + 0306  | 0.57                                                                                                     | 5.72   | 11.43  | 22.86  | 45.05  | 62.50    | 73.96    |
| S75B 36B + 0306  | 0.59                                                                                                     | 5.93   | 11.86  | 23.72  | 46.53  | 64.43    | 76.15    |
| S75B 40B + 0306  | 0.68                                                                                                     | 6.79   | 13.59  | 27.17  | 52.33  | 71.97    | 84.68    |
| S75B 42B + 0306  | 0.72                                                                                                     | 7.23   | 14.46  | 28.92  | 55.19  | 75.64    | 88.80    |
| S75B 45B + 0306  | 0.79                                                                                                     | 7.88   | 15.76  | 31.52  | 59.35  | 80.95    | 94.74    |
| S75B 48B + 0306  | 0.85                                                                                                     | 8.54   | 17.08  | 34.16  | 63.47  | 86.16    | 100.53   |
| S75B 50B + 0306  | 0.90                                                                                                     | 8.98   | 17.96  | 35.92  | 66.17  | 89.54    | 104.28   |
| S75B 55B + 0306  | 1.01                                                                                                     | 10.09  | 20.18  | 40.36  | 72.77  | 97.73    | 115.35   |
| S75B 56B + 0306  | 1.03                                                                                                     | 10.31  | 20.62  | 41.25  | 74.06  | 99.32    | 117.63   |
| S75B 58B + 0306  | 1.08                                                                                                     | 10.76  | 21.52  | 43.03  | 76.61  | 102.45   | 122.17   |
| S75B 60B + 0306  | 1.12                                                                                                     | 11.20  | 22.41  | 44.82  | 79.13  | 105.53   | 126.68   |
| S75B 62B + 0306  | 1.17                                                                                                     | 11.65  | 23.30  | 46.61  | 81.62  | 108.54   | 131.16   |
| S75B 64B + 0306  | 1.21                                                                                                     | 12.10  | 24.20  | 48.37  | 84.07  | 111.64   | 135.62   |
| S75B 66B + 0306  | 1.26                                                                                                     | 12.55  | 25.10  | 49.93  | 86.48  | 115.37   | 140.04   |
| S75B 68B + 0306  | 1.30                                                                                                     | 13.00  | 26.00  | 51.48  | 88.86  | 119.08   | 144.43   |
| S75B 70B + 0306  | 1.35                                                                                                     | 13.45  | 26.90  | 53.02  | 91.21  | 122.77   | 148.79   |
| S75B 72B + 0306  | 1.39                                                                                                     | 13.90  | 27.81  | 54.55  | 93.53  | 126.44   | 153.12   |
| S75B 75B + 0306  | 1.46                                                                                                     | 14.58  | 29.17  | 56.81  | 96.94  | 131.90   | 159.56   |
| S75B 80B + 0306  | 1.57                                                                                                     | 15.72  | 31.43  | 60.54  | 102.48 | 140.91   | 170.15   |
| S75B 85B + 0306  | 1.68                                                                                                     | 16.84  | 33.67  | 64.12  | 107.70 | 149.62   | 180.35   |
| S75B 90B + 0306  | 1.80                                                                                                     | 17.97  | 35.94  | 67.69  | 112.84 | 158.34   | 191.18   |
| S75B 95B + 0306  | 1.91                                                                                                     | 19.11  | 38.22  | 71.19  | 117.82 | 166.93   | 201.90   |
| S75B 100B + 0306 | 2.03                                                                                                     | 20.25  | 40.50  | 74.62  | 123.95 | 175.39   | 212.48   |
| S75B 105B + 0306 | 2.14                                                                                                     | 21.39  | 42.79  | 77.98  | 130.17 | 183.73   | 222.94   |
| S75B 110B + 0306 | 2.25                                                                                                     | 22.54  | 45.08  | 81.28  | 136.32 | 192.36   | 233.28   |
| S75B 115B + 0306 | 2.37                                                                                                     | 23.69  | 47.37  | 84.52  | 142.40 | 201.01   | 243.49   |
| S75B 120B + 0306 | 2.48                                                                                                     | 24.83  | 49.67  | 87.69  | 148.43 | 209.59   | 253.58   |



Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|--------------------------|----------|----------------|----------------|------------------------|--------------|
| Outside of control range | C3713P   | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The allowable transfer capability table was a reference value under accurately assembly conditions. Please assemble based on the theoretical value of the distance between centers.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

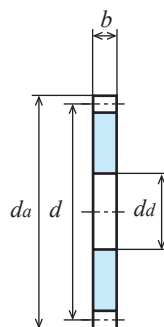
② A1 type is Outside of accuracy control range.

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$<br>(0 ~ +0.1) | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw |       | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|--------------------------------------|-----------------------|---------------------|-----------------------|-------|-------|------------------|
|                  |                        |                           |                       |      |                   |                                      |                       |                     |                       | $M$   | $l_s$ |                  |
| S75B 50A — 0315  | 50                     | φ37.5                     | φ39                   | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 23.7             |
| S75B 55A — 0315  | 55                     | φ41.25                    | φ42.75                | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 29.6             |
| S75B 56A — 0315  | 56                     | φ42                       | φ43.5                 | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 30.8             |
| S75B 58A — 0315  | 58                     | φ43.5                     | φ45                   | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 33.4             |
| S75B 60A — 0315  | 60                     | φ45                       | φ46.5                 | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 36.1             |
| S75B 62A — 0315  | 62                     | φ46.5                     | φ48                   | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 38.8             |
| S75B 64A — 0315  | 64                     | φ48                       | φ49.5                 | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 41.6             |
| S75B 66A — 0315  | 66                     | φ49.5                     | φ51                   | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 44.6             |
| S75B 68A — 0315  | 68                     | φ51                       | φ52.5                 | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 47.6             |
| S75B 70A — 0315  | 70                     | φ52.5                     | φ54                   | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 50.7             |
| S75B 72A — 0315  | 72                     | φ54                       | φ55.5                 | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 53.9             |
| S75B 75A — 0315  | 75                     | φ56.25                    | φ57.75                | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 58.9             |
| S75B 80A — 0315  | 80                     | φ60                       | φ61.5                 | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 67.6             |
| S75B 85A — 0315  | 85                     | φ63.75                    | φ65.25                | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 76.9             |
| S75B 90A — 0315  | 90                     | φ67.5                     | φ69                   | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 86.7             |
| S75B 95A — 0315  | 95                     | φ71.25                    | φ72.75                | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 97.2             |
| S75B 100A — 0315 | 100                    | φ75                       | φ76.5                 | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 108.1            |
| S75B 105A — 0315 | 105                    | φ78.75                    | φ80.25                | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 119.7            |
| S75B 110A — 0315 | 110                    | φ82.5                     | φ84                   | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 131.8            |
| S75B 115A — 0315 | 115                    | φ86.25                    | φ87.75                | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 144.5            |
| S75B 120A — 0315 | 120                    | φ90                       | φ91.5                 | A1   | 3                 | φ15                                  | -                     | -                   | 3                     | -     | -     | 157.7            |





2D • 3D CAD



A1 type

| Catalogue number        | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                         | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S75B 50A – 0315</b>  | 0.90                                                                                                     | 8.98   | 17.96  | 35.92  | 66.17  | 89.54    | 104.28   |
| <b>S75B 55A – 0315</b>  | 1.01                                                                                                     | 10.09  | 20.18  | 40.36  | 72.77  | 97.73    | 115.35   |
| <b>S75B 56A – 0315</b>  | 1.03                                                                                                     | 10.31  | 20.62  | 41.25  | 74.06  | 99.32    | 117.63   |
| <b>S75B 58A – 0315</b>  | 1.08                                                                                                     | 10.76  | 21.52  | 43.03  | 76.61  | 102.45   | 122.17   |
| <b>S75B 60A – 0315</b>  | 1.12                                                                                                     | 11.20  | 22.41  | 44.82  | 79.13  | 105.53   | 126.68   |
| <b>S75B 62A – 0315</b>  | 1.17                                                                                                     | 11.65  | 23.30  | 46.61  | 81.62  | 108.54   | 131.16   |
| <b>S75B 64A – 0315</b>  | 1.21                                                                                                     | 12.10  | 24.20  | 48.37  | 84.07  | 111.64   | 135.62   |
| <b>S75B 66A – 0315</b>  | 1.26                                                                                                     | 12.55  | 25.10  | 49.93  | 86.48  | 115.37   | 140.04   |
| <b>S75B 68A – 0315</b>  | 1.30                                                                                                     | 13.00  | 26.00  | 51.48  | 88.86  | 119.08   | 144.43   |
| <b>S75B 70A – 0315</b>  | 1.35                                                                                                     | 13.45  | 26.90  | 53.02  | 91.21  | 122.77   | 148.79   |
| <b>S75B 72A – 0315</b>  | 1.39                                                                                                     | 13.90  | 27.81  | 54.55  | 93.53  | 126.44   | 153.12   |
| <b>S75B 75A – 0315</b>  | 1.46                                                                                                     | 14.58  | 29.17  | 56.81  | 96.94  | 131.90   | 159.56   |
| <b>S75B 80A – 0315</b>  | 1.57                                                                                                     | 15.72  | 31.43  | 60.54  | 102.48 | 140.91   | 170.15   |
| <b>S75B 85A – 0315</b>  | 1.68                                                                                                     | 16.84  | 33.67  | 64.12  | 107.70 | 149.62   | 180.35   |
| <b>S75B 90A – 0315</b>  | 1.80                                                                                                     | 17.97  | 35.94  | 67.69  | 112.84 | 158.34   | 191.18   |
| <b>S75B 95A – 0315</b>  | 1.91                                                                                                     | 19.11  | 38.22  | 71.19  | 117.82 | 166.93   | 201.90   |
| <b>S75B 100A – 0315</b> | 2.03                                                                                                     | 20.25  | 40.50  | 74.62  | 123.95 | 175.39   | 212.48   |
| <b>S75B 105A – 0315</b> | 2.14                                                                                                     | 21.39  | 42.79  | 77.98  | 130.17 | 183.73   | 222.94   |
| <b>S75B 110A – 0315</b> | 2.25                                                                                                     | 22.54  | 45.08  | 81.28  | 136.32 | 192.36   | 233.28   |
| <b>S75B 115A – 0315</b> | 2.37                                                                                                     | 23.69  | 47.37  | 84.52  | 142.40 | 201.01   | 243.49   |
| <b>S75B 120A – 0315</b> | 2.48                                                                                                     | 24.83  | 49.67  | 87.69  | 148.43 | 209.59   | 253.58   |



Unit: mm

| Accuracy Class    | Material      | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|-------------------|---------------|----------------|----------------|------------------------|--------------|
| [JIS B 1702-1] N9 | C3604B、C3771B | 20°            | —              | —                      | 0.02 to 0.06 |

★ No surface treatment is applied. Gears with a [+] are provided with one screw hole and set screw.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).

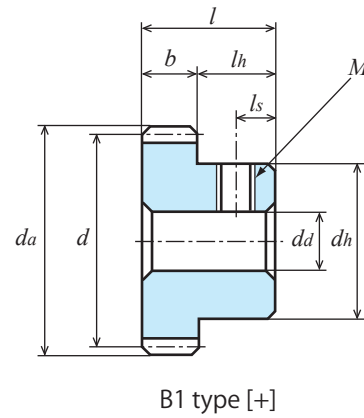
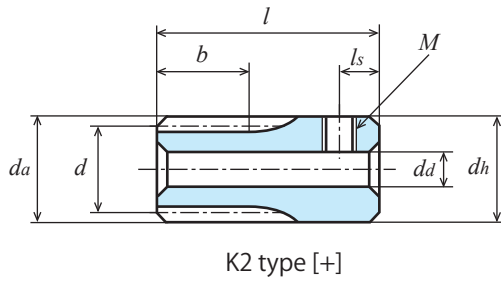
For the unit conversion method, refer to P. 20 in "References."

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

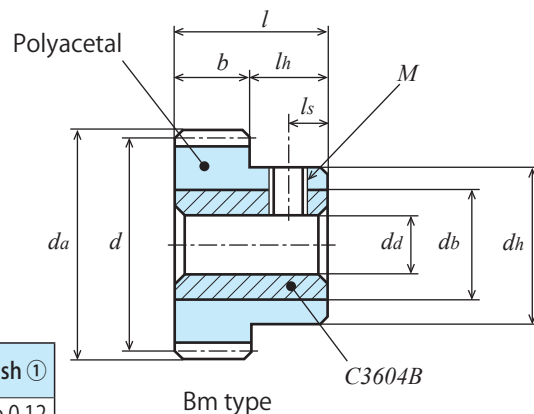
| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_i$ (H8) | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|-----------------------------|-----------------------|---------------------|-----------------------|-------|-------|------------------|
|                        |                        |                           |                       |      |                   |                             |                       |                     |                       | $M$   | $l_s$ |                  |
| <b>S80B 14K + 0704</b> | 14                     | φ11.2                     | φ12.8                 | K2   | 7                 | φ4                          | φ12.8                 | 13                  | 20                    | M3    | 3     | 17.8             |
| <b>S80B 15K + 0704</b> | 15                     | φ12                       | φ13.6                 | K2   | 7                 | φ4                          | φ13.6                 | 13                  | 20                    | M3    | 3     | 20.4             |
| <b>S80B 16B + 0504</b> | 16                     | φ12.8                     | φ14.4                 | B1   | 5                 | φ4                          | φ10                   | 9                   | 14                    | M3    | 3     | 9.8              |
| <b>S80B 16B + 0704</b> | 16                     | φ12.8                     | φ14.4                 | B1   | 7                 | φ4                          | φ10                   | 7                   | 14                    | M3    | 3     | 10.7             |
| <b>S80B 18B + 0504</b> | 18                     | φ14.4                     | φ16                   | B1   | 5                 | φ4                          | φ10                   | 9                   | 14                    | M3    | 3     | 11.3             |
| <b>S80B 18B + 0704</b> | 18                     | φ14.4                     | φ16                   | B1   | 7                 | φ4                          | φ10                   | 7                   | 14                    | M3    | 3     | 12.7             |
| <b>S80B 20B + 0504</b> | 20                     | φ16                       | φ17.6                 | B1   | 5                 | φ4                          | φ10                   | 9                   | 14                    | M3    | 3     | 12.9             |
| <b>S80B 20B + 0704</b> | 20                     | φ16                       | φ17.6                 | B1   | 7                 | φ4                          | φ10                   | 7                   | 14                    | M3    | 3     | 15.0             |
| <b>S80B 24B + 0505</b> | 24                     | φ19.2                     | φ20.8                 | B1   | 5                 | φ5                          | φ12.5                 | 9                   | 14                    | M3    | 3     | 19.2             |
| <b>S80B 24B + 0705</b> | 24                     | φ19.2                     | φ20.8                 | B1   | 7                 | φ5                          | φ12.5                 | 7                   | 14                    | M3    | 3     | 22.0             |
| <b>S80B 25B + 0505</b> | 25                     | φ20                       | φ21.6                 | B1   | 5                 | φ5                          | φ12.5                 | 9                   | 14                    | M3    | 3     | 20.2             |
| <b>S80B 25B + 0705</b> | 25                     | φ20                       | φ21.6                 | B1   | 7                 | φ5                          | φ12.5                 | 7                   | 14                    | M3    | 3     | 23.5             |
| <b>S80B 28B + 0505</b> | 28                     | φ22.4                     | φ24                   | B1   | 5                 | φ5                          | φ12.5                 | 9                   | 14                    | M3    | 3     | 23.6             |
| <b>S80B 28B + 0705</b> | 28                     | φ22.4                     | φ24                   | B1   | 7                 | φ5                          | φ12.5                 | 7                   | 14                    | M3    | 3     | 28.2             |
| <b>S80B 30B + 0505</b> | 30                     | φ24                       | φ25.6                 | B1   | 5                 | φ5                          | φ12.5                 | 9                   | 14                    | M3    | 3     | 26.1             |
| <b>S80B 30B + 0705</b> | 30                     | φ24                       | φ25.6                 | B1   | 7                 | φ5                          | φ12.5                 | 7                   | 14                    | M3    | 3     | 31.7             |
| <b>S80B 32B + 0505</b> | 32                     | φ25.6                     | φ27.2                 | B1   | 5                 | φ5                          | φ12.5                 | 9                   | 14                    | M3    | 4     | 28.8             |
| <b>S80B 36B + 0506</b> | 36                     | φ28.8                     | φ30.4                 | B1   | 5                 | φ6                          | φ14                   | 9                   | 14                    | M4    | 4     | 35.8             |
| <b>S80B 40B + 0506</b> | 40                     | φ32                       | φ33.6                 | B1   | 5                 | φ6                          | φ14                   | 9                   | 14                    | M4    | 4     | 42.3             |
| <b>S80B 45B + 0506</b> | 45                     | φ36                       | φ37.6                 | B1   | 5                 | φ6                          | φ14                   | 9                   | 14                    | M4    | 4     | 51.4             |
| <b>S80B 48B + 0506</b> | 48                     | φ38.4                     | φ40                   | B1   | 5                 | φ6                          | φ14                   | 9                   | 14                    | M4    | 4     | 57.3             |
| <b>S80B 50B + 0506</b> | 50                     | φ40                       | φ41.6                 | B1   | 5                 | φ6                          | φ14                   | 9                   | 14                    | M4    | 4     | 61.5             |
| <b>S80B 56B + 0506</b> | 56                     | φ44.8                     | φ46.4                 | B1   | 5                 | φ6                          | φ14                   | 9                   | 14                    | M4    | 4     | 75.1             |
| <b>S80B 60B + 0506</b> | 60                     | φ48                       | φ49.6                 | B1   | 5                 | φ6                          | φ14                   | 9                   | 14                    | M4    | 4     | 85.0             |
| <b>S80B 64B + 0506</b> | 64                     | φ51.2                     | φ52.8                 | B1   | 5                 | φ6                          | φ16                   | 9                   | 14                    | M4    | 4     | 99.1             |
| <b>S80B 70B + 0508</b> | 70                     | φ56                       | φ57.6                 | B1   | 5                 | φ8                          | φ16                   | 9                   | 14                    | M4    | 4     | 113.8            |
| <b>S80B 72B + 0508</b> | 72                     | φ57.6                     | φ59.2                 | B1   | 5                 | φ8                          | φ16                   | 9                   | 14                    | M4    | 4     | 119.8            |
| <b>S80B 80B + 0508</b> | 80                     | φ64                       | φ65.6                 | B1   | 5                 | φ8                          | φ16                   | 9                   | 14                    | M4    | 4     | 145.8            |



2D • 3D CAD



| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S80B 14K + 0704  | 0.40                                                                                                     | 3.97   | 7.93   | 15.86  | 31.73  | 47.59    | 59.49    |
| S80B 15K + 0704  | 0.44                                                                                                     | 4.44   | 8.89   | 17.78  | 35.56  | 53.33    | 66.67    |
| S80B 16B + 0504  | 0.35                                                                                                     | 3.52   | 7.05   | 14.09  | 28.19  | 42.28    | 52.81    |
| S80B 16B + 0704  | 0.49                                                                                                     | 4.93   | 9.86   | 19.73  | 39.46  | 59.19    | 73.93    |
| S80B 18B + 0504  | 0.42                                                                                                     | 4.24   | 8.47   | 16.94  | 33.88  | 50.82    | 62.30    |
| S80B 18B + 0704  | 0.59                                                                                                     | 5.93   | 11.86  | 23.72  | 47.43  | 71.15    | 87.23    |
| S80B 20B + 0504  | 0.50                                                                                                     | 4.97   | 9.95   | 19.89  | 39.78  | 59.63    | 71.83    |
| S80B 20B + 0704  | 0.70                                                                                                     | 6.96   | 13.92  | 27.85  | 55.70  | 83.48    | 100.56   |
| S80B 24B + 0505  | 0.65                                                                                                     | 6.48   | 12.97  | 25.93  | 51.86  | 75.46    | 90.36    |
| S80B 24B + 0705  | 0.91                                                                                                     | 9.08   | 18.15  | 36.30  | 72.61  | 105.64   | 126.50   |
| S80B 25B + 0505  | 0.69                                                                                                     | 6.87   | 13.74  | 27.47  | 54.95  | 79.37    | 94.90    |
| S80B 25B + 0705  | 0.96                                                                                                     | 9.62   | 19.23  | 38.46  | 76.93  | 111.12   | 132.87   |
| S80B 28B + 0505  | 0.80                                                                                                     | 8.04   | 16.08  | 32.17  | 64.33  | 90.94    | 108.29   |
| S80B 28B + 0705  | 1.13                                                                                                     | 11.26  | 22.52  | 45.03  | 90.06  | 127.31   | 151.60   |
| S80B 30B + 0505  | 0.88                                                                                                     | 8.83   | 17.66  | 35.32  | 70.58  | 98.45    | 116.92   |
| S80B 30B + 0705  | 1.24                                                                                                     | 12.36  | 24.72  | 49.45  | 98.81  | 137.88   | 163.69   |
| S80B 32B + 0505  | 0.96                                                                                                     | 9.63   | 19.26  | 38.51  | 76.20  | 105.88   | 125.42   |
| S80B 36B + 0506  | 1.12                                                                                                     | 11.25  | 22.49  | 44.98  | 87.26  | 120.33   | 141.83   |
| S80B 40B + 0506  | 1.28                                                                                                     | 12.88  | 25.77  | 51.53  | 98.05  | 134.24   | 157.49   |
| S80B 45B + 0506  | 1.49                                                                                                     | 14.94  | 29.88  | 59.77  | 111.08 | 150.77   | 175.91   |
| S80B 48B + 0506  | 1.61                                                                                                     | 16.19  | 32.38  | 64.77  | 118.70 | 160.33   | 186.72   |
| S80B 50B + 0506  | 1.70                                                                                                     | 17.03  | 34.06  | 68.12  | 123.70 | 166.54   | 195.42   |
| S80B 56B + 0506  | 1.96                                                                                                     | 19.55  | 39.11  | 78.21  | 138.25 | 184.44   | 221.21   |
| S80B 60B + 0506  | 2.12                                                                                                     | 21.25  | 42.49  | 84.92  | 147.60 | 196.01   | 238.11   |
| S80B 64B + 0506  | 2.29                                                                                                     | 22.95  | 45.90  | 90.81  | 156.68 | 210.07   | 254.77   |
| S80B 70B + 0508  | 2.55                                                                                                     | 25.51  | 51.02  | 99.46  | 169.80 | 230.87   | 297.32   |
| S80B 72B + 0508  | 2.64                                                                                                     | 26.37  | 52.73  | 102.30 | 174.05 | 237.72   | 287.38   |
| S80B 80B + 0508  | 2.98                                                                                                     | 29.80  | 59.61  | 113.43 | 190.42 | 264.72   | 319.13   |



Unit: mm

| Accuracy Class ②         | Material         | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|------------------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | White POM/C3604B | 20°            | Cutting          | —                      | 0.06 to 0.12 |

★ A brass bushing is in the hole. Gears with a [+] are provided with screw holes and set screws.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$da(H8)$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw |       | Bushing outside diameter<br>$d_b$ | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|---------------------------|-----------------------|---------------------|-----------------------|-------|-------|-----------------------------------|------------------|
|                  |                        |                           |                       |      |                   |                           |                       |                     |                       | $M$   | $l_s$ |                                   |                  |
| S1DB 20B + 1008  | 20                     | $\phi 20$                 | $\phi 22$             | Bm   | 10                | $\phi 8$                  | $\phi 16$             | 10                  | 20                    | M4    | 4     | $\phi 12$                         | 16.8             |
| S1DB 24B + 1008  | 24                     | $\phi 24$                 | $\phi 26$             | Bm   | 10                | $\phi 8$                  | $\phi 20$             | 10                  | 20                    | M4    | 4     | $\phi 12$                         | 17.5             |
| S1DB 25B + 1008  | 25                     | $\phi 25$                 | $\phi 27$             | Bm   | 10                | $\phi 8$                  | $\phi 20$             | 10                  | 20                    | M4    | 4     | $\phi 12$                         | 18.0             |
| S1DB 28B + 1010  | 28                     | $\phi 28$                 | $\phi 30$             | Bm   | 10                | $\phi 10$                 | $\phi 24$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 35.0             |
| S1DB 30B + 1010  | 30                     | $\phi 30$                 | $\phi 32$             | Bm   | 10                | $\phi 10$                 | $\phi 24$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 36.4             |
| S1DB 32B + 1010  | 32                     | $\phi 32$                 | $\phi 34$             | Bm   | 10                | $\phi 10$                 | $\phi 24$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 37.8             |
| S1DB 36B + 1010  | 36                     | $\phi 36$                 | $\phi 38$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 38.0             |
| S1DB 40B + 1010  | 40                     | $\phi 40$                 | $\phi 42$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 41.4             |
| S1DB 45B + 1010  | 45                     | $\phi 45$                 | $\phi 47$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 46.1             |
| S1DB 48B + 1010  | 48                     | $\phi 48$                 | $\phi 50$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 49.2             |
| S1DB 50B + 1010  | 50                     | $\phi 50$                 | $\phi 52$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 51.4             |
| S1DB 60B + 1010  | 60                     | $\phi 60$                 | $\phi 62$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 63.7             |
| S1DB 70B + 1010  | 70                     | $\phi 70$                 | $\phi 72$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 78.2             |
| S1DB 80B + 1010  | 80                     | $\phi 80$                 | $\phi 82$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 94.9             |
| S1DB 90B + 1010  | 90                     | $\phi 90$                 | $\phi 92$             | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 113.9            |
| S1DB 100B + 1010 | 100                    | $\phi 100$                | $\phi 102$            | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 135.1            |
| S1DB 120B + 1010 | 120                    | $\phi 120$                | $\phi 122$            | Bm   | 10                | $\phi 10$                 | $\phi 30$             | 10                  | 20                    | M4    | 4     | $\phi 16$                         | 184.1            |

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S1DB 20B + 1008  | 1.61                                                                                                     | 16.08  | 32.14  | 64.20  | 128.08 | 191.66   | 239.15   |
| S1DB 24B + 1008  | 1.93                                                                                                     | 19.29  | 38.55  | 77.00  | 153.55 | 229.66   | 286.46   |
| S1DB 25B + 1008  | 2.01                                                                                                     | 20.09  | 40.16  | 80.20  | 159.91 | 239.15   | 298.26   |
| S1DB 28B + 1010  | 2.25                                                                                                     | 22.50  | 44.97  | 89.79  | 178.97 | 267.55   | 333.59   |
| S1DB 30B + 1010  | 2.41                                                                                                     | 24.11  | 48.18  | 96.18  | 191.66 | 286.46   | 357.10   |
| S1DB 32B + 1010  | 2.57                                                                                                     | 25.72  | 51.38  | 102.57 | 204.34 | 305.33   | 380.51   |
| S1DB 36B + 1010  | 2.90                                                                                                     | 28.93  | 57.79  | 115.33 | 229.66 | 343.00   | 426.13   |
| S1DB 40B + 1010  | 3.22                                                                                                     | 32.14  | 64.20  | 128.08 | 254.94 | 380.51   | 471.31   |
| S1DB 45B + 1010  | 3.62                                                                                                     | 36.15  | 72.20  | 144.01 | 286.46 | 426.13   | 527.17   |
| S1DB 48B + 1010  | 3.86                                                                                                     | 38.55  | 77.00  | 153.55 | 305.33 | 453.29   | 560.37   |
| S1DB 50B + 1010  | 4.02                                                                                                     | 40.16  | 80.20  | 159.91 | 317.90 | 471.31   | 582.37   |
| S1DB 60B + 1010  | 4.83                                                                                                     | 48.18  | 96.18  | 191.66 | 380.51 | 560.37   | 690.72   |
| S1DB 70B + 1010  | 5.63                                                                                                     | 56.19  | 112.14 | 223.34 | 441.23 | 647.70   | 793.96   |
| S1DB 80B + 1010  | 6.43                                                                                                     | 64.20  | 128.08 | 254.94 | 501.19 | 733.18   | 892.22   |
| S1DB 90B + 1010  | 7.24                                                                                                     | 72.20  | 144.01 | 286.46 | 560.37 | 813.91   | 986.69   |
| S1DB 100B + 1010 | 8.04                                                                                                     | 80.20  | 159.91 | 317.90 | 618.78 | 892.22   | 1,073.70 |
| S1DB 120B + 1010 | 9.65                                                                                                     | 96.18  | 191.66 | 380.51 | 733.18 | 1,041.15 | 1,223.46 |





Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | Cutting          | —                      | 0.02 to 0.06 |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

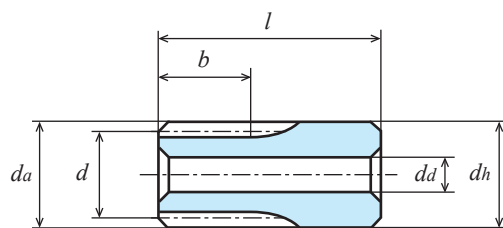
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

| Catalogue number         | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|--------------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| <b>S50BP 14K — 0803</b>  | 14                     | $\phi 7$                  | $\phi 8$              | K2   | 8                 | $\phi 3$               | $\phi 9$              | 10                  | 18                    | 1.1              |
| <b>S50BP 15K — 0803</b>  | 15                     | $\phi 7.5$                | $\phi 8.5$            | K2   | 8                 | $\phi 3$               | $\phi 9$              | 10                  | 18                    | 1.2              |
| <b>S50BP 16K — 0803</b>  | 16                     | $\phi 8$                  | $\phi 9$              | K2   | 8                 | $\phi 3$               | $\phi 9$              | 10                  | 18                    | 1.3              |
| <b>S50BP 18K — 0803</b>  | 18                     | $\phi 9$                  | $\phi 10$             | K2   | 8                 | $\phi 3$               | $\phi 10$             | 10                  | 18                    | 1.6              |
| <b>S50BP 20B — 0503</b>  | 20                     | $\phi 10$                 | $\phi 11$             | B1   | 5                 | $\phi 3$               | $\phi 8$              | 5                   | 10                    | 0.8              |
| <b>S50BP 24B — 0503</b>  | 24                     | $\phi 12$                 | $\phi 13$             | B1   | 5                 | $\phi 3$               | $\phi 10$             | 5                   | 10                    | 1.2              |
| <b>S50BP 25B — 0503</b>  | 25                     | $\phi 12.5$               | $\phi 13.5$           | B1   | 5                 | $\phi 3$               | $\phi 10$             | 5                   | 10                    | 1.3              |
| <b>S50BP 28B — 0503</b>  | 28                     | $\phi 14$                 | $\phi 15$             | B1   | 5                 | $\phi 3$               | $\phi 12$             | 5                   | 10                    | 1.8              |
| <b>S50BP 30B — 0503</b>  | 30                     | $\phi 15$                 | $\phi 16$             | B1   | 5                 | $\phi 3$               | $\phi 12$             | 5                   | 10                    | 1.9              |
| <b>S50BP 32B — 0503</b>  | 32                     | $\phi 16$                 | $\phi 17$             | B1   | 5                 | $\phi 3$               | $\phi 14$             | 5                   | 10                    | 2.4              |
| <b>S50BP 36B — 0503</b>  | 36                     | $\phi 18$                 | $\phi 19$             | B1   | 5                 | $\phi 3$               | $\phi 15$             | 5                   | 10                    | 2.9              |
| <b>S50BP 40B — 0503</b>  | 40                     | $\phi 20$                 | $\phi 21$             | B1   | 5                 | $\phi 3$               | $\phi 15$             | 5                   | 10                    | 3.3              |
| <b>S50BP 45B — 0503</b>  | 45                     | $\phi 22.5$               | $\phi 23.5$           | B1   | 5                 | $\phi 3$               | $\phi 18$             | 5                   | 10                    | 4.5              |
| <b>S50BP 50B — 0503</b>  | 50                     | $\phi 25$                 | $\phi 26$             | B1   | 5                 | $\phi 3$               | $\phi 20$             | 5                   | 10                    | 5.6              |
| <b>S50BP 56B — 0503</b>  | 56                     | $\phi 28$                 | $\phi 29$             | B1   | 5                 | $\phi 3$               | $\phi 22$             | 5                   | 10                    | 6.9              |
| <b>S50BP 60B — 0503</b>  | 60                     | $\phi 30$                 | $\phi 31$             | B1   | 5                 | $\phi 3$               | $\phi 24$             | 5                   | 10                    | 8.1              |
| <b>S50BP 64B — 0503</b>  | 64                     | $\phi 32$                 | $\phi 33$             | B1   | 5                 | $\phi 3$               | $\phi 26$             | 5                   | 10                    | 9.3              |
| <b>S50BP 70B — 0504</b>  | 70                     | $\phi 35$                 | $\phi 36$             | B1   | 5                 | $\phi 4$               | $\phi 26$             | 5                   | 10                    | 10.3             |
| <b>S50BP 72B — 0504</b>  | 72                     | $\phi 36$                 | $\phi 37$             | B1   | 5                 | $\phi 4$               | $\phi 28$             | 5                   | 10                    | 11.3             |
| <b>S50BP 80B — 0504</b>  | 80                     | $\phi 40$                 | $\phi 41$             | B1   | 5                 | $\phi 4$               | $\phi 32$             | 5                   | 10                    | 14.3             |
| <b>S50BP 90B — 0505</b>  | 90                     | $\phi 45$                 | $\phi 46$             | B1   | 5                 | $\phi 5$               | $\phi 36$             | 5                   | 10                    | 18.1             |
| <b>S50BP 100B — 0505</b> | 100                    | $\phi 50$                 | $\phi 51$             | B1   | 5                 | $\phi 5$               | $\phi 40$             | 5                   | 10                    | 22.4             |
| <b>S50BP 120B — 0505</b> | 120                    | $\phi 60$                 | $\phi 61$             | B1   | 5                 | $\phi 5$               | $\phi 50$             | 5                   | 10                    | 33.5             |

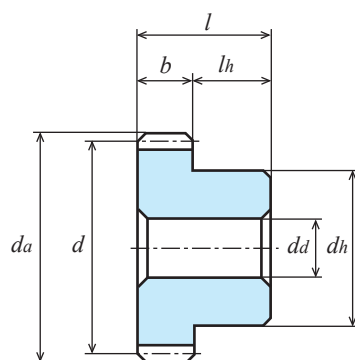




2D • 3D CAD



K2 type [-]



B1 type [-]

| Catalogue number  | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                   | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S50BP 14K — 0803  | 0.22                                                                                                     | 2.24   | 4.48   | 8.95   | 17.89  | 26.82    | 33.50    |
| S50BP 15K — 0803  | 0.24                                                                                                     | 2.40   | 4.80   | 9.59   | 19.17  | 28.73    | 35.88    |
| S50BP 16K — 0803  | 0.26                                                                                                     | 2.56   | 5.12   | 10.23  | 20.44  | 30.64    | 38.27    |
| S50BP 18K — 0803  | 0.29                                                                                                     | 2.88   | 5.76   | 11.51  | 22.99  | 34.45    | 43.03    |
| S50BP 20B — 0503  | 0.18                                                                                                     | 1.76   | 3.52   | 7.04   | 14.02  | 21.02    | 26.28    |
| S50BP 24B — 0503  | 0.22                                                                                                     | 2.22   | 4.44   | 8.86   | 17.71  | 26.56    | 33.10    |
| S50BP 25B — 0503  | 0.23                                                                                                     | 2.34   | 4.68   | 9.32   | 18.65  | 27.88    | 34.85    |
| S50BP 28B — 0503  | 0.27                                                                                                     | 2.68   | 5.37   | 10.73  | 21.40  | 32.11    | 40.02    |
| S50BP 30B — 0503  | 0.30                                                                                                     | 3.01   | 6.03   | 12.05  | 24.04  | 35.98    | 44.97    |
| S50BP 32B — 0503  | 0.33                                                                                                     | 3.25   | 6.51   | 13.02  | 25.98  | 38.88    | 48.60    |
| S50BP 36B — 0503  | 0.37                                                                                                     | 3.75   | 7.49   | 14.95  | 29.85  | 44.77    | 55.75    |
| S50BP 40B — 0503  | 0.44                                                                                                     | 4.36   | 8.71   | 17.42  | 34.72  | 51.98    | 64.87    |
| S50BP 45B — 0503  | 0.50                                                                                                     | 4.98   | 9.97   | 19.91  | 39.70  | 59.37    | 74.11    |
| S50BP 50B — 0503  | 0.56                                                                                                     | 5.61   | 11.21  | 22.40  | 44.68  | 66.85    | 83.34    |
| S50BP 56B — 0503  | 0.64                                                                                                     | 6.37   | 12.74  | 25.42  | 50.67  | 75.73    | 94.45    |
| S50BP 60B — 0503  | 0.70                                                                                                     | 7.01   | 14.02  | 27.97  | 55.71  | 83.30    | 103.79   |
| S50BP 64B — 0503  | 0.75                                                                                                     | 7.53   | 15.04  | 30.02  | 59.81  | 89.37    | 111.38   |
| S50BP 70B — 0504  | 0.83                                                                                                     | 8.30   | 16.58  | 33.10  | 65.91  | 98.43    | 122.38   |
| S50BP 72B — 0504  | 0.86                                                                                                     | 8.56   | 17.11  | 34.13  | 67.96  | 101.51   | 126.11   |
| S50BP 80B — 0504  | 0.96                                                                                                     | 9.59   | 19.16  | 38.23  | 76.12  | 113.65   | 140.74   |
| S50BP 90B — 0505  | 1.09                                                                                                     | 10.88  | 21.73  | 43.34  | 86.20  | 128.25   | 158.66   |
| S50BP 100B — 0505 | 1.24                                                                                                     | 12.35  | 24.67  | 49.20  | 97.81  | 144.96   | 179.11   |
| S50BP 120B — 0505 | 1.50                                                                                                     | 14.98  | 29.91  | 59.61  | 118.34 | 174.25   | 214.73   |



Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | Cutting          | —                      | 0.02 to 0.06 |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

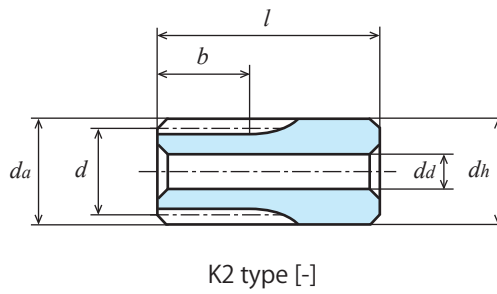
★ For details on blue POM, refer to P. 22.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

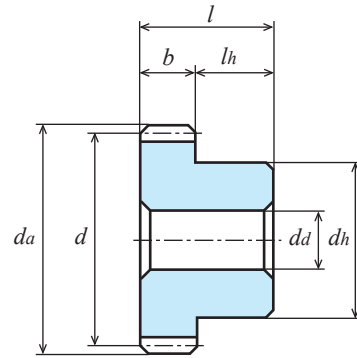
| Catalogue number         | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|--------------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| <b>S80BP 14K — 0703</b>  | 14                     | φ11.2                     | φ12.8                 | K2   | 7                 | φ3                     | φ12.8                 | 13                  | 20                    | 3.1              |
| <b>S80BP 15K — 0703</b>  | 15                     | φ12                       | φ13.6                 | K2   | 7                 | φ3                     | φ13.6                 | 13                  | 20                    | 3.6              |
| <b>S80BP 16B — 0503</b>  | 16                     | φ12.8                     | φ14.4                 | B1   | 5                 | φ3                     | φ10                   | 7                   | 12                    | 1.5              |
| <b>S80BP 18B — 0503</b>  | 18                     | φ14.4                     | φ16                   | B1   | 5                 | φ3                     | φ12                   | 7                   | 12                    | 2.1              |
| <b>S80BP 20B — 0503</b>  | 20                     | φ16                       | φ17.6                 | B1   | 5                 | φ3                     | φ12                   | 7                   | 12                    | 2.4              |
| <b>S80BP 22B — 0503</b>  | 22                     | φ17.6                     | φ19.2                 | B1   | 5                 | φ3                     | φ15                   | 7                   | 12                    | 3.3              |
| <b>S80BP 24B — 0503</b>  | 24                     | φ19.2                     | φ20.8                 | B1   | 5                 | φ3                     | φ16                   | 7                   | 12                    | 3.9              |
| <b>S80BP 25B — 0503</b>  | 25                     | φ20                       | φ21.6                 | B1   | 5                 | φ3                     | φ16                   | 7                   | 12                    | 4.1              |
| <b>S80BP 28B — 0503</b>  | 28                     | φ22.4                     | φ24                   | B1   | 5                 | φ3                     | φ20                   | 7                   | 12                    | 5.7              |
| <b>S80BP 30B — 0503</b>  | 30                     | φ24                       | φ25.6                 | B1   | 5                 | φ3                     | φ20                   | 7                   | 12                    | 6.1              |
| <b>S80BP 32B — 0503</b>  | 32                     | φ25.6                     | φ27.2                 | B1   | 5                 | φ3                     | φ20                   | 7                   | 12                    | 6.6              |
| <b>S80BP 36B — 0504</b>  | 36                     | φ28.8                     | φ30.4                 | B1   | 5                 | φ4                     | φ22                   | 7                   | 12                    | 8.1              |
| <b>S80BP 40B — 0504</b>  | 40                     | φ32                       | φ33.6                 | B1   | 5                 | φ4                     | φ22                   | 7                   | 12                    | 9.2              |
| <b>S80BP 45B — 0504</b>  | 45                     | φ36                       | φ37.6                 | B1   | 5                 | φ4                     | φ28                   | 7                   | 12                    | 13.0             |
| <b>S80BP 48B — 0504</b>  | 48                     | φ38.4                     | φ40                   | B1   | 5                 | φ4                     | φ30                   | 7                   | 12                    | 14.9             |
| <b>S80BP 50B — 0504</b>  | 50                     | φ40                       | φ41.6                 | B1   | 5                 | φ4                     | φ30                   | 7                   | 12                    | 15.6             |
| <b>S80BP 56B — 0504</b>  | 56                     | φ44.8                     | φ46.4                 | B1   | 5                 | φ4                     | φ35                   | 7                   | 12                    | 20.4             |
| <b>S80BP 60B — 0504</b>  | 60                     | φ48                       | φ49.6                 | B1   | 5                 | φ4                     | φ38                   | 7                   | 12                    | 23.7             |
| <b>S80BP 64B — 0504</b>  | 64                     | φ51.2                     | φ52.8                 | B1   | 5                 | φ4                     | φ38                   | 7                   | 12                    | 25.4             |
| <b>S80BP 70B — 0505</b>  | 70                     | φ56                       | φ57.6                 | B1   | 5                 | φ5                     | φ42                   | 7                   | 12                    | 30.6             |
| <b>S80BP 72B — 0505</b>  | 72                     | φ57.6                     | φ59.2                 | B1   | 5                 | φ5                     | φ45                   | 7                   | 12                    | 33.7             |
| <b>S80BP 80B — 0505</b>  | 80                     | φ64                       | φ65.6                 | B1   | 5                 | φ5                     | φ50                   | 7                   | 12                    | 41.7             |
| <b>S80BP 90B — 0505</b>  | 90                     | φ72                       | φ73.6                 | B1   | 5                 | φ5                     | φ54                   | 7                   | 12                    | 50.9             |
| <b>S80BP 100B — 0505</b> | 100                    | φ80                       | φ81.6                 | B1   | 5                 | φ5                     | φ58                   | 7                   | 12                    | 61.1             |
| <b>S80BP 120B — 0505</b> | 120                    | φ96                       | φ97.6                 | B1   | 5                 | φ5                     | φ68                   | 7                   | 12                    | 86.4             |



2D • 3D CAD



K2 type [-]



B1 type [-]

| Catalogue number  | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                   | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S80BP 14K — 0703  | 0.50                                                                                                     | 5.02   | 10.03  | 20.05  | 40.04  | 59.98    | 74.90    |
| S80BP 15K — 0703  | 0.54                                                                                                     | 5.37   | 10.75  | 21.48  | 42.89  | 64.24    | 80.22    |
| S80BP 16B — 0503  | 0.41                                                                                                     | 4.10   | 8.19   | 16.36  | 32.67  | 48.93    | 61.10    |
| S80BP 18B — 0503  | 0.46                                                                                                     | 4.61   | 9.21   | 18.40  | 36.74  | 55.02    | 68.68    |
| S80BP 20B — 0503  | 0.51                                                                                                     | 5.12   | 10.23  | 20.44  | 40.81  | 61.10    | 76.26    |
| S80BP 22B — 0503  | 0.56                                                                                                     | 5.63   | 11.25  | 22.48  | 44.87  | 67.17    | 83.83    |
| S80BP 24B — 0503  | 0.61                                                                                                     | 6.14   | 12.28  | 24.52  | 48.93  | 73.23    | 91.38    |
| S80BP 25B — 0503  | 0.64                                                                                                     | 6.40   | 12.79  | 25.54  | 50.96  | 76.26    | 95.15    |
| S80BP 28B — 0503  | 0.72                                                                                                     | 7.16   | 14.32  | 28.60  | 57.05  | 85.34    | 106.46   |
| S80BP 30B — 0503  | 0.77                                                                                                     | 7.68   | 15.34  | 30.64  | 61.10  | 91.38    | 113.98   |
| S80BP 32B — 0503  | 0.82                                                                                                     | 8.19   | 16.36  | 32.67  | 65.14  | 97.41    | 121.49   |
| S80BP 36B — 0504  | 0.92                                                                                                     | 9.21   | 18.40  | 36.74  | 73.23  | 109.47   | 136.47   |
| S80BP 40B — 0504  | 1.02                                                                                                     | 10.23  | 20.44  | 40.81  | 81.30  | 121.49   | 151.40   |
| S80BP 45B — 0504  | 1.15                                                                                                     | 11.51  | 22.99  | 45.89  | 91.38  | 136.47   | 169.55   |
| S80BP 48B — 0504  | 1.23                                                                                                     | 12.28  | 24.52  | 48.93  | 97.41  | 145.44   | 180.36   |
| S80BP 50B — 0504  | 1.28                                                                                                     | 12.79  | 25.54  | 50.96  | 101.44 | 151.40   | 187.53   |
| S80BP 56B — 0504  | 1.43                                                                                                     | 14.32  | 28.60  | 57.05  | 113.48 | 168.83   | 208.87   |
| S80BP 60B — 0504  | 1.54                                                                                                     | 15.34  | 30.64  | 61.10  | 121.49 | 180.36   | 222.96   |
| S80BP 64B — 0504  | 1.64                                                                                                     | 16.36  | 32.67  | 65.14  | 129.49 | 191.81   | 236.94   |
| S80BP 70B — 0505  | 1.79                                                                                                     | 17.89  | 35.73  | 71.21  | 141.46 | 208.87   | 257.71   |
| S80BP 72B — 0505  | 1.84                                                                                                     | 18.40  | 36.74  | 73.23  | 145.44 | 214.52   | 264.58   |
| S80BP 80B — 0505  | 2.05                                                                                                     | 20.44  | 40.81  | 81.30  | 161.10 | 236.94   | 291.72   |
| S80BP 90B — 0505  | 2.30                                                                                                     | 22.99  | 45.89  | 91.38  | 180.36 | 264.58   | 323.84   |
| S80BP 100B — 0505 | 2.56                                                                                                     | 25.54  | 50.96  | 101.44 | 199.41 | 291.72   | 355.00   |
| S80BP 120B — 0505 | 3.07                                                                                                     | 30.64  | 61.10  | 121.49 | 236.94 | 342.65   | 414.26   |



Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | Cutting          | —                      | 0.06 to 0.12 |

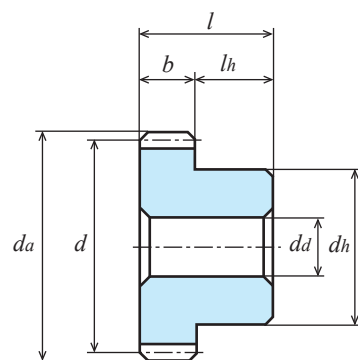
★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

② Accuracy at the time of manufacture.



B1 type [-]

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$dd$ | Hub diameter<br>$dh$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|-----------------------|----------------------|---------------------|-----------------------|------------------|
| S1BP 12B — 1004  | 12                     | $\phi 12$                 | $\phi 14$             | B1   | 10                | $\phi 4$              | $\phi 8$             | 10                  | 20                    | 1.9              |
| S1BP 14B — 1004  | 14                     | $\phi 14$                 | $\phi 16$             | B1   | 10                | $\phi 4$              | $\phi 10$            | 10                  | 20                    | 2.9              |
| S1BP 15B — 1004  | 15                     | $\phi 15$                 | $\phi 17$             | B1   | 10                | $\phi 4$              | $\phi 10$            | 10                  | 20                    | 3.2              |
| S1BP 16B — 1004  | 16                     | $\phi 16$                 | $\phi 18$             | B1   | 10                | $\phi 4$              | $\phi 12$            | 10                  | 20                    | 4.0              |
| S1BP 17B — 1004  | 17                     | $\phi 17$                 | $\phi 19$             | B1   | 10                | $\phi 4$              | $\phi 14$            | 10                  | 20                    | 5.0              |
| S1BP 18B — 1004  | 18                     | $\phi 18$                 | $\phi 20$             | B1   | 10                | $\phi 4$              | $\phi 15$            | 10                  | 20                    | 5.7              |
| S1BP 20B — 1005  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 10                | $\phi 5$              | $\phi 16$            | 10                  | 20                    | 6.6              |
| S1BP 22B — 1005  | 22                     | $\phi 22$                 | $\phi 24$             | B1   | 10                | $\phi 5$              | $\phi 18$            | 10                  | 20                    | 8.3              |
| S1BP 23B — 1005  | 23                     | $\phi 23$                 | $\phi 25$             | B1   | 10                | $\phi 5$              | $\phi 20$            | 10                  | 20                    | 9.7              |
| S1BP 24B — 1005  | 24                     | $\phi 24$                 | $\phi 26$             | B1   | 10                | $\phi 5$              | $\phi 20$            | 10                  | 20                    | 10.2             |
| S1BP 25B — 1005  | 25                     | $\phi 25$                 | $\phi 27$             | B1   | 10                | $\phi 5$              | $\phi 22$            | 10                  | 20                    | 11.6             |
| S1BP 26B — 1005  | 26                     | $\phi 26$                 | $\phi 28$             | B1   | 10                | $\phi 5$              | $\phi 22$            | 10                  | 20                    | 12.2             |
| S1BP 28B — 1005  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 10                | $\phi 5$              | $\phi 24$            | 10                  | 20                    | 14.4             |
| S1BP 30B — 1005  | 30                     | $\phi 30$                 | $\phi 32$             | B1   | 10                | $\phi 5$              | $\phi 24$            | 10                  | 20                    | 15.7             |
| S1BP 32B — 1005  | 32                     | $\phi 32$                 | $\phi 34$             | B1   | 10                | $\phi 5$              | $\phi 24$            | 10                  | 20                    | 17.1             |
| S1BP 34B — 1005  | 34                     | $\phi 34$                 | $\phi 36$             | B1   | 10                | $\phi 5$              | $\phi 24$            | 10                  | 20                    | 18.5             |
| S1BP 35B — 1005  | 35                     | $\phi 35$                 | $\phi 37$             | B1   | 10                | $\phi 5$              | $\phi 24$            | 10                  | 20                    | 19.3             |
| S1BP 36B — 1005  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 10                | $\phi 5$              | $\phi 26$            | 10                  | 20                    | 21.2             |
| S1BP 38B — 1005  | 38                     | $\phi 38$                 | $\phi 40$             | B1   | 10                | $\phi 5$              | $\phi 28$            | 10                  | 20                    | 24.0             |
| S1BP 40B — 1005  | 40                     | $\phi 40$                 | $\phi 42$             | B1   | 10                | $\phi 5$              | $\phi 30$            | 10                  | 20                    | 27.0             |
| S1BP 42B — 1005  | 42                     | $\phi 42$                 | $\phi 44$             | B1   | 10                | $\phi 5$              | $\phi 30$            | 10                  | 20                    | 28.8             |
| S1BP 44B — 1005  | 44                     | $\phi 44$                 | $\phi 46$             | B1   | 10                | $\phi 5$              | $\phi 32$            | 10                  | 20                    | 32.1             |
| S1BP 45B — 1005  | 45                     | $\phi 45$                 | $\phi 47$             | B1   | 10                | $\phi 5$              | $\phi 32$            | 10                  | 20                    | 33.1             |
| S1BP 48B — 1005  | 48                     | $\phi 48$                 | $\phi 50$             | B1   | 10                | $\phi 5$              | $\phi 36$            | 10                  | 20                    | 39.2             |
| S1BP 50B — 1005  | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 10                | $\phi 5$              | $\phi 36$            | 10                  | 20                    | 41.4             |
| S1BP 52B — 1005  | 52                     | $\phi 52$                 | $\phi 54$             | B1   | 10                | $\phi 5$              | $\phi 40$            | 10                  | 20                    | 47.0             |
| S1BP 55B — 1005  | 55                     | $\phi 55$                 | $\phi 57$             | B1   | 10                | $\phi 5$              | $\phi 40$            | 10                  | 20                    | 50.5             |
| S1BP 56B — 1005  | 56                     | $\phi 56$                 | $\phi 58$             | B1   | 10                | $\phi 5$              | $\phi 40$            | 10                  | 20                    | 51.7             |
| S1BP 60B — 1005  | 60                     | $\phi 60$                 | $\phi 62$             | B1   | 10                | $\phi 5$              | $\phi 46$            | 10                  | 20                    | 62.6             |
| S1BP 64B — 1005  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 10                | $\phi 5$              | $\phi 48$            | 10                  | 20                    | 70.2             |
| S1BP 65B — 1005  | 65                     | $\phi 65$                 | $\phi 67$             | B1   | 10                | $\phi 5$              | $\phi 48$            | 10                  | 20                    | 71.6             |
| S1BP 70B — 1005  | 70                     | $\phi 70$                 | $\phi 72$             | B1   | 10                | $\phi 5$              | $\phi 52$            | 10                  | 20                    | 83.5             |
| S1BP 72B — 1005  | 72                     | $\phi 72$                 | $\phi 74$             | B1   | 10                | $\phi 5$              | $\phi 52$            | 10                  | 20                    | 86.6             |
| S1BP 75B — 1005  | 75                     | $\phi 75$                 | $\phi 77$             | B1   | 10                | $\phi 5$              | $\phi 52$            | 10                  | 20                    | 91.5             |
| S1BP 80B — 1005  | 80                     | $\phi 80$                 | $\phi 82$             | B1   | 10                | $\phi 5$              | $\phi 58$            | 10                  | 20                    | 107.4            |
| S1BP 85B — 1005  | 85                     | $\phi 85$                 | $\phi 87$             | B1   | 10                | $\phi 5$              | $\phi 62$            | 10                  | 20                    | 121.8            |
| S1BP 90B — 1005  | 90                     | $\phi 90$                 | $\phi 92$             | B1   | 10                | $\phi 5$              | $\phi 65$            | 10                  | 20                    | 135.7            |
| S1BP 100B — 1005 | 100                    | $\phi 100$                | $\phi 102$            | B1   | 10                | $\phi 5$              | $\phi 70$            | 10                  | 20                    | 164.0            |
| S1BP 120B — 1005 | 120                    | $\phi 120$                | $\phi 122$            | B1   | 10                | $\phi 5$              | $\phi 84$            | 10                  | 20                    | 236.8            |



2D • 3D CAD

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

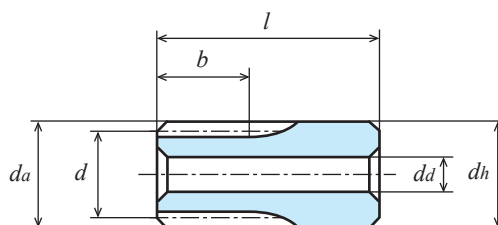
MITER GEARS

BEVEL GEARS

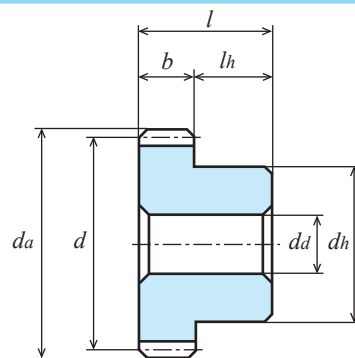
WORMS AND WORM  
WHEELS

REFERENCES

| Catalogue number        | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                         | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S1BP 12B – 1004</b>  | 0.73                                                                                                     | 7.27   | 14.53  | 29.03  | 57.98  | 86.86    | 108.43   |
| <b>S1BP 14B – 1004</b>  | 0.97                                                                                                     | 9.67   | 19.34  | 38.64  | 77.13  | 115.58   | 144.19   |
| <b>S1BP 15B – 1004</b>  | 1.07                                                                                                     | 10.69  | 21.36  | 42.67  | 85.20  | 127.57   | 159.18   |
| <b>S1BP 16B – 1004</b>  | 1.17                                                                                                     | 11.70  | 23.39  | 46.75  | 93.26  | 139.67   | 174.30   |
| <b>S1BP 17B – 1004</b>  | 1.27                                                                                                     | 12.72  | 25.43  | 50.82  | 101.41 | 151.77   | 189.43   |
| <b>S1BP 18B – 1004</b>  | 1.38                                                                                                     | 13.75  | 27.48  | 54.89  | 109.93 | 163.98   | 204.70   |
| <b>S1BP 20B – 1005</b>  | 1.61                                                                                                     | 16.08  | 32.14  | 64.20  | 128.08 | 191.66   | 239.15   |
| <b>S1BP 22B – 1005</b>  | 1.69                                                                                                     | 16.90  | 33.79  | 67.47  | 134.58 | 201.34   | 251.27   |
| <b>S1BP 23B – 1005</b>  | 1.79                                                                                                     | 17.88  | 35.75  | 71.38  | 142.41 | 212.98   | 265.69   |
| <b>S1BP 24B – 1005</b>  | 1.93                                                                                                     | 19.29  | 38.55  | 77.00  | 153.55 | 229.66   | 286.46   |
| <b>S1BP 25B – 1005</b>  | 2.01                                                                                                     | 20.09  | 40.16  | 80.20  | 159.91 | 239.15   | 298.26   |
| <b>S1BP 26B – 1005</b>  | 2.09                                                                                                     | 20.85  | 41.67  | 83.20  | 165.91 | 248.12   | 309.35   |
| <b>S1BP 28B – 1005</b>  | 2.25                                                                                                     | 22.50  | 44.97  | 89.79  | 178.97 | 267.55   | 333.59   |
| <b>S1BP 30B – 1005</b>  | 2.41                                                                                                     | 24.11  | 48.18  | 96.18  | 191.66 | 286.46   | 357.10   |
| <b>S1BP 32B – 1005</b>  | 2.57                                                                                                     | 25.72  | 51.38  | 102.57 | 204.34 | 305.33   | 380.51   |
| <b>S1BP 34B – 1005</b>  | 2.70                                                                                                     | 26.95  | 53.85  | 107.49 | 214.05 | 319.79   | 397.97   |
| <b>S1BP 35B – 1005</b>  | 2.79                                                                                                     | 27.89  | 55.71  | 111.21 | 221.48 | 330.81   | 411.27   |
| <b>S1BP 36B – 1005</b>  | 2.90                                                                                                     | 28.93  | 57.79  | 115.33 | 229.66 | 343.00   | 426.13   |
| <b>S1BP 38B – 1005</b>  | 3.08                                                                                                     | 30.81  | 61.54  | 122.80 | 244.47 | 365.10   | 452.84   |
| <b>S1BP 40B – 1005</b>  | 3.22                                                                                                     | 32.14  | 64.20  | 128.08 | 254.94 | 380.51   | 471.31   |
| <b>S1BP 42B – 1005</b>  | 3.37                                                                                                     | 33.63  | 67.18  | 134.02 | 266.69 | 397.56   | 492.13   |
| <b>S1BP 44B – 1005</b>  | 3.55                                                                                                     | 35.47  | 70.85  | 141.33 | 281.12 | 418.48   | 517.82   |
| <b>S1BP 45B – 1005</b>  | 3.62                                                                                                     | 36.15  | 72.20  | 144.01 | 286.46 | 426.13   | 527.17   |
| <b>S1BP 48B – 1005</b>  | 3.86                                                                                                     | 38.55  | 77.00  | 153.55 | 305.33 | 453.29   | 560.37   |
| <b>S1BP 50B – 1005</b>  | 4.02                                                                                                     | 40.16  | 80.20  | 159.91 | 317.90 | 471.31   | 582.37   |
| <b>S1BP 52B – 1005</b>  | 4.23                                                                                                     | 42.24  | 84.34  | 168.16 | 334.21 | 494.80   | 611.04   |
| <b>S1BP 55B – 1005</b>  | 4.44                                                                                                     | 44.33  | 88.52  | 176.47 | 350.57 | 518.00   | 639.24   |
| <b>S1BP 56B – 1005</b>  | 4.50                                                                                                     | 44.97  | 89.79  | 178.97 | 355.53 | 524.95   | 647.70   |
| <b>S1BP 60B – 1005</b>  | 4.83                                                                                                     | 48.18  | 96.18  | 191.66 | 380.51 | 560.37   | 690.72   |
| <b>S1BP 64B – 1005</b>  | 5.15                                                                                                     | 51.38  | 102.57 | 204.34 | 404.89 | 595.51   | 733.18   |
| <b>S1BP 65B – 1005</b>  | 5.21                                                                                                     | 52.04  | 103.88 | 206.95 | 409.86 | 602.58   | 741.37   |
| <b>S1BP 70B – 1005</b>  | 5.63                                                                                                     | 56.19  | 112.14 | 223.34 | 441.23 | 647.70   | 793.96   |
| <b>S1BP 72B – 1005</b>  | 5.79                                                                                                     | 57.79  | 115.33 | 229.66 | 453.29 | 664.96   | 813.91   |
| <b>S1BP 75B – 1005</b>  | 6.09                                                                                                     | 60.81  | 121.35 | 241.59 | 476.17 | 697.85   | 852.23   |
| <b>S1BP 80B – 1005</b>  | 6.43                                                                                                     | 64.20  | 128.08 | 254.94 | 501.19 | 733.18   | 892.22   |
| <b>S1BP 85B – 1005</b>  | 6.76                                                                                                     | 67.47  | 134.59 | 267.82 | 525.20 | 765.57   | 929.90   |
| <b>S1BP 90B – 1005</b>  | 7.24                                                                                                     | 72.20  | 144.01 | 286.46 | 560.37 | 813.91   | 986.69   |
| <b>S1BP 100B – 1005</b> | 8.04                                                                                                     | 80.20  | 159.91 | 317.90 | 618.78 | 892.22   | 1073.70  |
| <b>S1BP 120B – 1005</b> | 9.65                                                                                                     | 96.18  | 191.66 | 380.51 | 733.18 | 1041.15  | 1223.46  |



K2 type [-]



B1 type [-]

Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | Cutting          | —                      | 0.09 to 0.18 |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| <b>S1.5BP 14K—1806</b> | 14                     | φ21                       | φ24                   | K2   | 18                | φ 6                    | φ24                   | 22                  | 40                    | 21.0             |
| <b>S1.5BP 15B—1506</b> | 15                     | φ22.5                     | φ25.5                 | B1   | 15                | φ 6                    | φ18                   | 15                  | 30                    | 12.4             |
| <b>S1.5BP 16B—1506</b> | 16                     | φ24                       | φ27                   | B1   | 15                | φ 6                    | φ18                   | 15                  | 30                    | 13.6             |
| <b>S1.5BP 18B—1508</b> | 18                     | φ27                       | φ30                   | B1   | 15                | φ 8                    | φ20                   | 15                  | 30                    | 16.4             |
| <b>S1.5BP 20B—1508</b> | 20                     | φ30                       | φ33                   | B1   | 15                | φ 8                    | φ22                   | 15                  | 30                    | 20.6             |
| <b>S1.5BP 22B—1508</b> | 22                     | φ33                       | φ36                   | B1   | 15                | φ 8                    | φ24                   | 15                  | 30                    | 25.3             |
| <b>S1.5BP 24B—1508</b> | 24                     | φ36                       | φ39                   | B1   | 15                | φ 8                    | φ24                   | 15                  | 30                    | 28.7             |
| <b>S1.5BP 25B—1508</b> | 25                     | φ37.5                     | φ40.5                 | B1   | 15                | φ 8                    | φ28                   | 15                  | 30                    | 32.8             |
| <b>S1.5BP 26B—1508</b> | 26                     | φ39                       | φ42                   | B1   | 15                | φ 8                    | φ28                   | 15                  | 30                    | 35.9             |
| <b>S1.5BP 28B—1508</b> | 28                     | φ42                       | φ45                   | B1   | 15                | φ 8                    | φ30                   | 15                  | 30                    | 41.8             |
| <b>S1.5BP 30B—1508</b> | 30                     | φ45                       | φ48                   | B1   | 15                | φ 8                    | φ32                   | 15                  | 30                    | 48.2             |
| <b>S1.5BP 32B—1508</b> | 32                     | φ48                       | φ51                   | B1   | 15                | φ 8                    | φ35                   | 15                  | 30                    | 56.2             |
| <b>S1.5BP 35B—1508</b> | 35                     | φ52.5                     | φ55.5                 | B1   | 15                | φ 8                    | φ40                   | 15                  | 30                    | 69.9             |
| <b>S1.5BP 36B—1508</b> | 36                     | φ54                       | φ57                   | B1   | 15                | φ 8                    | φ40                   | 15                  | 30                    | 72.5             |
| <b>S1.5BP 40B—1510</b> | 40                     | φ60                       | φ63                   | B1   | 15                | φ10                    | φ45                   | 15                  | 30                    | 89.7             |
| <b>S1.5BP 45B—1510</b> | 45                     | φ67.5                     | φ70.5                 | B1   | 15                | φ10                    | φ50                   | 15                  | 30                    | 113.5            |
| <b>S1.5BP 48B—1510</b> | 48                     | φ72                       | φ75                   | B1   | 15                | φ10                    | φ55                   | 15                  | 30                    | 132.6            |
| <b>S1.5BP 50B—1510</b> | 50                     | φ75                       | φ78                   | B1   | 15                | φ10                    | φ55                   | 15                  | 30                    | 139.9            |
| <b>S1.5BP 55B—1510</b> | 55                     | φ82.5                     | φ85.5                 | B1   | 15                | φ10                    | φ60                   | 15                  | 30                    | 136.8            |
| <b>S1.5BP 56B—1510</b> | 56                     | φ84                       | φ87                   | B1   | 15                | φ10                    | φ60                   | 15                  | 30                    | 173.2            |
| <b>S1.5BP 60B—1510</b> | 60                     | φ90                       | φ93                   | B1   | 15                | φ10                    | φ65                   | 15                  | 30                    | 200.9            |

| Catalogue number       | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                        | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S1.5BP 14K—1806</b> | 1.43                                                                                                     | 14.29  | 28.57  | 57.06  | 113.82 | 170.38   | 212.54   |
| <b>S1.5BP 15B—1506</b> | 1.58                                                                                                     | 15.79  | 31.55  | 63.01  | 125.73 | 188.06   | 234.53   |
| <b>S1.5BP 16B—1506</b> | 1.73                                                                                                     | 17.29  | 34.55  | 69.02  | 137.63 | 205.83   | 256.74   |
| <b>S1.5BP 18B—1508</b> | 2.03                                                                                                     | 20.31  | 40.59  | 81.07  | 161.61 | 241.63   | 301.27   |
| <b>S1.5BP 20B—1508</b> | 2.34                                                                                                     | 23.38  | 46.72  | 93.27  | 185.89 | 277.78   | 346.35   |
| <b>S1.5BP 22B—1508</b> | 2.65                                                                                                     | 26.45  | 52.85  | 105.49 | 210.11 | 313.93   | 390.88   |
| <b>S1.5BP 24B—1508</b> | 2.96                                                                                                     | 29.53  | 58.99  | 117.72 | 234.45 | 350.08   | 434.97   |
| <b>S1.5BP 25B—1508</b> | 3.11                                                                                                     | 31.07  | 62.07  | 123.88 | 246.64 | 368.29   | 456.96   |
| <b>S1.5BP 26B—1508</b> | 3.27                                                                                                     | 32.62  | 65.16  | 130.04 | 258.84 | 386.41   | 478.95   |
| <b>S1.5BP 28B—1508</b> | 3.58                                                                                                     | 35.73  | 71.37  | 142.38 | 283.29 | 422.30   | 522.82   |
| <b>S1.5BP 30B—1508</b> | 4.02                                                                                                     | 40.11  | 80.10  | 159.80 | 317.83 | 472.79   | 584.94   |
| <b>S1.5BP 32B—1508</b> | 4.34                                                                                                     | 43.33  | 86.54  | 172.58 | 343.16 | 509.38   | 629.80   |
| <b>S1.5BP 35B—1508</b> | 4.82                                                                                                     | 48.17  | 96.18  | 191.78 | 381.11 | 564.09   | 696.54   |
| <b>S1.5BP 36B—1508</b> | 4.99                                                                                                     | 49.79  | 99.41  | 198.18 | 393.77 | 582.21   | 718.75   |
| <b>S1.5BP 40B—1510</b> | 5.80                                                                                                     | 57.95  | 115.70 | 230.55 | 457.75 | 674.13   | 830.90   |
| <b>S1.5BP 45B—1510</b> | 6.64                                                                                                     | 66.26  | 132.26 | 263.44 | 521.14 | 765.61   | 940.19   |
| <b>S1.5BP 48B—1510</b> | 7.14                                                                                                     | 71.28  | 142.25 | 283.26 | 559.08 | 820.15   | 1003.96  |
| <b>S1.5BP 50B—1510</b> | 7.48                                                                                                     | 74.63  | 148.92 | 296.49 | 584.35 | 856.39   | 1045.85  |
| <b>S1.5BP 55B—1510</b> | 8.32                                                                                                     | 83.00  | 165.59 | 329.53 | 647.04 | 944.88   | 1148.77  |
| <b>S1.5BP 56B—1510</b> | 8.49                                                                                                     | 84.68  | 168.93 | 336.16 | 659.53 | 962.12   | 1169.00  |
| <b>S1.5BP 60B—1510</b> | 9.34                                                                                                     | 93.16  | 185.82 | 369.61 | 723.04 | 1049.29  | 1273.12  |





Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | Cutting          | —                      | 0.12 to 0.24 |

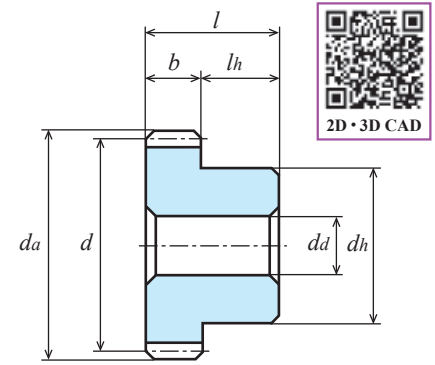
★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

② Accuracy at the time of manufacture.



B1 type [-]

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| S2BP 12B — 2008  | 12                     | $\phi 24$                 | $\phi 28$             | B1   | 20                | $\phi 8$               | $\phi 18$             | 20                  | 40                    | 16.7             |
| S2BP 13B — 2008  | 13                     | $\phi 26$                 | $\phi 30$             | B1   | 20                | $\phi 8$               | $\phi 20$             | 20                  | 40                    | 20.6             |
| S2BP 14B — 2008  | 14                     | $\phi 28$                 | $\phi 32$             | B1   | 20                | $\phi 8$               | $\phi 20$             | 20                  | 40                    | 23.0             |
| S2BP 15B — 2008  | 15                     | $\phi 30$                 | $\phi 34$             | B1   | 20                | $\phi 8$               | $\phi 22$             | 20                  | 40                    | 27.4             |
| S2BP 16B — 2010  | 16                     | $\phi 32$                 | $\phi 36$             | B1   | 20                | $\phi 10$              | $\phi 24$             | 20                  | 40                    | 30.5             |
| S2BP 18B — 2010  | 18                     | $\phi 36$                 | $\phi 40$             | B1   | 20                | $\phi 10$              | $\phi 30$             | 20                  | 40                    | 43.7             |
| S2BP 20B — 2010  | 20                     | $\phi 40$                 | $\phi 44$             | B1   | 20                | $\phi 10$              | $\phi 30$             | 20                  | 40                    | 50.4             |
| S2BP 22B — 2010  | 22                     | $\phi 44$                 | $\phi 48$             | B1   | 20                | $\phi 10$              | $\phi 32$             | 20                  | 40                    | 60.6             |
| S2BP 24B — 2010  | 24                     | $\phi 48$                 | $\phi 52$             | B1   | 20                | $\phi 10$              | $\phi 36$             | 20                  | 40                    | 74.7             |
| S2BP 25B — 2010  | 25                     | $\phi 50$                 | $\phi 54$             | B1   | 20                | $\phi 10$              | $\phi 36$             | 20                  | 40                    | 79.0             |
| S2BP 26B — 2010  | 26                     | $\phi 52$                 | $\phi 56$             | B1   | 20                | $\phi 10$              | $\phi 40$             | 20                  | 40                    | 90.2             |
| S2BP 28B — 2010  | 28                     | $\phi 56$                 | $\phi 60$             | B1   | 20                | $\phi 10$              | $\phi 40$             | 20                  | 40                    | 99.8             |
| S2BP 30B — 2010  | 30                     | $\phi 60$                 | $\phi 64$             | B1   | 20                | $\phi 10$              | $\phi 45$             | 20                  | 40                    | 119.4            |
| S2BP 32B — 2012  | 32                     | $\phi 64$                 | $\phi 68$             | B1   | 20                | $\phi 12$              | $\phi 45$             | 20                  | 40                    | 128.4            |
| S2BP 35B — 2012  | 35                     | $\phi 70$                 | $\phi 74$             | B1   | 20                | $\phi 12$              | $\phi 55$             | 20                  | 40                    | 168.3            |
| S2BP 36B — 2012  | 36                     | $\phi 72$                 | $\phi 76$             | B1   | 20                | $\phi 12$              | $\phi 55$             | 20                  | 40                    | 174.6            |
| S2BP 40B — 2012  | 40                     | $\phi 80$                 | $\phi 84$             | B1   | 20                | $\phi 12$              | $\phi 60$             | 20                  | 40                    | 214.2            |
| S2BP 45B — 2012  | 45                     | $\phi 90$                 | $\phi 94$             | B1   | 20                | $\phi 12$              | $\phi 65$             | 20                  | 40                    | 265.6            |
| S2BP 48B — 2012  | 48                     | $\phi 96$                 | $\phi 100$            | B1   | 20                | $\phi 12$              | $\phi 70$             | 20                  | 40                    | 305.2            |
| S2BP 50B — 2012  | 50                     | $\phi 100$                | $\phi 104$            | B1   | 20                | $\phi 12$              | $\phi 75$             | 20                  | 40                    | 338.6            |
| S2BP 55B — 2012  | 55                     | $\phi 110$                | $\phi 114$            | B1   | 20                | $\phi 12$              | $\phi 80$             | 20                  | 40                    | 402.2            |
| S2BP 56B — 2012  | 56                     | $\phi 112$                | $\phi 116$            | B1   | 20                | $\phi 12$              | $\phi 85$             | 20                  | 40                    | 430.3            |
| S2BP 60B — 2012  | 60                     | $\phi 120$                | $\phi 124$            | B1   | 20                | $\phi 12$              | $\phi 90$             | 20                  | 40                    | 490.7            |

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S2BP 12B — 2008  | 1.99                                                                                                     | 19.85  | 39.67  | 79.22  | 158.00 | 236.32   | 294.74   |
| S2BP 13B — 2008  | 2.30                                                                                                     | 22.95  | 45.87  | 91.61  | 182.58 | 273.07   | 340.58   |
| S2BP 14B — 2008  | 2.48                                                                                                     | 24.83  | 49.61  | 99.05  | 197.44 | 295.16   | 368.01   |
| S2BP 15B — 2008  | 2.66                                                                                                     | 26.60  | 53.15  | 106.10 | 211.44 | 316.01   | 393.94   |
| S2BP 16B — 2010  | 2.84                                                                                                     | 28.37  | 56.68  | 113.15 | 225.43 | 336.84   | 419.77   |
| S2BP 18B — 2010  | 3.19                                                                                                     | 31.91  | 63.75  | 127.23 | 253.36 | 378.39   | 470.09   |
| S2BP 20B — 2010  | 3.55                                                                                                     | 35.45  | 70.82  | 141.30 | 281.24 | 419.77   | 519.94   |
| S2BP 22B — 2010  | 3.83                                                                                                     | 38.27  | 76.42  | 152.51 | 303.28 | 451.62   | 558.79   |
| S2BP 24B — 2010  | 4.26                                                                                                     | 42.53  | 84.94  | 169.40 | 336.84 | 500.06   | 618.19   |
| S2BP 25B — 2010  | 4.44                                                                                                     | 44.30  | 88.47  | 176.41 | 350.70 | 519.94   | 642.45   |
| S2BP 26B — 2010  | 4.76                                                                                                     | 47.49  | 94.84  | 189.00 | 375.82 | 556.38   | 686.84   |
| S2BP 28B — 2010  | 4.97                                                                                                     | 49.61  | 99.05  | 197.44 | 392.21 | 579.12   | 714.53   |
| S2BP 30B — 2010  | 5.32                                                                                                     | 53.15  | 106.10 | 211.44 | 419.77 | 618.19   | 761.98   |
| S2BP 32B — 2012  | 5.68                                                                                                     | 56.68  | 113.15 | 225.43 | 446.67 | 656.95   | 808.83   |
| S2BP 35B — 2012  | 6.21                                                                                                     | 61.99  | 123.71 | 246.38 | 486.76 | 714.53   | 875.88   |
| S2BP 36B — 2012  | 6.39                                                                                                     | 63.75  | 127.23 | 253.36 | 500.06 | 733.57   | 897.89   |
| S2BP 40B — 2012  | 7.10                                                                                                     | 70.82  | 141.30 | 281.24 | 552.90 | 808.83   | 984.27   |
| S2BP 45B — 2012  | 7.98                                                                                                     | 79.65  | 158.87 | 316.01 | 618.19 | 897.89   | 1088.49  |
| S2BP 48B — 2012  | 8.52                                                                                                     | 84.94  | 169.40 | 336.84 | 656.95 | 950.04   | 1148.58  |
| S2BP 50B — 2012  | 8.87                                                                                                     | 88.47  | 176.41 | 350.70 | 682.63 | 984.27   | 1184.49  |
| S2BP 55B — 2012  | 9.65                                                                                                     | 96.17  | 191.80 | 381.11 | 737.95 | 1055.63  | 1255.42  |
| S2BP 56B — 2012  | 9.94                                                                                                     | 99.05  | 197.44 | 392.21 | 758.83 | 1084.40  | 1286.48  |
| S2BP 60B — 2012  | 10.64                                                                                                    | 106.10 | 211.44 | 419.77 | 808.83 | 1148.58  | 1349.70  |



Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Machining method | Tooth surface hardness | Backlash ①  |
|--------------------------|----------|----------------|------------------|------------------------|-------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | Cutting          | —                      | 0.15 to 0.3 |

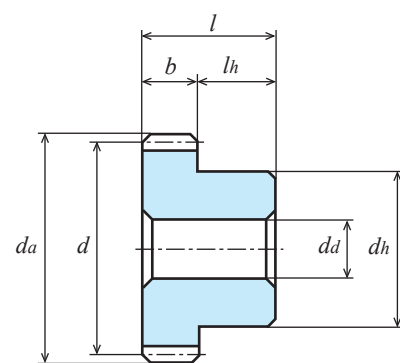
★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

② Accuracy at the time of manufacture.



B1 type [-]

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| S2.5BP 12B— 2510 | 12                     | $\phi$ 30                 | $\phi$ 35             | B1   | 25                | $\phi$ 10              | $\phi$ 22             | 20                  | 45                    | 29.9             |
| S2.5BP 13B— 2510 | 13                     | $\phi$ 32.5               | $\phi$ 37.5           | B1   | 25                | $\phi$ 10              | $\phi$ 25             | 20                  | 45                    | 37.3             |
| S2.5BP 14B— 2510 | 14                     | $\phi$ 35                 | $\phi$ 40             | B1   | 25                | $\phi$ 10              | $\phi$ 25             | 20                  | 45                    | 41.9             |
| S2.5BP 15B— 2510 | 15                     | $\phi$ 37.5               | $\phi$ 42.5           | B1   | 25                | $\phi$ 10              | $\phi$ 30             | 20                  | 45                    | 53.0             |
| S2.5BP 16B— 2510 | 16                     | $\phi$ 40                 | $\phi$ 45             | B1   | 25                | $\phi$ 10              | $\phi$ 30             | 20                  | 45                    | 58.3             |
| S2.5BP 18B— 2510 | 18                     | $\phi$ 45                 | $\phi$ 50             | B1   | 25                | $\phi$ 10              | $\phi$ 34             | 20                  | 45                    | 75.7             |
| S2.5BP 20B— 2512 | 20                     | $\phi$ 50                 | $\phi$ 55             | B1   | 25                | $\phi$ 12              | $\phi$ 34             | 20                  | 45                    | 86.6             |
| S2.5BP 22B— 2512 | 22                     | $\phi$ 55                 | $\phi$ 60             | B1   | 25                | $\phi$ 12              | $\phi$ 40             | 20                  | 45                    | 110.9            |
| S2.5BP 24B— 2512 | 24                     | $\phi$ 60                 | $\phi$ 65             | B1   | 25                | $\phi$ 12              | $\phi$ 45             | 20                  | 45                    | 136.1            |
| S2.5BP 25B— 2512 | 25                     | $\phi$ 62.5               | $\phi$ 67.5           | B1   | 25                | $\phi$ 12              | $\phi$ 45             | 20                  | 45                    | 144.6            |
| S2.5BP 26B— 2512 | 26                     | $\phi$ 65                 | $\phi$ 70             | B1   | 25                | $\phi$ 12              | $\phi$ 50             | 20                  | 45                    | 163.9            |
| S2.5BP 28B— 2512 | 28                     | $\phi$ 70                 | $\phi$ 75             | B1   | 25                | $\phi$ 12              | $\phi$ 50             | 20                  | 45                    | 182.5            |
| S2.5BP 30B— 2512 | 30                     | $\phi$ 75                 | $\phi$ 80             | B1   | 25                | $\phi$ 12              | $\phi$ 60             | 20                  | 45                    | 226.9            |
| S2.5BP 32B— 2515 | 32                     | $\phi$ 80                 | $\phi$ 85             | B1   | 25                | $\phi$ 15              | $\phi$ 60             | 20                  | 45                    | 244.2            |
| S2.5BP 35B— 2515 | 35                     | $\phi$ 87.5               | $\phi$ 92.5           | B1   | 25                | $\phi$ 15              | $\phi$ 70             | 20                  | 45                    | 307.7            |
| S2.5BP 36B— 2515 | 36                     | $\phi$ 90                 | $\phi$ 95             | B1   | 25                | $\phi$ 15              | $\phi$ 70             | 20                  | 45                    | 319.9            |
| S2.5BP 40B— 2515 | 40                     | $\phi$ 100                | $\phi$ 105            | B1   | 25                | $\phi$ 15              | $\phi$ 80             | 20                  | 45                    | 405.6            |
| S2.5BP 45B— 2515 | 45                     | $\phi$ 112.5              | $\phi$ 117.5          | B1   | 25                | $\phi$ 15              | $\phi$ 80             | 20                  | 45                    | 479.0            |
| S2.5BP 48B— 2515 | 48                     | $\phi$ 120                | $\phi$ 125            | B1   | 25                | $\phi$ 15              | $\phi$ 90             | 20                  | 45                    | 564.8            |
| S2.5BP 50B— 2515 | 50                     | $\phi$ 125                | $\phi$ 130            | B1   | 25                | $\phi$ 15              | $\phi$ 90             | 20                  | 45                    | 598.7            |

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |         |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|---------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm  | 1,200rpm | 1,500rpm |
| S2.5BP 12B— 2510 | 2.50                                                                                                     | 25.00  | 49.93  | 99.69  | 198.67  | 296.96   | 370.21   |
| S2.5BP 13B— 2510 | 2.98                                                                                                     | 29.83  | 59.59  | 118.95 | 236.97  | 354.04   | 441.01   |
| S2.5BP 14B— 2510 | 3.33                                                                                                     | 33.27  | 66.47  | 132.67 | 264.23  | 394.68   | 490.71   |
| S2.5BP 15B— 2510 | 3.68                                                                                                     | 36.75  | 73.42  | 146.48 | 291.68  | 435.49   | 540.41   |
| S2.5BP 16B— 2510 | 4.03                                                                                                     | 40.24  | 80.40  | 160.41 | 319.24  | 476.48   | 590.22   |
| S2.5BP 18B— 2510 | 4.73                                                                                                     | 47.29  | 94.44  | 188.35 | 374.71  | 557.41   | 689.61   |
| S2.5BP 20B— 2512 | 5.45                                                                                                     | 54.42  | 108.68 | 216.71 | 430.77  | 638.68   | 789.12   |
| S2.5BP 22B— 2512 | 6.16                                                                                                     | 61.55  | 122.90 | 245.00 | 486.72  | 719.17   | 887.53   |
| S2.5BP 24B— 2512 | 6.88                                                                                                     | 68.71  | 137.17 | 273.35 | 542.66  | 799.21   | 985.05   |
| S2.5BP 25B— 2512 | 7.24                                                                                                     | 72.30  | 144.34 | 287.60 | 570.28  | 839.15   | 1033.65  |
| S2.5BP 26B— 2512 | 7.60                                                                                                     | 75.91  | 151.53 | 301.85 | 597.84  | 878.99   | 1081.48  |
| S2.5BP 28B— 2512 | 8.33                                                                                                     | 83.14  | 165.92 | 330.44 | 652.85  | 958.33   | 1174.72  |
| S2.5BP 30B— 2512 | 9.35                                                                                                     | 93.32  | 186.21 | 370.76 | 730.66  | 1070.84  | 1307.76  |
| S2.5BP 32B— 2515 | 10.10                                                                                                    | 100.80 | 201.12 | 400.31 | 787.02  | 1151.32  | 1401.00  |
| S2.5BP 35B— 2515 | 11.23                                                                                                    | 112.06 | 223.54 | 444.70 | 871.05  | 1267.43  | 1538.00  |
| S2.5BP 36B— 2515 | 11.61                                                                                                    | 115.82 | 231.01 | 459.51 | 898.90  | 1305.60  | 1582.75  |
| S2.5BP 40B— 2515 | 13.52                                                                                                    | 134.80 | 268.78 | 534.33 | 1040.05 | 1499.65  | 1804.74  |
| S2.5BP 45B— 2515 | 15.46                                                                                                    | 154.11 | 307.17 | 610.18 | 1180.26 | 1686.03  | 1999.02  |
| S2.5BP 48B— 2515 | 16.63                                                                                                    | 165.76 | 330.32 | 655.78 | 1263.59 | 1794.40  | 2108.53  |
| S2.5BP 50B— 2515 | 17.41                                                                                                    | 173.53 | 345.76 | 685.60 | 1317.19 | 1860.02  | 2178.46  |



Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | Cutting          | —                      | 0.18 to 0.36 |

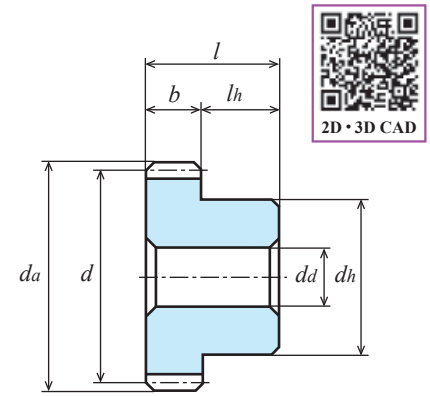
★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

② Accuracy at the time of manufacture.



B1 type [-]

| Catalogue number | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| S3BP 12B — 3012  | 12                     | φ 36                      | φ 42                  | B1   | 30                | φ12                    | φ 26                  | 20                  | 50                    | 48.7             |
| S3BP 13B — 3012  | 13                     | φ 39                      | φ 45                  | B1   | 30                | φ12                    | φ 30                  | 20                  | 50                    | 61.1             |
| S3BP 14B — 3012  | 14                     | φ 42                      | φ 48                  | B1   | 30                | φ12                    | φ 30                  | 20                  | 50                    | 69.1             |
| S3BP 15B — 3012  | 15                     | φ 45                      | φ 51                  | B1   | 30                | φ12                    | φ 34                  | 20                  | 50                    | 83.4             |
| S3BP 16B — 3012  | 16                     | φ 48                      | φ 54                  | B1   | 30                | φ12                    | φ 34                  | 20                  | 50                    | 92.6             |
| S3BP 18B — 3014  | 18                     | φ 54                      | φ 60                  | B1   | 30                | φ14                    | φ 40                  | 20                  | 50                    | 139.7            |
| S3BP 20B — 3014  | 20                     | φ 60                      | φ 66                  | B1   | 30                | φ14                    | φ 50                  | 20                  | 50                    | 162.3            |
| S3BP 22B — 3014  | 22                     | φ 66                      | φ 72                  | B1   | 30                | φ14                    | φ 50                  | 20                  | 50                    | 187.3            |
| S3BP 24B — 3014  | 24                     | φ 72                      | φ 78                  | B1   | 30                | φ14                    | φ 55                  | 20                  | 50                    | 226.3            |
| S3BP 25B — 3014  | 25                     | φ 75                      | φ 81                  | B1   | 30                | φ14                    | φ 55                  | 20                  | 50                    | 240.9            |
| S3BP 26B — 3014  | 26                     | φ 78                      | φ 84                  | B1   | 30                | φ14                    | φ 65                  | 20                  | 50                    | 282.6            |
| S3BP 28B — 3014  | 28                     | φ 84                      | φ 90                  | B1   | 30                | φ14                    | φ 65                  | 20                  | 50                    | 314.8            |
| S3BP 30B — 3014  | 30                     | φ 90                      | φ 96                  | B1   | 30                | φ14                    | φ 70                  | 20                  | 50                    | 364.3            |
| S3BP 32B — 3016  | 32                     | φ 96                      | φ102                  | B1   | 30                | φ16                    | φ 70                  | 20                  | 50                    | 398.0            |
| S3BP 35B — 3016  | 35                     | φ105                      | φ111                  | B1   | 30                | φ16                    | φ 80                  | 20                  | 50                    | 491.1            |
| S3BP 36B — 3016  | 36                     | φ108                      | φ114                  | B1   | 30                | φ16                    | φ 80                  | 20                  | 50                    | 512.3            |
| S3BP 40B — 3018  | 40                     | φ120                      | φ126                  | B1   | 30                | φ18                    | φ 95                  | 20                  | 50                    | 657.3            |
| S3BP 45B — 3018  | 45                     | φ135                      | φ141                  | B1   | 30                | φ18                    | φ 95                  | 20                  | 50                    | 1441.4           |
| S3BP 48B — 3018  | 48                     | φ144                      | φ150                  | B1   | 30                | φ18                    | φ110                  | 20                  | 50                    | 1719.6           |
| S3BP 50B — 3018  | 50                     | φ150                      | φ156                  | B1   | 30                | φ18                    | φ110                  | 20                  | 50                    | 1929.4           |

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |         |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|---------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm  | 1,200rpm | 1,500rpm |
| S3BP 12B — 3012  | 5.45                                                                                                     | 54.39  | 108.70 | 216.93 | 431.98  | 645.19   | 801.22   |
| S3BP 13B — 3012  | 6.30                                                                                                     | 62.89  | 125.70 | 250.69 | 499.19  | 745.03   | 923.86   |
| S3BP 14B — 3012  | 6.85                                                                                                     | 68.38  | 136.59 | 272.49 | 542.23  | 808.24   | 1000.62  |
| S3BP 15B — 3012  | 7.33                                                                                                     | 73.26  | 146.32 | 291.85 | 580.54  | 863.60   | 1068.39  |
| S3BP 16B — 3012  | 7.82                                                                                                     | 78.14  | 156.05 | 311.19 | 618.79  | 918.64   | 1135.66  |
| S3BP 18B — 3014  | 8.80                                                                                                     | 87.89  | 175.49 | 349.84 | 695.13  | 1027.78  | 1268.73  |
| S3BP 20B — 3014  | 9.78                                                                                                     | 97.63  | 194.92 | 388.43 | 771.16  | 1135.66  | 1399.82  |
| S3BP 22B — 3014  | 10.35                                                                                                    | 103.24 | 206.18 | 410.89 | 815.87  | 1201.65  | 1480.98  |
| S3BP 24B — 3014  | 11.73                                                                                                    | 117.12 | 233.73 | 465.44 | 918.69  | 1347.62  | 1649.49  |
| S3BP 25B — 3014  | 12.22                                                                                                    | 121.99 | 243.43 | 484.66 | 955.16  | 1399.82  | 1709.58  |
| S3BP 26B — 3014  | 12.84                                                                                                    | 128.12 | 255.51 | 508.82 | 1001.51 | 1465.93  | 1785.67  |
| S3BP 28B — 3014  | 13.69                                                                                                    | 136.59 | 272.49 | 542.23 | 1063.88 | 1551.92  | 1885.69  |
| S3BP 30B — 3014  | 14.67                                                                                                    | 146.32 | 291.85 | 580.54 | 1135.66 | 1649.49  | 1999.64  |
| S3BP 32B — 3016  | 15.65                                                                                                    | 156.05 | 311.19 | 618.79 | 1206.88 | 1745.30  | 2110.03  |
| S3BP 35B — 3016  | 17.11                                                                                                    | 170.63 | 340.19 | 676.07 | 1312.65 | 1885.69  | 2255.99  |
| S3BP 36B — 3016  | 17.60                                                                                                    | 175.49 | 349.84 | 695.13 | 1347.62 | 1931.61  | 2302.67  |
| S3BP 40B — 3018  | 19.56                                                                                                    | 194.92 | 388.43 | 771.16 | 1485.88 | 2110.03  | 2479.51  |
| S3BP 45B — 3018  | 22.00                                                                                                    | 219.18 | 436.59 | 863.60 | 1649.49 | 2302.67  | -        |
| S3BP 48B — 3018  | 23.46                                                                                                    | 233.73 | 465.44 | 918.64 | 1745.30 | 2410.67  | -        |
| S3BP 50B — 3018  | 24.44                                                                                                    | 243.43 | 484.66 | 955.16 | 1808.19 | 2479.51  | -        |



Unit: mm

| Accuracy Class ②         | Material  | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|-----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | White POM | 20°            | Cutting          | —                      | 0.02 to 0.06 |

★ This product is provided with a corrugated spring pin made of stainless steel. Nominal diameter of corrugated spring pin is  $\phi 1$ .

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

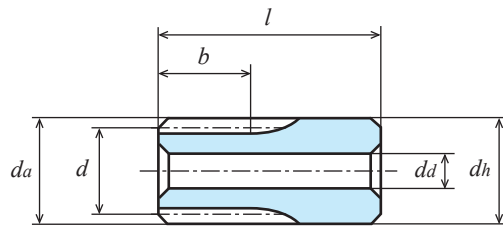
★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

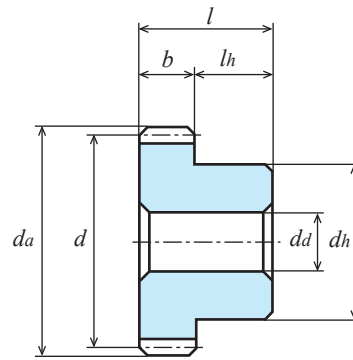
| Catalogue number        | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|-------------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| <b>S50D 14K — 0803</b>  | 14                     | $\phi 7$                  | $\phi 8$              | K2   | 8                 | $\phi 3$               | $\phi 9$              | 10                  | 18                    | 1.15             |
| <b>S50D 15K — 0803</b>  | 15                     | $\phi 7.5$                | $\phi 8.5$            | K2   | 8                 | $\phi 3$               | $\phi 9$              | 10                  | 18                    | 1.22             |
| <b>S50D 16K — 0803</b>  | 16                     | $\phi 8$                  | $\phi 9$              | K2   | 8                 | $\phi 3$               | $\phi 9$              | 10                  | 18                    | 1.29             |
| <b>S50D 18K — 0803</b>  | 18                     | $\phi 9$                  | $\phi 10$             | K2   | 8                 | $\phi 3$               | $\phi 10$             | 10                  | 18                    | 1.65             |
| <b>S50D 20B — 0303</b>  | 20                     | $\phi 10$                 | $\phi 11$             | B1   | 3                 | $\phi 3$               | $\phi 8$              | 5                   | 8                     | 0.61             |
| <b>S50D 24B — 0303</b>  | 24                     | $\phi 12$                 | $\phi 13$             | B1   | 3                 | $\phi 3$               | $\phi 8$              | 5                   | 8                     | 0.75             |
| <b>S50D 25B — 0303</b>  | 25                     | $\phi 12.5$               | $\phi 13.5$           | B1   | 3                 | $\phi 3$               | $\phi 8$              | 5                   | 8                     | 0.79             |
| <b>S50D 28B — 0303</b>  | 28                     | $\phi 14$                 | $\phi 15$             | B1   | 3                 | $\phi 3$               | $\phi 8$              | 5                   | 8                     | 0.93             |
| <b>S50D 30B — 0303</b>  | 30                     | $\phi 15$                 | $\phi 16$             | B1   | 3                 | $\phi 3$               | $\phi 8$              | 5                   | 8                     | 0.97             |
| <b>S50D 32B — 0303</b>  | 32                     | $\phi 16$                 | $\phi 17$             | B1   | 3                 | $\phi 3$               | $\phi 8$              | 5                   | 8                     | 1.13             |
| <b>S50D 36B — 0303</b>  | 36                     | $\phi 18$                 | $\phi 19$             | B1   | 3                 | $\phi 3$               | $\phi 8$              | 5                   | 8                     | 1.35             |
| <b>S50D 40B — 0303</b>  | 40                     | $\phi 20$                 | $\phi 21$             | B1   | 3                 | $\phi 3$               | $\phi 10$             | 5                   | 8                     | 1.81             |
| <b>S50D 45B — 0303</b>  | 45                     | $\phi 22.5$               | $\phi 23.5$           | B1   | 3                 | $\phi 3$               | $\phi 10$             | 5                   | 8                     | 2.17             |
| <b>S50D 50B — 0303</b>  | 50                     | $\phi 25$                 | $\phi 26$             | B1   | 3                 | $\phi 3$               | $\phi 10$             | 5                   | 8                     | 2.56             |
| <b>S50D 56B — 0303</b>  | 56                     | $\phi 28$                 | $\phi 29$             | B1   | 3                 | $\phi 3$               | $\phi 10$             | 5                   | 8                     | 3.09             |
| <b>S50D 60B — 0303</b>  | 60                     | $\phi 30$                 | $\phi 31$             | B1   | 3                 | $\phi 3$               | $\phi 10$             | 5                   | 8                     | 3.40             |
| <b>S50D 64B — 0303</b>  | 64                     | $\phi 32$                 | $\phi 33$             | B1   | 3                 | $\phi 3$               | $\phi 10$             | 5                   | 8                     | 3.90             |
| <b>S50D 70B — 0304</b>  | 70                     | $\phi 35$                 | $\phi 36$             | B1   | 3                 | $\phi 4$               | $\phi 12$             | 5                   | 8                     | 4.70             |
| <b>S50D 72B — 0304</b>  | 72                     | $\phi 36$                 | $\phi 37$             | B1   | 3                 | $\phi 4$               | $\phi 12$             | 5                   | 8                     | 4.99             |
| <b>S50D 80B — 0304</b>  | 80                     | $\phi 40$                 | $\phi 41$             | B1   | 3                 | $\phi 4$               | $\phi 12$             | 5                   | 8                     | 6.01             |
| <b>S50D 90B — 0305</b>  | 90                     | $\phi 45$                 | $\phi 46$             | B1   | 3                 | $\phi 5$               | $\phi 14$             | 5                   | 8                     | 7.64             |
| <b>S50D 100B — 0305</b> | 100                    | $\phi 50$                 | $\phi 51$             | B1   | 3                 | $\phi 5$               | $\phi 14$             | 5                   | 8                     | 9.22             |
| <b>S50D 120B — 0305</b> | 120                    | $\phi 60$                 | $\phi 61$             | B1   | 3                 | $\phi 5$               | $\phi 14$             | 5                   | 8                     | 12.90            |



2D • 3D CAD



K2 type [-]



B1 type [-]

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S50D 14K – 0803  | 0.22                                                                                                     | 2.24   | 4.48   | 8.95   | 17.89  | 26.82    | 33.50    |
| S50D 15K – 0803  | 0.24                                                                                                     | 2.40   | 4.80   | 9.59   | 19.17  | 28.73    | 35.88    |
| S50D 16K – 0803  | 0.26                                                                                                     | 2.56   | 5.12   | 10.23  | 20.44  | 30.64    | 38.27    |
| S50D 18K – 0803  | 0.29                                                                                                     | 2.88   | 5.76   | 11.51  | 22.99  | 34.45    | 43.03    |
| S50D 20B – 0303  | 0.12                                                                                                     | 1.20   | 2.40   | 4.79   | 9.58   | 14.35    | 17.92    |
| S50D 24B – 0303  | 0.17                                                                                                     | 1.74   | 3.48   | 6.96   | 13.90  | 20.82    | 25.99    |
| S50D 25B – 0303  | 0.18                                                                                                     | 1.81   | 3.63   | 7.25   | 14.47  | 21.68    | 27.07    |
| S50D 28B – 0303  | 0.20                                                                                                     | 2.03   | 4.06   | 8.12   | 16.21  | 24.27    | 30.30    |
| S50D 30B – 0303  | 0.22                                                                                                     | 2.18   | 4.35   | 8.70   | 17.36  | 25.99    | 32.45    |
| S50D 32B – 0303  | 0.23                                                                                                     | 2.32   | 4.64   | 9.27   | 18.51  | 27.71    | 34.59    |
| S50D 36B – 0303  | 0.26                                                                                                     | 2.61   | 5.22   | 10.43  | 20.82  | 31.16    | 38.88    |
| S50D 40B – 0303  | 0.29                                                                                                     | 2.90   | 5.80   | 11.59  | 23.12  | 34.59    | 43.16    |
| S50D 45B – 0303  | 0.33                                                                                                     | 3.26   | 6.52   | 13.03  | 25.99  | 38.88    | 48.50    |
| S50D 50B – 0303  | 0.36                                                                                                     | 3.63   | 7.25   | 14.47  | 28.86  | 43.16    | 53.83    |
| S50D 56B – 0303  | 0.41                                                                                                     | 4.06   | 8.12   | 16.21  | 32.30  | 48.29    | 60.21    |
| S50D 60B – 0303  | 0.44                                                                                                     | 4.35   | 8.70   | 17.36  | 34.59  | 51.70    | 64.45    |
| S50D 64B – 0303  | 0.46                                                                                                     | 4.64   | 9.27   | 18.51  | 36.88  | 55.11    | 68.68    |
| S50D 70B – 0304  | 0.51                                                                                                     | 5.08   | 10.14  | 20.24  | 40.31  | 60.21    | 74.86    |
| S50D 72B – 0304  | 0.52                                                                                                     | 5.22   | 10.43  | 20.82  | 41.45  | 61.91    | 76.91    |
| S50D 80B – 0304  | 0.58                                                                                                     | 5.80   | 11.59  | 23.12  | 46.01  | 68.68    | 85.07    |
| S50D 90B – 0305  | 0.65                                                                                                     | 6.52   | 13.03  | 25.99  | 51.70  | 76.91    | 95.15    |
| S50D 100B – 0305 | 0.73                                                                                                     | 7.25   | 14.47  | 28.86  | 57.38  | 85.07    | 105.11   |
| S50D 120B – 0305 | 0.87                                                                                                     | 8.70   | 17.36  | 34.59  | 68.68  | 101.14   | 124.67   |



Unit: mm

| Accuracy Class ②         | Material  | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|-----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | White POM | 20°            | Cutting          | —                      | 0.02 to 0.06 |

★ This product is provided with a corrugated spring pin made of stainless steel. (Gears with 120 teeth are not provided with a corrugated spring pin)

★ Nominal diameter of corrugated spring pin:  $\phi 1$  when the number of teeth is 14 to 64, and  $\phi 1.4$  when the number of teeth is 70 to 100.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

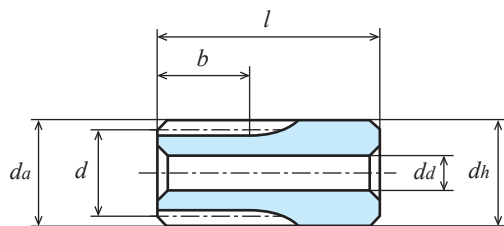
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

| Catalogue number        | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_i$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|-------------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| <b>S80D 14K — 0704</b>  | 14                     | $\phi 11.2$               | $\phi 12.8$           | K2   | 7                 | $\phi 4$               | $\phi 12.8$           | 13                  | 20                    | 3.0              |
| <b>S80D 15K — 0704</b>  | 15                     | $\phi 12$                 | $\phi 13.6$           | K2   | 7                 | $\phi 4$               | $\phi 13.6$           | 13                  | 20                    | 3.4              |
| <b>S80D 16B — 0504</b>  | 16                     | $\phi 12.8$               | $\phi 14.4$           | B1   | 5                 | $\phi 4$               | $\phi 10$             | 9                   | 14                    | 1.7              |
| <b>S80D 18B — 0504</b>  | 18                     | $\phi 14.4$               | $\phi 16$             | B1   | 5                 | $\phi 4$               | $\phi 10$             | 9                   | 14                    | 1.9              |
| <b>S80D 20B — 0504</b>  | 20                     | $\phi 16$                 | $\phi 17.6$           | B1   | 5                 | $\phi 4$               | $\phi 10$             | 9                   | 14                    | 2.2              |
| <b>S80D 22B — 0505</b>  | 22                     | $\phi 17.6$               | $\phi 19.2$           | B1   | 5                 | $\phi 5$               | $\phi 12.5$           | 9                   | 14                    | 2.9              |
| <b>S80D 24B — 0505</b>  | 24                     | $\phi 19.2$               | $\phi 20.8$           | B1   | 5                 | $\phi 5$               | $\phi 12.5$           | 9                   | 14                    | 3.2              |
| <b>S80D 25B — 0505</b>  | 25                     | $\phi 20$                 | $\phi 21.6$           | B1   | 5                 | $\phi 5$               | $\phi 12.5$           | 9                   | 14                    | 3.4              |
| <b>S80D 28B — 0505</b>  | 28                     | $\phi 22.4$               | $\phi 24$             | B1   | 5                 | $\phi 5$               | $\phi 12.5$           | 9                   | 14                    | 4.0              |
| <b>S80D 30B — 0505</b>  | 30                     | $\phi 24$                 | $\phi 25.6$           | B1   | 5                 | $\phi 5$               | $\phi 12.5$           | 9                   | 14                    | 4.4              |
| <b>S80D 32B — 0505</b>  | 32                     | $\phi 25.6$               | $\phi 27.2$           | B1   | 5                 | $\phi 5$               | $\phi 12.5$           | 9                   | 14                    | 4.8              |
| <b>S80D 36B — 0506</b>  | 36                     | $\phi 28.8$               | $\phi 30.4$           | B1   | 5                 | $\phi 6$               | $\phi 14$             | 9                   | 14                    | 6.0              |
| <b>S80D 40B — 0506</b>  | 40                     | $\phi 32$                 | $\phi 33.6$           | B1   | 5                 | $\phi 6$               | $\phi 14$             | 9                   | 14                    | 7.1              |
| <b>S80D 45B — 0506</b>  | 45                     | $\phi 36$                 | $\phi 37.6$           | B1   | 5                 | $\phi 6$               | $\phi 14$             | 9                   | 14                    | 8.6              |
| <b>S80D 48B — 0506</b>  | 48                     | $\phi 38.4$               | $\phi 40$             | B1   | 5                 | $\phi 6$               | $\phi 14$             | 9                   | 14                    | 9.6              |
| <b>S80D 50B — 0506</b>  | 50                     | $\phi 40$                 | $\phi 41.6$           | B1   | 5                 | $\phi 6$               | $\phi 14$             | 9                   | 14                    | 10.3             |
| <b>S80D 56B — 0506</b>  | 56                     | $\phi 44.8$               | $\phi 46.4$           | B1   | 5                 | $\phi 6$               | $\phi 14$             | 9                   | 14                    | 12.6             |
| <b>S80D 60B — 0506</b>  | 60                     | $\phi 48$                 | $\phi 49.6$           | B1   | 5                 | $\phi 6$               | $\phi 14$             | 9                   | 14                    | 14.2             |
| <b>S80D 64B — 0506</b>  | 64                     | $\phi 51.2$               | $\phi 52.8$           | B1   | 5                 | $\phi 6$               | $\phi 14$             | 9                   | 14                    | 15.9             |
| <b>S80D 70B — 0508</b>  | 70                     | $\phi 56$                 | $\phi 57.6$           | B1   | 5                 | $\phi 8$               | $\phi 16$             | 9                   | 14                    | 19.0             |
| <b>S80D 72B — 0508</b>  | 72                     | $\phi 57.6$               | $\phi 59.2$           | B1   | 5                 | $\phi 8$               | $\phi 16$             | 9                   | 14                    | 20.1             |
| <b>S80D 80B — 0508</b>  | 80                     | $\phi 64$                 | $\phi 65.6$           | B1   | 5                 | $\phi 8$               | $\phi 16$             | 9                   | 14                    | 24.2             |
| <b>S80D 90B — 0508</b>  | 90                     | $\phi 72$                 | $\phi 73.6$           | B1   | 5                 | $\phi 8$               | $\phi 20$             | 9                   | 14                    | 31.7             |
| <b>S80D 100B — 0508</b> | 100                    | $\phi 80$                 | $\phi 81.6$           | B1   | 5                 | $\phi 8$               | $\phi 24$             | 9                   | 14                    | 40.2             |
| <b>S80D 120B — 0508</b> | 120                    | $\phi 96$                 | $\phi 97.6$           | B1   | 5                 | $\phi 8$               | $\phi 30$             | 9                   | 14                    | 59.0             |

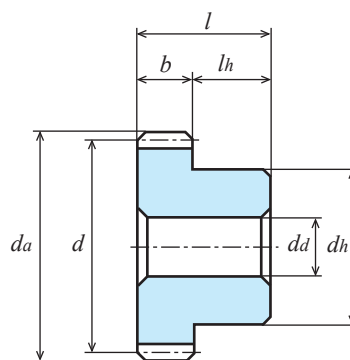




2D • 3D CAD

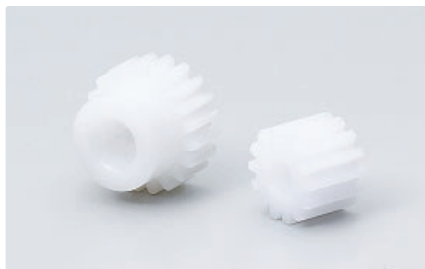


K2 type [-]



B1 type [-]

| Catalogue number        | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|-------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                         | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S80D 14K – 0704</b>  | 0.50                                                                                                     | 5.02   | 10.03  | 20.05  | 40.04  | 59.98    | 74.90    |
| <b>S80D 15K – 0704</b>  | 0.54                                                                                                     | 5.37   | 10.75  | 21.48  | 42.89  | 64.24    | 80.22    |
| <b>S80D 16B – 0504</b>  | 0.41                                                                                                     | 4.10   | 8.19   | 16.36  | 32.67  | 48.93    | 61.10    |
| <b>S80D 18B – 0504</b>  | 0.46                                                                                                     | 4.61   | 9.21   | 18.40  | 36.74  | 55.02    | 68.68    |
| <b>S80D 20B – 0504</b>  | 0.51                                                                                                     | 5.12   | 10.23  | 20.44  | 40.81  | 61.10    | 76.26    |
| <b>S80D 22B – 0505</b>  | 0.56                                                                                                     | 5.63   | 11.25  | 22.48  | 44.87  | 67.17    | 83.83    |
| <b>S80D 24B – 0505</b>  | 0.61                                                                                                     | 6.14   | 12.28  | 24.52  | 48.93  | 73.23    | 91.38    |
| <b>S80D 25B – 0505</b>  | 0.64                                                                                                     | 6.40   | 12.79  | 25.54  | 50.96  | 76.26    | 95.15    |
| <b>S80D 28B – 0505</b>  | 0.72                                                                                                     | 7.16   | 14.32  | 28.60  | 57.05  | 85.34    | 106.46   |
| <b>S80D 30B – 0505</b>  | 0.77                                                                                                     | 7.68   | 15.34  | 30.64  | 61.10  | 91.38    | 113.98   |
| <b>S80D 32B – 0505</b>  | 0.82                                                                                                     | 8.19   | 16.36  | 32.67  | 65.14  | 97.41    | 121.49   |
| <b>S80D 36B – 0506</b>  | 0.92                                                                                                     | 9.21   | 18.40  | 36.74  | 73.23  | 109.47   | 136.47   |
| <b>S80D 40B – 0506</b>  | 1.02                                                                                                     | 10.23  | 20.44  | 40.81  | 81.30  | 121.49   | 151.40   |
| <b>S80D 45B – 0506</b>  | 1.15                                                                                                     | 11.51  | 22.99  | 45.89  | 91.38  | 136.47   | 169.55   |
| <b>S80D 48B – 0506</b>  | 1.23                                                                                                     | 12.28  | 24.52  | 48.93  | 97.41  | 145.44   | 180.36   |
| <b>S80D 50B – 0506</b>  | 1.28                                                                                                     | 12.79  | 25.54  | 50.96  | 101.44 | 151.40   | 187.53   |
| <b>S80D 56B – 0506</b>  | 1.43                                                                                                     | 14.32  | 28.60  | 57.05  | 113.48 | 168.83   | 208.87   |
| <b>S80D 60B – 0506</b>  | 1.54                                                                                                     | 15.34  | 30.64  | 61.10  | 121.49 | 180.36   | 222.96   |
| <b>S80D 64B – 0506</b>  | 1.64                                                                                                     | 16.36  | 32.67  | 65.14  | 129.49 | 191.81   | 236.94   |
| <b>S80D 70B – 0508</b>  | 1.79                                                                                                     | 17.89  | 35.73  | 71.21  | 141.46 | 208.87   | 257.71   |
| <b>S80D 72B – 0508</b>  | 1.84                                                                                                     | 18.40  | 36.74  | 73.23  | 145.44 | 214.52   | 264.58   |
| <b>S80D 80B – 0508</b>  | 2.05                                                                                                     | 20.44  | 40.81  | 81.30  | 161.10 | 236.94   | 291.72   |
| <b>S80D 90B – 0508</b>  | 2.30                                                                                                     | 22.99  | 45.89  | 91.38  | 180.36 | 264.58   | 323.84   |
| <b>S80D 100B – 0508</b> | 2.56                                                                                                     | 25.54  | 50.96  | 101.44 | 199.41 | 291.72   | 355.00   |
| <b>S80D 120B – 0508</b> | 3.07                                                                                                     | 30.64  | 61.10  | 121.49 | 236.94 | 342.65   | 414.26   |



Unit: mm

| Accuracy Class ②         | Material  | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|-----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | White POM | 20°            | Cutting          | —                      | 0.02 to 0.06 |

★ This product is provided with a corrugated spring pin made of stainless steel. (Gears with 90 to 120 teeth are not provided with a corrugated spring pin)

★ Nominal diameter of corrugated spring pin:  $\phi 1$  when the number of teeth is 12 to 18, and  $\phi 1.4$  when the number of teeth is 20 to 80.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

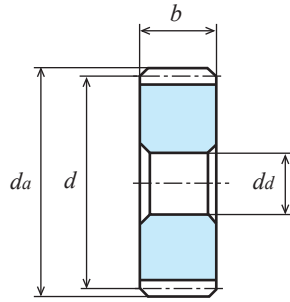
★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

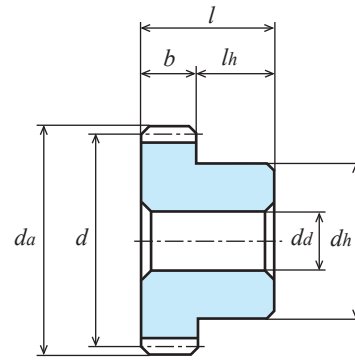
| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|------------------|
| <b>S1D 12A — 1206</b>  | 12                     | $\phi 12$                 | $\phi 14$             | A1   | 12                | $\phi 6$               | -                     | -                   | 12                    | 1.4              |
| <b>S1D 14A — 1206</b>  | 14                     | $\phi 14$                 | $\phi 16$             | A1   | 12                | $\phi 6$               | -                     | -                   | 12                    | 2.1              |
| <b>S1D 15A — 1206</b>  | 15                     | $\phi 15$                 | $\phi 17$             | A1   | 12                | $\phi 6$               | -                     | -                   | 12                    | 2.5              |
| <b>S1D 16A — 1206</b>  | 16                     | $\phi 16$                 | $\phi 18$             | A1   | 12                | $\phi 6$               | -                     | -                   | 12                    | 2.9              |
| <b>S1D 17B — 0806</b>  | 17                     | $\phi 17$                 | $\phi 19$             | B1   | 8                 | $\phi 6$               | $\phi 14$             | 8                   | 16                    | 3.7              |
| <b>S1D 18B — 0808</b>  | 18                     | $\phi 18$                 | $\phi 20$             | B1   | 8                 | $\phi 8$               | $\phi 15$             | 8                   | 16                    | 3.7              |
| <b>S1D 20B — 0808</b>  | 20                     | $\phi 20$                 | $\phi 22$             | B1   | 8                 | $\phi 8$               | $\phi 16$             | 8                   | 16                    | 4.7              |
| <b>S1D 22B — 0808</b>  | 22                     | $\phi 22$                 | $\phi 24$             | B1   | 8                 | $\phi 8$               | $\phi 18$             | 8                   | 16                    | 6.0              |
| <b>S1D 23B — 0808</b>  | 23                     | $\phi 23$                 | $\phi 25$             | B1   | 8                 | $\phi 8$               | $\phi 18$             | 8                   | 16                    | 6.4              |
| <b>S1D 24B — 0808</b>  | 24                     | $\phi 24$                 | $\phi 26$             | B1   | 8                 | $\phi 8$               | $\phi 18$             | 8                   | 16                    | 6.8              |
| <b>S1D 25B — 0808</b>  | 25                     | $\phi 25$                 | $\phi 27$             | B1   | 8                 | $\phi 8$               | $\phi 18$             | 8                   | 16                    | 7.3              |
| <b>S1D 26B — 0808</b>  | 26                     | $\phi 26$                 | $\phi 28$             | B1   | 8                 | $\phi 8$               | $\phi 20$             | 8                   | 16                    | 8.4              |
| <b>S1D 28B — 0808</b>  | 28                     | $\phi 28$                 | $\phi 30$             | B1   | 8                 | $\phi 8$               | $\phi 20$             | 8                   | 16                    | 9.4              |
| <b>S1D 30B — 0808</b>  | 30                     | $\phi 30$                 | $\phi 32$             | B1   | 8                 | $\phi 8$               | $\phi 20$             | 8                   | 16                    | 10.4             |
| <b>S1D 32B — 0608</b>  | 32                     | $\phi 32$                 | $\phi 34$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 9.4              |
| <b>S1D 34B — 0608</b>  | 34                     | $\phi 34$                 | $\phi 36$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 10.2             |
| <b>S1D 35B — 0608</b>  | 35                     | $\phi 35$                 | $\phi 37$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 10.7             |
| <b>S1D 36B — 0608</b>  | 36                     | $\phi 36$                 | $\phi 38$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 11.2             |
| <b>S1D 40B — 0608</b>  | 40                     | $\phi 40$                 | $\phi 42$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 13.2             |
| <b>S1D 42B — 0608</b>  | 42                     | $\phi 42$                 | $\phi 44$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 14.3             |
| <b>S1D 44B — 0608</b>  | 44                     | $\phi 44$                 | $\phi 46$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 15.4             |
| <b>S1D 45B — 0608</b>  | 45                     | $\phi 45$                 | $\phi 47$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 16.0             |
| <b>S1D 48B — 0608</b>  | 48                     | $\phi 48$                 | $\phi 50$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 17.9             |
| <b>S1D 50B — 0608</b>  | 50                     | $\phi 50$                 | $\phi 52$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 19.2             |
| <b>S1D 52B — 0608</b>  | 52                     | $\phi 52$                 | $\phi 54$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 20.5             |
| <b>S1D 55B — 0608</b>  | 55                     | $\phi 55$                 | $\phi 57$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 22.7             |
| <b>S1D 56B — 0608</b>  | 56                     | $\phi 56$                 | $\phi 58$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 23.4             |
| <b>S1D 60B — 0608</b>  | 60                     | $\phi 60$                 | $\phi 62$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 26.5             |
| <b>S1D 64B — 0608</b>  | 64                     | $\phi 64$                 | $\phi 66$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 29.8             |
| <b>S1D 70B — 0608</b>  | 70                     | $\phi 70$                 | $\phi 72$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 35.1             |
| <b>S1D 72B — 0608</b>  | 72                     | $\phi 72$                 | $\phi 74$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 37.0             |
| <b>S1D 80B — 0608</b>  | 80                     | $\phi 80$                 | $\phi 82$             | B1   | 6                 | $\phi 8$               | $\phi 20$             | 8                   | 14                    | 45.1             |
| <b>S1D 90B — 0608</b>  | 90                     | $\phi 90$                 | $\phi 92$             | B1   | 6                 | $\phi 8$               | $\phi 30$             | 8                   | 14                    | 60.8             |
| <b>S1D 100B — 0608</b> | 100                    | $\phi 100$                | $\phi 102$            | B1   | 6                 | $\phi 8$               | $\phi 30$             | 8                   | 14                    | 73.4             |
| <b>S1D 120B — 0608</b> | 120                    | $\phi 120$                | $\phi 122$            | B1   | 6                 | $\phi 8$               | $\phi 30$             | 8                   | 14                    | 102.7            |



2D • 3D CAD



A1 type [-]



B1 type [-]

| Catalogue number       | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                        | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S1D 12A – 1206</b>  | 0.88                                                                                                     | 8.82   | 17.64  | 35.25  | 70.40  | 105.44   | 131.66   |
| <b>S1D 14A – 1206</b>  | 1.03                                                                                                     | 10.29  | 20.57  | 41.11  | 82.09  | 122.93   | 153.47   |
| <b>S1D 15A – 1206</b>  | 1.10                                                                                                     | 11.03  | 22.04  | 44.05  | 87.93  | 131.66   | 164.35   |
| <b>S1D 16A – 1206</b>  | 1.18                                                                                                     | 11.76  | 23.51  | 46.98  | 93.77  | 140.39   | 175.23   |
| <b>S1D 17B – 0806</b>  | 0.83                                                                                                     | 8.33   | 16.65  | 33.27  | 66.41  | 99.41    | 124.07   |
| <b>S1D 18B – 0808</b>  | 0.88                                                                                                     | 8.82   | 17.63  | 35.22  | 70.30  | 105.22   | 131.31   |
| <b>S1D 20B – 0808</b>  | 0.98                                                                                                     | 9.80   | 19.59  | 39.13  | 78.07  | 116.82   | 145.76   |
| <b>S1D 22B – 0808</b>  | 1.08                                                                                                     | 10.78  | 21.54  | 43.03  | 85.83  | 128.41   | 160.19   |
| <b>S1D 23B – 0808</b>  | 1.13                                                                                                     | 11.27  | 22.52  | 44.98  | 89.71  | 134.20   | 167.40   |
| <b>S1D 24B – 0808</b>  | 1.18                                                                                                     | 11.76  | 23.50  | 46.93  | 93.59  | 139.98   | 174.60   |
| <b>S1D 25B – 0808</b>  | 1.23                                                                                                     | 12.25  | 24.48  | 48.88  | 97.47  | 145.76   | 181.79   |
| <b>S1D 26B – 0808</b>  | 1.27                                                                                                     | 12.74  | 25.45  | 50.83  | 101.34 | 151.54   | 188.98   |
| <b>S1D 28B – 0808</b>  | 1.37                                                                                                     | 13.72  | 27.41  | 54.73  | 109.09 | 163.08   | 203.33   |
| <b>S1D 30B – 0808</b>  | 1.47                                                                                                     | 14.70  | 29.36  | 58.62  | 116.82 | 174.60   | 217.65   |
| <b>S1D 32B – 0608</b>  | 2.10                                                                                                     | 20.97  | 41.90  | 83.65  | 166.65 | 249.01   | 310.33   |
| <b>S1D 34B – 0608</b>  | 2.23                                                                                                     | 22.28  | 44.52  | 88.85  | 176.98 | 264.39   | 328.97   |
| <b>S1D 35B – 0608</b>  | 2.30                                                                                                     | 22.94  | 45.82  | 91.46  | 182.14 | 272.06   | 338.26   |
| <b>S1D 36B – 0608</b>  | 2.36                                                                                                     | 23.59  | 47.13  | 94.06  | 187.30 | 279.73   | 347.53   |
| <b>S1D 38B – 0608</b>  | 2.49                                                                                                     | 24.90  | 49.74  | 99.26  | 197.61 | 295.06   | 366.00   |
| <b>S1D 40B – 0608</b>  | 2.62                                                                                                     | 26.21  | 52.36  | 104.46 | 207.91 | 310.33   | 384.38   |
| <b>S1D 42B – 0608</b>  | 2.75                                                                                                     | 27.52  | 54.97  | 109.66 | 218.20 | 325.25   | 402.67   |
| <b>S1D 44B – 0608</b>  | 2.89                                                                                                     | 28.83  | 57.58  | 114.85 | 228.48 | 340.12   | 420.87   |
| <b>S1D 45B – 0608</b>  | 2.9                                                                                                      | 28.92  | 57.76  | 115.21 | 229.17 | 340.98   | 421.74   |
| <b>S1D 48B – 0608</b>  | 3.15                                                                                                     | 31.44  | 62.80  | 125.23 | 249.01 | 369.68   | 457.01   |
| <b>S1D 50B – 0608</b>  | 3.28                                                                                                     | 32.75  | 65.40  | 130.42 | 259.26 | 384.38   | 474.95   |
| <b>S1D 52B – 0608</b>  | 3.41                                                                                                     | 34.06  | 68.01  | 135.60 | 269.50 | 399.02   | 492.80   |
| <b>S1D 55B – 0608</b>  | 3.61                                                                                                     | 36.02  | 71.92  | 143.37 | 284.84 | 420.87   | 519.41   |
| <b>S1D 56B – 0608</b>  | 3.67                                                                                                     | 36.68  | 73.23  | 145.96 | 289.95 | 428.13   | 528.23   |
| <b>S1D 60B – 0608</b>  | 3.94                                                                                                     | 39.29  | 78.44  | 156.31 | 310.33 | 457.01   | 563.31   |
| <b>S1D 64B – 0608</b>  | 4.20                                                                                                     | 41.92  | 83.65  | 166.65 | 330.21 | 485.67   | 597.95   |
| <b>S1D 70B – 0608</b>  | 4.59                                                                                                     | 45.82  | 91.46  | 182.14 | 359.85 | 528.23   | 647.51   |
| <b>S1D 72B – 0608</b>  | 4.72                                                                                                     | 47.13  | 94.06  | 187.30 | 369.68 | 542.31   | 663.79   |
| <b>S1D 80B – 0608</b>  | 5.25                                                                                                     | 52.36  | 104.46 | 207.91 | 408.74 | 597.95   | 727.65   |
| <b>S1D 90B – 0608</b>  | 5.90                                                                                                     | 58.88  | 117.45 | 233.62 | 457.01 | 663.79   | 804.69   |
| <b>S1D 100B – 0608</b> | 6.56                                                                                                     | 65.40  | 130.42 | 259.26 | 504.65 | 727.65   | 875.66   |
| <b>S1D 120B – 0608</b> | 7.87                                                                                                     | 78.44  | 156.31 | 310.33 | 597.95 | 849.11   | 997.80   |



Unit: mm

| Accuracy Class ②         | Material  | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|-----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | White POM | 20°            | Cutting          | —                      | 0.02 to 0.06 |

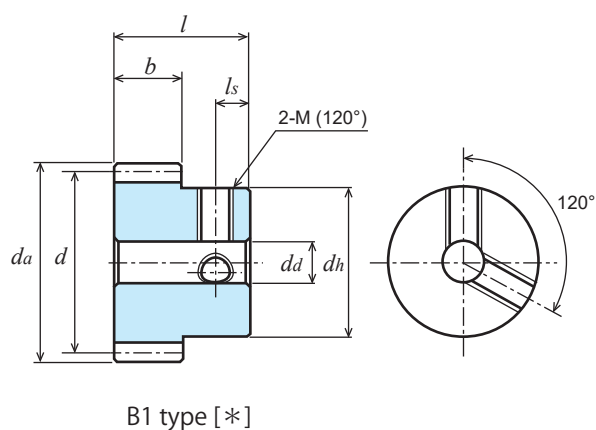
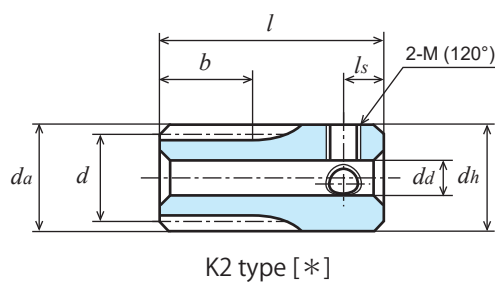
★ Gears with a [\*] are provided with two screw holes and two set screws.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

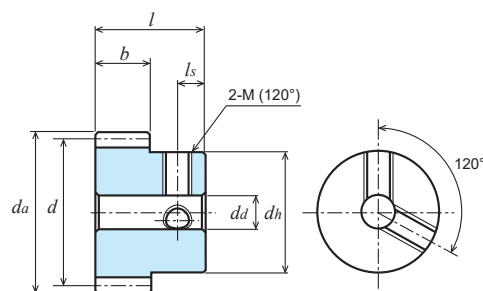
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

| Catalogue number        | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw     |       | Weight<br>$W(g)$ |
|-------------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|-----------|-------|------------------|
|                         |                        |                           |                       |      |                   |                        |                       |                     |                       | 2-M(120°) | $l_s$ |                  |
| <b>S50D 14K * 0803</b>  | 14                     | $\phi 7$                  | $\phi 8$              | K2   | 8                 | $\phi 3$               | $\phi 9$              | 10                  | 18                    | 2-M3      | 3     | 1.10             |
| <b>S50D 15K * 0803</b>  | 15                     | $\phi 7.5$                | $\phi 8.5$            | K2   | 8                 | $\phi 3$               | $\phi 9$              | 10                  | 18                    | 2-M3      | 3     | 1.17             |
| <b>S50D 18K * 0803</b>  | 18                     | $\phi 9$                  | $\phi 10$             | K2   | 8                 | $\phi 3$               | $\phi 10$             | 10                  | 18                    | 2-M3      | 3     | 1.59             |
| <b>S50D 20B * 0303</b>  | 20                     | $\phi 10$                 | $\phi 11$             | B1   | 3                 | $\phi 3$               | $\phi 8$              | 5                   | 8                     | 2-M3      | 3     | 0.57             |
| <b>S50D 24B * 0303</b>  | 24                     | $\phi 12$                 | $\phi 13$             | B1   | 3                 | $\phi 3$               | $\phi 10$             | 5                   | 8                     | 2-M3      | 3     | 0.90             |
| <b>S50D 30B * 0303</b>  | 30                     | $\phi 15$                 | $\phi 16$             | B1   | 3                 | $\phi 3$               | $\phi 12$             | 5                   | 8                     | 2-M3      | 3     | 1.39             |
| <b>S50D 32B * 0303</b>  | 32                     | $\phi 16$                 | $\phi 17$             | B1   | 3                 | $\phi 3$               | $\phi 14$             | 5                   | 8                     | 2-M3      | 3     | 1.77             |
| <b>S50D 36B * 0303</b>  | 36                     | $\phi 18$                 | $\phi 19$             | B1   | 3                 | $\phi 3$               | $\phi 15$             | 5                   | 8                     | 2-M3      | 3     | 2.15             |
| <b>S50D 40B * 0303</b>  | 40                     | $\phi 20$                 | $\phi 21$             | B1   | 3                 | $\phi 3$               | $\phi 15$             | 5                   | 8                     | 2-M3      | 3     | 2.40             |
| <b>S50D 45B * 0303</b>  | 45                     | $\phi 22.5$               | $\phi 23.5$           | B1   | 3                 | $\phi 3$               | $\phi 15$             | 5                   | 8                     | 2-M3      | 3     | 2.75             |
| <b>S50D 50B * 0303</b>  | 50                     | $\phi 25$                 | $\phi 26$             | B1   | 3                 | $\phi 3$               | $\phi 15$             | 5                   | 8                     | 2-M3      | 3     | 3.15             |
| <b>S50D 56B * 0303</b>  | 56                     | $\phi 28$                 | $\phi 29$             | B1   | 3                 | $\phi 3$               | $\phi 15$             | 5                   | 8                     | 2-M3      | 3     | 3.67             |
| <b>S50D 60B * 0303</b>  | 60                     | $\phi 30$                 | $\phi 31$             | B1   | 3                 | $\phi 3$               | $\phi 15$             | 5                   | 8                     | 2-M3      | 3     | 4.06             |
| <b>S50D 64B * 0303</b>  | 64                     | $\phi 32$                 | $\phi 33$             | B1   | 3                 | $\phi 3$               | $\phi 15$             | 5                   | 8                     | 2-M3      | 3     | 4.47             |
| <b>S50D 70B * 0304</b>  | 70                     | $\phi 35$                 | $\phi 36$             | B1   | 3                 | $\phi 4$               | $\phi 16$             | 5                   | 8                     | 2-M3      | 3     | 5.25             |
| <b>S50D 72B * 0304</b>  | 72                     | $\phi 36$                 | $\phi 37$             | B1   | 3                 | $\phi 4$               | $\phi 16$             | 5                   | 8                     | 2-M3      | 3     | 5.48             |
| <b>S50D 80B * 0304</b>  | 80                     | $\phi 40$                 | $\phi 41$             | B1   | 3                 | $\phi 4$               | $\phi 16$             | 5                   | 8                     | 2-M3      | 3     | 6.49             |
| <b>S50D 90B * 0305</b>  | 90                     | $\phi 45$                 | $\phi 46$             | B1   | 3                 | $\phi 5$               | $\phi 18$             | 5                   | 8                     | 2-M3      | 3     | 8.20             |
| <b>S50D 100B * 0305</b> | 100                    | $\phi 50$                 | $\phi 51$             | B1   | 3                 | $\phi 5$               | $\phi 18$             | 5                   | 8                     | 2-M3      | 3     | 9.77             |
| <b>S50D 120B * 0305</b> | 120                    | $\phi 60$                 | $\phi 61$             | B1   | 3                 | $\phi 5$               | $\phi 18$             | 5                   | 8                     | 2-M3      | 3     | 13.43            |



2D • 3D CAD

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S50D 14K * 0803  | 0.22                                                                                                     | 2.24   | 4.48   | 8.95   | 17.89  | 26.82    | 33.50    |
| S50D 15K * 0803  | 0.24                                                                                                     | 2.40   | 4.80   | 9.59   | 19.17  | 28.73    | 35.88    |
| S50D 18K * 0803  | 0.29                                                                                                     | 2.88   | 5.76   | 11.51  | 22.99  | 34.45    | 43.03    |
| S50D 20B * 0303  | 0.12                                                                                                     | 1.20   | 2.40   | 4.79   | 9.58   | 14.35    | 17.92    |
| S50D 24B * 0303  | 0.17                                                                                                     | 1.74   | 3.48   | 6.96   | 13.90  | 20.82    | 25.99    |
| S50D 30B * 0303  | 0.22                                                                                                     | 2.18   | 4.35   | 8.70   | 17.36  | 25.99    | 32.45    |
| S50D 32B * 0303  | 0.23                                                                                                     | 2.32   | 4.64   | 9.27   | 18.51  | 27.71    | 34.59    |
| S50D 36B * 0303  | 0.26                                                                                                     | 2.61   | 5.22   | 10.43  | 20.82  | 31.16    | 38.88    |
| S50D 40B * 0303  | 0.29                                                                                                     | 2.90   | 5.80   | 11.59  | 23.12  | 34.59    | 43.16    |
| S50D 45B * 0303  | 0.33                                                                                                     | 3.26   | 6.52   | 13.03  | 25.99  | 38.88    | 48.50    |
| S50D 50B * 0303  | 0.36                                                                                                     | 3.63   | 7.25   | 14.47  | 28.86  | 43.16    | 53.83    |
| S50D 56B * 0303  | 0.41                                                                                                     | 4.06   | 8.12   | 16.21  | 32.30  | 48.29    | 60.21    |
| S50D 60B * 0303  | 0.44                                                                                                     | 4.35   | 8.70   | 17.36  | 34.59  | 51.70    | 64.45    |
| S50D 64B * 0303  | 0.46                                                                                                     | 4.64   | 9.27   | 18.51  | 36.88  | 55.11    | 68.68    |
| S50D 70B * 0304  | 0.51                                                                                                     | 5.08   | 10.14  | 20.24  | 40.31  | 60.21    | 74.86    |
| S50D 72B * 0304  | 0.52                                                                                                     | 5.22   | 10.43  | 20.82  | 41.45  | 61.91    | 76.91    |
| S50D 80B * 0304  | 0.58                                                                                                     | 5.80   | 11.59  | 23.12  | 46.01  | 68.68    | 85.07    |
| S50D 90B * 0305  | 0.65                                                                                                     | 6.52   | 13.03  | 25.99  | 51.70  | 76.91    | 95.15    |
| S50D 100B * 0305 | 0.73                                                                                                     | 7.25   | 14.47  | 28.86  | 57.38  | 85.07    | 105.11   |
| S50D 120B * 0305 | 0.87                                                                                                     | 8.70   | 17.36  | 34.59  | 68.68  | 101.14   | 124.67   |



B1 type [\*]

Unit: mm

| Accuracy Class ②         | Material  | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|-----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | White POM | 20°            | Cutting          | —                      | 0.06 to 0.12 |

★ Gears with a [\*] are provided with two screw holes and two set screws.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

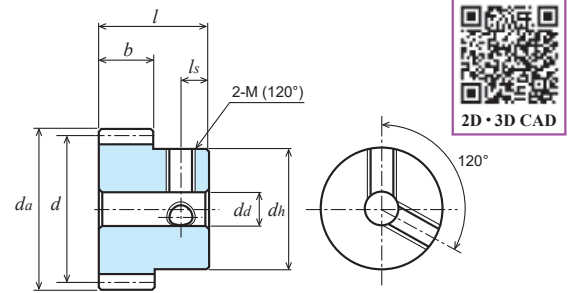
★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

| Catalogue number       | Number of teeth<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d$ | Hub diameter<br>$d_h$ | Hub length<br>$l_h$ | Overall length<br>$l$ | Screw     |       | Weight<br>$W(g)$ |
|------------------------|------------------------|---------------------------|-----------------------|------|-------------------|------------------------|-----------------------|---------------------|-----------------------|-----------|-------|------------------|
|                        |                        |                           |                       |      |                   |                        |                       |                     |                       | 2-M(120°) | $l_s$ |                  |
| <b>S80D 16B * 0503</b> | 16                     | $\phi 12.8$               | $\phi 14.4$           | B1   | 5                 | $\phi 3$               | $\phi 10$             | 7                   | 12                    | 2-M3      | 4     | 1.5              |
| <b>S80D 20B * 0503</b> | 20                     | $\phi 16$                 | $\phi 17.6$           | B1   | 5                 | $\phi 3$               | $\phi 12$             | 7                   | 12                    | 2-M3      | 4     | 2.4              |
| <b>S80D 25B * 0503</b> | 25                     | $\phi 20$                 | $\phi 21.6$           | B1   | 5                 | $\phi 3$               | $\phi 16$             | 7                   | 12                    | 2-M3      | 4     | 4.0              |
| <b>S80D 28B * 0503</b> | 28                     | $\phi 22.4$               | $\phi 24$             | B1   | 5                 | $\phi 3$               | $\phi 20$             | 7                   | 12                    | 2-M3      | 4     | 5.7              |
| <b>S80D 30B * 0503</b> | 30                     | $\phi 24$                 | $\phi 25.6$           | B1   | 5                 | $\phi 3$               | $\phi 20$             | 7                   | 12                    | 2-M3      | 4     | 6.1              |
| <b>S80D 32B * 0503</b> | 32                     | $\phi 25.6$               | $\phi 27.2$           | B1   | 5                 | $\phi 3$               | $\phi 20$             | 7                   | 12                    | 2-M3      | 4     | 6.6              |
| <b>S80D 36B * 0504</b> | 36                     | $\phi 28.8$               | $\phi 30.4$           | B1   | 5                 | $\phi 4$               | $\phi 22$             | 7                   | 12                    | 2-M4      | 4     | 8.1              |
| <b>S80D 40B * 0504</b> | 40                     | $\phi 32$                 | $\phi 33.6$           | B1   | 5                 | $\phi 4$               | $\phi 22$             | 7                   | 12                    | 2-M4      | 4     | 9.2              |
| <b>S80D 60B * 0504</b> | 60                     | $\phi 48$                 | $\phi 49.6$           | B1   | 5                 | $\phi 4$               | $\phi 22$             | 7                   | 12                    | 2-M4      | 4     | 16.3             |

| Catalogue number       | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                        | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>S80D 16B * 0503</b> | 0.41                                                                                                     | 4.10   | 8.19   | 16.36  | 32.67  | 48.93    | 61.10    |
| <b>S80D 20B * 0503</b> | 0.51                                                                                                     | 5.12   | 10.23  | 20.44  | 40.81  | 61.10    | 76.26    |
| <b>S80D 25B * 0503</b> | 0.64                                                                                                     | 6.40   | 12.79  | 25.54  | 50.96  | 76.26    | 95.15    |
| <b>S80D 28B * 0503</b> | 0.72                                                                                                     | 7.16   | 14.32  | 28.60  | 57.05  | 85.34    | 106.46   |
| <b>S80D 30B * 0503</b> | 0.77                                                                                                     | 7.68   | 15.34  | 30.64  | 61.10  | 91.38    | 113.98   |
| <b>S80D 32B * 0503</b> | 0.82                                                                                                     | 8.19   | 16.36  | 32.67  | 65.14  | 97.41    | 121.49   |
| <b>S80D 36B * 0504</b> | 0.92                                                                                                     | 9.21   | 18.40  | 36.74  | 73.23  | 109.47   | 136.47   |
| <b>S80D 40B * 0504</b> | 1.02                                                                                                     | 10.23  | 20.44  | 40.81  | 81.30  | 121.49   | 151.40   |
| <b>S80D 60B * 0504</b> | 1.54                                                                                                     | 15.34  | 30.64  | 61.10  | 121.49 | 180.36   | 222.96   |





Unit: mm

B1 type [※]

| Accuracy Class ②         | Material  | Pressure angle | Machining method | Tooth surface hardness | Backlash ①   |
|--------------------------|-----------|----------------|------------------|------------------------|--------------|
| [JIS B 1702-1] N9 to N10 | White POM | 20°            | Cutting          | —                      | 0.06 to 0.12 |

★ Gears with a [※] are provided with two screw holes and two set screws.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. ② Accuracy at the time of manufacture.

| Catalogue number | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>da</i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>dh</i> | Hub diameter<br><i>dh</i> | Hub length<br><i>lh</i> | Overall length<br><i>l</i> | Screw     |           | Weight<br><i>W(g)</i> |
|------------------|-----------------------------|--------------------------------|---------------------------|------|------------------------|----------------------------|---------------------------|-------------------------|----------------------------|-----------|-----------|-----------------------|
|                  |                             |                                |                           |      |                        |                            |                           |                         |                            | 2-M(120°) | <i>ls</i> |                       |
| S1D 17B * 0804   | 17                          | φ 17                           | φ 19                      | B1   | 8                      | φ4                         | φ14                       | 8                       | 16                         | 2-M4      | 4         | 4.0                   |
| S1D 18B * 0804   | 18                          | φ 18                           | φ 20                      | B1   | 8                      | φ4                         | φ15                       | 8                       | 16                         | 2-M4      | 4         | 4.5                   |
| S1D 20B * 0805   | 20                          | φ 20                           | φ 22                      | B1   | 8                      | φ5                         | φ16                       | 8                       | 16                         | 2-M4      | 4         | 5.3                   |
| S1D 24B * 0805   | 24                          | φ 24                           | φ 26                      | B1   | 8                      | φ5                         | φ20                       | 8                       | 16                         | 2-M4      | 4         | 8.2                   |
| S1D 25B * 0805   | 25                          | φ 25                           | φ 27                      | B1   | 8                      | φ5                         | φ22                       | 8                       | 16                         | 2-M4      | 4         | 9.3                   |
| S1D 26B * 0805   | 26                          | φ 26                           | φ 28                      | B1   | 8                      | φ5                         | φ22                       | 8                       | 16                         | 2-M4      | 4         | 9.8                   |
| S1D 30B * 0805   | 30                          | φ 30                           | φ 32                      | B1   | 8                      | φ5                         | φ24                       | 8                       | 16                         | 2-M4      | 4         | 12.6                  |
| S1D 32B * 0605   | 32                          | φ 32                           | φ 34                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 11.5                  |
| S1D 36B * 0605   | 36                          | φ 36                           | φ 38                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 13.3                  |
| S1D 38B * 0605   | 38                          | φ 38                           | φ 40                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 14.3                  |
| S1D 40B * 0605   | 40                          | φ 40                           | φ 42                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 15.3                  |
| S1D 48B * 0605   | 48                          | φ 48                           | φ 50                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 20.0                  |
| S1D 50B * 0605   | 50                          | φ 50                           | φ 52                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 21.3                  |
| S1D 60B * 0605   | 60                          | φ 60                           | φ 62                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 28.6                  |
| S1D 64B * 0605   | 64                          | φ 64                           | φ 66                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 31.9                  |
| S1D 72B * 0605   | 72                          | φ 72                           | φ 74                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 39.1                  |
| S1D 80B * 0605   | 80                          | φ 80                           | φ 82                      | B1   | 6                      | φ5                         | φ24                       | 8                       | 14                         | 2-M4      | 4         | 47.2                  |

| Catalogue number | Allowable transfer capability table for different revolutions per minute,<br>Bending strength, (Unit: W) |        |        |        |        |          |          |
|------------------|----------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                                    | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| S1D 17B * 0804   | 0.83                                                                                                     | 8.33   | 16.65  | 33.27  | 66.41  | 99.41    | 124.07   |
| S1D 18B * 0804   | 0.88                                                                                                     | 8.82   | 17.63  | 35.22  | 70.30  | 105.22   | 131.31   |
| S1D 20B * 0805   | 0.98                                                                                                     | 9.80   | 19.59  | 39.13  | 78.07  | 116.82   | 145.76   |
| S1D 24B * 0805   | 1.18                                                                                                     | 11.76  | 23.50  | 46.93  | 93.59  | 139.98   | 174.60   |
| S1D 25B * 0805   | 1.23                                                                                                     | 12.25  | 24.48  | 48.88  | 97.47  | 145.76   | 181.79   |
| S1D 26B * 0805   | 1.27                                                                                                     | 12.74  | 25.45  | 50.83  | 101.34 | 151.54   | 188.98   |
| S1D 30B * 0805   | 1.47                                                                                                     | 14.70  | 29.36  | 58.62  | 116.82 | 174.60   | 217.65   |
| S1D 32B * 0605   | 2.10                                                                                                     | 20.97  | 41.90  | 83.65  | 166.65 | 249.01   | 310.33   |
| S1D 36B * 0605   | 2.36                                                                                                     | 23.59  | 47.13  | 94.06  | 187.30 | 279.73   | 347.53   |
| S1D 38B * 0605   | 2.49                                                                                                     | 24.90  | 49.74  | 99.26  | 197.61 | 295.06   | 366.00   |
| S1D 40B * 0605   | 2.62                                                                                                     | 26.21  | 52.36  | 104.46 | 207.91 | 310.33   | 384.38   |
| S1D 48B * 0605   | 3.15                                                                                                     | 31.44  | 62.80  | 125.23 | 249.01 | 369.68   | 457.01   |
| S1D 50B * 0605   | 3.28                                                                                                     | 32.75  | 65.40  | 130.42 | 259.26 | 384.38   | 474.95   |
| S1D 60B * 0605   | 3.94                                                                                                     | 39.29  | 78.44  | 156.31 | 310.33 | 457.01   | 563.31   |
| S1D 64B * 0605   | 4.20                                                                                                     | 41.92  | 83.65  | 166.65 | 330.21 | 485.67   | 597.95   |
| S1D 72B * 0605   | 4.72                                                                                                     | 47.13  | 94.06  | 187.30 | 369.68 | 542.31   | 663.79   |
| S1D 80B * 0605   | 5.25                                                                                                     | 52.36  | 104.46 | 207.91 | 408.74 | 597.95   | 727.65   |

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITTER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES

Module size

# Rack gears

## RK series

## ORK series



\* These are samples

### How to Read Catalogue Numbers

**RK 1.5 SD 10 — 16 16**

| Gear type     | Module                                                                                                                                                              | Material                                                                          | Overall length                                                                                       |  | Face width | Height   |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--|------------|----------|
| RK: Rack gear | Represents the module size. When the module is less than 1, it indicates a value 100 times the actual module.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | SD: S45C<br>SU: Stainless steel SUS304<br>B : Brass C3604B<br>BP: Acetal Blue POM | Unit: mm<br>The actual length indicates a value 100 times.<br>Example:<br>2 → "200mm"<br>3 → "300mm" |  | Unit: mm   | Unit: mm |

**ORK 50 SU 2 — 08 15**

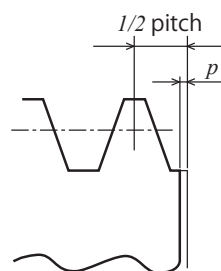
| Gear type            | Module                                                                                                                                                              | Material                   | Overall length                                                                                       |  | Face width | Effective contact length                                  |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------|--|------------|-----------------------------------------------------------|
| ORK: Round rack gear | Represents the module size. When the module is less than 1, it indicates a value 100 times the actual module.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | SU: Stainless steel SUS304 | Unit: mm<br>The actual length indicates a value 100 times.<br>Example:<br>2 → "200mm"<br>3 → "300mm" |  | Unit: mm   | Unit: mm<br>The actual length indicates a value 10 times. |

| Catalogue number       | RK      | ORK       | RK          | RK          | RK        |
|------------------------|---------|-----------|-------------|-------------|-----------|
| Shape                  |         |           |             |             |           |
| Page                   | P. 183  | P. 184    | P. 184      | P. 185      | P. 185    |
| Material               | S45C    | SUS304    | SUS304      | Brass       | Blue POM  |
| Module                 | m1 to 3 | m0.5 to 1 | m0.5 to 1.5 | m0.3 to 0.8 | m0.5 to 1 |
| Heat treatment         | —       | —         | —           | —           | —         |
| Teeth process sequence | Cutting | Cutting   | Cutting     | Cutting     | Cutting   |

# Rack gear information

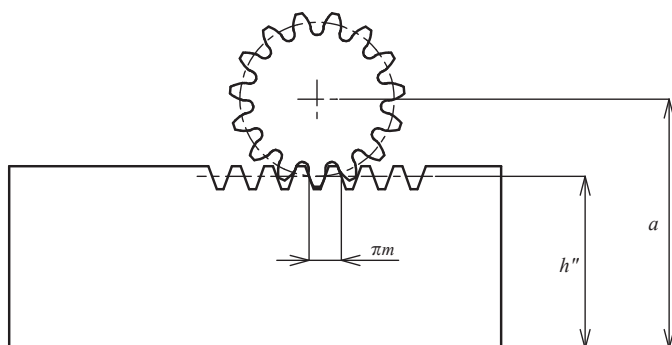
## Both-end machining (pitch alignment machining for coupling)

Our racks are finished to have a both-end machining dimension P so that one rack can be coupled to another.



Rack end machining shape

## How to calculate the rack assembly distance



$$a = h'' + \frac{m \times z}{2} + xm$$

Explanation

$a$  : Assembly distance (distance from the rack bottom to the spur gear center)

$h''$  : Rack datum line

$m$  : Module

$x$  : Rack shift coefficient

$z$  : Number of teeth

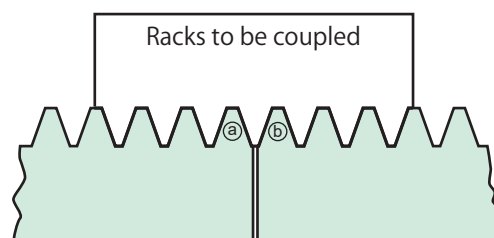
(When the module is 1 or more:  
 $x = 0.5$  when the number of teeth is 8 to 11  
 $x = 0$  when the number of teeth is 12 or more)

\*This is for our standard products.

## How to couple racks

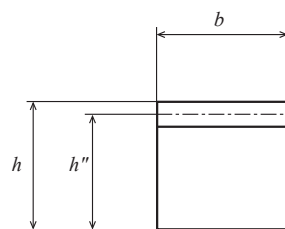
When coupling multiple racks, align their pitch by using another rack as shown in the figure to the right in order to set the optimal pitch between racks ① and ②.

Note: We do not offer racks designed exclusively for coupling.

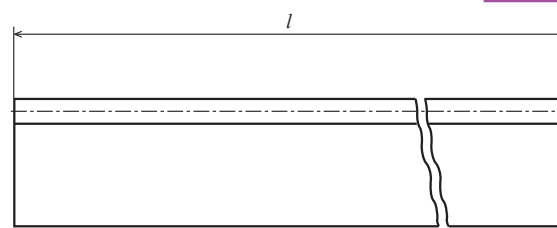




2D • 3D CAD



End face



Unit: mm

| Accuracy Class       | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|----------------------|----------|----------------|----------------|------------------------|
| Not specified by JIS | S45C     | 20°            | —              | —                      |

★ No surface treatment is applied. **The racks that have gone through both-end machining can be coupled with one another.**

★ This product is made of a drawn material, and therefore is finished to have dimensional tolerances of h12 to h13 for both the face width and height.

★ Straightening is done after tooth cutting, but bending may occur due to material aging.

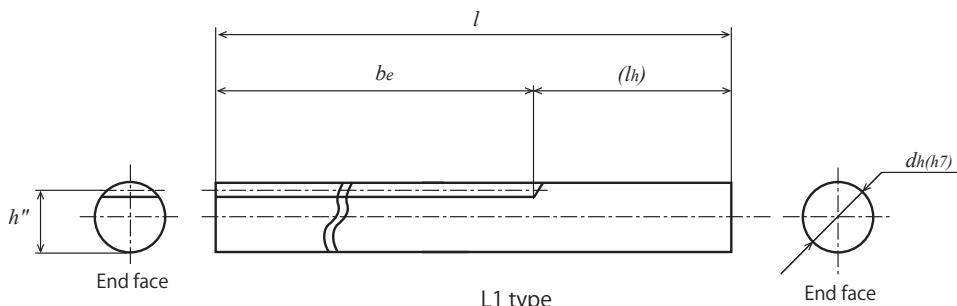
★ When the teeth are treated by induction hardening, the surface hardness of this product may not increase because the drawn material has a decarbonized layer on the surface. Also be aware that the pitch may change due to distortion or bending.

Mating gear



S45C spur gear

| Catalogue number         | Module<br><i>m</i> | Overall length<br><i>l</i> | Both-end machining<br><i>p</i> | Effective number of teeth<br><i>z</i> | Datum line<br><i>h''</i> | Face width<br><i>b</i> | Height<br><i>h</i> | Weight<br><i>W(kg)</i> |
|--------------------------|--------------------|----------------------------|--------------------------------|---------------------------------------|--------------------------|------------------------|--------------------|------------------------|
| <b>RK1SD 3 — 1010</b>    | 1                  | 303 to 306                 | -                              | 94                                    | 9                        | 10                     | 10                 | 0.20                   |
| <b>RK1SD 5 — 1010</b>    |                    | 505 to 508                 | -                              | 158                                   | 9                        | 10                     | 10                 | 0.34                   |
| <b>RK1SD 10 — 1015</b>   |                    | 1021.0                     | 0.1 to 0.3                     | 325                                   | 14                       | 10                     | 15                 | 1.12                   |
| <b>RK1.5SD 3 — 1616</b>  | 1.5                | 303 to 306                 | -                              | 62                                    | 14.5                     | 16                     | 16                 | 0.53                   |
| <b>RK1.5SD 5 — 1216</b>  |                    | 505 to 508                 | -                              | 105                                   | 14.5                     | 12                     | 16                 | 0.66                   |
| <b>RK1.5SD 5 — 1616</b>  |                    | 503 to 506                 | -                              | 105                                   | 14.5                     | 16                     | 16                 | 0.90                   |
| <b>RK1.5SD 10 — 1616</b> |                    | 1008.5                     | 0.1 to 0.3                     | 214                                   | 14.5                     | 16                     | 16                 | 1.84                   |
| <b>RK1.5SD 5 — 1620</b>  |                    | 503 to 506                 | -                              | 105                                   | 18.5                     | 16                     | 20                 | 1.16                   |
| <b>RK1.5SD 16 — 1620</b> |                    | 1602.2                     | 0.1 to 0.3                     | 340                                   | 18.5                     | 16                     | 20                 | 3.72                   |
| <b>RK2SD 3 — 2020</b>    | 2                  | 303 to 306                 | -                              | 46                                    | 18                       | 20                     | 20                 | 0.90                   |
| <b>RK2SD 5 — 2020</b>    |                    | 503 to 506                 | -                              | 78                                    | 18                       | 20                     | 20                 | 1.40                   |
| <b>RK2SD 5 — 2025</b>    |                    | 501 to 506                 | -                              | 78                                    | 23                       | 20                     | 25                 | 1.80                   |
| <b>RK2SD 10 — 1420</b>   |                    | 1005.3                     | 0.1 to 0.3                     | 160                                   | 18                       | 14                     | 20                 | 1.95                   |
| <b>RK2SD 10 — 2020</b>   |                    | 1005.3                     | 0.1 to 0.3                     | 160                                   | 18                       | 20                     | 20                 | 2.80                   |
| <b>RK2SD 10 — 2025</b>   |                    | 1005.3                     | 0.1 to 0.3                     | 160                                   | 23                       | 20                     | 25                 | 3.63                   |
| <b>RK2SD 16 — 2025</b>   |                    | 1602.2                     | 0.1 to 0.3                     | 255                                   | 23                       | 20                     | 25                 | 5.80                   |
| <b>RK2.5SD 3 — 2525</b>  | 2.5                | 303 to 306                 | -                              | 36                                    | 22.5                     | 25                     | 25                 | 1.32                   |
| <b>RK2.5SD 5 — 2525</b>  |                    | 503 to 506                 | -                              | 62                                    | 22.5                     | 25                     | 25                 | 2.20                   |
| <b>RK2.5SD 10 — 1825</b> |                    | 1005.3                     | 0.1 to 0.4                     | 128                                   | 22.5                     | 18                     | 25                 | 3.13                   |
| <b>RK2.5SD 10 — 2525</b> |                    | 1005.3                     | 0.1 to 0.4                     | 128                                   | 22.5                     | 25                     | 25                 | 4.40                   |
| <b>RK3SD 3 — 3030</b>    | 3                  | 300 to 306                 | -                              | 30                                    | 27                       | 30                     | 30                 | 1.90                   |
| <b>RK3SD 5 — 3030</b>    |                    | 503 to 506                 | -                              | 52                                    | 27                       | 30                     | 30                 | 3.20                   |
| <b>RK3SD 10 — 2230</b>   |                    | 1008.5                     | 0.1 to 0.4                     | 107                                   | 27                       | 22                     | 30                 | 4.80                   |
| <b>RK3SD 10 — 3030</b>   |                    | 1008.5                     | 0.1 to 0.4                     | 107                                   | 27                       | 30                     | 30                 | 6.40                   |



Unit: mm

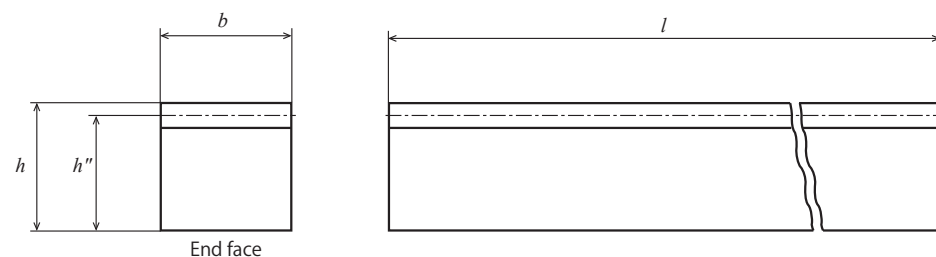
| Accuracy Class       | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|----------------------|----------|----------------|----------------|------------------------|
| Not specified by JIS | SUS304   | 20°            | —              | —                      |

- ★ No surface treatment is applied. This product cannot be coupled with another rack as it has not been both-end machined.
- ★ The dimensional tolerance of the material is  $202 \pm 1$  mm when the nominal overall length is 200 mm, and  $305 \pm 1$  mm when the nominal overall length is 300 mm.

Mating gear



| Catalogue number        | Module<br>$m$ | Overall length<br>$l$ | Effective number of teeth<br>$z$ | Effective contact length<br>$b_e$ | Datum line<br>$h''$ | Shaft diameter<br>$d_h(h7)$ | Stem length<br>$l_h$ | Weight<br>$W(g)$ |
|-------------------------|---------------|-----------------------|----------------------------------|-----------------------------------|---------------------|-----------------------------|----------------------|------------------|
| <b>ORK50SU 2 — 0815</b> | 0.5           | 200                   | 95                               | 149                               | 7.5                 | $\phi$ 8                    | 50                   | 78               |
| <b>ORK75SU 2 — 0815</b> | 0.75          | 200                   | 63                               | 148                               | 7.25                | $\phi$ 8                    | 50                   | 76               |
| <b>ORK80SU 2 — 0815</b> | 0.8           | 200                   | 59                               | 148                               | 7.2                 | $\phi$ 8                    | 50                   | 76               |
| <b>ORK1SU 3 — 1024</b>  | 1             | 300                   | 76                               | 238                               | 9                   | $\phi$ 10                   | 60                   | 177              |



Unit: mm

| Accuracy Class       | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|----------------------|----------|----------------|----------------|------------------------|
| Not specified by JIS | SUS304   | 20°            | —              | —                      |

- ★ No surface treatment is applied. **The racks that have gone through both-end machining can be coupled with one another.**
- ★ Overall length: If both-end machining is done, the overall length is obtained by subtracting 0.06 to 0.5 mm from the theoretical value.
- ★ This product is made of a drawn material, and therefore is finished to have dimensional tolerances of h12 to h13 for both the face width and height.
- ★ Straightening is done after tooth cutting, but bending may occur due to material aging.

Mating gear



| Catalogue number         | Module<br>$m$ | Overall length<br>$l$ | Both-end machining<br>$p$ | Effective number of teeth<br>$z$ | Datum line<br>$h''$ | Face width<br>$b$ | Height<br>$h$ | Weight<br>$W(g)$ |
|--------------------------|---------------|-----------------------|---------------------------|----------------------------------|---------------------|-------------------|---------------|------------------|
| <b>RK50SU 2 — 0310</b>   | 0.5           | 202 to 205            | -                         | 126                              | 9.5                 | 3                 | 10            | 45               |
| <b>RK50SU 2 — 0808</b>   |               | 202 to 205            | -                         | 126                              | 7.5                 | 8                 | 8             | 95               |
| <b>RK50SU 5 — 0810</b>   |               | 505 to 508            | -                         | 319                              | 9.5                 | 8                 | 10            | 300              |
| <b>RK75SU 2 — 0310</b>   | 0.75          | 202 to 205            | -                         | 83                               | 9.25                | 3                 | 10            | 44               |
| <b>RK75SU 2 — 0808</b>   |               | 202 to 205            | -                         | 83                               | 7.25                | 8                 | 8             | 91               |
| <b>RK75SU 5 — 0810</b>   |               | 505 to 508            | -                         | 212                              | 9.25                | 8                 | 10            | 295              |
| <b>RK80SU 2 — 0707</b>   | 0.8           | 202 to 205            | -                         | 78                               | 6.2                 | 7                 | 7             | 70               |
| <b>RK80SU 5 — 0510</b>   |               | 505 to 508            | -                         | 198                              | 9.2                 | 5                 | 10            | 183              |
| <b>RK80SU 5 — 0710</b>   |               | 505 to 508            | -                         | 198                              | 9.2                 | 7                 | 10            | 256              |
| <b>RK1SU 3 — 1010</b>    | 1             | 303 to 306            | -                         | 94                               | 9                   | 10                | 10            | 210              |
| <b>RK1SU 5 — 0810</b>    |               | 505 to 508            | -                         | 158                              | 9                   | 8                 | 10            | 280              |
| <b>RK1SU 5 — 1010</b>    |               | 505 to 508            | -                         | 158                              | 9                   | 10                | 10            | 360              |
| <b>RK1.5SU 3 — 1616</b>  | 1.5           | 303 to 306            | -                         | 62                               | 14.5                | 16                | 16            | 0.55(kg)         |
| <b>RK1.5SU 5 — 1616</b>  |               | 503 to 506            | -                         | 105                              | 14.5                | 16                | 16            | 0.92(kg)         |
| <b>RK1.5SU 10 — 1616</b> |               | 1008.5                | 0.1 to 0.3                | 214                              | 14.5                | 16                | 16            | 1.83(kg)         |



# RK

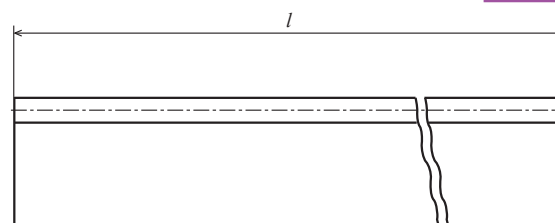
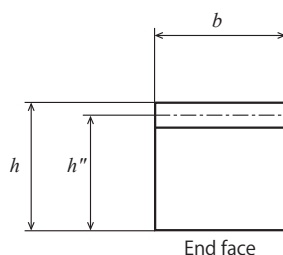
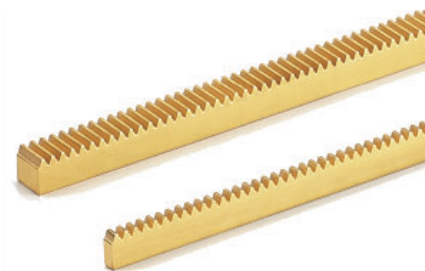
## Rack (Brass)

Module 0.3/0.5/0.75/0.8

(Full Depth Tooth)



2D • 3D CAD



Unit: mm

| Accuracy Class       | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|----------------------|----------|----------------|----------------|------------------------|
| Not specified by JIS | C3604B   | 20°            | —              | —                      |

- ★ No surface treatment is applied. This product cannot be coupled with another rack as it has not been both-end machined.
- ★ The dimensional tolerance for the overall length of the material (200 mm and 505 mm) is 0 to +3 mm.

Mating gear



Metallic spur gear

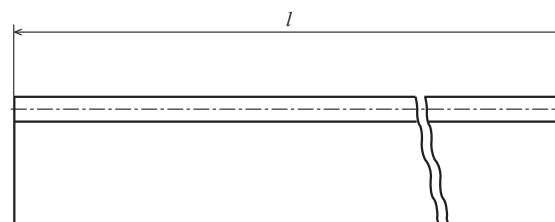
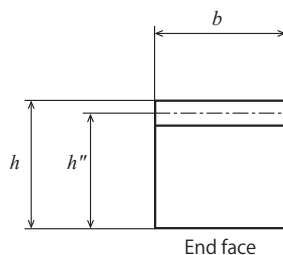
| Catalogue number      | Module<br><i>m</i> | Overall length<br><i>l</i> | Effective number of teeth<br><i>z</i> | Datum line<br><i>h''</i> | Face width<br><i>b(h1l)</i> | Height<br><i>h(h1l)</i> | Weight<br><i>W(g)</i> |
|-----------------------|--------------------|----------------------------|---------------------------------------|--------------------------|-----------------------------|-------------------------|-----------------------|
| <b>RK30B 2 — 0308</b> | 0.3                | 200                        | 210                                   | 7.7                      | 3                           | 8                       | 38                    |
| <b>RK50B 2 — 0308</b> | 0.5                | 200                        | 125                                   | 7.5                      | 3                           | 8                       | 37                    |
| <b>RK50B 2 — 0808</b> |                    | 200                        | 125                                   | 7.5                      | 8                           | 8                       | 98                    |
| <b>RK50B 5 — 0810</b> |                    | 505                        | 319                                   | 9.5                      | 8                           | 10                      | 313                   |
| <b>RK75B 2 — 0308</b> | 0.75               | 200                        | 82                                    | 7.25                     | 3                           | 8                       | 35                    |
| <b>RK75B 2 — 0808</b> |                    | 200                        | 82                                    | 7.25                     | 8                           | 8                       | 95                    |
| <b>RK75B 5 — 0310</b> |                    | 505                        | 212                                   | 9.25                     | 3                           | 10                      | 115                   |
| <b>RK75B 5 — 0810</b> |                    | 505                        | 212                                   | 9.25                     | 8                           | 10                      | 307                   |
| <b>RK80B 2 — 0707</b> | 0.8                | 200                        | 77                                    | 6.2                      | 7                           | 7                       | 70                    |
| <b>RK80B 5 — 0510</b> |                    | 505                        | 198                                   | 9.2                      | 5                           | 10                      | 191                   |
| <b>RK80B 5 — 0710</b> |                    | 505                        | 198                                   | 9.2                      | 7                           | 10                      | 268                   |

# RK

## Rack (Blue POM)

Module 0.5/0.8/1

(Full Depth Tooth)



Unit: mm

| Accuracy Class       | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|----------------------|----------|----------------|----------------|------------------------|
| Not specified by JIS | Blue POM | 20°            | —              | —                      |

- ★ This product cannot be coupled with another rack as it has not been both-end machined.
- ★ Straightening of bend: Straightening is done after tooth cutting, but bending may occur due to material aging or temperature changes. Straighten the bend before installation.
- ★ Because of the characteristics of the blue POM material, the dimensions change with time and due to temperature changes.
- ★ For details on blue POM, refer to P. 22.

Mating gear



SG/SGR/ Blue POM  
Spur gear

When a polyacetal gear is meshed with a polyacetal gear, the strength is approximately 75% of that when a polyacetal gear is meshed with a metallic gear.  
When a polyacetal gear is used, it is recommended to use a metallic spur gear with ground tooth surfaces as the mating gear.

| Catalogue number       | Module<br><i>m</i> | Overall length<br><i>l</i> | Effective number of teeth<br><i>z</i> | Datum line<br><i>h''</i> | Face width<br><i>b</i> | Height<br><i>h</i> | Weight<br><i>W(g)</i> |
|------------------------|--------------------|----------------------------|---------------------------------------|--------------------------|------------------------|--------------------|-----------------------|
| <b>RK50BP 2 — 0510</b> | 0.5                | 202 to 205                 | 126                                   | 9.5                      | 5                      | 10                 | 13.4                  |
| <b>RK80BP 2 — 0510</b> | 0.8                | 202 to 205                 | 78                                    | 9.2                      | 5                      | 10                 | 13.0                  |
| <b>RK80BP 5 — 0510</b> |                    | 505 to 508                 | 198                                   | 9.2                      | 5                      | 10                 | 32.6                  |
| <b>RK1BP 3 — 1010</b>  | 1                  | 303 to 306                 | 94                                    | 9                        | 10                     | 10                 | 38.2                  |
| <b>RK1BP 5 — 1010</b>  |                    | 502 to 506                 | 158                                   | 9                        | 10                     | 10                 | 63.7                  |
| <b>RK1BP 5 — 1012</b>  |                    | 502 to 506                 | 158                                   | 11                       | 10                     | 12                 | 77.9                  |

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

**RACKS**

HELICAL GEARS AND  
SCREW GEARS

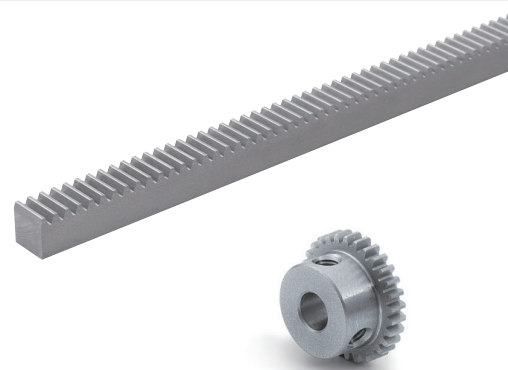
MITTER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES

# Circular pitch size CP Rack gears RKP series CP Pinion gears SP series



\* These are samples

## How to Read Catalogue Numbers

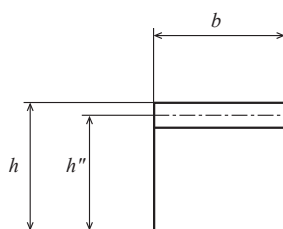
**RKP 5 SD 5 — 16 16**

| Gear type                             | Pitch                                                                                                                    | Material                     | Overall length                                                                                       |  | Face width | Height   |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------|--|------------|----------|
| RKP: CP Rack gear<br>(Circular pitch) | Represents the size of the circumferential pitch between adjacent teeth. In case of 5, the circumferential pitch is 5mm. | B : Brass C3604B<br>SD: S45C | Unit: mm<br>The actual length indicates a value 100 times.<br>Example:<br>2 → "200mm"<br>3 → "300mm" |  | Unit: mm   | Unit: mm |

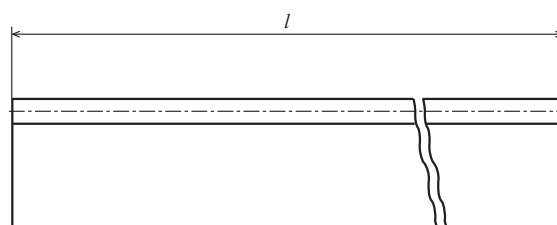
**SP 5 S — 15**

| Gear type                                     | Pitch                                                                                                                                                                              | Material | Hole finish                                                                                                  | Number of teeth                                  |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| SP: CP Pinion / Spur gear<br>(Circular pitch) | Represents the size of the circumferential pitch between adjacent teeth. In case of 5, the circumferential pitch is 5mm. The distance per revolution is the number of teeth x 5mm. | S: S45C  | Lathe turning<br>[-]: No screw holes provided,<br>no key grooves provided.<br>[*]: Two screw holes provided. | Example:<br>When the number of teeth is 15: "15" |

| Catalogue number       | RKP     | SP      | RKP        | SP         |
|------------------------|---------|---------|------------|------------|
| Shape                  |         |         |            |            |
| Page                   | P. 188  | P. 188  | P. 189     | P. 189     |
| Material               | Brass   | S45C    | S45C       | S45C       |
| Circular Pitch (CP)    | CP2     | CP2     | CP5 / CP10 | CP5 / CP10 |
| Heat treatment         | —       | —       | —          | —          |
| Teeth process sequence | Cutting | Cutting | Cutting    | Cutting    |



End face

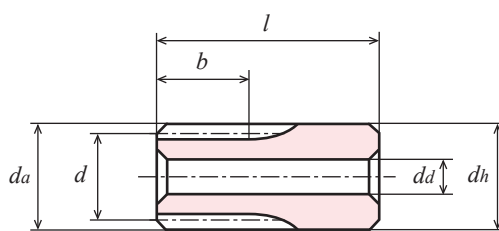


Unit: mm

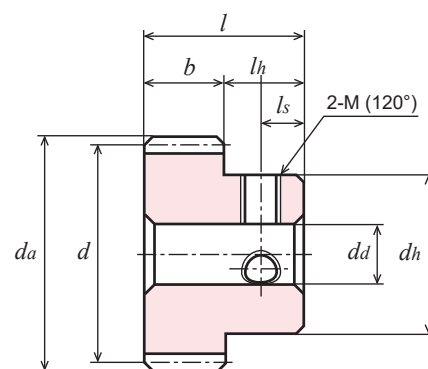
| Accuracy Class       | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|----------------------|----------|----------------|----------------|------------------------|
| Not specified by JIS | C3604B   | 20°            | —              | —                      |

- ★ No surface treatment is applied. This product cannot be coupled with another rack as it has not been both-end machined.
- ★ The dimensional tolerance for the overall length of the material (200 mm and 505 mm) is 0 to +3 mm.
- ★ The tooth size is based on the circular pitch (CP), and therefore, this product cannot be meshed with a gear with a module size.
- ★ Select the mating pinion from KG's SP Series pinions designed exclusively for CP racks.
- ★ For details such as how to calculate the rack assembly distance, refer to "Rack gear information" on the next page.

| Catalogue number | Pitch     | Overall length | Effective number of teeth | Datum line | Face width    | Height        | Weight      |
|------------------|-----------|----------------|---------------------------|------------|---------------|---------------|-------------|
|                  | <i>cp</i> | <i>l</i>       | <i>z</i>                  | <i>h''</i> | <i>b(h11)</i> | <i>h(h11)</i> | <i>W(g)</i> |
| RKP2B 2 — 0308   | 2         | 200            | 98                        | 7.36       | 3             | 8             | 35.8        |
| RKP2B 5 — 0310   | 2         | 505            | 248                       | 9.36       | 3             | 10            | 113.7       |



K2 type



B1 type [\*]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|-------------------|----------|----------------|----------------|------------------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      |

- ★ No surface treatment is applied. [\*] Two screw holes and set screws are provided.
- ★ The tooth size is based on the circular pitch (CP), and therefore, this product cannot be meshed with a rack with a module size.
- ★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."
- ★ Select the mating rack from KG's RKP Series CP racks.

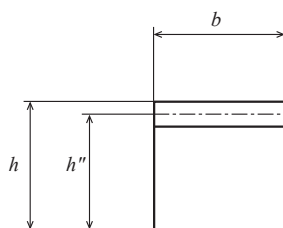
| Catalogue number | Pitch     | Number of teeth | Reference diameter | Tip diameter         | Type | Face width | Hole diameter            | Hub outside diameter | Hub length           | Overall length | Screw     |                      | Distance per revolution | Weight      |
|------------------|-----------|-----------------|--------------------|----------------------|------|------------|--------------------------|----------------------|----------------------|----------------|-----------|----------------------|-------------------------|-------------|
|                  |           |                 |                    |                      |      |            |                          |                      |                      |                | 2-M(120°) | <i>l<sub>s</sub></i> |                         |             |
|                  | <i>cp</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub>(H7)</i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> |                |           |                      | Note)                   | <i>W(g)</i> |
| SP2S — 15        | 2         | 15              | φ 9.55             | φ 10.82              | K2   | 5          | φ4(H8)                   | φ10.82               | 10                   | 15             | -         | -                    | 30                      | 8.54        |
| SP2S — 20        |           | 20              | φ 12.73            | φ 14.01              | B1   | 3          | φ 5                      | φ10                  | 7                    | 10             | -         | -                    | 40                      | 5.78        |
| SP2S * 20        |           | 20              | φ 12.73            | φ 14.01              | B1   | 3          | φ 5                      | φ10                  | 7                    | 10             | 2-M3      | 3.5                  | 40                      | 5.55        |
| SP2S — 25        |           | 25              | φ 15.92            | φ 17.19              | B1   | 3          | φ 6                      | φ12                  | 7                    | 10             | -         | -                    | 50                      | 8.67        |
| SP2S — 30        |           | 30              | φ 19.10            | φ 20.37              | B1   | 3          | φ 6                      | φ15                  | 7                    | 10             | -         | -                    | 60                      | 14.2        |
| SP2S * 30        |           | 30              | φ 19.10            | φ 20.37              | B1   | 3          | φ 6                      | φ15                  | 7                    | 10             | 2-M4      | 3.5                  | 60                      | 13.5        |

| Catalogue number | Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |        |        |        |        |          |          |
|------------------|-----------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                         | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| SP2S — 15        | 0.88                                                                                          | 8.78   | 17.55  | 35.10  | 70.21  | 105.31   | 131.64   |
| SP2S — 20        | 0.83                                                                                          | 8.25   | 16.50  | 33.00  | 66.01  | 99.01    | 117.89   |
| SP2S — 25        | 1.14                                                                                          | 11.36  | 22.71  | 45.43  | 90.86  | 131.38   | 154.87   |
| SP2S — 30        | 1.46                                                                                          | 14.56  | 29.12  | 58.25  | 116.49 | 162.56   | 189.99   |

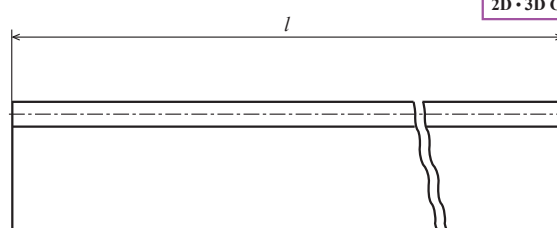
| Catalogue number | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |        |        |        |        |          |          |
|------------------|-------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                  | 10rpm                                                                                           | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| SP2S — 15        | 0.03                                                                                            | 0.29   | 0.59   | 1.21   | 2.42   | 3.63     | 4.54     |
| SP2S — 20        | 0.03                                                                                            | 0.33   | 0.66   | 1.32   | 2.63   | 3.95     | 4.81     |
| SP2S — 25        | 0.05                                                                                            | 0.53   | 1.05   | 2.10   | 4.27   | 6.19     | 7.34     |
| SP2S — 30        | 0.08                                                                                            | 0.77   | 1.55   | 3.10   | 6.27   | 8.76     | 10.41    |



2D • 3D CAD



End face



Unit: mm

| Accuracy Class       | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|----------------------|----------|----------------|----------------|------------------------|
| Not specified by JIS | S45C     | 20°            | —              | —                      |

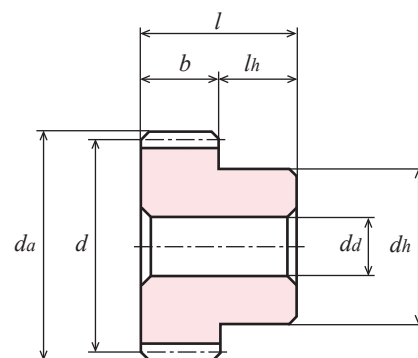
- ★ No surface treatment is applied. The racks (ex. length 1,000mm) that have gone through both-end machining can be coupled with one another.
- ★ The tooth size is based on the circular pitch (CP), and therefore, this product cannot be meshed with a gear with a module size.
- ★ Select the mating pinion from KG's SP Series pinions designed exclusively for CP racks.
- ★ For details such as how to calculate the rack assembly distance, refer to "Rack gear information" on the next page.
- ★ This product is made of a drawn material, and therefore is finished to have dimensional tolerances of h11 to h12 for both the face width and height.

| Catalogue number        | Pitch     | Overall length | Both-end machining | Effective number of teeth | Datum line | Face width | Height   | Weight       |
|-------------------------|-----------|----------------|--------------------|---------------------------|------------|------------|----------|--------------|
|                         | <i>cp</i> | <i>l</i>       | <i>p</i>           | <i>z</i>                  | <i>h''</i> | <i>b</i>   | <i>h</i> | <i>W(kg)</i> |
| <b>RKP5SD 5— 1616</b>   | 5         | 503 to 506     | —                  | 98                        | 14.41      | 16         | 16       | 0.92         |
| <b>RKP5SD 10— 1616</b>  | 5         | 1,000          | 0.1 to 0.3         | 200                       | 14.41      | 16         | 16       | 1.80         |
| <b>RKP10SD 10— 3030</b> | 10        | 1,000          | 0.1 to 0.4         | 100                       | 26.82      | 30         | 30       | 6.32         |

SP

## CP Pinion (S45C)

Pitch 5(Module 1.5915) /10(Module 3.1831) (Full Depth Tooth)



B1 type [-]

Unit: mm

| Accuracy Class    | Material | Pressure angle | Heat treatment | Tooth surface hardness |
|-------------------|----------|----------------|----------------|------------------------|
| [JIS B 1702-1] N8 | S45C     | 20°            | —              | —                      |

- ★ No surface treatment is applied.
- ★ The tooth size is based on the circular pitch (CP), and therefore, this product cannot be meshed with a rack with a module size.
- ★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association).
- For the unit conversion method, refer to P. 20 in "References."
- ★ Select the mating rack from KG's RKP Series CP racks.

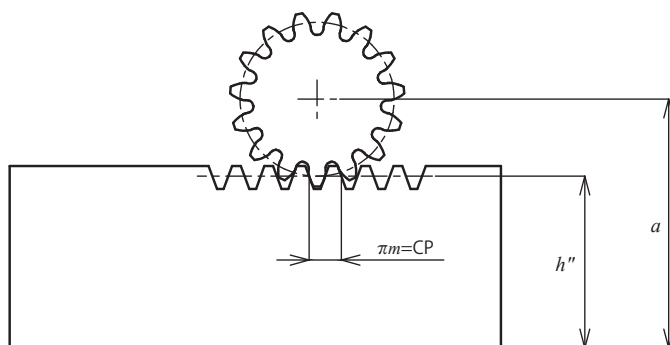
| Catalogue number  | Pitch     | Number of teeth | Reference diameter | Tip diameter         | Type | Face width | Hole diameter            | Hub outside diameter | Hub length           | Overall length | Distance per revolution | Weight      |
|-------------------|-----------|-----------------|--------------------|----------------------|------|------------|--------------------------|----------------------|----------------------|----------------|-------------------------|-------------|
|                   | <i>cp</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>a</sub>(H7)</i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | Note)                   | <i>W(g)</i> |
| <b>SP5S — 15</b>  | 5         | 15              | φ23.87             | φ 27.06              | B1   | 16         | φ 8                      | φ18                  | 10                   | 26             | 75                      | 65.9        |
| <b>SP5S — 20</b>  | 5         | 20              | φ31.83             | φ 35.01              | B1   | 16         | φ10                      | φ25                  | 10                   | 26             | 100                     | 122.4       |
| <b>SP5S — 24</b>  | 5         | 24              | φ38.20             | φ 41.38              | B1   | 16         | φ10                      | φ25                  | 10                   | 26             | 120                     | 166.3       |
| <b>SP10S — 20</b> | 10        | 20              | φ63.66             | φ 70.03              | B1   | 30         | φ18                      | φ50                  | 15                   | 45             | 200                     | 0.89(kg)    |
| <b>SP10S — 30</b> | 10        | 30              | φ95.49             | φ101.86              | B1   | 30         | φ18                      | φ60                  | 15                   | 45             | 300                     | 1.93(kg)    |

| Catalogue number  | Allowable transfer capability for different revolutions per minute |        |        |         |         |          |          | Allowable transfer capability for different revolutions per minute |        |        |        |        |          |          |
|-------------------|--------------------------------------------------------------------|--------|--------|---------|---------|----------|----------|--------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|
|                   | Bending strength (Unit: W)                                         |        |        |         |         |          |          | Surface durability (Unit: W)                                       |        |        |        |        |          |          |
|                   | 10rpm                                                              | 100rpm | 200rpm | 400rpm  | 800rpm  | 1,200rpm | 1,500rpm | 10rpm                                                              | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |
| <b>SP5S — 15</b>  | 17.55                                                              | 175.51 | 351.03 | 702.06  | 1353.35 | 1861.80  | 2149.14  | 0.65                                                               | 6.55   | 13.21  | 26.63  | 51.62  | 71.99    | 84.51    |
| <b>SP5S — 20</b>  | 27.51                                                              | 275.13 | 550.27 | 1048.12 | 2000.97 | 2695.23  | 3134.46  | 1.20                                                               | 12.03  | 24.28  | 46.78  | 89.93  | 123.79   | 147.26   |
| <b>SP5S — 24</b>  | 35.75                                                              | 357.55 | 715.09 | 1312.09 | 2487.24 | 3300.42  | 3972.78  | 1.76                                                               | 17.69  | 35.76  | 66.51  | 127.17 | 173.46   | 213.09   |
| <b>SP10S — 20</b> | 206.4                                                              | 2063.5 | 3751.8 | 6603.2  | 12537.7 | 17687.1  | 21265.0  | 9.67                                                               | 97.83  | 181.2  | 327.2  | 632.5  | 932.7    | 1169.8   |
| <b>SP10S — 30</b> | 364.1                                                              | 3509.2 | 5944.2 | 10787.6 | 20804.7 | 29453.5  | 36408.2  | 22.78                                                              | 223.3  | 389.8  | 732.0  | 1458.7 | 2192.2   | 2850.5   |

# Rack gear information

## How to calculate the rack assembly distance

For gears whose size is based on the circular pitch, their size can be converted to a module size by dividing the circular pitch by pi.



$$a = h'' + \frac{m \times z}{2} + xm$$

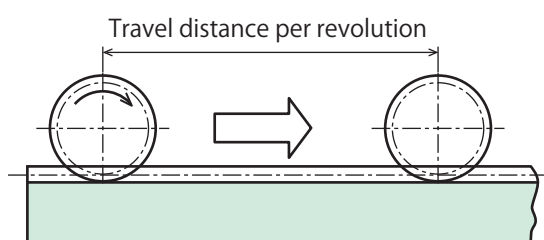
Explanation

$a$  : Assembly distance (distance from the rack bottom to the spur gear center)

$h''$  : Rack datum line

$m$  : Module

$z$  : Number of teeth

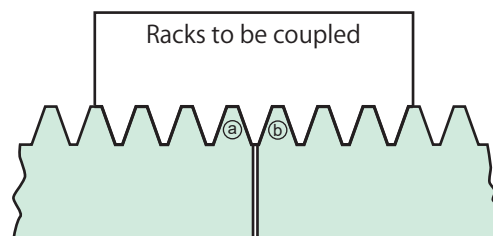


Note) Travel distance per revolution ... Distance that a pinion travels when it rotates once on a rack

## How to couple racks

When coupling multiple racks, align their pitch by using another rack as shown in the figure to the right in order to set the optimal pitch between racks ① and ②.

Note: We do not offer racks designed exclusively for coupling.





# Helical gears

## Screw gears

### H series



\* These are samples

### How to Read Catalogue Numbers

**H      1      S      13      R      –      B**

| Gear type       | Module                                                               | Material                                                                                 | Number of teeth                                  | Hand of helix                             | Hole finish                                                                                                  | Shape                       |
|-----------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------|
| H: Helical gear | Represents the module size.<br>Example:<br>When the module is 1: "1" | S : S45C<br>SU: Stainless steel<br>SUS304<br>BP: Acetal Blue POM<br>D : Acetal White POM | Example:<br>When the number of teeth is 15: "15" | R: Right hand helix<br>L: Left hand helix | Lathe turning<br>[-]: No screw holes provided,<br>no key grooves provided.<br>[*]: Two screw holes provided. | B: Hub provided on one side |

| Catalogue number       | H                                 | H            | H                     | H                     |
|------------------------|-----------------------------------|--------------|-----------------------|-----------------------|
| Shape                  |                                   |              |                       |                       |
| Page                   | P. 194                            | P. 196       | P. 198                | P. 202                |
| Material               | S45C                              | SUS304       | Blue POM              | White POM             |
| Module                 | m1 to 3                           | m1 to 1.5    | m1 to 3               | m1 to 1.5             |
| Accuracy grade         | JIS Class N9                      | JIS Class N9 | JIS Class N9 to N10 * | JIS Class N9 to N10 * |
| Teeth process sequence | Induction hardening after cutting | Cutting      | Cutting               | Cutting               |

※ Accuracy at the time of manufacture.

# Helical gear information

## 1. Cautions on Assembly

### 1) Shaft angle:

The hands of helix of the gears to be coupled depends on the shaft angle.

- In case of helical gears with the shaft twisted  $90^\circ$  : Combine gears with the same hand of helix.
- In case of helical gears with the shaft parallel: Combine gears with different hands of helix.

To achieve ideal intermeshing, install each helical gear at as accurate a shaft angle as possible.

When the shafts are parallel, low noise and high strength can be expected with a high contact ratio.

### 2) Thrust load on helical gears:

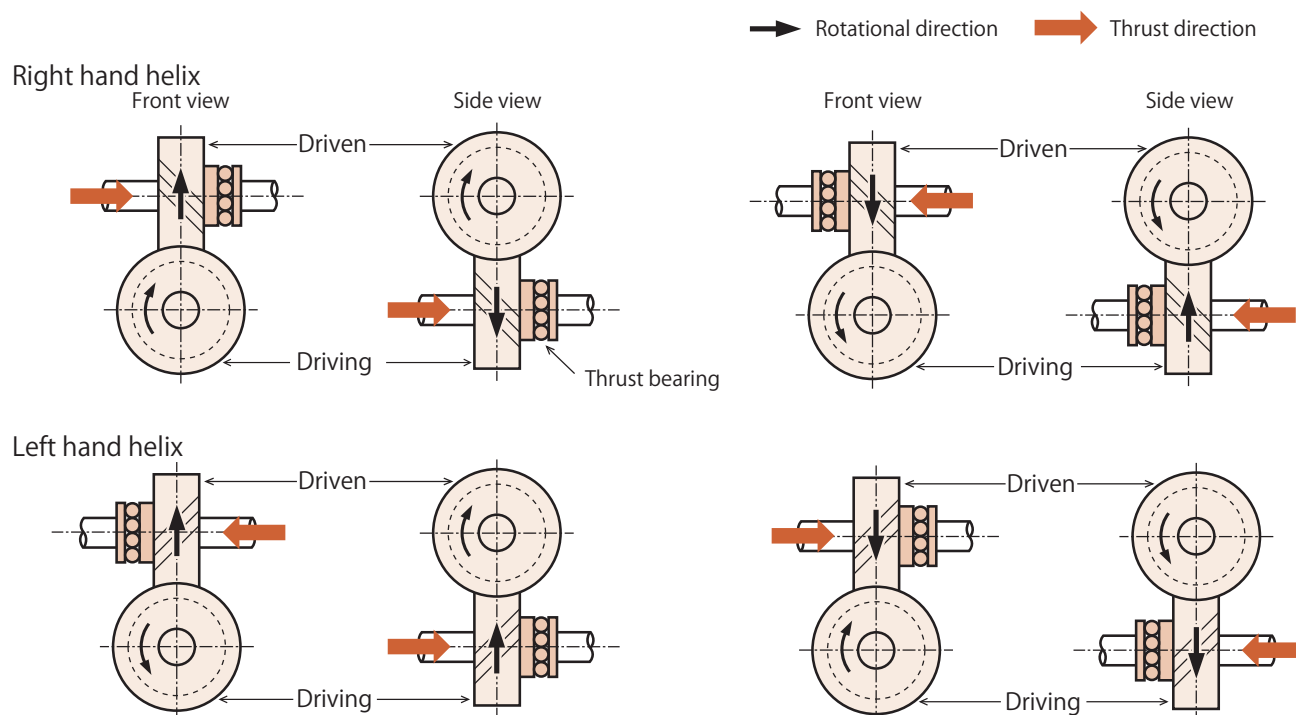
Helical gears provide smoother intermeshing than spur gears but have the disadvantage of generating a thrust load in the axial direction because they have helical teeth. Therefore, the bearings must be designed so that they can adequately support the axial thrust load.

A failure could occur if this product is used with a product other than ours.

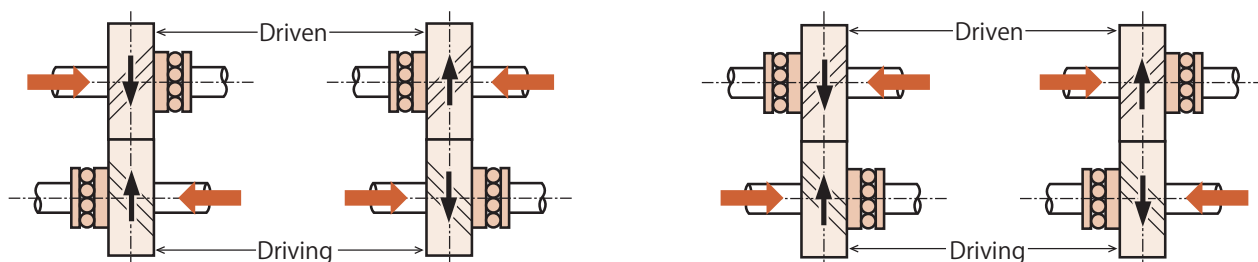
If your device is designed with specifications other than our standard ones, consult with us.

## 2. Thrust Load Applied to a Helical Gear in the Axial Direction

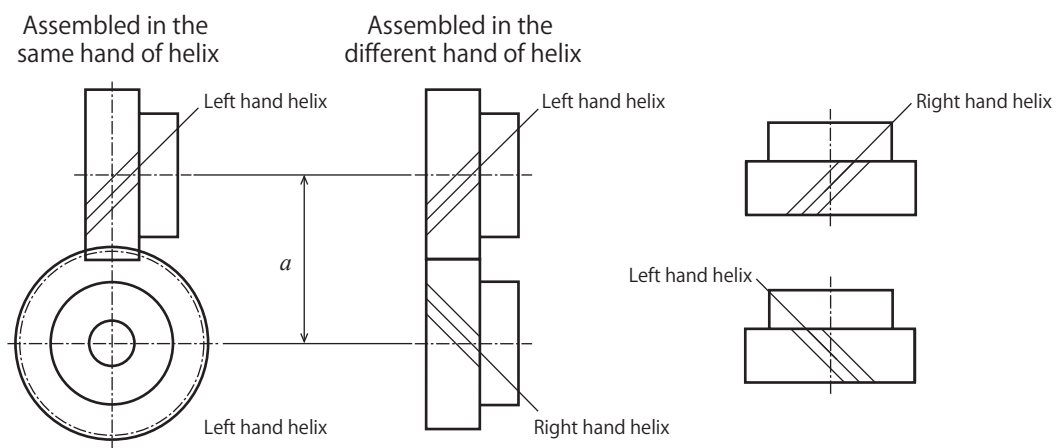
In case of helical gears with the shaft twisted  $90^\circ$  : Combine gears with the same hand of helix.



In case of helical gears with the shaft parallel: Combine gears with different hands of helix.



## 3. Relationship between hand of helix and assembly



# H: Hardened

## Helical Gear/Screw Gear (S45C)

Normal Module 1/1.5/2/2.5/3

(Full Depth Tooth)



Unit: mm

| Accuracy Class    | Material | Pressure angle | Helix angle | Heat treatment               | Tooth surface hardness | Backlash ①          |
|-------------------|----------|----------------|-------------|------------------------------|------------------------|---------------------|
| [JIS B 1702-1] N9 | S45C     | 20°            | 45°         | Induction hardening of teeth | HRC47 to 53            | See the table below |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

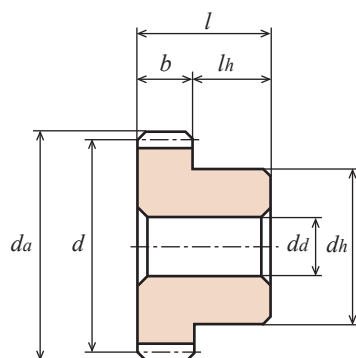
★ Assembly method and allowable transfer capability: When gears are assembled with the shafts parallel, check the allowable transfer capability table. In this case, the teeth have surface contact. When gears are assembled with the shafts intersecting, the allowable transfer capability is significantly lower than when they are assembled with the shafts parallel. In this case, the teeth have point contact.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. The backlash is a circumferential backlash.

| Catalogue number | Hand of helix | Module   | Number of teeth | Reference diameter | Tip diameter         | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Weight        |
|------------------|---------------|----------|-----------------|--------------------|----------------------|------------|---------------------------|----------------------|----------------------|----------------|---------------|
|                  |               | <i>m</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>W</i> (kg) |
| H1S 13R — B      | R             | 1        | 13              | φ 18.38            | φ 20.4               | 12         | φ 8                       | φ15                  | 10                   | 22             | 0.03          |
| H1S 13L — B      | L             | 1        | 13              | φ 18.38            | φ 20.4               | 12         | φ 8                       | φ15                  | 10                   | 22             | 0.03          |
| H1S 26R — B      | R             | 1        | 26              | φ 36.77            | φ 38.8               | 12         | φ10                       | φ32                  | 10                   | 22             | 0.15          |
| H1S 26L — B      | L             | 1        | 26              | φ 36.77            | φ 38.8               | 12         | φ10                       | φ32                  | 10                   | 22             | 0.15          |
| H1.5S 13R — B    | R             | 1.5      | 13              | φ 27.58            | φ 30.6               | 15         | φ10                       | φ23                  | 10                   | 25             | 0.09          |
| H1.5S 13L — B    | L             | 1.5      | 13              | φ 27.58            | φ 30.6               | 15         | φ10                       | φ23                  | 10                   | 25             | 0.09          |
| H1.5S 26R — B    | R             | 1.5      | 26              | φ 55.15            | φ 58.2               | 15         | φ12                       | φ40                  | 10                   | 25             | 0.36          |
| H1.5S 26L — B    | L             | 1.5      | 26              | φ 55.15            | φ 58.2               | 15         | φ12                       | φ40                  | 10                   | 25             | 0.36          |
| H2S 13R — B      | R             | 2        | 13              | φ 36.77            | φ 40.8               | 20         | φ12                       | φ30                  | 13                   | 33             | 0.21          |
| H2S 13L — B      | L             | 2        | 13              | φ 36.77            | φ 40.8               | 20         | φ12                       | φ30                  | 13                   | 33             | 0.21          |
| H2S 26R — B      | R             | 2        | 26              | φ 73.54            | φ 77.5               | 20         | φ16                       | φ55                  | 13                   | 33             | 0.86          |
| H2S 26L — B      | L             | 2        | 26              | φ 73.54            | φ 77.5               | 20         | φ16                       | φ55                  | 13                   | 33             | 0.86          |
| H2.5S 13R — B    | R             | 2.5      | 13              | φ 45.96            | φ 50.9               | 22         | φ14                       | φ38                  | 14                   | 36             | 0.37          |
| H2.5S 13L — B    | L             | 2.5      | 13              | φ 45.96            | φ 50.9               | 22         | φ14                       | φ38                  | 14                   | 36             | 0.37          |
| H2.5S 26R — B    | R             | 2.5      | 26              | φ 91.92            | φ 96.9               | 22         | φ18                       | φ63                  | 14                   | 36             | 1.41          |
| H3S 13R — B      | R             | 3        | 13              | φ 55.15            | φ 61.2               | 25         | φ16                       | φ44                  | 15                   | 40             | 0.58          |
| H3S 26L — B      | L             | 3        | 26              | φ110.31            | φ116.3               | 25         | φ22                       | φ70                  | 15                   | 40             | 2.21          |



2D • 3D CAD



B1 type [-]

| Allowable transfer capability for different revolutions per minute (for parallel shafts) Bending strength (Unit: kW) |         |         |         |         |           |           | Allowable transfer capability for different revolutions per minute (for parallel shafts) Surface durability (Unit: kW) |         |         |         |         |           |           | Backlash of parallel shafts (Unit: mm) | Catalogue number               |
|----------------------------------------------------------------------------------------------------------------------|---------|---------|---------|---------|-----------|-----------|------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|---------|-----------|-----------|----------------------------------------|--------------------------------|
| 10 rpm                                                                                                               | 100 rpm | 200 rpm | 400 rpm | 800 rpm | 1,200 rpm | 1,500 rpm | 10 rpm                                                                                                                 | 100 rpm | 200 rpm | 400 rpm | 800 rpm | 1,200 rpm | 1,500 rpm |                                        |                                |
| 0.009                                                                                                                | 0.09    | 0.19    | 0.38    | 0.77    | 1.13      | 1.36      | 0.003                                                                                                                  | 0.03    | 0.07    | 0.14    | 0.28    | 0.42      | 0.51      | 0.04 to 0.10                           | H1S 13R – B<br>H1S 13L – B     |
| 0.022                                                                                                                | 0.22    | 0.45    | 0.90    | 1.67    | 2.26      | 2.64      | 0.015                                                                                                                  | 0.15    | 0.31    | 0.64    | 1.20    | 1.65      | 1.95      | 0.04 to 0.10                           | H1S 26R – B<br>H1S 26L – B     |
| 0.027                                                                                                                | 0.27    | 0.54    | 1.08    | 2.12    | 2.94      | 3.47      | 0.010                                                                                                                  | 0.10    | 0.20    | 0.41    | 0.81    | 1.14      | 1.36      | 0.06 to 0.15                           | H1.5S 13R – B<br>H1.5S 13L – B |
| 0.063                                                                                                                | 0.63    | 1.27    | 2.48    | 4.25    | 5.76      | 6.98      | 0.045                                                                                                                  | 0.45    | 0.91    | 1.81    | 3.16    | 4.37      | 5.35      | 0.06 to 0.15                           | H1.5S 26R – B<br>H1.5S 26L – B |
| 0.06                                                                                                                 | 0.64    | 1.29    | 2.58    | 4.77    | 6.47      | 7.54      | 0.02                                                                                                                   | 0.24    | 0.49    | 0.99    | 1.87    | 2.57      | 3.03      | 0.08 to 0.20                           | H2S 13R – B<br>H2S 13L – B     |
| 0.15                                                                                                                 | 1.50    | 2.99    | 5.53    | 9.17    | 12.99     | 15.73     | 0.11                                                                                                                   | 1.07    | 2.16    | 4.06    | 6.91    | 9.98      | 12.23     | 0.08 to 0.20                           | H2S 26R – B<br>H2S 26L – B     |
| 0.11                                                                                                                 | 1.10    | 2.21    | 4.41    | 7.75    | 10.31     | 12.43     | 0.04                                                                                                                   | 0.52    | 0.85    | 1.71    | 3.06    | 4.14      | 5.04      | 0.10 to 0.25                           | H2.5S 13R – B<br>H2.5S 13L – B |
| 0.26                                                                                                                 | 2.57    | 5.15    | 9.04    | 15.34   | 21.67     | 26.20     | 0.19                                                                                                                   | 1.87    | 3.79    | 6.78    | 11.83   | 17.08     | 20.92     | 0.10 to 0.25                           | H2.5S 26R – B                  |
| 0.18                                                                                                                 | 1.82    | 3.63    | 7.10    | 12.14   | 16.47     | 19.93     | 0.07                                                                                                                   | 0.71    | 1.42    | 2.82    | 4.92    | 6.79      | 8.31      | 0.12 to 0.30                           | H3S 13R – B                    |
| 0.42                                                                                                                 | 4.22    | 8.24    | 14.10   | 24.43   | 34.56     | 42.17     | 0.31                                                                                                                   | 3.11    | 6.15    | 10.75   | 19.22   | 27.82     | 34.40     | 0.12 to 0.30                           | H3S 26L – B                    |



Unit: mm

| Accuracy Class    | Material | Pressure angle | Helix angle | Heat treatment | Tooth surface hardness | Backlash ①          |
|-------------------|----------|----------------|-------------|----------------|------------------------|---------------------|
| [JIS B 1702-1] N9 | SUS304   | 20°            | 45°         | —              | —                      | See the table below |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ Assembly method and allowable transfer capability: When gears are assembled with the shafts parallel, check the allowable transfer capability table. In this case, the teeth have surface contact. When gears are assembled with the twisted axes, the allowable transfer capability is significantly lower than when they are assembled with the shafts parallel. In this case, the teeth have point contact.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. The backlash is a circumferential backlash.

| Catalogue number      | Hand of helix | Module   | Number of teeth | Reference diameter | Tip diameter         | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Weight       |
|-----------------------|---------------|----------|-----------------|--------------------|----------------------|------------|---------------------------|----------------------|----------------------|----------------|--------------|
|                       |               | <i>m</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>W</i> (g) |
| <b>H1SU 13R — B</b>   | R             | 1        | 13              | φ18.38             | φ20.4                | 12         | φ 8                       | φ15                  | 10                   | 22             | 30.5         |
| <b>H1SU 13L — B</b>   | L             | 1        | 13              | φ18.38             | φ20.4                | 12         | φ 8                       | φ15                  | 10                   | 22             | 30.5         |
| <b>H1SU 26R — B</b>   | R             | 1        | 26              | φ36.77             | φ38.8                | 12         | φ10                       | φ32                  | 10                   | 22             | 151.1        |
| <b>H1.5SU 13R — B</b> | R             | 1.5      | 13              | φ27.58             | φ30.6                | 15         | φ10                       | φ23                  | 10                   | 25             | 88.4         |
| <b>H1.5SU 26R — B</b> | R             | 1.5      | 26              | φ55.15             | φ58.2                | 15         | φ12                       | φ40                  | 10                   | 25             | 361.4        |

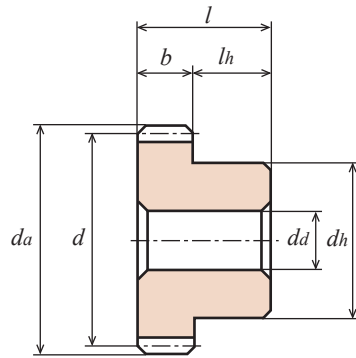
For gears with a [\*], two tap holes have been drilled. No set screws are provided for the SUS304 products.

| Catalogue number      | Hand of helix | Module   | Number of teeth | Reference diameter | Tip diameter         | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Screw     |                      | Weight       |
|-----------------------|---------------|----------|-----------------|--------------------|----------------------|------------|---------------------------|----------------------|----------------------|----------------|-----------|----------------------|--------------|
|                       |               | <i>m</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | 2-M(120°) | <i>l<sub>s</sub></i> | <i>W</i> (g) |
| <b>H1.5SU 13R * B</b> | R             | 1.5      | 13              | φ27.58             | φ30.6                | 15         | φ10                       | φ23                  | 10                   | 25             | 2-M4      | 5                    | 87.4         |



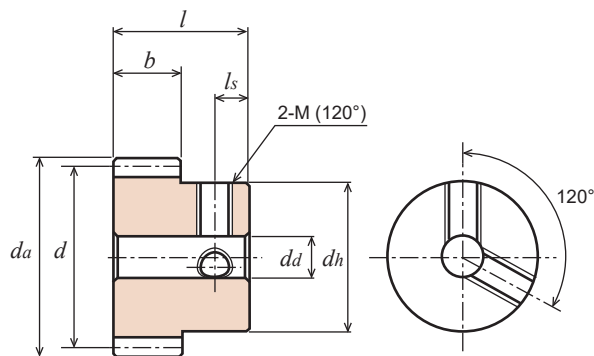


2D • 3D CAD



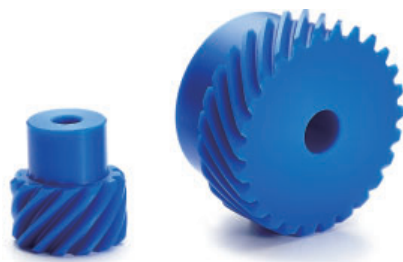
B1 type [-]

| Allowable transfer capability for different revolutions per minute (for parallel shafts),<br>Bending strength (Unit: W) |        |        |          |          |          |          | Backlash of parallel<br>shafts<br>(Unit: mm) | Catalogue number |
|-------------------------------------------------------------------------------------------------------------------------|--------|--------|----------|----------|----------|----------|----------------------------------------------|------------------|
| 10rpm                                                                                                                   | 100rpm | 200rpm | 400rpm   | 800rpm   | 1,200rpm | 1,500rpm |                                              |                  |
| 4.07                                                                                                                    | 40.68  | 81.36  | 162.73   | 325.46   | 477.08   | 572.13   | 0.06 to 0.12                                 | H1SU 13R – B     |
|                                                                                                                         |        |        |          |          |          |          |                                              | H1SU 13L – B     |
| 9.50                                                                                                                    | 95.02  | 190.03 | 380.06   | 703.15   | 952.90   | 1,110.70 | 0.06 to 0.12                                 | H1SU 26R – B     |
| 11.44                                                                                                                   | 114.42 | 228.83 | 457.67   | 894.52   | 1,237.04 | 1,460.79 | 0.09 to 0.18                                 | H1.5SU 13R – B   |
| 26.72                                                                                                                   | 267.23 | 534.46 | 1,044.61 | 1,786.69 | 2,423.37 | 2,933.19 | 0.09 to 0.18                                 | H1.5SU 26R – B   |



B1 type [\*]

| Allowable transfer capability for different revolutions per minute (for parallel shafts),<br>Bending strength (Unit: W) |        |        |        |        |          |          | Backlash of parallel<br>shafts<br>(Unit: mm) | Catalogue number |
|-------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|----------------------------------------------|------------------|
| 10rpm                                                                                                                   | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |                                              |                  |
| 11.44                                                                                                                   | 114.42 | 228.83 | 457.67 | 894.52 | 1,237.04 | 1,460.79 | 0.09 to 0.18                                 | H1.5SU 13R * B   |



Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Helix angle | Heat treatment | Tooth surface hardness | Backlash ①          |
|--------------------------|----------|----------------|-------------|----------------|------------------------|---------------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | 45°         | —              | —                      | See the table below |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Assembly method and allowable transfer capability: When gears are assembled with the twisted axes, check the allowable transfer capability table. In this case, the teeth have point contact.

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

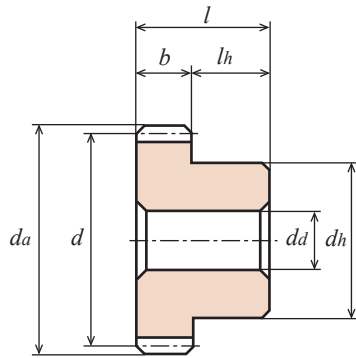
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. The backlash is a circumferential backlash.

② Accuracy at the time of manufacture.

| Catalogue number | Hand of helix | Module   | Number of teeth | Reference diameter | Tip diameter         | Face width | Hole diameter        | Hub diameter         | Hub length           | Overall length | Weight      |
|------------------|---------------|----------|-----------------|--------------------|----------------------|------------|----------------------|----------------------|----------------------|----------------|-------------|
|                  |               | <i>m</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> | <i>b</i>   | <i>d<sub>d</sub></i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>W(g)</i> |
| H1BP 10R — B     | R             | 1        | 10              | φ14.14             | φ16.1                | 12         | φ 4                  | φ10                  | 10                   | 22             | 3.4         |
| H1BP 10L — B     | L             | 1        | 10              | φ14.14             | φ16.1                | 12         | φ 4                  | φ10                  | 10                   | 22             | 3.4         |
| H1BP 13R — B     | R             | 1        | 13              | φ18.38             | φ20.4                | 12         | φ 5                  | φ14                  | 10                   | 22             | 6.0         |
| H1BP 13L — B     | L             | 1        | 13              | φ18.38             | φ20.4                | 12         | φ 5                  | φ14                  | 10                   | 22             | 6.0         |
| H1BP 15R — B     | R             | 1        | 15              | φ21.21             | φ23.2                | 12         | φ 6                  | φ15                  | 10                   | 22             | 7.6         |
| H1BP 15L — B     | L             | 1        | 15              | φ21.21             | φ23.2                | 12         | φ 6                  | φ15                  | 10                   | 22             | 7.6         |
| H1BP 20R — B     | R             | 1        | 20              | φ28.28             | φ30.3                | 12         | φ 6                  | φ22                  | 10                   | 22             | 15.1        |
| H1BP 20L — B     | L             | 1        | 20              | φ28.28             | φ30.3                | 12         | φ 6                  | φ22                  | 10                   | 22             | 15.1        |
| H1BP 26R — B     | R             | 1        | 26              | φ36.77             | φ38.8                | 12         | φ 8                  | φ32                  | 10                   | 22             | 27.7        |
| H1BP 26L — B     | L             | 1        | 26              | φ36.77             | φ38.8                | 12         | φ 8                  | φ32                  | 10                   | 22             | 27.7        |
| H1.5BP 10R — B   | R             | 1.5      | 10              | φ21.21             | φ24.2                | 15         | φ 6                  | φ16                  | 10                   | 25             | 9.3         |
| H1.5BP 10L — B   | L             | 1.5      | 10              | φ21.21             | φ24.2                | 15         | φ 6                  | φ16                  | 10                   | 25             | 9.3         |
| H1.5BP 13R — B   | R             | 1.5      | 13              | φ27.58             | φ30.6                | 15         | φ 8                  | φ23                  | 10                   | 25             | 16.6        |
| H1.5BP 13L — B   | L             | 1.5      | 13              | φ27.58             | φ30.6                | 15         | φ 8                  | φ23                  | 10                   | 25             | 16.6        |
| H1.5BP 15R — B   | R             | 1.5      | 15              | φ31.82             | φ34.8                | 15         | φ 8                  | φ25                  | 10                   | 25             | 22.0        |
| H1.5BP 15L — B   | L             | 1.5      | 15              | φ31.82             | φ34.8                | 15         | φ 8                  | φ25                  | 10                   | 25             | 22.0        |
| H1.5BP 20R — B   | R             | 1.5      | 20              | φ42.43             | φ45.4                | 15         | φ10                  | φ30                  | 10                   | 25             | 37.1        |
| H1.5BP 20L — B   | L             | 1.5      | 20              | φ42.43             | φ45.4                | 15         | φ10                  | φ30                  | 10                   | 25             | 37.1        |
| H1.5BP 26R — B   | R             | 1.5      | 26              | φ55.15             | φ58.2                | 15         | φ10                  | φ40                  | 10                   | 25             | 65.5        |
| H1.5BP 26L — B   | L             | 1.5      | 26              | φ55.15             | φ58.2                | 15         | φ10                  | φ40                  | 10                   | 25             | 65.5        |
| H2BP 10R — B     | R             | 2        | 10              | φ28.28             | φ32.3                | 20         | φ10                  | φ22                  | 15                   | 35             | 21.9        |
| H2BP 10L — B     | L             | 2        | 10              | φ28.28             | φ32.3                | 20         | φ10                  | φ22                  | 15                   | 35             | 21.9        |
| H2BP 13R — B     | R             | 2        | 13              | φ36.77             | φ40.8                | 20         | φ10                  | φ30                  | 15                   | 35             | 41.0        |
| H2BP 13L — B     | L             | 2        | 13              | φ36.77             | φ40.8                | 20         | φ10                  | φ30                  | 15                   | 35             | 41.0        |
| H2BP 15R — B     | R             | 2        | 15              | φ42.43             | φ46.4                | 20         | φ10                  | φ35                  | 15                   | 35             | 56.3        |
| H2BP 15L — B     | L             | 2        | 15              | φ42.43             | φ46.4                | 20         | φ10                  | φ35                  | 15                   | 35             | 56.3        |
| H2BP 20R — B     | R             | 2        | 20              | φ56.57             | φ60.6                | 20         | φ12                  | φ45                  | 15                   | 35             | 98.9        |
| H2BP 20L — B     | L             | 2        | 20              | φ56.57             | φ60.6                | 20         | φ12                  | φ45                  | 15                   | 35             | 98.9        |
| H2BP 26R — B     | R             | 2        | 26              | φ73.54             | φ77.5                | 20         | φ12                  | φ55                  | 15                   | 35             | 164.4       |
| H2BP 26L — B     | L             | 2        | 26              | φ73.54             | φ77.5                | 20         | φ12                  | φ55                  | 15                   | 35             | 164.4       |



2D • 3D CAD



B1 type [-]

| Allowable transfer capability for different revolutions per minute for helical gears with twisted axes Surface durability (Unit: W) |        |        |        |        |          |          | Backlash of parallel shafts (Unit: mm) | Catalogue number |
|-------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|----------------------------------------|------------------|
| 10rpm                                                                                                                               | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |                                        |                  |
| 0.06                                                                                                                                | 0.51   | 1.03   | 2.05   | 3.29   | 3.70     | 4.62     | 0.06 to 0.12                           | H1BP 10R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1BP 10L – B     |
| 0.13                                                                                                                                | 1.23   | 2.47   | 4.11   | 6.57   | 8.63     | 9.24     | 0.06 to 0.12                           | H1BP 13R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1BP 13L – B     |
| 0.21                                                                                                                                | 1.95   | 3.70   | 6.16   | 9.86   | 12.32    | 13.86    | 0.06 to 0.12                           | H1BP 15R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1BP 15L – B     |
| 0.50                                                                                                                                | 4.62   | 8.42   | 14.38  | 22.18  | 27.11    | 29.27    | 0.06 to 0.12                           | H1BP 20R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1BP 20L – B     |
| 1.10                                                                                                                                | 9.86   | 17.46  | 28.75  | 42.72  | 50.52    | 53.91    | 0.06 to 0.12                           | H1BP 26R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1BP 26L – B     |
| 0.21                                                                                                                                | 1.95   | 3.70   | 6.16   | 9.86   | 12.32    | 13.86    | 0.09 to 0.18                           | H1.5BP 10R – B   |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1.5BP 10L – B   |
| 0.46                                                                                                                                | 4.11   | 7.80   | 13.14  | 20.54  | 24.65    | 27.73    | 0.09 to 0.18                           | H1.5BP 13R – B   |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1.5BP 13L – B   |
| 0.72                                                                                                                                | 6.47   | 11.71  | 19.72  | 29.58  | 35.74    | 38.51    | 0.09 to 0.18                           | H1.5BP 15R – B   |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1.5BP 15L – B   |
| 1.69                                                                                                                                | 14.89  | 26.08  | 42.31  | 60.79  | 71.47    | 77.02    | 0.09 to 0.18                           | H1.5BP 20R – B   |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1.5BP 20L – B   |
| 3.71                                                                                                                                | 31.42  | 53.81  | 83.39  | 115.01 | 130.62   | 138.63   | 0.09 to 0.18                           | H1.5BP 26R – B   |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H1.5BP 26L – B   |
| 0.50                                                                                                                                | 4.62   | 8.42   | 14.38  | 22.18  | 27.11    | 29.27    | 0.12 to 0.24                           | H2BP 10R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H2BP 10L – B     |
| 1.10                                                                                                                                | 9.86   | 17.46  | 28.75  | 42.72  | 50.52    | 53.91    | 0.12 to 0.24                           | H2BP 13R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H2BP 13L – B     |
| 1.69                                                                                                                                | 14.89  | 26.08  | 42.31  | 60.79  | 71.47    | 77.02    | 0.12 to 0.24                           | H2BP 15R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H2BP 15L – B     |
| 4.00                                                                                                                                | 33.79  | 57.51  | 88.73  | 121.59 | 139.25   | 147.87   | 0.12 to 0.24                           | H2BP 20R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H2BP 20L – B     |
| 8.74                                                                                                                                | 70.55  | 116.25 | 171.70 | 225.92 | 251.39   | 264.94   | 0.12 to 0.24                           | H2BP 26R – B     |
|                                                                                                                                     |        |        |        |        |          |          |                                        | H2BP 26L – B     |



Unit: mm

| Accuracy Class ②         | Material | Pressure angle | Helix angle | Heat treatment | Tooth surface hardness | Backlash ①          |
|--------------------------|----------|----------------|-------------|----------------|------------------------|---------------------|
| [JIS B 1702-1] N9 to N10 | Blue POM | 20°            | 45°         | —              | —                      | See the table below |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Assembly method and allowable transfer capability: When gears are assembled with the twisted axes, check the allowable transfer capability table. In this case, the teeth have point contact.

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

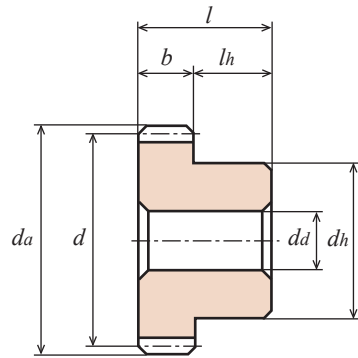
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. The backlash is a circumferential backlash.

② Accuracy at the time of manufacture.

| Catalogue number      | Hand of helix | Module   | Number of teeth | Reference diameter | Tip diameter         | Face width | Hole diameter        | Hub diameter         | Hub length           | Overall length | Weight      |
|-----------------------|---------------|----------|-----------------|--------------------|----------------------|------------|----------------------|----------------------|----------------------|----------------|-------------|
|                       |               | <i>m</i> | <i>z</i>        | <i>d</i>           | <i>d<sub>a</sub></i> | <i>b</i>   | <i>d<sub>d</sub></i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>W(g)</i> |
| <b>H2.5BP 10R — B</b> | R             | 2.5      | 10              | φ 35.36            | φ 40.4               | 22         | φ10                  | φ26                  | 16                   | 38             | 38.2        |
| <b>H2.5BP 10L — B</b> | L             | 2.5      | 10              | φ 35.36            | φ 40.4               | 22         | φ10                  | φ26                  | 16                   | 38             | 38.2        |
| <b>H2.5BP 13R — B</b> | R             | 2.5      | 13              | φ 45.96            | φ 50.9               | 22         | φ12                  | φ38                  | 16                   | 38             | 71.0        |
| <b>H2.5BP 13L — B</b> | L             | 2.5      | 13              | φ 45.96            | φ 50.9               | 22         | φ12                  | φ38                  | 16                   | 38             | 71.0        |
| <b>H2.5BP 15R — B</b> | R             | 2.5      | 15              | φ 53.03            | φ 58.0               | 22         | φ12                  | φ40                  | 16                   | 38             | 90.8        |
| <b>H2.5BP 15L — B</b> | L             | 2.5      | 15              | φ 53.03            | φ 58.0               | 22         | φ12                  | φ40                  | 16                   | 38             | 90.8        |
| <b>H2.5BP 20R — B</b> | R             | 2.5      | 20              | φ 70.71            | φ 75.7               | 22         | φ12                  | φ60                  | 16                   | 38             | 179.5       |
| <b>H2.5BP 20L — B</b> | L             | 2.5      | 20              | φ 70.71            | φ 75.7               | 22         | φ12                  | φ60                  | 16                   | 38             | 179.5       |
| <b>H2.5BP 26R — B</b> | R             | 2.5      | 26              | φ 91.92            | φ 96.9               | 22         | φ16                  | φ70                  | 16                   | 38             | 281.9       |
| <b>H2.5BP 26L — B</b> | L             | 2.5      | 26              | φ 91.92            | φ 96.9               | 22         | φ16                  | φ70                  | 16                   | 38             | 281.9       |
| <b>H3BP 10R — B</b>   | R             | 3        | 10              | φ 42.43            | φ 48.4               | 25         | φ12                  | φ34                  | 18                   | 43             | 66.0        |
| <b>H3BP 10L — B</b>   | L             | 3        | 10              | φ 42.43            | φ 48.4               | 25         | φ12                  | φ34                  | 18                   | 43             | 66.0        |
| <b>H3BP 13R — B</b>   | R             | 3        | 13              | φ 55.15            | φ 61.2               | 25         | φ15                  | φ45                  | 18                   | 43             | 113.8       |
| <b>H3BP 13L — B</b>   | L             | 3        | 13              | φ 55.15            | φ 61.2               | 25         | φ15                  | φ45                  | 18                   | 43             | 113.8       |
| <b>H3BP 15R — B</b>   | R             | 3        | 15              | φ 63.64            | φ 69.6               | 25         | φ15                  | φ50                  | 18                   | 43             | 151.2       |
| <b>H3BP 15L — B</b>   | L             | 3        | 15              | φ 63.64            | φ 69.6               | 25         | φ15                  | φ50                  | 18                   | 43             | 151.2       |
| <b>H3BP 20R — B</b>   | R             | 3        | 20              | φ 84.85            | φ 90.9               | 25         | φ15                  | φ60                  | 18                   | 43             | 260.3       |
| <b>H3BP 20L — B</b>   | L             | 3        | 20              | φ 84.85            | φ 90.9               | 25         | φ15                  | φ60                  | 18                   | 43             | 260.3       |
| <b>H3BP 26R — B</b>   | R             | 3        | 26              | φ110.31            | φ116.3               | 25         | φ18                  | φ80                  | 18                   | 43             | 449.0       |
| <b>H3BP 26L — B</b>   | L             | 3        | 26              | φ110.31            | φ116.3               | 25         | φ18                  | φ80                  | 18                   | 43             | 449.0       |



2D • 3D CAD



B1 type [-]

| Allowable transfer capability for different revolutions per minute for helical gears with twisted axes Surface durability (Unit: W) |        |        |        |        |          |          | Backlash of parallel shafts (Unit: mm) | Catalogue number                 |
|-------------------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|----------------------------------------|----------------------------------|
| 10rpm                                                                                                                               | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |                                        |                                  |
| 0.98                                                                                                                                | 8.73   | 15.81  | 25.88  | 38.61  | 45.60    | 49.29    | 0.15 to 0.3                            | H2.5BP 10R – B<br>H2.5BP 10L – B |
| 2.15                                                                                                                                | 18.69  | 32.66  | 52.17  | 73.94  | 86.26    | 92.42    | 0.15 to 0.3                            | H2.5BP 13R – B<br>H2.5BP 13L – B |
| 3.30                                                                                                                                | 28.14  | 48.27  | 75.17  | 104.33 | 119.53   | 127.85   | 0.15 to 0.3                            | H2.5BP 15R – B<br>H2.5BP 15L – B |
| 7.77                                                                                                                                | 63.26  | 104.74 | 155.68 | 206.20 | 230.44   | 241.84   | 0.15 to 0.3                            | H2.5BP 20R – B<br>H2.5BP 20L – B |
| 16.96                                                                                                                               | 130.83 | 208.67 | 296.98 | 376.26 | 414.05   | 429.76   | 0.15 to 0.3                            | H2.5BP 26R – B<br>H2.5BP 26L – B |
| 1.69                                                                                                                                | 14.89  | 26.08  | 42.31  | 60.79  | 71.47    | 77.02    | 0.18 to 0.36                           | H3BP 10R – B<br>H3BP 10L – B     |
| 3.71                                                                                                                                | 31.42  | 53.81  | 83.39  | 115.01 | 130.62   | 138.63   | 0.18 to 0.36                           | H3BP 13R – B<br>H3BP 13L – B     |
| 5.68                                                                                                                                | 47.03  | 79.07  | 119.53 | 161.02 | 182.38   | 192.55   | 0.18 to 0.36                           | H3BP 15R – B<br>H3BP 15L – B     |
| 13.37                                                                                                                               | 104.95 | 169.44 | 244.40 | 313.82 | 346.27   | 361.98   | 0.18 to 0.36                           | H3BP 20R – B<br>H3BP 20L – B     |
| 29.12                                                                                                                               | 215.24 | 333.54 | 460.05 | 567.67 | 616.14   | 637.71   | 0.18 to 0.36                           | H3BP 26R – B<br>H3BP 26L – B     |



Unit: mm

| Accuracy Class ②         | Material  | Pressure angle | Helix angle | Heat treatment | Tooth surface hardness | Backlash ①          |
|--------------------------|-----------|----------------|-------------|----------------|------------------------|---------------------|
| [JIS B 1702-1] N9 to N10 | White POM | 20°            | 45°         | —              | —                      | See the table below |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Assembly method and allowable transfer capability: When gears are assembled with the shafts parallel, check the allowable transfer capability table. In this case, the teeth have surface contact. When gears are assembled with the twisted axes, the allowable transfer capability is significantly lower than when they are assembled with the shafts parallel. In this case, the teeth have point contact.

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other. The backlash is a circumferential backlash.

② Accuracy at the time of manufacture.

| Catalogue number     | Hand of helix | Module<br><i>m</i> | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>d</sub></i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Weight<br><i>W(g)</i> |
|----------------------|---------------|--------------------|-----------------------------|--------------------------------|--------------------------------------|------------------------|---------------------------------------|--------------------------------------|------------------------------------|----------------------------|-----------------------|
| <b>H1D 13R — B</b>   | R             | 1                  | 13                          | φ18.38                         | φ20.4                                | 12                     | φ 8                                   | φ15                                  | 10                                 | 22                         | 5.4                   |
| <b>H1D 13L — B</b>   | L             | 1                  | 13                          | φ18.38                         | φ20.4                                | 12                     | φ 8                                   | φ15                                  | 10                                 | 22                         | 5.4                   |
| <b>H1D 26R — B</b>   | R             | 1                  | 26                          | φ36.77                         | φ38.8                                | 12                     | φ10                                   | φ32                                  | 10                                 | 22                         | 26.9                  |
| <b>H1D 26L — B</b>   | L             | 1                  | 26                          | φ36.77                         | φ38.8                                | 12                     | φ10                                   | φ32                                  | 10                                 | 22                         | 26.9                  |
| <b>H1.5D 13R — B</b> | R             | 1.5                | 13                          | φ27.58                         | φ30.6                                | 15                     | φ10                                   | φ23                                  | 10                                 | 25                         | 15.7                  |
| <b>H1.5D 13L — B</b> | L             | 1.5                | 13                          | φ27.58                         | φ30.6                                | 15                     | φ10                                   | φ23                                  | 10                                 | 25                         | 15.7                  |

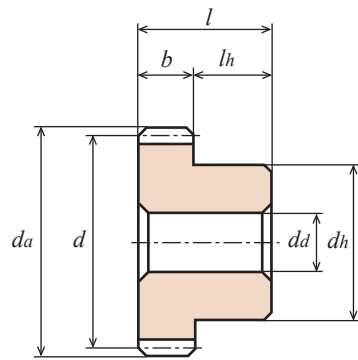
For gears with a [\*], two tap holes have been drilled. Also, two set screws are provided.

| Catalogue number     | Hand of helix | Module<br><i>m</i> | Number of teeth<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>d</sub></i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length<br><i>l<sub>h</sub></i> | Overall length<br><i>l</i> | Screw     |                      | Weight<br><i>W(g)</i> |
|----------------------|---------------|--------------------|-----------------------------|--------------------------------|--------------------------------------|------------------------|---------------------------------------|--------------------------------------|------------------------------------|----------------------------|-----------|----------------------|-----------------------|
|                      |               |                    |                             |                                |                                      |                        |                                       |                                      |                                    |                            | 2-M(120°) | <i>l<sub>s</sub></i> |                       |
| <b>H1.5D 13R * B</b> | R             | 1.5                | 13                          | φ27.58                         | φ30.6                                | 15                     | φ10                                   | φ23                                  | 10                                 | 25                         | 2-M4      | 5                    | 15.5                  |



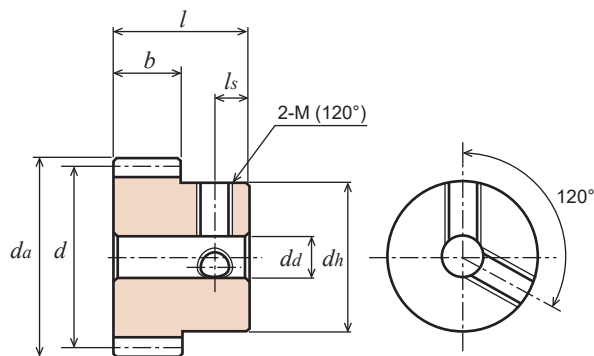


2D • 3D CAD



B1 type [-]

| Allowable transfer capability for different revolutions per minute (for parallel shafts),<br>Bending strength (Unit: W) |        |        |        |        |          |          | Backlash of parallel<br>shafts<br>(Unit: mm) | Catalogue number               |
|-------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|----------------------------------------------|--------------------------------|
| 10rpm                                                                                                                   | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |                                              |                                |
| 2.98                                                                                                                    | 29.75  | 59.46  | 118.79 | 237.06 | 354.80   | 442.76   | 0.06 to 0.12                                 | H1D 13R – B<br>H1D 13L – B     |
| 5.95                                                                                                                    | 59.46  | 118.79 | 237.06 | 472.02 | 704.88   | 875.19   | 0.06 to 0.12                                 | H1D 26R – B<br>H1D 26L – B     |
| 4.71                                                                                                                    | 47.10  | 94.12  | 187.93 | 374.61 | 560.04   | 698.30   | 0.09 to 0.18                                 | H1.5D 13R – B<br>H1.5D 13L – B |



B1 type [\*]

| Allowable transfer capability for different revolutions per minute (for parallel shafts),<br>Bending strength (Unit: W) |        |        |        |        |          |          | Backlash of parallel<br>shafts<br>(Unit: mm) | Catalogue number |
|-------------------------------------------------------------------------------------------------------------------------|--------|--------|--------|--------|----------|----------|----------------------------------------------|------------------|
| 10rpm                                                                                                                   | 100rpm | 200rpm | 400rpm | 800rpm | 1,200rpm | 1,500rpm |                                              |                  |
| 4.71                                                                                                                    | 47.10  | 94.12  | 187.93 | 374.61 | 560.04   | 698.30   | 0.09 to 0.18                                 | H1.5D 13R * B    |

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITTER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES

# Ground miter gears

## Miter gears

MG series  
MGE series  
M series

MGH series  
ML series  
ML-N series



\* These are samples.

### How to read catalogue numbers

**MG 1.5 S 20 R – 30 08 H**

| Gear type                                                                                                                                                              | Module                                                                                                                                                                              | Material                                                                                                                                                                                                                         | Number of teeth                                  | Tooth trace shape                                                    | Hole finish                                                                                                                                                                                                                                                                                                                                                                     | Assembly distance | Hole diameter | Type                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------------|------------------------------------------------------------------------------------------------|
| MG : Ground spiral miter gear (Accuracy grade: JIS Class 1)<br>MGE: Ground spiral miter gear (Accuracy grade: JIS Class 2)<br>ML : B-LOCK miter gear<br>M : Miter gear | Represents the module size.<br>When the module is less than 1, the figure indicates a value 100 times the actual module size.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | MG Series<br>S: SCM440<br><br>MGE Series<br>S: SCM435, 440<br><br>ML and M Series<br>S : S45C<br>B : Brass C3604B<br>SU : Stainless steel SUS304<br>SUM: Stainless steel SUS304L<br>BP : Acetal Blue POM<br>D : Acetal White POM | Example:<br>When the number of teeth is 20: "20" | Blank :<br>Straight<br>R : Right-hand spiral<br>L : Left-hand spiral | MG and MGE Series<br>Ground finish<br>[-]: No screw holes provided, no key grooves provided<br>[=]: Key groove provided<br><br>ML and M Series<br>Lathe turning finish<br>[-]: No screw holes provided, no key grooves provided<br>[+]: One screw hole provided<br>[*]: Two screw holes provided<br>[=]: Key groove provided<br>[#]: One key groove and one screw hole provided | Unit: mm          | Unit: mm      | H:<br>Induction hardening of teeth<br>HB:<br>Induction hardening of teeth + Black oxide finish |

**MGH R + 8**

#### Features of the MGH Series

The teeth have been treated by induction hardening, and the holes have been finished by grinding. Also, keys and set screws are provided. Therefore, the MGH Series can be used without additional machining. [Note] For details on modules, refer to the respective product description pages.

| Gear type       | Tooth trace shape                                              | Hole finish                                                                 | Hub length |
|-----------------|----------------------------------------------------------------|-----------------------------------------------------------------------------|------------|
| MGH: Miter gear | Blank :Straight<br>R :Right-hand spiral<br>L :Left-hand spiral | Grinding finish<br>[+]: One screw hole provided<br>[=]: Key groove provided | Unit: mm   |

| Catalogue number       | MG                                 | MGE                                | M           | M                                               | M                                 | MGH                               |
|------------------------|------------------------------------|------------------------------------|-------------|-------------------------------------------------|-----------------------------------|-----------------------------------|
| Shape                  |                                    |                                    |             |                                                 |                                   |                                   |
| Page                   | P. 212                             | P. 214                             | P. 216      | P. 218                                          | P. 220                            | P. 222                            |
| Material               | SCM440                             | SCM435 • 440                       | S45C        | S45C                                            | S45C                              | S45C                              |
| Module                 | m1.5 to 3                          | m1.5 to 3                          | m0.8 to 3   | m1 to 3                                         | m1 to 3                           | m1 to 2                           |
| Tooth trace shape      | Spiral                             | Spiral                             | Spiral      | Spiral                                          | Spiral                            | Spiral                            |
| Accuracy grade         | JIS Class 1                        | JIS Class 2                        | JIS Class 3 | JIS Class 4                                     | JIS Class 4                       | JIS Class 4                       |
| Teeth process sequence | Grinding after Induction hardening | Grinding after Induction hardening | Cutting     | Induction hardening & black oxide after cutting | Induction hardening after cutting | Induction hardening after cutting |

| Catalogue number       | ML-N        | ML          | M           | M                                 | MGH                               | M           |
|------------------------|-------------|-------------|-------------|-----------------------------------|-----------------------------------|-------------|
| Shape                  |             |             |             |                                   |                                   |             |
| Page                   | P. 224      | P. 224      | P. 226      | P. 228                            | P. 230                            | P. 232      |
| Material               | S45C        | SUS304      | S45C        | S45C                              | S45C                              | SUS304      |
| Module                 | m1 to 2.5   | m0.8 to 2   | m0.5 to 4   | m1.5 to 4                         | m2.5 to 3                         | m0.8 to 3   |
| Tooth trace shape      | Straight    | Straight    | Straight    | Straight                          | Straight                          | Straight    |
| Accuracy grade         | JIS Class 3 | JIS Class 4 | JIS Class 3 | JIS Class 4                       | JIS Class 4                       | JIS Class 4 |
| Teeth process sequence | Cutting     | Cutting     | Cutting     | Induction hardening after cutting | Induction hardening after cutting | Cutting     |

| Catalogue number       | M                             | M           | M         | M          |
|------------------------|-------------------------------|-------------|-----------|------------|
| Shape                  |                               |             |           |            |
| Page                   | P. 232                        | P. 234      | P. 234    | P. 236     |
| Material               | SUS304L                       | Brass       | White POM | Blue POM   |
| Module                 | m0.5 to 1                     | m0.5 to 1   | m 1       | m 0.8 to 3 |
| Tooth trace shape      | Straight                      | Straight    | Straight  | Straight   |
| Accuracy grade         | —                             | JIS Class 4 | —         | —          |
| Teeth process sequence | MIM (metal injection molding) | Cutting     | Cutting   | Cutting    |

# Miter gear information

## 1. What are Miter Gears?

### 1) Miter gears and bevel gears

Among our standard bevel gears, those with a gear ratio (pinion shaft P : gear shaft G) of 1:1 are referred to as miter gears.

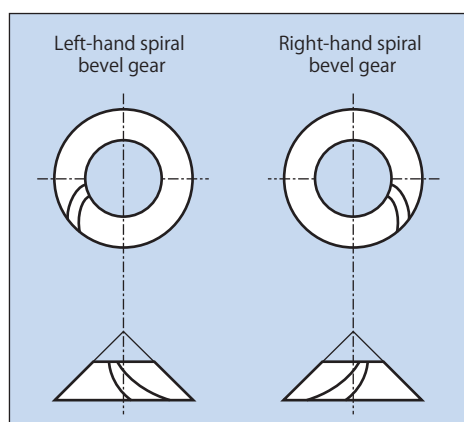
|                    | Miter gears | Bevel gears |         |        |         |
|--------------------|-------------|-------------|---------|--------|---------|
| Gear ratio (P : G) | 1:1         | 1:1.5       |         | 1:2    | 1:3     |
| Pitch angle        | 45°         | Pinion      | 33° 41' | Pinion | 26° 34' |
|                    |             | Gear        | 56° 19' | Gear   | 63° 26' |
| Shaft angle        | 90°         |             |         |        |         |

### 2) Differences between straight miter gears and spiral miter gears

|                      | Tooth trace | Tooth surface grinding | High-speed rotation | Circumferential velocity of pitch circle*                                                           | Contact ratio | Rotation smoothness | Thrust |
|----------------------|-------------|------------------------|---------------------|-----------------------------------------------------------------------------------------------------|---------------|---------------------|--------|
| Straight miter gears | Linear      | Not possible           | ○                   | Less than 5.5 m/s                                                                                   | Low           | ○                   | Small  |
| Spiral miter gears   | Curved      | Possible               | ◎                   | 5.5 m/s or more<br><u>When the velocity is 15 m/s or more, use of a ground gear is recommended.</u> | High          | ◎                   | Large  |

$$\text{*Circumferential velocity [m/s]} = \frac{\pi \times \text{Reference diameter [mm]} \times \text{Revolutions per minute [rpm]}}{1000 \times 60}$$

- Spiral miter gear:
- ① Low noise can be expected with a high contact ratio.
  - ② Right-hand and left-hand gears can be combined.



Left hand



Right hand

# Miter gear information

## 2. Cautions on Assembly

### 1) Installation

Particular attention is required when installing miter gears. In general, miter gears have a bearing only on one side and their shafts bend easily when subjected to a load, which is one of their main disadvantages. This results in poor, uneven tooth contact. Make sure that the gear shafts and bearings have adequate toughness and the bearings are located close to the gears. Assemble miter gears so that they can be adjusted in the axial direction and insert a shim into the hub end face. This enables easy adjustment of the tooth contact.

### 2) Mating gear

This product cannot be used with other companies' products. If your device is designed with a product other than the standard products, use our customization service. Use a ground gear with a ground gear, and a cut gear with a cut gear.

### 3) Lubrication

Select an appropriate lubrication method according to the revolutions per minute and load conditions. For details, refer to "Lubrication of Gears" in "References."

### 4) Gear shafts and backlash

To achieve ideal intermeshing, assemble gears at as accurate a shaft angle as possible with an appropriate backlash. For both ground gears and cut gears, the recommended shaft angle and shaft center height misalignment are  $\pm 15'$  and  $\pm 0.015$  mm or less, respectively.

Backlash: Our products are designed to have the backlash shown in Table 1 when the gears are assembled with the assembly distance given in the catalogue. For details, refer to "How to Measure the Backlash" in "References."

Thrust acting on spiral miter gears

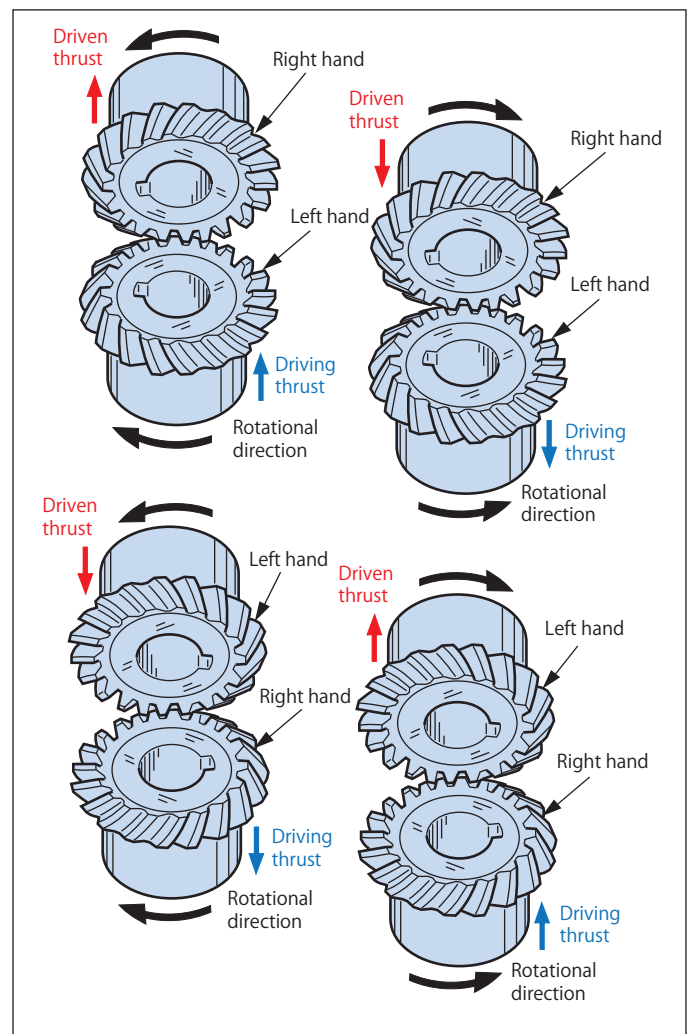


Table 1 Backlash of miter gears (when a pair of gears are meshed, same for straight and spiral miter gears)

Backlash of ground miter gears

| Module  | Backlash [mm] |
|---------|---------------|
|         | SCM440        |
| m = 1.5 | 0.03 to 0.06  |
| m = 2   | 0.04 to 0.08  |
| m = 2.5 | 0.05 to 0.1   |
| m = 3   | 0.06 to 0.12  |

Backlash of cut miter gears

| Module                      | Backlash [ mm ]                  |                |
|-----------------------------|----------------------------------|----------------|
|                             | SCM435・440, S45C, SUS304, C3604B | White/blue POM |
| m ≤ 0.9                     | 0.02 to 0.08                     | 0.03 to 0.10   |
| More than 0.9 and 2 or less | 0.05 to 0.12                     | 0.05 to 0.16   |
| More than 2 and 4 or less   | 0.06 to 0.15                     | -              |
| More than 4 and 6 or less   | 0.08 to 0.20                     | -              |

- Adjustment: The assembly distance, backlash, and tooth contact can easily be adjusted by inserting a shim in the hub end face.
- Change in circumferential backlash (when a miter gear is moved in the axial direction)  
 Straight miter gear:  $J_t = J_x \times 0.51$   
 Spiral miter gear:  $J_t = J_x \times 0.63$

$J_t$ : Change in circumferential backlash

$J_x$ : Axial displacement

\* The backlash may not be as estimated depending on machining or assembly accuracy.

# Miter gear information

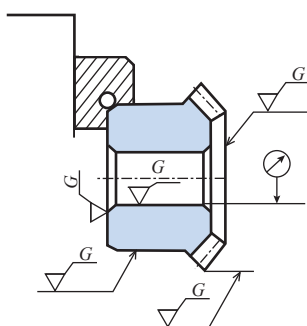
## Features of Ground Spiral Miter Gears (MG Series)

| Accuracy grade     | Hardening           | Tooth surface finish | Grinding areas                                                                                          | Module                         | Gear ratio | Backlash                     | High-speed rotation | Noise | Tooth surface hardness |
|--------------------|---------------------|----------------------|---------------------------------------------------------------------------------------------------------|--------------------------------|------------|------------------------------|---------------------|-------|------------------------|
| JIS B 1704 Class 1 | Induction hardening | Grinding             | Hole diameter<br>Hub lateral face<br>Hub circumference<br>Tooth tip circumference<br>Tooth lateral face | $m = 1.5$<br>2.0<br>2.5<br>3.0 | $u = 1:1$  | Settable to up to $30 \mu m$ | ◎                   | Low   | HRC52 to 60            |

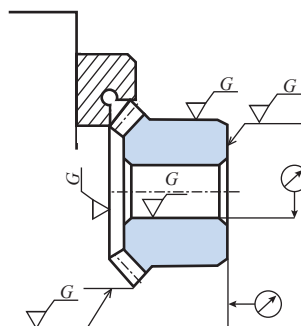
\* Do not mesh a ground gear with a cut gear.

### Cautions on additional machining for ground spiral miter gears

- 1) The hub circumference and tooth tip circumference have been finished by grinding to ensure adequate accuracy and workability at the time of additional machining by customers.  
(The tooth tip circumference has been chamfered parallel to the shaft center, which enables accurate chucking.)  
For the cautions on additional machining, refer to Fig. 1 and "Precautions for additional processing" in this catalogue.
- 2) Be sure to use a soft jaw and scroll chuck. Adjust the runout of the product to as close to zero as possible.  
(The runout should be 0.003 mm or less.)



The hub circumference and end faces have been finished by grinding for high-accuracy additional machining.



The tooth tip circumference and end faces have been finished by grinding for high-accuracy additional machining.

Fig. 1 Additional machining



# Miter gear information

## Features of Ground Spiral Miter Gears (MGE Series)

| Accuracy grade     | Hardening           | Tooth surface finish* | Grinding areas                    | Module                       | Gear ratio | Backlash                                           | High-speed rotation | Noise | Tooth surface hardness | Cost balance |
|--------------------|---------------------|-----------------------|-----------------------------------|------------------------------|------------|----------------------------------------------------|---------------------|-------|------------------------|--------------|
| JIS B 1704 Class 2 | Induction hardening | Grinding              | Hole diameter<br>Hub lateral face | m = 1.5<br>2.0<br>2.5<br>3.0 | u = 1: 1   | Refer to the respective product description pages. | ○                   | Low   | HRC49 to 55            | Good         |

### 1) Design focused on size reduction

(1) Number of teeth: 19 and 23. Optimal for compact designs.

(2) The bearing and oil seal specifications have been taken into consideration.

Compared with conventional spiral miter gears with 20 or 25 teeth, this product enables further size reduction including design around the gears, such as the bearing size.

### 2) Assembly example

In general, a gearbox is assembled by assembling a gear unit (gear, bearing, shaft, etc.) in advance and passing it through the hole in the bearing housing.

Therefore, as shown in Fig. 2, the outside diameter of the gear unit must be smaller than the outside diameter of the bearing or oil seal.

Dimensional conditions

(Outside diameter of gear)  $\approx$  (Diameter of pitch circle)  $A = (1 + r)$  mm or more

(Diameter of bearing D)  $\geq$  (Outside diameter of gear) + (2  $\times$  A)

The table below shows the bearing and oil seal specifications assuming the above conditions when the number of teeth is 19 and 20 for reference.

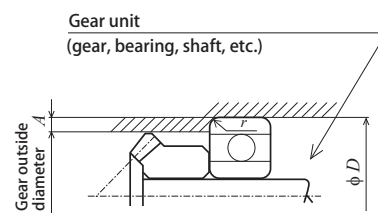


Fig. 2 Bearing housing

Table Gear outside diameter, bearing diameter, and oil seal diameter

| m   | Number of teeth | Gear outside diameter | Shaft diameter | Bearing diameter |     | Oil seal diameter | m   | Number of teeth | Gear outside diameter | Shaft diameter | Bearing diameter |     | Oil seal diameter |
|-----|-----------------|-----------------------|----------------|------------------|-----|-------------------|-----|-----------------|-----------------------|----------------|------------------|-----|-------------------|
|     |                 |                       |                | $\phi D$         | r   |                   |     |                 |                       |                | $\phi D$         | r   |                   |
| 1.5 | 19              | $\phi 28.5$           | $\phi 12$      | $\phi 32$        | 0.6 | $\phi 32$         | 2.5 | 19              | $\phi 47.5$           | $\phi 20$      | $\phi 52$        | 1.1 | —                 |
|     |                 |                       | $\phi 15$      | $\phi 32$        | 0.3 | $\phi 32$         |     |                 |                       | $\phi 25$      | $\phi 52$        | 1.0 | $\phi 52$         |
|     | 20              | $\phi 30.0$           | $\phi 12$      | $\phi 37$        | 1.0 | —                 |     | 20              | $\phi 50.0$           | $\phi 20$      | —                | —   | —                 |
|     |                 |                       | $\phi 15$      | $\phi 35$        | 0.6 | $\phi 35$         |     |                 |                       | $\phi 25$      | $\phi 62$        | 1.1 | —                 |
| 2.0 | 19              | $\phi 38.0$           | $\phi 15$      | $\phi 42$        | 1.0 | —                 | 3.0 | 19              | $\phi 57.0$           | $\phi 25$      | $\phi 62$        | 1.1 | —                 |
|     |                 |                       | $\phi 20$      | $\phi 42$        | 0.6 | $\phi 42$         |     |                 |                       | $\phi 28$      | $\phi 68$        | 1.1 | —                 |
|     | 20              | $\phi 40.0$           | $\phi 15$      | —                | —   | —                 |     | 20              | $\phi 60.0$           | $\phi 25$      | —                | —   | —                 |
|     |                 |                       | $\phi 20$      | $\phi 47$        | 1.0 | $\phi 47$         |     |                 |                       | $\phi 28$      | $\phi 68$        | 1.1 | —                 |

This table indicates the values when the outside diameter of the gear is used as the diameter of the pitch circle.

# Miter gear information

## Features of B-LOCK Miter Gears (ML Series and the new ML-N Series)

This product has the following features with the boss fastening mechanism:

| Method of fastening with shaft | Damage to shaft | Tuning of intermeshing | Machining of shaft (key groove, D-shape cutting, etc.) |
|--------------------------------|-----------------|------------------------|--------------------------------------------------------|
| Friction fastening             | Little          | Optimal                | Not required                                           |

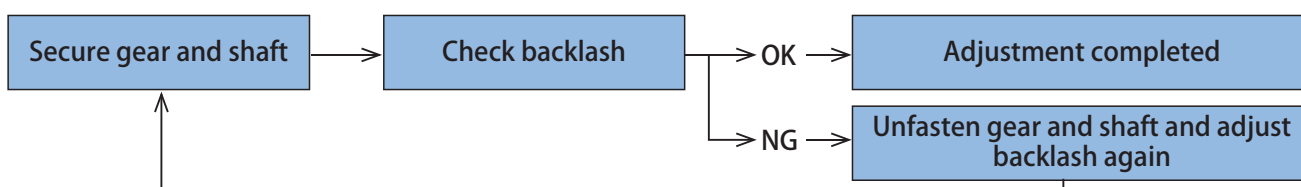


This product is designed to be compatible with our standard straight miter gears, so it can be used as the mating gears of the standard gears.

### 1) How to adjust the backlash

B-LOCK uses a fastening mechanism at the boss of the gear to secure the gear and shaft, which, unlike when they are secured with screws, prevents the shaft from being dented.

In general, adjust the backlash by following the steps below:



### 2) Cautions

- (1) **Selection:** Select a product whose maximum operating torque is less than or equal to the torque value given in the allowable transfer capability table. To prevent accidents, take the motor startup torque into consideration.
- (2) **Accuracy of the shaft to be installed:** Use a shaft whose shaft diameter tolerance is h7 or more and surface roughness is Ra1.6 (6.3 S) or more.
- (3) **Warm-up operation at low load:** Avoid high-load operation immediately after assembly. Perform warm-up operation at low load to check the operation, and then, perform operation at the actual operating load. After warm-up operation at low load, tighten the set screws again to the specified torque with a torque wrench.
- (4) **Additional machining and heat treatment:** Perform additional machining and heat treatment to the extent not affecting the tightening force.  
Do not perform additional machining or heat treatment for the hole length, hole diameter, and hub diameter.
- (5) **If the number of startups is large:** We recommend using a product with a key groove, except for B-LOCK miter gears.
- (6) **When the gear spins out:** Be sure to inspect and clean other mechanical components.  
The teeth may be damaged when the gears are disengaged. Also, broken pieces may adversely affect other mechanical components.

Please note that this product is subject to dimensional changes without prior notice to the extent not adversely affecting its functionality.

### 3) Cautions on installing gears

- (1) To fasten the boss, use bolts with a JIS strength class of 10.9 or higher.
- (2) Checking the tightening torque and preventing loose set screws
  - ① Applying a screw locking agent to the threaded portions of the screws is recommended.
  - ② When tightening a set screw, tighten it to the specified torque using a torque wrench.





Unit: mm

| Accuracy Class | Material | Pressure angle | Helix angle | Heat treatment               | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|-------------|------------------------------|------------------------|----------------------|
| [JIS B 1704] 1 | SCM440   | 20°            | 35°         | Induction hardening of teeth | HRC52 to 60            | See the table below. |

★ No surface treatment is applied.

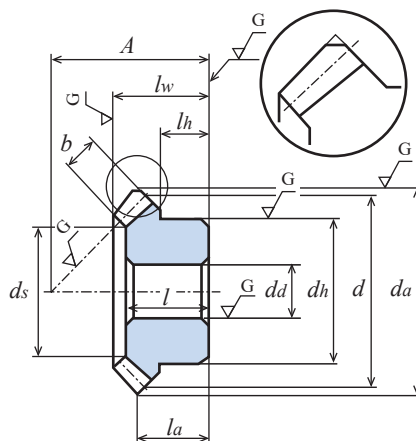
★ The allowable transfer capability table was prepared based on the assumption that a left-hand gear is used on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number   | Gear ratio | Number of teeth | Reference diameter | Tip diameter | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Tip angle  | Counterbore diameter (Reference value) | Weight |
|--------------------|------------|-----------------|--------------------|--------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|------------|----------------------------------------|--------|
|                    | $u$        | $z$             | $d$                | $d_a$        | $A$               | $d_a(H7)$     | $d_h$        | $l_h$      | $l$         | $l_w$          | $l_a$                         | $b$        | $\delta_a$ | $d_s$                                  | $W(g)$ |
| MG1.5S 20R – 3008H | 1 : 1      | 20              | $\phi 30$          | $\phi 30.5$  | 30                | $\phi 8$      | $\phi 26$    | 13         | 19          | 21.11          | 15.96                         | 8          | 50°08'     | $\phi 15.37$                           | 74.4   |
| MG1.5S 20L – 3008H |            | 20              | $\phi 30$          | $\phi 30.5$  | 30                | $\phi 8$      | $\phi 26$    | 13         | 19          | 21.11          | 15.96                         | 8          | 50°08'     | $\phi 15.37$                           | 74.4   |
| MG1.5S 25R – 3410H |            | 25              | $\phi 37.5$        | $\phi 38$    | 34                | $\phi 10$     | $\phi 32$    | 12.5       | 19          | 22.1           | 16.21                         | 9          | 49°18'     | $\phi 19.54$                           | 118.2  |
| MG1.5S 25L – 3410H |            | 25              | $\phi 37.5$        | $\phi 38$    | 34                | $\phi 10$     | $\phi 32$    | 12.5       | 19          | 22.1           | 16.21                         | 9          | 49°18'     | $\phi 19.54$                           | 118.2  |
| MG1.5S 30R – 4310H |            | 30              | $\phi 45$          | $\phi 45.2$  | 43                | $\phi 10$     | $\phi 40$    | 18         | 25          | 28.13          | 21.41                         | 10         | 47°48'     | $\phi 25.72$                           | 240.6  |
| MG1.5S 30L – 4310H |            | 30              | $\phi 45$          | $\phi 45.2$  | 43                | $\phi 10$     | $\phi 40$    | 18         | 25          | 28.13          | 21.41                         | 10         | 47°48'     | $\phi 25.72$                           | 240.6  |
| MG2S 20R – 3712H   |            | 20              | $\phi 40$          | $\phi 41$    | 37                | $\phi 12$     | $\phi 35$    | 14.5       | 22          | 24.71          | 18.27                         | 10         | 50°04'     | $\phi 21.72$                           | 152.3  |
| MG2S 20L – 3712H   |            | 20              | $\phi 40$          | $\phi 41$    | 37                | $\phi 12$     | $\phi 35$    | 14.5       | 22          | 24.71          | 18.27                         | 10         | 50°04'     | $\phi 21.72$                           | 152.3  |
| MG2S 25R – 4012H   |            | 25              | $\phi 50$          | $\phi 51$    | 40                | $\phi 12$     | $\phi 44$    | 12         | 20          | 24.12          | 16.29                         | 12         | 49°25'     | $\phi 26.06$                           | 238.4  |
| MG2S 25L – 4012H   |            | 25              | $\phi 50$          | $\phi 51$    | 40                | $\phi 12$     | $\phi 44$    | 12         | 20          | 24.12          | 16.29                         | 12         | 49°25'     | $\phi 26.06$                           | 238.4  |
| MG2S 30R – 5012H   |            | 30              | $\phi 60$          | $\phi 60.8$  | 50                | $\phi 12$     | $\phi 52$    | 16         | 25          | 29.12          | 21.21                         | 12         | 47°52'     | $\phi 36.06$                           | 427.8  |
| MG2S 30L – 5012H   |            | 30              | $\phi 60$          | $\phi 60.8$  | 50                | $\phi 12$     | $\phi 52$    | 16         | 25          | 29.12          | 21.21                         | 12         | 47°52'     | $\phi 36.06$                           | 427.8  |
| MG2.5S 20R – 4814H |            | 20              | $\phi 50$          | $\phi 51.5$  | 48                | $\phi 14$     | $\phi 44$    | 20         | 29          | 32.28          | 24.61                         | 12         | 50°32'     | $\phi 28.06$                           | 321.2  |
| MG2.5S 20L – 4814H |            | 20              | $\phi 50$          | $\phi 51.5$  | 48                | $\phi 14$     | $\phi 44$    | 20         | 29          | 32.28          | 24.61                         | 12         | 50°32'     | $\phi 28.06$                           | 321.2  |
| MG2.5S 25R – 5016H |            | 25              | $\phi 62.5$        | $\phi 64$    | 50                | $\phi 16$     | $\phi 54$    | 14.5       | 26          | 30.21          | 20.31                         | 15         | 48°49'     | $\phi 34.57$                           | 456.8  |
| MG2.5S 25L – 5016H |            | 25              | $\phi 62.5$        | $\phi 64$    | 50                | $\phi 16$     | $\phi 54$    | 14.5       | 26          | 30.21          | 20.31                         | 15         | 48°49'     | $\phi 34.57$                           | 456.8  |
| MG2.5S 30R – 6216H |            | 30              | $\phi 75$          | $\phi 76.5$  | 62                | $\phi 16$     | $\phi 66$    | 20         | 32          | 36.08          | 26.01                         | 15         | 47°56'     | $\phi 47.57$                           | 848.3  |
| MG2.5S 30L – 6216H |            | 30              | $\phi 75$          | $\phi 76.5$  | 62                | $\phi 16$     | $\phi 66$    | 20         | 32          | 36.08          | 26.01                         | 15         | 47°56'     | $\phi 47.57$                           | 848.3  |
| MG3S 20R – 5816H   |            | 20              | $\phi 60$          | $\phi 62$    | 58                | $\phi 16$     | $\phi 52$    | 24         | 35          | 39.57          | 29.9                          | 15         | 50°04'     | $\phi 31.57$                           | 556.1  |
| MG3S 20L – 5816H   |            | 20              | $\phi 60$          | $\phi 62$    | 58                | $\phi 16$     | $\phi 52$    | 24         | 35          | 39.57          | 29.9                          | 15         | 50°04'     | $\phi 31.57$                           | 556.1  |



| Allowable transfer capability for different revolutions per minute Bending strength (Unit: kW) |         |         |           |           |           |           |           |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: kW) |         |         |           |           |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number                         |
|------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------|------------------------------------------|
| 250 rpm                                                                                        | 500 rpm | 800 rpm | 1,000 rpm | 1,500 rpm | 2,000 rpm | 2,500 rpm | 3,000 rpm | 4,000 rpm | 250 rpm                                                                                          | 500 rpm | 800 rpm | 1,000 rpm | 1,500 rpm | 2,000 rpm | 2,500 rpm | 3,000 rpm | 4,000 rpm |                        |                                          |
| 0.15                                                                                           | 0.31    | 0.48    | 0.59      | 0.86      | 1.11      | 1.36      | 1.61      | 2.09      | 0.08                                                                                             | 0.17    | 0.27    | 0.33      | 0.49      | 0.64      | 0.79      | 0.94      | 1.24      | 0.03 to 0.06           | MG1.5S 20R – 3008H<br>MG1.5S 20L – 3008H |
| 0.23                                                                                           | 0.47    | 0.72    | 0.89      | 1.27      | 1.66      | 2.03      | 2.40      | 3.11      | 0.15                                                                                             | 0.32    | 0.50    | 0.62      | 0.91      | 1.20      | 1.48      | 1.76      | 2.32      | 0.03 to 0.06           | MG1.5S 25R – 3410H<br>MG1.5S 25L – 3410H |
| 0.33                                                                                           | 0.65    | 1.01    | 1.23      | 1.77      | 2.30      | 2.83      | 3.33      | 4.26      | 0.26                                                                                             | 0.53    | 0.84    | 1.04      | 1.52      | 2.00      | 2.48      | 2.95      | 3.82      | 0.03 to 0.06           | MG1.5S 30R – 4310H<br>MG1.5S 30L – 4310H |
| 0.35                                                                                           | 0.69    | 1.07    | 1.31      | 1.88      | 2.45      | 3.00      | 3.55      | 4.58      | 0.19                                                                                             | 0.39    | 0.61    | 0.76      | 1.11      | 1.46      | 1.80      | 2.15      | 2.81      | 0.04 to 0.08           | MG2S 20R – 3712H<br>MG2S 20L – 3712H     |
| 0.55                                                                                           | 1.08    | 1.66    | 2.03      | 2.93      | 3.80      | 4.66      | 5.49      | 6.95      | 0.37                                                                                             | 0.76    | 1.19    | 1.47      | 2.16      | 2.84      | 3.51      | 4.17      | 5.35      | 0.04 to 0.08           | MG2S 25R – 4012H<br>MG2S 25L – 4012H     |
| 0.72                                                                                           | 1.41    | 2.16    | 2.63      | 3.80      | 4.95      | 6.05      | 7.04      | 8.79      | 0.59                                                                                             | 1.19    | 1.86    | 2.29      | 3.37      | 4.44      | 5.49      | 6.43      | 8.13      | 0.04 to 0.08           | MG2S 30R – 5012H<br>MG2S 30L – 5012H     |
| 0.66                                                                                           | 1.29    | 1.99    | 2.43      | 3.50      | 4.55      | 5.58      | 6.57      | 8.32      | 0.37                                                                                             | 0.74    | 1.17    | 1.44      | 2.12      | 2.78      | 3.44      | 4.09      | 5.24      | 0.05 to 0.1            | MG2.5S 20R – 4814H<br>MG2.5S 20L – 4814H |
| 1.07                                                                                           | 2.07    | 3.16    | 3.86      | 5.58      | 7.26      | 8.86      | 10.28     | -         | 0.74                                                                                             | 1.49    | 2.32    | 2.86      | 4.21      | 5.55      | 6.83      | 7.99      | -         | 0.05 to 0.1            | MG2.5S 25R – 5016H<br>MG2.5S 25L – 5016H |
| 1.41                                                                                           | 2.69    | 4.09    | 5.02      | 7.27      | 9.43      | 11.33     | 13.08     | -         | 1.18                                                                                             | 2.33    | 3.61    | 4.48      | 6.59      | 8.66      | 10.51     | 12.23     | -         | 0.05 to 0.1            | MG2.5S 30R – 6216H<br>MG2.5S 30L – 6216H |
| 1.16                                                                                           | 2.25    | 3.44    | 4.19      | 6.07      | 7.90      | 9.66      | 11.23     | 14.03     | 0.66                                                                                             | 1.32    | 2.06    | 2.53      | 3.74      | 4.92      | 6.08      | 7.13      | 9.01      | 0.06 to 0.12           | MG3S 20R – 5816H<br>MG3S 20L – 5816H     |



This product has the same shape as the former MF Series and its tooth surfaces have been finished by grinding.

Unit: mm

| Accuracy Class | Material   | Pressure angle | Helix angle | Heat treatment               | Tooth surface hardness | Backlash ①           |
|----------------|------------|----------------|-------------|------------------------------|------------------------|----------------------|
| [JIS B 1704] 2 | SCM435/440 | 20°            | 35°         | Induction hardening of teeth | HRC49 to 55            | See the table below. |

★ No surface treatment is applied.

★ The allowable transfer capability table was prepared based on the assumption that a left-hand gear is used on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center.

★ Gears with a [#] are provided with key grooves, keys, two screw holes, and two set screws.

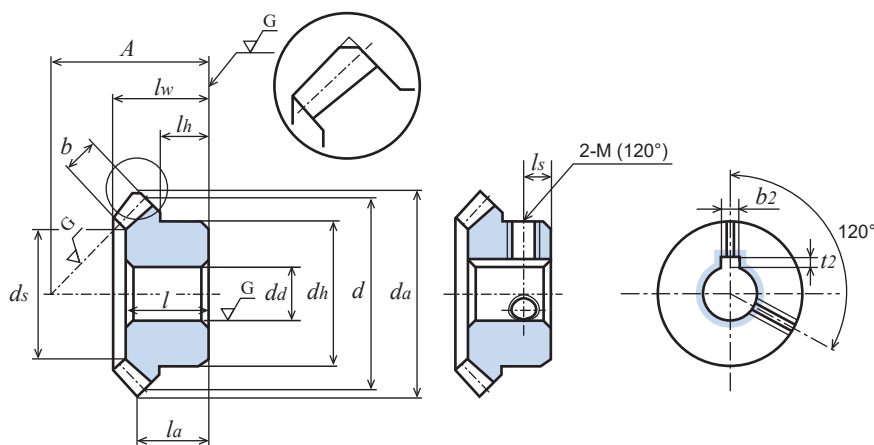
① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number    | Gear ratio | Number of teeth | Reference diameter | Tip diameter               | As-assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Over-all length | Distance from end face to tip | Face width | Key groove       | Screw |    | Tip angle  | Counterbore diameter (Reference value) | Weight |
|---------------------|------------|-----------------|--------------------|----------------------------|----------------------|---------------|--------------|------------|-------------|-----------------|-------------------------------|------------|------------------|-------|----|------------|----------------------------------------|--------|
|                     |            |                 |                    |                            |                      |               |              |            |             |                 |                               |            |                  | M     | ls |            |                                        |        |
|                     | $u$        | $z$             | $d$                | $d_a$                      | $A$                  | $d_d(H7)$     | $d_h$        | $l_h$      | $l$         | $l_w$           | $l_a$                         | $b$        | $b_2 \times t_2$ |       |    | $\delta_a$ | $d_s$                                  | $W(g)$ |
| MGE1.5S 19R – 2810H | 1 : 1      | 19              | $\phi 28.5$        | $\phi 28.5^{(\phi 30.34)}$ | 28                   | $\phi 10$     | $\phi 25$    | 12         | 16          | 18.19           | 14.67                         | 5.5        | -                | -     | -  | 50°23'     | $\phi 17.4$                            | 54.7   |
| MGE1.5S 19L – 2810H |            | 19              | $\phi 28.5$        | $\phi 28.5^{(\phi 30.34)}$ | 28                   | $\phi 10$     | $\phi 25$    | 12         | 16          | 18.19           | 14.67                         | 5.5        | -                | -     | -  | 50°23'     | $\phi 17.4$                            | 54.7   |
| MGE2S 19R – 3512H   |            | 19              | $\phi 38$          | $\phi 38.0^{(\phi 40.43)}$ | 35                   | $\phi 12$     | $\phi 32$    | 13         | 19          | 22.09           | 17.21                         | 7.5        | -                | -     | -  | 49°39'     | $\phi 22.8$                            | 113.4  |
| MGE2S 19L – 3512H   |            | 19              | $\phi 38$          | $\phi 38.0^{(\phi 40.43)}$ | 35                   | $\phi 12$     | $\phi 32$    | 13         | 19          | 22.09           | 17.21                         | 7.5        | -                | -     | -  | 49°39'     | $\phi 22.8$                            | 113.4  |
| MGE2S 23R – 4015H   |            | 23              | $\phi 46$          | $\phi 46.0^{(\phi 48.52)}$ | 40                   | $\phi 15$     | $\phi 40$    | 14         | 21          | 24.43           | 18.26                         | 9.5        | -                | -     | -  | 49°39'     | $\phi 27.1$                            | 191.9  |
| MGE2S 23L – 4015H   |            | 23              | $\phi 46$          | $\phi 46.0^{(\phi 48.52)}$ | 40                   | $\phi 15$     | $\phi 40$    | 14         | 21          | 24.43           | 18.26                         | 9.5        | -                | -     | -  | 49°39'     | $\phi 27.1$                            | 191.9  |
| MGE2S 23R # 4020H   |            | 23              | $\phi 46$          | $\phi 46.0^{(\phi 48.52)}$ | 40                   | $\phi 20$     | $\phi 40$    | 14         | 21          | 24.43           | 18.26                         | 9.5        | 6 × 2.8          | 2-M5  | 9  | 49°39'     | $\phi 27.1$                            | 166.5  |
| MGE2S 23L # 4020H   |            | 23              | $\phi 46$          | $\phi 46.0^{(\phi 48.52)}$ | 40                   | $\phi 20$     | $\phi 40$    | 14         | 21          | 24.43           | 18.26                         | 9.5        | 6 × 2.8          | 2-M5  | 9  | 49°39'     | $\phi 27.1$                            | 166.5  |
| MGE2.5S 19R – 4215H |            | 19              | $\phi 47.5$        | $\phi 47.5^{(\phi 50.55)}$ | 42                   | $\phi 15$     | $\phi 40$    | 14.5       | 23          | 25.93           | 19.78                         | 9.5        | -                | -     | -  | 49°48'     | $\phi 30.1$                            | 210.8  |
| MGE2.5S 19L – 4215H |            | 19              | $\phi 47.5$        | $\phi 47.5^{(\phi 50.55)}$ | 42                   | $\phi 15$     | $\phi 40$    | 14.5       | 23          | 25.93           | 19.78                         | 9.5        | -                | -     | -  | 49°48'     | $\phi 30.1$                            | 210.8  |
| MGE2.5S 23R – 4815H |            | 23              | $\phi 57.5$        | $\phi 57.5^{(\phi 60.63)}$ | 48                   | $\phi 15$     | $\phi 50$    | 15.5       | 24          | 28.30           | 20.81                         | 11.5       | -                | -     | -  | 49°30'     | $\phi 34.5$                            | 363.9  |
| MGE2.5S 23L – 4815H |            | 23              | $\phi 57.5$        | $\phi 57.5^{(\phi 60.63)}$ | 48                   | $\phi 15$     | $\phi 50$    | 15.5       | 24          | 28.30           | 20.81                         | 11.5       | -                | -     | -  | 49°30'     | $\phi 34.5$                            | 363.9  |
| MGE3S 19R – 5020H   |            | 19              | $\phi 57$          | $\phi 57.0^{(\phi 60.68)}$ | 50                   | $\phi 20$     | $\phi 48$    | 17         | 27          | 31.09           | 23.34                         | 12.0       | -                | -     | -  | 49°56'     | $\phi 34.1$                            | 347.8  |
| MGE3S 19L – 5020H   |            | 19              | $\phi 57$          | $\phi 57.0^{(\phi 60.68)}$ | 50                   | $\phi 20$     | $\phi 48$    | 17         | 27          | 31.09           | 23.34                         | 12.0       | -                | -     | -  | 49°56'     | $\phi 34.1$                            | 347.8  |
| MGE3S 23R – 5520H   |            | 23              | $\phi 69$          | $\phi 68.0^{(\phi 72.73)}$ | 55                   | $\phi 20$     | $\phi 60$    | 16         | 27          | 31.51           | 22.36                         | 14.0       | -                | -     | -  | 49°22'     | $\phi 42.4$                            | 571.3  |
| MGE3S 23L – 5520H   |            | 23              | $\phi 69$          | $\phi 68.0^{(\phi 72.73)}$ | 55                   | $\phi 20$     | $\phi 60$    | 16         | 27          | 31.51           | 22.36                         | 14.0       | -                | -     | -  | 49°22'     | $\phi 42.4$                            | 571.3  |





2D • 3D CAD



| Allowable transfer capability for different revolutions per minute Bending strength (Unit: kW) |         |         |         |           |           |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: kW) |         |         |         |           |           |           | Backlash<br>(Unit: mm) | Catalogue number                                                                 |
|------------------------------------------------------------------------------------------------|---------|---------|---------|-----------|-----------|-----------|--------------------------------------------------------------------------------------------------|---------|---------|---------|-----------|-----------|-----------|------------------------|----------------------------------------------------------------------------------|
| 100 rpm                                                                                        | 250 rpm | 500 rpm | 800 rpm | 1,000 rpm | 1,500 rpm | 2,000 rpm | 100 rpm                                                                                          | 250 rpm | 500 rpm | 800 rpm | 1,000 rpm | 1,500 rpm | 2,000 rpm |                        |                                                                                  |
| 0.054                                                                                          | 0.137   | 0.274   | 0.432   | 0.525     | 0.736     | 0.922     | 0.025                                                                                            | 0.067   | 0.138   | 0.223   | 0.273     | 0.391     | 0.495     | 0.05 to 0.12           | MGE1.5S 19R – 2810H<br>MGE1.5S 19L – 2810H                                       |
| 0.133                                                                                          | 0.334   | 0.668   | 1.014   | 1.223     | 1.685     | 2.150     | 0.064                                                                                            | 0.167   | 0.344   | 0.533   | 0.649     | 0.911     | 1.178     | 0.05 to 0.12           | MGE2S 19R – 3512H<br>MGE2S 19L – 3512H                                           |
| 0.215                                                                                          | 0.539   | 1.060   | 1.587   | 1.901     | 2.640     | 3.359     | 0.123                                                                                            | 0.320   | 0.648   | 0.991   | 1.199     | 1.694     | 2.183     | 0.05 to 0.12           | MGE2S 23R – 4015H<br>MGE2S 23L – 4015H<br>MGE2S 23R # 4020H<br>MGE2S 23L # 4020H |
| 0.264                                                                                          | 0.662   | 1.298   | 1.939   | 2.321     | 3.228     | 4.103     | 0.128                                                                                            | 0.335   | 0.678   | 1.034   | 1.250     | 1.769     | 2.278     | 0.06 to 0.15           | MGE2.5S 19R – 4215H<br>MGE2.5S 19L – 4215H                                       |
| 0.414                                                                                          | 1.036   | 1.980   | 2.923   | 3.474     | 4.897     | 6.240     | 0.240                                                                                            | 0.624   | 1.230   | 1.853   | 2.224     | 3.192     | 4.119     | 0.06 to 0.15           | MGE2.5S 23R – 4815H<br>MGE2.5S 23L – 4815H                                       |
| 0.472                                                                                          | 1.188   | 2.274   | 3.360   | 3.995     | 5.626     | 7.166     | 0.233                                                                                            | 0.608   | 1.201   | 1.812   | 2.176     | 3.119     | 4.023     | 0.06 to 0.15           | MGE3S 19R – 5020H<br>MGE3S 19L – 5020H                                           |
| 0.726                                                                                          | 1.815   | 3.374   | 4.916   | 5.923     | 8.319     | 10.061    | 0.425                                                                                            | 1.108   | 2.123   | 3.157   | 3.841     | 5.493     | 7.098     | 0.06 to 0.15           | MGE3S 23R – 5520H<br>MGE3S 23L – 5520H                                           |



Unit: mm

| Accuracy Class | Material | Pressure angle | Helix angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|-------------|----------------|------------------------|----------------------|
| [JIS B 1704] 3 | S45C     | 20°            | 35°         | —              | —                      | See the table below. |

★ No surface treatment is applied.

★ The allowable transfer capability table was prepared based on the assumption that a left-hand gear is used on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

★ Gears with a [\*] are provided with two screw holes and two set screws.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number        | Gear ratio | Number of teeth | Reference diameter | Tip diameter       | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Screw |     | Tip angle | Counterbore diameter (Reference value) | Weight |
|-------------------------|------------|-----------------|--------------------|--------------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|-------|-----|-----------|----------------------------------------|--------|
|                         |            |                 |                    |                    |                   |               |              |            |             |                |                               |            | M     | ls  |           |                                        |        |
| <b>M80S20R — 1605</b>   | 1 : 1      | 20              | φ16                | φ17.06             | 16                | φ 5           | φ12          | 6          | 10          | 10.86          | 8.53                          | 3.7        | -     | -   | 51°15'    | φ 9.54                                 | 10.5   |
| <b>M80S20L — 1605</b>   |            | 20              | φ16                | φ17.06             | 16                | φ 5           | φ12          | 6          | 10          | 10.86          | 8.53                          | 3.7        | -     | -   | 51°15'    | φ 9.54                                 | 10.5   |
| <b>M80S25R — 1805</b>   |            | 25              | φ20                | φ21.05             | 18                | φ 5           | φ16          | 6          | 10.5        | 11.56          | 8.53                          | 4.7        | -     | -   | 49°56'    | φ11.71                                 | 18.5   |
| <b>M80S25L — 1805</b>   |            | 25              | φ20                | φ21.05             | 18                | φ 5           | φ16          | 6          | 10.5        | 11.56          | 8.53                          | 4.7        | -     | -   | 49°56'    | φ11.71                                 | 18.5   |
| <b>M80S30R — 2006</b>   |            | 30              | φ24                | φ25.06             | 20                | φ 6           | φ18          | 6          | 11          | 12.2           | 8.53                          | 5.6        | -     | -   | 49°13'    | φ14.16                                 | 25.5   |
| <b>M80S30L — 2006</b>   |            | 30              | φ24                | φ25.06             | 20                | φ 6           | φ18          | 6          | 11          | 12.2           | 8.53                          | 5.6        | -     | -   | 49°13'    | φ14.16                                 | 25.5   |
| <b>M1S 20R — 2106</b>   |            | 20              | φ20                | φ21.12             | 21                | φ 6           | φ16          | 9          | 13          | 14.43          | 11.56                         | 4.5        | -     | -   | 50°31'    | φ11.3                                  | 19.7   |
| <b>M1S 20L — 2106</b>   |            | 20              | φ20                | φ21.12             | 21                | φ 6           | φ16          | 9          | 13          | 14.43          | 11.56                         | 4.5        | -     | -   | 50°31'    | φ11.3                                  | 19.7   |
| <b>M1S 20R * 2108</b>   |            | 20              | φ20                | φ21.12             | 21                | φ 8           | φ16          | 9          | 13          | 14.43          | 11.56                         | 4.5        | 2-M4  | 4.5 | 50°31'    | φ11.3                                  | 16.9   |
| <b>M1S 20L * 2108</b>   |            | 20              | φ20                | φ21.12             | 21                | φ 8           | φ16          | 9          | 13          | 14.43          | 11.56                         | 4.5        | 2-M4  | 4.5 | 50°31'    | φ11.3                                  | 16.9   |
| <b>M1S25R — 2306</b>    |            | 25              | φ25                | φ26.3              | 23                | φ 6           | φ20          | 8          | 13          | 14.58          | 11.15                         | 5.30       | -     | -   | 49°47'    | φ15.0                                  | 32.9   |
| <b>M1S25L — 2306</b>    |            | 25              | φ25                | φ26.3              | 23                | φ 6           | φ20          | 8          | 13          | 14.58          | 11.15                         | 5.30       | -     | -   | 49°47'    | φ15.0                                  | 32.9   |
| <b>M1S 30R — 2610</b>   |            | 30              | φ30                | φ31.09             | 26                | φ10           | φ22          | 9          | 14.5        | 15.67          | 11.54                         | 6.2        | -     | -   | 48°21'    | φ19.4                                  | 43.0   |
| <b>M1S 30L — 2610</b>   |            | 30              | φ30                | φ31.09             | 26                | φ10           | φ22          | 9          | 14.5        | 15.67          | 11.54                         | 6.2        | -     | -   | 48°21'    | φ19.4                                  | 43.0   |
| <b>M1.5S 20R — 2810</b> |            | 20              | φ30                | φ31.85             | 28                | φ10           | φ24          | 10         | 16.5        | 18.44          | 13.93                         | 7          | -     | -   | 50° 5'    | φ17.2                                  | 54.7   |
| <b>M1.5S 20L — 2810</b> |            | 20              | φ30                | φ31.85             | 28                | φ10           | φ24          | 10         | 16.5        | 18.44          | 13.93                         | 7          | -     | -   | 50° 5'    | φ17.2                                  | 54.7   |
| <b>M1.5S25R — 3410</b>  |            | 25              | φ37.5              | φ39.38             | 34                | φ10           | φ30          | 11.5       | 19          | 21.10          | 16.19                         | 7.5        | -     | -   | 49°12'    | φ23.79                                 | 105.7  |
| <b>M1.5S25L — 3410</b>  |            | 25              | φ37.5              | φ39.38             | 34                | φ10           | φ30          | 11.5       | 19          | 21.10          | 16.19                         | 7.5        | -     | -   | 49°12'    | φ23.79                                 | 105.7  |
| <b>M1.5S 30R — 3812</b> |            | 30              | φ45                | φ46.79             | 38                | φ12           | φ33          | 12         | 21          | 22.64          | 16.4                          | 9.3        | -     | -   | 47°54'    | φ29.7                                  | 152.0  |
| <b>M1.5S 30L — 3812</b> |            | 30              | φ45                | φ46.79             | 38                | φ12           | φ33          | 12         | 21          | 22.64          | 16.4                          | 9.3        | -     | -   | 47°54'    | φ29.7                                  | 152.0  |
| <b>M2S25R — 4012</b>    |            | 25              | φ50                | φ51.33<br>(φ52.53) | 40                | φ12           | φ42          | 11         | 21          | 23.13          | 16.27                         | 10.5       | -     | -   | 49°21'    | φ32.3                                  | 224.9  |
| <b>M2S25L — 4012</b>    |            | 25              | φ50                | φ51.33<br>(φ52.53) | 40                | φ12           | φ42          | 11         | 21          | 23.13          | 16.27                         | 10.5       | -     | -   | 49°21'    | φ32.3                                  | 224.9  |
| <b>M2S 30R — 5116</b>   |            | 30              | φ60                | φ60.94<br>(φ62.42) | 51                | φ16           | φ44          | 17         | 28          | 30.53          | 22.21                         | 12.4       | -     | -   | 47°54'    | φ38.9                                  | 358.4  |
| <b>M2S 30L — 5116</b>   |            | 30              | φ60                | φ60.94<br>(φ62.42) | 51                | φ16           | φ44          | 17         | 28          | 30.53          | 22.21                         | 12.4       | -     | -   | 47°54'    | φ38.9                                  | 358.4  |
| <b>M2.5S25R — 5016</b>  |            | 25              | φ62.5              | φ64.16<br>(φ65.69) | 50                | φ16           | φ52          | 13.5       | 27          | 29.14          | 20.35                         | 13.5       | -     | -   | 49°30'    | φ40.82                                 | 437.6  |
| <b>M2.5S25L — 5016</b>  |            | 25              | φ62.5              | φ64.16<br>(φ65.69) | 50                | φ16           | φ52          | 13.5       | 27          | 29.14          | 20.35                         | 13.5       | -     | -   | 49°30'    | φ40.82                                 | 437.6  |
| <b>M3S25R — 6020</b>    |            | 25              | φ75                | φ77.0<br>(φ78.66)  | 60                | φ20           | φ65          | 17.5       | 32          | 35.06          | 24.33                         | 16.2       | -     | -   | 48°37'    | φ48.18                                 | 777.6  |
| <b>M3S25L — 6020</b>    |            | 25              | φ75                | φ77.0<br>(φ78.66)  | 60                | φ20           | φ65          | 17.5       | 32          | 35.06          | 24.33                         | 16.2       | -     | -   | 48°37'    | φ48.18                                 | 777.6  |



2D • 3D CAD

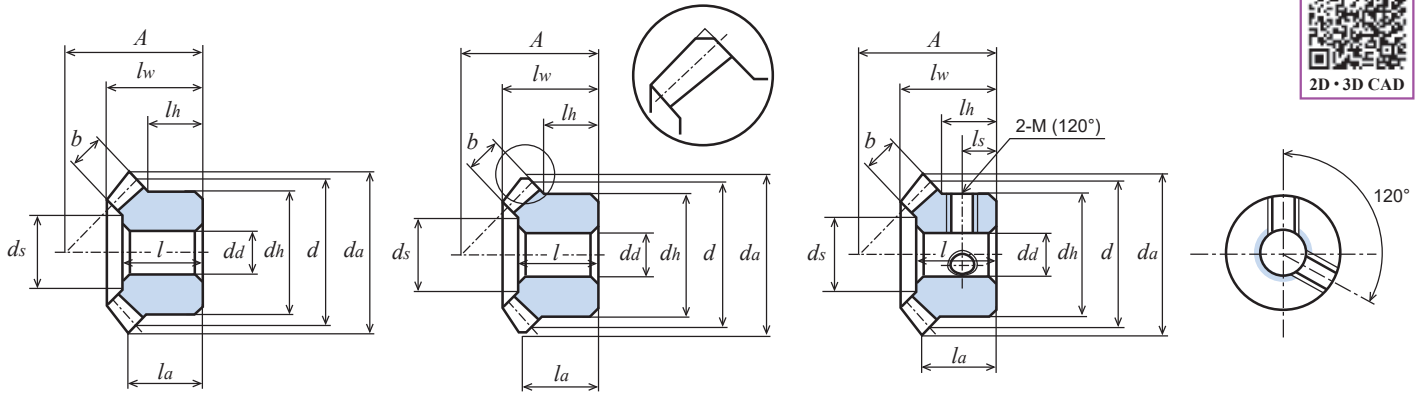


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |            |            |            |            |            |            | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |            |            |            |            |            |            | Backlash (Unit: mm) | Catalogue number                                                     |
|-----------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|-------------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|---------------------|----------------------------------------------------------------------|
| 300 rpm                                                                                       | 600 rpm    | 900 rpm    | 1,200 rpm  | 1,500 rpm  | 1,800 rpm  | 2,000 rpm  | 300 rpm                                                                                         | 600 rpm    | 900 rpm    | 1,200 rpm  | 1,500 rpm  | 1,800 rpm  | 2,000 rpm  |                     |                                                                      |
| 17.9                                                                                          | 35.8       | 53.7       | 71.6       | 86.2       | 99.9       | 108.4      | 2.3                                                                                             | 4.7        | 7.1        | 9.5        | 11.5       | 13.4       | 14.7       | 0.02 to 0.08        | M80S20R – 1605<br>M80S20L – 1605                                     |
| 30.6                                                                                          | 61.3       | 92.0       | 118.1      | 141.2      | 162.4      | 175.6      | 4.8                                                                                             | 9.7        | 14.7       | 19.1       | 23.0       | 26.6       | 28.9       | 0.02 to 0.08        | M80S25R – 1805<br>M80S25L – 1805                                     |
| 46.0                                                                                          | 92.1       | 135.6      | 171.3      | 203.4      | 232.5      | 250.4      | 8.6                                                                                             | 17.4       | 25.9       | 33.0       | 39.5       | 45.6       | 49.4       | 0.02 to 0.08        | M80S30R – 2006<br>M80S30L – 2006                                     |
| 34.9                                                                                          | 69.9       | 104.9      | 134.6      | 161.0      | 185.2      | 200.2      | 4.6                                                                                             | 9.4        | 14.1       | 18.2       | 21.9       | 25.4       | 27.6       | 0.05 to 0.12        | M1S 20R – 2106<br>M1S 20L – 2106<br>M1S 20R * 2108<br>M1S 20L * 2108 |
| 57.0                                                                                          | 113.9      | 166.4      | 209.9      | 248.9      | 284.0      | 305.6      | 9.1                                                                                             | 18.3       | 27.0       | 34.3       | 41.0       | 47.3       | 51.3       | 0.05 to 0.12        | M1S25R – 2306<br>M1S25L – 2306                                       |
| 84.0                                                                                          | 168.0      | 222.5      | 279.2      | 329.7      | 395.6      | 428.5      | 16.1                                                                                            | 32.5       | 49.1       | 58.7       | 69.9       | 80.3       | 87.7       | 0.05 to 0.12        | M1S 30R – 2610<br>M1S 30L – 2610                                     |
| 123.2                                                                                         | 246.4      | 348.1      | 435.2      | 512.0      | 580.3      | 628.6      | 16.7                                                                                            | 33.9       | 48.4       | 61.1       | 72.8       | 83.6       | 91.3       | 0.05 to 0.12        | M1.5S 20R – 2810<br>M1.5S 20L – 2810                                 |
| 187.5                                                                                         | 365.2      | 504.4      | 623.1      | 725.6      | 847.8      | 928.3      | 30.9                                                                                            | 61.0       | 85.4       | 107.1      | 126.8      | 150.5      | 166.5      | 0.05 to 0.12        | M1.5S25R – 3410<br>M1.5S25L – 3410                                   |
| 286.5                                                                                         | 539.5      | 735.8      | 899.5      | 1,079.8    | 1,262.1    | 1,378.5    | 57.1                                                                                            | 109.2      | 151.4      | 188.7      | 231.0      | 274.0      | 303.9      | 0.05 to 0.12        | M1.5S 30R – 3812<br>M1.5S 30L – 3812                                 |
| 0.462 (kW)                                                                                    | 0.851 (kW) | 1.152 (kW) | 1.414 (kW) | 1.716 (kW) | 2.001 (kW) | 2.188 (kW) | 0.078 (kW)                                                                                      | 0.147 (kW) | 0.203 (kW) | 0.254 (kW) | 0.315 (kW) | 0.375 (kW) | 0.416 (kW) | 0.05 to 0.12        | M2S25R – 4012<br>M2S25L – 4012                                       |
| 0.682 (kW)                                                                                    | 1.205 (kW) | 1.607 (kW) | 2.040 (kW) | 2.463 (kW) | 2.880 (kW) | 3.154 (kW) | 0.140 (kW)                                                                                      | 0.253 (kW) | 0.346 (kW) | 0.450 (kW) | 0.557 (kW) | 0.669 (kW) | 0.744 (kW) | 0.05 to 0.12        | M2S 30R – 5116<br>M2S 30L – 5116                                     |
| 0.923 (kW)                                                                                    | 1.612 (kW) | 2.143 (kW) | 2.742 (kW) | 3.306 (kW) | 3.873 (kW) | 4.238 (kW) | 0.160 (kW)                                                                                      | 0.286 (kW) | 0.391 (kW) | 0.513 (kW) | 0.635 (kW) | 0.764 (kW) | 0.849 (kW) | 0.06 to 0.15        | M2.5S25R – 5016<br>M2.5S25L – 5016                                   |
| 1.557 (kW)                                                                                    | 2.657 (kW) | 3.615 (kW) | 4.615 (kW) | 5.591 (kW) | 6.530 (kW) | - (kW)     | 0.276 (kW)                                                                                      | 0.485 (kW) | 0.681 (kW) | 0.896 (kW) | 1.122 (kW) | 1.346 (kW) | - (kW)     | 0.06 to 0.15        | M3S25R – 6020<br>M3S25L – 6020                                       |



Unit: mm

| Accuracy Class | Material | Pressure angle | Helix angle | Heat treatment               | Tooth surface hardness | Surface treatment  | Backlash ①           |
|----------------|----------|----------------|-------------|------------------------------|------------------------|--------------------|----------------------|
| [JIS B 1704] 4 | S45C     | 20°            | 35°         | Induction hardening of teeth | HRC47 to 53            | Black oxide finish | See the table below. |

★ The allowable transfer capability table was prepared based on the assumption that a left-hand gear is used on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number  | Gear ratio | Num-ber of teeth | Refer-ence diam-eter | Tip diam-eter | Assem-bly dis-tance | Hole diam-eter | Hub diam-eter | Hub length | Hole length | Overall length | Dis-tance from end face to tip | Face width | Tip angle  | Coun-terbore diam-eter (Refer-ence value) | Weight |
|-------------------|------------|------------------|----------------------|---------------|---------------------|----------------|---------------|------------|-------------|----------------|--------------------------------|------------|------------|-------------------------------------------|--------|
|                   | $u$        | $z$              | $d$                  | $d_a$         | $A$                 | $d_a(H8)$      | $d_h$         | $l_h$      | $l$         | $l_w$          | $l_a$                          | $b$        | $\delta_a$ | $d_s$                                     | $W(g)$ |
| M1S25R – 2306HB   | 1 : 1      | 25               | $\phi 25$            | $\phi 26.3$   | 23                  | $\phi 6$       | $\phi 20$     | 8          | 13          | 14.58          | 11.15                          | 5.30       | 49°47'     | $\phi 15.01$                              | 32.9   |
| M1S25L – 2306HB   |            | 25               | $\phi 25$            | $\phi 26.3$   | 23                  | $\phi 6$       | $\phi 20$     | 8          | 13          | 14.58          | 11.15                          | 5.30       | 49°47'     | $\phi 15.01$                              | 32.9   |
| M1.5S25R – 3410HB |            | 25               | $\phi 37.5$          | $\phi 39.38$  | 34                  | $\phi 10$      | $\phi 30$     | 11.5       | 19          | 21.10          | 16.19                          | 7.5        | 49°12'     | $\phi 23.79$                              | 105.7  |
| M1.5S25L – 3410HB |            | 25               | $\phi 37.5$          | $\phi 39.38$  | 34                  | $\phi 10$      | $\phi 30$     | 11.5       | 19          | 21.10          | 16.19                          | 7.5        | 49°12'     | $\phi 23.79$                              | 105.7  |
| M2S25R – 4012HB   |            | 25               | $\phi 50$            | $\phi 51.33$  | 40                  | $\phi 12$      | $\phi 42$     | 11         | 21          | 23.13          | 16.27                          | 10.5       | 49°21'     | $\phi 32.3$                               | 224.9  |
| M2S25L – 4012HB   |            | 25               | $\phi 50$            | $\phi 51.33$  | 40                  | $\phi 12$      | $\phi 42$     | 11         | 21          | 23.13          | 16.27                          | 10.5       | 49°21'     | $\phi 32.3$                               | 224.9  |
| M2.5S25R – 5016HB |            | 25               | $\phi 62.5$          | $\phi 64.16$  | 50                  | $\phi 16$      | $\phi 52$     | 13.5       | 27          | 29.14          | 20.35                          | 13.5       | 49°30'     | $\phi 40.82$                              | 437.6  |
| M2.5S25L – 5016HB |            | 25               | $\phi 62.5$          | $\phi 64.16$  | 50                  | $\phi 16$      | $\phi 52$     | 13.5       | 27          | 29.14          | 20.35                          | 13.5       | 49°30'     | $\phi 40.82$                              | 437.6  |
| M3S25R – 6020HB   |            | 25               | $\phi 75$            | $\phi 77.0$   | 60                  | $\phi 20$      | $\phi 65$     | 17.5       | 32          | 35.06          | 24.33                          | 16.2       | 48°37'     | $\phi 48.18$                              | 777.6  |
| M3S25L – 6020HB   |            | 25               | $\phi 75$            | $\phi 77.0$   | 60                  | $\phi 20$      | $\phi 65$     | 17.5       | 32          | 35.06          | 24.33                          | 16.2       | 48°37'     | $\phi 48.18$                              | 777.6  |

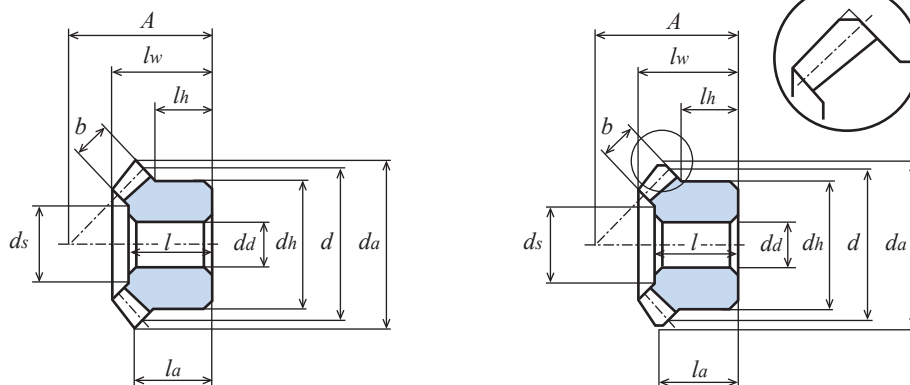


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |            |            |            |            |            |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |            |            |            |            |            |           | Backlash<br>(Unit: mm) | Catalogue number                         |
|-----------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|-----------|-------------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|-----------|------------------------|------------------------------------------|
| 300 rpm                                                                                       | 600 rpm    | 900 rpm    | 1,200 rpm  | 1,500 rpm  | 1,800 rpm  | 2,000 rpm | 300 rpm                                                                                         | 600 rpm    | 900 rpm    | 1,200 rpm  | 1,500 rpm  | 1,800 rpm  | 2,000 rpm |                        |                                          |
| 49.7                                                                                          | 99.4       | 145.6      | 184.4      | 219.6      | 251.7      | 271.4     | 24.9                                                                                            | 51.3       | 76.5       | 98.1       | 118.0      | 136.3      | 147.7     | 0.05 to 0.12           | M1S 25R – 2306HB<br>M1S 25L – 2306HB     |
| 163.6                                                                                         | 319.4      | 444.2      | 552.1      | 646.4      | 756.7      | 829.3     | 83.8                                                                                            | 168.7      | 238.9      | 300.7      | 355.5      | 419.4      | 461.9     | 0.05 to 0.12           | M1.5S 25R – 3410HB<br>M1.5S 25L – 3410HB |
| 0.403 (kW)                                                                                    | 0.748 (kW) | 1.021 (kW) | 1.261 (kW) | 1.533 (kW) | 1.791 (kW) | -         | 0.210 (kW)                                                                                      | 0.403 (kW) | 0.559 (kW) | 0.699 (kW) | 0.859 (kW) | 1.011 (kW) | -         | 0.05 to 0.12           | M2S 25R – 4012HB<br>M2S 25L – 4012HB     |
| 0.805 (kW)                                                                                    | 1.423 (kW) | 1.909 (kW) | 2.449 (kW) | 2.961 (kW) | -          | -         | 0.427 (kW)                                                                                      | 0.778 (kW) | 1.062 (kW) | 1.380 (kW) | 1.685 (kW) | -          | -         | 0.06 to 0.15           | M2.5S 25R – 5016HB<br>M2.5S 25L – 5016HB |
| 1.362 (kW)                                                                                    | 2.354 (kW) | 3.226 (kW) | 4.131 (kW) | -          | -          | -         | 0.732 (kW)                                                                                      | 1.305 (kW) | 1.820 (kW) | 2.360 (kW) | -          | -          | -         | 0.06 to 0.15           | M3S 25R – 6020HB<br>M3S 25L – 6020HB     |



Unit: mm

| Accuracy Class | Material | Pressure angle | Helix angle | Heat treatment               | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|-------------|------------------------------|------------------------|----------------------|
| [JIS B 1704] 4 | S45C     | 20°            | 35°         | Induction hardening of teeth | HRC47 to 53            | See the table below. |

★ No surface treatment is applied.

★ The allowable transfer capability table was prepared based on the assumption that a left-hand gear is used on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ Gears with a [\*] are provided with two screw holes and two set screws. Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number                                 | Gear ratio | Number of teeth | Reference diameter | Tip diameter       | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Key groove | Screw |        | Tip angle | Counter-bore diameter (Reference value) | Weight |
|--------------------------------------------------|------------|-----------------|--------------------|--------------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|------------|-------|--------|-----------|-----------------------------------------|--------|
|                                                  |            |                 |                    |                    |                   |               |              |            |             |                |                               |            |            | M     | ls     |           |                                         |        |
| M1S25R— 2306H                                    | 1 : 1      | 25              | φ25                | φ26.3              | 23                | φ 6           | φ20          | 8          | 13          | 14.58          | 11.15                         | 5.30       | -          | -     | -      | 49°47'    | φ15.01                                  | 32.9   |
| M1S25L— 2306H                                    |            | 25              | φ25                | φ26.3              | 23                | φ 6           | φ20          | 8          | 13          | 14.58          | 11.15                         | 5.30       | -          | -     | -      | 49°47'    | φ15.01                                  | 32.9   |
| M1S 30R * 2610H                                  |            | 30              | φ30                | φ31.09             | 26                | φ10           | φ22          | 9          | 14.5        | 15.67          | 11.54                         | 6.2        | -          | 2-M5  | 4.5    | 48°21'    | φ19.4                                   | 41.5   |
| M1S 30L * 2610H                                  |            | 30              | φ30                | φ31.09             | 26                | φ10           | φ22          | 9          | 14.5        | 15.67          | 11.54                         | 6.2        | -          | 2-M5  | 4.5    | 48°21'    | φ19.4                                   | 41.5   |
| M1.5S 20R — 2810H                                |            | 20              | φ30                | φ31.85             | 28                | φ10           | φ24          | 10         | 16.5        | 18.44          | 13.93                         | 7          | -          | -     | -      | 50° 5'    | φ17.2                                   | 54.7   |
| M1.5S 20L — 2810H                                |            | 20              | φ30                | φ31.85             | 28                | φ10           | φ24          | 10         | 16.5        | 18.44          | 13.93                         | 7          | -          | -     | -      | 50° 5'    | φ17.2                                   | 54.7   |
| M1.5S 20R # 2812H                                |            | 20              | φ30                | φ31.85             | 28                | φ12           | φ24          | 10         | 16.5        | 18.44          | 13.93                         | 7          | 4 × 1.8    | 2-M4  | 5      | 50° 5'    | φ17.2                                   | 49.1   |
| M1.5S 20L # 2812H                                |            | 20              | φ30                | φ31.85             | 28                | φ12           | φ24          | 10         | 16.5        | 18.44          | 13.93                         | 7          | 4 × 1.8    | 2-M4  | 5      | 50° 5'    | φ17.2                                   | 49.1   |
| M1.5S25R— 3410H                                  |            | 25              | φ37.5              | φ39.38             | 34                | φ10           | φ30          | 11.5       | 19          | 21.10          | 16.19                         | 7.5        | -          | -     | -      | 49°12'    | φ23.79                                  | 105.7  |
| M1.5S25L— 3410H                                  |            | 25              | φ37.5              | φ39.38             | 34                | φ10           | φ30          | 11.5       | 19          | 21.10          | 16.19                         | 7.5        | -          | -     | -      | 49°12'    | φ23.79                                  | 105.7  |
| M1.5S 30R — 3812H                                |            | 30              | φ45                | φ46.79             | 38                | φ12           | φ33          | 12         | 21          | 22.64          | 16.4                          | 9.3        | -          | -     | -      | 47°54'    | φ29.7                                   | 152.0  |
| M1.5S 30L — 3812H                                |            | 30              | φ45                | φ46.79             | 38                | φ12           | φ33          | 12         | 21          | 22.64          | 16.4                          | 9.3        | -          | -     | -      | 47°54'    | φ29.7                                   | 152.0  |
| For all the weight values below, the unit is kg. |            |                 |                    |                    |                   |               |              |            |             |                |                               |            |            |       |        |           |                                         |        |
| M2S 20R — 3712H                                  | 1 : 1      | 20              | φ40                | φ40.8<br>(φ42.28)  | 37                | φ12           | φ34          | 14         | 21          | 24.16          | 18.14                         | 9          | -          | -     | -      | 48° 3'    | φ22.5                                   | 0.14   |
| M2S 20L — 3712H                                  |            | 20              | φ40                | φ40.8<br>(φ42.28)  | 37                | φ12           | φ34          | 14         | 21          | 24.16          | 18.14                         | 9          | -          | -     | -      | 48° 3'    | φ22.5                                   | 0.14   |
| M2S 20R # 3715H                                  |            | 20              | φ40                | φ40.8<br>(φ42.28)  | 37                | φ15           | φ34          | 14         | 21          | 24.16          | 18.14                         | 9          | 5 × 2.3    | 2-M5  | 7      | 48° 3'    | φ22.5                                   | 0.13   |
| M2S 20L # 3715H                                  |            | 20              | φ40                | φ40.8<br>(φ42.28)  | 37                | φ15           | φ34          | 14         | 21          | 24.16          | 18.14                         | 9          | 5 × 2.3    | 2-M5  | 7      | 48° 3'    | φ22.5                                   | 0.13   |
| M2S 20R — 2812H                                  |            | 20              | φ40                | φ40.8<br>(φ42.28)  | 28                | φ12           | φ34          | 5          | 12          | 15.16          | 9.14                          | 9          | -          | -     | -      | 48° 3'    | φ22.5                                   | 0.09   |
| M2S 20L — 2812H                                  |            | 20              | φ40                | φ40.8<br>(φ42.28)  | 28                | φ12           | φ34          | 5          | 12          | 15.16          | 9.14                          | 9          | -          | -     | -      | 48° 3'    | φ22.5                                   | 0.09   |
| M2S25R— 4012H                                    |            | 25              | φ50                | φ51.33<br>(φ52.53) | 40                | φ12           | φ42          | 11         | 21          | 23.13          | 16.27                         | 10.5       | -          | -     | -      | 49°21'    | φ32.3                                   | 0.23   |
| M2S25L— 4012H                                    |            | 25              | φ50                | φ51.33<br>(φ52.53) | 40                | φ12           | φ42          | 11         | 21          | 23.13          | 16.27                         | 10.5       | -          | -     | -      | 49°21'    | φ32.3                                   | 0.23   |
| M2S 30R — 5116H                                  |            | 30              | φ60                | φ60.94<br>(φ62.42) | 51                | φ16           | φ44          | 17         | 28          | 30.53          | 22.21                         | 12.4       | -          | -     | -      | 47°54'    | φ38.9                                   | 0.36   |
| M2S 30L — 5116H                                  |            | 30              | φ60                | φ60.94<br>(φ62.42) | 51                | φ16           | φ44          | 17         | 28          | 30.53          | 22.21                         | 12.4       | -          | -     | -      | 47°54'    | φ38.9                                   | 0.36   |
| M2.5S 20R — 4814H                                |            | 20              | φ50                | φ51.14<br>(φ53.02) | 48                | φ14           | φ42          | 19         | 28          | 31.77          | 24.51                         | 11.1       | -          | -     | -      | 49°20'    | φ28.6                                   | 0.30   |
| M2.5S 20L — 4814H                                |            | 20              | φ50                | φ51.14<br>(φ53.02) | 48                | φ14           | φ42          | 19         | 28          | 31.77          | 24.51                         | 11.1       | -          | -     | -      | 49°20'    | φ28.6                                   | 0.30   |
| M2.5S 20R # 4820H                                |            | 20              | φ50                | φ51.14<br>(φ53.02) | 48                | φ20           | φ42          | 19         | 28          | 31.77          | 24.51                         | 11.1       | 6 × 2.8    | 2-M5  | 9.5    | 49°20'    | φ28.6                                   | 0.26   |
| M2.5S 20L # 4820H                                |            | 20              | φ50                | φ51.14<br>(φ53.02) | 48                | φ20           | φ42          | 19         | 28          | 31.77          | 24.51                         | 11.1       | 6 × 2.8    | 2-M5  | 9.5    | 49°20'    | φ28.6                                   | 0.26   |
| M2.5S25R— 5016H                                  |            | 25              | φ62.5              | φ64.16<br>(φ65.69) | 50                | φ16           | φ52          | 13.5       | 27          | 29.14          | 20.35                         | 13.5       | -          | -     | -      | 49°30'    | φ40.82                                  | 0.44   |
| M2.5S25L— 5016H                                  |            | 25              | φ62.5              | φ64.16<br>(φ65.69) | 50                | φ16           | φ52          | 13.5       | 27          | 29.14          | 20.35                         | 13.5       | -          | -     | -      | 49°30'    | φ40.82                                  | 0.44   |
| M2.5S 30R — 6318H                                | 30         | φ75             | φ76.2<br>(φ78.05)  | 63                 | φ18               | φ55           | 20           | 34.5       | 37.07       | 27.03          | 15                            | -          | -          | -     | 48° 3' | φ50.6     | 0.71                                    |        |
| M2.5S 30L — 6318H                                | 30         | φ75             | φ76.2<br>(φ78.05)  | 63                 | φ18               | φ55           | 20           | 34.5       | 37.07       | 27.03          | 15                            | -          | -          | -     | 48° 3' | φ50.6     | 0.71                                    |        |
| M3S 20R — 5816H                                  | 20         | φ60             | φ61.39<br>(φ63.66) | 58                 | φ16               | φ50           | 23           | 35         | 38.95       | 29.83          | 14                            | -          | -          | -     | 49°30' | φ34.4     | 0.52                                    |        |
| M3S 20L — 5816H                                  | 20         | φ60             | φ61.39<br>(φ63.66) | 58                 | φ16               | φ50           | 23           | 35         | 38.95       | 29.83          | 14                            | -          | -          | -     | 49°30' | φ34.4     | 0.52                                    |        |
| M3S25R— 6020H                                    | 25         | φ75             | φ77.0<br>(φ78.66)  | 60                 | φ20               | φ65           | 17.5         | 32         | 35.06       | 24.33          | 16.2                          | -          | -          | -     | 48°37' | φ48.18    | 0.78                                    |        |
| M3S25L— 6020H                                    | 25         | φ75             | φ77.0<br>(φ78.66)  | 60                 | φ20               | φ65           | 17.5         | 32         | 35.06       | 24.33          | 16.2                          | -          | -          | -     | 48°37' | φ48.18    | 0.78                                    |        |
| M3S 30R — 7522H                                  | 30         | φ90             | φ91.28<br>(φ93.46) | 75                 | φ22               | φ66           | 24           | 40         | 44.38       | 31.73          | 18.6                          | -          | -          | -     | 47°11' | φ57.4     | 1.19                                    |        |
| M3S 30L — 7522H                                  | 30         | φ90             | φ91.28<br>(φ93.46) | 75                 | φ22               | φ66           | 24           | 40         | 44.38       | 31.73          | 18.6                          | -          | -          | -     | 47°11' | φ57.4     | 1.19                                    |        |



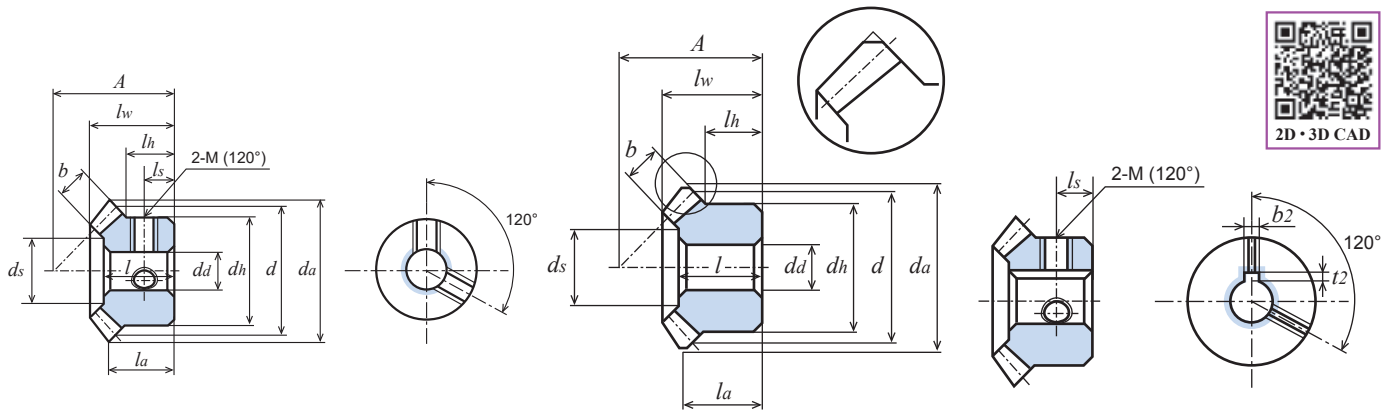


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |         |         |           |           |           |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |         |         |           |           |           |           | Backlash (Unit: mm) | Catalogue number                                                                 |
|-----------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|-------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|---------------------|----------------------------------------------------------------------------------|
| 300 rpm                                                                                       | 600 rpm | 900 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,000 rpm | 300 rpm                                                                                         | 600 rpm | 900 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,000 rpm |                     |                                                                                  |
| 49.7                                                                                          | 99.4    | 145.6   | 184.4     | 219.6     | 251.7     | 271.4     | 24.9                                                                                            | 51.3    | 76.5    | 98.1      | 118.0     | 136.3     | 147.7     | 0.05 to 0.12        | M1S25R – 2306H<br>M1S25L – 2306H                                                 |
| 73.3                                                                                          | 146.6   | 198.1   | 254.5     | 298.5     | 348.7     | 387.5     | 43.6                                                                                            | 90.0    | 130.7   | 167.2     | 200.4     | 230.8     | 250.8     | 0.05 to 0.12        | M1S 30R * 2610H<br>M1S 30L * 2610H                                               |
| 107.5                                                                                         | 215.1   | 306.9   | 387.5     | 460.0     | 525.5     | 568.4     | 45.5                                                                                            | 93.8    | 136.2   | 174.2     | 208.8     | 240.5     | 261.4     | 0.05 to 0.12        | M1.5S 20R – 2810H<br>M1.5S 20L – 2810H<br>M1.5S 20R # 2812H<br>M1.5S 20L # 2812H |
| 163.6                                                                                         | 319.4   | 444.2   | 552.1     | 646.4     | 756.7     | 829.3     | 83.8                                                                                            | 168.7   | 238.9   | 300.7     | 355.5     | 419.4     | 461.9     | 0.05 to 0.12        | M1.5S25R – 3410H<br>M1.5S25L – 3410H                                             |
| 250.1                                                                                         | 475.6   | 658.2   | 814.5     | 966.1     | 1,108.9   | 1,197.3   | 152.8                                                                                           | 299.7   | 422.1   | 529.0     | 633.7     | 733.1     | 795.3     | 0.05 to 0.12        | M1.5S 30R – 3812H<br>M1.5S 30L – 3812H                                           |
| For all the values below, the unit is kW.                                                     |         |         |           |           |           |           |                                                                                                 |         |         |           |           |           |           |                     |                                                                                  |
| 0.251                                                                                         | 0.488   | 0.680   | 0.847     | 0.998     | 1.150     | 1.245     | 0.108                                                                                           | 0.216   | 0.307   | 0.387     | 0.460     | 0.535     | 0.581     | 0.05 to 0.12        | M2S 20R – 3712H<br>M2S 20L – 3712H<br>M2S 20R # 3715H<br>M2S 20L # 3715H         |
| 0.251                                                                                         | 0.488   | 0.680   | 0.847     | 0.998     | 1.150     | 1.245     | 0.108                                                                                           | 0.216   | 0.307   | 0.387     | 0.460     | 0.535     | 0.581     | 0.05 to 0.12        | M2S 20R – 2812H<br>M2S 20L – 2812H                                               |
| 0.403                                                                                         | 0.748   | 1.021   | 1.261     | 1.533     | 1.791     | -         | 0.210                                                                                           | 0.403   | 0.559   | 0.699     | 0.859     | 1.011     | -         | 0.05 to 0.12        | M2S25R – 4012H<br>M2S25L – 4012H                                                 |
| 0.596                                                                                         | 1.073   | 1.455   | 1.814     | 2.139     | -         | -         | 0.371                                                                                           | 0.690   | 0.952   | 1.202     | 1.432     | -         | -         | 0.05 to 0.12        | M2S 30R – 5116H<br>M2S 30L – 5116H                                               |
| 0.491                                                                                         | 0.916   | 1.259   | 1.556     | 1.850     | 2.115     | -         | 0.214                                                                                           | 0.411   | 0.576   | 0.721     | 0.865     | 0.997     | -         | 0.06 to 0.15        | M2.5S 20R – 4814H<br>M2.5S 20L – 4814H<br>M2.5S 20R # 4820H<br>M2.5S 20L # 4820H |
| 0.805                                                                                         | 1.423   | 1.909   | 2.449     | 2.961     | -         | -         | 0.427                                                                                           | 0.778   | 1.062   | 1.380     | 1.685     | -         | -         | 0.06 to 0.15        | M2.5S25R – 5016H<br>M2.5S25L – 5016H                                             |
| 1.117                                                                                         | 1.953   | 2.647   | 3.281     | -         | -         | -         | 0.709                                                                                           | 1.278   | 1.763   | 2.213     | -         | -         | -         | 0.06 to 0.15        | M2.5S 30R – 6318H<br>M2.5S 30L – 6318H                                           |
| 0.878                                                                                         | 1.582   | 2.146   | 2.674     | 3.155     | -         | -         | 0.387                                                                                           | 0.719   | 0.993   | 1.253     | 1.493     | -         | -         | 0.06 to 0.15        | M3S 20R – 5816H<br>M3S 20L – 5816H                                               |
| 1.362                                                                                         | 2.354   | 3.226   | 4.131     | -         | -         | -         | 0.732                                                                                           | 1.305   | 1.820   | 2.360     | -         | -         | -         | 0.06 to 0.15        | M3S25R – 6020H<br>M3S25L – 6020H                                                 |
| 1.922                                                                                         | 3.291   | 4.481   | -         | -         | -         | -         | 1.237                                                                                           | 2.184   | 3.026   | -         | -         | -         | -         | 0.06 to 0.15        | M3S 30R – 7522H<br>M3S 30L – 7522H                                               |



Unit: mm

| Accuracy Class | Material | Pressure angle | Helix angle | Heat treatment               | Tooth surface hardness | Backlash ①           | Number of teeth of all gears |
|----------------|----------|----------------|-------------|------------------------------|------------------------|----------------------|------------------------------|
| [JIS B 1704] 4 | S45C     | 20°            | 35°         | Induction hardening of teeth | HRC47 to 53            | See the table below. | 20                           |

★ No surface treatment is applied.

★ The allowable transfer capability table was prepared based on the assumption that a left-hand gear is used on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

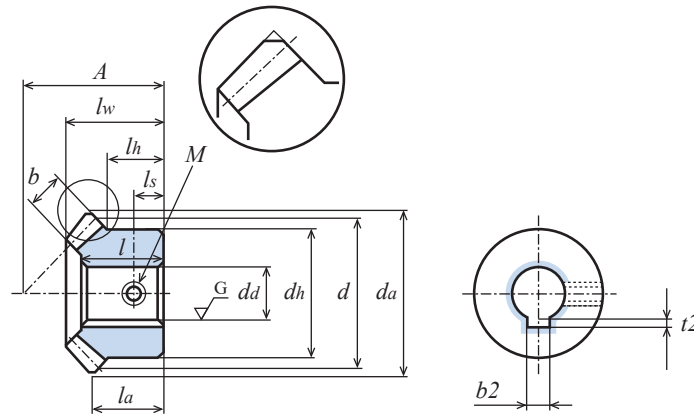
★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center.

★ For the MGH Series, the teeth have been finished by induction hardening and the holes have been finished by grinding. Also, keys and set screws are provided. This product can be used without additional machining.

★ Gears with a [+] are provided with screw holes and set screws, and gears with a [=] are provided with keys and key grooves.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number | Gear ratio | Module | Reference diameter | Tip diameter                     | As-sembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Over-all length | Dis-tance from end face to tip | Face width | Key groove | Screw |       | Tip angle | Weight |
|------------------|------------|--------|--------------------|----------------------------------|--------------------|---------------|--------------|------------|-------------|-----------------|--------------------------------|------------|------------|-------|-------|-----------|--------|
|                  |            |        |                    |                                  |                    |               |              |            |             |                 |                                |            |            | $M$   | $l_s$ |           |        |
| <b>MGH R+ 8</b>  | 1 : 1      | 1      | $\phi 20$          | $\phi 21.12$                     | 20                 | $\phi 8$      | $\phi 16$    | 8          | 12          | 13.43           | 10.56                          | 4.5        | -          | M4    | 4     | 50°31'    | 16.0   |
| <b>MGH L+ 8</b>  |            | 1      | $\phi 20$          | $\phi 21.12$                     | 20                 | $\phi 8$      | $\phi 16$    | 8          | 12          | 13.43           | 10.56                          | 4.5        | -          | M4    | 4     | 50°31'    | 16.0   |
| <b>MGH R+ 10</b> |            | 1.25   | $\phi 25$          | $\phi 26.42$                     | 25                 | $\phi 10$     | $\phi 20$    | 10         | 15.5        | 17.13           | 13.21                          | 6          | -          | M4    | 5     | 49°22'    | 32.0   |
| <b>MGH L+ 10</b> |            | 1.25   | $\phi 25$          | $\phi 26.42$                     | 25                 | $\phi 10$     | $\phi 20$    | 10         | 15.5        | 17.13           | 13.21                          | 6          | -          | M4    | 5     | 49°22'    | 32.0   |
| <b>MGH R= 12</b> |            | 1.5    | $\phi 30$          | $\phi 31.85$                     | 30                 | $\phi 12$     | $\phi 24$    | 12         | 18.5        | 20.44           | 15.93                          | 7          | 4 × 1.8    | M5    | 6     | 50° 5'    | 54.9   |
| <b>MGH L= 12</b> |            | 1.5    | $\phi 30$          | $\phi 31.85$                     | 30                 | $\phi 12$     | $\phi 24$    | 12         | 18.5        | 20.44           | 15.93                          | 7          | 4 × 1.8    | M5    | 6     | 50° 5'    | 54.9   |
| <b>MGH R= 14</b> |            | 2      | $\phi 40$          | $\phi 40.88$<br>( $\phi 42.28$ ) | 40                 | $\phi 14$     | $\phi 32$    | 16         | 24          | 27.16           | 21.14                          | 9          | 5 × 2.3    | M5    | 8     | 48° 3'    | 137.6  |
| <b>MGH L= 14</b> |            | 2      | $\phi 40$          | $\phi 40.88$<br>( $\phi 42.28$ ) | 40                 | $\phi 14$     | $\phi 32$    | 16         | 24          | 27.16           | 21.14                          | 9          | 5 × 2.3    | M5    | 8     | 48° 3'    | 137.6  |



| Allowable transfer capability for different revolutions per minute Bending strength (Unit: kW) |         |         |           |           |           |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: kW) |         |         |           |           |           |           | Backlash<br>(Unit: mm) | Catalogue number         |
|------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|--------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|------------------------|--------------------------|
| 300 rpm                                                                                        | 600 rpm | 900 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,000 rpm | 300 rpm                                                                                          | 600 rpm | 900 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm | 2,000 rpm |                        |                          |
| 0.030                                                                                          | 0.061   | 0.091   | 0.118     | 0.142     | 0.164     | 0.179     | 0.012                                                                                            | 0.026   | 0.040   | 0.052     | 0.063     | 0.074     | 0.081     | 0.05 to 0.12           | MGH R + 8<br>MGH L + 8   |
| 0.062                                                                                          | 0.125   | 0.184   | 0.234     | 0.280     | 0.322     | 0.348     | 0.026                                                                                            | 0.054   | 0.081   | 0.104     | 0.126     | 0.146     | 0.158     | 0.05 to 0.12           | MGH R + 10<br>MGH L + 10 |
| 0.107                                                                                          | 0.215   | 0.297   | 0.387     | 0.460     | 0.525     | 0.568     | 0.045                                                                                            | 0.093   | 0.136   | 0.174     | 0.208     | 0.240     | 0.261     | 0.05 to 0.12           | MGH R = 12<br>MGH L = 12 |
| 0.251                                                                                          | 0.488   | 0.680   | 0.847     | 0.998     | 1.150     | 1.245     | 0.108                                                                                            | 0.216   | 0.307   | 0.387     | 0.460     | 0.535     | 0.581     | 0.05 to 0.12           | MGH R = 14<br>MGH L = 14 |

# ML-N: B-LOCK Simplified Lock

## Straight Miter (S45C)

Module 1/1.5/2/2.5

Gear Ratio 1 : 1



New product

The ML-N Series is the successor of the former ML Series (S45C).

Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|----------------|------------------------|----------------------|
| [JIS B 1704] 3 | S45C     | 20°            | —              | —                      | See the table below. |

★ No surface treatment is applied. Set screws are attached to the main body.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ This product is fastened to the shaft by tightening set screws to generate a frictional force, thereby preventing damage to the shaft.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number  | Gear ratio | Number of teeth | Reference diameter | Tip diameter | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Screw |     | Tip angle | Counterbore diameter (Reference value) | Weight |
|-------------------|------------|-----------------|--------------------|--------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|-------|-----|-----------|----------------------------------------|--------|
|                   |            |                 |                    |              |                   |               |              |            |             |                |                               |            | M     | ls  |           |                                        |        |
| ML1S 20 — 2108N   | 1 : 1      | 20              | φ20                | φ21.41       | 21                | φ 8           | φ18          | 10         | 13          | 14.48          | 11.71                         | 4.3        | M3    | 4   | 49° 3'    | φ11.8                                  | 19.5   |
| ML1.5S 20 — 3010N |            | 20              | φ30                | φ32.12       | 30                | φ10           | φ24          | 12         | 18.5        | 20.38          | 16.06                         | 6.8        | M4    | 5   | 49° 3'    | φ17.7                                  | 54.6   |
| ML1.5S 25 — 3412N |            | 25              | φ37.5              | φ39.62       | 34                | φ12           | φ30          | 12.5       | 19          | 21.11          | 16.31                         | 7.5        | M5    | 5.5 | 48°51'    | φ23.8                                  | 93.4   |
| ML2S 20 — 3715N   |            | 20              | φ40                | φ41.32       | 37                | φ15           | φ34          | 14         | 21          | 23.85          | 18.41                         | 8.5        | M5    | 6   | 49° 3'    | φ23.9                                  | 119.2  |
| ML2.5S 20 — 4820N |            | 20              | φ50                | φ51.66       | 48                | φ20           | φ42          | 19         | 28          | 31.86          | 24.77                         | 11.1       | M6    | 7.5 | 49° 3'    | φ28.5                                  | 236.6  |

# ML: B-LOCK Simplified Lock

## Straight Miter (SUS304)

Module 0.8/1/1.5/2

Gear Ratio 1 : 1



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|----------------|------------------------|----------------------|
| [JIS B 1704] 4 | SUS304   | 20°            | —              | —                      | See the table below. |

★ No surface treatment is applied. Set screws are attached to the main body.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

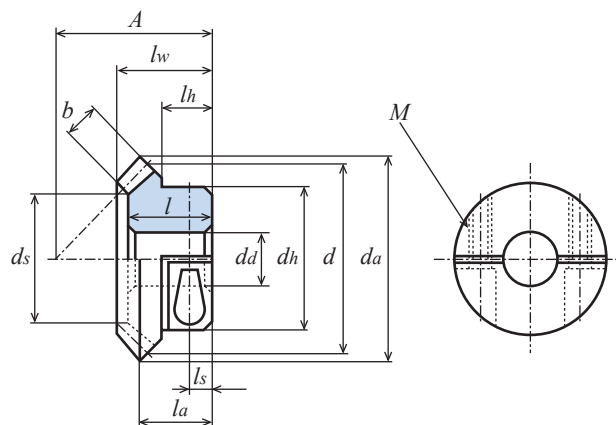
★ This product is fastened to the shaft by tightening set screws to generate a frictional force, thereby preventing damage to the shaft.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

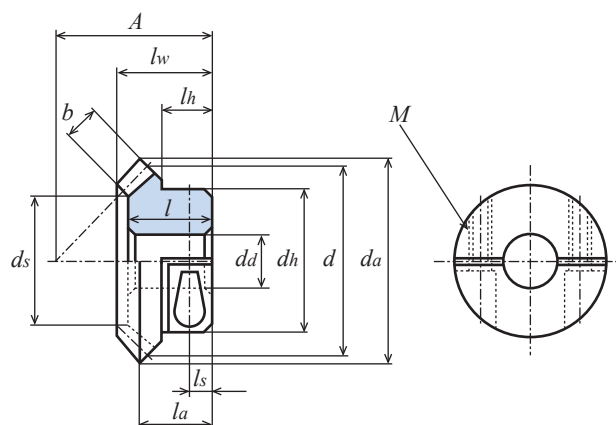
| Catalogue number  | Gear ratio | Number of teeth | Reference diameter | Tip diameter | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Screw |     | Tip angle | Counterbore diameter (Reference value) | Weight |
|-------------------|------------|-----------------|--------------------|--------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|-------|-----|-----------|----------------------------------------|--------|
|                   |            |                 |                    |              |                   |               |              |            |             |                |                               |            | M     | ls  |           |                                        |        |
| ML80SU 20 — 1605  | 1 : 1      | 20              | φ16                | φ17.13       | 16                | φ 5           | φ14.5        | 7.25       | 10          | 10.95          | 8.57                          | 3.7        | M2.5  | 3   | 49° 3'    | φ 9.5                                  | 10.2   |
| ML1SU 20 — 2106   |            | 20              | φ20                | φ21.41       | 21                | φ 6           | φ16          | 9          | 13          | 14.48          | 11.71                         | 4.3        | M3    | 4   | 49° 3'    | φ11.8                                  | 18.6   |
| ML1SU 30 — 2808   |            | 30              | φ30                | φ31.41       | 28                | φ 8           | φ24          | 11         | 16.5        | 17.84          | 13.71                         | 6.2        | M4    | 5   | 47°42'    | φ19.4                                  | 54.3   |
| ML1.5SU 20 — 3010 |            | 20              | φ30                | φ32.12       | 30                | φ10           | φ24          | 12         | 18.5        | 20.38          | 16.06                         | 6.8        | M4    | 5   | 49° 3'    | φ17.7                                  | 57.3   |
| ML1.5SU 25 — 3412 |            | 25              | φ37.5              | φ39.62       | 34                | φ12           | φ30          | 12.5       | 19          | 21.11          | 16.31                         | 7.5        | M5    | 5.5 | 48°51'    | φ23.8                                  | 94.0   |
| ML2SU 20 — 3715   |            | 20              | φ40                | φ41.32       | 37                | φ15           | φ34          | 14         | 21          | 23.85          | 19.07                         | 8.5        | M5    | 6   | 49° 3'    | φ23.9                                  | 121.5  |



2D • 3D CAD



| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |        |         |         |         |         |           | Recommended tightening torque of screw (Unit: N • m) | Recommended mating gear (KG product) | Backlash (Unit: mm) | Catalogue number  |
|-----------------------------------------------------------------------------------------------|--------|---------|---------|---------|---------|-----------|------------------------------------------------------|--------------------------------------|---------------------|-------------------|
| 10 rpm                                                                                        | 50 rpm | 100 rpm | 250 rpm | 500 rpm | 800 rpm | 1,000 rpm |                                                      |                                      |                     |                   |
| 1.0                                                                                           | 5.1    | 10.2    | 25.6    | 51.3    | 82.2    | 102.0     | 1.17                                                 | M1S 20 – 2106                        | 0.05 to 0.12        | ML1S 20 – 2108N   |
| 3.5                                                                                           | 17.9   | 35.8    | 89.7    | 179.4   | 277.3   | 332.8     | 2.54                                                 | M1.5S 20 – 2810                      | 0.05 to 0.12        | ML1.5S 20 – 3010N |
| 5.5                                                                                           | 27.9   | 55.8    | 139.5   | 279.1   | 414.4   | 493.4     | 5.09                                                 | M1.5S 25 – 3410                      | 0.05 to 0.12        | ML1.5S 25 – 3412N |
| 8.1                                                                                           | 40.8   | 81.6    | 204.0   | 405.4   | 597.9   | 710.2     | 5.09                                                 | M2S 20 – 3712                        | 0.05 to 0.12        | ML2S 20 – 3715N   |
| 16.3                                                                                          | 81.9   | 163.9   | 409.8   | 786.6   | 1141.2  | 1343.2    | 7.84                                                 | M2.5S 20 – 4814                      | 0.06 to 0.15        | ML2.5S 20 – 4820N |



| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |        |         |         |         |         |           | Recommended tightening torque of screw (Unit: N • m) | Recommended mating gear (KG product) | Backlash (Unit: mm) | Catalogue number  |
|-----------------------------------------------------------------------------------------------|--------|---------|---------|---------|---------|-----------|------------------------------------------------------|--------------------------------------|---------------------|-------------------|
| 10 rpm                                                                                        | 50 rpm | 100 rpm | 250 rpm | 500 rpm | 800 rpm | 1,000 rpm |                                                      |                                      |                     |                   |
| 0.2                                                                                           | 1.3    | 2.6     | 6.5     | 13.1    | 20.9    | 26.2      | 0.68                                                 | M80SU 20 * 1605                      | 0.02 to 0.08        | ML80SU 20 – 1605  |
| 0.4                                                                                           | 2.4    | 4.8     | 12.1    | 24.4    | 39.1    | 48.5      | 0.98                                                 | M1SU 20 * 2106                       | 0.05 to 0.12        | ML1SU 20 – 2106   |
| 1.2                                                                                           | 6.1    | 12.2    | 30.5    | 61.1    | 94.5    | 113.5     | 2.45                                                 | M1SU 30 * 2608                       | 0.05 to 0.12        | ML1SU 30 – 2808   |
| 1.6                                                                                           | 8.5    | 17.0    | 42.7    | 85.4    | 132.0   | 158.4     | 2.45                                                 | M1.5SU 20 – 2810                     | 0.05 to 0.12        | ML1.5SU 20 – 3010 |
| 2.6                                                                                           | 13.2   | 26.5    | 66.4    | 132.9   | 197.3   | 234.9     | 3.92                                                 | M1.5SU 25 – 3410                     | 0.05 to 0.12        | ML1.5SU 25 – 3412 |
| 3.8                                                                                           | 19.4   | 38.8    | 97.1    | 193.0   | 284.7   | 338.1     | 3.92                                                 | M2SU 20 – 3712                       | 0.05 to 0.12        | ML2SU 20 – 3715   |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|----------------|------------------------|----------------------|
| [JIS B 1704] 3 | S45C     | 20°            | —              | —                      | See the table below. |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ Gears with a [\*] are provided with two screw holes and set screws, and gears with a [=] are provided with key grooves and keys.

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number                                 | Gear ratio | Number of teeth | Reference diameter | Tip diameter               | Assembly distance | Hole diameter       | Hub diameter   | Hub length     | Hole length | Overall length | Distance from end face to tip | Face width | Key groove                      | Screw  |                | Tip angle | Counter-bore diameter (Reference value) | Weight |
|--------------------------------------------------|------------|-----------------|--------------------|----------------------------|-------------------|---------------------|----------------|----------------|-------------|----------------|-------------------------------|------------|---------------------------------|--------|----------------|-----------|-----------------------------------------|--------|
|                                                  |            |                 |                    |                            |                   |                     |                |                |             |                |                               |            |                                 | 2-M    | l <sub>s</sub> |           |                                         |        |
|                                                  | u          | z               | d                  | d <sub>a</sub>             | A                 | d <sub>a</sub> (H7) | d <sub>h</sub> | l <sub>h</sub> | l           | l <sub>w</sub> | l <sub>a</sub>                | b          | b <sub>2</sub> × t <sub>2</sub> |        |                |           |                                         |        |
| M50S 20 — 1103                                   | 1 : 1      | 20              | φ10                | φ10.71                     | 11                | φ3(H8)              | φ 8            | 5              | 7           | 8              | 6.35                          | 2.5        | -                               | -      | -              | 49° 3'    | φ 4.9                                   | 2.7    |
| M50S 20 * 1103                                   |            | 20              | φ10                | φ10.71                     | 11                | φ3(H8)              | φ 8            | 5              | 7           | 8              | 6.35                          | 2.5        | -                               | 2-M2.5 | 2.5            | 49° 3'    | φ 4.9                                   | 2.5    |
| M50S 25 — 1204                                   |            | 25              | φ12.5              | φ13.21                     | 12                | φ4(H8)              | φ11            | 5              | 7           | 8.11           | 6.10                          | 3.0        | -                               | -      | -              | 48°14'    | φ 6.5                                   | 5.2    |
| M50S 25 * 1204                                   |            | 25              | φ12.5              | φ13.21                     | 12                | φ4(H8)              | φ11            | 5              | 7           | 8.11           | 6.10                          | 3.0        | -                               | 2-M3   | 3              | 48°14'    | φ 6.5                                   | 4.6    |
| M50S 30 — 1404                                   |            | 30              | φ15                | φ15.71                     | 14                | φ4(H8)              | φ12            | 5              | 8           | 9.21           | 6.85                          | 3.5        | -                               | -      | -              | 47°42'    | φ 8.1                                   | 7.4    |
| M50S 30 * 1404                                   |            | 30              | φ15                | φ15.71                     | 14                | φ4(H8)              | φ12            | 5              | 8           | 9.21           | 6.85                          | 3.5        | -                               | 2-M3   | 3              | 47°42'    | φ 8.1                                   | 7.0    |
| M80S 20 — 1605                                   |            | 20              | φ16                | φ17.13                     | 16                | φ 5                 | φ12            | 6              | 10          | 11             | 8.57                          | 3.7        | -                               | -      | -              | 49° 3'    | φ 9.5                                   | 8.7    |
| M80S 20 * 1605                                   |            | 20              | φ16                | φ17.13                     | 16                | φ 5                 | φ12            | 6              | 10          | 11             | 8.57                          | 3.7        | -                               | 2-M3   | 3              | 49° 3'    | φ 9.5                                   | 8.4    |
| M80S 25 — 1805                                   |            | 25              | φ20                | φ21.13                     | 18                | φ 5                 | φ16            | 6              | 10.5        | 11.67          | 8.57                          | 4.7        | -                               | -      | -              | 48°51'    | φ11.7                                   | 16.8   |
| M1S 20 — 2106                                    |            | 20              | φ20                | φ21.41                     | 21                | φ 6                 | φ16            | 9              | 13          | 14.53          | 11.71                         | 4.3        | -                               | -      | -              | 49° 3'    | φ11.8                                   | 19.7   |
| M1S 20 * 2106                                    |            | 20              | φ20                | φ21.41                     | 21                | φ 6                 | φ16            | 9              | 13          | 14.53          | 11.71                         | 4.3        | -                               | 2-M4   | 4.5            | 49° 3'    | φ11.8                                   | 18.9   |
| M1S 20 * 2108                                    |            | 20              | φ20                | φ21.41                     | 21                | φ 8                 | φ16            | 9              | 13          | 14.53          | 11.71                         | 4.3        | -                               | 2-M4   | 4.5            | 49° 3'    | φ11.8                                   | 16.9   |
| M1S 20 — 1406                                    |            | 20              | φ20                | φ21.41                     | 14                | φ 6                 | φ16            | 2              | 6           | 7.53           | 4.71                          | 4.3        | -                               | -      | -              | 49° 3'    | φ11.8                                   | 10.2   |
| M1S 20 = 1408                                    |            | 20              | φ20                | φ21.41                     | 14                | φ 8                 | φ16            | 2              | 6           | 7.53           | 4.71                          | 4.3        | 3 × 1.4                         | -      | -              | 49° 3'    | φ11.8                                   | 9.0    |
| M1S 25 — 2306                                    |            | 25              | φ25                | φ26.41                     | 23                | φ 6                 | φ20            | 8              | 13          | 14.7           | 11.21                         | 5.3        | -                               | -      | -              | 48°51'    | φ15.0                                   | 33.2   |
| M1S 25 * 2308                                    |            | 25              | φ25                | φ26.41                     | 23                | φ 8                 | φ20            | 8              | 13          | 14.7           | 11.21                         | 5.3        | -                               | 2-M4   | 4              | 48°51'    | φ15.0                                   | 30.0   |
| M1S 25 * 2310                                    |            | 25              | φ25                | φ26.41                     | 23                | φ10                 | φ20            | 8              | 13          | 14.7           | 11.21                         | 5.3        | -                               | 2-M4   | 4              | 48°51'    | φ15.0                                   | 27.3   |
| M1S 30 — 2608                                    |            | 30              | φ30                | φ31.41                     | 26                | φ 8                 | φ22            | 8.9            | 14.5        | 15.89          | 11.71                         | 6.2        | -                               | -      | -              | 47°42'    | φ19.4                                   | 46.4   |
| M1S 30 * 2608                                    |            | 30              | φ30                | φ31.41                     | 26                | φ 8                 | φ22            | 8.9            | 14.5        | 15.89          | 11.71                         | 6.2        | -                               | 2-M5   | 4.5            | 47°42'    | φ19.4                                   | 44.7   |
| M1S 30 * 2610                                    |            | 30              | φ30                | φ31.41                     | 26                | φ10                 | φ22            | 8.9            | 14.5        | 15.89          | 11.71                         | 6.2        | -                               | 2-M5   | 4.5            | 47°42'    | φ19.4                                   | 41.8   |
| M1S 30 * 2612                                    |            | 30              | φ30                | φ31.41                     | 26                | φ12                 | φ22            | 8.9            | 14.5        | 15.89          | 11.71                         | 6.2        | -                               | 2-M5   | 4.5            | 47°42'    | φ19.4                                   | 38.3   |
| M1S 30 — 2008                                    |            | 30              | φ30                | φ31.41                     | 20                | φ 8                 | φ22            | 2.9            | 8.5         | 9.89           | 5.71                          | 6.2        | -                               | -      | -              | 47°42'    | φ19.4                                   | 30.9   |
| M1.25S 20 — 2408                                 |            | 20              | φ25                | φ26.77                     | 24                | φ 8                 | φ20            | 8.99           | 14          | 16             | 12.38                         | 5.5        | -                               | -      | -              | 49° 3'    | φ14.4                                   | 33.1   |
| M1.25S 30 — 3210                                 |            | 30              | φ37.5              | φ39.27                     | 32                | φ10                 | φ28            | 10             | 17          | 18.85          | 14.13                         | 7          | -                               | -      | -              | 47°42'    | φ25.2                                   | 88.6   |
| M1.5S 20 — 2810                                  |            | 20              | φ30                | φ32.12                     | 28                | φ10                 | φ24            | 10             | 16.5        | 18.53          | 14.06                         | 6.8        | -                               | -      | -              | 49° 3'    | φ17.7                                   | 54.9   |
| M1.5S 20 — 2110                                  |            | 20              | φ30                | φ32.12                     | 21                | φ10                 | φ24            | 3              | 9           | 11             | 7.06                          | 6          | -                               | -      | -              | 49° 3'    | φ19.0                                   | 32.8   |
| M1.5S 25 — 3410                                  |            | 25              | φ37.5              | φ39.62                     | 34                | φ10                 | φ30            | 11.5           | 19          | 21.26          | 16.31                         | 7.5        | -                               | -      | -              | 48°51'    | φ23.7                                   | 106.5  |
| M1.5S 30 — 3812                                  |            | 30              | φ45                | φ47.12                     | 38                | φ12                 | φ33            | 12.34          | 21          | 22.83          | 16.56                         | 9.3        | -                               | -      | -              | 47°42'    | φ29.6                                   | 152.0  |
| For all the weight values below, the unit is kg. |            |                 |                    |                            |                   |                     |                |                |             |                |                               |            |                                 |        |                |           |                                         |        |
| M2S 20 — 3712                                    | 1 : 1      | 20              | φ40                | φ41.32 <sup>(φ42.83)</sup> | 37                | φ12                 | φ34            | 14             | 21          | 24             | 18.41                         | 8.5        | -                               | -      | -              | 49° 3'    | φ23.9                                   | 0.14   |
| M2S 20 — 2812                                    |            | 20              | φ40                | φ41.32 <sup>(φ42.83)</sup> | 28                | φ12                 | φ34            | 5              | 12          | 15             | 9.41                          | 8.5        | -                               | -      | -              | 49° 3'    | φ23.9                                   | 0.09   |
| M2S 25 — 4012                                    |            | 25              | φ50                | φ51.33 <sup>(φ52.83)</sup> | 40                | φ12                 | φ42            | 10.99          | 21          | 23.34          | 16.41                         | 10.5       | -                               | -      | -              | 48°51'    | φ32.3                                   | 0.23   |
| M2S 30 — 5116                                    |            | 30              | φ60                | φ61.36 <sup>(φ62.83)</sup> | 51                | φ16                 | φ44            | 16.79          | 28          | 30.77          | 22.41                         | 12.4       | -                               | -      | -              | 47°42'    | φ38.9                                   | 0.36   |
| M2.5S 20 — 4814                                  |            | 20              | φ50                | φ51.66 <sup>(φ53.54)</sup> | 48                | φ14                 | φ42            | 19             | 28          | 32.06          | 24.77                         | 11.1       | -                               | -      | -              | 49° 3'    | φ28.5                                   | 0.30   |
| M2.5S 20 — 3514                                  |            | 20              | φ50                | φ51.66 <sup>(φ53.54)</sup> | 35                | φ14                 | φ42            | 6              | 15          | 19.06          | 11.77                         | 11.1       | -                               | -      | -              | 49° 3'    | φ28.5                                   | 0.17   |
| M2.5S 25 — 5016                                  |            | 25              | φ62.5              | φ64.16 <sup>(φ66.04)</sup> | 50                | φ16                 | φ52            | 13.5           | 27          | 29.42          | 20.52                         | 13.5       | -                               | -      | -              | 48°51'    | φ40.8                                   | 0.44   |
| M2.5S 30 — 6318                                  |            | 30              | φ75                | φ76.7 <sup>(φ78.54)</sup>  | 63                | φ18                 | φ55            | 20.5           | 34.5        | 37.71          | 27.27                         | 15.5       | -                               | -      | -              | 47°42'    | φ49.1                                   | 0.71   |
| M2.5S 30 — 5016                                  |            | 30              | φ75                | φ76.7 <sup>(φ78.54)</sup>  | 50                | φ16                 | φ55            | 7.5            | 21.5        | 24.71          | 14.27                         | 15.5       | -                               | -      | -              | 47°42'    | φ49.1                                   | 0.51   |
| M3S 20 — 5816                                    |            | 20              | φ60                | φ61.99 <sup>(φ64.24)</sup> | 58                | φ16                 | φ50            | 23             | 35          | 39.06          | 30.12                         | 13.6       | -                               | -      | -              | 49° 3'    | φ35.5                                   | 0.52   |
| M3S 20 — 4216                                    |            | 20              | φ60                | φ61.99 <sup>(φ64.24)</sup> | 42                | φ16                 | φ50            | 7              | 19          | 23.06          | 14.12                         | 13.6       | -                               | -      | -              | 49° 3'    | φ35.5                                   | 0.30   |
| M4S 20 — 7520                                    |            | 20              | φ80                | φ82.65 <sup>(φ85.66)</sup> | 75                | φ20                 | φ64            | 27             | 45          | 50.05          | 37.83                         | 18.6       | -                               | -      | -              | 49° 3'    | φ47.3                                   | 1.14   |



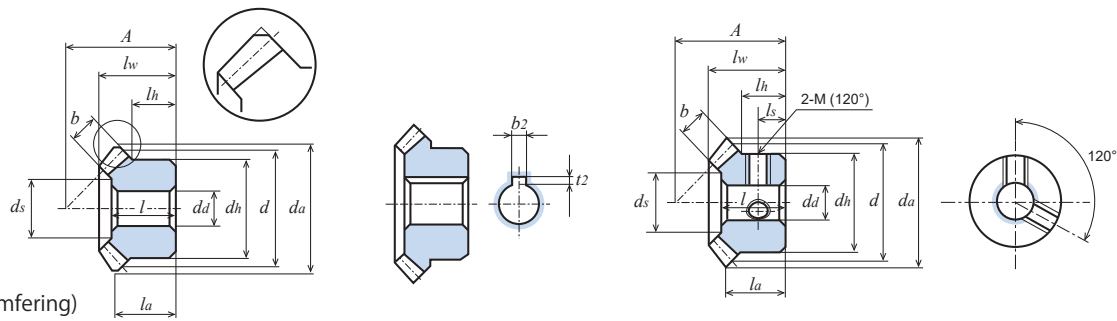


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |         |         |         |         |         |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |         |         |         |         |         |           | Backlash (Unit: mm) | Catalogue number                                                 |
|-----------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|-------------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|---------------------|------------------------------------------------------------------|
| 10 rpm                                                                                        | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm | 10 rpm                                                                                          | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm |                     |                                                                  |
| 0.1                                                                                           | 1.5     | 3.1     | 6.2     | 9.3     | 12.4    | 15.5      | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.02 to 0.08        | M50S 20 – 1103<br>M50S 20 * 1103                                 |
| 0.2                                                                                           | 2.5     | 5.0     | 10.0    | 15.0    | 20.1    | 25.1      | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.02 to 0.08        | M50S 25 – 1204<br>M50S 25 * 1204                                 |
| 0.3                                                                                           | 3.8     | 7.6     | 15.2    | 22.9    | 30.5    | 38.1      | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.02 to 0.08        | M50S 30 – 1404<br>M50S 30 * 1404                                 |
| 0.6                                                                                           | 6.0     | 12.1    | 24.2    | 36.3    | 48.4    | 60.6      | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.02 to 0.08        | M80S 20 – 1605<br>M80S 20 * 1605                                 |
| 1.0                                                                                           | 10.3    | 20.6    | 41.3    | 61.9    | 82.6    | 103.3     | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.02 to 0.08        | M80S 25 – 1805                                                   |
| 1.0                                                                                           | 10.5    | 21.2    | 42.3    | 63.5    | 84.7    | 104.7     | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.05 to 0.12        | M1S 20 – 2106<br>M1S 20 * 2106<br>M1S 20 * 2108                  |
| 1.0                                                                                           | 10.5    | 21.2    | 42.3    | 63.5    | 84.7    | 104.7     | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.05 to 0.12        | M1S 20 – 1406<br>M1S 20 = 1408                                   |
| 1.7                                                                                           | 17.5    | 35.0    | 70.0    | 105.0   | 139.9   | 169.1     | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.05 to 0.12        | M1S 25 – 2306<br>M1S 25 * 2308<br>M1S 25 * 2310                  |
| 2.6                                                                                           | 26.2    | 52.4    | 104.7   | 157.2   | 202.7   | 241.9     | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.05 to 0.12        | M1S 30 – 2608<br>M1S 30 * 2608<br>M1S 30 * 2610<br>M1S 30 * 2612 |
| 2.6                                                                                           | 26.2    | 52.4    | 104.7   | 157.2   | 202.7   | 241.9     | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.05 to 0.12        | M1S 30 – 2008                                                    |
| 2.0                                                                                           | 20.9    | 41.9    | 83.9    | 125.9   | 167.1   | 206.7     | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.05 to 0.12        | M1.25S 20 – 2408                                                 |
| 4.6                                                                                           | 46.9    | 93.9    | 187.7   | 274.3   | 347.8   | 414.3     | -                                                                                               | -       | -       | -       | -       | -       | -         | 0.05 to 0.12        | M1.25S 30 – 3210                                                 |
| 3.7                                                                                           | 37.1    | 74.4    | 148.9   | 223.3   | 287.6   | 344.7     | 0.2                                                                                             | 2.8     | 5.7     | 11.7    | 18.1    | 23.4    | 27.6      | 0.05 to 0.12        | M1.5S 20 – 2810                                                  |
| 3.3                                                                                           | 33.5    | 67.0    | 134.1   | 201.1   | 259.2   | 310.8     | 0.2                                                                                             | 2.6     | 5.3     | 10.6    | 15.5    | 20.8    | 25.1      | 0.05 to 0.12        | M1.5S 20 – 2110                                                  |
| 5.6                                                                                           | 56.5    | 113.1   | 226.3   | 331.5   | 419.3   | 499.1     | 0.5                                                                                             | 5.1     | 10.5    | 21.3    | 31.4    | 40.2    | 48.4      | 0.05 to 0.12        | M1.5S 25 – 3410                                                  |
| 8.8                                                                                           | 88.3    | 176.7   | 353.5   | 501.8   | 630.0   | 744.7     | 0.9                                                                                             | 9.5     | 19.1    | 38.7    | 55.6    | 70.7    | 84.4      | 0.05 to 0.12        | M1.5S 30 – 3812                                                  |
| For all the values below, the unit is kW.                                                     |         |         |         |         |         |           |                                                                                                 |         |         |         |         |         |           |                     |                                                                  |
| 0.008                                                                                         | 0.083   | 0.167   | 0.334   | 0.484   | 0.611   | 0.726     | 0.0006                                                                                          | 0.006   | 0.013   | 0.027   | 0.040   | 0.051   | 0.061     | 0.05 to 0.12        | M2S 20 – 3712                                                    |
| 0.008                                                                                         | 0.083   | 0.167   | 0.334   | 0.484   | 0.611   | 0.726     | 0.0006                                                                                          | 0.006   | 0.013   | 0.027   | 0.040   | 0.051   | 0.061     | 0.05 to 0.12        | M2S 20 – 2812                                                    |
| 0.013                                                                                         | 0.139   | 0.279   | 0.554   | 0.777   | 0.971   | 1.143     | 0.001                                                                                           | 0.013   | 0.026   | 0.054   | 0.076   | 0.097   | 0.115     | 0.05 to 0.12        | M2S 25 – 4012                                                    |
| 0.020                                                                                         | 0.209   | 0.418   | 0.809   | 1.121   | 1.388   | 1.637     | 0.002                                                                                           | 0.023   | 0.047   | 0.092   | 0.129   | 0.163   | 0.195     | 0.05 to 0.12        | M2S 30 – 5116                                                    |
| 0.016                                                                                         | 0.169   | 0.338   | 0.672   | 0.941   | 1.177   | 1.385     | 0.001                                                                                           | 0.013   | 0.028   | 0.056   | 0.080   | 0.101   | 0.121     | 0.06 to 0.15        | M2.5S 20 – 4814                                                  |
| 0.016                                                                                         | 0.169   | 0.338   | 0.672   | 0.941   | 1.177   | 1.385     | 0.001                                                                                           | 0.013   | 0.028   | 0.056   | 0.080   | 0.101   | 0.121     | 0.06 to 0.15        | M2.5S 20 – 3514                                                  |
| 0.027                                                                                         | 0.279   | 0.558   | 1.069   | 1.480   | 1.829   | 2.171     | 0.002                                                                                           | 0.027   | 0.055   | 0.107   | 0.150   | 0.189   | 0.229     | 0.06 to 0.15        | M2.5S 25 – 5016                                                  |
| 0.040                                                                                         | 0.408   | 0.817   | 1.517   | 2.070   | 2.557   | 3.109     | 0.004                                                                                           | 0.046   | 0.094   | 0.177   | 0.247   | 0.312   | 0.387     | 0.06 to 0.15        | M2.5S 30 – 6318                                                  |
| 0.040                                                                                         | 0.408   | 0.817   | 1.517   | 2.070   | 2.557   | 3.109     | 0.004                                                                                           | 0.046   | 0.094   | 0.177   | 0.247   | 0.312   | 0.387     | 0.06 to 0.15        | M2.5S 30 – 5016                                                  |
| 0.029                                                                                         | 0.297   | 0.594   | 1.148   | 1.591   | 1.971   | 2.323     | 0.002                                                                                           | 0.025   | 0.050   | 0.098   | 0.139   | 0.175   | 0.209     | 0.06 to 0.15        | M3S 20 – 5816                                                    |
| 0.029                                                                                         | 0.297   | 0.594   | 1.148   | 1.591   | 1.971   | 2.323     | 0.002                                                                                           | 0.025   | 0.050   | 0.098   | 0.139   | 0.175   | 0.209     | 0.06 to 0.15        | M3S 20 – 4216                                                    |
| 0.071                                                                                         | 0.719   | 1.438   | 2.634   | 3.577   | 4.465   | 5.421     | 0.006                                                                                           | 0.062   | 0.126   | 0.236   | 0.327   | 0.418   | 0.516     | 0.06 to 0.15        | M4S 20 – 7520                                                    |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|------------------------------|------------------------|----------------------|
| [JIS B 1704] 4 | S45C     | 20°            | Induction hardening of teeth | HRC47 to 53            | See the table below. |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ Gears with a [#] are provided with key grooves, keys, two screw holes, and two set screws, and gears with a [=] are provided with key grooves and keys.

★ The values in parentheses below "Tip diameter da" are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number                                 | Gear ratio | Number of teeth | Reference diameter | Tip diameter                  | As-sembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Over-all length | Distance from end face to tip | Face width | Key groove | Screw |                | Tip angle | Counter-bore diameter (Reference value) | Weight |
|--------------------------------------------------|------------|-----------------|--------------------|-------------------------------|--------------------|---------------|--------------|------------|-------------|-----------------|-------------------------------|------------|------------|-------|----------------|-----------|-----------------------------------------|--------|
|                                                  |            |                 |                    |                               |                    |               |              |            |             |                 |                               |            |            | 2-M   | l <sub>s</sub> |           |                                         |        |
| M1.5S 20 – 2810H                                 | 1 : 1      | 20              | φ 30               | φ32.12                        | 28                 | φ10           | φ24          | 10         | 16.5        | 18.53           | 14.06                         | 6.8        | -          | -     | -              | 49° 3'    | φ17.7                                   | 54.9   |
| M1.5S 20 # 2810H                                 |            | 20              | φ 30               | φ32.12                        | 28                 | φ10           | φ24          | 10         | 16.5        | 18.53           | 14.06                         | 6.8        | 3 × 1.4    | 2-M4  | 5              | 49° 3'    | φ17.7                                   | 53.7   |
| M1.5S 20 # 2812H                                 |            | 20              | φ 30               | φ32.12                        | 28                 | φ12           | φ24          | 10         | 16.5        | 18.53           | 14.06                         | 6.8        | 4 × 1.8    | 2-M4  | 5              | 49° 3'    | φ17.7                                   | 49.0   |
| M1.5S 20 – 2110H                                 |            | 20              | φ 30               | φ32.12                        | 21                 | φ10           | φ24          | 3          | 9           | 11              | 7.06                          | 6          | -          | -     | -              | 49° 3'    | φ19.0                                   | 32.8   |
| M1.5S 20 = 2110H                                 |            | 20              | φ 30               | φ32.12                        | 21                 | φ10           | φ24          | 3          | 9           | 11              | 7.06                          | 6          | 3 × 1.4    | -     | -              | 49° 3'    | φ19.0                                   | 32.5   |
| M1.5S 25 – 3410H                                 |            | 25              | φ 37.5             | φ39.62                        | 34                 | φ10           | φ30          | 11.5       | 19          | 21.26           | 16.31                         | 7.5        | -          | -     | -              | 48°51'    | φ23.7                                   | 106.5  |
| M1.5S 30 – 3812H                                 |            | 30              | φ 45               | φ47.12                        | 38                 | φ12           | φ33          | 12.34      | 21          | 22.83           | 16.56                         | 9.3        | -          | -     | -              | 47°42'    | φ29.6                                   | 152.0  |
| M1.5S 30 # 3812H                                 |            | 30              | φ 45               | φ47.12                        | 38                 | φ12           | φ33          | 12.34      | 21          | 22.83           | 16.56                         | 9.3        | 4 × 1.8    | 2-M4  | 6.5            | 47°42'    | φ29.6                                   | 150.1  |
| M1.5S 30 # 3815H                                 |            | 30              | φ 45               | φ47.12                        | 38                 | φ15           | φ33          | 12.34      | 21          | 22.83           | 16.56                         | 9.3        | 5 × 2.3    | 2-M4  | 6.5            | 47°42'    | φ29.6                                   | 139.0  |
| For all the weight values below, the unit is kg. |            |                 |                    |                               |                    |               |              |            |             |                 |                               |            |            |       |                |           |                                         |        |
| M2S 20 – 3712H                                   | 1 : 1      | 20              | φ 40               | <sup>(φ42.83)</sup><br>φ41.32 | 37                 | φ12           | φ34          | 14         | 21          | 24              | 18.41                         | 8.5        | -          | -     | -              | 49° 3'    | φ23.9                                   | 0.14   |
| M2S 20 # 3712H                                   |            | 20              | φ 40               | <sup>(φ42.83)</sup><br>φ41.32 | 37                 | φ12           | φ34          | 14         | 21          | 24              | 18.41                         | 8.5        | 4 × 1.8    | 2-M5  | 7              | 49° 3'    | φ23.9                                   | 0.14   |
| M2S 20 # 3715H                                   |            | 20              | φ 40               | <sup>(φ42.83)</sup><br>φ41.32 | 37                 | φ15           | φ34          | 14         | 21          | 24              | 18.41                         | 8.5        | 5 × 2.3    | 2-M5  | 7              | 49° 3'    | φ23.9                                   | 0.13   |
| M2S 20 – 2812H                                   |            | 20              | φ 40               | <sup>(φ42.83)</sup><br>φ41.32 | 28                 | φ12           | φ34          | 5          | 12          | 15              | 9.41                          | 8.5        | -          | -     | -              | 49° 3'    | φ23.9                                   | 0.085  |
| M2S 20 = 2812H                                   |            | 20              | φ 40               | <sup>(φ42.83)</sup><br>φ41.32 | 28                 | φ12           | φ34          | 5          | 12          | 15              | 9.41                          | 8.5        | 4 × 1.8    | -     | -              | 49° 3'    | φ23.9                                   | 0.084  |
| M2S 20 = 2816H                                   |            | 20              | φ 40               | <sup>(φ42.83)</sup><br>φ41.32 | 28                 | φ16           | φ34          | 5          | 12          | 15              | 9.41                          | 8.5        | 5 × 2.3    | -     | -              | 49° 3'    | φ23.9                                   | 0.076  |
| M2S 25 – 4012H                                   |            | 25              | φ 50               | <sup>(φ52.83)</sup><br>φ51.33 | 40                 | φ12           | φ42          | 10.99      | 21          | 23.34           | 16.41                         | 10.5       | -          | -     | -              | 48°51'    | φ32.3                                   | 0.23   |
| M2S 30 – 5116H                                   |            | 30              | φ 60               | <sup>(φ62.83)</sup><br>φ61.36 | 51                 | φ16           | φ44          | 16.79      | 28          | 30.77           | 22.41                         | 12.4       | -          | -     | -              | 47°42'    | φ38.9                                   | 0.36   |
| M2S 30 # 5120H                                   |            | 30              | φ 60               | <sup>(φ62.83)</sup><br>φ61.36 | 51                 | φ20           | φ44          | 16.79      | 28          | 30.77           | 22.41                         | 12.4       | 6 × 2.8    | 2-M5  | 8.5            | 47°42'    | φ38.9                                   | 0.33   |
| M2.5S 20 – 4814H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 48                 | φ14           | φ42          | 19         | 28          | 32.06           | 24.77                         | 11.1       | -          | -     | -              | 49° 3'    | φ28.5                                   | 0.29   |
| M2.5S 20 # 4815H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 48                 | φ15           | φ42          | 19         | 28          | 32.06           | 24.77                         | 11.1       | 5 × 2.3    | 2-M5  | 9.5            | 49° 3'    | φ28.5                                   | 0.29   |
| M2.5S 20 # 4816H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 48                 | φ16           | φ42          | 19         | 28          | 32.06           | 24.77                         | 11.1       | 5 × 2.3    | 2-M5  | 9.5            | 49° 3'    | φ28.5                                   | 0.28   |
| M2.5S 20 # 4818H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 48                 | φ18           | φ42          | 19         | 28          | 32.06           | 24.77                         | 11.1       | 6 × 2.8    | 2-M5  | 9.5            | 49° 3'    | φ28.5                                   | 0.27   |
| M2.5S 20 # 4820H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 48                 | φ20           | φ42          | 19         | 28          | 32.06           | 24.77                         | 11.1       | 6 × 2.8    | 2-M5  | 9.5            | 49° 3'    | φ28.5                                   | 0.25   |
| M2.5S 20 – 3514H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 35                 | φ14           | φ42          | 6          | 15          | 19.06           | 11.77                         | 11.1       | -          | -     | -              | 49° 3'    | φ28.5                                   | 0.17   |
| M2.5S 20 = 3515H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 35                 | φ15           | φ42          | 6          | 15          | 19.06           | 11.77                         | 11.1       | 5 × 2.3    | -     | -              | 49° 3'    | φ28.5                                   | 0.16   |
| M2.5S 20 = 3518H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 35                 | φ18           | φ42          | 6          | 15          | 19.06           | 11.77                         | 11.1       | 6 × 2.8    | -     | -              | 49° 3'    | φ28.5                                   | 0.16   |
| M2.5S 20 = 3520H                                 |            | 20              | φ 50               | <sup>(φ53.54)</sup><br>φ51.66 | 35                 | φ20           | φ42          | 6          | 15          | 19.06           | 11.77                         | 11.1       | 6 × 2.8    | -     | -              | 49° 3'    | φ28.5                                   | 0.15   |
| M2.5S 25 – 5016H                                 |            | 25              | φ 62.5             | <sup>(φ66.04)</sup><br>φ64.16 | 50                 | φ16           | φ52          | 13.5       | 27          | 29.42           | 20.52                         | 13.5       | -          | -     | -              | 48°51'    | φ40.8                                   | 0.44   |
| M2.5S 30 – 6318H                                 |            | 30              | φ 75               | <sup>(φ78.54)</sup><br>φ76.7  | 63                 | φ18           | φ55          | 20.5       | 34.5        | 37.71           | 27.27                         | 15.5       | -          | -     | -              | 47°42'    | φ49.1                                   | 0.71   |
| M2.5S 30 – 5016H                                 |            | 30              | φ 75               | <sup>(φ78.54)</sup><br>φ76.7  | 50                 | φ16           | φ55          | 7.5        | 21.5        | 24.71           | 14.27                         | 15.5       | -          | -     | -              | 47°42'    | φ49.1                                   | 0.50   |
| M3S 20 – 5816H                                   | 1 : 1      | 20              | φ 60               | <sup>(φ64.24)</sup><br>φ61.99 | 58                 | φ16           | φ50          | 23         | 35          | 39.06           | 30.12                         | 13.6       | -          | -     | -              | 49° 3'    | φ35.5                                   | 0.52   |
| M3S 20 # 5820H                                   |            | 20              | φ 60               | <sup>(φ64.24)</sup><br>φ61.99 | 58                 | φ20           | φ50          | 23         | 35          | 39.06           | 30.12                         | 13.6       | 6 × 2.8    | 2-M6  | 11.5           | 49° 3'    | φ35.5                                   | 0.49   |
| M3S 20 # 5825H                                   |            | 20              | φ 60               | <sup>(φ64.24)</sup><br>φ61.99 | 58                 | φ25           | φ50          | 23         | 35          | 39.06           | 30.12                         | 13.6       | 8 × 3.3    | 2-M6  | 11.5           | 49° 3'    | φ35.5                                   | 0.43   |
| M3S 20 = 4220H                                   |            | 20              | φ 60               | <sup>(φ64.24)</sup><br>φ61.99 | 42                 | φ20           | φ50          | 7          | 19          | 23.06           | 14.12                         | 13.6       | 6 × 2.8    | -     | -              | 49° 3'    | φ35.5                                   | 0.28   |
| M3S 25 – 6020H                                   |            | 25              | φ 75               | <sup>(φ79.24)</sup><br>φ77    | 60                 | φ20           | φ65          | 17.5       | 32          | 35.31           | 24.62                         | 16.2       | -          | -     | -              | 48°51'    | φ48.1                                   | 0.79   |
| M3S 30 – 7522H                                   |            | 30              | φ 90               | <sup>(φ94.24)</sup><br>φ92.04 | 75                 | φ22           | φ66          | 23.64      | 40          | 44.65           | 32.12                         | 18.6       | -          | -     | -              | 47°42'    | φ57.3                                   | 1.20   |
| M3S 30 # 7530H                                   |            | 30              | φ 90               | <sup>(φ94.24)</sup><br>φ92.04 | 75                 | φ30           | φ66          | 23.64      | 40          | 44.65           | 32.12                         | 18.6       | 8 × 3.3    | 2-M6  | 12             | 47°42'    | φ57.3                                   | 1.09   |
| M4S 20 – 7520H                                   |            | 20              | φ 80               | <sup>(φ85.66)</sup><br>φ82.65 | 75                 | φ20           | φ64          | 27         | 45          | 50.05           | 37.83                         | 18.6       | -          | -     | -              | 49° 3'    | φ47.3                                   | 1.14   |

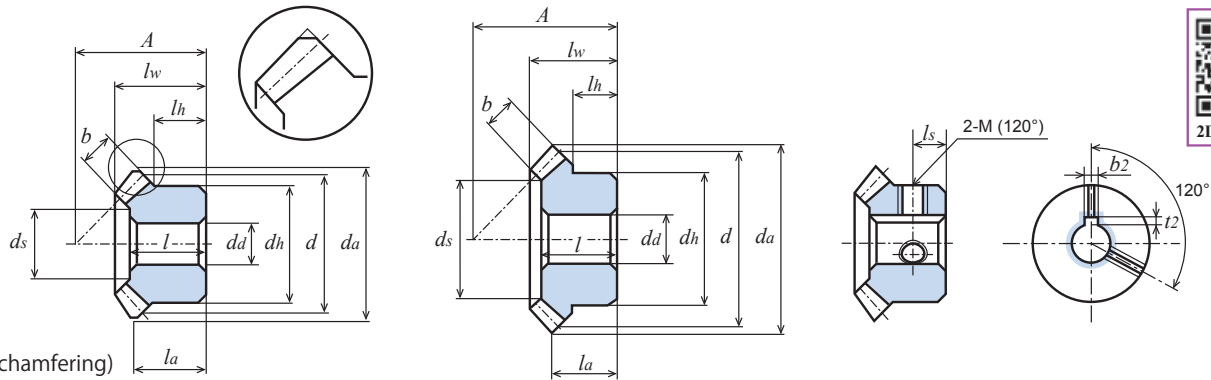


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |         |         |         |         |         |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |         |         |         |         |         |           | Backlash (Unit: mm) | Catalogue number                                                                                 |
|-----------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|-------------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|---------------------|--------------------------------------------------------------------------------------------------|
| 10 rpm                                                                                        | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm | 10 rpm                                                                                          | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm |                     |                                                                                                  |
| 3.4                                                                                           | 34.4    | 68.9    | 137.8   | 206.7   | 267.0   | 321.6     | 0.7                                                                                             | 8.0     | 16.5    | 34.0    | 52.0    | 68.0    | 82.8      | 0.05 to 0.12        | M1.5S 20 – 2810H<br>M1.5S 20 # 2810H<br>M1.5S 20 # 2812H                                         |
| 3.1                                                                                           | 31.7    | 63.5    | 127.0   | 190.5   | 246.2   | 296.4     | 0.6                                                                                             | 7.4     | 15.2    | 31.4    | 48.0    | 62.8    | 76.4      | 0.05 to 0.12        | M1.5S 20 – 2110H<br>M1.5S 20 = 2110H                                                             |
| 5.3                                                                                           | 53.6    | 107.2   | 214.4   | 314.6   | 400.3   | 478.5     | 1.3                                                                                             | 14.7    | 30.4    | 62.7    | 93.6    | 120.6   | 145.6     | 0.05 to 0.12        | M1.5S 25 – 3410H                                                                                 |
| 8.3                                                                                           | 83.2    | 166.5   | 333.1   | 475.1   | 599.9   | 712.1     | 2.3                                                                                             | 26.4    | 54.5    | 112.5   | 163.3   | 208.9   | 250.4     | 0.05 to 0.12        | M1.5S 30 – 3812H<br>M1.5S 30 # 3812H<br>M1.5S 30 # 3815H                                         |
| For all the values below, the unit is kW.                                                     |         |         |         |         |         |           |                                                                                                 |         |         |         |         |         |           |                     |                                                                                                  |
| 0.007                                                                                         | 0.078   | 0.156   | 0.313   | 0.455   | 0.578   | 0.689     | 0.001                                                                                           | 0.018   | 0.038   | 0.079   | 0.117   | 0.151   | 0.182     | 0.05 to 0.12        | M2S 20 – 3712H<br>M2S 20 # 3712H<br>M2S 20 # 3715H                                               |
| 0.007                                                                                         | 0.078   | 0.156   | 0.313   | 0.455   | 0.578   | 0.689     | 0.001                                                                                           | 0.018   | 0.038   | 0.079   | 0.117   | 0.151   | 0.182     | 0.05 to 0.12        | M2S 20 – 2812H<br>M2S 20 = 2812H<br>M2S 20 = 2816H                                               |
| 0.013                                                                                         | 0.131   | 0.262   | 0.522   | 0.735   | 0.923   | 1.091     | 0.003                                                                                           | 0.037   | 0.076   | 0.156   | 0.224   | 0.285   | 0.340     | 0.05 to 0.12        | M2S 25 – 4012H                                                                                   |
| 0.019                                                                                         | 0.197   | 0.394   | 0.765   | 1.066   | 1.328   | 1.564     | 0.005                                                                                           | 0.064   | 0.132   | 0.265   | 0.376   | 0.474   | 0.564     | 0.05 to 0.12        | M2S 30 – 5116H<br>M2S 30 # 5120H                                                                 |
| 0.015                                                                                         | 0.157   | 0.314   | 0.626   | 0.881   | 1.108   | 1.309     | 0.003                                                                                           | 0.038   | 0.079   | 0.162   | 0.232   | 0.295   | 0.353     | 0.06 to 0.15        | M2.5S 20 – 4814H<br>M2.5S 20 # 4815H<br>M2.5S 20 # 4816H<br>M2.5S 20 # 4818H<br>M2.5S 20 # 4820H |
| 0.015                                                                                         | 0.157   | 0.314   | 0.626   | 0.881   | 1.108   | 1.309     | 0.003                                                                                           | 0.038   | 0.079   | 0.162   | 0.232   | 0.295   | 0.353     | 0.06 to 0.15        | M2.5S 20 – 3514H<br>M2.5S 20 = 3515H<br>M2.5S 20 = 3518H<br>M2.5S 20 = 3520H                     |
| 0.026                                                                                         | 0.261   | 0.522   | 1.005   | 1.398   | 1.737   | 2.051     | 0.006                                                                                           | 0.075   | 0.154   | 0.307   | 0.435   | 0.547   | 0.653     | 0.06 to 0.15        | M2.5S 25 – 5016H                                                                                 |
| 0.038                                                                                         | 0.385   | 0.771   | 1.439   | 1.978   | 2.444   | 2.905     | 0.011                                                                                           | 0.128   | 0.264   | 0.509   | 0.712   | 0.891   | 1.069     | 0.06 to 0.15        | M2.5S 30 – 6318H                                                                                 |
| 0.038                                                                                         | 0.385   | 0.771   | 1.439   | 1.978   | 2.444   | 2.905     | 0.011                                                                                           | 0.128   | 0.264   | 0.509   | 0.712   | 0.891   | 1.069     | 0.06 to 0.15        | M2.5S 30 – 5016H                                                                                 |
| 0.027                                                                                         | 0.275   | 0.551   | 1.068   | 1.489   | 1.854   | 2.184     | 0.006                                                                                           | 0.068   | 0.140   | 0.281   | 0.398   | 0.503   | 0.598     | 0.06 to 0.15        | M3S 20 – 5816H<br>M3S 20 # 5820H<br>M3S 20 # 5825H                                               |
| 0.027                                                                                         | 0.275   | 0.551   | 1.068   | 1.489   | 1.854   | 2.184     | 0.006                                                                                           | 0.068   | 0.140   | 0.281   | 0.398   | 0.503   | 0.598     | 0.06 to 0.15        | M3S 20 = 4220H                                                                                   |
| 0.045                                                                                         | 0.451   | 0.902   | 1.684   | 2.315   | 2.861   | 3.400     | 0.011                                                                                           | 0.131   | 0.272   | 0.523   | 0.732   | 0.916   | 1.100     | 0.06 to 0.15        | M3S 25 – 6020H                                                                                   |
| 0.066                                                                                         | 0.666   | 1.332   | 2.399   | 3.254   | 4.056   | 4.784     | 0.020                                                                                           | 0.225   | 0.464   | 0.862   | 1.190   | 1.502   | 1.790     | 0.06 to 0.15        | M3S 30 – 7522H<br>M3S 30 # 7530H                                                                 |
| 0.066                                                                                         | 0.663   | 1.327   | 2.448   | 3.349   | 4.150   | 4.920     | 0.015                                                                                           | 0.168   | 0.347   | 0.660   | 0.920   | 1.154   | 1.382     | 0.06 to 0.15        | M4S 20 – 7520H                                                                                   |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①           | Number of teeth of all gears |
|----------------|----------|----------------|------------------------------|------------------------|----------------------|------------------------------|
| [JIS B 1704] 4 | S45C     | 20°            | Induction hardening of teeth | HRC47 to 53            | See the table below. | 20                           |

- ★ No surface treatment is applied. Gears with a [=] are provided with key grooves and keys. ① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.
- ★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."
- ★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center.
- ★ For the MGH Series, the teeth have been finished by induction hardening and the holes have been finished by grinding. Also, keys and set screws are provided. This product can be used without additional machining. (See Fig. 1.)

| Catalogue number | Gear ratio | Module | Reference diameter | Tip diameter                                     | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Key groove | Screw |       | Tip angle | Weight |
|------------------|------------|--------|--------------------|--------------------------------------------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|------------|-------|-------|-----------|--------|
|                  |            |        |                    |                                                  |                   |               |              |            |             |                |                               |            |            | $M$   | $l_s$ |           |        |
| MGH = 18         | 1 : 1      | 2.5    | $\phi$ 50          | $\phi$ 51.66 <sup>(<math>\phi</math>53.54)</sup> | 50                | $\phi$ 18     | $\phi$ 40    | 20         | 30          | 33.54          | 26.77                         | 10.3       | 6 × 2.8    | M6    | 10    | 49° 3'    | 0.26   |
| MGH = 20         |            | 2.75   | $\phi$ 55          | $\phi$ 56.82 <sup>(<math>\phi</math>58.89)</sup> | 54                | $\phi$ 20     | $\phi$ 44    | 21         | 32          | 35.54          | 28.45                         | 10.8       | 6 × 2.8    | M6    | 10.5  | 49° 3'    | 0.34   |
| MGH = 22         |            | 3      | $\phi$ 60          | $\phi$ 61.99 <sup>(<math>\phi</math>64.24)</sup> | 58                | $\phi$ 22     | $\phi$ 48    | 22         | 34          | 38.01          | 30.12                         | 12         | 6 × 2.8    | M6    | 11    | 49° 3'    | 0.43   |
| MGH = 25A        |            | 3      | $\phi$ 60          | $\phi$ 61.99 <sup>(<math>\phi</math>64.24)</sup> | 58                | $\phi$ 25     | $\phi$ 48    | 22         | 34          | 38.01          | 30.12                         | 12         | 8 × 3.3    | M8    | 11    | 49° 3'    | 0.40   |

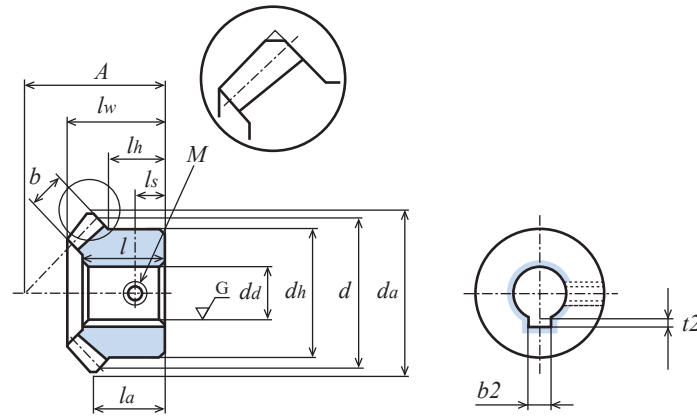


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: kW) |         |         |         |         |         |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: kW) |         |         |         |         |         |           | Backlash (Unit: mm) | Catalogue number |
|------------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|--------------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|---------------------|------------------|
| 10 rpm                                                                                         | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm | 10 rpm                                                                                           | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm |                     |                  |
| 0.014                                                                                          | 0.143   | 0.287   | 0.575   | 0.825   | 0.985   | 1.180     | 0.003                                                                                            | 0.036   | 0.075   | 0.154   | 0.221   | 0.281   | 0.335     | 0.06 to 0.15        | MGH = 18         |
| 0.018                                                                                          | 0.186   | 0.373   | 0.743   | 1.016   | 1.273   | 1.509     | 0.004                                                                                            | 0.047   | 0.097   | 0.198   | 0.282   | 0.358   | 0.426     | 0.06 to 0.15        | MGH = 20         |
| 0.024                                                                                          | 0.246   | 0.492   | 0.952   | 1.324   | 1.655   | 1.951     | 0.005                                                                                            | 0.061   | 0.125   | 0.251   | 0.356   | 0.450   | 0.533     | 0.06 to 0.15        | MGH = 22         |
| 0.024                                                                                          | 0.246   | 0.492   | 0.952   | 1.324   | 1.655   | 1.951     | 0.005                                                                                            | 0.061   | 0.125   | 0.251   | 0.356   | 0.450   | 0.533     | 0.06 to 0.15        | MGH = 25A        |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|----------------|------------------------|----------------------|
| [JIS B 1704] 4 | SUS304   | 20°            | —              | —                      | See the table below. |

★ No surface treatment is applied. ① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ Gears with a [\*] are provided with two screw holes. No set screws are provided.

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

| Catalogue number | Gear ratio | Num-ber of teeth | Refer-ence diam-eter | Tip diam-eter | As-sem-bly dis-tance | Hole diam-eter | Hub diam-eter | Hub length | Hole length | Over-all length | Dis-tance from end face to tip | Face width | Screw     |       | Tip angle | Coun-terbore diam-eter (Refer-ence value) | Weight |
|------------------|------------|------------------|----------------------|---------------|----------------------|----------------|---------------|------------|-------------|-----------------|--------------------------------|------------|-----------|-------|-----------|-------------------------------------------|--------|
|                  |            |                  |                      |               |                      |                |               |            |             |                 |                                |            | 2-M(120°) | $l_s$ |           |                                           |        |
| M80SU 20 — 1605  | 1 : 1      | 20               | $\phi 16$            | $\phi 17.13$  | 16                   | $\phi 5$       | $\phi 12$     | 6          | 10          | 11              | 8.57                           | 3.7        | -         | -     | 49° 3'    | $\phi 9.5$                                | 8.9    |
| M80SU 20 * 1605  |            | 20               | $\phi 16$            | $\phi 17.13$  | 16                   | $\phi 5$       | $\phi 12$     | 6          | 10          | 11              | 8.57                           | 3.7        | 2-M3      | 3     | 49° 3'    | $\phi 9.5$                                | 8.5    |
| M80SU 25 — 1805  |            | 25               | $\phi 20$            | $\phi 21.13$  | 18                   | $\phi 5$       | $\phi 16$     | 6          | 10.5        | 11.67           | 8.57                           | 4.7        | -         | -     | 48° 51'   | $\phi 11.7$                               | 17.3   |
| M80SU 25 * 1805  |            | 25               | $\phi 20$            | $\phi 21.13$  | 18                   | $\phi 5$       | $\phi 16$     | 6          | 10.5        | 11.67           | 8.57                           | 4.7        | 2-M3      | 3     | 48° 51'   | $\phi 11.7$                               | 16.8   |
| M80SU 30 — 2006  |            | 30               | $\phi 24$            | $\phi 25.13$  | 20                   | $\phi 6$       | $\phi 18$     | 6          | 11          | 12.34           | 8.57                           | 5.6        | -         | -     | 47° 42'   | $\phi 14.1$                               | 24.8   |
| M15U 20 — 2106   |            | 20               | $\phi 20$            | $\phi 21.41$  | 21                   | $\phi 6$       | $\phi 16$     | 9          | 13          | 14.53           | 11.71                          | 4.3        | -         | -     | 49° 3'    | $\phi 11.8$                               | 19.9   |
| M15U 20 * 2106   |            | 20               | $\phi 20$            | $\phi 21.41$  | 21                   | $\phi 6$       | $\phi 16$     | 9          | 13          | 14.53           | 11.71                          | 4.3        | 2-M4      | 4.5   | 49° 3'    | $\phi 11.8$                               | 19.1   |
| M15U 25 — 2306   |            | 25               | $\phi 25$            | $\phi 26.41$  | 23                   | $\phi 6$       | $\phi 20$     | 8          | 13          | 14.70           | 11.21                          | 5.3        | -         | -     | 48° 51'   | $\phi 15.0$                               | 34.1   |
| M15U 25 * 2306   |            | 25               | $\phi 25$            | $\phi 26.41$  | 23                   | $\phi 6$       | $\phi 20$     | 8          | 13          | 14.70           | 11.21                          | 5.3        | 2-M4      | 4     | 48° 51'   | $\phi 15.0$                               | 32.9   |
| M15U 30 — 2608   |            | 30               | $\phi 30$            | $\phi 31.41$  | 26                   | $\phi 8$       | $\phi 22$     | 8.9        | 14.5        | 15.89           | 11.71                          | 6.2        | -         | -     | 47° 42'   | $\phi 19.4$                               | 47     |
| M15U 30 * 2608   |            | 30               | $\phi 30$            | $\phi 31.41$  | 26                   | $\phi 8$       | $\phi 22$     | 8.9        | 14.5        | 15.89           | 11.71                          | 6.2        | 2-M5      | 4.5   | 47° 42'   | $\phi 19.4$                               | 45.2   |
| M1.55U 20 — 2810 |            | 20               | $\phi 30$            | $\phi 32.12$  | 28                   | $\phi 10$      | $\phi 24$     | 10         | 16.5        | 18.53           | 14.06                          | 6.8        | -         | -     | 49° 3'    | $\phi 17.7$                               | 55.4   |
| M1.55U 25 — 3410 |            | 25               | $\phi 37.5$          | $\phi 39.62$  | 34                   | $\phi 10$      | $\phi 30$     | 11.5       | 19          | 21.26           | 16.31                          | 7.5        | -         | -     | 48° 51'   | $\phi 23.7$                               | 107.6  |
| M1.55U 30 — 3812 |            | 30               | $\phi 45$            | $\phi 47.12$  | 38                   | $\phi 12$      | $\phi 33$     | 12.34      | 21          | 22.83           | 16.56                          | 9.3        | -         | -     | 47° 42'   | $\phi 29.6$                               | 153.6  |
| M2SU 20 — 3712   |            | 20               | $\phi 40$            | $\phi 41.32$  | 37                   | $\phi 12$      | $\phi 34$     | 14         | 21          | 24              | 18.41                          | 8.5        | -         | -     | 49° 3'    | $\phi 23.9$                               | 142.5  |
| M2SU 25 — 4012   |            | 25               | $\phi 50$            | $\phi 51.33$  | 40                   | $\phi 12$      | $\phi 42$     | 11         | 21          | 23.34           | 17.07                          | 10.5       | -         | -     | 48° 51'   | $\phi 32.3$                               | 229.6  |
| M2SU 30 — 5116   |            | 30               | $\phi 60$            | $\phi 61.36$  | 51                   | $\phi 16$      | $\phi 44$     | 16.79      | 28          | 30.77           | 22.41                          | 12.4       | -         | -     | 47° 42'   | $\phi 38.9$                               | 364.9  |
| M3SU 20 — 5816   |            | 20               | $\phi 60$            | $\phi 61.99$  | 58                   | $\phi 16$      | $\phi 50$     | 23         | 35          | 39.06           | 30.12                          | 13.6       | -         | -     | 49° 3'    | $\phi 35.5$                               | 525.6  |

## M: Metal-Injection-Molded (MIM)

### Straight Miter (SUS304L)

Module 0.5/0.8/1

Gear Ratio 1 : 1



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|----------------|------------------------|----------------------|
| —              | SUS304L  | 20°            | —              | —                      | See the table below. |

★ No surface treatment is applied. This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ Gears with a [\*] are provided with two screw holes. No set screws are provided.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

★ The module size is a nominal value. The dimensions vary slightly depending on the molding shrinkage rate.

This product must be used with a MIM miter gear. This product cannot be used with products of other series.

★ Cautions on additional machining: Hold the tip circle with a chuck. Failure to do so may cause air bubble blowholes.

| Catalogue number | Gear ratio | Mod-ule | Num-ber of teeth | Refer-ence diam-eter | Tip diam-eter | Assem-bly dis-tance | Hole diam-eter | Hub diam-eter | Hub length | Over-all length | Dis-tance from end face to tip | Face width | Screw     |       | Tip angle | Weight |
|------------------|------------|---------|------------------|----------------------|---------------|---------------------|----------------|---------------|------------|-----------------|--------------------------------|------------|-----------|-------|-----------|--------|
|                  |            |         |                  |                      |               |                     |                |               |            |                 |                                |            | 2-M(120°) | $l_s$ |           |        |
| M50SUM 20 * 1103 | 1 : 1      | 0.5     | 20               | $\phi 10$            | $\phi 10.70$  | 11                  | $\phi 3$       | $\phi 8$      | 4.25       | 8               | 6.35                           | 2.5        | 2-M2.5    | 2.5   | 49° 48'   | 2.6    |
| M80SUM 20 * 1605 |            | 0.8     | 20               | $\phi 16$            | $\phi 17.13$  | 16                  | $\phi 5$       | $\phi 12$     | 4.5        | 10.96           | 8.57                           | 3.7        | 2-M3      | 2.5   | 49° 48'   | 10.2   |
| M1SUM 20 * 2106  |            | 1.0     | 20               | $\phi 20$            | $\phi 21.41$  | 21                  | $\phi 6$       | $\phi 16$     | 7.5        | 14.49           | 11.71                          | 4.3        | 2-M4      | 4.5   | 49° 48'   | 22.0   |



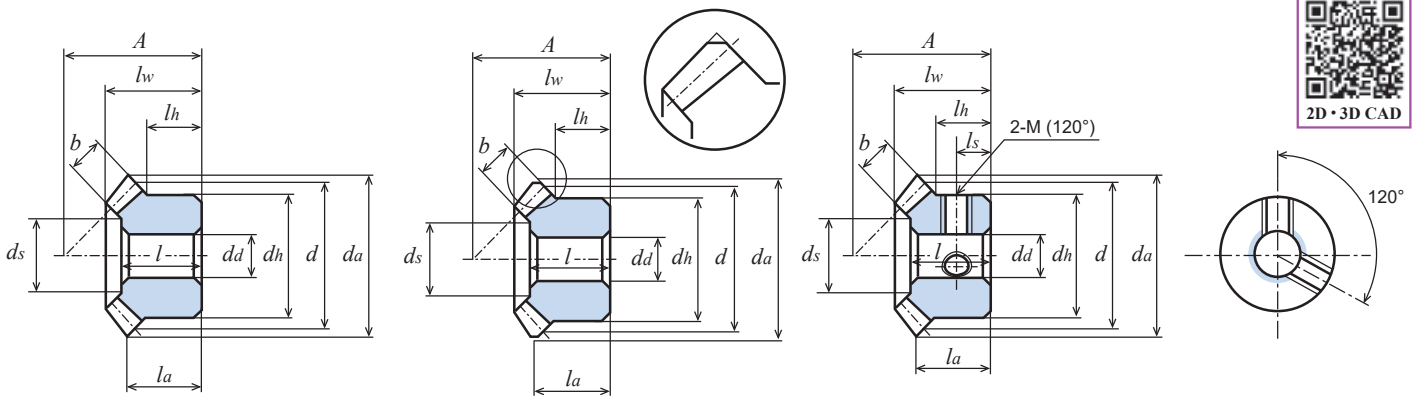


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |         |         |         |         |         |           | Backlash<br>(Unit: mm) | Catalogue number                   |
|-----------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|------------------------|------------------------------------|
| 10 rpm                                                                                        | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm |                        |                                    |
| 0.2                                                                                           | 2.7     | 5.5     | 11.0    | 16.5    | 22.0    | 27.5      | 0.02 to 0.08           | M80SU 20 – 1605<br>M80SU 20 * 1605 |
| 0.4                                                                                           | 4.6     | 9.3     | 18.7    | 28.1    | 37.5    | 46.6      | 0.02 to 0.08           | M80SU 25 – 1805<br>M80SU 25 * 1805 |
| 0.7                                                                                           | 7.1     | 14.2    | 28.4    | 42.6    | 56.8    | 68.6      | 0.02 to 0.08           | M80SU 30 – 2006                    |
| 0.5                                                                                           | 5.1     | 10.2    | 20.5    | 30.8    | 41.1    | 51.0      | 0.05 to 0.12           | M1SU 20 – 2106<br>M1SU 20 * 2106   |
| 0.8                                                                                           | 8.5     | 17.1    | 34.3    | 51.5    | 68.3    | 82.4      | 0.05 to 0.12           | M1SU 25 – 2306<br>M1SU 25 * 2306   |
| 1.2                                                                                           | 12.8    | 25.6    | 51.3    | 77.0    | 99.3    | 119.2     | 0.05 to 0.12           | M1SU 30 – 2608<br>M1SU 30 * 2608   |
| 1.7                                                                                           | 17.9    | 35.8    | 71.7    | 107.6   | 138.6   | 166.4     | 0.05 to 0.12           | M1.5SU 20 – 2810                   |
| 2.7                                                                                           | 27.9    | 55.8    | 111.6   | 163.5   | 207.2   | 246.7     | 0.05 to 0.12           | M1.5SU 25 – 3410                   |
| 4.3                                                                                           | 43.3    | 86.7    | 173.4   | 246.3   | 309.5   | 365.9     | 0.05 to 0.12           | M1.5SU 30 – 3812                   |
| 4.0                                                                                           | 40.8    | 81.6    | 163.2   | 236.5   | 298.9   | 355.1     | 0.05 to 0.12           | M2SU 20 – 3712                     |
| 6.7                                                                                           | 67.0    | 134.0   | 268.0   | 402.1   | 536.1   | 670.1     | 0.05 to 0.12           | M2SU 25 – 4012                     |
| 10.2                                                                                          | 102.7   | 205.5   | 397.2   | 550.3   | 681.6   | 803.6     | 0.05 to 0.12           | M2SU 30 – 5116                     |
| 14.3                                                                                          | 143.5   | 287.0   | 554.6   | 768.4   | 951.7   | 1122.0    | 0.06 to 0.15           | M3SU 20 – 5816                     |

## M: Metal-Injection-Molded (MIM)

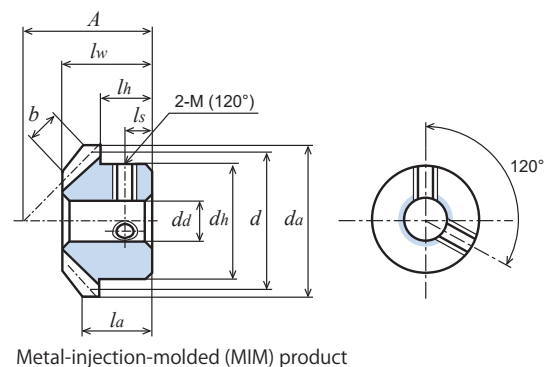
## Straight Miter (SUS304L)

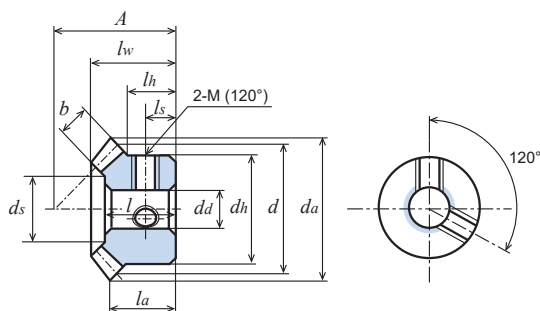
Module 0.5/0.8/1

Gear Ratio 1 : 1

| Strength comparison of each material |                     |      |
|--------------------------------------|---------------------|------|
| Material                             | Strength comparison |      |
| S45C                                 | 1                   | 1.67 |
| SUS304                               | 0.6                 | 1    |
| MIM (SUS304L)                        | 0.4                 | 0.67 |

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |         |         |         |         |           | Backlash<br>(Unit: mm) | Catalogue number |
|-----------------------------------------------------------------------------------------------|---------|---------|---------|---------|-----------|------------------------|------------------|
| 100 rpm                                                                                       | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm |                        |                  |
| 0.5                                                                                           | 1.1     | 2.2     | 3.3     | 4.4     | 5.6       | 0.02 to 0.08           | M50SUM 20 * 1103 |
| 2.1                                                                                           | 4.3     | 8.7     | 13.1    | 17.5    | 21.9      | 0.02 to 0.08           | M80SUM 20 * 1605 |
| 3.7                                                                                           | 7.6     | 15.3    | 22.9    | 30.6    | 37.8      | 0.05 to 0.12           | M1SUM 20 * 2106  |





Unit: mm

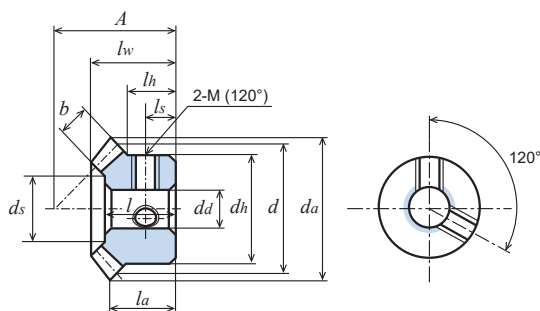
| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①  |
|----------------|----------|----------------|----------------|------------------------|-------------|
| [JIS B 1704] 4 | C3604B   | 20°            | —              | —                      | See below ② |

★ No surface treatment is applied. Gears with a [\*] are provided with two screw holes and set screws.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

② The backlash is 0.02 mm to 0.08 mm when module 0.5 and 0.8, 0.05 mm to 0.12 mm when module 1.

| Catalogue number      | Gear ratio | Number of teeth | Reference diameter | Tip diameter | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Screw     |     | Tip angle | Counterbore diameter (Reference value) | Weight |
|-----------------------|------------|-----------------|--------------------|--------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|-----------|-----|-----------|----------------------------------------|--------|
|                       |            |                 |                    |              |                   |               |              |            |             |                |                               |            | 2-M(120°) | ls  |           | ds                                     |        |
| <b>M50B 20 — 1103</b> | 1 : 1      | 20              | φ10                | φ10.71       | 11                | φ3            | φ 8          | 5          | 7           | 8              | 6.35                          | 2.5        | -         | -   | 49° 3'    | φ 4.9                                  | 2.9    |
| <b>M50B 20 * 1103</b> |            | 20              | φ10                | φ10.71       | 11                | φ3            | φ 8          | 5          | 7           | 8              | 6.35                          | 2.5        | 2-M2.5    | 2.5 | 49° 3'    | φ 4.9                                  | 2.7    |
| <b>M50B 25 * 1204</b> |            | 25              | φ12.5              | φ13.21       | 12                | φ4            | φ11          | 5          | 7           | 8.11           | 6.10                          | 3.0        | 2-M3      | 3   | 48°14'    | φ 6.5                                  | 4.9    |
| <b>M80B 20 — 1605</b> |            | 20              | φ16                | φ17.13       | 16                | φ5            | φ12          | 6          | 10          | 11             | 8.57                          | 3.7        | -         | -   | 49° 3'    | φ 9.5                                  | 9.4    |
| <b>M80B 20 * 1605</b> |            | 20              | φ16                | φ17.13       | 16                | φ5            | φ12          | 6          | 10          | 11             | 8.57                          | 3.7        | 2-M3      | 3   | 49° 3'    | φ 9.5                                  | 9.1    |
| <b>M1B 20 * 2106</b>  |            | 20              | φ20                | φ21.41       | 21                | φ6            | φ16          | 9          | 13          | 14.53          | 11.71                         | 4.3        | 2-M4      | 4.5 | 49° 3'    | φ11.8                                  | 18.1   |
| <b>M1B 25 * 2306</b>  |            | 25              | φ25                | φ26.41       | 23                | φ6            | φ20          | 8          | 13          | 14.70          | 11.21                         | 5.3        | 2-M4      | 4   | 48°51'    | φ15.0                                  | 31.5   |



Unit: mm

| Accuracy Class | Material  | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|-----------|----------------|----------------|------------------------|----------------------|
| —              | White POM | 20°            | —              | —                      | See the table below. |

★ This is a machined product.

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ The values in parentheses below "Tip diameter da" are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number     | Gear ratio | Number of teeth | Reference diameter | Tip diameter | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Screw     |     | Tip angle | Counterbore diameter (Reference value) | Weight |
|----------------------|------------|-----------------|--------------------|--------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|-----------|-----|-----------|----------------------------------------|--------|
|                      |            |                 |                    |              |                   |               |              |            |             |                |                               |            | 2-M(120°) | ls  |           | ds                                     |        |
| <b>M1D 25 * 2306</b> | 1 : 1      | 25              | φ25                | φ26.41       | 23                | φ6            | φ20          | 8          | 13          | 14.70          | 11.21                         | 5.3        | 2-M4      | 4   | 48°51'    | φ15.0                                  | 5.2    |
| <b>M1D 30 — 2608</b> |            | 30              | φ30                | φ31.41       | 26                | φ8            | φ22          | 8.9        | 14.5        | 15.89          | 11.71                         | 6.2        | -         | -   | 47°42'    | φ19.4                                  | 8.3    |
| <b>M1D 30 * 2608</b> |            | 30              | φ30                | φ31.41       | 26                | φ8            | φ22          | 8.9        | 14.5        | 15.89          | 11.71                         | 6.2        | 2-M4      | 4.5 | 47°42'    | φ19.4                                  | 8.1    |

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |            |            |            |            |            |              | Backlash<br>(Unit: mm) | Catalogue number     |
|-----------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|--------------|------------------------|----------------------|
| 10<br>rpm                                                                                     | 100<br>rpm | 200<br>rpm | 400<br>rpm | 600<br>rpm | 800<br>rpm | 1,000<br>rpm |                        |                      |
| 0.34                                                                                          | 3.50       | 7.00       | 14.00      | 21.00      | 27.98      | 33.82        | 0.05 to 0.12           | <b>M1D 25 * 2306</b> |
| 0.52                                                                                          | 5.24       | 10.48      | 20.94      | 31.44      | 40.54      | 48.38        | 0.05 to 0.12           | <b>M1D 30 — 2608</b> |
| 0.52                                                                                          | 5.24       | 10.48      | 20.94      | 31.44      | 40.54      | 48.38        | 0.05 to 0.12           | <b>M1D 30 * 2608</b> |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|----------------|------------------------|----------------------|
| —              | Blue POM | 20°            | —              | —                      | See the table below. |

★ This is a machined product.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

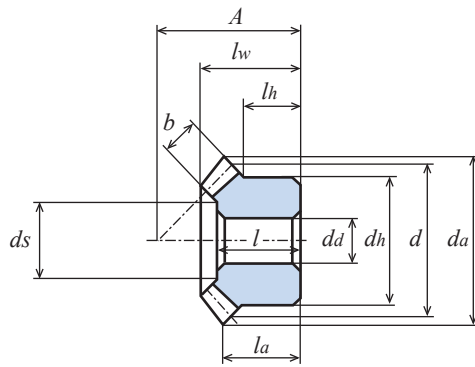
★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

★ For details on blue POM, refer to P. 22.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number         | Gear ratio | Number of teeth | Reference diameter | Tip diameter                                      | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Tip angle  | Counterbore diameter (Reference value) | Weight |
|--------------------------|------------|-----------------|--------------------|---------------------------------------------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|------------|----------------------------------------|--------|
|                          | $u$        | $z$             | $d$                | $d_a$                                             | $A$               | $d_d$         | $d_h$        | $l_h$      | $l$         | $l_w$          | $l_a$                         | $b$        | $\delta_a$ | $d_s$                                  | $W(g)$ |
| <b>M80BP 20 — 1604</b>   | 1 : 1      | 20              | $\phi 16$          | $\phi 17.13$                                      | 16                | $\phi 4$      | $\phi 12$    | 6          | 10          | 11             | 8.57                          | 3.7        | 49° 3'     | $\phi 9.53$                            | 1.7    |
| <b>M80BP 25 — 1805</b>   |            | 25              | $\phi 20$          | $\phi 21.13$                                      | 18                | $\phi 5$      | $\phi 16$    | 6          | 10.5        | 11.67          | 8.57                          | 4.7        | 48° 51'    | $\phi 11.70$                           | 3.0    |
| <b>M80BP 30 — 2005</b>   |            | 30              | $\phi 24$          | $\phi 25.13$                                      | 20                | $\phi 5$      | $\phi 18$    | 6          | 11          | 12.34          | 8.57                          | 5.6        | 47° 42'    | $\phi 14.16$                           | 4.5    |
| <b>M1BP 20 — 2105</b>    |            | 20              | $\phi 20$          | $\phi 21.41$                                      | 21                | $\phi 5$      | $\phi 16$    | 9          | 13          | 14.53          | 11.71                         | 4.3        | 49° 3'     | $\phi 11.83$                           | 3.7    |
| <b>M1BP 25 — 2306</b>    |            | 25              | $\phi 25$          | $\phi 26.41$                                      | 23                | $\phi 6$      | $\phi 20$    | 8          | 13          | 14.7           | 11.21                         | 5.3        | 48° 51'    | $\phi 15.01$                           | 6.0    |
| <b>M1BP 30 — 2606</b>    |            | 30              | $\phi 30$          | $\phi 31.41$                                      | 26                | $\phi 6$      | $\phi 22$    | 8.9        | 14.5        | 15.89          | 11.71                         | 6.2        | 47° 42'    | $\phi 19.46$                           | 8.8    |
| <b>M1.25BP 20 — 2406</b> |            | 20              | $\phi 25$          | $\phi 26.77$                                      | 24                | $\phi 6$      | $\phi 20$    | 8.99       | 14          | 16             | 12.38                         | 5.5        | 49° 3'     | $\phi 14.43$                           | 6.4    |
| <b>M1.25BP 25 — 2808</b> |            | 25              | $\phi 31.25$       | $\phi 33.02$                                      | 28                | $\phi 8$      | $\phi 26$    | 9.75       | 15.5        | 17.35          | 13.26                         | 6.2        | 48° 51'    | $\phi 19.96$                           | 11.5   |
| <b>M1.25BP 30 — 3208</b> |            | 30              | $\phi 37.5$        | $\phi 39.27$                                      | 32                | $\phi 8$      | $\phi 28$    | 10         | 17          | 18.85          | 14.13                         | 7          | 47° 42'    | $\phi 25.20$                           | 16.6   |
| <b>M1.5BP 20 — 2808</b>  |            | 20              | $\phi 30$          | $\phi 32.12$                                      | 28                | $\phi 8$      | $\phi 24$    | 10         | 16.5        | 18.53          | 14.06                         | 6.8        | 49° 3'     | $\phi 17.75$                           | 10.5   |
| <b>M1.5BP 25 — 3410</b>  |            | 25              | $\phi 37.5$        | $\phi 39.62$                                      | 34                | $\phi 10$     | $\phi 30$    | 11.5       | 19          | 21.26          | 16.31                         | 7.5        | 48° 51'    | $\phi 23.8$                            | 19.9   |
| <b>M1.5BP 30 — 3810</b>  |            | 30              | $\phi 45$          | $\phi 47.12$                                      | 38                | $\phi 10$     | $\phi 33$    | 12.34      | 21          | 22.83          | 16.56                         | 9.3        | 47° 42'    | $\phi 29.69$                           | 28.4   |
| <b>M2BP 20 — 3710</b>    |            | 20              | $\phi 40$          | $\phi 41.32$ <sup>(<math>\phi 42.83</math>)</sup> | 37                | $\phi 10$     | $\phi 34$    | 14         | 21          | 24             | 18.41                         | 8.5        | 49° 3'     | $\phi 23.94$                           | 26.4   |
| <b>M2BP 25 — 4012</b>    |            | 25              | $\phi 50$          | $\phi 51.33$ <sup>(<math>\phi 52.83</math>)</sup> | 40                | $\phi 12$     | $\phi 42$    | 10.99      | 21          | 23.34          | 16.41                         | 10.5       | 48° 51'    | $\phi 32.30$                           | 41.7   |
| <b>M2BP 30 — 5112</b>    |            | 30              | $\phi 60$          | $\phi 61.36$ <sup>(<math>\phi 62.83</math>)</sup> | 51                | $\phi 12$     | $\phi 44$    | 16.79      | 28          | 30.77          | 22.41                         | 12.4       | 47° 42'    | $\phi 38.92$                           | 68.4   |
| <b>M2.5BP 20 — 4812</b>  |            | 20              | $\phi 50$          | $\phi 51.66$ <sup>(<math>\phi 53.54</math>)</sup> | 48                | $\phi 12$     | $\phi 42$    | 19         | 28          | 32.06          | 24.77                         | 11.1       | 49° 3'     | $\phi 28.58$                           | 54.4   |
| <b>M2.5BP 25 — 5014</b>  |            | 25              | $\phi 62.5$        | $\phi 64.16$ <sup>(<math>\phi 66.04</math>)</sup> | 50                | $\phi 14$     | $\phi 52$    | 13.5       | 27          | 29.42          | 20.52                         | 13.5       | 48° 51'    | $\phi 40.82$                           | 81.0   |
| <b>M2.5BP 30 — 6316</b>  |            | 30              | $\phi 75$          | $\phi 76.7$ <sup>(<math>\phi 78.54</math>)</sup>  | 63                | $\phi 16$     | $\phi 55$    | 20.5       | 34.5        | 37.71          | 27.27                         | 15.5       | 47° 42'    | $\phi 49.15$                           | 130.5  |
| <b>M3BP 20 — 5814</b>    |            | 20              | $\phi 60$          | $\phi 61.99$ <sup>(<math>\phi 64.24</math>)</sup> | 58                | $\phi 14$     | $\phi 50$    | 23         | 35          | 39.06          | 30.12                         | 13.6       | 49° 3'     | $\phi 35.51$                           | 95.9   |
| <b>M3BP 25 — 6016</b>    |            | 25              | $\phi 75$          | $\phi 77$ <sup>(<math>\phi 79.24</math>)</sup>    | 60                | $\phi 16$     | $\phi 65$    | 17.5       | 32          | 35.31          | 24.62                         | 16.2       | 48° 51'    | $\phi 48.18$                           | 146.2  |
| <b>M3BP 30 — 7518</b>    |            | 30              | $\phi 90$          | $\phi 92.04$ <sup>(<math>\phi 94.24</math>)</sup> | 75                | $\phi 18$     | $\phi 66$    | 23.64      | 40          | 44.65          | 32.12                         | 18.6       | 47° 42'    | $\phi 57.37$                           | 222.9  |



Machined product

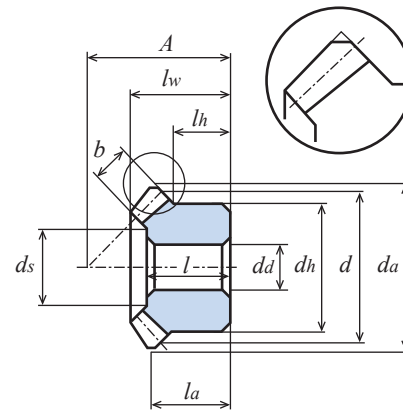


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |            |            |            |            |            |              | Backlash<br>(Unit: mm) | Catalogue number         |
|-----------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|--------------|------------------------|--------------------------|
| 10<br>rpm                                                                                     | 100<br>rpm | 200<br>rpm | 400<br>rpm | 600<br>rpm | 800<br>rpm | 1,000<br>rpm |                        |                          |
| 0.12                                                                                          | 1.20       | 2.42       | 4.84       | 7.26       | 9.68       | 12.12        | 0.02 to 0.08           | <b>M80BP 20 – 1604</b>   |
| 0.20                                                                                          | 2.06       | 4.12       | 8.26       | 12.38      | 16.52      | 20.66        | 0.02 to 0.08           | <b>M80BP 25 – 1805</b>   |
| 0.30                                                                                          | 3.12       | 6.24       | 12.50      | 18.76      | 24.98      | 31.24        | 0.02 to 0.08           | <b>M80BP 30 – 2005</b>   |
| 0.20                                                                                          | 2.10       | 4.24       | 8.46       | 12.70      | 16.94      | 20.94        | 0.05 to 0.12           | <b>M1BP 20 – 2105</b>    |
| 0.34                                                                                          | 3.50       | 7.00       | 14.00      | 21.00      | 27.98      | 33.82        | 0.05 to 0.12           | <b>M1BP 25 – 2306</b>    |
| 0.52                                                                                          | 5.24       | 10.48      | 20.94      | 31.44      | 40.54      | 48.38        | 0.05 to 0.12           | <b>M1BP 30 – 2606</b>    |
| 0.40                                                                                          | 4.18       | 8.38       | 16.78      | 25.18      | 33.42      | 41.34        | 0.05 to 0.12           | <b>M1.25BP 20 – 2406</b> |
| 0.64                                                                                          | 6.50       | 13.00      | 26.04      | 39.00      | 49.92      | 59.64        | 0.05 to 0.12           | <b>M1.25BP 25 – 2808</b> |
| 0.92                                                                                          | 9.38       | 18.78      | 37.54      | 54.86      | 69.56      | 82.86        | 0.05 to 0.12           | <b>M1.25BP 30 – 3208</b> |
| 0.68                                                                                          | 6.86       | 13.76      | 27.55      | 41.31      | 53.21      | 63.77        | 0.05 to 0.12           | <b>M1.5BP 20 – 2808</b>  |
| 1.04                                                                                          | 10.45      | 20.92      | 41.87      | 61.33      | 77.57      | 92.33        | 0.05 to 0.12           | <b>M1.5BP 25 – 3410</b>  |
| 1.63                                                                                          | 16.34      | 32.69      | 65.40      | 92.83      | 116.55     | 137.77       | 0.05 to 0.12           | <b>M1.5BP 30 – 3810</b>  |
| 1.48                                                                                          | 15.36      | 30.90      | 61.79      | 89.54      | 113.04     | 134.31       | 0.05 to 0.12           | <b>M2BP 20 – 3710</b>    |
| 2.41                                                                                          | 25.72      | 51.62      | 102.49     | 143.75     | 179.64     | 211.46       | 0.05 to 0.12           | <b>M2BP 25 – 4012</b>    |
| 3.70                                                                                          | 38.67      | 77.33      | 149.67     | 207.39     | 256.78     | 302.85       | 0.05 to 0.12           | <b>M2BP 30 – 5112</b>    |
| 2.96                                                                                          | 31.27      | 62.53      | 124.32     | 174.09     | 217.75     | 256.23       | 0.06 to 0.15           | <b>M2.5BP 20 – 4812</b>  |
| 5.00                                                                                          | 51.62      | 103.23     | 197.77     | 273.80     | 338.37     | 401.64       | 0.06 to 0.15           | <b>M2.5BP 25 – 5014</b>  |
| 7.40                                                                                          | 75.48      | 151.15     | 280.65     | 382.95     | 473.05     | 575.17       | 0.06 to 0.15           | <b>M2.5BP 30 – 6316</b>  |
| 5.37                                                                                          | 54.95      | 109.89     | 212.38     | 294.34     | 364.64     | 429.76       | 0.06 to 0.15           | <b>M3BP 20 – 5814</b>    |
| 8.88                                                                                          | 89.17      | 178.34     | 330.97     | 451.77     | 557.96     | 678.40       | 0.06 to 0.15           | <b>M3BP 25 – 6016</b>    |
| 12.95                                                                                         | 130.61     | 261.41     | 466.57     | 627.89     | 799.57     | 967.92       | 0.06 to 0.15           | <b>M3BP 30 – 7518</b>    |

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

**MITER GEARS**

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES



# Ground bevel gears

## Bevel gears

BG series  
B series



\* These are samples

### How to Read Catalogue Numbers

**BG 1.5 S 20 L 30 R – 12 H**

| Gear type                    | Module                      | Material  | Number of teeth                               | Tooth trace shape                           | Number of teeth of mating gear                | Tooth trace shape of mating gear            | Hole finish     | Hole diameter | Type                         |
|------------------------------|-----------------------------|-----------|-----------------------------------------------|---------------------------------------------|-----------------------------------------------|---------------------------------------------|-----------------|---------------|------------------------------|
| BG: Ground spiral bevel gear | Represents the module size. | S: SCM440 | Example: When the number of teeth is 20: "20" | R: Right-hand spiral<br>L: Left-hand spiral | Example: When the number of teeth is 30: "30" | R: Right-hand spiral<br>L: Left-hand spiral | Grinding finish | Unit: mm      | Induction hardening of teeth |

**B 1.5 S 45 R – 12 H**

| Gear type     | Module                                                                                                                                                                              | Material                                                   | Number of teeth                               | Tooth trace shape                                              | Hole finish                                                                                                                                                                                                                   | Hole diameter | Type                         |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------------|
| B: Bevel gear | Represents the module size.<br>When the module is less than 1, the figure indicates a value 100 times the actual module size.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | S : S45C<br>SU: Stainless steel SUS304<br>B : Brass C3604B | Example: When the number of teeth is 45: "45" | Blank: Straight<br>R: Right-hand spiral<br>L: Left-hand spiral | Lathe turning finish<br>[-]: No screw holes provided, no key grooves provided<br>[+]: One screw hole provided<br>[*]: Two screw holes provided<br>[=]: Key groove provided<br>[#]: One key groove and one screw hole provided | Unit: mm      | Induction hardening of teeth |

| Catalogue number       | BG                                 | B             | B                                 | B           | B                                 | B           |
|------------------------|------------------------------------|---------------|-----------------------------------|-------------|-----------------------------------|-------------|
| Shape                  |                                    |               |                                   |             |                                   |             |
| Page                   | P. 244                             | P. 246        | P. 248                            | P. 250      | P. 252                            | P. 254      |
| Material               | SCM440                             | S45C          | S45C                              | S45C        | S45C                              | SUS304      |
| Module                 | m1.5 to 2.5                        | m1 to 3       | m1 to 2.5                         | m0.5 to 3   | m1.5 to 4                         | m0.8 to 2   |
| Tooth trace shape      | <b>Spiral</b>                      | <b>Spiral</b> | <b>Spiral</b>                     | Straight    | Straight                          | Straight    |
| Accuracy grade         | JIS Class 1                        | JIS Class 3   | JIS Class 4                       | JIS Class 3 | JIS Class 4                       | JIS Class 4 |
| Teeth process sequence | Grinding after Induction hardening | Cutting       | Induction hardening after cutting | Cutting     | Induction hardening after cutting | Cutting     |

| Catalogue number       | B           |
|------------------------|-------------|
| Shape                  |             |
| Page                   | P. 254      |
| Material               | Brass       |
| Module                 | m0.5 to 0.8 |
| Tooth trace shape      | Straight    |
| Accuracy grade         | JIS Class 4 |
| Teeth process sequence | Cutting     |

# Bevel gear information

## 1. Features of Bevel Gears and Cautions on Selection

Since bevel gears have a gear ratio other than 1:1, they cannot be used as a miter gear (gear ratio = 1:1) even if the number of teeth and module are the same. In designing bevel gears, the pitch angle and shaft angle are determined according to the gear ratio. Since the gears and pinions of bevel gears are designed and manufactured as a pair, you must select an appropriate pair of bevel gears to be meshed.

Example: A gear designed to have a gear ratio (pinion shaft P : gear shaft G) of 1:2 cannot be meshed with a gear designed to have a gear ratio of 1:3. For details, see the table below:

|                    | Miter gear | Bevel gear |         |        |         |        |         |
|--------------------|------------|------------|---------|--------|---------|--------|---------|
| Gear ratio (P : G) | 1 : 1      | 1 : 1.5    |         | 1 : 2  |         | 1 : 3  |         |
| Pitch angle        | 45°        | Pinion     | 33° 41' | Pinion | 26° 34' | Pinion | 18° 26' |
|                    |            | Gear       | 56° 19' | Gear   | 63° 26' | Gear   | 71° 34' |
| Shaft angle        |            | 90°        |         |        |         |        |         |

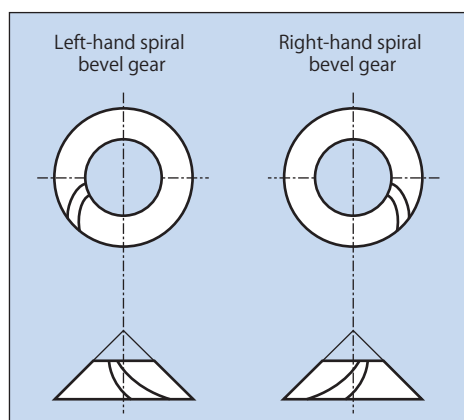
\* In designing and manufacturing bevel gears, the pitch angle and other parameters differ depending on the gear ratio.

## 2. Differences between Straight Bevel Gears and Spiral Bevel Gears

|                     | Tooth trace | Tooth surface grinding | High-speed rotation | Circumferential velocity of pitch circle*                                            | Contact ratio | Rotation smoothness | Thrust |
|---------------------|-------------|------------------------|---------------------|--------------------------------------------------------------------------------------|---------------|---------------------|--------|
| Straight bevel gear | Linear      | Not possible           | ○                   | Less than 5.5 m/s                                                                    | Low           | ○                   | Small  |
| Spiral bevel gear   | Curved      | Possible               | ◎                   | 5.5 m/s or more<br><u>When the velocity is 15 m/s or more, use a ground product.</u> | High          | ◎                   | Large  |

\* Circumferential velocity [m/s] =  $\frac{\pi \times \text{Reference diameter [mm]} \times \text{Revolutions per minute [rpm]}}{1000 \times 60}$

Spiral bevel gear: ① Low noise can be expected with a high contact ratio.  
② Right-hand and left-hand gears can be combined.



Left hand



Right hand

# Bevel gear information

## 3. Cautions on assembly

### 1) Installation

Particular attention is required when installing bevel gears. In general, bevel gears have a bearing only on one side and their shafts bend easily when subjected to a load, which is one of their main disadvantages. This results in poor, uneven tooth contact. Make sure that the gear shafts and bearings have adequate toughness and the bearings are located close to the gears. Assemble bevel gears so that they can be adjusted in the axial direction and insert a shim into the hub end face. This enables easy adjustment of the tooth contact.

### 2) Mating gear

This product cannot be used with other companies' products. If your device is designed with a product other than the standard products, use our customization service. Use a ground gear with a ground gear, and a cut gear with a cut gear.

### 3) Lubrication

Select an appropriate lubrication method according to the revolutions per minute and load conditions. For details, refer to "Lubrication of Gears" in "References."

### 4) Gear shafts and backlash

To achieve ideal intermeshing, assemble the gears at as accurate a shaft angle as possible with an appropriate backlash. For both ground gears and cut gears, the recommended shaft angle and shaft center height misalignment are  $\pm 15'$  and  $\pm 0.015$  mm or less, respectively.

Backlash: Our products are designed to have the backlash shown in Table 1 when the gears are assembled with the assembly distance given in the catalogue. For details, refer to "How to Measure Backlash" in "References."

Thrust acting on spiral bevel gear

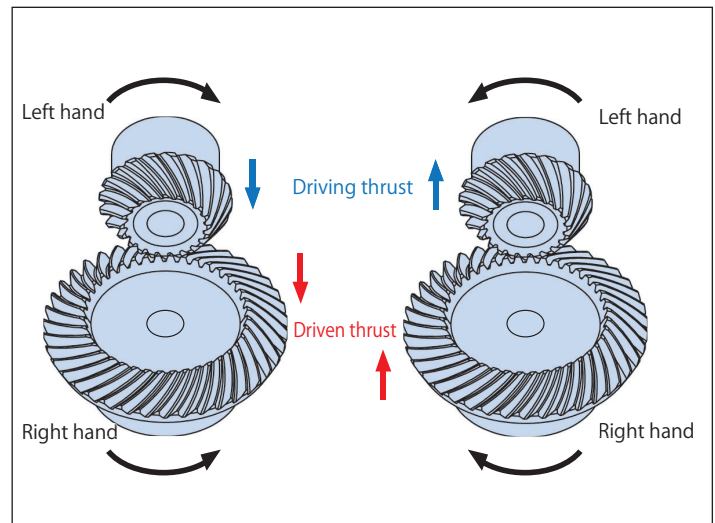


Table 1 Backlash of bevel gears (when a pair of gears are meshed, same for straight and spiral bevel gears)

Backlash of ground bevel gears

| Module  | Backlash [mm] |
|---------|---------------|
|         | SCM440        |
| m = 1.5 | 0.03 to 0.06  |
| m = 2   | 0.04 to 0.08  |
| m = 2.5 | 0.05 to 0.1   |
| m = 3   | 0.06 to 0.12  |

Backlash of cut bevel gears

| Module                      | Backlash [mm]                    |                |
|-----------------------------|----------------------------------|----------------|
|                             | SCM435-440, S45C, SUS304, C3604B | White/blue POM |
| m ≤ 0.9                     | 0.02 to 0.08                     | 0.03 to 0.10   |
| More than 0.9 and 2 or less | 0.05 to 0.12                     | 0.05 to 0.16   |
| More than 2 and 4 or less   | 0.06 to 0.15                     | -              |
| More than 4 and 6 or less   | 0.08 to 0.20                     | -              |

- Adjustment: The assembly distance, backlash, and tooth contact can easily be adjusted by inserting a shim into the hub end face.
- Change in circumferential backlash (when a bevel gear is moved in the axial direction): Table 2

Table 2 Change in circumferential backlash of bevel gears

| Gear ratio (P : G) | Straight bevel gear |       |       | Spiral bevel gear |       |       |
|--------------------|---------------------|-------|-------|-------------------|-------|-------|
|                    | 1 : 1.5             | 1 : 2 | 1 : 3 | 1 : 1.5           | 1 : 2 | 1 : 3 |
| Pinion Jt = Jx ×   | 0.40                | 0.33  | 0.23  | 0.49              | 0.40  | 0.28  |
| Gear Jt = Jx ×     | 0.61                | 0.65  | 0.69  | 0.74              | 0.79  | 0.84  |

Jt: Change in circumferential backlash

Jx: Axial displacement

\* The backlash may not be as estimated depending on machining or assembly accuracy.

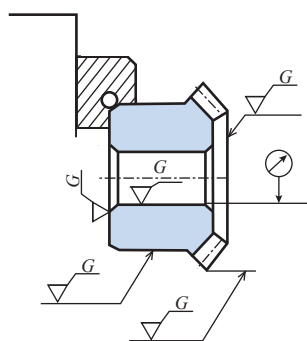
## 4. Features of Ground Spiral Bevel Gears (BG Series)

| Accuracy grade     | Hardening           | Tooth surface finish | Ground areas                                                                                            | Module                  | Gear ratio                      | Backlash                     | High-speed rotation | Noise | Tooth surface hardness |
|--------------------|---------------------|----------------------|---------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------|------------------------------|---------------------|-------|------------------------|
| JIS B 1704 Class 1 | Induction hardening | Grinding             | Hole diameter<br>Hub lateral face<br>Hub circumference<br>Tooth tip circumference<br>Tooth lateral face | $m = 1.5$<br>2.0<br>2.5 | $u = 1 : 1.5$<br>1 : 2<br>1 : 3 | Settable to up to $30 \mu m$ | ◎                   | Low   | HRC52 to 60            |

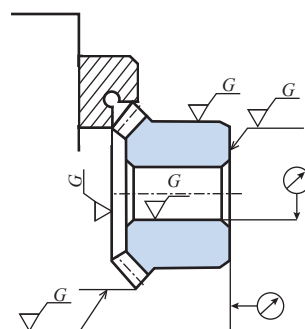
\* Do not mesh a ground gear with a cut gear.

### Cautions on additional machining

- 1) The hub circumference and tooth tip circumference have been finished by grinding to ensure adequate accuracy and workability at the time of additional machining by customers.  
(The tooth tip circumference has been chamfered parallel to the shaft center, which enables accurate chucking.)  
For the cautions on additional machining, refer to Fig. 1 and "Precautions for additional processing" in the KG-General Catalogue.
- 2) Be sure to use a soft jaw and scroll chuck. Adjust the runout of the product to as close to zero as possible.  
(The runout should be 0.003 mm or less.)



For high-accuracy additional machining, the hub circumference and end faces have been finished by grinding.



For high-accuracy additional machining, the tooth tip circumference and end faces have been finished by grinding.

Fig. 1 Additional machining





Unit: mm

| Accuracy Class | Material | Pressure angle | Helix angle | Heat treatment               | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|-------------|------------------------------|------------------------|----------------------|
| [JIS B 1704] 1 | SCM440   | 20°            | 35°         | Induction hardening of teeth | HRC52 to 60            | See the table below. |

★ No surface treatment is applied. The allowable transfer capability table was prepared based on the assumption that the pinion (left-hand gear) is on the input side.  
 ★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $da$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number           | Gear ratio | Number of teeth | Reference diameter | Tip diameter                     | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Tip angle  | Counterbore diameter (Reference value) | Weight |
|----------------------------|------------|-----------------|--------------------|----------------------------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|------------|----------------------------------------|--------|
|                            | $u$        | $z$             | $d$                | $da$                             | $A$               | $da(H7)$      | $d_h$        | $l_h$      | $l$         | $l_w$          | $l_a$                         | $b$        | $\delta_a$ | $ds$                                   | $W(g)$ |
| <b>BG1.5S 20L30R – 8H</b>  | 1 : 1.5    | 20              | $\phi$ 30          | $\phi$ 31.5<br>( $\phi$ 32.96)   | 37                | $\phi$ 8      | $\phi$ 26    | 13.16      | 20          | 22.49          | 15.48                         | 9          | 39°08'     | $\phi$ 14.07                           | 79.0   |
| <b>BG1.5S 30R20L – 8H</b>  |            | 30              | $\phi$ 45          | $\phi$ 44.6<br>( $\phi$ 46.02)   | 26                | $\phi$ 8      | $\phi$ 32    | 8          | 14          | 16.39          | 11.77                         | 9          | 59°11'     | $\phi$ 27.45                           | 112.8  |
| <b>BG1.5S 20L40R – 8H</b>  | 1 : 2      | 20              | $\phi$ 30          | $\phi$ 32<br>( $\phi$ 33.45)     | 45                | $\phi$ 8      | $\phi$ 26    | 14         | 24          | 25.29          | 15.87                         | 11         | 31°21'     | $\phi$ 16.80                           | 90.5   |
| <b>BG1.5S 40R20L – 10H</b> |            | 40              | $\phi$ 60          | $\phi$ 59.5<br>( $\phi$ 60.69)   | 30                | $\phi$ 10     | $\phi$ 40    | 10         | 18          | 20.27          | 15.69                         | 11         | 65°24'     | $\phi$ 38.40                           | 247.9  |
| <b>BG1.5S 15L45R – 8H</b>  | 1 : 3      | 15              | $\phi$ 22.5        | $\phi$ 25.2<br>( $\phi$ 26.37)   | 45                | $\phi$ 8      | $\phi$ 20    | 10.83      | 21          | 22.03          | 11.89                         | 11         | 23°19'     | $\phi$ 11.45                           | 42.3   |
| <b>BG1.5S 45R15L – 12H</b> |            | 45              | $\phi$ 67.5        | $\phi$ 67<br>( $\phi$ 67.92)     | 30                | $\phi$ 12     | $\phi$ 45    | 12         | 20          | 22.56          | 19.38                         | 11         | 73°13'     | $\phi$ 45.14                           | 350.3  |
| <b>BG2S 20L30R – 10H</b>   | 1 : 1.5    | 20              | $\phi$ 40          | $\phi$ 42.2<br>( $\phi$ 43.94)   | 45                | $\phi$ 10     | $\phi$ 34    | 12.99      | 22          | 24.87          | 16.31                         | 11         | 39°12'     | $\phi$ 21.36                           | 153.4  |
| <b>BG2S 30R20L – 12H</b>   |            | 30              | $\phi$ 60          | $\phi$ 60<br>( $\phi$ 60.93)     | 40                | $\phi$ 12     | $\phi$ 40    | 15         | 23          | 26.66          | 21.02                         | 11         | 59°12'     | $\phi$ 37.55                           | 294.8  |
| <b>BG2S 20L40R – 12H</b>   | 1 : 2      | 20              | $\phi$ 40          | $\phi$ 43.2<br>( $\phi$ 44.68)   | 60                | $\phi$ 12     | $\phi$ 35    | 18.75      | 32          | 34             | 21.17                         | 15         | 31°36'     | $\phi$ 20.91                           | 175.8  |
| <b>BG2S 40R20L – 12H</b>   |            | 40              | $\phi$ 80          | $\phi$ 79.5<br>( $\phi$ 80.93)   | 45                | $\phi$ 12     | $\phi$ 50    | 18         | 27          | 32.16          | 25.93                         | 15         | 65°29'     | $\phi$ 48.46                           | 616.2  |
| <b>BG2S 15L45R – 10H</b>   | 1 : 3      | 15              | $\phi$ 30          | $\phi$ 33.8<br>( $\phi$ 35.13)   | 60                | $\phi$ 10     | $\phi$ 24.5  | 14.08      | 29          | 29.69          | 15.85                         | 15         | 23°07'     | $\phi$ 19.16                           | 94.4   |
| <b>BG2S 45R15L – 12H</b>   |            | 45              | $\phi$ 90          | $\phi$ 89.5<br>( $\phi$ 90.55)   | 40                | $\phi$ 12     | $\phi$ 60    | 17         | 26          | 30.18          | 25.83                         | 15         | 73°07'     | $\phi$ 59.04                           | 815.4  |
| <b>BG2.5S 20L30R – 12H</b> | 1 : 1.5    | 20              | $\phi$ 50          | $\phi$ 53.5<br>( $\phi$ 55)      | 55                | $\phi$ 12     | $\phi$ 44    | 15.49      | 28          | 30.81          | 19.16                         | 15         | 39°24'     | $\phi$ 27.44                           | 311.0  |
| <b>BG2.5S 30R20L – 15H</b> |            | 30              | $\phi$ 75          | $\phi$ 75<br>( $\phi$ 76.72)     | 50                | $\phi$ 15     | $\phi$ 50    | 18         | 30          | 33.97          | 26.3                          | 15         | 59°17'     | $\phi$ 45.6                            | 605.3  |
| <b>BG2.5S 20L40R – 12H</b> | 1 : 2      | 20              | $\phi$ 50          | $\phi$ 54.2<br>( $\phi$ 55.55)   | 75                | $\phi$ 12     | $\phi$ 44    | 23.5       | 40          | 43.66          | 26.39                         | 20         | 30°31'     | $\phi$ 20.54                           | 441.2  |
| <b>BG2.5S 40R20L – 15H</b> |            | 40              | $\phi$ 100         | $\phi$ 100<br>( $\phi$ 101.1)    | 55                | $\phi$ 15     | $\phi$ 65    | 20         | 34          | 39.55          | 31.1                          | 20         | 65°01'     | $\phi$ 59.28                           | 1294.1 |
| <b>BG2.5S 15L45R – 12H</b> | 1 : 3      | 15              | $\phi$ 37.5        | $\phi$ 42.5<br>( $\phi$ 43.55)   | 75                | $\phi$ 12     | $\phi$ 33    | 18         | 37          | 38.34          | 19.75                         | 20         | 21°57'     | $\phi$ 20.54                           | 206.6  |
| <b>BG2.5S 45R15L – 15H</b> |            | 45              | $\phi$ 112.5       | $\phi$ 112.2<br>( $\phi$ 113.15) | 50                | $\phi$ 15     | $\phi$ 75    | 22         | 35          | 38.16          | 32.22                         | 20         | 72°43'     | $\phi$ 72.84                           | 1655.6 |





2D • 3D CAD

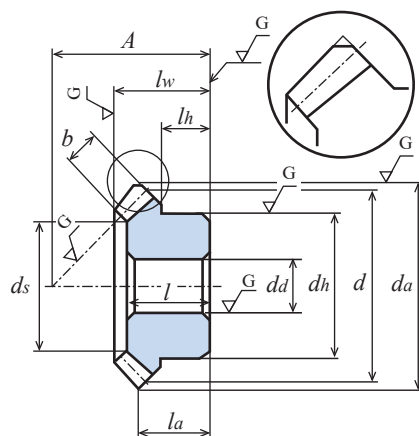


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: kW) |         |         |           |           |           |           |           |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: kW) |         |         |           |           |           |           |           |           | Backlash (Unit: mm) | Catalogue number    |
|------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|--------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|---------------------|---------------------|
| 250 rpm                                                                                        | 500 rpm | 800 rpm | 1,000 rpm | 1,500 rpm | 2,000 rpm | 2,500 rpm | 3,000 rpm | 4,000 rpm | 250 rpm                                                                                          | 500 rpm | 800 rpm | 1,000 rpm | 1,500 rpm | 2,000 rpm | 2,500 rpm | 3,000 rpm | 4,000 rpm |                     |                     |
| 0.19                                                                                           | 0.37    | 0.59    | 0.72      | 1.04      | 1.34      | 1.65      | 1.95      | 2.53      | 0.11                                                                                             | 0.23    | 0.37    | 0.46      | 0.68      | 0.89      | 1.10      | 1.31      | 1.73      | 0.03 to 0.06        | BG1.5S 20L30R – 8H  |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |
| 0.24                                                                                           | 0.47    | 0.75    | 0.92      | 1.33      | 1.72      | 2.11      | 2.49      | 3.24      | 0.15                                                                                             | 0.30    | 0.49    | 0.61      | 0.89      | 1.17      | 1.45      | 1.72      | 2.26      | 0.03 to 0.06        | BG1.5S 20L40R – 8H  |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |
| 0.18                                                                                           | 0.36    | 0.58    | 0.71      | 1.04      | 1.35      | 1.64      | 1.94      | 2.52      | 0.08                                                                                             | 0.17    | 0.28    | 0.35      | 0.53      | 0.69      | 0.85      | 1.01      | 1.33      | 0.03 to 0.06        | BG1.5S 15L45R – 8H  |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |
| 0.41                                                                                           | 0.83    | 1.28    | 1.57      | 2.25      | 2.94      | 3.59      | 4.25      | 5.48      | 0.26                                                                                             | 0.53    | 0.84    | 1.04      | 1.52      | 2.00      | 2.48      | 2.95      | 3.86      | 0.04 to 0.08        | BG2S 20L30R – 10H   |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |
| 0.56                                                                                           | 1.13    | 1.75    | 2.14      | 3.07      | 4.00      | 4.89      | 5.78      | 7.47      | 0.36                                                                                             | 0.74    | 1.18    | 1.46      | 2.13      | 2.81      | 3.47      | 4.13      | 5.41      | 0.04 to 0.08        | BG2S 20L40R – 12H   |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |
| 0.42                                                                                           | 0.85    | 1.34    | 1.65      | 2.39      | 3.08      | 3.78      | 4.46      | 5.80      | 0.21                                                                                             | 0.43    | 0.69    | 0.86      | 1.26      | 1.65      | 2.04      | 2.43      | 3.20      | 0.04 to 0.08        | BG2S 15L45R – 10H   |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |
| 0.85                                                                                           | 1.68    | 2.59    | 3.16      | 4.56      | 5.91      | 7.26      | 8.55      | 10.82     | 0.54                                                                                             | 1.10    | 1.73    | 2.13      | 3.14      | 4.12      | 5.11      | 6.06      | 7.77      | 0.05 to 0.1         | BG2.5S 20L30R – 12H |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |
| 1.14                                                                                           | 2.24    | 3.45    | 4.21      | 6.08      | 7.89      | 9.68      | 11.40     | 14.43     | 0.75                                                                                             | 1.52    | 2.39    | 2.94      | 4.32      | 5.68      | 7.04      | 8.36      | 10.71     | 0.05 to 0.1         | BG2.5S 20L40R – 12H |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |
| 0.85                                                                                           | 1.71    | 2.66    | 3.26      | 4.67      | 6.08      | 7.44      | 8.80      | 11.41     | 0.43                                                                                             | 0.89    | 1.41    | 1.74      | 2.54      | 3.35      | 4.14      | 4.93      | 6.48      | 0.05 to 0.1         | BG2.5S 15L45R – 12H |
| -                                                                                              | -       | -       | -         | -         | -         | -         | -         | -         | -                                                                                                | -       | -       | -         | -         | -         | -         | -         | -         | -                   | -                   |



Unit: mm

| Accuracy Class | Material | Pressure angle | Helix angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|-------------|----------------|------------------------|----------------------|
| [JIS B 1704] 3 | S45C     | 20°            | 35°         | —              | —                      | See the table below. |

★ No surface treatment is applied. The allowable transfer capability table was prepared based on the assumption that the pinion (left-hand gear) is on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number      | Gear ratio | Number of teeth | Reference diameter | Tip diameter                                      | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Tip angle  | Counterbore diameter (Reference value) | Weight |
|-----------------------|------------|-----------------|--------------------|---------------------------------------------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|------------|----------------------------------------|--------|
|                       | $u$        | $z$             | $d$                | $d_a$                                             | $A$               | $d_d(H7)$     | $d_h$        | $l_h$      | $l$         | $l_w$          | $l_a$                         | $b$        | $\delta_a$ | $d_s$                                  | $W(g)$ |
| <b>B1S 20L — 8</b>    | 1 : 2      | 20              | $\phi$ 20          | $\phi$ 21.87                                      | 29.6              | $\phi$ 8      | $\phi$ 16    | 8.6        | 14          | 15             | 10.07                         | 5.7        | 30°13'     | $\phi$ 12.1                            | 18.8   |
| <b>B1S 40R — 10</b>   |            | 40              | $\phi$ 40          | $\phi$ 40.41                                      | 21.8              | $\phi$ 10     | $\phi$ 25    | 8          | 13          | 14.57          | 12.21                         | 5.7        | 65°36'     | $\phi$ 28.4                            | 66.9   |
| <b>B1S 15L — 6</b>    | 1 : 3      | 15              | $\phi$ 15          | $\phi$ 17.07                                      | 31                | $\phi$ 6      | $\phi$ 13    | 8.17       | 14.4        | 15.07          | 8.85                          | 6.7        | 21°53'     | $\phi$ 8.0                             | 12.1   |
| <b>B1S 45R — 10</b>   |            | 45              | $\phi$ 45          | $\phi$ 45.25                                      | 20                | $\phi$ 10     | $\phi$ 25    | 8          | 12.9        | 14.8           | 12.88                         | 6.7        | 73°21'     | $\phi$ 31.1                            | 80.6   |
| <b>B1.5S 18L — 8</b>  | 1 : 2      | 18              | $\phi$ 27          | $\phi$ 30.09                                      | 40.74             | $\phi$ 8      | $\phi$ 22    | 12.49      | 21          | 22.96          | 14.51                         | 9.8        | 30°44'     | $\phi$ 12.2                            | 59.6   |
| <b>B1.5S 36R — 10</b> |            | 36              | $\phi$ 54          | $\phi$ 54.76                                      | 26.75             | $\phi$ 10     | $\phi$ 30    | 9          | 15.5        | 18.01          | 14.01                         | 9.8        | 65°57'     | $\phi$ 34.3                            | 143.0  |
| <b>B1.5S 15L — 8</b>  | 1 : 3      | 15              | $\phi$ 22.5        | $\phi$ 25.99                                      | 46                | $\phi$ 8      | $\phi$ 19.5  | 11.75      | 21.1        | 22.19          | 12.83                         | 10.1       | 22°28'     | $\phi$ 11.7                            | 41.9   |
| <b>B1.5S 45R — 12</b> |            | 45              | $\phi$ 67.5        | $\phi$ 68.01                                      | 30                | $\phi$ 12     | $\phi$ 37.5  | 12         | 19.4        | 22.31          | 19.51                         | 10.1       | 73°56'     | $\phi$ 46.6                            | 283.0  |
| <b>B2S 18L — 10</b>   | 1 : 2      | 18              | $\phi$ 36          | $\phi$ 38.35 <sup>(<math>\phi</math>40.20)</sup>  | 53.12             | $\phi$ 10     | $\phi$ 28    | 15.12      | 27          | 29.36          | 18.17                         | 13         | 30°53'     | $\phi$ 17.4                            | 130.3  |
| <b>B2S 36R — 12</b>   |            | 36              | $\phi$ 72          | $\phi$ 71.41 <sup>(<math>\phi</math>73.05)</sup>  | 35.21             | $\phi$ 12     | $\phi$ 36    | 12         | 21          | 23.54          | 18.26                         | 13         | 66° 6'     | $\phi$ 46.7                            | 318.4  |
| <b>B2S 15L — 10</b>   | 1 : 3      | 15              | $\phi$ 30          | $\phi$ 33.35 <sup>(<math>\phi</math>34.66)</sup>  | 62                | $\phi$ 10     | $\phi$ 26    | 16.33      | 28.9        | 30.2           | 17.78                         | 13.4       | 22°19'     | $\phi$ 16.6                            | 104.0  |
| <b>B2S 45R — 14</b>   |            | 45              | $\phi$ 90          | $\phi$ 89.16 <sup>(<math>\phi</math>90.68)</sup>  | 40                | $\phi$ 14     | $\phi$ 50    | 16         | 25.9        | 29.76          | 26.02                         | 13.4       | 73°47'     | $\phi$ 62.3                            | 680.6  |
| <b>B3S 18L — 15</b>   | 1 : 2      | 18              | $\phi$ 54          | $\phi$ 57.37 <sup>(<math>\phi</math>60.07)</sup>  | 75.27             | $\phi$ 15     | $\phi$ 41    | 18.02      | 37          | 40.12          | 22.79                         | 20         | 30° 9'     | $\phi$ 27.5                            | 390    |
| <b>B3S 36R — 16</b>   |            | 36              | $\phi$ 108         | $\phi$ 107.0 <sup>(<math>\phi</math>109.47)</sup> | 52.32             | $\phi$ 16     | $\phi$ 60    | 18         | 31          | 35.13          | 26.79                         | 20         | 65°22'     | $\phi$ 68.9                            | 1,130  |



2D • 3D CAD

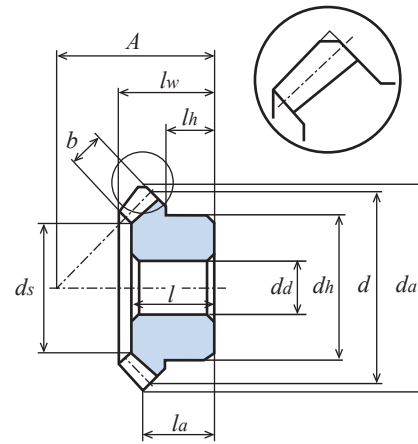
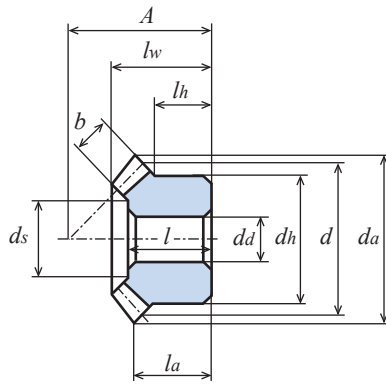


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |            |            |            |            |            |            | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |            |            |            |            |            |            | Backlash (Unit: mm) | Catalogue number                |
|-----------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|-------------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|---------------------|---------------------------------|
| 300 rpm                                                                                       | 600 rpm    | 900 rpm    | 1,200 rpm  | 1,500 rpm  | 1,800 rpm  | 2,000 rpm  | 300 rpm                                                                                         | 600 rpm    | 900 rpm    | 1,200 rpm  | 1,500 rpm  | 1,800 rpm  | 2,000 rpm  |                     |                                 |
| 46.5                                                                                          | 93.0       | 139.5      | 179.1      | 214.1      | 246.3      | 266.3      | 7.9                                                                                             | 16.0       | 24.2       | 31.3       | 36.4       | 42.7       | 47.5       | 0.05 to 0.12        | B1S 20L – 8<br>B1S 40R – 10     |
| 35.7                                                                                          | 71.5       | 107.3      | 143.1      | 174.2      | 202.1      | 219.7      | 5.0                                                                                             | 10.1       | 15.2       | 20.4       | 25.0       | 29.2       | 31.8       | 0.05 to 0.12        | B1S 15L – 6<br>B1S 45R – 10     |
| 149.1                                                                                         | 298.3      | 430.0      | 540.3      | 638.6      | 726.7      | 780.6      | 23.5                                                                                            | 47.4       | 69.0       | 87.5       | 104.5      | 120.3      | 130.2      | 0.05 to 0.12        | B1.5S 18L – 8<br>B1.5S 36R – 10 |
| 126.2                                                                                         | 252.5      | 375.3      | 475.5      | 566.1      | 648.5      | 699.4      | 17.8                                                                                            | 36.0       | 53.9       | 68.9       | 82.6       | 95.5       | 103.6      | 0.05 to 0.12        | B1.5S 15L – 8<br>B1.5S 45R – 12 |
| 0.355 (kW)                                                                                    | 0.697 (kW) | 0.966 (kW) | 1.196 (kW) | 1.396 (kW) | 1.617 (kW) | 1.771 (kW) | 0.057 (kW)                                                                                      | 0.114 (kW) | 0.160 (kW) | 0.200 (kW) | 0.238 (kW) | 0.280 (kW) | 0.309 (kW) | 0.05 to 0.12        | B2S 18L – 10<br>B2S 36R – 12    |
| 0.304 (kW)                                                                                    | 0.608 (kW) | 0.859 (kW) | 1.074 (kW) | 1.264 (kW) | 1.433 (kW) | 1.552 (kW) | 0.043 (kW)                                                                                      | 0.088 (kW) | 0.125 (kW) | 0.159 (kW) | 0.189 (kW) | 0.217 (kW) | 0.237 (kW) | 0.05 to 0.12        | B2S 15L – 10<br>B2S 45R – 14    |
| 1.230 (kW)                                                                                    | 2.228 (kW) | 2.997 (kW) | 3.729 (kW) | 4.517 (kW) | 5.262 (kW) | 5.769 (kW) | 0.206 (kW)                                                                                      | 0.381 (kW) | 0.524 (kW) | 0.668 (kW) | 0.808 (kW) | 0.986 (kW) | 1.098 (kW) | 0.06 to 0.15        | B3S 18L – 15<br>B3S 36R – 16    |



Unit: mm

| Accuracy Class | Material | Pressure angle | Helix angle | Heat treatment               | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|-------------|------------------------------|------------------------|----------------------|
| [JIS B 1704] 4 | S45C     | 20°            | 35°         | Induction hardening of teeth | HRC47 to 53            | See the table below. |

★ No surface treatment is applied. The allowable transfer capability table was prepared based on the assumption that the pinion (left-hand gear) is on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ Gears with a [\*] are provided with two screw holes and two set screws.

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number       | Gear ratio | Number of teeth | Reference diameter | Tip diameter                    | Assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Screw |       | Tip angle | Counterbore diameter (Reference value) | Weight |
|------------------------|------------|-----------------|--------------------|---------------------------------|-------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|-------|-------|-----------|----------------------------------------|--------|
|                        |            |                 |                    |                                 |                   |               |              |            |             |                |                               |            | 2-M   | $l_s$ |           |                                        |        |
| <b>B1S 20L * 8H</b>    | 1 : 2      | 20              | $\phi$ 20          | $\phi$ 21.87                    | 29.6              | $\phi$ 8      | $\phi$ 16    | 8.6        | 14          | 15             | 10.07                         | 5.7        | 2-M4  | 4     | 30°13'    | $\phi$ 12.1                            | 18.2   |
| <b>B1S 40R * 10H</b>   |            | 40              | $\phi$ 40          | $\phi$ 40.41                    | 21.8              | $\phi$ 10     | $\phi$ 25    | 8          | 13          | 14.57          | 12.21                         | 5.7        | 2-M5  | 4     | 65°36'    | $\phi$ 28.4                            | 65.1   |
| <b>B1S 15L * 6H</b>    | 1 : 3      | 15              | $\phi$ 15          | $\phi$ 17.07                    | 31                | $\phi$ 6      | $\phi$ 13    | 8.17       | 14.4        | 15.07          | 8.85                          | 6.7        | 2-M4  | 4     | 21°53'    | $\phi$ 8.0                             | 11.5   |
| <b>B1S 45R * 10H</b>   |            | 45              | $\phi$ 45          | $\phi$ 45.25                    | 20                | $\phi$ 10     | $\phi$ 25    | 8          | 12.9        | 14.8           | 12.88                         | 6.7        | 2-M5  | 4     | 73°21'    | $\phi$ 31.1                            | 78.8   |
| <b>B1.5S 18L – 8H</b>  | 1 : 2      | 18              | $\phi$ 27          | $\phi$ 30.09                    | 40.74             | $\phi$ 8      | $\phi$ 22    | 12.49      | 21          | 22.96          | 14.51                         | 9.8        | -     | -     | 30°44'    | $\phi$ 12.2                            | 59.6   |
| <b>B1.5S 36R – 10H</b> |            | 36              | $\phi$ 54          | $\phi$ 54.76                    | 26.75             | $\phi$ 10     | $\phi$ 30    | 9          | 15.5        | 18.01          | 14.01                         | 9.8        | -     | -     | 65°57'    | $\phi$ 34.3                            | 143.0  |
| <b>B1.5S 15L – 8H</b>  | 1 : 3      | 15              | $\phi$ 22.5        | $\phi$ 25.99                    | 46                | $\phi$ 8      | $\phi$ 19.5  | 11.75      | 21.1        | 22.19          | 12.83                         | 10.1       | -     | -     | 22°28'    | $\phi$ 11.7                            | 41.9   |
| <b>B1.5S 45R – 12H</b> |            | 45              | $\phi$ 67.5        | $\phi$ 68.01                    | 30                | $\phi$ 12     | $\phi$ 37.5  | 12         | 19.4        | 22.31          | 19.51                         | 10.1       | -     | -     | 73°56'    | $\phi$ 46.6                            | 283.0  |
| <b>B2S 18L – 10H</b>   | 1 : 2      | 18              | $\phi$ 36          | $\phi$ 38.35<br>( $\phi$ 40.20) | 53.12             | $\phi$ 10     | $\phi$ 28    | 15.12      | 27          | 29.36          | 18.17                         | 13         | -     | -     | 30°53'    | $\phi$ 17.4                            | 130.3  |
| <b>B2S 36R – 12H</b>   |            | 36              | $\phi$ 72          | $\phi$ 71.41<br>( $\phi$ 73.05) | 35.21             | $\phi$ 12     | $\phi$ 36    | 12         | 21          | 23.54          | 18.26                         | 13         | -     | -     | 66° 6'    | $\phi$ 46.7                            | 318.4  |
| <b>B2.5S 18L – 12H</b> | 1 : 2      | 18              | $\phi$ 45          | $\phi$ 48.63<br>( $\phi$ 50.25) | 64.29             | $\phi$ 12     | $\phi$ 36    | 17.04      | 32          | 34.98          | 20.6                          | 16.7       | -     | -     | 30°53'    | $\phi$ 21.2                            | 250.0  |
| <b>B2.5S 36R – 14H</b> |            | 36              | $\phi$ 90          | $\phi$ 89.88<br>( $\phi$ 91.32) | 42.55             | $\phi$ 14     | $\phi$ 50    | 14         | 25          | 28.14          | 21.37                         | 16.7       | -     | -     | 66° 6'    | $\phi$ 57.6                            | 640.0  |



2D • 3D CAD

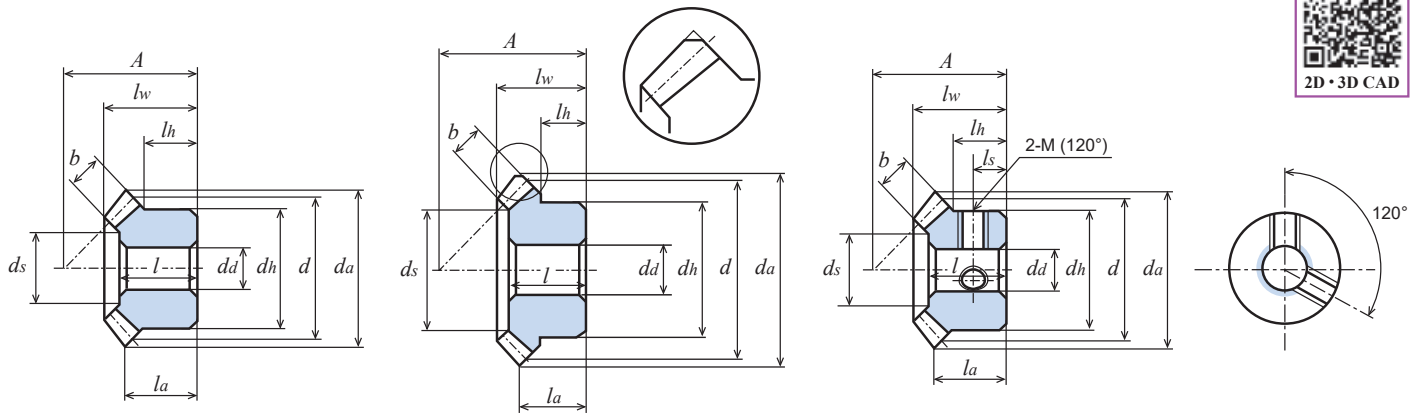


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |            |            |            |            |            |            | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |            |            |            |            |            |            | Backlash<br>(Unit: mm) | Catalogue number                   |
|-----------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|-------------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|------------------------|------------------------------------|
| 300 rpm                                                                                       | 600 rpm    | 900 rpm    | 1,200 rpm  | 1,500 rpm  | 1,800 rpm  | 2,000 rpm  | 300 rpm                                                                                         | 600 rpm    | 900 rpm    | 1,200 rpm  | 1,500 rpm  | 1,800 rpm  | 2,000 rpm  |                        |                                    |
| 40.6                                                                                          | 81.2       | 121.8      | 157.3      | 189.4      | 219.3      | 238.0      | 21.8                                                                                            | 44.9       | 68.6       | 89.8       | 109.2      | 127.4      | 139.0      | 0.05 to 0.12           | B1S 20L * 8H<br>B1S 40R * 10H      |
| 31.2                                                                                          | 62.4       | 93.7       | 124.9      | 152.8      | 178.2      | 194.4      | 13.8                                                                                            | 28.6       | 43.7       | 59.0       | 72.9       | 85.7       | 93.9       | 0.05 to 0.12           | B1S 15L * 6H<br>B1S 45R * 10H      |
| 130.2                                                                                         | 260.4      | 377.8      | 479.2      | 571.2      | 654.9      | 706.8      | 63.9                                                                                            | 131.8      | 194.6      | 232.5      | 300.9      | 347.8      | 377.1      | 0.05 to 0.12           | B1.5S 18L – 8H<br>B1.5S 36R – 10H  |
| 110.2                                                                                         | 220.4      | 328.2      | 419.2      | 502.9      | 580.1      | 628.3      | 48.7                                                                                            | 100.5      | 152.4      | 197.1      | 238.5      | 277.7      | 302.2      | 0.05 to 0.12           | B1.5S 15L – 8H<br>B1.5S 45R – 12H  |
| 0.310 (kW)                                                                                    | 0.611 (kW) | 0.857 (kW) | 1.073 (kW) | 1.264 (kW) | 1.452 (kW) | 1.575 (kW) | 0.155 (kW)                                                                                      | 0.314 (kW) | 0.448 (kW) | 0.569 (kW) | 0.677 (kW) | 0.784 (kW) | 0.854 (kW) | 0.05 to 0.12           | B2S 18L – 10H<br>B2S 36R – 12H     |
| 0.620 (kW)                                                                                    | 1.179 (kW) | 1.631 (kW) | 2.019 (kW) | 2.395 (kW) | 2.749 (kW) | 2.968 (kW) | 0.314 (kW)                                                                                      | 0.615 (kW) | 0.867 (kW) | 1.086 (kW) | 1.301 (kW) | 1.505 (kW) | 1.633 (kW) | 0.06 to 0.15           | B2.5S 18L – 12H<br>B2.5S 36R – 14H |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|----------------|------------------------|----------------------|
| [JIS B 1704] 3 | S45C     | 20°            | —              | —                      | See the table below. |

★ No surface treatment is applied. The allowable transfer capability table was prepared based on the assumption that the pinion is on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

★ Gears with a (\*) are provided with two screw holes and two set screws.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number     | Gear ratio | Num-ber of teeth | Refer-ence diam-eter | Tip diam-eter                 | As-sem-bley dis-tance | Hole diam-eter | Hub diam-eter | Hub length | Hole length | Overall length | Dis-tance from end face to tip | Face width | Screw  |       | Tip angle | Count-erbore diam-eter (Refer-ence value) | Weight |
|----------------------|------------|------------------|----------------------|-------------------------------|-----------------------|----------------|---------------|------------|-------------|----------------|--------------------------------|------------|--------|-------|-----------|-------------------------------------------|--------|
|                      |            |                  |                      |                               |                       |                |               |            |             |                |                                |            | 2-M    | $l_s$ |           |                                           |        |
| <b>B50S 20</b>       | 1 : 2      | 20               | $\phi 10$            | $\phi 10.89$                  | 15.52                 | $\phi 3(H8)$   | $\phi 8$      | 5          | 8           | 8.54           | 5.74                           | 3.2        | -      | -     | 29° 8'    | $\phi 5.6$                                | 3.0    |
| <b>B50S 20 * 3</b>   |            | 20               | $\phi 10$            | $\phi 10.89$                  | 15.52                 | $\phi 3(H8)$   | $\phi 8$      | 5          | 8           | 8.54           | 5.74                           | 3.2        | 2-M2.5 | 2.5   | 29° 8'    | $\phi 5.6$                                | 2.8    |
| <b>B50S 40</b>       |            | 40               | $\phi 20$            | $\phi 20.45$                  | 10.56                 | $\phi 4(H8)$   | $\phi 12$     | 4          | 6.3         | 7.31           | 6.01                           | 3.2        | -      | -     | 66° 0'    | $\phi 13.5$                               | 8.2    |
| <b>B50S 40 * 4</b>   |            | 40               | $\phi 20$            | $\phi 20.45$                  | 10.56                 | $\phi 4(H8)$   | $\phi 12$     | 4          | 6.3         | 7.31           | 6.01                           | 3.2        | 2-M3   | 2     | 66° 0'    | $\phi 13.5$                               | 7.8    |
| <b>B80S 20</b>       | 1 : 2      | 20               | $\phi 16$            | $\phi 17.43$                  | 22.5                  | $\phi 5$       | $\phi 12$     | 5.5        | 10          | 10.79          | 6.86                           | 4.5        | -      | -     | 29° 8'    | $\phi 9.8$                                | 9.0    |
| <b>B80S 40</b>       |            | 40               | $\phi 32$            | $\phi 32.72$                  | 16.46                 | $\phi 6$       | $\phi 20$     | 6          | 9.5         | 11.01          | 9.18                           | 4.5        | -      | -     | 66° 0'    | $\phi 22.9$                               | 33.4   |
| <b>B1S 20 - 6</b>    | 1 : 2      | 20               | $\phi 20$            | $\phi 21.79$                  | 29.6                  | $\phi 6$       | $\phi 16$     | 8.6        | 14          | 15.03          | 10.05                          | 5.7        | -      | -     | 29° 8'    | $\phi 12.1$                               | 21.3   |
| <b>B1S 20 * 6</b>    |            | 20               | $\phi 20$            | $\phi 21.79$                  | 29.6                  | $\phi 6$       | $\phi 16$     | 8.6        | 14          | 15.03          | 10.05                          | 5.7        | 2-M4   | 4     | 29° 8'    | $\phi 12.1$                               | 20.5   |
| <b>B1S 20 * 8</b>    |            | 20               | $\phi 20$            | $\phi 21.79$                  | 29.6                  | $\phi 8$       | $\phi 16$     | 8.6        | 14          | 15.03          | 10.05                          | 5.7        | 2-M4   | 4     | 29° 8'    | $\phi 12.1$                               | 18.3   |
| <b>B1S 40 - 8</b>    |            | 40               | $\phi 40$            | $\phi 40.89$                  | 21.8                  | $\phi 8$       | $\phi 25$     | 8          | 13          | 15.02          | 12.69                          | 5.7        | -      | -     | 66° 0'    | $\phi 28.4$                               | 71.7   |
| <b>B1S 40 * 8</b>    |            | 40               | $\phi 40$            | $\phi 40.89$                  | 21.8                  | $\phi 8$       | $\phi 25$     | 8          | 13          | 15.02          | 12.69                          | 5.7        | 2-M5   | 4     | 66° 0'    | $\phi 28.4$                               | 69.6   |
| <b>B1S 40 * 10</b>   |            | 40               | $\phi 40$            | $\phi 40.89$                  | 21.8                  | $\phi 10$      | $\phi 25$     | 8          | 13          | 15.02          | 12.69                          | 5.7        | 2-M5   | 4     | 66° 0'    | $\phi 28.4$                               | 67.0   |
| <b>B1S 15 - 6</b>    | 1 : 3      | 15               | $\phi 15$            | $\phi 17.67$                  | 31                    | $\phi 6$       | $\phi 13$     | 8.17       | 14.4        | 15.16          | 8.95                           | 6.7        | -      | -     | 22° 17'   | $\phi 8.0$                                | 12.0   |
| <b>B1S 15 * 6</b>    |            | 15               | $\phi 15$            | $\phi 17.67$                  | 31                    | $\phi 6$       | $\phi 13$     | 8.17       | 14.4        | 15.16          | 8.95                           | 6.7        | 2-M4   | 4     | 22° 17'   | $\phi 8.0$                                | 11.4   |
| <b>B1S 45 - 10</b>   |            | 45               | $\phi 45$            | $\phi 45.37$                  | 20                    | $\phi 10$      | $\phi 25$     | 8          | 12.9        | 14.97          | 13.06                          | 6.7        | -      | -     | 73° 27'   | $\phi 31.1$                               | 86.0   |
| <b>B1S 45 * 10</b>   |            | 45               | $\phi 45$            | $\phi 45.37$                  | 20                    | $\phi 10$      | $\phi 25$     | 8          | 12.9        | 14.97          | 13.06                          | 6.7        | 2-M5   | 4     | 73° 27'   | $\phi 31.1$                               | 84.2   |
| <b>B1.5S 18 - 8</b>  | 1 : 2      | 18               | $\phi 27$            | $\phi 29.68$                  | 40.74                 | $\phi 8$       | $\phi 22$     | 12.5       | 21          | 22.96          | 14.41                          | 9.8        | -      | -     | 29° 25'   | $\phi 12.2$                               | 59.4   |
| <b>B1.5S 36 - 10</b> |            | 36               | $\phi 54$            | $\phi 55.34$                  | 26.75                 | $\phi 10$      | $\phi 30$     | 10         | 15.5        | 18.54          | 14.59                          | 9.8        | -      | -     | 66° 17'   | $\phi 34.3$                               | 139.9  |
| <b>B1.5S 15 - 8</b>  | 1 : 3      | 15               | $\phi 22.5$          | $\phi 26.51$                  | 46                    | $\phi 8$       | $\phi 19.5$   | 11.78      | 21.1        | 22.29          | 12.92                          | 10.1       | -      | -     | 22° 17'   | $\phi 11.7$                               | 41.8   |
| <b>B1.5S 45 - 12</b> |            | 45               | $\phi 67.5$          | $\phi 68.06$                  | 30                    | $\phi 12$      | $\phi 37.5$   | 12         | 19.4        | 22.47          | 19.59                          | 10.1       | -      | -     | 73° 27'   | $\phi 46.6$                               | 300.8  |
| <b>B2S 18 - 10</b>   | 1 : 2      | 18               | $\phi 36$            | $\phi 39.58$<br>$\phi 37.81$  | 53.12                 | $\phi 10$      | $\phi 28$     | 15.12      | 27          | 29             | 18.01                          | 12.6       | -      | -     | 29° 25'   | $\phi 19.1$                               | 129.6  |
| <b>B2S 36 - 12</b>   |            | 36               | $\phi 72$            | $\phi 73.79$<br>$\phi 72.15$  | 35.21                 | $\phi 12$      | $\phi 36$     | 13         | 21          | 24.07          | 19                             | 12.6       | -      | -     | 66° 17'   | $\phi 47.6$                               | 313.0  |
| <b>B2S 15 - 10</b>   | 1 : 3      | 15               | $\phi 30$            | $\phi 33.35$<br>$\phi 34.19$  | 62                    | $\phi 10$      | $\phi 26$     | 16.33      | 28.9        | 30.32          | 17.89                          | 13.4       | -      | -     | 22° 17'   | $\phi 16.6$                               | 103.8  |
| <b>B2S 45 - 14</b>   |            | 45               | $\phi 90$            | $\phi 90.75$<br>$\phi 89.29$  | 40                    | $\phi 14$      | $\phi 50$     | 16         | 25.9        | 29.94          | 26.12                          | 13.4       | -      | -     | 73° 27'   | $\phi 62.3$                               | 722.7  |
| <b>B2.5S 18 - 12</b> | 1 : 2      | 18               | $\phi 45$            | $\phi 49.47$<br>$\phi 47.27$  | 64.29                 | $\phi 12$      | $\phi 36$     | 17         | 32          | 34.97          | 20.41                          | 16.7       | -      | -     | 29° 25'   | $\phi 21.1$                               | 250    |
| <b>B2.5S 36 - 14</b> |            | 36               | $\phi 90$            | $\phi 92.24$<br>$\phi 90.18$  | 42.55                 | $\phi 14$      | $\phi 50$     | 15         | 25          | 29.01          | 22.29                          | 16.7       | -      | -     | 66° 17'   | $\phi 57.5$                               | 640    |
| <b>B2.5S 15 - 10</b> | 1 : 3      | 15               | $\phi 37.5$          | $\phi 44.18$<br>$\phi 42.74$  | 77.93                 | $\phi 10(H8)$  | $\phi 32$     | 20.8       | 38.5        | 40.41          | 22.79                          | 19         | -      | -     | 22° 17'   | $\phi 18.2$                               | 220    |
| <b>B2.5S 45 - 16</b> |            | 45               | $\phi 112.5$         | $\phi 113.44$<br>$\phi 111.6$ | 40.67                 | $\phi 16$      | $\phi 60$     | 14         | 24.5        | 28.74          | 23.32                          | 19         | -      | -     | 73° 27'   | $\phi 74.1$                               | 1,100  |
| <b>B3S 18 - 15</b>   | 1 : 2      | 18               | $\phi 54$            | $\phi 59.37$<br>$\phi 56.72$  | 75.27                 | $\phi 15$      | $\phi 41$     | 18         | 37          | 40.06          | 22.61                          | 20         | -      | -     | 29° 25'   | $\phi 27.4$                               | 390    |
| <b>B3S 36 - 16</b>   |            | 36               | $\phi 108$           | $\phi 110.68$<br>$\phi 108.2$ | 52.32                 | $\phi 16$      | $\phi 60$     | 19         | 31          | 36.06          | 28                             | 20         | -      | -     | 66° 17'   | $\phi 68.9$                               | 1,150  |





2D • 3D CAD

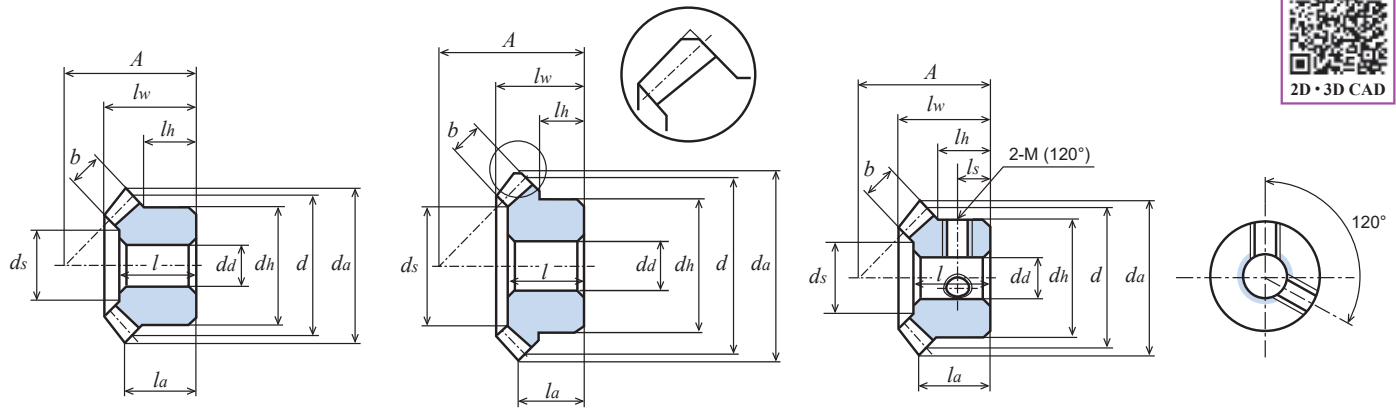


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |            |            |            |            |            |            | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |            |            |            |            |            |            | Backlash (Unit: mm) | Catalogue number                                                                  |
|-----------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|-------------------------------------------------------------------------------------------------|------------|------------|------------|------------|------------|------------|---------------------|-----------------------------------------------------------------------------------|
| 10 rpm                                                                                        | 100 rpm    | 200 rpm    | 400 rpm    | 600 rpm    | 800 rpm    | 1,000 rpm  | 10 rpm                                                                                          | 100 rpm    | 200 rpm    | 400 rpm    | 600 rpm    | 800 rpm    | 1,000 rpm  |                     |                                                                                   |
| 0.2                                                                                           | 2.0        | 4.1        | 8.2        | 12.4       | 16.5       | 20.7       | -                                                                                               | -          | -          | -          | -          | -          | -          | 0.02 to 0.08        | B50S 20<br>B50S 20 * 3<br>B50S 40<br>B50S 40 * 4                                  |
| 0.7                                                                                           | 7.7        | 15.5       | 31.0       | 46.5       | 62.0       | 77.6       | -                                                                                               | -          | -          | -          | -          | -          | -          | 0.02 to 0.08        | B80S 20<br>B80S 40                                                                |
| 1.3                                                                                           | 13.8       | 27.7       | 55.5       | 83.3       | 111.1      | 138.0      | -                                                                                               | -          | -          | -          | -          | -          | -          | 0.05 to 0.12        | B1S 20 – 6<br>B1S 20 * 6<br>B1S 20 * 8<br>B1S 40 – 8<br>B1S 40 * 8<br>B1S 40 * 10 |
| 1.1                                                                                           | 11.3       | 22.6       | 45.6       | 68.5       | 91.2       | 113.4      | -                                                                                               | -          | -          | -          | -          | -          | -          | 0.05 to 0.12        | B1S 15 – 6<br>B1S 15 * 6<br>B1S 45 – 10<br>B1S 45 * 10                            |
| 4.4                                                                                           | 44.4       | 88.8       | 170.3      | 255.4      | 334.6      | 403.0      | 0.3                                                                                             | 3.9        | 7.6        | 15.8       | 23.9       | 31.4       | 38.1       | 0.05 to 0.12        | B1.5S 18 – 8<br>B1.5S 36 – 10                                                     |
| 3.8                                                                                           | 38.4       | 76.9       | 153.9      | 230.9      | 307.8      | 375.9      | 0.3                                                                                             | 3.2        | 6.4        | 13.0       | 19.6       | 26.3       | 32.2       | 0.05 to 0.12        | B1.5S 15 – 8<br>B1.5S 45 – 12                                                     |
| 0.010 (kW)                                                                                    | 0.102 (kW) | 0.204 (kW) | 0.408 (kW) | 0.602 (kW) | 0.764 (kW) | 0.912 (kW) | -                                                                                               | 0.010 (kW) | 0.020 (kW) | 0.040 (kW) | 0.060 (kW) | 0.077 (kW) | 0.093 (kW) | 0.05 to 0.12        | B2S 18 – 10<br>B2S 36 – 12                                                        |
| 0.009 (kW)                                                                                    | 0.091 (kW) | 0.182 (kW) | 0.364 (kW) | 0.546 (kW) | 0.703 (kW) | 0.844 (kW) | -                                                                                               | 0.007 (kW) | 0.015 (kW) | 0.031 (kW) | 0.047 (kW) | 0.062 (kW) | 0.075 (kW) | 0.05 to 0.12        | B2S 15 – 10<br>B2S 45 – 14                                                        |
| 0.020 (kW)                                                                                    | 0.209 (kW) | 0.418 (kW) | 0.837 (kW) | 1.189 (kW) | 1.494 (kW) | 1.767 (kW) | 0.002 (kW)                                                                                      | 0.021 (kW) | 0.042 (kW) | 0.085 (kW) | 0.122 (kW) | 0.155 (kW) | 0.186 (kW) | 0.06 to 0.15        | B2.5S 18 – 12<br>B2.5S 36 – 14                                                    |
| 0.019 (kW)                                                                                    | 0.197 (kW) | 0.394 (kW) | 0.789 (kW) | 1.155 (kW) | 1.464 (kW) | 1.744 (kW) | 0.001 (kW)                                                                                      | 0.017 (kW) | 0.034 (kW) | 0.070 (kW) | 0.104 (kW) | 0.133 (kW) | 0.160 (kW) | 0.06 to 0.15        | B2.5S 15 – 10<br>B2.5S 45 – 16                                                    |
| 0.036 (kW)                                                                                    | 0.361 (kW) | 0.722 (kW) | 1.419 (kW) | 1.979 (kW) | 2.465 (kW) | 2.892 (kW) | 0.003 (kW)                                                                                      | 0.037 (kW) | 0.074 (kW) | 0.148 (kW) | 0.209 (kW) | 0.264 (kW) | 0.315 (kW) | 0.06 to 0.15        | B3S 18 – 15<br>B3S 36 – 16                                                        |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment               | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|------------------------------|------------------------|----------------------|
| [JIS B 1704] 4 | S45C     | 20°            | Induction hardening of teeth | HRC47 to 53            | See the table below. |

★ No surface treatment is applied. The allowable transfer capability table was prepared based on the assumption that the pinion is on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

★ Gears with a [#] are provided with key grooves, keys, screw holes, and set screws.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number                                 | Gear ratio | Number of teeth | Reference diameter | Tip diameter                 | As-sembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Over-all length | Distance from end face to tip | Face width | Key groove | Screw |     | Tip angle | Counterbore diameter (Reference value) | Weight |
|--------------------------------------------------|------------|-----------------|--------------------|------------------------------|--------------------|---------------|--------------|------------|-------------|-----------------|-------------------------------|------------|------------|-------|-----|-----------|----------------------------------------|--------|
|                                                  |            |                 |                    |                              |                    |               |              |            |             |                 |                               |            |            | 2-M   | ls  |           |                                        |        |
| B1.5S 18 — 8H                                    | 1 : 2      | 18              | φ 27               | φ 29.68                      | 40.74              | φ 8           | φ 22         | 12.5       | 21          | 22.96           | 14.41                         | 9.8        | -          | -     | -   | 29°25'    | φ 12.2                                 | 59.4   |
| B1.5S 18 # 10H                                   |            | 18              | φ 27               | φ 29.68                      | 40.74              | φ 10          | φ 22         | 12.5       | 21          | 22.96           | 14.41                         | 9.8        | 3 × 1.4    | 2-M4  | 6.5 | 29°25'    | φ 12.2                                 | 54.5   |
| B1.5S 36 — 10H                                   |            | 36              | φ 54               | φ 55.34                      | 26.75              | φ 10          | φ 30         | 10         | 15.5        | 18.54           | 14.59                         | 9.8        | -          | -     | -   | 66°17'    | φ 34.3                                 | 139.9  |
| B1.5S 36 # 10H                                   |            | 36              | φ 54               | φ 55.34                      | 26.75              | φ 10          | φ 30         | 10         | 15.5        | 18.54           | 14.59                         | 9.8        | 3 × 1.4    | 2-M4  | 5   | 66°17'    | φ 34.3                                 | 138.6  |
| B1.5S 15 — 8H                                    | 1 : 3      | 15              | φ 22.5             | φ 26.51                      | 46                 | φ 8           | φ 19.5       | 11.78      | 21.1        | 22.29           | 12.92                         | 10.1       | -          | -     | -   | 22°17'    | φ 11.7                                 | 41.8   |
| B1.5S 15 # 8H                                    |            | 15              | φ 22.5             | φ 26.51                      | 46                 | φ 8           | φ 19.5       | 11.78      | 21.1        | 22.29           | 12.92                         | 10.1       | 3 × 1.4    | 2-M4  | 6   | 22°17'    | φ 11.7                                 | 40.6   |
| B1.5S 45 — 12H                                   |            | 45              | φ 67.5             | φ 68.06                      | 30                 | φ 12          | φ 37.5       | 12         | 19.4        | 22.47           | 19.59                         | 10.1       | -          | -     | -   | 73°27'    | φ 46.6                                 | 300.8  |
| For all the weight values below, the unit is kg. |            |                 |                    |                              |                    |               |              |            |             |                 |                               |            |            |       |     |           |                                        |        |
| B2S 18 — 10H                                     | 1 : 2      | 18              | φ 36               | φ 37.81 <sup>(φ39.58)</sup>  | 53.12              | φ 10          | φ 28         | 15.12      | 27          | 29              | 18.01                         | 12.6       | -          | -     | -   | 29°25'    | φ 19.1                                 | 0.13   |
| B2S 18 # 12H                                     |            | 18              | φ 36               | φ 37.81 <sup>(φ39.58)</sup>  | 53.12              | φ 12          | φ 28         | 15.12      | 27          | 29              | 18.01                         | 12.6       | 4 × 1.8    | 2-M5  | 8   | 29°25'    | φ 19.1                                 | 0.12   |
| B2S 36 — 12H                                     |            | 36              | φ 72               | φ 72.15 <sup>(φ73.79)</sup>  | 35.21              | φ 12          | φ 36         | 13         | 21          | 24.07           | 19                            | 12.6       | -          | -     | -   | 66°17'    | φ 47.6                                 | 0.31   |
| B2S 36 # 18H                                     |            | 36              | φ 72               | φ 72.15 <sup>(φ73.79)</sup>  | 35.21              | φ 18          | φ 36         | 13         | 21          | 24.07           | 19                            | 12.6       | 6 × 2.8    | 2-M5  | 6.5 | 66°17'    | φ 47.6                                 | 0.29   |
| B2S 15 — 10H                                     | 1 : 3      | 15              | φ 30               | φ 34.19 <sup>(φ35.35)</sup>  | 62                 | φ 10          | φ 26         | 16.33      | 28.9        | 30.32           | 17.89                         | 13.4       | -          | -     | -   | 22°17'    | φ 16.6                                 | 0.10   |
| B2S 15 # 12H                                     |            | 15              | φ 30               | φ 34.19 <sup>(φ35.35)</sup>  | 62                 | φ 12          | φ 26         | 16.33      | 28.9        | 30.32           | 17.89                         | 13.4       | 4 × 1.8    | 2-M5  | 8.5 | 22°17'    | φ 16.6                                 | 0.093  |
| B2S 45 — 14H                                     |            | 45              | φ 90               | φ 90.75 <sup>(φ92.24)</sup>  | 40                 | φ 14          | φ 50         | 16         | 25.9        | 29.94           | 26.12                         | 13.4       | -          | -     | -   | 73°27'    | φ 62.3                                 | 0.72   |
| B2S 45 # 20H                                     |            | 45              | φ 90               | φ 90.75 <sup>(φ92.24)</sup>  | 40                 | φ 20          | φ 50         | 16         | 25.9        | 29.94           | 26.12                         | 13.4       | 6 × 2.8    | 2-M5  | 8   | 73°27'    | φ 62.3                                 | 0.69   |
| B2.5S 18 — 12H                                   | 1 : 2      | 18              | φ 45               | φ 47.27 <sup>(φ49.47)</sup>  | 64.29              | φ 12          | φ 36         | 17         | 32          | 34.97           | 20.41                         | 16.7       | -          | -     | -   | 29°25'    | φ 21.1                                 | 0.25   |
| B2.5S 36 — 14H                                   |            | 36              | φ 90               | φ 90.18 <sup>(φ92.24)</sup>  | 42.55              | φ 14          | φ 50         | 15         | 25          | 29.01           | 22.29                         | 16.7       | -          | -     | -   | 66°17'    | φ 57.5                                 | 0.64   |
| B2.5S 15 — 10H                                   | 1 : 3      | 15              | φ 37.5             | φ 42.74 <sup>(φ44.18)</sup>  | 77.93              | φ 10          | φ 32         | 20.8       | 38.5        | 40.41           | 22.79                         | 19         | -          | -     | -   | 22°17'    | φ 18.2                                 | 0.22   |
| B2.5S 45 — 16H                                   |            | 45              | φ 112.5            | φ 111.6 <sup>(φ113.44)</sup> | 40.67              | φ 16          | φ 60         | 14         | 24.5        | 28.74           | 23.32                         | 19         | -          | -     | -   | 73°27'    | φ 74.1                                 | 1.10   |
| B3S 18 — 15H                                     | 1 : 2      | 18              | φ 54               | φ 56.72 <sup>(φ59.37)</sup>  | 75.27              | φ 15          | φ 41         | 18         | 37          | 40.06           | 22.61                         | 20         | -          | -     | -   | 29°25'    | φ 27.4                                 | 0.39   |
| B3S 18 # 20H                                     |            | 18              | φ 54               | φ 56.72 <sup>(φ59.37)</sup>  | 75.27              | φ 20          | φ 41         | 18         | 37          | 40.06           | 22.61                         | 20         | 6 × 2.8    | 2-M6  | 9   | 29°25'    | φ 27.4                                 | 0.35   |
| B3S 36 — 16H                                     |            | 36              | φ 108              | φ 108.2 <sup>(φ110.68)</sup> | 52.32              | φ 16          | φ 60         | 19         | 31          | 36.06           | 28                            | 20         | -          | -     | -   | 66°17'    | φ 68.9                                 | 1.15   |
| B3S 36 # 25H                                     |            | 36              | φ 108              | φ 108.2 <sup>(φ110.68)</sup> | 52.32              | φ 25          | φ 60         | 19         | 31          | 36.06           | 28                            | 20         | 8 × 3.3    | 2-M6  | 9.5 | 66°17'    | φ 68.9                                 | 1.07   |
| B3S 15 — 12H                                     | 1 : 3      | 15              | φ 45               | φ 51.29 <sup>(φ53.02)</sup>  | 89.36              | φ 12          | φ 36         | 20.3       | 42          | 44.53           | 23.2                          | 23         | -          | -     | -   | 22°17'    | φ 20.3                                 | 0.34   |
| B3S 45 — 18H                                     |            | 45              | φ 135              | φ 133.9 <sup>(φ136.12)</sup> | 50.95              | φ 18          | φ 70         | 19         | 32          | 36.69           | 30.13                         | 23         | -          | -     | -   | 73°27'    | φ 88.8                                 | 1.95   |
| B4S 18 — 20H                                     | 1 : 2      | 18              | φ 72               | φ 75.63 <sup>(φ79.16)</sup>  | 99.73              | φ 20          | φ 55         | 23.5       | 48          | 52.02           | 29.52                         | 25.8       | -          | -     | -   | 29°25'    | φ 37.6                                 | 0.94   |
| B4S 36 — 22H                                     |            | 36              | φ 144              | φ 144.3 <sup>(φ147.58)</sup> | 71.56              | φ 22          | φ 75         | 23         | 42          | 49.53           | 39.14                         | 25.8       | -          | -     | -   | 66°17'    | φ 92.7                                 | 2.89   |
| B4S 15 # 20H                                     | 1 : 3      | 15              | φ 60               | φ 68.38 <sup>(φ70.69)</sup>  | 119.14             | φ 20          | φ 52         | 27.8       | 57          | 59.67           | 30.92                         | 31         | 6 × 2.8    | 2-M8  | 14  | 22°17'    | φ 31.1                                 | 0.78   |
| B4S 45 # 30H                                     |            | 45              | φ 180              | φ 178.6 <sup>(φ181.5)</sup>  | 65.47              | φ 30          | φ 80         | 22         | 40          | 46.55           | 37.71                         | 31         | 8 × 3.3    | 2-M8  | 11  | 73°27'    | φ 117.6                                | 4.19   |



2D • 3D CAD

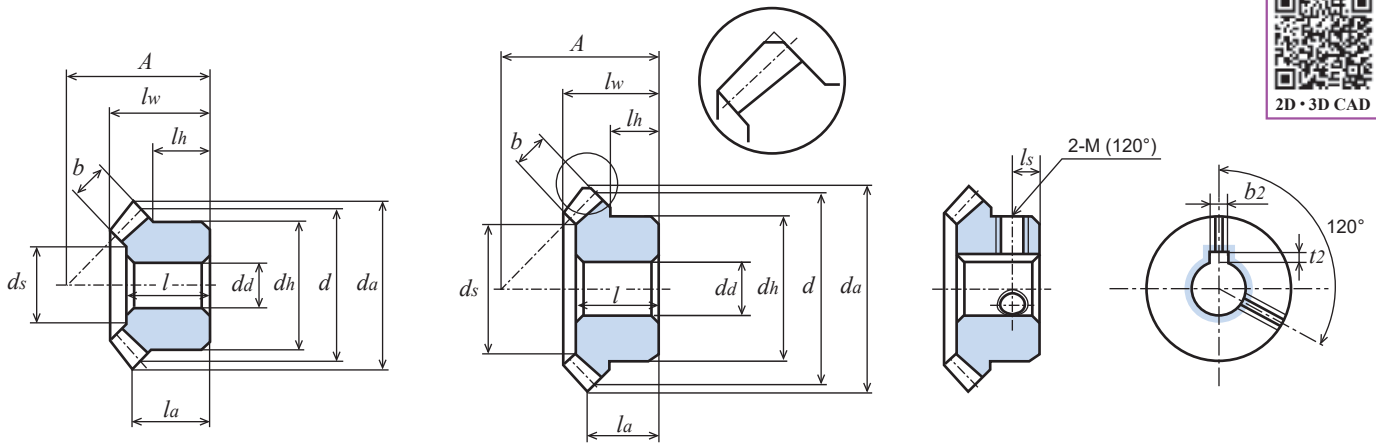


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute Bending strength (Unit: W) |         |         |         |         |         |           | Allowable transfer capability for different revolutions per minute Surface durability (Unit: W) |         |         |         |         |         |           | Backlash (Unit: mm) | Catalogue number                                                    |
|-----------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|-------------------------------------------------------------------------------------------------|---------|---------|---------|---------|---------|-----------|---------------------|---------------------------------------------------------------------|
| 10 rpm                                                                                        | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm | 10 rpm                                                                                          | 100 rpm | 200 rpm | 400 rpm | 600 rpm | 800 rpm | 1,000 rpm |                     |                                                                     |
| 4.1                                                                                           | 41.1    | 82.2    | 164.4   | 246.6   | 323.5   | 390.8     | 1.0                                                                                             | 11.6    | 24.0    | 49.6    | 75.7    | 100.6   | 122.7     | 0.05 to 0.12        | B1.5S 18 – 8H<br>B1.5S 18 # 10H<br>B1.5S 36 – 10H<br>B1.5S 36 # 10H |
| 3.6                                                                                           | 36.5    | 73.0    | 146.1   | 219.2   | 292.3   | 357.5     | 0.8                                                                                             | 9.1     | 18.8    | 38.9    | 59.4    | 80.2    | 99.0      | 0.05 to 0.12        | B1.5S 15 – 8H<br>B1.5S 15 # 8H<br>B1.5S 45 – 12H                    |
| For all the values below, the unit is kW.                                                     |         |         |         |         |         |           |                                                                                                 |         |         |         |         |         |           |                     |                                                                     |
| 0.009                                                                                         | 0.095   | 0.190   | 0.380   | 0.562   | 0.716   | 0.857     | 0.002                                                                                           | 0.027   | 0.057   | 0.118   | 0.177   | 0.228   | 0.276     | 0.05 to 0.12        | B2S 18 – 10H<br>B2S 18 # 12H<br>B2S 36 – 12H<br>B2S 36 # 18H        |
| 0.008                                                                                         | 0.086   | 0.172   | 0.345   | 0.518   | 0.669   | 0.805     | 0.002                                                                                           | 0.022   | 0.045   | 0.094   | 0.144   | 0.188   | 0.229     | 0.05 to 0.12        | B2S 15 – 10H<br>B2S 15 # 12H<br>B2S 45 – 14H<br>B2S 45 # 20H        |
| 0.019                                                                                         | 0.192   | 0.385   | 0.771   | 1.100   | 1.389   | 1.649     | 0.005                                                                                           | 0.057   | 0.118   | 0.243   | 0.353   | 0.452   | 0.542     | 0.06 to 0.15        | B2.5S 18 – 12H<br>B2.5S 36 – 14H                                    |
| 0.018                                                                                         | 0.183   | 0.366   | 0.732   | 1.074   | 1.366   | 1.633     | 0.004                                                                                           | 0.047   | 0.098   | 0.203   | 0.304   | 0.392   | 0.473     | 0.06 to 0.15        | B2.5S 15 – 10H<br>B2.5S 45 – 16H                                    |
| 0.033                                                                                         | 0.332   | 0.665   | 1.310   | 1.837   | 2.300   | 2.710     | 0.009                                                                                           | 0.100   | 0.207   | 0.420   | 0.600   | 0.761   | 0.905     | 0.06 to 0.15        | B3S 18 – 15H<br>B3S 18 # 20H<br>B3S 36 – 16H<br>B3S 36 # 25H        |
| 0.031                                                                                         | 0.317   | 0.635   | 1.271   | 1.814   | 2.290   | 2.718     | 0.007                                                                                           | 0.084   | 0.174   | 0.359   | 0.522   | 0.667   | 0.800     | 0.06 to 0.15        | B3S 15 – 12H<br>B3S 45 – 18H                                        |
| 0.077                                                                                         | 0.773   | 1.546   | 2.908   | 4.007   | 4.943   | 5.883     | 0.021                                                                                           | 0.239   | 0.494   | 0.958   | 1.344   | 1.679   | 2.018     | 0.06 to 0.15        | B4S 18 – 20H<br>B4S 36 – 22H                                        |
| 0.075                                                                                         | 0.758   | 1.517   | 2.940   | 4.099   | 5.104   | 6.013     | 0.018                                                                                           | 0.207   | 0.427   | 0.853   | 1.210   | 1.526   | 1.816     | 0.06 to 0.15        | B4S 15 # 20H<br>B4S 45 # 30H                                        |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①           |
|----------------|----------|----------------|----------------|------------------------|----------------------|
| [JIS B 1704] 4 | SUS304   | 20°            | —              | —                      | See the table below. |

★ No surface treatment is applied. The allowable transfer capability table was prepared based on the assumption that the pinion is on the input side.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

★ The values in parentheses below "Tip diameter  $d_a$ " are theoretical values. The actual maximum diameter is the value obtained after the teeth are chamfered parallel to the shaft center. (See Fig. 1.)

★ Gears with a [\*] are provided with two screw holes. No set screws are provided.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number      | Gear ratio | Number of teeth | Reference diameter | Tip diameter                     | As-assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Screw     |       | Tip angle | Counterbore diameter (Reference value) | Weight |
|-----------------------|------------|-----------------|--------------------|----------------------------------|----------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|-----------|-------|-----------|----------------------------------------|--------|
|                       |            |                 |                    |                                  |                      |               |              |            |             |                |                               |            | 2-M(120°) | $l_s$ |           |                                        |        |
| <b>B80SU 20 * 5</b>   | 1 : 2      | 20              | $\phi 16$          | $\phi 17.43$                     | 22.5                 | $\phi 5$      | $\phi 12$    | 5.5        | 10          | 10.79          | 6.86                          | 4.5        | 2-M3      | 2.5   | 29° 8'    | $\phi 9.8$                             | 8.8    |
| <b>B80SU 40 * 6</b>   |            | 40              | $\phi 32$          | $\phi 32.72$                     | 16.46                | $\phi 6$      | $\phi 20$    | 6          | 9.5         | 11.01          | 9.18                          | 4.5        | 2-M4      | 3.5   | 66° 0'    | $\phi 22.9$                            | 33.2   |
| <b>B1SU 20 — 6</b>    |            | 20              | $\phi 20$          | $\phi 21.79$                     | 29.6                 | $\phi 6$      | $\phi 16$    | 8.6        | 14          | 15.03          | 10.05                         | 5.7        | -         | -     | 29° 8'    | $\phi 12.1$                            | 21.6   |
| <b>B1SU 40 — 8</b>    |            | 40              | $\phi 40$          | $\phi 40.89$                     | 21.8                 | $\phi 8$      | $\phi 25$    | 8          | 13          | 15.02          | 12.69                         | 5.7        | -         | -     | 66° 0'    | $\phi 28.4$                            | 72.6   |
| <b>B1SU 20 * 6</b>    |            | 20              | $\phi 20$          | $\phi 21.79$                     | 29.6                 | $\phi 6$      | $\phi 16$    | 8.6        | 14          | 15.03          | 10.05                         | 5.7        | 2-M4      | 4     | 29° 8'    | $\phi 12.1$                            | 20.8   |
| <b>B1SU 40 * 8</b>    |            | 40              | $\phi 40$          | $\phi 40.89$                     | 21.8                 | $\phi 8$      | $\phi 25$    | 8          | 13          | 15.02          | 12.69                         | 5.7        | 2-M5      | 4     | 66° 0'    | $\phi 28.4$                            | 70.4   |
| <b>B1.5SU 18 — 8</b>  |            | 18              | $\phi 27$          | $\phi 29.68$                     | 40.74                | $\phi 8$      | $\phi 22$    | 12.5       | 21          | 22.96          | 14.41                         | 9.8        | -         | -     | 29°25'    | $\phi 12.1$                            | 60.0   |
| <b>B1.5SU 36 — 10</b> |            | 36              | $\phi 54$          | $\phi 55.34$                     | 26.75                | $\phi 10$     | $\phi 30$    | 10         | 15.5        | 18.54          | 14.59                         | 9.8        | -         | -     | 66°17'    | $\phi 34.3$                            | 141.3  |
| <b>B2SU 18 — 10</b>   |            | 18              | $\phi 36$          | $\phi 37.81$<br>( $\phi 39.58$ ) | 53.12                | $\phi 10$     | $\phi 28$    | 15.12      | 27          | 29             | 18.01                         | 12.6       | -         | -     | 29°25'    | $\phi 19.1$                            | 131.0  |
| <b>B2SU 36 — 12</b>   |            | 36              | $\phi 72$          | $\phi 72.15$<br>( $\phi 73.79$ ) | 35.21                | $\phi 12$     | $\phi 36$    | 13         | 21          | 24.07          | 19                            | 12.6       | -         | -     | 66°17'    | $\phi 47.6$                            | 316.2  |



Unit: mm

| Accuracy Class | Material | Pressure angle | Heat treatment | Tooth surface hardness | Backlash ①   |
|----------------|----------|----------------|----------------|------------------------|--------------|
| [JIS B 1704] 4 | C3604B   | 20°            | —              | —                      | 0.02 to 0.08 |

★ No surface treatment is applied. The allowable transfer capability table was prepared based on the assumption that the pinion is on the input side.

★ Gears with a [\*] are provided with two screw holes and two set screws.

① This is a theoretical value obtained when a pair of gears of the same type and material are meshed with each other.

| Catalogue number   | Gear ratio | Number of teeth | Reference diameter | Tip diameter | As-assembly distance | Hole diameter | Hub diameter | Hub length | Hole length | Overall length | Distance from end face to tip | Face width | Screw     |       | Tip angle | Counterbore diameter (Reference value) | Weight |
|--------------------|------------|-----------------|--------------------|--------------|----------------------|---------------|--------------|------------|-------------|----------------|-------------------------------|------------|-----------|-------|-----------|----------------------------------------|--------|
|                    |            |                 |                    |              |                      |               |              |            |             |                |                               |            | 2-M(120°) | $l_s$ |           |                                        |        |
| <b>B50B 20</b>     | 1 : 2      | 20              | $\phi 10$          | $\phi 10.89$ | 15.52                | $\phi 3$      | $\phi 8$     | 5          | 8           | 8.54           | 5.74                          | 3.2        | -         | -     | 29° 8'    | $\phi 5.6$                             | 3.2    |
| <b>B50B 40</b>     |            | 40              | $\phi 20$          | $\phi 20.45$ | 10.56                | $\phi 4$      | $\phi 12$    | 4          | 6.3         | 7.31           | 6.01                          | 3.2        | -         | -     | 66° 0'    | $\phi 13.5$                            | 8.9    |
| <b>B50B 20 * 3</b> |            | 20              | $\phi 10$          | $\phi 10.89$ | 15.52                | $\phi 3$      | $\phi 8$     | 5          | 8           | 8.54           | 5.74                          | 3.2        | 2-M2.5    | 2.5   | 29° 8'    | $\phi 5.6$                             | 3.0    |
| <b>B50B 40 * 4</b> |            | 40              | $\phi 20$          | $\phi 20.45$ | 10.56                | $\phi 4$      | $\phi 12$    | 4          | 6.3         | 7.31           | 6.01                          | 3.2        | 2-M3      | 2     | 66° 0'    | $\phi 13.5$                            | 8.5    |
| <b>B80B 20</b>     |            | 20              | $\phi 16$          | $\phi 17.43$ | 22.5                 | $\phi 5$      | $\phi 12$    | 5.5        | 10          | 10.79          | 6.86                          | 4.5        | -         | -     | 29° 8'    | $\phi 9.8$                             | 9.8    |
| <b>B80B 40</b>     |            | 40              | $\phi 32$          | $\phi 32.72$ | 16.46                | $\phi 6$      | $\phi 20$    | 6          | 9.5         | 11.01          | 9.18                          | 4.5        | -         | -     | 66° 0'    | $\phi 22.9$                            | 36.1   |

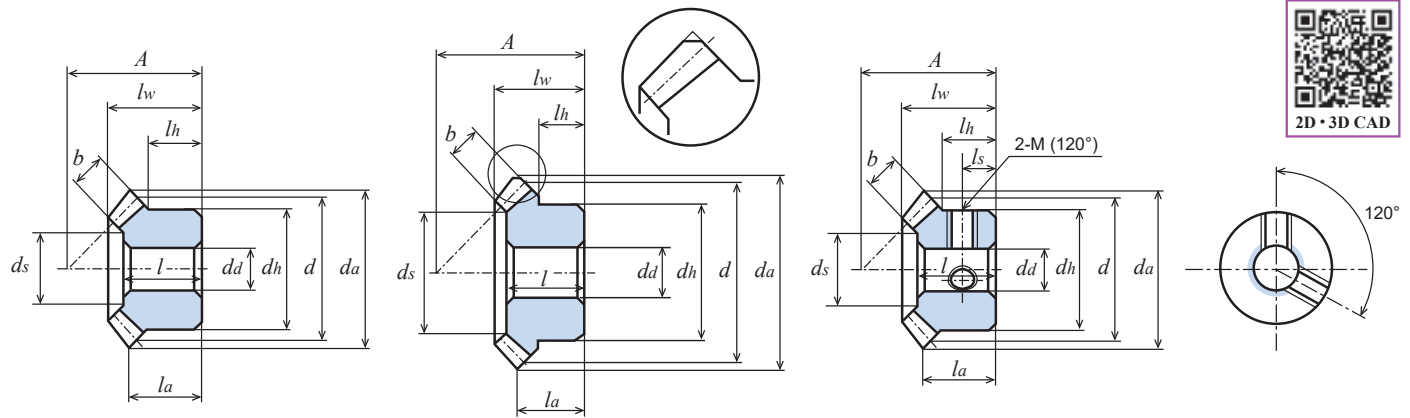
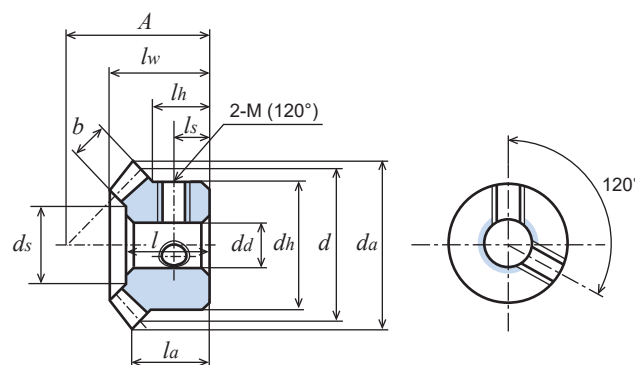


Fig. 1 (Tip chamfering)

| Allowable transfer capability for different revolutions per minute<br>Bending strength (Unit: W) |        |        |        |        |        |          | Backlash<br>(Unit: mm) | Catalogue number                                         |
|--------------------------------------------------------------------------------------------------|--------|--------|--------|--------|--------|----------|------------------------|----------------------------------------------------------|
| 10rpm                                                                                            | 100rpm | 200rpm | 400rpm | 600rpm | 800rpm | 1,000rpm |                        |                                                          |
| 0.3                                                                                              | 3.5    | 7.0    | 14.1   | 21.1   | 28.2   | 35.2     | 0.02 to 0.08           | B80SU 20 * 5<br>B80SU 40 * 6                             |
| 0.6                                                                                              | 6.9    | 13.9   | 27.8   | 41.7   | 55.6   | 69.1     | 0.05 to 0.12           | B1SU 20 – 6<br>B1SU 40 – 8<br>B1SU 20 * 6<br>B1SU 40 * 8 |
| 2.1                                                                                              | 21.3   | 42.7   | 85.5   | 128.3  | 168.1  | 202.5    | 0.05 to 0.12           | B1.5SU 18 – 8<br>B1.5SU 36 – 10                          |
| 4.9                                                                                              | 49.5   | 99.1   | 198.3  | 292.2  | 370.9  | 442.4    | 0.05 to 0.12           | B2SU 18 – 10<br>B2SU 36 – 12                             |



CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITTER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES



# Worm gear sets

## W worm series

## G worm wheel series



\* These are samples

### How to Read Catalogue Numbers

**W 1 S R 1 + B - 8**

| Gear type | Module                                                                                                                                                                              | Material                               | Hand of helix                 | Number of threads                                    | Hole finish                                                                                                                               | Shape                                                                                                                                                                                         |  | Hole diameter |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------|
| W: Worm   | Represents the module size.<br>When the module is less than 1, the figure indicates a value 100 times the actual module size.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | S : S45C<br>SU: Stainless steel SUS304 | R: Right-hand<br>L: Left-hand | 1: Single thread of worm<br>2: Double thread of worm | Lathe turning finish<br>[-]: No screw holes provided, no key grooves provided<br>[+]: One screw hole provided<br>[=]: Key groove provided | A : No hub provided<br>B : Hub provided on one side<br>B : Hub provided on both side<br>CF: Hub provided on both side (Product for additional machining)<br>L : Shafts provided on both sides |  | Unit: mm      |

**G 1 A 20 R 2 + 6**

| Gear type     | Module                                                                                                                                                                              | Material                                                                                                                                                                            | Number of teeth                                  | Hand of helix                 | Number of thread for mating worm gear                | Hole finish                                                                                                                               | Hole diameter |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| G: Worm wheel | Represents the module size.<br>When the module is less than 1, the figure indicates a value 100 times the actual module size.<br>Example:<br>Module 0.5 → "50"<br>Module 0.8 → "80" | B : Brass C3604B<br>BP : Acetal Blue POM<br>A : Aluminum bronze casting CAC702<br>Aluminum bronze C6191BE<br>D : Acetal White POM<br>DB: Acetal White POM (w/ brass C3604B bushing) | Example:<br>When the number of teeth is 20: "20" | R: Right-hand<br>L: Left-hand | 1: Single thread of worm<br>2: Double thread of worm | Lathe turning finish<br>[-]: No screw holes provided, no key grooves provided<br>[+]: One screw hole provided<br>[=]: Key groove provided | Unit: mm      |

(The catalog number differs slightly depending on the material.)

| Catalogue number       | W50                    | W50                    | G50     | G50     | G50      | W80                    | W80                    | G80     | G80      | G80       |
|------------------------|------------------------|------------------------|---------|---------|----------|------------------------|------------------------|---------|----------|-----------|
| Shape                  |                        |                        |         |         |          |                        |                        |         |          |           |
| Page                   | P. 262                 | P. 263                 | P. 262  | P. 262  | P. 262   | P. 264                 | P. 265                 | P. 264  | P. 264   | P. 264    |
| Material               | SUS304                 | S45C                   | CAC702  | Brass   | Blue POM | SUS304                 | S45C                   | CAC702  | Blue POM | White POM |
| Module                 | m0.5                   | m0.5                   | m0.5    | m0.5    | m0.5     | m0.8                   | m0.8                   | m0.8    | m0.8     | m0.8      |
| Teeth process sequence | Precision cold rolling | Precision cold rolling | Cutting | Cutting | Cutting  | Precision cold rolling | Precision cold rolling | Cutting | Cutting  | Cutting   |

| Catalogue number       | W1                     | W1                     | G1      | G1                                       | G1       | W1.5                   | W1.5                   | G1.5    | G1.5                                     | G1.5     |
|------------------------|------------------------|------------------------|---------|------------------------------------------|----------|------------------------|------------------------|---------|------------------------------------------|----------|
| Shape                  |                        |                        |         |                                          |          |                        |                        |         |                                          |          |
| Page                   | P. 266                 | P. 267                 | P. 266  | P. 268                                   | P. 268   | P. 270                 | P. 271                 | P. 270  | P. 272                                   | P. 272   |
| Material               | SUS304                 | S45C                   | CAC702  | White POM / White POM (w/ brass bushing) | Blue POM | SUS304                 | S45C                   | CAC702  | White POM / White POM (w/ brass bushing) | Blue POM |
| Module                 | m1                     | m1                     | m1      | m1                                       | m1       | m1.5                   | m1.5                   | m1.5    | m1.5                                     | m1.5     |
| Teeth process sequence | Precision cold rolling | Precision cold rolling | Cutting | Cutting                                  | Cutting  | Precision cold rolling | Precision cold rolling | Cutting | Cutting                                  | Cutting  |

| Catalogue number       | W2                     | G2      | W2.5    | G2.5    | W3      | G3      |
|------------------------|------------------------|---------|---------|---------|---------|---------|
| Shape                  |                        |         |         |         |         |         |
| Page                   | P. 274                 | P. 274  | P. 276  | P. 276  | P. 277  | P. 277  |
| Material               | S45C                   | CAC702  | S45C    | CAC702  | S45C    | CAC702  |
| Module                 | m2                     | m2      | m2.5    | m2.5    | m3      | m3      |
| Teeth process sequence | Precision cold rolling | Cutting | Cutting | Cutting | Cutting | Cutting |

# Worm and Worm wheel information

## 1. Features of Worms and Worm Wheels

| Machining method | Module     | Tooth surface wear of worm wheel | Tooth surface roughness   | Tooth surface hardness                     | Hardening    |
|------------------|------------|----------------------------------|---------------------------|--------------------------------------------|--------------|
| Cold rolling     | 0.5 to 2.0 | Small                            | Cold-rolled surface Ra1.6 | 1.2 to 1.3 times larger than base material | Not possible |
| Cutting          | 2.5 to 3.0 | Large                            | Cut surface Ra4.5         | Base material hardness                     | Possible     |

A failure could occur if this product is used by using a product other than ours as the mating gear. If your device is designed with a product other than our standard products, consult with us.

### 1) Features of cold-rolled worms

#### ① Surface hardness:

Since cold-rolled worms are processed by cold rolling, they have enhanced thread surface hardness thanks to work hardening, and their metal fiber structure remains uncut. As a result, cold-rolled worms have better mechanical properties than cut worms. The hardness of the thread surface after cold rolling increases 1.2-to 1.3-fold the hardness of the base material, and the hardness is HB240 to 260.

#### ② Surface roughness:

The thread surface has a mirror finish and the threads are rolled to form a completely curved surface.

#### ③ Extended worm wheel life

When a cold-rolled worm is used, since its thread surface has a mirror finish, the worm wheel lasts longer than when a cut worm is used.

#### ④ Compatibility with worm wheels made of polyacetal resin

Because of the above characteristics, cold-rolled worms reduce wear on worm wheels made of a soft material, such as polyacetal, providing the greatest durability.

#### ⑤ Maximum single pitch error and pressure angle error

The single pitch error and pressure angle error depend on the precision of the roll dice for cold rolling. The maximum adjacent error and pressure angle error of a cold-rolled worm is 18  $\mu$  m and  $\pm 20'$ , respectively.

#### ⑥ Cost performance

Compared with ground worms, which are expensive, cold-rolled worms are cost-effective with excellent surface roughness.

#### Cold rolling:

- ① Based on the principle of plastic deformation of materials, the material is placed between a pair of rollers, and the rollers are rotated while being hydraulically pressed with high pressure from both sides to process the material.
- ② Material: S45C, SUS304. (If a non-metallic material or other material is desired, consult with us.)
- ③ The thread pitch range is 0.5 mm to 2 mm.
- ④ When a cold-rolled worm is provided alone, the outside diameter and length are up to 40 mm and 80 mm, respectively.
- ⑤ If a special tooth profile is desired, consult with us.

### 2) Customization of ground worms

#### ① Overall accuracy:

Ground worms have excellent overall accuracy and are commonly used for machinery that requires high accuracy.

#### ② Production flow:

We offer a separate estimate based on your drawings.

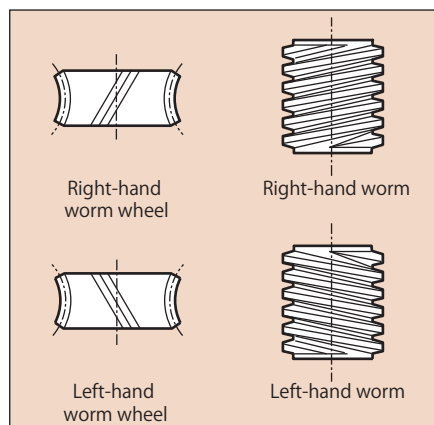
# Worm and Worm wheel information

## 2. How to Select a Worm and Worm Wheel to be Meshed

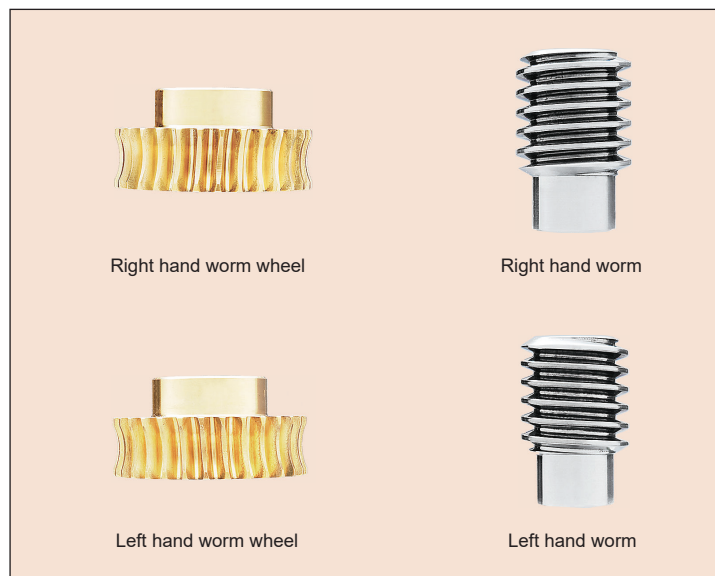
Use a combination of a worm and a worm wheel having the same hand of helix and number of threads.

| Compatible combination | Worm |    |    |    |
|------------------------|------|----|----|----|
|                        | R1   | R2 | L1 | L2 |
| Worm wheel             | R1   | R2 | L1 | L2 |

How to identify the hand of helix  
(right hand helix or left hand helix) of  
worms and worm wheels



Actual samples

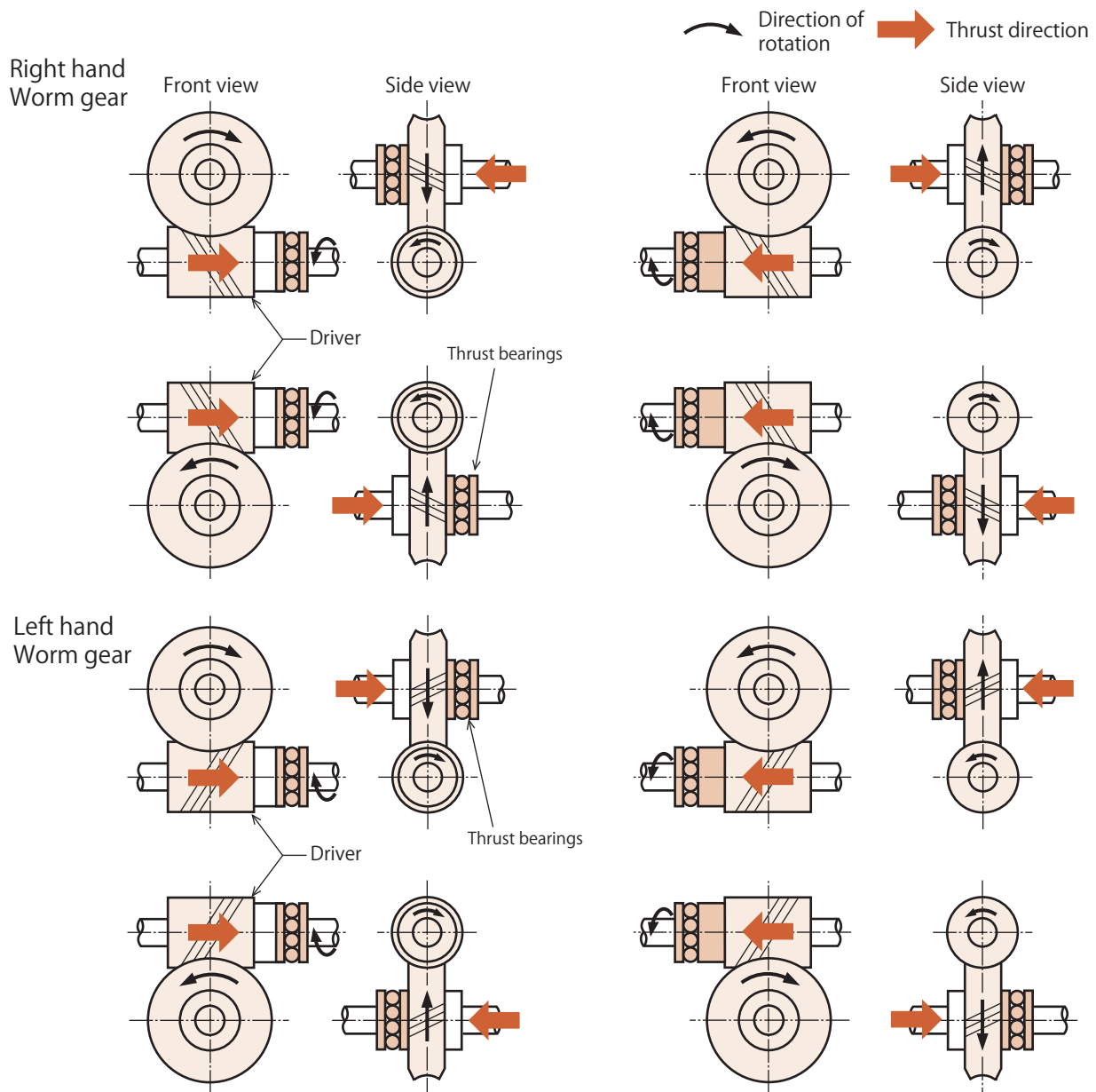


## 3. Cautions on Assembling a Worm and Worm Wheel

- 1) Accurate perpendicularity is the key to achieving ideal intermeshing.
- 2) The friction of tooth surfaces is large when a worm and a worm wheel are meshed. For the lubrication method, refer to 5. 4) on the next page.
- 3) To prevent the worm shaft and worm wheel shaft from bending, design the worm and worm wheel so that the bearings are tough and are located as close to the gears as possible.
- 4) Note that a large axial thrust acts on the worm. For more on axial thrust, see the figure of 4.
- 5) For more on tooth contact, refer to "Tooth Contacts of Gears" on P. 9 in "References."

# Worm and Worm wheel information

## 4. Axial thrust load to Worm gear and location of bearings.



# Worm and Worm wheel information

## 5. Technical Information on Worms and Worm Wheels

### 1) Self-lock

Self-lock refers to the phenomenon in which a worm cannot be driven by the mating worm wheel. Theoretically, self-lock occurs when the lead angle is  $4^\circ$  or less. Self-lock may not occur depending mainly on the material, machining accuracy, lubricating oil, and effect of vibration.

\* To stop the worm and worm wheel without fail, provide a separate safety device.

### 2) Transfer efficiency

The theoretical transfer efficiency of our worm gears is 45 to 55% when the number of threads is one, and 55 to 65% when the number of threads is two. Use these values as reference values because the transfer efficiency depends mainly on the lubricating oil and revolutions per minute.

### 3) Backlash

Our gears are designed to have the backlash shown on the product description page when the gears are assembled with the assembly distance given in the catalogue. The amount of change in normal backlash due to changes in the intermeshing center distance can be calculated by the formula below.

This calculation formula is for our standard products with a pressure angle of  $20^\circ$ .

$$J_n = \Delta a / 1.46$$

$J_n$ : Amount of change in normal backlash

$\Delta a$ : Amount of change in the intermeshing center distance

### 4) Lubrication

One criterion for selecting the lubrication method is circumferential velocity. The circumferential velocity can be calculated as follows:

$$\text{Circumferential velocity [m/s]} = \frac{\pi \times \text{Reference diameter [mm]} \times \text{Revolutions per minute [rpm]}}{1000 \times 60}$$

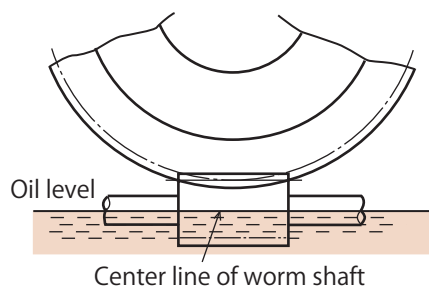
| Lubrication method | Circumferential velocity (m/s) |   |    |    |    |
|--------------------|--------------------------------|---|----|----|----|
|                    | 0                              | 5 | 10 | 15 | 20 |
| Grease lubrication | →                              |   |    |    |    |
| Splash lubrication | ←→                             |   |    |    |    |
| Forced lubrication | ←                              |   |    |    |    |

#### Lubricating oil

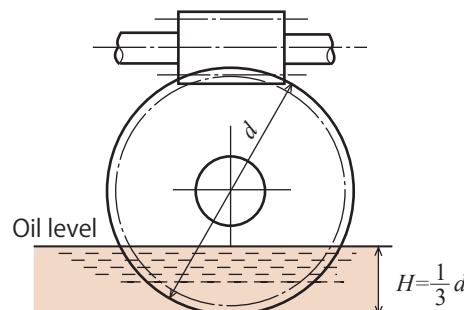
- Purpose: To avoid contact between metallic gear teeth, to remove heat generated by friction between teeth, and to remove abrasion powder from the tooth surfaces. Lubricating oil may reduce vibration and noise.

- Appropriate amount of oil: Fig. 1 shows the amount of oil required to immerse the gear for reference.

The more of the gear is immersed, the larger the agitation resistance and windage loss (churning loss).



When the worm is used below the worm wheel, add oil until the oil level reaches half the worm diameter.



When the worm is used above the worm wheel, add oil until the oil level reaches 1/3 of the wheel diameter.

Fig. 1 Target amount of lubricating oil to be added



Example of use



Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | SUS304   | 20°            | Precision cold rolling |

★ No surface treatment is applied.

★ Gears with a [+] are provided with screw holes and set screws (Made of steel. Not stainless steel.).

| Catalogue number    | Hand of helix | Number of threads | Reference diameter | Tip diameter | Type | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Lead angle | Weight |
|---------------------|---------------|-------------------|--------------------|--------------|------|------------|---------------|--------------|------------|----------------|------------|--------|
|                     |               | $z$               | $d$                | $d_a$        |      | $b$        | $d_a(H8)$     | $d_h$        | $l_h$      | $l$            | $\gamma$   | $W(g)$ |
| <b>W50SU R1 + B</b> | R             | 1                 | $\phi 9$           | $\phi 10$    | B    | 13         | $\phi 3$      | $\phi 7.6$   | 5          | 18             | 3°11'      | 7.3    |

Unit: mm



| Accuracy Class  | Material                         | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|----------------------------------|----------------|------------------------|---------------------|
| No relevant JIS | CAC702 (aluminum bronze casting) | 20°            | Cutting                | See the table below |

★ No surface treatment is applied. Gears with a [+] are provided with screw holes and set screws.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter | Tip diameter | Type | Face width | Hole diameter  | Hub diameter          | Hub length            | Over-all length | Screw |                | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight       |
|------------------|------------|-----------------|-------------------------------------|------------------------|-----------------|--------------|------|------------|----------------|-----------------------|-----------------------|-----------------|-------|----------------|-------------------------------|---------------------------------------------|--------------|
|                  |            |                 |                                     |                        |                 |              |      |            |                |                       |                       |                 | M     | l <sub>s</sub> |                               |                                             |              |
|                  |            |                 |                                     |                        |                 |              |      |            |                |                       |                       |                 |       |                |                               |                                             |              |
|                  | <i>u</i>   | <i>z</i>        | <i>u</i>                            | <i>z</i>               | <i>u</i>        | <i>z</i>     |      | <i>b</i>   | <i>d</i> a(H8) | <i>d</i> <sub>h</sub> | <i>l</i> <sub>h</sub> | <i>l</i>        |       |                |                               |                                             | <i>W</i> (g) |
| G50A 20 + R1     | 1 : 20     | 20              | φ10                                 | -0.015                 | φ11             | φ11.45       | 1B   | 5          | φ3             | φ 9                   | 6                     | 11              | M3    | 3              | 9.5                           | R1                                          | 6.6          |
| G50A 30 + R1     | 1 : 30     | 30              | φ15                                 | -0.023                 | φ16             | φ16.45       |      |            | φ4             | φ12                   | 6                     | 11              | M3    | 3              | 12                            |                                             | 12.0         |
| G50A 40 + R1     | 1 : 40     | 40              | φ20                                 | -0.031                 | φ21             | φ21.45       |      |            | φ5             | φ15                   | 8                     | 13              | M4    | 4              | 14.5                          |                                             | 21.6         |
| G50A 50 + R1     | 1 : 50     | 50              | φ25                                 | -0.038                 | φ26             | φ26.45       |      |            | φ5             | φ20                   | 8                     | 13              | M4    | 4              | 17                            |                                             | 34.8         |
| G50A 60 + R1     | 1 : 60     | 60              | φ30                                 | -0.046                 | φ31             | φ31.45       |      |            | φ5             | φ25                   | 8                     | 13              | M4    | 4              | 19.5                          |                                             | 54.5         |
| G50A 80 + R1     | 1 : 80     | 80              | φ40                                 | -0.061                 | φ41             | φ41.45       |      |            | φ6             | φ30                   | 8                     | 13              | M4    | 4              | 24.5                          |                                             | 86.0         |

Unit: mm



| Accuracy Class  | Material | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|----------|----------------|------------------------|---------------------|
| No relevant JIS | C3604B   | 20°            | Cutting                | See the table below |

★ No surface treatment is applied. Gears with a [+] are provided with screw holes and set screws.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number    | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter       | Tip diameter          | Type | Face width | Hole diameter              | Hub diameter          | Hub length            | Over-all length | Screw    |                       | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight       |
|---------------------|------------|-----------------|-------------------------------------|------------------------|-----------------------|-----------------------|------|------------|----------------------------|-----------------------|-----------------------|-----------------|----------|-----------------------|-------------------------------|---------------------------------------------|--------------|
|                     | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d</i> <sub>T</sub> | <i>d</i> <sub>a</sub> |      | <i>b</i>   | <i>d</i> <sub>a</sub> (H8) | <i>d</i> <sub>h</sub> | <i>l</i> <sub>h</sub> | <i>l</i>        | <i>M</i> | <i>l</i> <sub>s</sub> | <i>a</i>                      |                                             | <i>W</i> (g) |
| <b>G50B 20 + R1</b> | 1 : 20     | 20              | φ10                                 | -0.015                 | φ11                   | φ11.45                | 1B   | 5          | φ3                         | φ 9                   | 6                     | 11              | M3       | 3                     | 9.5                           | R1                                          | 5.9          |
| <b>G50B 30 + R1</b> | 1 : 30     | 30              | φ15                                 | -0.023                 | φ16                   | φ16.45                |      |            | φ4                         | φ12                   | 6                     | 11              | M3       | 3                     | 12.0                          |                                             | 11.2         |
| <b>G50B 40 + R1</b> | 1 : 40     | 40              | φ20                                 | -0.031                 | φ21                   | φ21.45                |      |            | φ5                         | φ15                   | 8                     | 13              | M4       | 4                     | 14.5                          |                                             | 22.7         |
| <b>G50B 50 + R1</b> | 1 : 50     | 50              | φ25                                 | -0.038                 | φ26                   | φ26.45                |      |            | φ5                         | φ16                   | 8                     | 13              | M4       | 4                     | 17.0                          |                                             | 29.8         |

Unit: mm



| Accuracy Class  | Material | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|----------|----------------|------------------------|---------------------|
| No relevant JIS | Blue POM | 20°            | Cutting                | See the table below |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

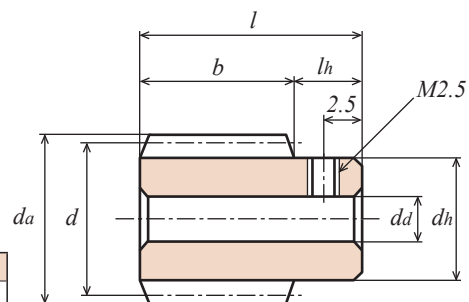
★ For details on blue POM, refer to P. 22.

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number     | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter | Tip diameter | Type | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight |
|----------------------|------------|-----------------|-------------------------------------|------------------------|-----------------|--------------|------|------------|---------------|--------------|------------|----------------|-------------------------------|---------------------------------------------|--------|
|                      | $u$        | $z$             | $d$                                 | $x$                    | $d_T$           | $d_a$        |      | $b$        | $d_a$         | $d_h$        | $l_h$      | $l$            | $a$                           |                                             | $W(g)$ |
| <b>G50BP 20 - R1</b> | 1 : 20     | 20              | $\phi 10$                           | -0.015                 | $\phi 11$       | $\phi 11.45$ | 1B   | 5          | $\phi 3$      | $\phi 9$     | 6          | 11             | 9.5                           | R1                                          | 1.0    |
| <b>G50BP 30 - R1</b> | 1 : 30     | 30              | $\phi 15$                           | -0.023                 | $\phi 16$       | $\phi 16.45$ |      |            | $\phi 4$      | $\phi 12$    | 6          | 11             | 12.0                          |                                             | 2.0    |
| <b>G50BP 40 - R1</b> | 1 : 40     | 40              | $\phi 20$                           | -0.031                 | $\phi 21$       | $\phi 21.45$ |      |            | $\phi 5$      | $\phi 15$    | 8          | 13             | 14.5                          |                                             | 3.8    |
| <b>G50BP 50 - R1</b> | 1 : 50     | 50              | $\phi 25$                           | -0.038                 | $\phi 26$       | $\phi 26.45$ |      |            | $\phi 5$      | $\phi 20$    | 8          | 13             | 17.0                          |                                             | 6.6    |
| <b>G50BP 60 - R1</b> | 1 : 60     | 60              | $\phi 30$                           | -0.046                 | $\phi 31$       | $\phi 31.45$ |      |            | $\phi 5$      | $\phi 25$    | 8          | 13             | 19.5                          |                                             | 10.2   |
| <b>G50BP 80 - R1</b> | 1 : 80     | 80              | $\phi 40$                           | -0.061                 | $\phi 41$       | $\phi 41.45$ |      |            | $\phi 6$      | $\phi 30$    | 8          | 13             | 24.5                          |                                             | 17.7   |





Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | S45C     | 20°            | Precision cold rolling |

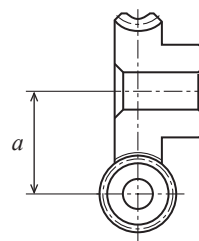
★ No surface treatment is applied.

★ Gears with a [+] are provided with screw holes and set screws (Made of steel. Not stainless steel.).

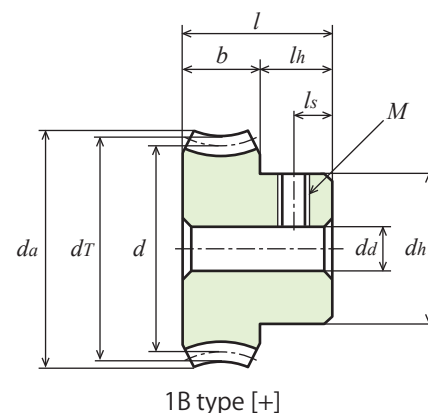
B type [+]

| Catalogue number   | Hand of helix | Number of threads | Reference diameter | Tip diameter | Type | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Lead angle | Weight |
|--------------------|---------------|-------------------|--------------------|--------------|------|------------|---------------|--------------|------------|----------------|------------|--------|
|                    |               | $z$               | $d$                | $d_a$        |      | $b$        | $d_a(H8)$     | $d_h$        | $l_h$      | $l$            | $\gamma$   | $W(g)$ |
| <b>W50S R1 + B</b> | R             | 1                 | $\phi 9$           | $\phi 10$    | B    | 13         | $\phi 3$      | $\phi 7.6$   | 5          | 18             | 3°11'      | 7.3    |

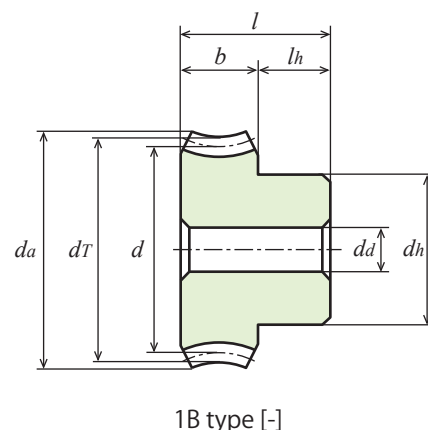
| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N · cm) Surface durability ② |         |         |           |           |           |           | Backlash ①<br>(Unit: mm) | Catalogue number    |
|--------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|--------------------------|---------------------|
| 100 rpm                                                                                                                  | 250 rpm | 500 rpm | 1,000 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm |                          |                     |
| 30.83                                                                                                                    | 26.26   | 21.94   | 18.00     | 17.02     | 15.87     | 14.95     | 0.06 to 0.15             | <b>G50A 20 + R1</b> |
| 66.07                                                                                                                    | 57.03   | 48.36   | 39.95     | 37.87     | 35.39     | 33.44     |                          | <b>G50A 30 + R1</b> |
| 112.86                                                                                                                   | 98.36   | 84.54   | 70.15     | 66.58     | 62.34     | 58.99     |                          | <b>G50A 40 + R1</b> |
| 170.92                                                                                                                   | 150.05  | 129.89  | 108.41    | 103.00    | 96.57     | 91.46     |                          | <b>G50A 50 + R1</b> |
| 239.89                                                                                                                   | 211.80  | 183.56  | 154.60    | 146.99    | 137.94    | 130.76    |                          | <b>G50A 60 + R1</b> |
| 409.47                                                                                                                   | 362.63  | 316.59  | 270.27    | 257.25    | 241.75    | 229.44    |                          | <b>G50A 80 + R1</b> |



| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N · cm) Surface durability ② |         |         |           |           |           |           | Backlash ①<br>(Unit: mm) | Catalogue number    |
|--------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|--------------------------|---------------------|
| 100 rpm                                                                                                                  | 250 rpm | 500 rpm | 1,000 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm |                          |                     |
| 21.687                                                                                                                   | 18.482  | 15.435  | 12.661    | 11.975    | 11.162    | 10.515    | 0.06 to 0.15             | <b>G50B 20 + R1</b> |
| 46.452                                                                                                                   | 40.111  | 34.015  | 28.096    | 26.636    | 24.892    | 23.520    |                          | <b>G50B 30 + R1</b> |
| 79.380                                                                                                                   | 69.188  | 59.466  | 49.343    | 46.834    | 43.855    | 41.493    |                          | <b>G50B 40 + R1</b> |
| 120.226                                                                                                                  | 105.546 | 91.365  | 76.263    | 72.451    | 67.923    | 64.337    |                          | <b>G50B 50 + R1</b> |



| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N · cm) Surface durability ② |         |         |           |           |           |           | Backlash ①<br>(Unit: mm) | Catalogue number     |
|--------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|--------------------------|----------------------|
| 100 rpm                                                                                                                  | 250 rpm | 500 rpm | 1,000 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm |                          |                      |
| 9.00                                                                                                                     | 9.00    | 9.00    | 9.00      | 8.94      | 8.94      | 8.87      | 0.06 to 0.15             | <b>G50BP 20 - R1</b> |
| 13.50                                                                                                                    | 13.50   | 13.50   | 13.41     | 13.41     | 13.41     | 13.31     |                          | <b>G50BP 30 - R1</b> |
| 18.01                                                                                                                    | 18.01   | 18.01   | 18.01     | 17.88     | 17.88     | 17.75     |                          | <b>G50BP 40 - R1</b> |
| 22.50                                                                                                                    | 22.50   | 22.50   | 22.50     | 22.34     | 22.34     | 22.19     |                          | <b>G50BP 50 - R1</b> |
| 27.00                                                                                                                    | 27.00   | 27.00   | 27.00     | 26.82     | 26.82     | 26.63     |                          | <b>G50BP 60 - R1</b> |
| 32.15                                                                                                                    | 32.15   | 32.15   | 32.03     | 32.03     | 31.92     | 31.92     |                          | <b>G50BP 80 - R1</b> |



# W : Worm G : Worm Wheel



Example of use

Normal Module 0.8

(Full Depth Tooth)

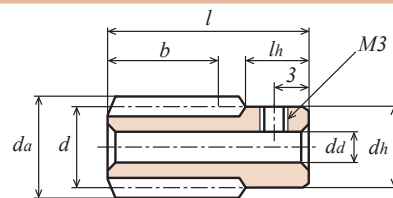


Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | SUS304   | 20°            | Precision cold rolling |

★ No surface treatment is applied.

★ For gears with a [+], screw holes are provided, but no set screws are provided.



B type [+]

| Catalogue number | Hand of helix | Number of threads | Reference diameter | Tip diameter         | Type | Face width | Hole diameter             | Hub diameter         | Hub length            | Overall length        | Lead angle | Weight       |
|------------------|---------------|-------------------|--------------------|----------------------|------|------------|---------------------------|----------------------|-----------------------|-----------------------|------------|--------------|
|                  |               | <i>z</i>          | <i>d</i>           | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>hL</sub></i> | <i>l<sub>hR</sub></i> | <i>γ</i>   | <i>W</i> (g) |
| W80SU R1 + B     | R             | 1                 | φ10.4              | φ12                  | B    | 14         | φ5                        | φ10.3                | -                     | 6                     | 4°24'      | 18.0         |
| W80SU R1 - L     | R             | 1                 | φ10.4              | φ12                  | L    | 20         | -                         | φ8 (h9)              | 20                    | 40                    | 4°24'      | 40.0         |



Unit: mm

| Accuracy Class  | Material                                                      | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|---------------------------------------------------------------|----------------|------------------------|---------------------|
| No relevant JIS | CAC702 (aluminum bronze casting)<br>C6191BE (aluminum bronze) | 20°            | Cutting                | See the table below |

★ No surface treatment is applied. Gears with a [+] are provided with screw holes and set screws.

★ This allowable transfer capability table was prepared by using the formulas presented by the JGMA (Japan Gear Manufacturers Association). For the unit conversion method, refer to P. 20 in "References."

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter | Tip diameter | Type     | Face width | Hole diameter | Hub diameter | Hub length | Overall length | Screw    | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight       |
|------------------|------------|-----------------|-------------------------------------|------------------------|-----------------|--------------|----------|------------|---------------|--------------|------------|----------------|----------|-------------------------------|---------------------------------------------|--------------|
|                  | <i>l</i>   | <i>γ</i>        | <i>W</i> (g)                        | <i>l</i>               | <i>γ</i>        | <i>W</i> (g) | <i>l</i> | <i>γ</i>   | <i>W</i> (g)  | <i>l</i>     | <i>γ</i>   | <i>W</i> (g)   | <i>M</i> | <i>l<sub>s</sub></i>          | <i>a</i>                                    | <i>W</i> (g) |
| G80A 20 + R1     | 1 : 20     | 20              | φ16                                 | -0.029                 | φ17.6           | φ18.1        | 1B       | 6          | φ5            | φ12          | 6          | 12             | M3       | 3                             | 13.2                                        | 12.9         |
| G80A 30 + R1     | 1 : 30     | 30              | φ24                                 | -0.044                 | φ25.6           | φ26.1        |          |            | φ5            | φ16          | 6          | 12             | M3       | 3                             | 17.2                                        | 26.5         |
| G80A 40 + R1     | 1 : 40     | 40              | φ32                                 | -0.059                 | φ33.6           | φ34.1        |          |            | φ6            | φ18          | 8          | 14             | M4       | 4                             | 21.2                                        | 50.7         |
| G80A 50 + R1     | 1 : 50     | 50              | φ40                                 | -0.074                 | φ41.6           | φ42.1        |          |            | φ6            | φ20          | 8          | 14             | M4       | 4                             | 25.2                                        | 75.7         |
| G80A 60 + R1     | 1 : 60     | 60              | φ48                                 | -0.089                 | φ49.6           | φ50.2        |          |            | φ8            | φ30          | 8          | 14             | M4       | 4                             | 29.2                                        | 121.1        |
| G80A 80 + R1     | 1 : 80     | 80              | φ64                                 | -0.119                 | φ65.6           | φ66.2        |          |            | φ8            | φ40          | 8          | 14             | M4       | 4                             | 37.2                                        | 214.3        |



Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|----------|----------------|------------------------|---------------------|
| No relevant JIS | Blue POM | 20°            | Cutting                | See the table below |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter      | Tip diameter         | Type | Face width | Hole diameter        | Hub diameter         | Hub length           | Overall length | Screw    | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight       |
|------------------|------------|-----------------|-------------------------------------|------------------------|----------------------|----------------------|------|------------|----------------------|----------------------|----------------------|----------------|----------|-------------------------------|---------------------------------------------|--------------|
|                  | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub></i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>M</i> | <i>l<sub>s</sub></i>          | <i>a</i>                                    | <i>W</i> (g) |
| G80BP 20 - R1    | 1 : 20     | 20              | φ16                                 | -0.029                 | φ17.6                | φ18.1                | 1B   | 6          | φ4                   | φ12                  | 6                    | 12             | -        | -                             | 13.2                                        | 2.4          |
| G80BP 30 - R1    | 1 : 30     | 30              | φ24                                 | -0.044                 | φ25.6                | φ26.1                |      |            | φ5                   | φ18                  | 6                    | 12             | -        | -                             | 17.2                                        | 5.6          |
| G80BP 40 - R1    | 1 : 40     | 40              | φ32                                 | -0.059                 | φ33.6                | φ34.1                |      |            | φ6                   | φ20                  | 8                    | 14             | -        | -                             | 21.2                                        | 9.8          |
| G80BP 50 - R1    | 1 : 50     | 50              | φ40                                 | -0.074                 | φ41.6                | φ42.1                |      |            | φ6                   | φ25                  | 8                    | 14             | -        | -                             | 25.2                                        | 15.5         |
| G80BP 60 - R1    | 1 : 60     | 60              | φ48                                 | -0.089                 | φ49.6                | φ50.1                |      |            | φ8                   | φ30                  | 8                    | 14             | -        | -                             | 29.2                                        | 22.2         |
| G80BP 80 - R1    | 1 : 80     | 80              | φ64                                 | -0.119                 | φ65.6                | φ66.2                |      |            | φ8                   | φ40                  | 8                    | 14             | -        | -                             | 37.2                                        | 42.4         |



Unit: mm

| Accuracy Class  | Material  | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|-----------|----------------|------------------------|---------------------|
| No relevant JIS | White POM | 20°            | Cutting                | See the table below |

★ Gears with a [+] are provided with screw holes and set screws.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

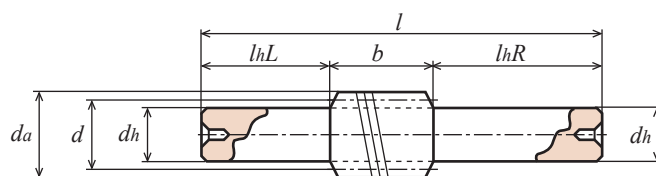
★ For the allowable torque value and backlash of this product, check the values for the blue POM products.

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter      | Tip diameter         | Type | Face width | Hole diameter        | Hub diameter         | Hub length           | Overall length | Screw    | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight       |
|------------------|------------|-----------------|-------------------------------------|------------------------|----------------------|----------------------|------|------------|----------------------|----------------------|----------------------|----------------|----------|-------------------------------|---------------------------------------------|--------------|
|                  | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub></i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>M</i> | <i>l<sub>s</sub></i>          | <i>a</i>                                    | <i>W</i> (g) |
| G80D 20 + R1     | 1 : 20     | 20              | φ16                                 | -0.029                 | φ17.6                | φ18.1                | 1B   | 6          | φ5                   | φ12                  | 6                    | 12             | M3       | 3                             | 13.2                                        | 2.5          |
| G80D 30 + R1     | 1 : 30     | 30              | φ24                                 | -0.044                 | φ25.6                | φ26.1                |      |            | φ5                   | φ16                  | 6                    | 12             | M3       | 3                             | 17.2                                        | 5.2          |
| G80D 40 + R1     | 1 : 40     | 40              | φ32                                 | -0.059                 | φ33.6                | φ34.1                |      |            | φ6                   | φ18                  | 8                    | 14             | M4       | 4                             | 21.2                                        | 10.0         |
| G80D 50 + R1     | 1 : 50     | 50              | φ40                                 | -0.074                 | φ41.6                | φ42.1                |      |            | φ6                   | φ20                  | 8                    | 14             | M4       | 4                             | 25.2                                        | 14.0         |



L type



2D • 3D CAD

Unit: mm

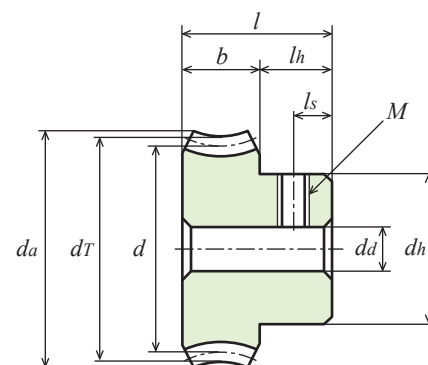
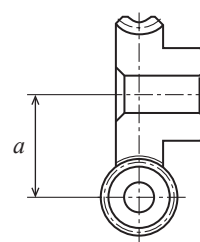
| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | S45C     | 20°            | Precision cold rolling |

★ No surface treatment is applied.

★ Gears with a [+] are provided with screw holes and set screws (Made of steel. Not stainless steel.).

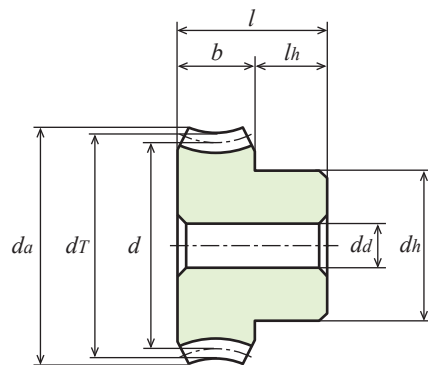
| Catalogue number   | Hand of helix | Num-ber of threads<br><i>z</i> | Refer-ence diameter<br><i>d</i> | Tip diameter<br><i>da</i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>da(H8)</i> | Hub diameter<br><i>dh</i> | Hub length |            | Overall length<br><i>l</i> | Lead angle<br><i>γ</i> | Weight<br><i>W(g)</i> |
|--------------------|---------------|--------------------------------|---------------------------------|---------------------------|------|------------------------|--------------------------------|---------------------------|------------|------------|----------------------------|------------------------|-----------------------|
|                    |               |                                |                                 |                           |      |                        |                                |                           | <i>lhL</i> | <i>lhR</i> |                            |                        |                       |
| <b>W80S R1 + B</b> | R             | 1                              | φ10.4                           | φ12                       | B    | 14                     | φ5                             | φ10.3                     | -          | 6          | 26                         | 4°24'                  | 18.0                  |
| <b>W80S R1 - L</b> | R             | 1                              | φ10.4                           | φ12                       | L    | 20                     | -                              | φ 8 (h9)                  | 20         | 40         | 80                         | 4°24'                  | 40.0                  |

| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N · m) Surface durability ② |         |         |           |           |           |           | Backlash ①<br>(Unit: mm) | Catalogue number    |
|-------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|--------------------------|---------------------|
| 100 rpm                                                                                                                 | 250 rpm | 500 rpm | 1,000 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm |                          |                     |
| 0.872                                                                                                                   | 0.735   | 0.607   | 0.499     | 0.470     | 0.441     | 0.411     | 0.06 to 0.15             | <b>G80A 20 + R1</b> |
| 1.871                                                                                                                   | 1.597   | 1.352   | 1.117     | 1.058     | 0.989     | 0.931     |                          | <b>G80A 30 + R1</b> |
| 3.194                                                                                                                   | 2.763   | 2.371   | 1.960     | 1.862     | 1.744     | 1.646     |                          | <b>G80A 40 + R1</b> |
| 4.841                                                                                                                   | 4.223   | 3.645   | 3.038     | 2.891     | 2.704     | 2.557     |                          | <b>G80A 50 + R1</b> |
| 6.799                                                                                                                   | 5.965   | 5.163   | 4.342     | 4.126     | 3.870     | 3.666     |                          | <b>G80A 60 + R1</b> |
| 11.606                                                                                                                  | 10.213  | 8.904   | 7.590     | 7.221     | 6.782     | 6.433     |                          | <b>G80A 80 + R1</b> |



1B type [+]

| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N · m) Surface durability ② |         |         |           |           |           |           | Backlash ①<br>(Unit: mm) | Catalogue number     |
|-------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|--------------------------|----------------------|
| 100 rpm                                                                                                                 | 250 rpm | 500 rpm | 1,000 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm |                          |                      |
| 0.28                                                                                                                    | 0.28    | 0.28    | 0.27      | 0.27      | 0.27      | 0.27      | 0.06 to 0.15             | <b>G80BP 20 - R1</b> |
| 0.41                                                                                                                    | 0.41    | 0.41    | 0.41      | 0.41      | 0.41      | 0.41      |                          | <b>G80BP 30 - R1</b> |
| 0.55                                                                                                                    | 0.55    | 0.55    | 0.55      | 0.55      | 0.55      | 0.55      |                          | <b>G80BP 40 - R1</b> |
| 0.69                                                                                                                    | 0.69    | 0.69    | 0.69      | 0.69      | 0.68      | 0.68      |                          | <b>G80BP 50 - R1</b> |
| 0.83                                                                                                                    | 0.83    | 0.83    | 0.82      | 0.82      | 0.82      | 0.82      |                          | <b>G80BP 60 - R1</b> |
| 1.04                                                                                                                    | 1.04    | 1.04    | 1.03      | 1.03      | 1.03      | 1.03      |                          | <b>G80BP 80 - R1</b> |



1B type [-]

# W : Worm G : Worm Wheel



Example of use

## Normal Module 1

## (Full Depth Tooth)

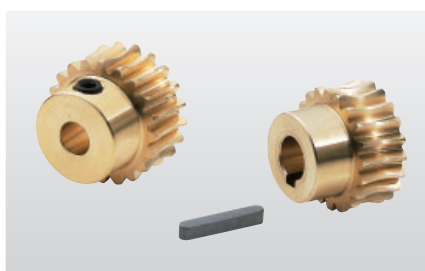


Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | SUS304   | 20°            | Precision cold rolling |

★ No surface treatment is applied. For gears with a [+], screw holes are provided, but no set screws are provided.

| Catalogue number | Hand of helix | Number of threads | Reference diameter | Tip diameter         | Type | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Lead angle | Weight       |
|------------------|---------------|-------------------|--------------------|----------------------|------|------------|---------------------------|----------------------|----------------------|----------------|------------|--------------|
|                  |               | <i>z</i>          | <i>d</i>           | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>γ</i>   | <i>W</i> (g) |
| W1SU R1 + B      | R             | 1                 | φ16                | φ18                  | B    | 15.5       | φ6                        | φ15.85               | 7                    | 32             | 3°35'      | 42.0         |
| W1SU R2 + B      | R             | 2                 | φ16                | φ18                  | B    | 15         | φ6                        | φ15.85               | 7                    | 32             | 7°11'      | 42.0         |



Unit: mm

| Accuracy Class  | Material                                                      | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|---------------------------------------------------------------|----------------|------------------------|---------------------|
| No relevant JIS | CAC702 (aluminum bronze casting)<br>C6191BE (aluminum bronze) | 20°            | Cutting                | See the table below |

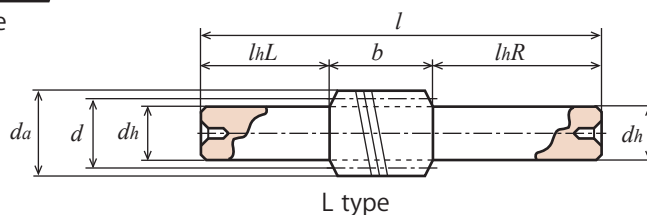
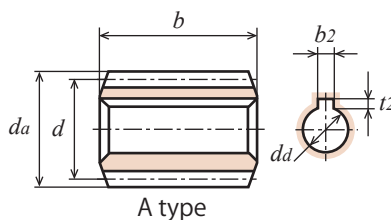
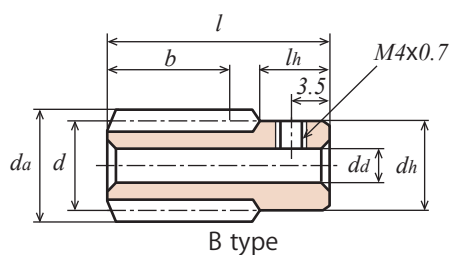
★ No surface treatment is applied. Gears with a [+], are provided with screw holes and set screws. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Num-ber of teeth | Inter-meshing pitch circle diam-eter | Rack shift coef-ficient | Throat diam-eter     | Tip diam-eter        | Type | Face width | Hole diam-eter            | Hub diam-eter        | Hub length           | Overall length | Key groove              | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight       |   |    |    |       |
|------------------|------------|------------------|--------------------------------------|-------------------------|----------------------|----------------------|------|------------|---------------------------|----------------------|----------------------|----------------|-------------------------|-------------------------------|---------------------------------------------|--------------|---|----|----|-------|
|                  | <i>u</i>   | <i>z</i>         | <i>d</i>                             | <i>x</i>                | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>b</i> 2 × <i>t</i> 2 | <i>a</i>                      |                                             | <i>W</i> (g) |   |    |    |       |
| G1A 20R2+ 6      | 1 : 10     | 20               | φ20                                  | -0.079                  | φ22                  | φ23.5                | 1B   | 10         | φ 6                       | φ17                  | 8                    | 18             | -                       | 18                            | R2                                          | 35.0         |   |    |    |       |
| G1A 20R2+ 8      | 1 : 10     |                  |                                      | -0.079                  |                      |                      |      |            | φ 8                       |                      |                      |                | -                       |                               | R2                                          | 32.0         |   |    |    |       |
| G1A 20R2= 8      | 1 : 10     |                  |                                      | -0.079                  |                      |                      |      |            | φ 8                       |                      |                      |                | 3 × 1.4                 |                               | R2                                          | 31.7         |   |    |    |       |
| G1A 20R1+ 6      | 1 : 20     |                  |                                      | -0.019                  |                      |                      |      |            | φ 6                       |                      |                      |                | -                       |                               | R1                                          | 35.0         |   |    |    |       |
| G1A 20R1+ 8      | 1 : 20     |                  |                                      | -0.019                  |                      |                      |      |            | φ 8                       |                      |                      |                | -                       |                               | R1                                          | 32.0         |   |    |    |       |
| G1A 20R1= 8      | 1 : 20     |                  |                                      | -0.019                  |                      |                      |      |            | φ 8                       |                      |                      |                | 3 × 1.4                 |                               | R1                                          | 31.7         |   |    |    |       |
| G1A 20L2+ 6      | 1 : 10     |                  |                                      | -0.079                  |                      |                      |      |            | φ 6                       |                      |                      |                | -                       |                               | L2                                          | 35.0         |   |    |    |       |
| G1A 20L1+ 6      | 1 : 20     |                  |                                      | -0.019                  |                      |                      |      |            | φ 6                       |                      |                      |                | -                       |                               | L1                                          | 35.0         |   |    |    |       |
| G1A 30R2+ 6      | 1 : 15     | 30               | φ30                                  | -0.118                  | φ32                  | φ33.5                |      |            |                           |                      |                      |                | φ 6                     | φ22                           |                                             |              | - | 23 | R2 | 73.0  |
| G1A 30R2+ 8      | 1 : 15     |                  |                                      | -0.118                  |                      |                      |      |            | φ 8                       | -                    |                      |                | R2                      |                               | 69.5                                        |              |   |    |    |       |
| G1A 30R2= 10     | 1 : 15     |                  |                                      | -0.118                  |                      |                      |      |            | φ10                       | 3 × 1.4              |                      |                | R2                      |                               | 66.0                                        |              |   |    |    |       |
| G1A 30R1+ 6      | 1 : 30     |                  |                                      | -0.029                  |                      |                      |      |            | φ 6                       | -                    |                      |                | R1                      |                               | 73.0                                        |              |   |    |    |       |
| G1A 30R1+ 8      | 1 : 30     |                  |                                      | -0.029                  |                      |                      |      |            | φ 8                       | -                    |                      |                | R1                      |                               | 69.5                                        |              |   |    |    |       |
| G1A 30R1= 10     | 1 : 30     |                  |                                      | -0.029                  |                      |                      |      |            | φ10                       | 3 × 1.4              |                      |                | R1                      |                               | 66.0                                        |              |   |    |    |       |
| G1A 30L2+ 6      | 1 : 15     |                  |                                      | -0.118                  |                      |                      |      |            | φ 6                       | -                    |                      |                | L2                      |                               | 73.0                                        |              |   |    |    |       |
| G1A 30L1+ 6      | 1 : 30     |                  |                                      | -0.029                  |                      |                      |      |            | φ 6                       | -                    |                      |                | L1                      |                               | 73.0                                        |              |   |    |    |       |
| G1A 40R2+ 8      | 1 : 20     | 40               | φ40                                  | -0.158                  | φ42                  | φ43.5                |      |            |                           |                      |                      |                | φ 8                     | φ25                           |                                             |              | - | 28 | R2 | 121.0 |
| G1A 40R1+ 8      | 1 : 40     |                  |                                      | -0.039                  |                      |                      |      |            | φ 8                       | -                    |                      |                | R1                      |                               | 121.0                                       |              |   |    |    |       |
| G1A 40R1+ 10     | 1 : 40     |                  |                                      | -0.039                  |                      |                      |      |            | φ10                       | -                    |                      |                | R1                      |                               | 119.5                                       |              |   |    |    |       |
| G1A 40R1= 10     | 1 : 40     |                  |                                      | -0.039                  |                      |                      |      |            | φ10                       | 3 × 1.4              |                      |                | R1                      |                               | 118.0                                       |              |   |    |    |       |
| G1A 40L2+ 8      | 1 : 20     |                  |                                      | -0.158                  |                      |                      |      |            | φ 8                       | -                    |                      |                | L2                      |                               | 121.0                                       |              |   |    |    |       |
| G1A 40L1+ 8      | 1 : 40     |                  |                                      | -0.039                  |                      |                      |      |            | φ 8                       | -                    |                      |                | L1                      |                               | 120.0                                       |              |   |    |    |       |
| G1A 50R2+ 8      | 1 : 25     | 50               | φ50                                  | -0.197                  | φ52                  | φ53.5                |      |            |                           |                      |                      |                | φ 8                     | φ30                           |                                             |              | - | 33 | R2 | 190.0 |
| G1A 50R1+ 8      | 1 : 50     |                  |                                      | -0.048                  |                      |                      |      |            | φ 8                       | -                    |                      |                | R1                      |                               | 190.0                                       |              |   |    |    |       |
| G1A 50R1+ 10     | 1 : 50     |                  |                                      | -0.048                  |                      |                      |      |            | φ10                       | -                    |                      |                | R1                      |                               | 187.5                                       |              |   |    |    |       |
| G1A 50R1= 12     | 1 : 50     |                  |                                      | -0.048                  |                      |                      |      |            | φ12                       | 4 × 1.8              |                      |                | R1                      |                               | 185.0                                       |              |   |    |    |       |
| G1A 50L2+ 8      | 1 : 25     |                  |                                      | -0.197                  |                      |                      |      |            | φ 8                       | -                    |                      |                | L2                      |                               | 190.0                                       |              |   |    |    |       |
| G1A 50L1+ 8      | 1 : 50     |                  |                                      | -0.048                  |                      |                      |      |            | φ 8                       | -                    |                      |                | L1                      |                               | 190.0                                       |              |   |    |    |       |



2D • 3D CAD

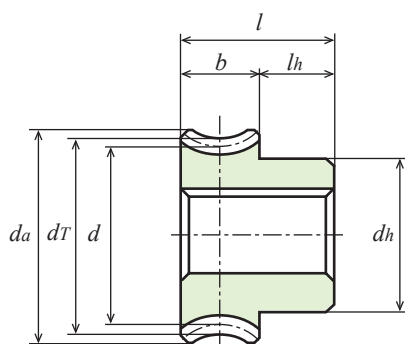
Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | S45C     | 20°            | Precision cold rolling |

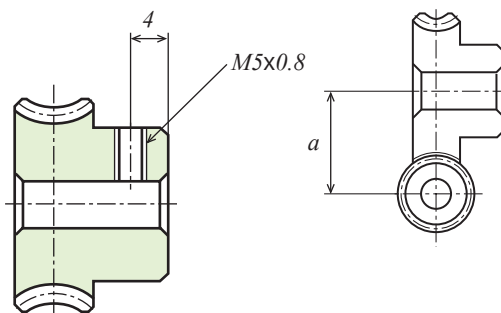
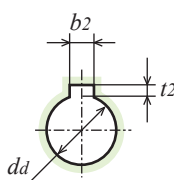
★ No surface treatment is applied.

Gears with a [+] are provided with screw holes and set screws. Gears with a [=] are provided with key grooves and keys.

| Catalogue number | Hand of helix | Number of threads<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>d</sub>(H8)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length            |                       | Overall length<br><i>l</i> | Key groove<br><i>b<sub>2</sub> × t<sub>2</sub></i> | Lead angle<br><i>γ</i> | Weight<br><i>W</i> (g) |
|------------------|---------------|-------------------------------|--------------------------------|--------------------------------------|------|------------------------|-------------------------------------------|--------------------------------------|-----------------------|-----------------------|----------------------------|----------------------------------------------------|------------------------|------------------------|
|                  |               |                               |                                |                                      |      |                        |                                           |                                      | <i>l<sub>hL</sub></i> | <i>l<sub>hR</sub></i> |                            |                                                    |                        |                        |
| W1S R1 = A       | R             | 1                             | φ16                            | φ18                                  | A    | 25                     | φ8                                        | -                                    | -                     | -                     | 25                         | 3 × 1.4                                            | 3°35′                  | 28.0                   |
| W1S R1 + B       |               |                               |                                |                                      | B    | 17                     | φ6                                        | φ15.85                               | -                     | 7                     | 32                         | -                                                  | 3°35′                  | 42.0                   |
| W1S R1 + B – 8   |               |                               |                                |                                      | B    | 17                     | φ8                                        | φ15.85                               | -                     | 7                     | 32                         | -                                                  | 3°35′                  | 42.0                   |
| W1S R1 – L       |               |                               |                                |                                      | L    | 25                     | -                                         | φ13(h8)                              | 25                    | 50                    | 100                        | -                                                  | 3°35′                  | 120.0                  |
| W1S R2 = A       | R             | 2                             |                                |                                      | A    | 25                     | φ8                                        | -                                    | -                     | -                     | 25                         | 3 × 1.4                                            | 7°11′                  | 28.0                   |
| W1S R2 + B       |               |                               |                                |                                      | B    | 16.5                   | φ6                                        | φ15.85                               | -                     | 7                     | 32                         | -                                                  | 7°11′                  | 42.0                   |
| W1S R2 + B – 8   |               |                               |                                |                                      | B    | 16.5                   | φ8                                        | φ15.85                               | -                     | 7                     | 32                         | -                                                  | 7°11′                  | 42.0                   |
| W1S R2 – L       |               |                               |                                |                                      | L    | 25                     | -                                         | φ13(h8)                              | 25                    | 50                    | 100                        | -                                                  | 7°11′                  | 120.0                  |
| W1S L1 = A       | L             | 1                             |                                |                                      | A    | 25                     | φ8                                        | -                                    | -                     | -                     | 25                         | 3 × 1.4                                            | 3°35′                  | 28.0                   |
| W1S L1 + B       |               |                               |                                |                                      | B    | 17                     | φ6                                        | φ15.85                               | -                     | 7                     | 32                         | -                                                  | 3°35′                  | 42.0                   |
| W1S L1 – L       |               |                               |                                |                                      | L    | 25                     | -                                         | φ13(h8)                              | 25                    | 50                    | 100                        | -                                                  | 3°35′                  | 120.0                  |
| W1S L2 + B       | L             | 2                             |                                |                                      | B    | 16.5                   | φ6                                        | φ15.85                               | -                     | 7                     | 32                         | -                                                  | 7°11′                  | 42.0                   |
| W1S L2 – L       |               |                               | L                              | 25                                   | -    | φ13(h8)                | 25                                        | 50                                   | 100                   | -                     | 7°11′                      | 120.0                                              |                        |                        |



1B type [=]



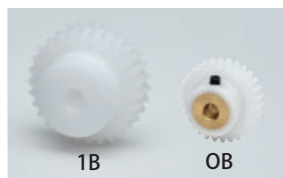
1B type [+]

| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N・m) |            |            |              |              |              |              | Backlash ①<br>(Unit: mm) | Catalogue number |
|--------------------------------------------------------------------------------------------------|------------|------------|--------------|--------------|--------------|--------------|--------------------------|------------------|
| Surface durability ②                                                                             |            |            |              |              |              |              |                          |                  |
| 100<br>rpm                                                                                       | 250<br>rpm | 500<br>rpm | 1,000<br>rpm | 1,200<br>rpm | 1,500<br>rpm | 1,800<br>rpm | 0.08 to 0.20             |                  |
| 2.185                                                                                            | 1.793      | 1.479      | 1.185        | 1.107        | 1.009        | 0.980        |                          | G1A 20R2 + 6     |
| 2.322                                                                                            | 1.930      | 1.597      | 1.303        | 1.225        | 1.146        | 1.078        |                          | G1A 20R1 + 6     |
| 2.185                                                                                            | 1.793      | 1.479      | 1.185        | 1.107        | 1.009        | 0.980        |                          | G1A 20L2 + 6     |
| 2.322                                                                                            | 1.930      | 1.597      | 1.303        | 1.225        | 1.146        | 1.078        |                          | G1A 20L1 + 6     |
| 4.488                                                                                            | 3.547      | 2.900      | 2.312        | 2.175        | 1.989        | 1.852        |                          | G1A 30R2 + 6     |
| 4.978                                                                                            | 4.184      | 3.528      | 2.891        | 2.724        | 2.548        | 2.401        |                          | G1A 30R1 + 6     |
| 4.488                                                                                            | 3.547      | 2.900      | 2.312        | 2.175        | 1.989        | 1.852        |                          | G1A 30L2 + 6     |
| 4.978                                                                                            | 4.184      | 3.528      | 2.891        | 2.724        | 2.548        | 2.401        |                          | G1A 30L1 + 6     |
| 8.339                                                                                            | 6.918      | 5.742      | 4.684        | 4.390        | 4.096        | 3.861        |                          | G1A 40R2 + 8     |
| 8.496                                                                                            | 7.212      | 6.164      | 5.086        | 4.792        | 4.488        | 4.243        |                          | G1A 40R1 + 8     |
| 8.339                                                                                            | 6.918      | 5.742      | 4.684        | 4.390        | 4.096        | 3.861        |                          | G1A 40L2 + 8     |
| 8.496                                                                                            | 7.212      | 6.164      | 5.086        | 4.792        | 4.488        | 4.243        |                          | G1A 40L1 + 8     |
| 12.965                                                                                           | 10.838     | 8.878      | 7.271        | 6.830        | 6.379        | 6.017        |                          | G1A 50R2 + 8     |
| 12.926                                                                                           | 11.054     | 9.476      | 7.859        | 7.408        | 6.948        | 6.585        |                          | G1A 50R1 + 8     |
| 12.965                                                                                           | 10.838     | 8.878      | 7.271        | 6.830        | 6.379        | 6.017        |                          | G1A 50L2 + 8     |
| 12.926                                                                                           | 11.054     | 9.476      | 7.859        | 7.408        | 6.948        | 6.585        | G1A 50L1 + 8             |                  |





Example of use



Unit: mm

| Accuracy Class  | Material    | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|-------------|----------------|------------------------|---------------------|
| No relevant JIS | White POM ③ | 20°            | Cutting                | See the table below |

Gears with a [+] are provided with screw holes and set screws. ★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ For the allowable torque value and backlash of this product, check the values for the blue POM products.

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

③ The 1B products consist solely of white POM. The OB products consist of white POM and a brass (C3604B) bushing.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter      | Tip diameter         | Type | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight       |
|------------------|------------|-----------------|-------------------------------------|------------------------|----------------------|----------------------|------|------------|---------------------------|----------------------|----------------------|----------------|-------------------------------|---------------------------------------------|--------------|
|                  | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>a</i>                      |                                             | <i>W</i> (g) |
| G1DB 20 + R2     | 1 : 10     | 20              | φ 20                                | -0.079                 | φ 22                 | φ 23                 | OB   | 8          | φ 6                       | φ 16                 | 9                    | 17             | 18                            | R2                                          | 15.0         |
| G1DB 20 + R1     | 1 : 20     | 20              | φ 20                                | -0.019                 | φ 22                 | φ 23                 |      |            |                           | φ 16                 |                      |                | 18                            | R1                                          | 15.0         |
| G1DB 30 + R1     | 1 : 30     | 30              | φ 30                                | -0.029                 | φ 32                 | φ 33                 |      |            |                           | φ 20                 |                      |                | 23                            | R1                                          | 25.7         |
| G1D 20 - R2      | 1 : 10     | 20              | φ 20                                | -0.079                 | φ 22                 | φ 23.5               | 1B   | 10         | φ 6                       | φ 17                 | 8                    | 18             | 18                            | R2                                          | 6.0          |
| G1D 20 - R1      | 1 : 20     | 20              | φ 20                                | -0.019                 | φ 22                 | φ 23.5               |      |            | φ 6                       | φ 17                 |                      |                | 18                            | R1                                          | 6.0          |
| G1D 30 - R2      | 1 : 15     | 30              | φ 30                                | -0.118                 | φ 32                 | φ 33.5               |      |            | φ 6                       | φ 22                 |                      |                | 23                            | R2                                          | 14.0         |
| G1D 30 - R1      | 1 : 30     | 30              | φ 30                                | -0.029                 | φ 32                 | φ 33.5               |      |            | φ 6                       | φ 22                 |                      |                | 23                            | R1                                          | 14.0         |
| G1D 40 - R1      | 1 : 40     | 40              | φ 40                                | -0.039                 | φ 42                 | φ 43.5               |      |            | φ 8                       | φ 25                 |                      |                | 28                            | R1                                          | 22.2         |
| G1D 50 - R1      | 1 : 50     | 50              | φ 50                                | -0.048                 | φ 52                 | φ 53.5               |      |            | φ 8                       | φ 30                 |                      |                | 33                            | R1                                          | 34.7         |
| G1D 60 - R1      | 1 : 60     | 60              | φ 60                                | -0.058                 | φ 62                 | φ 63.5               |      |            | φ 10                      | φ 30                 |                      |                | 38                            | R1                                          | 46.0         |
| G1D 80 - R1      | 1 : 80     | 80              | φ 80                                | -0.078                 | φ 82                 | φ 83.5               |      |            | φ 10                      | φ 40                 |                      |                | 48                            | R1                                          | 84.0         |
| G1D 100 - R1     | 1 : 100    | 100             | φ 100                               | -0.098                 | φ 102                | φ 103.5              |      |            | φ 10                      | φ 40                 |                      |                | 58                            | R1                                          | 125.0        |



Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|----------|----------------|------------------------|---------------------|
| No relevant JIS | Blue POM | 20°            | Cutting                | See the table below |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

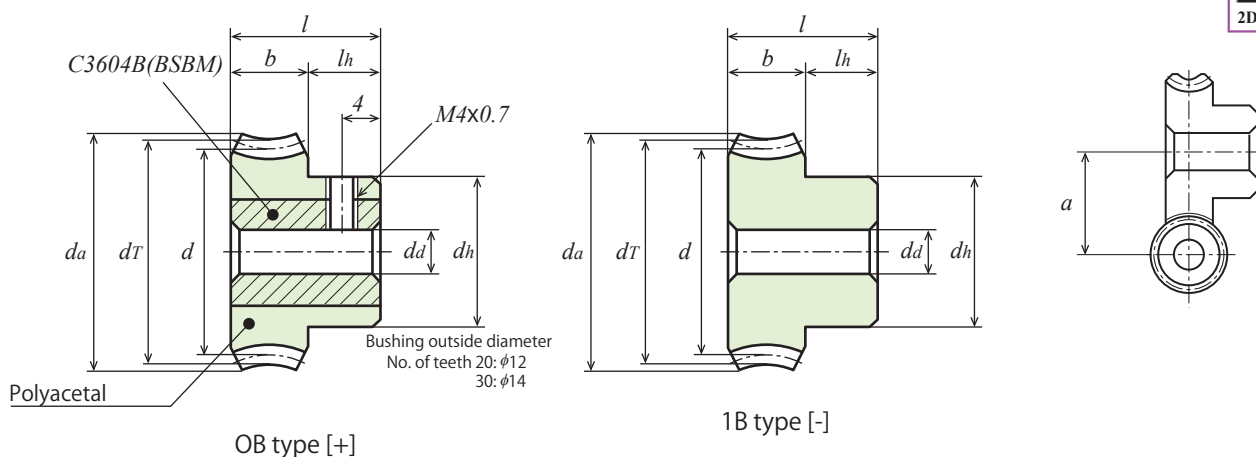
② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter      | Tip diameter         | Type | Face width | Hole diameter        | Hub diameter         | Hub length           | Overall length | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight       |
|------------------|------------|-----------------|-------------------------------------|------------------------|----------------------|----------------------|------|------------|----------------------|----------------------|----------------------|----------------|-------------------------------|---------------------------------------------|--------------|
|                  | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub></i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>a</i>                      |                                             | <i>W</i> (g) |
| G1BP 20 - R2     | 1 : 10     | 20              | φ 20                                | -0.079                 | φ 22                 | φ 23.5               | 1B   | 10         | φ 5                  | φ 17                 | 8                    | 18             | 18                            | R2                                          | 6.8          |
| G1BP 20 - R1     | 1 : 20     | 20              | φ 20                                | -0.019                 | φ 22                 | φ 23.5               |      |            | φ 5                  | φ 17                 |                      |                | 18                            | R1                                          | 6.8          |
| G1BP 30 - R2     | 1 : 15     | 30              | φ 30                                | -0.118                 | φ 32                 | φ 33.5               |      |            | φ 6                  | φ 22                 |                      |                | 23                            | R2                                          | 13.9         |
| G1BP 30 - R1     | 1 : 30     | 30              | φ 30                                | -0.029                 | φ 32                 | φ 33.5               |      |            | φ 6                  | φ 22                 |                      |                | 23                            | R1                                          | 13.9         |
| G1BP 40 - R1     | 1 : 40     | 40              | φ 40                                | -0.039                 | φ 42                 | φ 43.5               |      |            | φ 8                  | φ 30                 |                      |                | 28                            | R1                                          | 24.9         |
| G1BP 50 - R1     | 1 : 50     | 50              | φ 50                                | -0.048                 | φ 52                 | φ 53.5               |      |            | φ 8                  | φ 35                 |                      |                | 33                            | R1                                          | 37.8         |
| G1BP 60 - R1     | 1 : 60     | 60              | φ 60                                | -0.058                 | φ 62                 | φ 63.5               |      |            | φ 8                  | φ 40                 |                      |                | 38                            | R1                                          | 53.4         |
| G1BP 80 - R1     | 1 : 80     | 80              | φ 80                                | -0.078                 | φ 82                 | φ 83.5               |      |            | φ 10                 | φ 50                 |                      |                | 48                            | R1                                          | 91.7         |
| G1BP 100 - R1    | 1 : 100    | 100             | φ 100                               | -0.098                 | φ 102                | φ 103.5              |      |            | φ 10                 | φ 60                 |                      |                | 58                            | R1                                          | 141.3        |





2D • 3D CAD



| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N · m)<br>Surface durability ② |            |            |              |              |              |              | Backlash ①<br>(Unit: mm) | Catalogue number |
|----------------------------------------------------------------------------------------------------------------------------|------------|------------|--------------|--------------|--------------|--------------|--------------------------|------------------|
| 100<br>rpm                                                                                                                 | 250<br>rpm | 500<br>rpm | 1,000<br>rpm | 1,200<br>rpm | 1,500<br>rpm | 1,800<br>rpm |                          |                  |
| 0.63                                                                                                                       | 0.63       | 0.63       | 0.63         | 0.62         | 0.62         | 0.62         | 0.08 to 0.20             | G1BP 20 – R2     |
| 0.63                                                                                                                       | 0.63       | 0.63       | 0.62         | 0.62         | 0.62         | 0.62         |                          | G1BP 20 – R1     |
| 0.95                                                                                                                       | 0.95       | 0.95       | 0.94         | 0.93         | 0.93         | 0.93         |                          | G1BP 30 – R2     |
| 0.95                                                                                                                       | 0.95       | 0.95       | 0.93         | 0.93         | 0.92         | 0.92         |                          | G1BP 30 – R1     |
| 1.26                                                                                                                       | 1.26       | 1.26       | 1.24         | 1.24         | 1.23         | 1.23         |                          | G1BP 40 – R1     |
| 1.58                                                                                                                       | 1.58       | 1.58       | 1.55         | 1.55         | 1.54         | 1.54         |                          | G1BP 50 – R1     |
| 1.89                                                                                                                       | 1.89       | 1.89       | 1.86         | 1.86         | 1.85         | 1.85         |                          | G1BP 60 – R1     |
| 2.52                                                                                                                       | 2.52       | 2.52       | 2.49         | 2.48         | 2.47         | 2.47         |                          | G1BP 80 – R1     |
| 3.15                                                                                                                       | 3.15       | 3.15       | 3.11         | 3.10         | 3.08         | 3.08         | 0.15 to 0.30             | G1BP 100 – R1    |

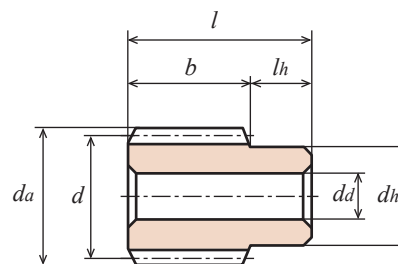
# W : Worm G : Worm Wheel



Example of use

Normal Module 1.5

(Full Depth Tooth)



B type [-]

Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | SUS304   | 20°            | Precision cold rolling |

★ No surface treatment is applied.

| Catalogue number     | Hand of helix | Number of threads | Reference diameter | Tip diameter         | Type | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Lead angle | Weight       |
|----------------------|---------------|-------------------|--------------------|----------------------|------|------------|---------------------------|----------------------|----------------------|----------------|------------|--------------|
|                      |               | <i>z</i>          | <i>d</i>           | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>γ</i>   | <i>W</i> (g) |
| <b>W1.5SU R1 – B</b> | R             | 1                 | φ25                | φ28                  | B    | 30         | φ10                       | φ20                  | 13                   | 43             | 3°26′      | 120.0        |
| <b>W1.5SU R2 – B</b> |               | 2                 |                    |                      |      |            |                           |                      |                      |                | 6°54′      |              |



Unit: mm

| Accuracy Class  | Material                                                      | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|---------------------------------------------------------------|----------------|------------------------|---------------------|
| No relevant JIS | CAC702 (aluminum bronze casting)<br>C6191BE (aluminum bronze) | 20°            | Cutting                | See the table below |

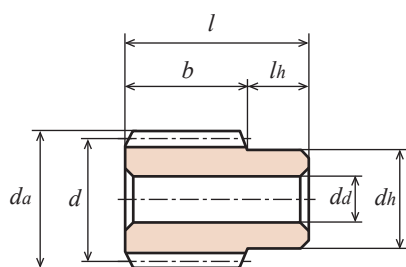
★ No surface treatment is applied. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

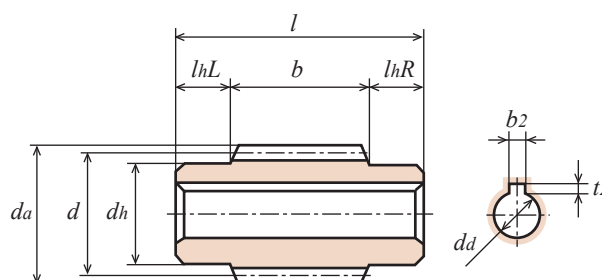
① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter      | Tip diameter         | Type | Face width | Hole diameter             | Hub diameter         | Hub length           | Overall length | Key groove              | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight        |    |      |
|------------------|------------|-----------------|-------------------------------------|------------------------|----------------------|----------------------|------|------------|---------------------------|----------------------|----------------------|----------------|-------------------------|-------------------------------|---------------------------------------------|---------------|----|------|
|                  | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>a</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>b</i> 2 × <i>t</i> 2 | <i>a</i>                      |                                             | <i>W</i> (kg) |    |      |
| G1.5A 20R2 — 8   | 1 : 10     | 20              | φ30                                 | -0.072                 | φ33                  | φ35.3                | 1B   | 15         | φ 8                       | φ25                  | 10                   | 25             | -                       | 27.5                          | R2                                          | 0.11          |    |      |
| G1.5A 20R2 = 12  | 1 : 10     |                 |                                     | -0.072                 |                      |                      |      |            | φ12                       |                      |                      |                | 4 × 1.8                 |                               | R2                                          | 0.10          |    |      |
| G1.5A 20R1 — 8   | 1 : 20     |                 |                                     | -0.018                 |                      |                      |      |            | φ 8                       |                      |                      |                | -                       |                               | R1                                          | 0.11          |    |      |
| G1.5A 20R1 = 12  | 1 : 20     |                 |                                     | -0.018                 |                      |                      |      |            | φ12                       |                      |                      |                | 4 × 1.8                 |                               | R1                                          | 0.11          |    |      |
| G1.5A 20L2 — 8   | 1 : 10     |                 |                                     | -0.072                 |                      |                      |      |            | φ 8                       |                      |                      |                | -                       |                               | L2                                          | 0.11          |    |      |
| G1.5A 20L1 — 8   | 1 : 20     |                 |                                     | -0.018                 |                      |                      |      |            | φ 8                       |                      |                      |                | -                       |                               | L1                                          | 0.11          |    |      |
| G1.5A 30R2 — 10  | 1 : 15     | 30              | φ45                                 | -0.109                 | φ48                  | φ50.3                |      |            |                           |                      | φ10                  | φ30            |                         |                               | -                                           | 35            | R2 | 0.23 |
| G1.5A 30R1 — 10  | 1 : 30     |                 |                                     | -0.027                 |                      |                      |      |            | φ10                       | -                    | R1                   |                | 0.23                    |                               |                                             |               |    |      |
| G1.5A 30R1 = 15  | 1 : 30     |                 |                                     | -0.027                 |                      |                      |      |            | φ15                       | 5 × 2.3              | R1                   |                | 0.18                    |                               |                                             |               |    |      |
| G1.5A 30L1 — 10  | 1 : 30     |                 |                                     | -0.027                 |                      |                      |      |            | φ10                       | -                    | L1                   |                | 0.23                    |                               |                                             |               |    |      |



B type [-]



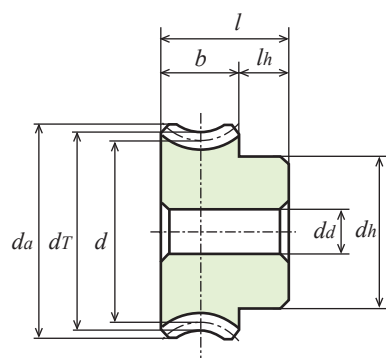
C type [=]

Unit: mm

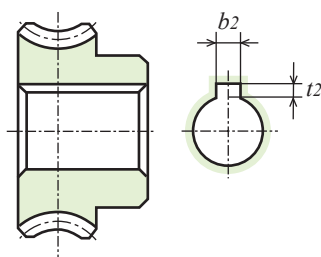
| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | S45C     | 20°            | Precision cold rolling |

★ No surface treatment is applied. Gears with a [=] are provided with key grooves and keys.

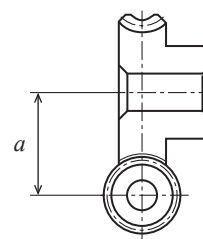
| Catalogue number     | Hand of helix | Number of threads<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(\text{H}8)$ | Hub diameter<br>$d_h$ | Hub length |          | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Lead angle<br>$\gamma$ | Weight<br>$W(\text{kg})$ |
|----------------------|---------------|--------------------------|---------------------------|-----------------------|------|-------------------|-----------------------------------|-----------------------|------------|----------|-----------------------|--------------------------------|------------------------|--------------------------|
|                      |               |                          |                           |                       |      |                   |                                   |                       | $l_{hL}$   | $l_{hR}$ |                       |                                |                        |                          |
| <b>W1.5S R1 – B</b>  | R             | 1                        | $\phi 25$                 | $\phi 28$             | B    | 30                | $\phi 10$                         | $\phi 20$             | -          | 13       | 43                    | -                              | 3°26'                  | 0.12                     |
| <b>W1.5S R1 – CF</b> |               | 1                        |                           |                       | C    | 35                | $\phi 12$                         |                       | 10         | 10       | 55                    | -                              | 3°26'                  | 0.14                     |
| <b>W1.5S R1 = C</b>  |               | 1                        |                           |                       | C    | 35                | $\phi 12$                         |                       | 10         | 10       | 55                    | 4 × 1.8                        | 3°26'                  | 0.13                     |
| <b>W1.5S R2 – B</b>  |               | 2                        |                           |                       | B    | 30                | $\phi 10$                         |                       | -          | 13       | 43                    | -                              | 6°54'                  | 0.12                     |
| <b>W1.5S R2 = C</b>  |               | 2                        |                           |                       | C    | 35                | $\phi 12$                         |                       | 10         | 10       | 55                    | 4 × 1.8                        | 6°54'                  | 0.13                     |
| <b>W1.5S L1 – B</b>  | L             | 1                        | $\phi 25$                 | $\phi 28$             | B    | 30                | $\phi 10$                         | $\phi 20$             | -          | 13       | 43                    | -                              | 3°26'                  | 0.12                     |
| <b>W1.5S L1 = C</b>  |               | 1                        |                           |                       | C    | 35                | $\phi 12$                         |                       | 10         | 10       | 55                    | 4 × 1.8                        | 3°26'                  | 0.13                     |
| <b>W1.5S L2 – B</b>  |               | 2                        |                           |                       | B    | 30                | $\phi 10$                         |                       | -          | 13       | 43                    | -                              | 6°54'                  | 0.12                     |
| <b>W1.5S L2 = C</b>  |               | 2                        |                           |                       | C    | 35                | $\phi 12$                         |                       | 10         | 10       | 55                    | 4 × 1.8                        | 6°54'                  | 0.13                     |



1B type [-]



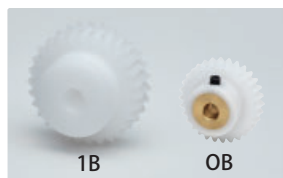
1B type [=]



| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N・m) |            |            |              |              |              |              | Backlash ①<br>(Unit: mm) | Catalogue number       |
|--------------------------------------------------------------------------------------------------|------------|------------|--------------|--------------|--------------|--------------|--------------------------|------------------------|
| Surface durability ②                                                                             |            |            |              |              |              |              |                          |                        |
| 100<br>rpm                                                                                       | 250<br>rpm | 500<br>rpm | 1,000<br>rpm | 1,200<br>rpm | 1,500<br>rpm | 1,800<br>rpm | 0.08 to 0.20             |                        |
| 6.801                                                                                            | 5.370      | 4.390      | 3.498        | 3.273        | 3.008        | 2.802        |                          | <b>G1.5A 20R2 — 8</b>  |
| 7.036                                                                                            | 5.762      | 4.762      | 3.851        | 3.635        | 3.381        | 3.185        |                          | <b>G1.5A 20R1 — 8</b>  |
| 6.801                                                                                            | 5.370      | 4.390      | 3.498        | 3.273        | 3.008        | 2.802        |                          | <b>G1.5A 20L2 — 8</b>  |
| 7.036                                                                                            | 5.762      | 4.762      | 3.851        | 3.635        | 3.381        | 3.185        |                          | <b>G1.5A 20L1 — 8</b>  |
| 14.700                                                                                           | 11.858     | 9.741      | 7.830        | 7.389        | 6.840        | 6.409        |                          | <b>G1.5A 30R2 — 10</b> |
| 15.092                                                                                           | 12.544     | 10.486     | 8.545        | 8.085        | 7.546        | 7.114        |                          | <b>G1.5A 30R1 — 10</b> |
| 15.092                                                                                           | 12.544     | 10.486     | 8.545        | 8.085        | 7.546        | 7.114        |                          | <b>G1.5A 30L1 — 10</b> |



Example of use



Unit: mm

| Accuracy Class  | Material    | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|-------------|----------------|------------------------|---------------------|
| No relevant JIS | White POM ③ | 20°            | Cutting                | See the table below |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ For the allowable torque value and backlash of this product, check the values for the blue POM products.

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

③ The 1B products consist solely of white POM. The OB products consist of white POM and a brass (C3604B) bushing.

| Catalogue number      | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter      | Tip diameter         | Type | Face width | Hole diameter        | Hub diameter         | Hub length           | Overall length | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight      |
|-----------------------|------------|-----------------|-------------------------------------|------------------------|----------------------|----------------------|------|------------|----------------------|----------------------|----------------------|----------------|-------------------------------|---------------------------------------------|-------------|
|                       | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub></i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>a</i>                      |                                             | <i>W(g)</i> |
| <b>G1.5DB 20 — R2</b> | 1 : 10     | 20              | φ30                                 | -0.072                 | φ33                  | φ34.3                | OB   | 10         | φ 8                  | φ22                  | 10                   | 20             | 27.5                          | R2                                          | 35.0        |
| <b>G1.5DB 20 — R1</b> | 1 : 20     | 20              | φ30                                 | -0.018                 | φ33                  | φ34.3                | OB   | 10         | φ 8                  | φ22                  | 10                   | 20             | 27.5                          | R1                                          | 35.0        |
| <b>G1.5D 20 — R2</b>  | 1 : 10     | 20              | φ30                                 | -0.072                 | φ33                  | φ35.3                | 1B   | 15         | φ 8                  | φ25                  | 10                   | 25             | 27.5                          | R2                                          | 21.0        |
| <b>G1.5D 30 — R2</b>  | 1 : 15     | 30              | φ45                                 | -0.109                 | φ48                  | φ50.3                | 1B   | 15         | φ10                  | φ30                  | 10                   | 25             | 35                            | R2                                          | 42.0        |



Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|----------|----------------|------------------------|---------------------|
| No relevant JIS | Blue POM | 20°            | Cutting                | See the table below |

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

★ Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

★ For details on blue POM, refer to P. 22.

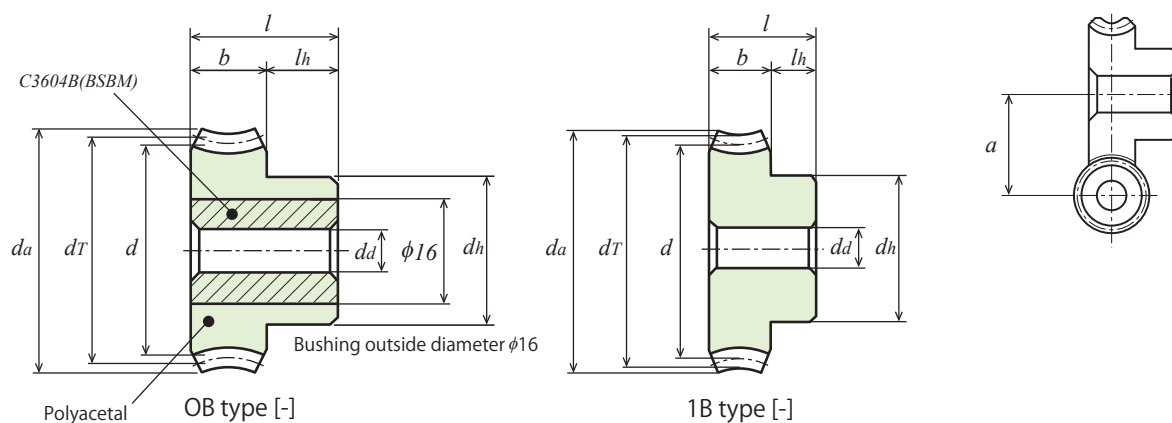
① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

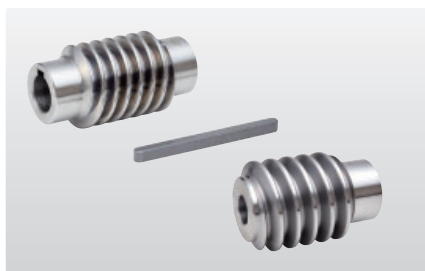
| Catalogue number      | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter      | Tip diameter         | Type | Face width | Hole diameter        | Hub diameter         | Hub length           | Overall length | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight      |
|-----------------------|------------|-----------------|-------------------------------------|------------------------|----------------------|----------------------|------|------------|----------------------|----------------------|----------------------|----------------|-------------------------------|---------------------------------------------|-------------|
|                       | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub></i> | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>       | <i>a</i>                      |                                             | <i>W(g)</i> |
| <b>G1.5BP 20 — R2</b> | 1 : 10     | 20              | φ30                                 | -0.072                 | φ33                  | φ35.3                | 1B   | 15         | φ 6                  | φ25                  | 10                   | 25             | 27.5                          | R2                                          | 22.0        |
| <b>G1.5BP 20 — R1</b> | 1 : 20     | 20              | φ30                                 | -0.018                 | φ33                  | φ35.3                | 1B   | 15         | φ 6                  | φ25                  | 10                   | 25             | 27.5                          | R1                                          | 22.0        |
| <b>G1.5BP 30 — R2</b> | 1 : 15     | 30              | φ45                                 | -0.109                 | φ48                  | φ50.3                | 1B   | 15         | φ 8                  | φ30                  | 10                   | 25             | 35                            | R2                                          | 43.4        |
| <b>G1.5BP 30 — R1</b> | 1 : 30     | 30              | φ45                                 | -0.027                 | φ48                  | φ50.3                | 1B   | 15         | φ 8                  | φ30                  | 10                   | 25             | 35                            | R1                                          | 43.4        |
| <b>G1.5BP 40 — R1</b> | 1 : 40     | 40              | φ60                                 | -0.036                 | φ63                  | φ65.3                | 1B   | 15         | φ10                  | φ40                  | 13                   | 28             | 42.5                          | R1                                          | 81.6        |
| <b>G1.5BP 50 — R1</b> | 1 : 50     | 50              | φ75                                 | -0.045                 | φ78                  | φ80.3                | 1B   | 15         | φ10                  | φ50                  | 13                   | 28             | 50                            | R1                                          | 128.5       |



2D • 3D CAD



| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N • m)<br>Surface durability ② |            |            |              |              |              |              | Backlash ①<br>(Unit: mm) | Catalogue number |
|----------------------------------------------------------------------------------------------------------------------------|------------|------------|--------------|--------------|--------------|--------------|--------------------------|------------------|
| 100<br>rpm                                                                                                                 | 250<br>rpm | 500<br>rpm | 1,000<br>rpm | 1,200<br>rpm | 1,500<br>rpm | 1,800<br>rpm |                          |                  |
| 1.22                                                                                                                       | 1.22       | 1.21       | 1.20         | 1.20         | 1.19         | 1.19         | 0.08 to 0.20             | G1.5BP 20 – R2   |
| 1.21                                                                                                                       | 1.21       | 1.21       | 1.19         | 1.19         | 1.18         | 1.18         |                          | G1.5BP 20 – R1   |
| 1.83                                                                                                                       | 1.83       | 1.82       | 1.79         | 1.79         | 1.79         | 1.78         |                          | G1.5BP 30 – R2   |
| 1.82                                                                                                                       | 1.82       | 1.81       | 1.78         | 1.78         | 1.78         | 1.77         |                          | G1.5BP 30 – R1   |
| 2.43                                                                                                                       | 2.43       | 2.41       | 2.38         | 2.38         | 2.37         | 2.36         |                          | G1.5BP 40 – R1   |
| 3.04                                                                                                                       | 3.04       | 3.02       | 2.97         | 2.97         | 2.96         | 2.95         |                          | G1.5BP 50 – R1   |



Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | S45C     | 20°            | Precision cold rolling |

★ No surface treatment is applied. Gears with a [=] are provided with key grooves and keys.

| Catalogue number | Hand of helix | Num-ber of threads<br>$z$ | Refer-ence diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_i$ (H8) | Hub diameter<br>$d_h$ | Hub length |          | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Lead angle<br>$\gamma$ | Weight<br>$W(\text{kg})$ |
|------------------|---------------|---------------------------|----------------------------|-----------------------|------|-------------------|-----------------------------|-----------------------|------------|----------|-----------------------|--------------------------------|------------------------|--------------------------|
|                  |               |                           |                            |                       |      |                   |                             |                       | $l_{hL}$   | $l_{hR}$ |                       |                                |                        |                          |
| W2S R1 – B       | R             | 1                         | $\phi 31$                  | $\phi 35$             | B    | 35                | $\phi 12$                   | $\phi 25$             | -          | 15       | 50                    | -                              | 3°42'                  | 0.22                     |
| W2S R1 – CF      |               | 1                         |                            |                       | C    | 41                | $\phi 14$                   |                       | 12         | 12       | 65                    | -                              | 3°42'                  | 0.25                     |
| W2S R1 = C       |               | 1                         |                            |                       | C    | 41                | $\phi 14$                   |                       | 12         | 12       | 65                    | 5 × 2.3                        | 3°42'                  | 0.24                     |
| W2S R2 – B       |               | 2                         |                            |                       | B    | 35                | $\phi 12$                   |                       | -          | 15       | 50                    | -                              | 7°25'                  | 0.22                     |
| W2S R2 = C       |               | 2                         |                            |                       | C    | 41                | $\phi 14$                   |                       | 12         | 12       | 65                    | 5 × 2.3                        | 7°25'                  | 0.24                     |



Unit: mm

| Accuracy Class  | Material                            | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|-------------------------------------|----------------|------------------------|---------------------|
| No relevant JIS | CAC702<br>(aluminum bronze casting) | 20°            | Cutting                | See the table below |

★ No surface treatment is applied. Gears with a [=] are provided with key grooves and keys.

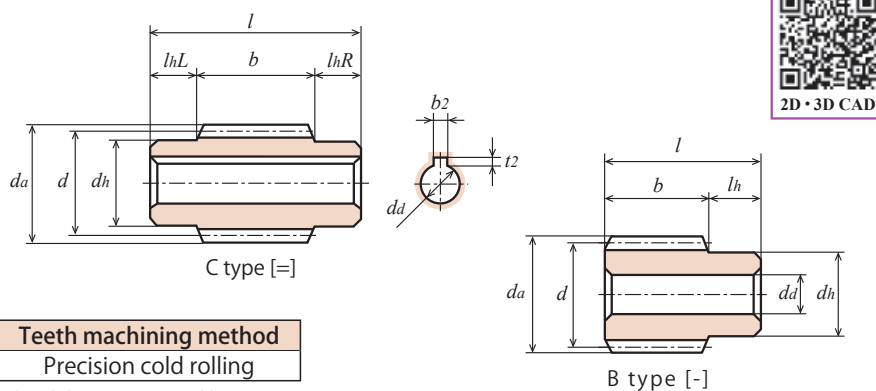
★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Num-ber of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter      | Tip diameter         | Type | Face width | Hole diameter             | Hub diameter         | Hub length           | Over-all length | Key groove              | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight        |      |
|------------------|------------|------------------|-------------------------------------|------------------------|----------------------|----------------------|------|------------|---------------------------|----------------------|----------------------|-----------------|-------------------------|-------------------------------|---------------------------------------------|---------------|------|
|                  | <i>u</i>   | <i>z</i>         | <i>d</i>                            | <i>x</i>               | <i>d<sub>T</sub></i> | <i>d<sub>a</sub></i> |      | <i>b</i>   | <i>d<sub>d</sub></i> (H8) | <i>d<sub>h</sub></i> | <i>l<sub>h</sub></i> | <i>l</i>        | <i>b</i> 2 × <i>t</i> 2 | <i>a</i>                      |                                             | <i>W</i> (kg) |      |
| G2A 20R2 — 10    | 1 : 10     | 20               | φ40                                 | -0.084                 | φ 44                 | φ 47                 | 1B   | 20         | φ10                       | φ32                  | 15                   | 35              | -                       | 35.5                          | R2                                          | 0.26          |      |
| G2A 20R2 = 15    | 1 : 10     |                  |                                     | -0.084                 |                      |                      |      |            | φ15                       |                      |                      |                 | 5 × 2.3                 |                               | R2                                          | 0.23          |      |
| G2A 20R1 — 10    | 1 : 20     |                  |                                     | -0.020                 |                      |                      |      |            | φ10                       |                      |                      |                 | -                       |                               | R1                                          | 0.26          |      |
| G2A 20R1 = 15    | 1 : 20     |                  |                                     | -0.020                 |                      |                      |      |            | φ15                       |                      |                      |                 | 5 × 2.3                 |                               | R1                                          | 0.23          |      |
| G2A 20L2 — 10    | 1 : 10     |                  |                                     | -0.084                 |                      |                      |      |            | φ10                       |                      |                      |                 | -                       |                               | L2                                          | 0.26          |      |
| G2A 20L1 — 10    | 1 : 20     |                  |                                     | -0.020                 |                      |                      |      |            | φ10                       |                      |                      |                 | -                       |                               | L1                                          | 0.26          |      |
| G2A 25R1 — 12    | 1 : 25     | 25               | φ50                                 | -0.026                 | φ 54                 | φ 57                 |      |            | 20                        | φ12                  | φ38                  | 15              | 35                      | -                             | 40.5                                        | R1            | 0.41 |
| G2A 25L1 — 12    | 1 : 25     |                  |                                     | -                      |                      |                      |      | L1         |                           | 0.41                 |                      |                 |                         |                               |                                             |               |      |
| G2A 30R2 — 12    | 1 : 15     | 30               | φ60                                 | -0.126                 | φ 64                 | φ 67                 |      |            | 20                        | φ12                  | φ40                  | 15              | 35                      | -                             | 45.5                                        | R2            | 0.56 |
| G2A 30R1 — 12    | 1 : 30     |                  |                                     | -0.031                 |                      |                      |      | φ12        |                           | -                    |                      |                 |                         | R1                            |                                             | 0.56          |      |
| G2A 30R1 = 18    | 1 : 30     |                  |                                     | -0.031                 |                      |                      |      | φ18        |                           | 6 × 2.8              |                      |                 |                         | R1                            |                                             | 0.53          |      |
| G2A 30L1 — 12    | 1 : 30     |                  |                                     | -0.031                 |                      |                      |      | φ12        |                           | -                    |                      |                 |                         | L1                            |                                             | 0.56          |      |



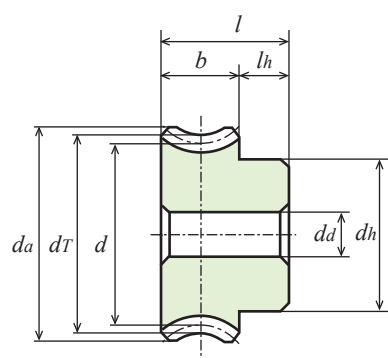


Unit: mm

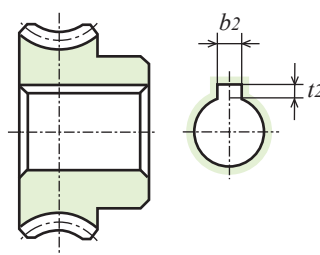
| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | S45C     | 20°            | Precision cold rolling |

★ No surface treatment is applied. Gears with a [=] are provided with key grooves and keys.

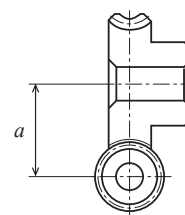
| Catalogue number | Hand of helix | Number of threads<br><i>z</i> | Reference diameter<br><i>d</i> | Tip diameter<br><i>d<sub>a</sub></i> | Type | Face width<br><i>b</i> | Hole diameter<br><i>d<sub>d</sub>(H8)</i> | Hub diameter<br><i>d<sub>h</sub></i> | Hub length            |                       | Overall length<br><i>l</i> | Key groove<br><i>b</i> 2 × <i>t</i> 2 | Lead angle<br><i>γ</i> | Weight<br><i>W</i> (kg) |  |  |
|------------------|---------------|-------------------------------|--------------------------------|--------------------------------------|------|------------------------|-------------------------------------------|--------------------------------------|-----------------------|-----------------------|----------------------------|---------------------------------------|------------------------|-------------------------|--|--|
|                  |               |                               |                                |                                      |      |                        |                                           |                                      | <i>l<sub>hL</sub></i> | <i>l<sub>hR</sub></i> |                            |                                       |                        |                         |  |  |
| W2S L1 – B       | L             | 1                             | φ31                            | φ35                                  | B    | 35                     | φ12                                       | φ25                                  | -                     | 15                    | 50                         | -                                     | 3°42'                  | 0.22                    |  |  |
| W2S L1 = C       |               |                               |                                |                                      | C    | 41                     | φ14                                       |                                      | 12                    | 12                    | 65                         | 5 × 2.3                               | 3°42'                  | 0.24                    |  |  |
| W2S L2 – B       |               | 2                             |                                |                                      | B    | 35                     | φ12                                       |                                      | -                     | 15                    | 50                         | -                                     | 7°25'                  | 0.22                    |  |  |
| W2S L2 = C       |               |                               |                                |                                      | C    | 41                     | φ14                                       |                                      | 12                    | 12                    | 65                         | 5 × 2.3                               | 7°25'                  | 0.24                    |  |  |



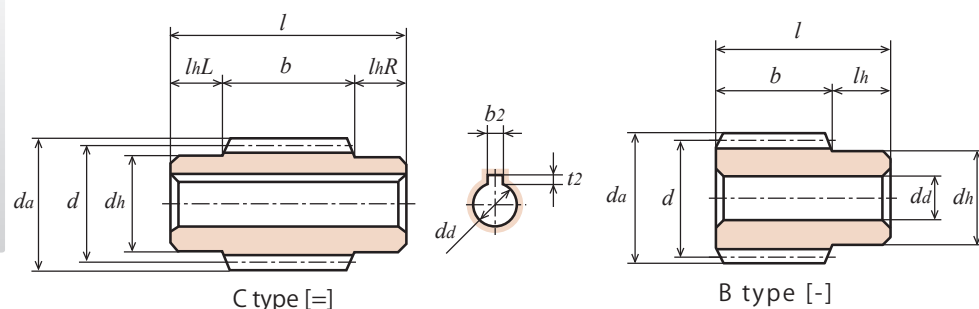
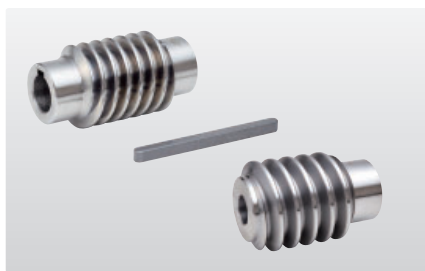
1B type [-]



1B type [=]



| Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N · m) |            |            |              |              |              |              | Backlash ①<br>(Unit: mm) | Catalogue number     |
|----------------------------------------------------------------------------------------------------|------------|------------|--------------|--------------|--------------|--------------|--------------------------|----------------------|
| Surface durability ②                                                                               |            |            |              |              |              |              |                          |                      |
| 100<br>rpm                                                                                         | 250<br>rpm | 500<br>rpm | 1,000<br>rpm | 1,200<br>rpm | 1,500<br>rpm | 1,800<br>rpm |                          |                      |
| 14.504                                                                                             | 11.466     | 9.310      | 7.350        | 6.860        | 6.370        | 5.880        | 0.08 to 0.20             | <b>G2A 20R2 — 10</b> |
| 14.949                                                                                             | 12.250     | 10.094     | 8.134        | 7.644        | 7.154        | 6.664        |                          | <b>G2A 20R1— 10</b>  |
| 14.504                                                                                             | 11.466     | 9.310      | 7.350        | 6.860        | 6.370        | 5.880        |                          | <b>G2A 20L2 — 10</b> |
| 12.936                                                                                             | 12.250     | 10.094     | 8.134        | 7.644        | 7.154        | 6.664        |                          | <b>G2A 20L1 — 10</b> |
| 22.932                                                                                             | 18.816     | 15.582     | 12.642       | 11.956       | 11.172       | 10.486       |                          | <b>G2A 25R1— 12</b>  |
| 22.932                                                                                             | 18.816     | 15.582     | 12.642       | 11.956       | 11.172       | 10.486       |                          | <b>G2A 25L1 — 12</b> |
| 32.144                                                                                             | 26.656     | 22.246     | 18.130       | 17.150       | 15.974       | 14.994       |                          | <b>G2A 30R1— 12</b>  |
| 32.144                                                                                             | 26.656     | 22.246     | 18.130       | 17.150       | 15.974       | 14.994       |                          | <b>G2A 30L1 — 12</b> |

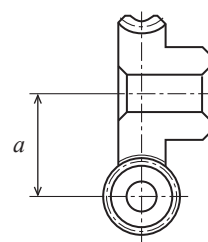
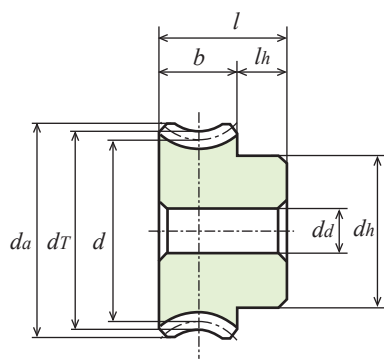


Unit: mm

| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | S45C     | 20°            | Cutting                |

★ No surface treatment is applied. Gears with a [-] are provided with key grooves and keys.

| Catalogue number | Hand of helix | Number of threads<br>$z$ | Reference diameter<br>$d$ | Tip diameter<br>$d_a$ | Type | Face width<br>$b$ | Hole diameter<br>$d_d(H8)$ | Hub diameter<br>$d_h$ | Hub length |          | Overall length<br>$l$ | Key groove<br>$b_2 \times t_2$ | Lead angle<br>$\gamma$ | Weight<br>$W(kg)$ |
|------------------|---------------|--------------------------|---------------------------|-----------------------|------|-------------------|----------------------------|-----------------------|------------|----------|-----------------------|--------------------------------|------------------------|-------------------|
|                  |               |                          |                           |                       |      |                   |                            |                       | $l_{hL}$   | $l_{hR}$ |                       |                                |                        |                   |
| W2.5S R1 – B     | R             | 1                        | $\phi 37$                 | $\phi 42$             | B    | 42                | $\phi 14$                  | $\phi 30$             | -          | 18       | 60                    | -                              | 3°52'                  | 0.37              |
| W2.5S R1 = C     |               | 1                        |                           |                       | C    | 47                | $\phi 16$                  |                       | 14         | 14       | 75                    | 5 × 2.3                        | 3°52'                  | 0.41              |
| W2.5S R2 – B     |               | 2                        |                           |                       | B    | 42                | $\phi 14$                  |                       | -          | 18       | 60                    | -                              | 7°46'                  | 0.37              |
| W2.5S R2 – CF    |               | 2                        |                           |                       | C    | 47                | $\phi 16$                  |                       | 14         | 14       | 75                    | -                              | 7°46'                  | 0.42              |
| W2.5S R2 = C     |               | 2                        |                           |                       | C    | 47                | $\phi 16$                  |                       | 14         | 14       | 75                    | 5 × 2.3                        | 7°46'                  | 0.41              |
| W2.5S L1 – B     | L             | 1                        |                           |                       | B    | 42                | $\phi 14$                  |                       | -          | 18       | 60                    | -                              | 3°52'                  | 0.37              |



Unit: mm

1B type [-]

| Accuracy Class  | Material                            | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|-------------------------------------|----------------|------------------------|---------------------|
| No relevant JIS | CAC702<br>(aluminum bronze casting) | 20°            | Cutting                | See the table below |

★ No surface treatment is applied.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction)

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter       | Tip diameter          | Type | Face width | Hole diameter              | Hub diameter          | Hub length            | Overall length | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight        |
|------------------|------------|-----------------|-------------------------------------|------------------------|-----------------------|-----------------------|------|------------|----------------------------|-----------------------|-----------------------|----------------|-------------------------------|---------------------------------------------|---------------|
|                  | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d</i> <sub>T</sub> | <i>d</i> <sub>a</sub> |      | <i>b</i>   | <i>d</i> <sub>a</sub> (H8) | <i>d</i> <sub>h</sub> | <i>l</i> <sub>h</sub> | <i>l</i>       | <i>a</i>                      |                                             | <i>W</i> (kg) |
| G2.5A 20R2 — 12  | 1 : 10     | 20              | φ 50                                | -0.092                 | φ 55                  | φ 58.8                | 1B   | 24         | φ 12                       | φ 40                  | 16                    | 40             | 43.5                          | R2                                          | 0.50          |
| G2.5A 20R1 — 12  | 1 : 20     |                 |                                     | -0.022                 |                       |                       |      |            |                            |                       |                       |                |                               | R1                                          | 0.50          |
| G2.5A 30R2 — 14  | 1 : 15     | 30              | φ 75                                | -0.138                 | φ 80                  | φ 83.8                |      |            | φ 14                       | φ 50                  |                       |                | 56                            | R2                                          | 1.02          |
| G2.5A 30R1 — 14  | 1 : 30     |                 |                                     | -0.034                 |                       |                       |      |            |                            |                       |                       |                |                               | R1                                          | 1.02          |
| G2.5A 30L1 — 14  | 1 : 30     |                 |                                     | -0.034                 |                       |                       |      |            |                            |                       |                       |                |                               | L1                                          | 1.02          |

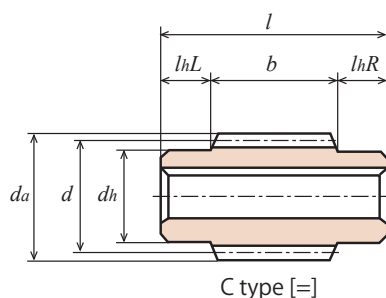
| Catalogue number | Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N・m) |            |            |              |              |              |              | Backlash ①<br>(Unit: mm) |
|------------------|--------------------------------------------------------------------------------------------------|------------|------------|--------------|--------------|--------------|--------------|--------------------------|
|                  | Surface durability ②                                                                             |            |            |              |              |              |              |                          |
|                  | 100<br>rpm                                                                                       | 250<br>rpm | 500<br>rpm | 1,000<br>rpm | 1,200<br>rpm | 1,500<br>rpm | 1,800<br>rpm |                          |
| G2.5A 20R2 — 12  | 26.166                                                                                           | 20.580     | 16.758     | 13.328       | 12.446       | 11.368       | 10.486       | 0.08 to 0.20             |
| G2.5A 20R1 — 12  | 27.048                                                                                           | 22.050     | 18.130     | 14.700       | 13.818       | 12.838       | 11.956       |                          |
| G2.5A 30R2 — 14  | 56.448                                                                                           | 45.276     | 37.142     | 29.792       | 28.028       | 25.970       | 24.010       | 0.15 to 0.3              |
| G2.5A 30R1 — 14  | 58.016                                                                                           | 47.922     | 39.984     | 32.536       | 30.772       | 28.616       | 26.656       |                          |
| G2.5A 30L1 — 14  | 58.016                                                                                           | 47.922     | 39.984     | 32.536       | 30.772       | 28.616       | 26.656       |                          |

# W : Worm G : Worm Wheel

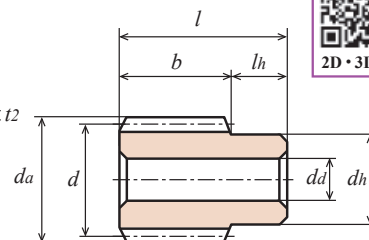
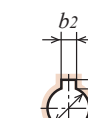


## Normal Module 3

## (Full Depth Tooth)



C type [=]



B type [-]



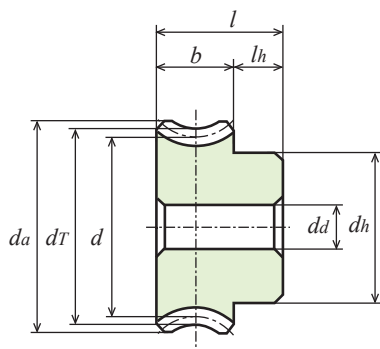
2D • 3D CAD

Unit: mm

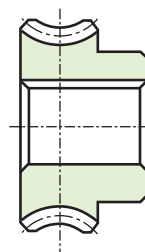
| Accuracy Class  | Material | Pressure angle | Teeth machining method |
|-----------------|----------|----------------|------------------------|
| No relevant JIS | S45C     | 20°            | Cutting                |

★ No surface treatment is applied. Gears with a [=] are provided with key grooves and keys.

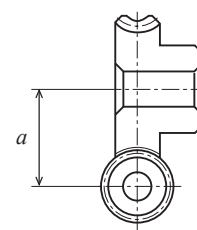
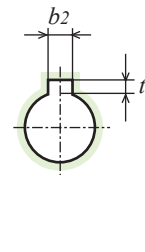
| Catalogue number | Hand of helix | Num-ber of threads<br>z | Refer-ence diameter<br>d | Tip diameter<br>da | Type | Face width<br>b | Hole diameter<br>da(H8) | Hub diameter<br>dh | Hub length |     | Overall length<br>l | Key groove<br>b2 × t2 | Lead angle<br>γ | Weight<br>W(kg) |
|------------------|---------------|-------------------------|--------------------------|--------------------|------|-----------------|-------------------------|--------------------|------------|-----|---------------------|-----------------------|-----------------|-----------------|
|                  |               |                         |                          |                    |      |                 |                         |                    | lhL        | lhR |                     |                       |                 |                 |
| W3S R1 – B       | R             | 1                       | φ44                      | φ50                | B    | 50              | φ16                     | φ36                | -          | 20  | 70                  | -                     | 3°55'           | 0.62            |
| W3S R1 – CF      |               | 1                       |                          |                    | C    | 55              | φ20                     |                    | 15         | 15  | 85                  | -                     | 3°55'           | 0.67            |
| W3S R1 = C       |               | 1                       |                          |                    | C    | 55              | φ20                     |                    | 15         | 15  | 85                  | 6 × 2.8               | 3°55'           | 0.66            |
| W3S R2 – B       |               | 2                       |                          |                    | B    | 50              | φ16                     |                    | -          | 20  | 70                  | -                     | 7°50'           | 0.62            |
| W3S R2 – CF      |               | 2                       |                          |                    | C    | 55              | φ20                     |                    | 15         | 15  | 85                  | -                     | 7°50'           | 0.67            |
| W3S R2 = C       |               | 2                       |                          |                    | C    | 55              | φ20                     |                    | 15         | 15  | 85                  | 6 × 2.8               | 7°50'           | 0.66            |
| W3S L1 – B       | L             | 1                       |                          |                    | B    | 50              | φ16                     |                    | -          | 20  | 70                  | -                     | 3°55'           | 0.62            |
| W3S L1 = C       |               |                         |                          |                    | C    | 55              | φ20                     |                    | 15         | 15  | 85                  | 6 × 2.8               | 3°55'           | 0.66            |



1B type [-]



1B type [=]



Unit: mm

| Accuracy Class  | Material                            | Pressure angle | Teeth machining method | Backlash ①          |
|-----------------|-------------------------------------|----------------|------------------------|---------------------|
| No relevant JIS | CAC702<br>(aluminum bronze casting) | 20°            | Cutting                | See the table below |

★ No surface treatment is applied. Gears with a [=] are provided with key grooves and keys.

★ This allowable transfer capability table was prepared by using the Lewis formula. For the unit conversion method, refer to P. 20 in "References."

① Backlash when an appropriate combination of a worm and a worm wheel are meshed. (Backlash in the circumferential direction).

② Allowable torque value for the revolutions per minute of each worm.

| Catalogue number | Gear ratio | Number of teeth | Inter-meshing pitch circle diameter | Rack shift coefficient | Throat diameter   | Tip diameter      | Type | Face width | Hole diameter          | Hub diameter      | Hub length            | Overall length | Key groove              | Inter-meshing center distance | Hand of helix and number of threads of worm | Weight        |
|------------------|------------|-----------------|-------------------------------------|------------------------|-------------------|-------------------|------|------------|------------------------|-------------------|-----------------------|----------------|-------------------------|-------------------------------|---------------------------------------------|---------------|
|                  | <i>u</i>   | <i>z</i>        | <i>d</i>                            | <i>x</i>               | <i>d</i> <i>r</i> | <i>d</i> <i>a</i> |      | <i>b</i>   | <i>d</i> <i>a</i> (H8) | <i>d</i> <i>h</i> | <i>l</i> <sub>h</sub> | <i>l</i>       | <i>b</i> 2 × <i>t</i> 2 | <i>a</i>                      |                                             | <i>W</i> (kg) |
| G3A 20R2 — 16    | 10         | 20              | φ 60                                | -0.094                 | φ 66              | φ 70.5            | 1B   | 28         | φ16                    | φ48               | 17                    | 45             | -                       | 52                            | R2                                          | 0.80          |
| G3A 20R1 — 16    | 20         | 20              |                                     | -0.023                 |                   |                   |      |            | φ16                    |                   |                       |                | -                       |                               | R1                                          | 0.80          |
| G3A 20R1 = 20    |            |                 |                                     |                        |                   |                   |      |            | φ20                    |                   |                       |                | 6 × 2.8                 |                               | R1                                          | 0.77          |
| G3A 20L1 — 16    |            |                 |                                     |                        |                   |                   |      |            | φ16                    |                   |                       |                | -                       |                               | L1                                          | 0.80          |
| G3A 25R1 — 16    | 25         | 25              | φ 75                                | -0.029                 | φ 81              | φ 85.5            |      |            | φ16                    | φ55               | -                     | 59.5           | R1                      | 1.22                          |                                             |               |
| G3A 25L1 — 16    |            |                 |                                     |                        |                   |                   |      |            | -                      | L1                | 1.22                  |                |                         |                               |                                             |               |

| Catalogue number | Allowable transfer torque of worm wheel for different revolutions per minute of worm (Unit: N • m)<br>Surface durability ② |         |         |           |           |           |           | Backlash ①<br>(Unit: mm) |
|------------------|----------------------------------------------------------------------------------------------------------------------------|---------|---------|-----------|-----------|-----------|-----------|--------------------------|
|                  | 100 rpm                                                                                                                    | 250 rpm | 500 rpm | 1,000 rpm | 1,200 rpm | 1,500 rpm | 1,800 rpm |                          |
| G3A 20R2 – 16    | 42.532                                                                                                                     | 33.418  | 26.950  | 21.560    | 20.188    | 18.228    | 16.758    | 0.15 to 0.30             |
| G3A 20R1 – 16    | 44.100                                                                                                                     | 35.868  | 29.302  | 23.716    | 22.344    | 20.580    | 19.012    |                          |
| G3A 20L1 – 16    | 44.100                                                                                                                     | 35.868  | 29.302  | 23.716    | 22.344    | 20.580    | 19.012    |                          |
| G3A 25R1 – 16    | 67.326                                                                                                                     | 55.076  | 45.276  | 36.848    | 34.790    | 31.948    | 29.694    |                          |
| G3A 25L1 – 16    | 67.326                                                                                                                     | 55.076  | 45.276  | 36.848    | 34.790    | 31.948    | 29.694    |                          |

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES

CONTENTS

INFORMATION

GEARBOXES

ANTI-BACKLASH  
SPUR GEARS

SPUR GEARS

RACKS

HELICAL GEARS AND  
SCREW GEARS

MITTER GEARS

BEVEL GEARS

WORMS AND WORM  
WHEELS

REFERENCES

# References (for KG Metric gears)

For detailed information on gears, please refer to the separate "Technical Data"



## Contents

|                                                                                                                                                 |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>1. Fundamental dimensions for various sizes of Tooth profile</b>                                                                             | <b>1</b>  |
| (1) Module $m$ (Unit: mm)                                                                                                                       | 1         |
| (2) Diametral pitch $P$ or $DP$                                                                                                                 | 1         |
| (3) Circular pitch $CP$                                                                                                                         | 1         |
| <b>2. Advise on gear assembly</b>                                                                                                               | <b>3</b>  |
| <b>3. Centre distance for spur and helical gears</b>                                                                                            | <b>4</b>  |
| (1) Accuracy standard for spur and helical gears                                                                                                | 4         |
| (2) Centre distance: Shortest distance from centre of axes of Parallel spur gear pair or gear pair with Non-parallel and Non-intersecting axes. | 4         |
| <b>4. Parallelism of axis for spur and helical gears</b>                                                                                        | <b>4</b>  |
| (1) Application range                                                                                                                           | 4         |
| (2) Definition of terms                                                                                                                         | 5         |
| (3) Allowable value                                                                                                                             | 5         |
| <b>5. Measurement of the backlash</b>                                                                                                           | <b>7</b>  |
| (1) Backlash of Bevel gear pair                                                                                                                 | 7         |
| (2) Backlash of Worm gear pair                                                                                                                  | 8         |
| <b>6. Tooth bearings</b>                                                                                                                        | <b>9</b>  |
| <b>7. Gear efficiency</b>                                                                                                                       | <b>11</b> |
| <b>8. Lubricating oil for gears</b>                                                                                                             | <b>12</b> |
| (1) Purpose of using lubricating oil                                                                                                            | 12        |
| (2) Method of lubricating oil                                                                                                                   | 12        |
| (3) Proper level of lubricating oil                                                                                                             | 13        |
| (4) Features of Polyacetal gear                                                                                                                 | 14        |
| (5) Combination of gear materials                                                                                                               | 14        |
| <b>9. Cause and solution for noise and oscillation</b>                                                                                          | <b>15</b> |
| <b>10. The vocabulary of gear and gear terms</b>                                                                                                | <b>16</b> |

|                                                                                                    |           |
|----------------------------------------------------------------------------------------------------|-----------|
| <b>11. Interpretation of Allowable capability torque table. ....</b>                               | <b>17</b> |
| (1) Bending Strength and Surface Durability for Spur and Helical gears. ....                       | 17        |
| (2) Bending strength and Surface durability for Bevel gears. ....                                  | 18        |
| (3) Surface durability of Cylindrical worm gear pair. ....                                         | 18        |
| <b>12. While examination of Bending strength from the Allowable transfer capability table.....</b> | <b>19</b> |
| For example 1. To calculate Allowable transfer torque: $T[N.m]$ .....                              | 19        |
| For example 2. To select KG-STOCK GEARS from usage condition of Spur gear. ....                    | 20        |
| The Conversion formula of Power .....                                                              | 20        |
| <b>13. Conversion table for SI units (International System of Units).....</b>                      | <b>21</b> |
| <b>14. Standardizing the coordination between ISO and JIS .....</b>                                | <b>22</b> |
| Introduction .....                                                                                 | 22        |
| Precision of KG STOCK GEARS. ....                                                                  | 22        |
| <b>Hardness conversion table.....</b>                                                              | <b>24</b> |
| Approximate conversion values compared with Vickers hardness of Steel .....                        | 24        |
| Approximate converted values compared with Rockwell hardness for Steel.....                        | 26        |
| <b>Commonly used fitting tolerances for bore dimensions .....</b>                                  | <b>28</b> |
| <b>Commonly used fitting tolerances for axis dimensions .....</b>                                  | <b>30</b> |
| <b>Metric coarse and fine screw threads,<br/>and reference pilot hole dimensions.....</b>          | <b>32</b> |
| <b>Spot facing and Thread hole for Hexagon socket head cap screws .....</b>                        | <b>33</b> |
| <b>Shape and dimensions of keyway for parallel key .....</b>                                       | <b>34</b> |
| <b>C-type retaining ring for shaft (reference) .....</b>                                           | <b>37</b> |
| <b>C-type retaining ring for hole (reference) .....</b>                                            | <b>38</b> |
| <b>E-type retaining ring (reference).....</b>                                                      | <b>39</b> |
| <b>Explanation of material notation .....</b>                                                      | <b>39</b> |



# 1. Fundamental dimensions for various sizes of Tooth profile

There are three types of formulas to calculate various sizes of Tooth profile.

## (1) Module $m$ (Unit: mm)

Reference pitch divided by  $\pi$  is module, which defines the size of tooth in metric gear. If value of Reference diameter  $d(\text{mm})$  divided by Number of teeth  $z$  increases, tooth capacity increases proportionately.

$$\text{Module } m = \frac{\text{Reference diameter } d}{\text{Number of teeth } z} \quad (\text{mm}) \quad \text{Tip (Outside) diameter is defined as } d_a,$$

calculation formula is  $m = \frac{d_a}{z + 2}$ . Refer to Fig. 1-1 for a full-scale drawing.

## (2) Diametral pitch $P$ or $DP$

Diametral pitch is size of tooth expressed in teeth per inch of pitch diameter. Formula of calculation is given as Number of teeth  $z$  divided by Reference diameter  $d$  (inch). Capacity of tooth profile increases and decreases inversely proportional to the numerical sum.

$$DP = \frac{\text{Number of teeth } z}{\text{Reference diameter } d \text{ (inch)}} \quad (\text{An absolute number}) \quad \text{Tip (Outside) diameter defined as } d_a,$$

$$\text{Calculation formula of } DP = \frac{z + 2}{d_a \text{ (in)}}$$

There is a relationship between module and Diametral pitch. (Comparison between module and Diametral pitch)

$$m = \frac{25.4}{DP} \quad (\text{mm}) \quad DP = \frac{25.4}{m}$$

## (3) Circular pitch $CP$

This is length of centre distance between adjacent teeth divided by arc circle of pitch circle. Calculated by circumference of pitch circle divided by number of teeth.

$$CP = \frac{\text{Circumference of Pitch circle } (\pi \times d)}{\text{Number of teeth } z} \quad (\text{mm})$$

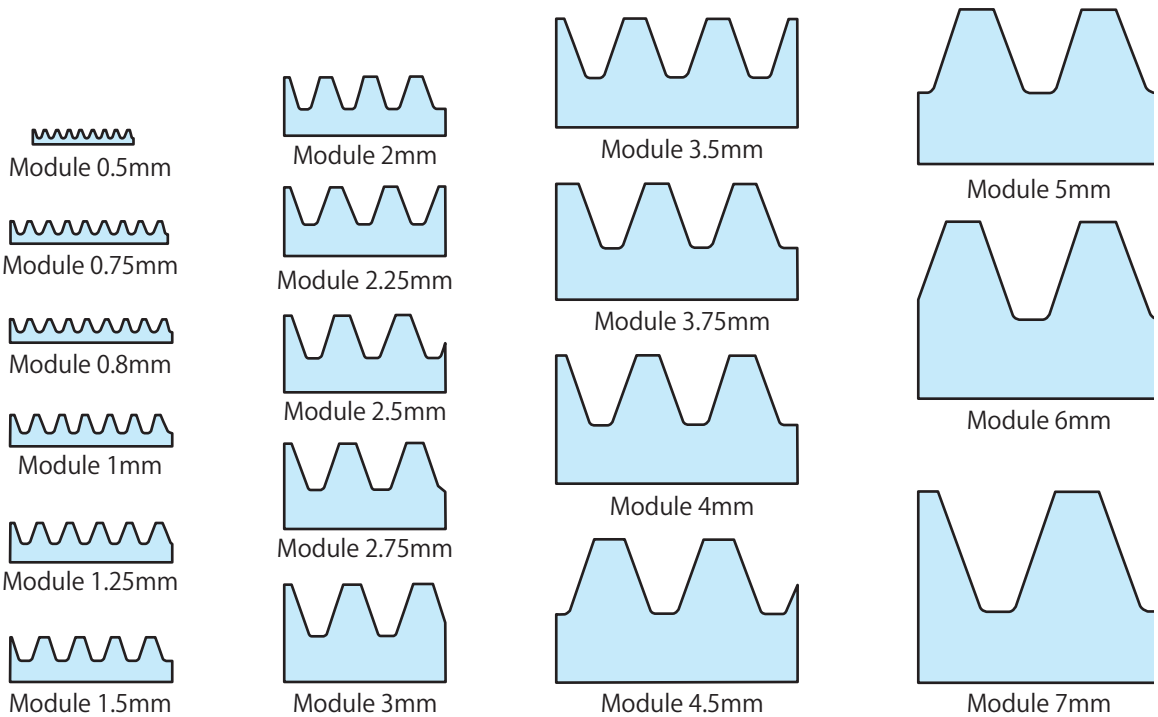


Fig. 1-1 Full-scale drawing of module

Note that  $\pi$  is ratio of the circumference of a circle to its diameter as  $\pi=3.14159 \dots$

Where Tip(outside) diameter  $d_a$ , calculation of  $CP = \frac{\pi \times d_a}{z + 2}$  (mm)

The 3 categories for size of Tooth profile mentioned above are widely used. In particular, Circular pitch CP is used to control traveling distance and positioning.

The standardization of module is shown by the following classification. Introduced in Japanese Industrial Standards

**JIS B 1701-2: 1999** Cylindrical gear- Involute tooth profile and Article 2-Module and Appendix of the same standard (stipulation). Also shown below is classification not stipulated for Involute tooth profile cylindrical gear below module 1 in **ISO 54**.

**Table 1-1. Standard value for module of Cylindrical gear.**

Unit : mm

| I   | II   | I    | II    | I  | II    | I  | II |
|-----|------|------|-------|----|-------|----|----|
| 0.1 |      | 1    |       |    | 5.5   | 25 |    |
|     | 0.15 |      | 1.125 | 6  |       |    | 28 |
| 0.2 |      | 1.25 |       |    | (6.5) | 32 |    |
|     | 0.25 |      | 1.375 |    | 7     |    | 36 |
| 0.3 |      | 1.5  |       | 8  |       | 40 |    |
|     | 0.35 |      | 1.75  |    | 9     |    | 45 |
| 0.4 |      | 2    |       | 10 |       | 50 |    |
|     | 0.45 |      | 2.25  |    | 11    |    |    |
| 0.5 |      | 2.5  |       | 12 |       |    |    |
|     | 0.55 |      | 2.75  |    | 14    |    |    |
| 0.6 |      | 3    |       | 16 |       |    |    |
|     | 0.7  |      | 3.5   |    | 18    |    |    |
|     | 0.75 | 4    |       | 20 |       |    |    |
| 0.8 |      |      | 4.5   |    | 22    |    |    |
|     | 0.9  | 5    |       |    |       |    |    |

It is advisable to select column-I of module (priority selection) as far as possible.

It is not advisable to select the module 6.5 as seen in column-II.

The standardization of module for Bevel gear is shown by the following classification. Introduced in **JIS B 1706-2: 1999** Straight bevel gear- Article 2-Module and Diametral pitch and Appendix of the same standard (stipulation). Also shown below is classification not stipulated for Straight bevel gear below module 1 in **ISO 678**. However the Diametral pitch is omitted here.

**Table 1-2. Standard value for module of straight bevel gear.**

Unit : mm

| I   | II   | I    | II    | I  | II    |
|-----|------|------|-------|----|-------|
| 0.3 |      | 1    |       |    | 3.5   |
|     | 0.35 |      | 1.125 | 4  |       |
| 0.4 |      | 1.25 |       |    | 4.5   |
|     | 0.45 |      | 1.375 | 5  |       |
| 0.5 |      | 1.5  |       |    | 5.5   |
|     | 0.55 |      | 1.75  | 6  |       |
| 0.6 |      | 2    |       |    | (6.5) |
|     | 0.7  |      | 2.25  |    | 7     |
|     | 0.75 | 2.5  |       | 8  |       |
| 0.8 |      |      | 2.75  |    | 9     |
|     | 0.9  | 3    |       | 10 |       |

It is advisable to select column-I of module (priority selection) as far as possible.

It is not advisable to select the module 6.5 as seen in column-II.

**Table 1-3. Comparison tables between module and Diametral pitch.**

Unit : mm

|                 |       |       |       |       |       |       |       |       |       |       |       |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Module          | 9     | 8.467 | 8     | 7.257 | 7     | 6.35  | 6     | 5.08  | 5     | 4.233 | 4     |
| Diametral pitch | 2.822 | 3     | 3.175 | 3.5   | 3.629 | 4     | 4.233 | 5     | 5.08  | 6     | 6.35  |
| Tooth depth     | 20.25 | 19.05 | 18.00 | 16.33 | 15.75 | 14.29 | 13.50 | 11.43 | 11.25 | 9.52  | 9.00  |
| Pitch           | 28.27 | 26.60 | 25.13 | 22.80 | 21.99 | 19.95 | 18.85 | 15.96 | 15.71 | 13.30 | 12.57 |

|                 |       |       |       |      |       |      |       |       |        |       |       |
|-----------------|-------|-------|-------|------|-------|------|-------|-------|--------|-------|-------|
| Module          | 3.629 | 3.5   | 3.175 | 3    | 2.822 | 2.54 | 2.5   | 2.309 | 2.25   | 2.117 | 2     |
| Diametral pitch | 7     | 7.257 | 8     | 8.47 | 9     | 10   | 10.16 | 11    | 11.289 | 12    | 12.70 |
| Tooth depth     | 8.17  | 7.88  | 7.14  | 6.75 | 6.35  | 5.72 | 5.63  | 5.20  | 5.06   | 4.76  | 4.50  |
| Pitch           | 11.40 | 11.00 | 9.98  | 9.43 | 8.87  | 7.98 | 7.85  | 7.25  | 7.07   | 6.65  | 6.28  |

|                 |       |        |       |        |       |      |       |      |       |        |      |
|-----------------|-------|--------|-------|--------|-------|------|-------|------|-------|--------|------|
| Module          | 1.814 | 1.75   | 1.588 | 1.5    | 1.411 | 1.27 | 1.25  | 1    | 0.8   | 0.75   | 0.5  |
| Diametral pitch | 14    | 14.514 | 16    | 16.933 | 18    | 20   | 20.32 | 25.4 | 31.75 | 33.867 | 50.8 |
| Tooth depth     | 4.08  | 3.94   | 3.57  | 3.38   | 3.17  | 2.86 | 2.81  | 2.25 | 1.80  | 1.69   | 1.13 |
| Pitch           | 5.70  | 5.50   | 4.99  | 4.71   | 4.43  | 3.99 | 3.93  | 3.14 | 2.51  | 2.36   | 1.57 |

Note that Tooth depth is calculated with Bottom clearance as  $C = 0.25 \times \text{module}$  (Unit: mm)

## 2. Advice on gear assembly

When assembling the gear pair, please note the following recommended points.

### (1) Beware of gear with scratches and rust, handle gear with care.

Small scratch marks may cause noise.

### (2) Measure the backlash.

Backlash regardless big or small causes noise. It is necessary to maintain proper backlash. If not, it is necessary to adjust centre distance. For details on KG-Backlash, please refer to Information page for each products.

### (3) Confirm tooth bearing.

Noise and oscillation is caused by poor tooth contact. Poor tooth bearing also harms the durability of the gear. Please refer to section 6 in References for more on tooth contact.

### (4) Use suitable type of lubricating oil in proper amounts.

Refer to section 8 in References for suitable type of lubricating oil in proper amounts.

### (5) Perform warm up and test run.

#### Importance of worm gear test run

We recommend that warm up and test run be performed before actual operations in order to improve hardness and strength of tooth flank.

(When applying Heat treatment to pinion only) Especially for Worm gear pair, warm up and test run is recommended to improve area of tooth bearing and surface strength.

Tooth profile for Worm gear pair has complicated curved surface compared with other gears making it difficult to fabricate Worm gear pair with improved accuracy. There are limitations to surface roughness when processed with lath only.

It is necessary to perform warm up and test run for Worm gear pair. Do not apply full load or close to full load to Worm gear pair or scuffing will occur easily.

For Warm up and Test run, gives improved evenness of tooth flank and increased tooth contact area (per square measure), which reduces the load (per square measure). It will also improve wear resistance against work hardening of tooth flank.

Therefore it provides a longer lifespan for the gear and reduces the noise level and oscillation.

#### How to worm gear test run

Method of Warm up and Test run. Firstly check the tooth contact while applying empty load and then gradually increase load to the gear.

We recommend changing all the lubricating oil after warm up and test run. Subsequently we recommend that the lubricating oil be changed every 6 months or 25,000 hours whichever comes first.

### (6) In addition, take note of dynamic balance and assembling method as recommended.

Please make final adjustments according to the actual operation status.

### 3. Centre distance for Spur and Helical gears

Gear assembly with accurate working centre distance is recommended for Spur and Helical gears. Fig. 3-1 shows an extract from the Allowable deviations of Centre distance for Spur and Helical gears as defined in JGMA 1101-1 (2000 Japan Gear Manufacturing Association).

#### Allowable tolerance for Centre distance

##### (1) Accuracy standard for Spur and Helical gears

Table 3-1 shows Allowable deviation of Centre distance for classes N3 to N12 gears of JIS B 1702-1 and JIS B 1702-2 (covers only ground and hobbing gears)

##### (2) Centre distance: Shortest distance from centre of axes of Parallel spur gear pair or gear pair with Non-parallel and Non-intersecting axes.

For example,

##### 1. Case of spur gear

Module is 0.5, Number of teeth is 20 : Half of reference diameter is 5

Module is 0.5, Number of teeth is 25 : Half of reference diameter is 6.25

Center distance above is 11.25mm

##### 2. Case of Helical gear (Normal module), Refer to the product page for reference diameter of the standard product.

Module is 1.5, Number of teeth is 13 : Half of reference diameter is 13.79

Module is 1.5, Number of teeth is 26 : Half of reference diameter is 27.575

Center distance above is 41.365mm

Table 3-1. Allowable tolerances of Centre distance for the gear

\*The above chart uses  $\pm$  symbol. It is recommended to use positive side tolerances for External gear pair and negative side tolerance for Internal gear pair.

Unit:  $\mu\text{m}$

| System of accuracy<br>a = Centre distance (mm) | N3, N4   | N5, N6    | N7, N8    | N9, N10   | N11, N12  |
|------------------------------------------------|----------|-----------|-----------|-----------|-----------|
| $5.0 < a \leq 20.0$                            | $\pm 6$  | $\pm 10$  | $\pm 16$  | $\pm 26$  | $\pm 65$  |
| $20.0 < a \leq 50.0$                           | $\pm 8$  | $\pm 12$  | $\pm 20$  | $\pm 31$  | $\pm 80$  |
| $50.0 < a \leq 125.0$                          | $\pm 12$ | $\pm 20$  | $\pm 32$  | $\pm 50$  | $\pm 125$ |
| $125.0 < a \leq 280.0$                         | $\pm 16$ | $\pm 26$  | $\pm 40$  | $\pm 65$  | $\pm 160$ |
| $280.0 < a \leq 560.0$                         | $\pm 22$ | $\pm 35$  | $\pm 55$  | $\pm 88$  | $\pm 220$ |
| $560.0 < a \leq 1,000.0$                       | $\pm 28$ | $\pm 45$  | $\pm 70$  | $\pm 115$ | $\pm 280$ |
| $1,000.0 < a \leq 1,600.0$                     | $\pm 39$ | $\pm 62$  | $\pm 98$  | $\pm 155$ | $\pm 390$ |
| $1,600.0 < a \leq 2,500.0$                     | $\pm 55$ | $\pm 88$  | $\pm 140$ | $\pm 220$ | $\pm 550$ |
| $2,500.0 < a \leq 4,000.0$                     | $\pm 84$ | $\pm 130$ | $\pm 205$ | $\pm 330$ | $\pm 825$ |

### 4. Parallelism of axes for Spur and Helical gears

Extract from JGMA1102 (2000) is as follows.

**0. Preface:** This standard stipulates Allowable value of parallel accuracy for Spur and Helical gears.

Basically, these standards are consistent with recommended values from ISO/TR10064-3 (1996).

#### (1) Application range

This standard stipulates the parallel accuracy for steel-made Involute spur and helical gears. Therefore gears covered by this standard are simply called Gear.

1) Normal module: 0.5 to 70.0 (mm)

2) Reference diameter: 5.0 to 10,000.0 (mm)

3) Facewidth: From 4.0 to 1,000.0 (mm)

Remark 1. Double helical gear axis is also covered.

Remark 2. The above mentioned Standard is quoted from:

ISO/TR 10064-3 (1996) Cylindrical gears- Code of inspection practice- Part 3

JIS B 0102 (1999) International gear notation - Symbols for geometrical data

JIS B 1702-1 (1998) Cylindrical gears- ISO System of accuracy Classification-Article 1:

Definition and allowable values of deviations relevant to corresponding flanks of the gear teeth.

ISO/TR 10064-3 (1996) Cylindrical gears- Code of Inspection Practice- Part 3

## (2) Definition of terms

Definition for this standard is from JIS B 0102 (1999) (Terms of Tooth Flank-Geometric Definition) and following details.

- 1) **Parallel accuracy of axis:** Composes of accuracy of parallel deviation and Non-parallel and Non-intersection deviations.
- 2) **Parallel deviation of axis:** Distance between C and O<sup>(1)</sup> (Refer to Fig. 4-1) where both ends of measurement distance L on the a-axis on one side of the gear are points A and B; and Flat face H is surface to include one of the points A and one of shaft centre b (b-axis); and flat face V is surface through point A and parallel to b and perpendicular to flat face H, and orthogonal projection of point B to H is C.  
Note(1): Point O is base of tolerance among perpendicular flat face S, V, H and B.
- 3) Refer to Fig.4-1, **deviation for Non-parallel and Non-intersecting axes:** Distance between points O and D where D is orthogonal projection of point B to V, referring to above (2).

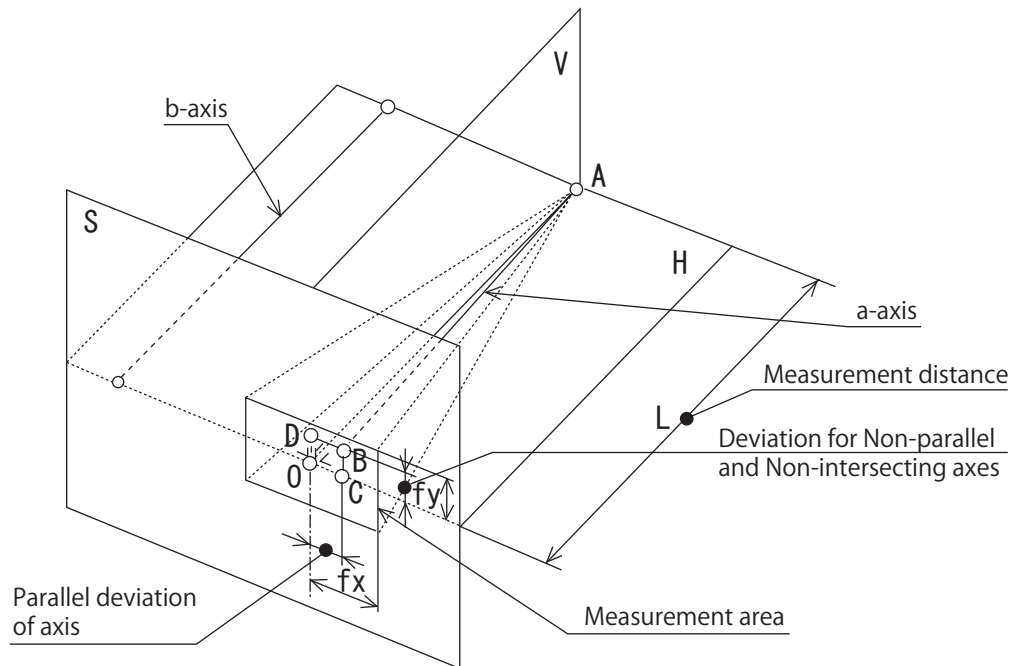


Fig. 4-1 Deviations for Parallel axis,  
Non-parallel and Non-intersecting axes.

## (3) Allowable value

Allowable value for parallel accuracy of gear axis is met with System of accuracy N10 to N12 in JIS B1702-1 (1998) as follows,

- 1) Allowable value of parallel deviation for axis  $f_x$   
Calculating  $f_x$  for measuring span L of gear axis is as follows,

$$f_x = \frac{L}{b} f_x'$$

Hereby, L : Measuring span (mm)

b : Facewidth (mm), choose smaller dimension of Facewidth (mm) between pinion and gear.

$f_x'$ : Refer to Table 1 ( $\mu\text{m}$ )

2) Allowable value of deviation for Axes of Non-parallel and Non-intersecting  $f_y$ .

Calculation  $f_y$  for measuring span  $L$  of gear axis is as follows,

$$f_y = \frac{L}{b} f_y'$$

Hereby,  $L$ : Measuring span (mm)

$b$ : Facewidth (mm), choose smaller dimension of Facewidth (mm) between pinion and gear.

$f_y'$ : Refer to Table 2 ( $\mu\text{m}$ )

Remark

Depending on purpose of usage and System of accuracy class, which is different from the gear, Allowable value of deviation of parallelism accuracy of axis can be used.

Table 4-1. Allowable values of parallel deviations  $f_x'$  for axis per Facewidth

Unit:  $\mu\text{m}$

| Reference diameter d<br>(mm) | Facewidth b (mm)   | System of Accuracy |     |     |     |     |     |     |    |    |    |     |     |     |
|------------------------------|--------------------|--------------------|-----|-----|-----|-----|-----|-----|----|----|----|-----|-----|-----|
|                              |                    | N0                 | N1  | N2  | N3  | N4  | N5  | N6  | N7 | N8 | N9 | N10 | N11 | N12 |
| $5 \leq d \leq 20$           | $4 \leq b \leq 10$ | 1.1                | 1.5 | 2.2 | 3.1 | 4.3 | 6.0 | 8.5 | 12 | 17 | 24 | 35  | 49  | 69  |
|                              | $10 < b \leq 20$   | 1.2                | 1.7 | 2.4 | 3.4 | 4.9 | 7.0 | 9.5 | 14 | 19 | 28 | 39  | 55  | 78  |
|                              | $20 < b \leq 40$   | 1.4                | 2.0 | 2.8 | 3.9 | 5.5 | 8.0 | 11  | 16 | 22 | 31 | 45  | 63  | 89  |
| $20 < d \leq 50$             | $4 \leq b \leq 10$ | 1.1                | 1.6 | 2.2 | 3.2 | 4.5 | 6.5 | 9.0 | 13 | 18 | 25 | 36  | 51  | 72  |
|                              | $10 < b \leq 20$   | 1.3                | 1.8 | 2.5 | 3.6 | 5.0 | 7.0 | 10  | 14 | 20 | 29 | 40  | 57  | 81  |
|                              | $20 < b \leq 40$   | 1.4                | 2.0 | 2.9 | 4.1 | 5.5 | 8.0 | 11  | 16 | 23 | 32 | 46  | 65  | 92  |
| $50 < d \leq 125$            | $4 \leq b \leq 10$ | 1.2                | 1.7 | 2.4 | 3.3 | 4.7 | 6.5 | 9.5 | 13 | 19 | 27 | 38  | 53  | 76  |
|                              | $10 < b \leq 20$   | 1.3                | 1.9 | 2.6 | 3.7 | 5.5 | 7.5 | 11  | 15 | 21 | 30 | 42  | 60  | 84  |
|                              | $20 < b \leq 40$   | 1.5                | 2.1 | 3.0 | 4.2 | 6.0 | 8.5 | 12  | 17 | 24 | 34 | 48  | 68  | 95  |
|                              | $40 < b \leq 80$   | 1.7                | 2.5 | 3.5 | 4.9 | 7.0 | 10  | 14  | 20 | 28 | 39 | 56  | 79  | 111 |
| $125 < d \leq 280$           | $4 \leq b \leq 10$ | 1.3                | 1.8 | 2.5 | 3.6 | 5.0 | 7.0 | 10  | 14 | 20 | 29 | 40  | 57  | 81  |
|                              | $10 < b \leq 20$   | 1.4                | 2.0 | 2.8 | 4.0 | 5.5 | 8.0 | 11  | 16 | 22 | 32 | 45  | 63  | 90  |
|                              | $20 < b \leq 40$   | 1.6                | 2.2 | 3.2 | 4.5 | 6.5 | 9.0 | 13  | 18 | 25 | 36 | 50  | 71  | 101 |
|                              | $40 < b \leq 80$   | 1.8                | 2.6 | 3.6 | 5.0 | 7.5 | 10  | 15  | 21 | 29 | 41 | 58  | 82  | 117 |
| $280 < d \leq 560$           | $10 < b \leq 20$   | 1.5                | 2.1 | 3.0 | 4.3 | 6.0 | 8.5 | 12  | 17 | 24 | 34 | 48  | 68  | 97  |
|                              | $20 < b \leq 40$   | 1.7                | 2.4 | 3.4 | 4.8 | 6.5 | 9.5 | 13  | 19 | 27 | 38 | 54  | 76  | 108 |
|                              | $40 < b \leq 80$   | 1.9                | 2.7 | 3.9 | 5.5 | 7.5 | 11  | 15  | 22 | 31 | 44 | 62  | 87  | 124 |
|                              | $80 < b \leq 160$  | 2.3                | 3.2 | 4.6 | 6.5 | 9.0 | 13  | 18  | 26 | 36 | 52 | 73  | 103 | 146 |

Table 4-2. Allowable values of Non-parallel and Non-intersecting deviations  $f_y'$  for axis per Facewidth

Unit:  $\mu\text{m}$

| Reference diameter d<br>(mm) | Facewidth b (mm) | System of Accuracy |     |     |     |     |     |     |     |     |    |     |     |     |  |
|------------------------------|------------------|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|--|
|                              |                  | N0                 | N1  | N2  | N3  | N4  | N5  | N6  | N7  | N8  | N9 | N10 | N11 | N12 |  |
| 5 ≤ d ≤ 20                   | 4 ≤ b ≤ 10       | 0.5                | 0.8 | 1.1 | 1.5 | 2.2 | 3.1 | 4.3 | 6.0 | 8.5 | 12 | 17  | 24  | 35  |  |
|                              | 10 < b ≤ 20      | 0.6                | 0.9 | 1.2 | 1.7 | 2.4 | 3.4 | 4.9 | 7.0 | 9.5 | 14 | 19  | 28  | 39  |  |
|                              | 20 < b ≤ 40      | 0.7                | 1.0 | 1.4 | 2.0 | 2.8 | 3.9 | 5.5 | 8.0 | 11  | 16 | 22  | 31  | 45  |  |
| 20 < d ≤ 50                  | 4 ≤ b ≤ 10       | 0.6                | 0.8 | 1.1 | 1.6 | 2.2 | 3.2 | 4.5 | 6.5 | 9.0 | 13 | 18  | 25  | 36  |  |
|                              | 10 < b ≤ 20      | 0.6                | 0.9 | 1.3 | 1.8 | 2.5 | 3.6 | 5.0 | 7.0 | 10  | 14 | 20  | 29  | 40  |  |
|                              | 20 < b ≤ 40      | 0.7                | 1.0 | 1.4 | 2.0 | 2.9 | 4.1 | 5.5 | 8.0 | 11  | 16 | 23  | 32  | 46  |  |
| 50 < d ≤ r125                | 4 ≤ b ≤ 10       | 0.6                | 0.8 | 1.2 | 1.7 | 2.4 | 3.3 | 4.7 | 6.5 | 9.5 | 13 | 19  | 27  | 38  |  |
|                              | 10 < b ≤ 20      | 0.7                | 0.9 | 1.3 | 1.9 | 2.6 | 3.7 | 5.5 | 7.5 | 11  | 15 | 21  | 30  | 42  |  |
|                              | 20 < b ≤ 40      | 0.7                | 1.1 | 1.5 | 2.1 | 3.0 | 4.2 | 6.0 | 8.5 | 12  | 17 | 24  | 34  | 48  |  |
|                              | 40 < b ≤ 80      | 0.9                | 1.2 | 1.7 | 2.5 | 3.5 | 4.9 | 7.0 | 10  | 14  | 20 | 28  | 39  | 56  |  |
| 125 < d ≤ 280                | 4 ≤ b ≤ 10       | 0.6                | 0.9 | 1.3 | 1.8 | 2.5 | 3.5 | 5.0 | 7.0 | 10  | 14 | 20  | 29  | 40  |  |
|                              | 10 < b ≤ 20      | 0.7                | 1.0 | 1.4 | 2.0 | 2.8 | 4.0 | 5.5 | 8.0 | 11  | 16 | 22  | 32  | 45  |  |
|                              | 20 < b ≤ 40      | 0.8                | 1.1 | 1.6 | 2.2 | 3.2 | 4.5 | 6.5 | 9.0 | 13  | 18 | 25  | 36  | 50  |  |
|                              | 40 < b ≤ 80      | 0.9                | 1.3 | 1.8 | 2.6 | 3.6 | 5.0 | 7.5 | 10  | 15  | 21 | 29  | 41  | 58  |  |
| 280 < d ≤ 560                | 10 < b ≤ 20      | 0.8                | 1.1 | 1.5 | 2.1 | 3.0 | 4.3 | 6.0 | 8.5 | 12  | 17 | 24  | 34  | 48  |  |
|                              | 20 < b ≤ 40      | 0.8                | 1.2 | 1.7 | 2.4 | 3.4 | 4.8 | 6.5 | 9.5 | 13  | 19 | 27  | 38  | 54  |  |
|                              | 40 < b ≤ 80      | 1.0                | 1.4 | 1.9 | 2.7 | 3.9 | 5.5 | 7.5 | 11  | 15  | 22 | 31  | 44  | 62  |  |



## 5. Measurement of the backlash

### (1) Backlash of Bevel gear pair

To Measure the backlash for Bevel gear pair, there are two (2) types of measurements. Circumferential backlash  $j_t$  and normal backlash  $j_n$ , which is the same for Spur and Helical gears.

Fix the pinion and put an indicator to outer gear to measure.

Normal pressure angle  $\alpha_n$  and centre (mean) gear tooth of helix angle  $\beta_m$  of Spiral bevel gear have the following relationship between  $j_t$  and  $j_n$ .

$$j_n = j_t \cos \alpha_n \cos \beta_m \quad j_t = j_n / \cos \alpha_n \cos \beta_m$$

(The above calculation formula is for Spiral bevel gear. For Straight bevel gear, it is cosine  $\beta_m = 1$ )

Circumferential backlash for Bevel gear pair is stipulated in JIS B 1705.

In addition to this, there is another method to assemble the Bevel gear with a designated Locating distance. Fix a gear and move the Pinion in axis direction. Measure the amount of movement with an indicator.

Bevel gear has the following relationship between Circumferential backlash  $j_t$  and Locating direction  $j_x$ .

$$\begin{aligned} j_x &= j_t / 2 \tan \alpha_n \sin \delta_i & \text{Straight bevel gear} \\ j_x &= j_n / 2 \tan d_i \sin \delta_i & \text{Spiral bevel gear} \end{aligned}$$

Hereby

$j_n$ : Circumferential backlash at Transverse plane

$$j_n = j_t / \cos \alpha_t$$

$\alpha_t$ : Transverse pressure angle  $\alpha_t = \tan^{-1}(\tan \alpha_n / \cos \beta)$

For example, Straight bevel gear with Pressure angle  $20^\circ$  and gear ratio 1:1. Assuming that Circumferential backlash  $j_t$  is 1.0mm therefore backlash of Locating direction is 1.94mm. Which means it can measure minute backlash to about twice the accuracy.

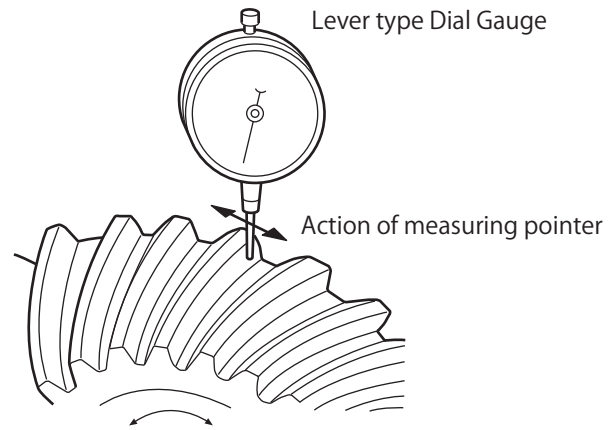


Fig. 5-1 Measurement method of backlash for the Bevel gear (Circumference direction)

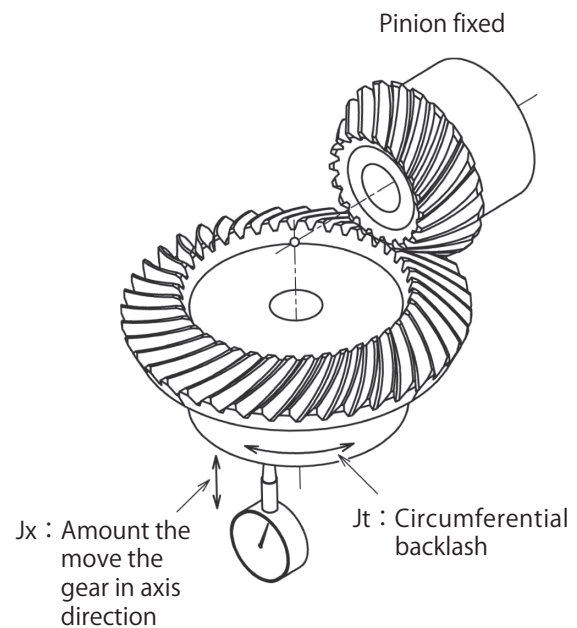
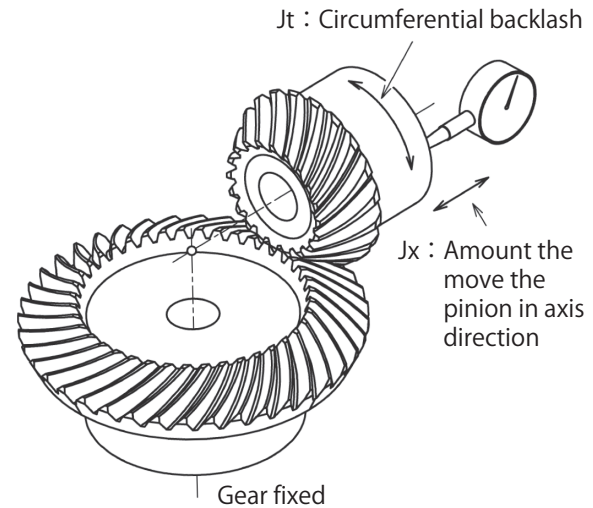


Fig.5-2 Move the pinion in axis direction to measure the backlash.

## (2) Backlash of Worm gear pair

Generally the Worm gear is fixed and indicator is placed to flank of Worm wheel for backlash measurement. This is the same method for both Spur and Helical gears pair.

Shown in backlash value for each product page, value for KG-Worm gear pair with assembled designated centre distance. Due to undefined backlash for Worm gear in JIS currently.

When using worm gear pair for accurate locating and positioning, it is necessary to keep backlash to a minimum. Providing large backlash for power transmission is recommend due to expansion caused by generation of heat. Even though the backlash may be larger, performance of worm gear pair will almost be the same.

Racing angle of Worm gear caused by backlash become a crucial problem occasionally.

Below is the explanation of the calculation formula for racing angle of Worm gear instead of backlash of Worm wheel.

Place an indicator to flank of Worm Wheel as show in Fig. 5-3 to measure circumferential backlash.

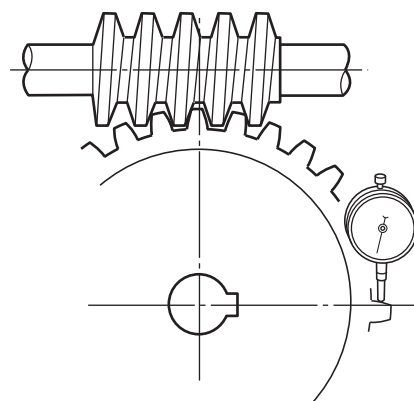


Fig. 5-3 Method of measurement for Worm gear pair (Circumference direction)

For example,

Module is 2.0,

Gear ratio 1 : 30,

Reference diameter of Worm gear is 31.0 mm,

Lead angle of Worm gear is  $3^{\circ}42''$  ,

Lead of Worm gear is 6.2963,

Measurement amount of Circumferential backlash is 0.2 mm.

Calculation formula is as follows.

(Lead) :  $(360^{\circ}) = (\text{Measured circumferential backlash})$   
: (Racing angle of Worm gear) therefore,

$$\text{Racing angle of Worm gear} = \frac{360^{\circ} \times \text{Circumferential backlash}}{\text{Lead}} = 360^{\circ} \times 0.2 / 6.2963 \\ = 11^{\circ}27'$$

Worm gear provides the racing of  $11^{\circ}27'$  .

(Lead of Worm gear : It is the distance of a point on the flank as it moves forward in axis direction when the Worm gear turns one revolution.)

## 6. Tooth bearings

Regardless of how accurate the gear itself may be, poor tooth bearing not only causes oscillation and noise but also have bad effect on gear's life span.

Refer to Fig. 6-1. Extracted **Tooth bearing on gear from JIS B 1741-1977 (old)**

JIS B1741 (old) 「Tooth bearing on Gear」 stipulates percentage of tooth bearing mark as follows.

As for Tooth trace direction, it is percentage (%) of mean value  $b_c$  of Length of tooth bearing for Effective length of trace -  $b'$ . As for Tooth depth direction, it is percentage (%) of mean value  $l_c$  of tooth bearing width for Working depth-  $h'$ .

Note\* For edge of gear tooth with chamfering, Effective length of trace is after deducting chamfered area. For different Effective lengths of Tooth trace between Pinion and Gear, take the shorter side.

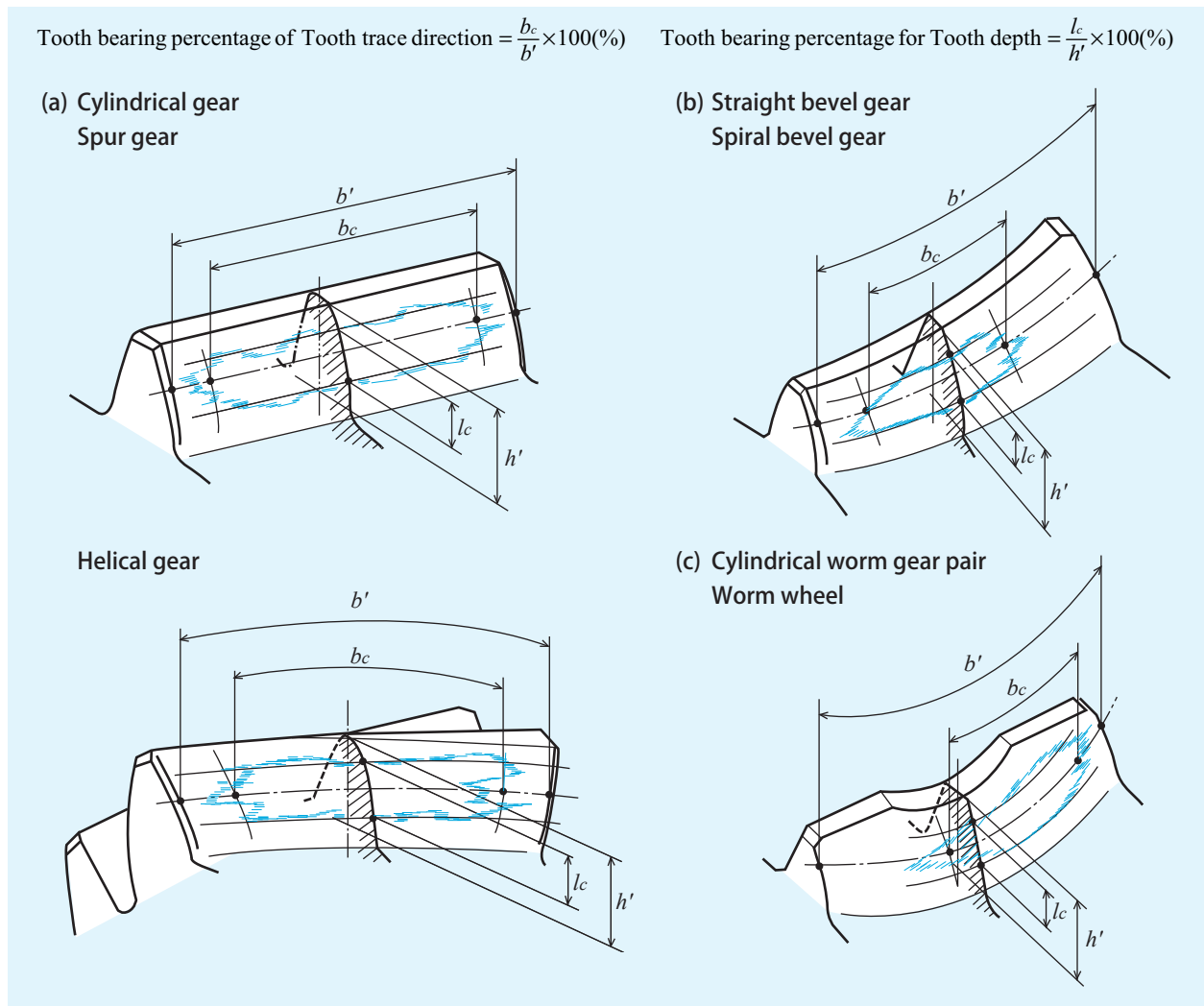


Fig. 6-1 Tooth bearing

Refer to Fig. 6-2 for Bevel gear with Crowning and empty load. It is desirable that centre of tooth bearing in Tooth trace direction is about 60% of Length of tooth trace from heel.

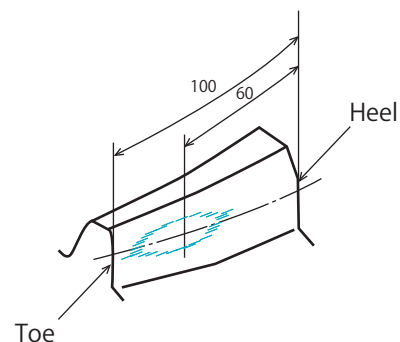


Fig. 6-2 Tooth bearing for Bevel gear with Crowning.

Percentage of tooth bearing for Worm gear pair is for Worm wheel engaged with Worm gear.  
In general, Tooth bearing to inflow side of flank of Worm wheel is not desirable. It is desirable for Tooth bearing centre in Tooth trace direction to be biased towards outflow side to make clearance at inflow side. (Refer to Fig. 6-3)

Fig. 6-3 Tooth bearing for Worm wheel

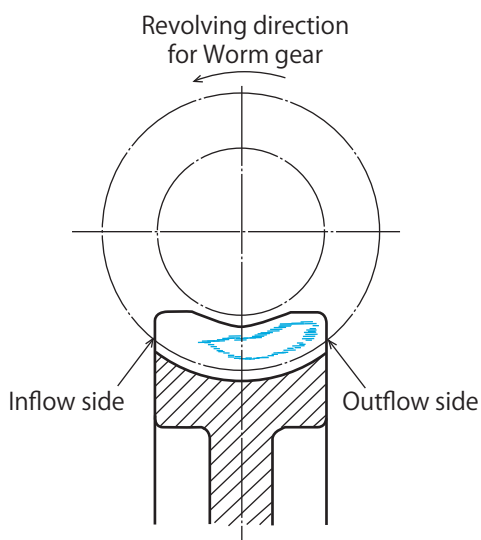


Fig. 6-4 Inflow clearance for Worm gear pair

{A few problems of lubricating oil for Worm gear pair and research work for machine. Volume 8, No. 4 (1956) written by Dr. Waguri and Dr. Ueno from Yokendo Co. Ltd.}

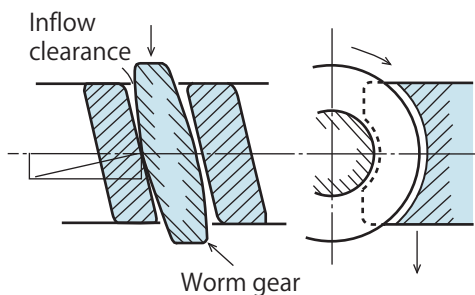


Fig. 6-5 Line of contact for Worm gear pair (2 number of threads) and Tooth bearing for standard Worm gear. Quoted literature is the same as Fig. 6-4.

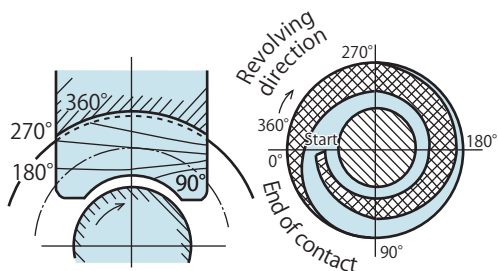
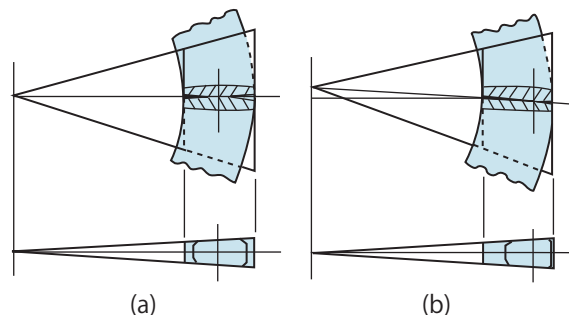


Fig. 6-6 Engagement for Bevel gear with Crowning  
{Gleason Company, INSTALLATION OF BEVEL GEARS (1965)}

#### Coniflex® Bevel Gear

(Straight bevel gear with Crowning)

® mark is Gleason Works trademark



#### Spiral bevel gear

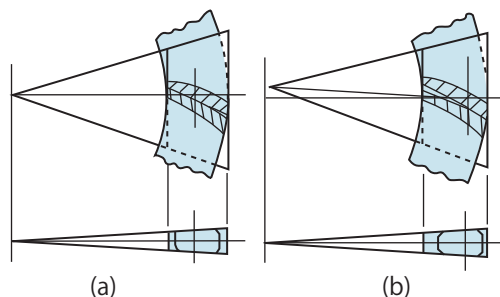
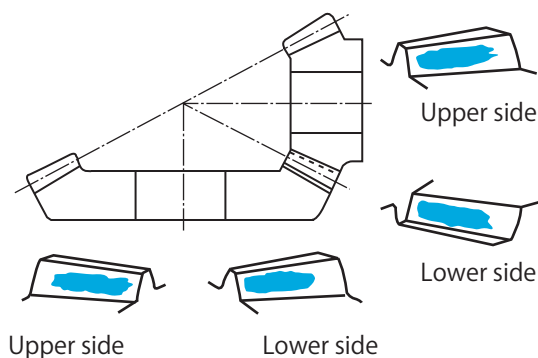


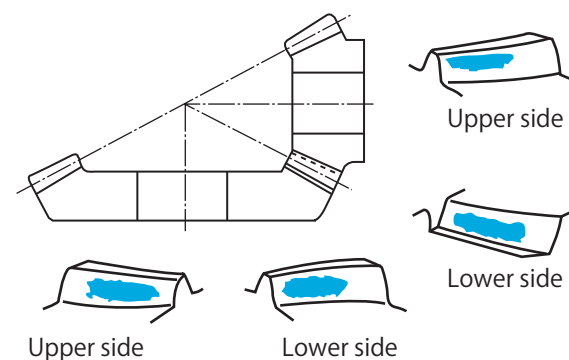
Fig. (a) shows proper assembly method, (b) is assembled off centre from location of Top cone. Please observe the difference in position for Tooth bearing.

Fig.6-7 Ideal tooth bearing for Bevel gear



#### Spiral bevel gear

(Pinion: Shape of teeth is left hand)



Tables 6.1 to 6.4 represents the recommended tooth bearing categories according to gear accuracy grades.

**Table 6-1. Percentage of tooth bearing for Cylindrical gear (Spur and Helical gears)**

| Class | Percentage of tooth bearing                  |                                                |
|-------|----------------------------------------------|------------------------------------------------|
|       | Tooth trace direction                        | Tooth depth direction                          |
| A     | Above 70% of Effective length of Tooth trace | Above 40% of Effective length of Tooth profile |
| B     | Above 50% of Effective length of Tooth trace | Above 30% of Effective length of Tooth profile |
| C     | Above 35% of Effective length of Tooth trace | Above 20% of Effective length of Tooth profile |

**Table 6-2. Percentage of tooth bearing for Worm gear pair (Worm wheel)**

| Class | Percentage of tooth bearing                  |                                                |
|-------|----------------------------------------------|------------------------------------------------|
|       | Tooth trace direction                        | Tooth depth direction                          |
| A     | Above 50% of Effective length of Tooth trace | Above 40% of Effective length of Tooth profile |
| B     | Above 35% of Effective length of Tooth trace | Above 30% of Effective length of Tooth profile |
| C     | Above 20% of Effective length of Tooth trace | Above 20% of Effective length of Tooth profile |

**Table 6-3. Percentage of tooth bearing for Bevel gear**

| Class | Percentage of tooth bearing                  |                                                |
|-------|----------------------------------------------|------------------------------------------------|
|       | Tooth trace direction                        | Tooth depth direction                          |
| A     | Above 50% of effective length of Tooth trace | Above 40% of Effective length of Tooth profile |
| B     | Above 35% of Effective length of Tooth trace | Above 30% of Effective length of Tooth profile |
| C     | Above 25% of Effective length of Tooth trace | Above 20% of Effective length of Tooth profile |

**Table 6-4. Table for Tooth bearing classification and System of accuracy**

| Class | System of accuracy for Cylindrical gear | System of accuracy class for Bevel gear |
|-------|-----------------------------------------|-----------------------------------------|
|       | JIS B 1702-1960 (old)                   | JIS B 1704-1973                         |
| A     | 1, 2                                    | 1, 2                                    |
| B     | 3, 4                                    | 3, 4                                    |
| C     | 5, 6                                    | 5, 6                                    |

## 7. Gear efficiency

(Reference for gears only)

| Types of gear |               | Efficiency of gear |
|---------------|---------------|--------------------|
| Spur gear     |               | 97 - 99%           |
| Helical gear  |               | 97 - 99%           |
| Bevel gear    |               | 96 - 99%           |
| Worm gear     | Single thread | 45 - 55% *         |
|               | Double thread | 55 - 65% *         |

\*Above efficiency values are for KG STOCK GEARS only

## 8. Lubricating oil for Gears

### (1) Purpose of using lubricating oil

Purpose of using lubricating oil for longer life of gear is as follows,

- 1) Avoid metal contact (without oil film) to flank.
- 2) Reduce frictional heat from flank
- 3) Reduce vibration and noise.

In addition, better efficiency with less oscillation and noise can be expected.

Insufficient lubricating oil to flank can cause high oscillation and noise in a short time. Scuffing will occur with the increasing temperature, resulting in damage to the bearing. To prevent such problems, apply suitable lubricating oil to the gear is necessary. Proceed with proper method and amount to gear.

### (2) Method of lubricating oil

Classifications of lubricating oil to gears are as follows,

- 1) Grease lubricating method
- 2) Splash lubricating method (Oil bath or Splash lubrication)
- 3) Forced lubricating method

Selection of Method of lubricating oil can be by types of gears, Circumferential velocity, surface pressure (load applied to gear), finishing condition of flank, hardness of material and combination of materials. However, Circumferential velocity is usually used.

Table 8-1 indicates guide for selecting gear’s lubricating method by circumferential velocity.

Table 8-1 (1) For Spur, Helical and Bevel gears

| Lubrication method        | Circumferential velocity (m/s) |   |    |    |    |
|---------------------------|--------------------------------|---|----|----|----|
|                           | 0                              | 5 | 10 | 15 | 20 |
| Grease lubricating method | →                              |   |    |    |    |
| Splash lubricating method | ←→                             |   |    |    |    |
| Forced lubricating method | ←                              |   |    |    |    |

Table 8-1 (2) For Worm gear pair and Hypoid gears

| Lubrication method        | Circumferential velocity (m/s) |   |    |    |    |
|---------------------------|--------------------------------|---|----|----|----|
|                           | 0                              | 5 | 10 | 15 | 20 |
| Grease lubricating method | →                              |   |    |    |    |
| Splash lubricating method | ←→                             |   |    |    |    |
| Forced lubricating method | ←                              |   |    |    |    |

Table 8-1. Guide for selecting gear lubricating method by circumferential velocity.

#### How to calculate Circumferential velocity

Circumferential velocity (m/s) = 
$$\frac{\pi \times \text{Reference diameter (mm)} \times \text{The number of revolution (min}^{-1}\text{)}}{1000 \times 60}$$

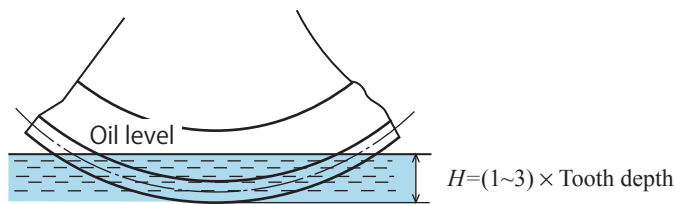
※Please be careful about the units of numerical values.



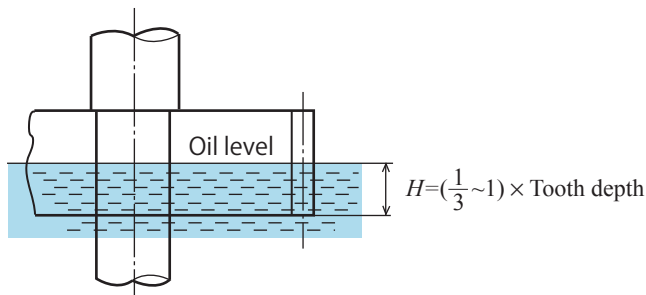
### (3) Proper level of lubricating oil

#### 1) Splash lubricating method (Oil bath or Splash lubricating)

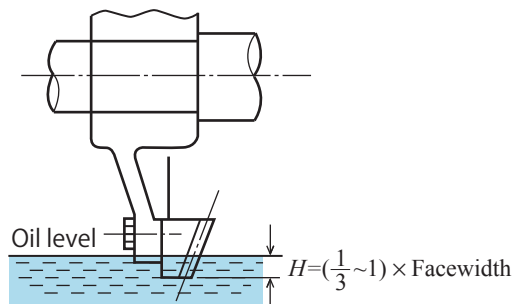
Amount of lubricating oil for soaking each type of gear is different. The mixer resistance and windage are increased when large amount of lubricating oil are used for soaking the gear. Fig. 8-1 shows the proper level of lubricating oil for soaking the gear.



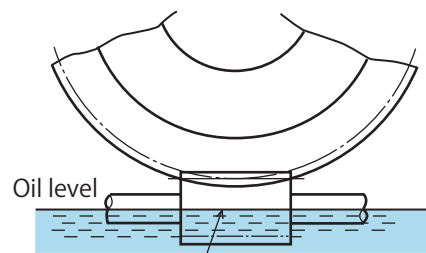
(a) Spur and Helical gears (Horizontal axis)



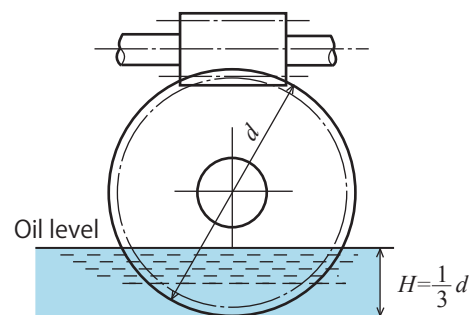
(b) Spur and Helical gears (Perpendicular axis)



(c) Bevel and Hypoid gears



(d1) Worm gear pair (Lower position of Worm gear)



(d2) Worm gear pair (Upper position of Worm gear)

Fig. 8-1 Soaking level of gear in gearbox

#### 2) Forced lubricating method

##### Spraying oil:

In general, temperature of lubricating oil should not exceed 8°C when lubricating oil flows onto working area of gear. Criterion for facewidth per cm is 0.5l/min for low speed and 1l/min for high speed. Lubricating oil for high speed, use following empirical formula.

$$\text{Oil level (l/min)} = 0.6 + 2 \times 10^{-3} \cdot m v$$

Hereby

$m$  : Module (mm)

$v$  : Circumferential velocity (m/s) of Pitch circle

##### How to spray:

Spray before the starting area of gear engagement with lubricating oil perpendicular to flank. In rare instances for high speed, spray in the direction towards the end of the engagement.

To prevent temperature of oil from increasing, the collected oil should go through a cooling process using cooling equipment before being reused.

(4) Features of Polyacetal gear

Strength of plastic gear compared with metal gear excluding external factors is 1/6 to 1/9. However, it is necessary to take factors like temperature, humidity and others into considerations.

Table 8-2. Circumferential speed and Limitation of frictional speed

| Lubrication                                        | Without lubricating oil | Lubricating oil |
|----------------------------------------------------|-------------------------|-----------------|
| Circumferential speed for Spur and Bevel gears m/s | 6                       | 12              |
| Frictional speed for Worm gear pair m/s            | 1                       | 2.5             |

Lowest usage temperature limitation -38℃

(5) Combination of gear materials

The combination of materials for plastic gear pair, assuming combination between Polyacetal, metal material factor is 1.0. When combining two Polyacetals, material factor is 0.75. Therefore gear strength for Polyacetal gear pair becomes 75%.

Backlash for plastic gear

Plastic material has extremely smaller thermal conductivity and larger thermal expansion factor compared with metals. Plastic gear pair has higher tendency to change dimension compared with metal gear. Therefore KG has intentionally fabricated wider backlash plastic gears as compared with metal gears.

We believe that engagement between Polyacetal and metal gears are best combination. However, note that maximum surface roughness Ra1.6 at flank for metal gear is advised to prevent wear for plastic gears.

## 9. Cause and solution for noise and oscillation

During operation of machine, make sure that gearing sound can be heard. 500 to 5,000 Hz is comfortable sound frequency for humans. Even if it is not loud, depending on the frequency component or the environment where the gears are used, such sound may feel unpleasant. Occurrence of noise is often blamed on the gear. However, noise problems are not solely from gear but may also include causes from designing error to lubrication. Refer to Fig. 9-1 for cause and solution.

Refer to Fig. 1 to reduce the noise level by following solutions.

- 1) Improve the accuracies of gear and gear assembly. → (Preventing at source)
- 2) For gear, axis and gearbox, provide suitable material and design to reduce noise. → (Reduce the cause of noise level)  
(avoid resonance and quick attenuation)
- 3) Provide a sealed type of gearbox to shut in the noise. → (Shield and cover)

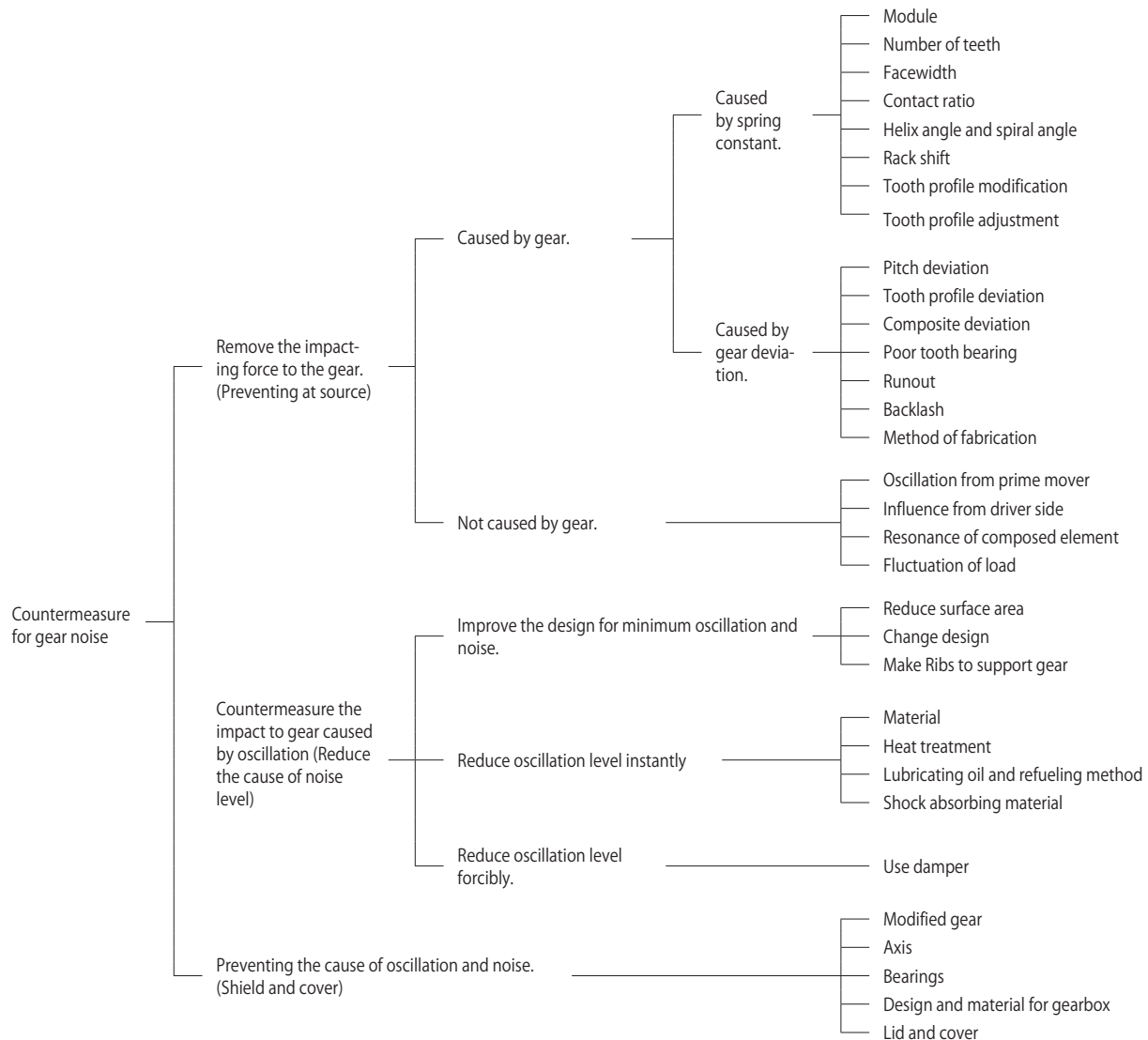


Fig. 9-1 Cause and solution for gear noise

## 10. The vocabulary of gear and gear terms.

We have been adopting the symbol of JIS.

The Vocabulary of each dimension for the gear's drawing in various usages includes many different fields. KG has been adopting the symbols as there is reference literature of JIS standard and gear.

### The Vocabulary of Gear and Gear terms.

With regard to the Vocabulary of gear for gear calculation, define JIS B 0121-1999(Gear vocabulary).

With regard to the Gear terms, define JIS B 0102(Gear terms)

#### The relative dimension of the Rectilinear and Circumference

| Gear Terms                    | Vocabularies      |
|-------------------------------|-------------------|
| center distance               | $a$               |
| when you call pitch           | $P$               |
| reference pitch               | $P$               |
| transverse pitch              | $P_t$             |
| normal pitch                  | $P_n$             |
| axial pitch                   | $P_x$             |
| base pitch                    | $P_b$             |
| transverse base pitch         | $P_{bt}$          |
| normal base pitch             | $P_{bn}$          |
| tooth depth                   | $h$               |
| addendum                      | $h_a$             |
| dedendum                      | $h_f$             |
| chordal addendum              | $\bar{h}$         |
| working tooth depth           | $h'$              |
| when you call tooth thickness | $s$               |
| tooth thickness               | $s$               |
| base circle                   | $\underline{s_b}$ |
| chordal tooth thickness       | $\bar{s}$         |
| sector span                   | $w$               |
| spacewidth                    | $e$               |
| bottom clearance              | $c$               |
| circumferential backlash      | $j_i$             |
| normal backlash               | $j_n$             |
| facewidth                     | $b$               |
| effective facewidth           | $b'$ or $b_w$     |
| lead                          | $P_z$             |
| length of path of contact     | $g_a$             |
| length of approach path       | $g_f$             |
| length of recess path         | $g_\alpha$        |
| overlap length                | $g_\beta$         |
| when you call diameter        | $d$               |
| reference diameter            | $d$               |
| intermeshing pitch diameter   | $d'$ or $d_w$     |
| tip diameter                  | $d_a$             |
| base diameter                 | $d_b$             |
| root diameter                 | $d_f$             |
| when you call radius          | $r$               |
| reference radius              | $r$               |
| intermeshing pitch radius     | $r'$ or $r_w$     |
| tip radius                    | $r_a$             |
| base radius                   | $r_b$             |
| root radius                   | $r_f$             |
| curvature radius              | $\rho$            |
| when you call cone distance   | $R$               |
| cone distance                 | $R_e$             |
| mean cone distance            | $R_m$             |
| inner cone distance           | $R_i$             |
| back cone distance            | $R_v$             |
| locating distance             | $A$               |

#### The Angulars

| Gear Terms                       | Vocabularies            |
|----------------------------------|-------------------------|
| when you call pressure angle     | $\alpha$                |
| reference pressure angle         | $\alpha$                |
| intermeshing pressure angle      | $\alpha'$ or $\alpha_w$ |
| cutter pressure angle            | $\alpha_o$              |
| transverse pressure angle        | $\alpha_t$              |
| normal pressure angle            | $\alpha_n$              |
| axial pressure angle             | $\alpha_x$              |
| when you call helix angle        | $\beta$                 |
| reference cylinder helix angle   | $\beta$                 |
| tip cylinder helix angle         | $\beta_a$               |
| base cylinder helix angle        | $\beta_b$               |
| when you call lead angle         | $\gamma$                |
| reference cylinder lead angle    | $\gamma$                |
| tip cylinder lead angle          | $\gamma_a$              |
| base cylinder lead angle         | $\gamma_b$              |
| shaft angle                      | $\Sigma$                |
| when you call angle              | $\delta$                |
| pitch angle                      | $\delta$                |
| tip angle                        | $\delta_a$              |
| root angle                       | $\delta_f$              |
| addendum angle                   | $\theta_a$              |
| dedendum angle                   | $\theta_f$              |
| transverse angle of transmission | $\phi^\alpha$           |
| overlap angle                    | $\phi^\beta$            |
| total angle of transmission      | $\phi^\gamma$           |
| angle pitch of crown gear        | $\tau$                  |
| involute $\alpha$                | $\text{inv } \alpha$    |

#### The Number of teeth and Gear ratio

| Gear Terms                               | Vocabularies         |
|------------------------------------------|----------------------|
| number of teeth                          | $z$                  |
| equivalent number of teeth               | $z_v$                |
| number of thread                         | $z_l$                |
| gear ratio                               | $u$                  |
| transmission ratio                       | $i$                  |
| module                                   | $m$                  |
| transverse module                        | $m_t$                |
| normal module                            | $m_n$                |
| axial module                             | $m_x$                |
| contact ratio                            | $\varepsilon$        |
| transverse contact ratio                 | $\varepsilon^\alpha$ |
| overlap contact ratio                    | $\varepsilon^\beta$  |
| total contact ratio                      | $\varepsilon^\gamma$ |
| specific sliding                         | $\sigma$             |
| angular velocity                         | $\omega$             |
| linear velocity                          | $v$                  |
| revolution per minute                    | $n$                  |
| rack shift coefficient                   | $x$                  |
| center distance modification coefficient | $y$                  |

## 11. Interpretation of Allowable capability torque table.

The Bending Strength, Surface Durability and Allowable Transfer Capability Torque of Worm Wheel are introduced by using JGMA (Japan Gear Manufacturers Association) formula except Poly Acetal material. This JGMA formula does not apply to every gear, or some is reference only. Therefore refer to the below classification of reference 11-1 for Kind of the gear and Module size.

Applicable range for JGMA formula (Reference 11-1)

| Kind of Gears     | JGMA standard | Range of Module                      | Pitch Diameter                                    |
|-------------------|---------------|--------------------------------------|---------------------------------------------------|
| Spur gear         | JGMA401 - 01  | 1.5 ~ 25mm                           | Pitch diameter 25 ~ 3200mm                        |
| Helical gear      | JGMA402 - 01  |                                      |                                                   |
| Bevel gear        | JGMA403 - 01  | Outertransverse module<br>1.5 ~ 25mm | Below 1600mm of Outer pitch diameter 1600mm 以下    |
| Spiral bevel gear | JGMA404 - 01  |                                      | Below 1000mm of Outer pitch diameter 1000mm 以下    |
| Worm gear pair    | JGMA405 - 01  | Metric axial module<br>1.0 ~ 25mm    | Below 900mm Pitch diameter of Worm wheel 900mm 以下 |

### (1) Bending Strength and Surface Durability for Spur and Helical gears.

| Material<br><br>Descriptions                                         | SCM435                                                                       | S45C                    |                          | (1) SUS304              | (1) C3604B             | Poly Acetal            |
|----------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------|--------------------------|-------------------------|------------------------|------------------------|
|                                                                      | Induction hardening                                                          | —                       | Induction hardening      |                         |                        |                        |
| Calculation                                                          | Calculation for Bending strength of Spur and Helical gears as JGMA 401-01.   |                         |                          |                         |                        | Louis formula          |
|                                                                      | Calculation for Surface durability of Spur and Helical gears as JGMA 402-01. |                         |                          |                         |                        |                        |
| Matching gear                                                        | The same number of teeth and same material                                   |                         |                          |                         |                        | —                      |
| Stress of Allowable Bending : $\sigma F_{lim}$                       | 36.5kgf/mm <sup>2</sup>                                                      | 21.0kgf/mm <sup>2</sup> | 25.0kgf/mm <sup>2</sup>  | 10.5kgf/mm <sup>2</sup> | 4.2kgf/mm <sup>2</sup> | 3.4kgf/mm <sup>2</sup> |
| Stress of Allowable Hertz : $\sigma H_{lim}$                         | 121kgf/mm <sup>2</sup>                                                       | —                       | 106.5kgf/mm <sup>2</sup> | —                       | —                      | —                      |
| The number of times of engagement between two gears during life span | Above 10 to the power of 7. (K <sub>L</sub> =1.0)                            |                         |                          |                         |                        | —                      |
| Impact from motor side.                                              | Flat load                                                                    |                         |                          |                         |                        | —                      |
| Impact from load                                                     | Average impact (K <sub>o</sub> =1.25)                                        |                         |                          |                         |                        | —                      |
| Lubricating system and Oil viscosity                                 | Oil Lubrication. 100 cSt (50°C) (Z <sub>L</sub> =1.0)                        |                         |                          |                         |                        | —                      |
| Method of supporting gear                                            | Double supporting with plane symmetry to both bearing                        |                         |                          |                         |                        | —                      |
| Safety Factor of Tooth Breakage : S <sub>F</sub>                     | 1.2                                                                          |                         |                          |                         |                        | —                      |
| Factor of safety at Surface strength : S <sub>H</sub>                | 1.15                                                                         |                         |                          |                         |                        | —                      |
| Load direction                                                       | One-way direction                                                            |                         |                          |                         |                        |                        |

Regarding the amount of allowable transfer capability, load direction is the reversible and the middle gear become 2/3 (including rack pinion).

Surface Durability in Allowable transfer capability table that the formula does not apply to Idler gear or mid gear engaged with 2 gears.

Note (1) Sub standard JGMA401-01 and JGMA402-01 equivalent to JGMA 6101-01 and JGMA6102-01.

The Amount of Allowable transfer torque [N.m] at the number of revolution per minute  $n=100$  [N.m] to each reference compare with Bending strength of Allowable transfer capability table (Range: Module 1.0 to 5.0 with ISO C45 carbon steel) in KG-catalogue.

## (2) Bending strength and Surface durability for Bevel gears.

| Material<br>Descriptions                                                | SCM435                                                                                      | SCM440                              | S45C                    |                         | (2) SUS304              |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------|-------------------------|-------------------------|-------------------------|
|                                                                         | Induction<br>hardening                                                                      | Ground tooth<br>Induction hardening | —                       | Induction<br>hardening  |                         |
| Calculation                                                             | Calculation for Bending strength of Bevel gears as JGMA 403-01.                             |                                     |                         |                         |                         |
|                                                                         | Calculation for Surface durability of Bevel gears as JGMA 404-01.                           |                                     |                         |                         |                         |
| Matching gear                                                           | Nominative Matching gear.                                                                   |                                     |                         |                         |                         |
| Stress of Allowable Bending : $\sigma F_{lim}$                          | 31.0kgf/mm <sup>2</sup>                                                                     | 31.0kgf/mm <sup>2</sup>             | 19.0kgf/mm <sup>2</sup> | 22.0kgf/mm <sup>2</sup> | 10.5kgf/mm <sup>2</sup> |
| Stress of Allowable Hertz : $\sigma H_{lim}$                            | 109.0kgf/mm <sup>2</sup>                                                                    | 115.0kgf/mm <sup>2</sup>            | 54.0kgf/mm <sup>2</sup> | 85.0kgf/mm <sup>2</sup> | —                       |
| The number of times of engagement<br>between two gears during life span | Above 10 to the power of 7. <span style="float:right;">(<math>K_L=1.0</math>)</span>        |                                     |                         |                         |                         |
| Impact from motor side.                                                 | Flat load                                                                                   |                                     |                         |                         |                         |
| Impact from load                                                        | Average impact <span style="float:right;">(<math>K_I=1.25</math>)</span>                    |                                     |                         |                         |                         |
| Lubricating system and Oil viscosity                                    | Oil Lubrication. 100 cSt (50°C)<br><span style="float:right;">(<math>Z_L=1.0</math>)</span> |                                     |                         |                         |                         |
| Stiffness of gear shaft and gearbox.                                    | Standard                                                                                    |                                     |                         |                         |                         |
| Supporting condition of the gear                                        | Overhang condition                                                                          |                                     |                         |                         |                         |
|                                                                         | $(K_M\beta=1.8)$                                                                            |                                     | $(K_M\beta=2.1)$        |                         |                         |
| Coefficient of reliability of Tooth<br>Breakage : $K_R$                 | 1.2                                                                                         |                                     |                         |                         |                         |
| Coefficient of reliability at Surface<br>strength : $C_R$               | 1.15                                                                                        |                                     |                         |                         |                         |
| Load direction                                                          | One-way direction                                                                           |                                     |                         |                         |                         |

Regarding the amount of allowable transfer capability, load direction is the reversible and the middle gear become 2/3.

Note (2) Sub standard JGMA403-01 and JGMA404-01 equivalent to JGMA 6101-01 and JGMA6102-01.

## (3) Surface durability of Cylindrical worm gear pair.

| Material of Wheel<br>Descriptions                                      | C3604B Brass                                                                                                                                                              | FC200 Cast iron | CAC702 Aluminum Bronze |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------------|
| Calculation                                                            | Calculation for Surface strength of Cylindrical worm gear pair.                                                                                                           |                 |                        |
| Coefficient of Allowable Stress at Surface strength : $\sigma F_{lim}$ | 0.42                                                                                                                                                                      | 0.63            | 0.56                   |
| Effective life period                                                  | 26,000 hours                                                                                                                                                              |                 |                        |
| Oil Lubrication.                                                       | Provided extreme additive lubricant oil with proper viscosity. <span style="float: right;">(<math>Z_L=1.0</math>)</span>                                                  |                 |                        |
| Lubricating system                                                     | Oil bath Lubrication <span style="float: right;">(<math>Z_M=1.0</math>)</span>                                                                                            |                 |                        |
| Surface contact                                                        | This Surface contact is equivalent to classification A of JIS B1741 (Surface contact) <span style="float: right;">(<math>K_C=1.0</math>)</span>                           |                 |                        |
| Starting condition                                                     | Starting torque should below 200 % from rating torque and the number of starting time should less than 2 times. <span style="float: right;">(<math>K_S=1.0</math>)</span> |                 |                        |
| Impact from motor side.                                                | Flat load                                                                                                                                                                 |                 |                        |
| Impact from load                                                       | Flat load <span style="float: right;">(<math>K_H=1.0</math>)</span>                                                                                                       |                 |                        |

Regarding the amount of allowable transfer capability, load direction is the reversible and the middle gear become 2/3.

Note (1) Sub standard JGMA403-01 and JGMA404-01 equivalent to JGMA 6101-01 and JGMA6102-01.



## 12. While examination of Bending strength from the Allowable transfer capability table, Surface strength check are necessary too.

**To calculate Allowable transfer torque of KG STOCK GEARS.**

**To select KG-STOCK GEARS from usage condition of Spur gear.**

**For example 1. To calculate Allowable transfer torque: T[N.m]**

(1) For example, calculating KG — STOCK GEAR S2S 40B-2016

- 1) Module M2.0      3) Face width 20mm
- 2) No. of teeth z=40      4) Bore 16mm

(2) Usage condition of Spur gear.

- 1) Gear ratio of Spur gear  $u=1:1$
- 2) The number of revolution  $n=100$  rpm
- 3) Providing conditions with usage of gear for strength calculation. Please refer to Calculation for Bending strength of Spur and Helical gears as JGMA401-01.
  - a) The gear is in gearbox with lubricant oil.
  - b) Bearing in gearbox should position on both sides. Bearings are plane symmetry.
  - c) Receiving load from a motor side is a flat load or less.
  - d) Receiving impact from a load side is an Average or less.
  - e) During gear life period, the number of times for set of gear engagement is below  $10^7$  times.

(3) To calculate Allowable torque from Allowable transfer capability table (kW) with Bending strength in KG-catalogue.

- 1) Base on Usage Condition of Spur Gear stated above (1) and (2) that obtain a numerical value from Allowable transfer capability table in KG-catalogue.

$$KW=1.61[kW]$$

- 2) Convert to Torque [N.m] from power kW[kW]

$$\text{Gained } T = 9549.7 \frac{kW}{n} = 9549.7 \times \frac{1.61}{100} = 153.75[N.m]$$

Therefore selected S2S 38B-2016F as Allowable transfer torque  $T=153.75[N.m]$

This gear can be used unless exceed range of Input torque  $T=153.75[N.m]$

## For example 2. To select KG-STOCK GEARS from usage condition of Spur gear.

(1) Usage condition of Spur gear. (Give us the specification by customer)

- 1) Action to Spur gear with maximum normal torque is  $T=142$  [N.m] included factor of safety.
- 2) The number of revolution  $n=100$  rpm
- 3) Face width of Spur gear  $b=10-30$  [mm]
- 4) Center distance of Spur gear  $a=70-100$  [mm]
- 5) Gear ratio of Spur gear  $u=1:1$
- 6) Providing conditions with usage of gear for strength calculation. Please refer to Calculation for Bending strength of Spur and Helical gears as JGMA401-01.
  - a) The gear is in gearbox with lubricant oil.
  - d) Bearing in gearbox should position on both sides. Bearings are plane symmetry.
  - c) Receiving load from a motor side is a flat load or less.
  - d) Receiving impact from a load side is an Average or less.
  - e) During gear life period, the number of times for set of gear engagement is below  $10^7$  times.

(2) Convert to Power kW [kW] of Allowable transfer capability table with Bending strength from axial torque T [N.m] with action to Spur gear.

$$kW = \frac{T \cdot n}{9549.7} = \frac{142 \times 100}{9549.7} = 1.487 [\text{kW}]$$

(3) To select KG-STOCK GEARS

- 1) Selected condition of Spur gear.
  - a) Module  $M=2.0$  (eg)
  - b) No. of teeth Center distance  $a=70-100$  [mm]  
Gear ratio  $u=1:1$

Therefore we verify the No. of teeth of 35-50z.

- c) Face width  $b=10-30$  [mm]
- d) The number of revolution  $n=100$  rpm
- e) Power  $kW=1.487$  [kW]

2) Selection of KG STOCK GEARS

- a) Please refer the page for Module 2.0 and Number of teeth 35 to 50 from the catalogue of KG-Spur gear.
- b) Refer to Allowable transfer capability table (kW) of Bending strength.

The number of revolution

Observing the column of  $n=100$  rpm for your selection.

Power

Look up numerical value of  $kW=1.487$  [kW] or more

Concluded,

On condition that Number of teeth:  $z=38[z]$ , Face width:  $b=20$  [mm] and material: S45C

Obtained  $kW=1.51$  [kW] from Allowable transfer capability table.

Compared with action to Spur gear with maximum normal torque is  $T=142$  [N.m] included factor of safety.

Can be judged (Allowable transfer capability)  $\geq$  (Normal power).

- c) Can be searched your suitable S2S 38B-2016 as our recommendation only.

### The Conversion formula of Power

1) Calculate Torque from

$T$  : Torque [N · m]

$$T = 9549.7 \frac{kW}{n} \Leftrightarrow kW = \frac{T \cdot n}{9549.7}$$

$T$  : Torque [kgf · m]

$$T = 973.8 \frac{kW}{n} \Leftrightarrow kW = \frac{T \cdot n}{973.8}$$

$T$  : Torque [kgf · m]

$$T = \frac{F_t \cdot r}{1000} \Leftrightarrow F_t = \frac{1000 \cdot T}{r}$$

2) Convert to Standard Integer

$1[\text{kgf} \cdot \text{m}] = 9.80665[\text{N} \cdot \text{m}]$

$1[\text{W}] = 1[\text{N} \cdot \text{m/s}]$

Hereby  $n$  : Revolution per minute rpm

$r$  : Reference radius [mm]

(In case of Shifted gears as working Radius)

$T$  : Torque [N · m]

$kW$  : Power [kW]

$F_t$  : Tangential Force of pitch circle [N]

## 13. Conversion table for SI units (International System of Units)

|       | N                  | dyn                   | kgf                      |
|-------|--------------------|-----------------------|--------------------------|
| Force | 1                  | $1 \times 10^5$       | $1.01972 \times 10^{-1}$ |
|       | $1 \times 10^{-5}$ | 1                     | $1.01972 \times 10^{-6}$ |
|       | 9.806 65           | $9.80665 \times 10^5$ | 1                        |

|          | Pa                    | bar                      | kgf/cm <sup>2</sup>      | atm                      | mmH <sub>2</sub> O       | mmHg or Torr             |
|----------|-----------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Pressure | 1                     | $1 \times 10^{-5}$       | $1.01972 \times 10^{-5}$ | $9.86923 \times 10^{-6}$ | $1.01972 \times 10^{-1}$ | $7.50062 \times 10^{-3}$ |
|          | $1 \times 10^5$       | 1                        | 1.019 72                 | $9.86923 \times 10^{-1}$ | $1.01972 \times 10^4$    | $7.50062 \times 10^2$    |
|          | $9.80665 \times 10^4$ | $9.80665 \times 10^{-1}$ | 1                        | $9.67841 \times 10^{-1}$ | $1 \times 10^4$          | $7.35559 \times 10^2$    |
|          | $1.01325 \times 10^5$ | 1.013 25                 | 1.033 23                 | 1                        | $1.03323 \times 10^4$    | $7.60000 \times 10^2$    |
|          | 9.806 65              | $9.80665 \times 10^{-5}$ | $1 \times 10^{-4}$       | $9.67841 \times 10^{-5}$ | 1                        | $7.35559 \times 10^{-2}$ |
|          | $1.33322 \times 10^2$ | $1.33322 \times 10^{-3}$ | $1.35951 \times 10^{-3}$ | $1.31579 \times 10^{-3}$ | $1.35951 \times 10$      | 1                        |

Note IPa=IN/m<sup>2</sup>

|        | Pa                    | Mpa or N/mm <sup>2</sup> | kfg/mm <sup>2</sup>      | kgf/cm <sup>2</sup>      |
|--------|-----------------------|--------------------------|--------------------------|--------------------------|
| Stress | 1                     | $1 \times 10^{-6}$       | $1.01972 \times 10^{-7}$ | $1.01972 \times 10^{-5}$ |
|        | $1 \times 10^6$       | 1                        | $1.01972 \times 10^{-1}$ | $1.01972 \times 10$      |
|        | $9.80665 \times 10^6$ | 9.806 65                 | 1                        | $1 \times 10^2$          |
|        | $9.80665 \times 10^4$ | $9.80665 \times 10^{-2}$ | $1 \times 10^{-2}$       | 1                        |

|                          | Pa·s               | cP              | P                  |
|--------------------------|--------------------|-----------------|--------------------|
| Coefficient of viscosity | 1                  | $1 \times 10^3$ | $1 \times 10$      |
|                          | $1 \times 10^{-3}$ | 1               | $1 \times 10^{-2}$ |
|                          | $1 \times 10^{-1}$ | $1 \times 10^2$ | 1                  |

Note IP = Idyn·s/cm<sup>2</sup> = Ig/cm·S,  
IPa·s = IN·s/m<sup>2</sup>, IcP = ImPa·s

## 14. Standardizing the coordination between ISO and JIS

### Introduction

Firstly, as standardizing at the coordination of ISO standard from JIS standard, most of JIS-standard (included Technical report) has been making revision and replacement.

In due time JIS standard and JGMA standard (Japan Gear Manufacturers Association) for the gears shall be revised to a new edition as time to come. However JIS standard and JGMA standard are not complete and some standard was abolished when we started the new edition of KG catalogue. However an old JIS and JGMA standard are essential reference of gears for KG-new catalogue.

Therefore we had adopted the latest JIS and JGMA standard as latest as possible in our new edition KG-catalogue. However if we found inexplicability and nonexistence standard, we introduced the old and new standards to our new edition KG-catalogue.

With respect to the new edition of ISO, JIS and JGMA standards, new edition KG-catalogue is unable to adopt the latest revised ISO, JIS and JGMA standards. We seek your understanding for our latest edition of KG-catalogue.

### Precision of KG STOCK GEARS.

The Two Regulations had enacted that JIS B 1702-1:1998 (Cylindrical gears - Precision and Classification Article 1: Definition of Error and Amount of Permissible for a Gear flank) and JIS B 1702-2:1998 (Cylindrical gears - Precision and Classification Article 2: Error of Tooth to Tooth Working, Definition of Run out and Amount of Precision) in place of JIS B 1702: 1995, confirmed (Precision for the Spur and Helical gears) was discontinued after so many years used.

When new JIS compared with old JIS B 1702, the new JIS is unable to be equivalent to the Old JIS class 4 detail, due to different classification of Module and Reference diameter (call Pitch Diameter of old JIS).

The rough outline of the theory is New JIS precision class = Old JIS precision class plus(+) 4, however comparatively range of small or big number of teeth are unable to cover the above classification.

Comparison of new and old gear's terms

| JIS B0102 : 1999    | Old JIS B0102 : 1993 |
|---------------------|----------------------|
| reference diameter  | pitch diameter       |
| tooth depth         | whole depth          |
| working tooth depth | working depth        |
| pitch angle         | pitch cone angle     |
| tip angle           | tip cone angle       |
| root angle          | root cone angle      |
| spiral angle        | helix angel          |
| locating distance   | mounting distance    |

Some of the old standard still remain unchanged in our new KG-catalogue for the Dimensions of the Gears.

System of accuracy of KG-STOCK GEARS based on JIS B 1702-1 standards are as follows.

|                            |                                     |
|----------------------------|-------------------------------------|
| Single pitch deviation     | JIS B1702-1 class 7                 |
| Total cumulative deviation | JIS B1702-1 class 8                 |
| Tooth profile deviation    | JIS B1702-1 class 8                 |
| Run out                    | JIS B1702-2 class 8 (For reference) |

Although we are able to provide the gear with JIS B1702-1 class 8 for tooth profile deviation and runout. In order to maintain the demand so that economically price to be as competitive as possible. Therefore, we manufacturing by equivalent at the JIS B1702-1 class 8 gear.

### Accuracy class of standard gears

| Gear type                                              | Series code | Material                 | Accuracy class                  |
|--------------------------------------------------------|-------------|--------------------------|---------------------------------|
| Ground spur gear                                       | SG          | SCM435 • 440             | JIS B1702-1 class N5            |
|                                                        | SGR         | S45C                     | JIS B1702-1 class N6            |
| Spur gear                                              | S           | S45C                     | JIS B1702-1 class N8            |
| Spur gear / Helical gear                               | S • H       | SUS304                   | JIS B1702-1 class N9            |
|                                                        |             | Brass ※ 1                | JIS B1702-1 class N9            |
|                                                        |             | Poly Acetal              | JIS B1702-1 class N9 to N10 ※ 2 |
| Ground spiral miter gear /<br>Ground spiral bevel gear | MG<br>BG    | SCM440                   | JIS B1704 class 1               |
| Ground spiral miter gear                               | MGE         | SCM435 • 440             | JIS B1704 class 2               |
| Straight miter gear /<br>Straight bevel gear           | M • B       | S45C                     | JIS B1704 class 3               |
|                                                        |             | S45C (Hardened products) | JIS B1704 class 4               |
|                                                        |             | SUS304                   | JIS B1704 class 4               |
|                                                        |             | Brass                    | JIS B1704 class 4               |
|                                                        |             | Poly Acetal              | JIS B1704 class 5 to 6 ※ 2      |

※ 1 Excludes gear-shaped A1 and A2 types.

※ 2 Accuracy at the time of manufacture. Because of the material characteristics, the dimensions and accuracy change with time and due to temperature changes.

# Hardness conversion table

Approximate conversion values compared with Vickers hardness of Steel

| Vickers hardness | Brinell hardness<br>10 mm ball 3000kgf |                |                       | Rockwell hardness <sup>(2)</sup>           |                                    |                                             |                                             | Rockwell superficial hardness<br>diamond cone penetrator |                        |                        | Shore hardness | Tensile strength<br>(Approx. value) MPa<br>(kgf/mm <sup>2</sup> ) <sup>(1)</sup> | Vickers hardness Load |
|------------------|----------------------------------------|----------------|-----------------------|--------------------------------------------|------------------------------------|---------------------------------------------|---------------------------------------------|----------------------------------------------------------|------------------------|------------------------|----------------|----------------------------------------------------------------------------------|-----------------------|
|                  | Standard ball                          | Hult-gren ball | Tungsten carbide ball | Scale A Load 60kgf Diamond cone penetrator | Scale B Load 100kgf 1/16 inch Ball | Scale C Load 150kgf Diamond cone penetrator | Scale D Load 100kgf Diamond cone penetrator | 15-N Scale Load 15 kgf                                   | 30-N Scale Load 30 kgf | 45-N Scale Load 45 kgf |                |                                                                                  |                       |
| 940              | -                                      | -              | -                     | 85·6                                       | -                                  | 68·0                                        | 76·9                                        | 93·2                                                     | 84·4                   | 75·4                   | 97             | -                                                                                | 940                   |
| 920              | -                                      | -              | -                     | 85·3                                       | -                                  | 67·5                                        | 76·5                                        | 93·0                                                     | 84·0                   | 74·8                   | 96             | -                                                                                | 920                   |
| 900              | -                                      | -              | -                     | 85·0                                       | -                                  | 67·0                                        | 76·1                                        | 92·9                                                     | 83·6                   | 74·2                   | 95             | -                                                                                | 900                   |
| 880              | -                                      | -              | (767)                 | 84·7                                       | -                                  | 66·4                                        | 75·7                                        | 92·7                                                     | 83·1                   | 73·6                   | 93             | -                                                                                | 880                   |
| 860              | -                                      | -              | (757)                 | 84·4                                       | -                                  | 65·9                                        | 75·3                                        | 92·5                                                     | 82·7                   | 73·1                   | 92             | -                                                                                | 860                   |
| 840              | -                                      | -              | (745)                 | 84·1                                       | -                                  | 65·3                                        | 74·8                                        | 92·3                                                     | 82·2                   | 72·2                   | 91             | -                                                                                | 840                   |
| 820              | -                                      | -              | (733)                 | 83·8                                       | -                                  | 64·7                                        | 74·3                                        | 92·1                                                     | 81·7                   | 71·8                   | 90             | -                                                                                | 820                   |
| 800              | -                                      | -              | (722)                 | 83·4                                       | -                                  | 64·0                                        | 73·8                                        | 91·8                                                     | 81·1                   | 71·0                   | 88             | -                                                                                | 800                   |
| 780              | -                                      | -              | (710)                 | 83·0                                       | -                                  | 63·3                                        | 73·3                                        | 91·5                                                     | 80·4                   | 70·2                   | 87             | -                                                                                | 780                   |
| 760              | -                                      | -              | (698)                 | 82·6                                       | -                                  | 62·5                                        | 72·6                                        | 91·2                                                     | 79·7                   | 69·4                   | 86             | -                                                                                | 760                   |
| 740              | -                                      | -              | (684)                 | 82·2                                       | -                                  | 61·8                                        | 72·1                                        | 91·0                                                     | 79·1                   | 68·6                   | 84             | -                                                                                | 740                   |
| 720              | -                                      | -              | (670)                 | 81·8                                       | -                                  | 61·0                                        | 71·5                                        | 90·7                                                     | 78·4                   | 67·7                   | 83             | -                                                                                | 720                   |
| 700              | -                                      | 615            | (656)                 | 81·3                                       | -                                  | 60·1                                        | 70·8                                        | 90·3                                                     | 77·6                   | 66·7                   | 81             | -                                                                                | 700                   |
| 690              | -                                      | 610            | (647)                 | 81·1                                       | -                                  | 59·7                                        | 70·5                                        | 90·1                                                     | 77·2                   | 66·2                   | -              | -                                                                                | 690                   |
| 680              | -                                      | 603            | (638)                 | 80·8                                       | -                                  | 59·2                                        | 70·1                                        | 89·8                                                     | 76·8                   | 65·7                   | 80             | -                                                                                | 680                   |
| 670              | -                                      | 597            | 630                   | 80·6                                       | -                                  | 58·8                                        | 69·8                                        | 89·7                                                     | 76·4                   | 65·3                   | -              | -                                                                                | 670                   |
| 660              | -                                      | 590            | 620                   | 80·3                                       | -                                  | 58·3                                        | 69·4                                        | 89·5                                                     | 75·9                   | 64·7                   | 79             | -                                                                                | 660                   |
| 650              | -                                      | 585            | 611                   | 80·0                                       | -                                  | 57·8                                        | 69·0                                        | 89·2                                                     | 75·5                   | 64·1                   | -              | -                                                                                | 650                   |
| 640              | -                                      | 578            | 601                   | 79·8                                       | -                                  | 57·3                                        | 68·7                                        | 89·0                                                     | 75·1                   | 63·5                   | 77             | -                                                                                | 640                   |
| 630              | -                                      | 571            | 591                   | 79·5                                       | -                                  | 56·8                                        | 68·3                                        | 88·8                                                     | 74·6                   | 63·0                   | -              | -                                                                                | 630                   |
| 620              | -                                      | 564            | 582                   | 79·2                                       | -                                  | 56·3                                        | 67·9                                        | 88·5                                                     | 74·2                   | 62·4                   | 75             | -                                                                                | 620                   |
| 610              | -                                      | 557            | 573                   | 78·9                                       | -                                  | 55·7                                        | 67·5                                        | 88·2                                                     | 73·6                   | 61·7                   | -              | -                                                                                | 610                   |
| 600              | -                                      | 550            | 564                   | 78·6                                       | -                                  | 55·2                                        | 67·0                                        | 88·0                                                     | 73·2                   | 61·2                   | 74             | -                                                                                | 600                   |
| 590              | -                                      | 542            | 554                   | 78·4                                       | -                                  | 54·7                                        | 66·7                                        | 87·8                                                     | 72·7                   | 60·5                   | -              | 2055 (210)                                                                       | 590                   |
| 580              | -                                      | 535            | 545                   | 78·0                                       | -                                  | 54·1                                        | 66·2                                        | 87·5                                                     | 72·1                   | 59·9                   | 72             | 2020 (206)                                                                       | 580                   |
| 570              | -                                      | 527            | 535                   | 77·8                                       | -                                  | 53·6                                        | 65·8                                        | 87·2                                                     | 71·7                   | 59·3                   | -              | 1985 (202)                                                                       | 570                   |
| 560              | -                                      | 519            | 525                   | 77·4                                       | -                                  | 53·0                                        | 65·4                                        | 86·9                                                     | 71·2                   | 58·6                   | 71             | 1950 (199)                                                                       | 560                   |
| 550              | (505)                                  | 512            | 517                   | 77·0                                       | -                                  | 52·3                                        | 64·8                                        | 86·6                                                     | 70·5                   | 57·8                   | -              | 1905 (194)                                                                       | 550                   |
| 540              | (496)                                  | 503            | 507                   | 76·7                                       | -                                  | 51·7                                        | 64·4                                        | 86·3                                                     | 70·0                   | 57·0                   | 69             | 1860 (190)                                                                       | 540                   |
| 530              | (488)                                  | 495            | 497                   | 76·4                                       | -                                  | 51·1                                        | 63·9                                        | 86·0                                                     | 69·5                   | 56·2                   | -              | 1825 (186)                                                                       | 530                   |
| 520              | (480)                                  | 487            | 488                   | 76·1                                       | -                                  | 50·5                                        | 63·5                                        | 85·7                                                     | 69·0                   | 55·6                   | 67             | 1795 (183)                                                                       | 520                   |
| 510              | (473)                                  | 479            | 479                   | 75·7                                       | -                                  | 49·8                                        | 62·9                                        | 85·4                                                     | 68·3                   | 54·7                   | -              | 1750 (179)                                                                       | 510                   |
| 500              | (465)                                  | 471            | 471                   | 75·3                                       | -                                  | 49·1                                        | 62·2                                        | 85·0                                                     | 67·7                   | 53·9                   | 66             | 1705 (174)                                                                       | 500                   |
| 490              | (456)                                  | 460            | 460                   | 74·9                                       | -                                  | 48·4                                        | 61·6                                        | 84·7                                                     | 67·1                   | 53·1                   | -              | 1660 (169)                                                                       | 490                   |
| 480              | 448                                    | 452            | 452                   | 74·5                                       | -                                  | 47·7                                        | 61·3                                        | 84·3                                                     | 66·4                   | 52·2                   | 64             | 1620 (165)                                                                       | 480                   |
| 470              | 441                                    | 442            | 442                   | 74·1                                       | -                                  | 46·9                                        | 60·7                                        | 83·9                                                     | 65·7                   | 51·3                   | -              | 1570 (160)                                                                       | 470                   |
| 460              | 433                                    | 433            | 433                   | 73·6                                       | -                                  | 46·1                                        | 60·1                                        | 83·6                                                     | 64·9                   | 50·4                   | 62             | 1530 (156)                                                                       | 460                   |
| 450              | 425                                    | 425            | 425                   | 73·3                                       | -                                  | 45·3                                        | 59·4                                        | 83·2                                                     | 64·3                   | 49·4                   | -              | 1495 (153)                                                                       | 450                   |
| 440              | 415                                    | 415            | 415                   | 72·8                                       | -                                  | 44·5                                        | 58·8                                        | 82·8                                                     | 63·5                   | 48·4                   | 59             | 1460 (149)                                                                       | 440                   |
| 430              | 405                                    | 405            | 405                   | 72·3                                       | -                                  | 43·6                                        | 58·2                                        | 82·3                                                     | 62·7                   | 47·4                   | -              | 1410 (144)                                                                       | 430                   |
| 420              | 397                                    | 397            | 397                   | 71·8                                       | -                                  | 42·7                                        | 57·5                                        | 81·8                                                     | 61·9                   | 46·4                   | 57             | 1370 (140)                                                                       | 420                   |
| 410              | 388                                    | 388            | 388                   | 71·4                                       | -                                  | 41·8                                        | 56·8                                        | 81·4                                                     | 61·1                   | 45·3                   | -              | 1330 (136)                                                                       | 410                   |
| 400              | 379                                    | 379            | 379                   | 70·8                                       | -                                  | 40·8                                        | 56·0                                        | 81·0                                                     | 60·2                   | 44·1                   | 55             | 1290 (131)                                                                       | 400                   |
| 390              | 369                                    | 369            | 369                   | 70·3                                       | -                                  | 39·8                                        | 55·2                                        | 80·3                                                     | 59·3                   | 42·9                   | -              | 1240 (127)                                                                       | 390                   |
| 380              | 360                                    | 360            | 380                   | 69·8                                       | (110·0)                            | 38·8                                        | 54·4                                        | 79·8                                                     | 58·4                   | 41·7                   | 52             | 1205 (123)                                                                       | 380                   |
| 370              | 350                                    | 350            | 350                   | 69·2                                       | -                                  | 37·7                                        | 53·6                                        | 79·2                                                     | 57·4                   | 40·4                   | -              | 1170 (120)                                                                       | 370                   |
| 360              | 341                                    | 341            | 341                   | 68·7                                       | (109·0)                            | 36·6                                        | 52·8                                        | 78·6                                                     | 56·4                   | 39·1                   | 50             | 1130 (115)                                                                       | 360                   |
| 350              | 331                                    | 331            | 331                   | 68·1                                       | -                                  | 35·5                                        | 51·9                                        | 78·0                                                     | 55·4                   | 37·8                   | -              | 1095 (112)                                                                       | 350                   |
| 340              | 322                                    | 322            | 322                   | 67·6                                       | (108·0)                            | 34·4                                        | 51·1                                        | 77·4                                                     | 54·4                   | 36·5                   | 47             | 1070 (109)                                                                       | 340                   |
| 330              | 313                                    | 313            | 313                   | 67·0                                       | -                                  | 33·3                                        | 50·2                                        | 76·8                                                     | 53·6                   | 35·2                   | -              | 1035 (105)                                                                       | 330                   |



## Approximate conversion values compared with Vickers hardness for Steel

| Vickers hardness | Brinell hardness<br>10 mm ball 3000kgf |                |                       | Rockwell hardness <sup>(2)</sup>                 |                                          |                                                   |                                                   | Rockwell superficial hardness<br>diamond cone penetrator |                           |                           | Shore hardness | Tensile strength<br>(Approx. value) MPa<br>(kgf/mm <sup>2</sup> ) <sup>(1)</sup> | Vickers hardness Load |
|------------------|----------------------------------------|----------------|-----------------------|--------------------------------------------------|------------------------------------------|---------------------------------------------------|---------------------------------------------------|----------------------------------------------------------|---------------------------|---------------------------|----------------|----------------------------------------------------------------------------------|-----------------------|
|                  | Standard ball                          | Hult-gren ball | Tungsten carbide ball | Scale A<br>Load 60kgf<br>Diamond cone penetrator | Scale B<br>Load 100kgf<br>1/16 inch Ball | Scale C<br>Load 150kgf<br>Diamond cone penetrator | Scale D<br>Load 100kgf<br>Diamond cone penetrator | 15-N Scale<br>Load 15 kgf                                | 30-N Scale<br>Load 30 kgf | 45-N Scale<br>Load 45 kgf |                |                                                                                  |                       |
| 320              | 303                                    | 303            | 303                   | 66·4                                             | (107·0)                                  | 33·2                                              | 49·4                                              | 76·2                                                     | 52·3                      | 33·9                      | 45             | 1005 (103)                                                                       | 320                   |
| 310              | 294                                    | 294            | 294                   | 65·8                                             | -                                        | 31·0                                              | 48·4                                              | 75·6                                                     | 51·3                      | 32·5                      | -              | 980 (100)                                                                        | 310                   |
| 300              | 284                                    | 284            | 284                   | 65·2                                             | (105·5)                                  | 29·8                                              | 47·5                                              | 74·9                                                     | 50·2                      | 31·1                      | 42             | 950 ( 97)                                                                        | 300                   |
| 295              | 280                                    | 280            | 280                   | 64·8                                             | -                                        | 29·2                                              | 47·1                                              | 74·6                                                     | 49·7                      | 30·4                      | -              | 935 ( 96)                                                                        | 295                   |
| 290              | 275                                    | 275            | 275                   | 64·5                                             | (104·5)                                  | 28·5                                              | 46·5                                              | 74·2                                                     | 49·0                      | 29·5                      | 41             | 915 ( 94)                                                                        | 290                   |
|                  |                                        |                |                       |                                                  |                                          |                                                   |                                                   |                                                          |                           |                           |                |                                                                                  |                       |
| 285              | 270                                    | 270            | 270                   | 64·2                                             | -                                        | 27·8                                              | 46·0                                              | 73·8                                                     | 48·4                      | 28·7                      | -              | 905 ( 92)                                                                        | 285                   |
| 280              | 265                                    | 265            | 265                   | 63·8                                             | (103·5)                                  | 27·1                                              | 45·3                                              | 73·4                                                     | 47·8                      | 27·9                      | 40             | 890 ( 91)                                                                        | 280                   |
| 275              | 261                                    | 261            | 261                   | 63·5                                             | -                                        | 26·4                                              | 44·9                                              | 73·0                                                     | 47·2                      | 27·1                      | -              | 875 ( 89)                                                                        | 275                   |
| 270              | 256                                    | 256            | 256                   | 63·1                                             | (102·0)                                  | 25·6                                              | 44·3                                              | 72·6                                                     | 46·4                      | 26·2                      | 38             | 855 ( 87)                                                                        | 270                   |
| 265              | 252                                    | 252            | 252                   | 62·7                                             | -                                        | 24·8                                              | 43·7                                              | 72·1                                                     | 45·7                      | 25·2                      | -              | 840 ( 86)                                                                        | 265                   |
|                  |                                        |                |                       |                                                  |                                          |                                                   |                                                   |                                                          |                           |                           |                |                                                                                  |                       |
| 260              | 247                                    | 247            | 247                   | 62·4                                             | (101·0)                                  | 24·0                                              | 43·1                                              | 71·6                                                     | 45·0                      | 24·3                      | 37             | 825 ( 84)                                                                        | 260                   |
| 255              | 243                                    | 243            | 243                   | 62·0                                             | -                                        | 23·1                                              | 42·2                                              | 71·1                                                     | 44·2                      | 23·2                      | -              | 805 ( 82)                                                                        | 255                   |
| 250              | 238                                    | 238            | 238                   | 61·6                                             | 99·5                                     | 22·2                                              | 41·7                                              | 70·6                                                     | 43·4                      | 22·2                      | 36             | 795 ( 81)                                                                        | 250                   |
| 245              | 233                                    | 233            | 233                   | 61·2                                             | -                                        | 21·3                                              | 41·1                                              | 70·1                                                     | 42·5                      | 21·1                      | -              | 780 ( 79)                                                                        | 245                   |
| 240              | 228                                    | 228            | 228                   | 60·7                                             | 98·1                                     | 20·3                                              | 40·3                                              | 69·6                                                     | 41·7                      | 19·9                      | 34             | 765 ( 78)                                                                        | 240                   |
|                  |                                        |                |                       |                                                  |                                          |                                                   |                                                   |                                                          |                           |                           |                |                                                                                  |                       |
| 230              | 219                                    | 219            | 219                   | -                                                | 96·7                                     | (18·0)                                            | -                                                 | -                                                        | -                         | -                         | 33             | 730 ( 75)                                                                        | 230                   |
| 220              | 209                                    | 209            | 209                   | -                                                | 95·0                                     | (15·7)                                            | -                                                 | -                                                        | -                         | -                         | 32             | 695 ( 71)                                                                        | 220                   |
| 210              | 200                                    | 200            | 200                   | -                                                | 93·4                                     | (13·4)                                            | -                                                 | -                                                        | -                         | -                         | 30             | 670 ( 68)                                                                        | 210                   |
| 200              | 190                                    | 190            | 190                   | -                                                | 91·5                                     | (11·0)                                            | -                                                 | -                                                        | -                         | -                         | 29             | 635 ( 65)                                                                        | 200                   |
| 190              | 181                                    | 181            | 181                   | -                                                | 89·5                                     | ( 8·5)                                            | -                                                 | -                                                        | -                         | -                         | 28             | 605 ( 62)                                                                        | 190                   |
|                  |                                        |                |                       |                                                  |                                          |                                                   |                                                   |                                                          |                           |                           |                |                                                                                  |                       |
| 180              | 171                                    | 171            | 171                   | -                                                | 87·1                                     | ( 6·0)                                            | -                                                 | -                                                        | -                         | -                         | 26             | 580 ( 59)                                                                        | 180                   |
| 170              | 162                                    | 162            | 162                   | -                                                | 85·0                                     | ( 3·0)                                            | -                                                 | -                                                        | -                         | -                         | 25             | 545 ( 56)                                                                        | 170                   |
| 160              | 152                                    | 152            | 152                   | -                                                | 81·7                                     | ( 0·0)                                            | -                                                 | -                                                        | -                         | -                         | 24             | 515 ( 53)                                                                        | 160                   |
| 150              | 143                                    | 143            | 143                   | -                                                | 78·7                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | 22             | 490 ( 50)                                                                        | 150                   |
| 140              | 133                                    | 133            | 133                   | -                                                | 75·0                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | 21             | 455 ( 46)                                                                        | 140                   |
|                  |                                        |                |                       |                                                  |                                          |                                                   |                                                   |                                                          |                           |                           |                |                                                                                  |                       |
| 130              | 124                                    | 124            | 124                   | -                                                | 71·2                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | 20             | 425 ( 44)                                                                        | 130                   |
| 120              | 114                                    | 114            | 114                   | -                                                | 66·7                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | -              | 390 ( 40)                                                                        | 120                   |
| 110              | 105                                    | 105            | 105                   | -                                                | 62·3                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | -              | -                                                                                | 110                   |
| 100              | 95                                     | 95             | 95                    | -                                                | 56·2                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | -              | -                                                                                | 100                   |
| 95               | 90                                     | 90             | 90                    | -                                                | 52·0                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | -              | -                                                                                | 95                    |
|                  |                                        |                |                       |                                                  |                                          |                                                   |                                                   |                                                          |                           |                           |                |                                                                                  |                       |
| 90               | 86                                     | 86             | 86                    | -                                                | 48·0                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | -              | -                                                                                | 90                    |
| 85               | 81                                     | 81             | 81                    | -                                                | 41·0                                     | -                                                 | -                                                 | -                                                        | -                         | -                         | -              | -                                                                                | 85                    |

Remark : Bold figure indicates values from Table 1 of ASTM E 140. (SAE-ASM-ASTM combined and adjusted)

Note : (1) Units and Numerical values in brackets ( ) are converted from psi conversion table of JIS Z 8438 with 1MPa = 1N/ mm<sup>2</sup>

(2) Figures in brackets ( ) from table are seldom used and mainly for reference only.

(3) Iron and Steel quoted from JIS hand book

Approximate converted values compared with Rockwell hardness for Steel (1)

| Rockwell Scale C hardness | Vickers hardness | Brinell hardness<br>10 mm ball 3000kgf |                |                       | Rockwell hardness <sup>(2)</sup>                 |                                          |                                                   | Rockwell superficial hardness<br>diamond cone penetrator |                           |                           | Shore hardness | Tensile strength<br>(Approx. value) MPa<br>(kgf/mm <sup>2</sup> ) <sup>(1)</sup> | Rockwell Scale C hardness |
|---------------------------|------------------|----------------------------------------|----------------|-----------------------|--------------------------------------------------|------------------------------------------|---------------------------------------------------|----------------------------------------------------------|---------------------------|---------------------------|----------------|----------------------------------------------------------------------------------|---------------------------|
|                           |                  | Standard ball                          | Hult-gren ball | Tungsten carbide ball | Scale A<br>Load 60kgf<br>Diamond cone penetrator | Scale B<br>Load 100kgf<br>1/16 inch Ball | Scale D<br>Load 100kgf<br>Diamond cone penetrator | 15-N Scale<br>Load 15 kgf                                | 30-N Scale<br>Load 30 kgf | 45-N Scale<br>Load 45 kgf |                |                                                                                  |                           |
| 68                        | 940              | -                                      | -              | -                     | 85·6                                             | -                                        | 76·9                                              | 93·2                                                     | 84·4                      | 75·4                      | 97             | -                                                                                | 68                        |
| 67                        | 900              | -                                      | -              | -                     | 85·0                                             | -                                        | 76·1                                              | 92·9                                                     | 83·6                      | 74·2                      | 95             | -                                                                                | 67                        |
| 66                        | 865              | -                                      | -              | -                     | 84·5                                             | -                                        | 75·4                                              | 92·5                                                     | 82·8                      | 73·3                      | 92             | -                                                                                | 66                        |
| 65                        | 832              | -                                      | -              | (739)                 | 83·9                                             | -                                        | 74·5                                              | 92·2                                                     | 81·9                      | 72·0                      | 91             | -                                                                                | 65                        |
| 64                        | 800              | -                                      | -              | (722)                 | 83·4                                             | -                                        | 73·8                                              | 91·8                                                     | 81·1                      | 71·0                      | 88             | -                                                                                | 64                        |
| 63                        | 772              | -                                      | -              | (705)                 | 82·8                                             | -                                        | 73·0                                              | 91·4                                                     | 80·1                      | 69·9                      | 87             | -                                                                                | 63                        |
| 62                        | 746              | -                                      | -              | (688)                 | 82·3                                             | -                                        | 72·2                                              | 91·1                                                     | 79·3                      | 68·8                      | 85             | -                                                                                | 62                        |
| 61                        | 720              | -                                      | -              | (670)                 | 81·8                                             | -                                        | 71·5                                              | 90·7                                                     | 78·4                      | 67·7                      | 83             | -                                                                                | 61                        |
| 60                        | 697              | -                                      | 613            | (654)                 | 81·2                                             | -                                        | 70·7                                              | 90·2                                                     | 77·5                      | 66·6                      | 81             | -                                                                                | 60                        |
| 59                        | 674              | -                                      | 599            | (634)                 | 80·7                                             | -                                        | 69·9                                              | 89·8                                                     | 76·6                      | 65·5                      | 80             | -                                                                                | 59                        |
| 58                        | 653              | -                                      | 587            | 615                   | 80·1                                             | -                                        | 69·2                                              | 89·3                                                     | 75·7                      | 64·3                      | 78             | -                                                                                | 58                        |
| 57                        | 633              | -                                      | 575            | 595                   | 79·6                                             | -                                        | 68·5                                              | 88·9                                                     | 74·8                      | 63·2                      | 76             | -                                                                                | 57                        |
| 56                        | 613              | -                                      | 561            | 577                   | 79·0                                             | -                                        | 67·7                                              | 88·3                                                     | 73·9                      | 62·0                      | 75             | -                                                                                | 56                        |
| 55                        | 595              | -                                      | 546            | 560                   | 78·5                                             | -                                        | 66·9                                              | 87·9                                                     | 73·0                      | 60·9                      | 74             | 2075 (212)                                                                       | 55                        |
| 54                        | 577              | -                                      | 534            | 543                   | 78·0                                             | -                                        | 66·1                                              | 87·4                                                     | 72·0                      | 59·8                      | 72             | 2015 (205)                                                                       | 54                        |
| 53                        | 560              | -                                      | 519            | 525                   | 77·4                                             | -                                        | 65·4                                              | 86·9                                                     | 71·2                      | 58·6                      | 71             | 1950 (199)                                                                       | 53                        |
| 52                        | 544              | (500)                                  | 508            | 512                   | 76·8                                             | -                                        | 64·6                                              | 86·4                                                     | 70·2                      | 57·4                      | 69             | 1880 (192)                                                                       | 52                        |
| 51                        | 528              | (487)                                  | 494            | 496                   | 76·3                                             | -                                        | 63·8                                              | 85·9                                                     | 69·4                      | 56·1                      | 68             | 1820 (186)                                                                       | 51                        |
| 50                        | 513              | (475)                                  | 481            | 481                   | 75·9                                             | -                                        | 63·1                                              | 85·5                                                     | 68·5                      | 55·0                      | 67             | 1760 (179)                                                                       | 50                        |
| 49                        | 498              | (464)                                  | 469            | 469                   | 75·2                                             | -                                        | 62·1                                              | 85·0                                                     | 67·6                      | 53·8                      | 66             | 1695 (173)                                                                       | 49                        |
| 48                        | 484              | 451                                    | 455            | 455                   | 74·7                                             | -                                        | 61·4                                              | 84·5                                                     | 66·7                      | 52·5                      | 64             | 1635 (167)                                                                       | 48                        |
| 47                        | 471              | 442                                    | 443            | 443                   | 74·1                                             | -                                        | 60·8                                              | 83·9                                                     | 65·8                      | 51·4                      | 63             | 1580 (161)                                                                       | 47                        |
| 46                        | 458              | 432                                    | 432            | 432                   | 73·6                                             | -                                        | 60·0                                              | 83·5                                                     | 64·8                      | 50·3                      | 62             | 1530 (156)                                                                       | 46                        |
| 45                        | 446              | 421                                    | 421            | 421                   | 73·1                                             | -                                        | 59·2                                              | 83·0                                                     | 64·0                      | 49·0                      | 60             | 1480 (151)                                                                       | 45                        |
| 44                        | 434              | 409                                    | 409            | 409                   | 72·5                                             | -                                        | 58·5                                              | 82·5                                                     | 63·1                      | 47·8                      | 58             | 1435 (146)                                                                       | 44                        |
| 43                        | 423              | 400                                    | 400            | 400                   | 72·0                                             | -                                        | 57·7                                              | 82·0                                                     | 62·2                      | 46·7                      | 57             | 1385 (141)                                                                       | 43                        |
| 42                        | 412              | 390                                    | 390            | 390                   | 71·5                                             | -                                        | 56·9                                              | 81·5                                                     | 61·3                      | 45·5                      | 56             | 1340 (136)                                                                       | 42                        |
| 41                        | 402              | 381                                    | 381            | 381                   | 70·9                                             | -                                        | 56·2                                              | 80·9                                                     | 60·4                      | 44·3                      | 55             | 1295 (132)                                                                       | 41                        |
| 40                        | 392              | 371                                    | 371            | 371                   | 70·4                                             | -                                        | 55·4                                              | 80·4                                                     | 59·5                      | 43·1                      | 54             | 1250 (127)                                                                       | 40                        |
| 39                        | 382              | 362                                    | 362            | 362                   | 69·9                                             | -                                        | 54·6                                              | 79·9                                                     | 58·6                      | 41·9                      | 52             | 1215 (124)                                                                       | 39                        |
| 38                        | 372              | 353                                    | 353            | 353                   | 69·4                                             | -                                        | 53·8                                              | 79·4                                                     | 57·7                      | 40·8                      | 51             | 1180 (120)                                                                       | 38                        |
| 37                        | 363              | 344                                    | 344            | 344                   | 68·9                                             | -                                        | 53·1                                              | 78·8                                                     | 56·8                      | 39·6                      | 50             | 1160 (118)                                                                       | 37                        |
| 36                        | 354              | 336                                    | 336            | 336                   | 68·4                                             | (109·0)                                  | 52·3                                              | 78·3                                                     | 55·9                      | 38·4                      | 49             | 1115 (114)                                                                       | 36                        |
| 35                        | 345              | 327                                    | 327            | 327                   | 67·9                                             | (108·5)                                  | 51·5                                              | 77·7                                                     | 55·0                      | 37·2                      | 48             | 1080 (110)                                                                       | 35                        |
| 34                        | 336              | 319                                    | 319            | 319                   | 67·4                                             | (108·0)                                  | 50·8                                              | 77·2                                                     | 54·2                      | 36·1                      | 47             | 1055 (108)                                                                       | 34                        |
| 33                        | 327              | 311                                    | 311            | 311                   | 66·8                                             | (107·5)                                  | 50·0                                              | 76·6                                                     | 53·3                      | 34·9                      | 46             | 1025 (105)                                                                       | 33                        |
| 32                        | 318              | 301                                    | 301            | 301                   | 66·3                                             | (107·0)                                  | 49·2                                              | 76·1                                                     | 52·1                      | 33·7                      | 44             | 1000 (102)                                                                       | 32                        |
| 31                        | 310              | 294                                    | 294            | 294                   | 65·8                                             | (106·0)                                  | 48·4                                              | 75·6                                                     | 51·3                      | 32·5                      | 43             | 980 (100)                                                                        | 31                        |
| 30                        | 302              | 286                                    | 286            | 286                   | 65·3                                             | (105·5)                                  | 47·7                                              | 75·0                                                     | 50·4                      | 31·3                      | 42             | 950 (97)                                                                         | 30                        |
| 29                        | 294              | 279                                    | 279            | 279                   | 64·7                                             | (104·5)                                  | 47·0                                              | 74·5                                                     | 49·5                      | 30·1                      | 41             | 930 (95)                                                                         | 29                        |

# Approximate converted values compared with Rockwell hardness for Steel (1)

| Rockwell Scale C hardness | Vickers hardness | Brinell hardness<br>10 mm ball 3000kgf |                |                       | Rockwell hardness <sup>(2)</sup>                 |                                          |                                                   | Rockwell superficial hardness<br>diamond cone penetrator |                           |                           | Shore hardness | Tensile strength<br>(Approx. value) MPa<br>(kgf/mm <sup>2</sup> ) <sup>(1)</sup> | Rockwell Scale C hardness |
|---------------------------|------------------|----------------------------------------|----------------|-----------------------|--------------------------------------------------|------------------------------------------|---------------------------------------------------|----------------------------------------------------------|---------------------------|---------------------------|----------------|----------------------------------------------------------------------------------|---------------------------|
|                           |                  | Standard ball                          | Hult-gren ball | Tungsten carbide ball | Scale A<br>Load 60kgf<br>Diamond cone penetrator | Scale B<br>Load 100kgf<br>1/16 inch Ball | Scale D<br>Load 100kgf<br>Diamond cone penetrator | 15-N Scale<br>Load 15 kgf                                | 30-N Scale<br>Load 30 kgf | 45-N Scale<br>Load 45 kgf |                |                                                                                  |                           |
| 28                        | 286              | 271                                    | 271            | 271                   | 64·3                                             | (104·0)                                  | 46·1                                              | 73·9                                                     | 48·6                      | 28·9                      | 41             | 910 (93)                                                                         | 28                        |
| 27                        | 279              | 264                                    | 264            | 264                   | 63·8                                             | (103·0)                                  | 45·2                                              | 73·3                                                     | 47·7                      | 27·8                      | 40             | 880 (90)                                                                         | 27                        |
| 26                        | 272              | 258                                    | 258            | 258                   | 63·3                                             | (102·5)                                  | 44·6                                              | 72·8                                                     | 46·8                      | 26·7                      | 38             | 860 (88)                                                                         | 26                        |
| 25                        | 266              | 253                                    | 253            | 253                   | 62·8                                             | (101·5)                                  | 43·8                                              | 72·2                                                     | 45·9                      | 25·5                      | 38             | 840 (86)                                                                         | 25                        |
| 24                        | 260              | 247                                    | 247            | 247                   | 62·4                                             | (101·0)                                  | 43·1                                              | 71·6                                                     | 45·0                      | 24·3                      | 37             | 825 (84)                                                                         | 24                        |
| 23                        | 254              | 243                                    | 243            | 243                   | 62·0                                             | 100·0                                    | 42·1                                              | 71·0                                                     | 44·0                      | 23·1                      | 36             | 805 (82)                                                                         | 23                        |
| 22                        | 248              | 237                                    | 237            | 237                   | 61·5                                             | 99·0                                     | 41·6                                              | 70·5                                                     | 43·2                      | 22·0                      | 35             | 785 (80)                                                                         | 22                        |
| 21                        | 243              | 231                                    | 231            | 231                   | 61·0                                             | 98·5                                     | 40·9                                              | 69·9                                                     | 42·3                      | 20·7                      | 35             | 770 (79)                                                                         | 21                        |
| 20                        | 238              | 226                                    | 226            | 226                   | 60·5                                             | 97·8                                     | 40·1                                              | 69·4                                                     | 41·5                      | 19·6                      | 34             | 760 (77)                                                                         | 20                        |
| (18)                      | 230              | 219                                    | 219            | 219                   | -                                                | 96·7                                     | -                                                 | -                                                        | -                         | -                         | 33             | 730 (75)                                                                         | (18)                      |
| (16)                      | 222              | 212                                    | 212            | 212                   | -                                                | 95·5                                     | -                                                 | -                                                        | -                         | -                         | 32             | 705 (72)                                                                         | (16)                      |
| (14)                      | 213              | 203                                    | 203            | 203                   | -                                                | 93·9                                     | -                                                 | -                                                        | -                         | -                         | 31             | 675 (69)                                                                         | (14)                      |
| (12)                      | 204              | 194                                    | 194            | 194                   | -                                                | 92·3                                     | -                                                 | -                                                        | -                         | -                         | 29             | 650 (66)                                                                         | (12)                      |
| (10)                      | 196              | 187                                    | 187            | 187                   | -                                                | 90·7                                     | -                                                 | -                                                        | -                         | -                         | 28             | 620 (63)                                                                         | (10)                      |
| ( 8)                      | 188              | 179                                    | 179            | 179                   | -                                                | 89·5                                     | -                                                 | -                                                        | -                         | -                         | 27             | 600 (61)                                                                         | ( 8)                      |
| ( 6)                      | 180              | 171                                    | 171            | 161                   | -                                                | 87·1                                     | -                                                 | -                                                        | -                         | -                         | 26             | 580 (59)                                                                         | ( 6)                      |
| ( 4)                      | 173              | 165                                    | 165            | 165                   | -                                                | 85·5                                     | -                                                 | -                                                        | -                         | -                         | 25             | 550 (56)                                                                         | ( 4)                      |
| ( 2)                      | 166              | 158                                    | 158            | 158                   | -                                                | 83·5                                     | -                                                 | -                                                        | -                         | -                         | 24             | 530 (54)                                                                         | ( 2)                      |
| ( 0)                      | 160              | 152                                    | 152            | 152                   | -                                                | 81·7                                     | -                                                 | -                                                        | -                         | -                         | 24             | 515 (53)                                                                         | ( 0)                      |

Note : (1) Units and Numerical values in bracket ( ) is converted from psi conversion table of JIS Z 8438 with 1Mpa = 1N/ mm<sup>2</sup>

(2) Figures in brackets ( ) from table are seldom used and mainly for reference only.

(3) Iron and Steel quoted from JIS hand book

# Commonly used fitting tolerances for bore dimensions

Unit :  $\mu\text{m}$

| Dimensions (mm) |       | D    |              |      | E    |              |      | F    |             |      | G   |            | H   |     |     |           |      |      |      |      |     |     |
|-----------------|-------|------|--------------|------|------|--------------|------|------|-------------|------|-----|------------|-----|-----|-----|-----------|------|------|------|------|-----|-----|
| Above           | Below | D8   | D9           | D10  | E7   | E8           | E9   | F6   | F7          | F8   | G6  | G7         | H6  | H7  | H8  | H9        | H10  | H11  | H12  | H13  |     |     |
| -               | 3     | +34  | +45<br>+20   | +60  | +24  | +28<br>+14   | +39  | +12  | +16<br>+6   | +20  | +8  | +12<br>+2  | +6  | +10 | +14 | +25<br>0  | +40  | +60  | +100 | +140 |     |     |
| 3               | 6     | +48  | +60<br>+30   | +78  | +32  | +38<br>+20   | +50  | +18  | +22<br>+10  | +28  | +12 | +16<br>+4  | +8  | +12 | +18 | +30<br>0  | +48  | +75  | +120 | +180 |     |     |
| 6               | 10    | +62  | +76<br>+40   | +98  | +40  | +47<br>+25   | +61  | +22  | +28<br>+13  | +35  | +14 | +20<br>+5  | +9  | +15 | +22 | +36<br>0  | +58  | +90  | +150 | +220 |     |     |
| 10              | 14    | +77  | +93          | +120 | +50  | +59          | +75  | +27  | +34         | +43  | +17 | +24        | +11 | +18 | +27 | +43       | +70  | +110 | +180 | +270 |     |     |
| 14              | 18    |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      | +50 | +32 |
| 18              | 24    | +98  | +117         | +149 | +61  | +73          | +92  | +33  | +41         | +53  | +20 | +28        | +13 | +21 | +33 | +52       | +84  | +130 | +210 | +330 |     |     |
| 24              | 30    |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      | +65 | +40 |
| 30              | 40    | +119 | +142<br>+80  | +180 | +75  | +89<br>+50   | +112 | +41  | +50<br>+25  | +64  | +25 | +34<br>+9  | +16 | +25 | +39 | +62<br>0  | +100 | +160 | +250 | +390 |     |     |
| 40              | 50    |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 50              | 65    | +146 | +174<br>+100 | +220 | +90  | +106<br>+60  | +134 | +49  | +60<br>+30  | +76  | +29 | +40<br>+10 | +19 | +30 | +46 | +74<br>0  | +120 | +190 | +300 | +460 |     |     |
| 65              | 80    |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 80              | 100   | +174 | +207<br>+120 | +260 | +107 | +126<br>+72  | +159 | +58  | +71<br>+36  | +90  | +34 | +47<br>+12 | +22 | +35 | +54 | +87<br>0  | +140 | +220 | +350 | +540 |     |     |
| 100             | 120   |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 120             | 140   | +208 | +245<br>+145 | +305 | +125 | +148<br>+85  | +185 | +68  | +83<br>+43  | +106 | +39 | +54<br>+14 | +25 | +40 | +63 | +100<br>0 | +160 | +250 | +400 | +630 |     |     |
| 140             | 160   |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 160             | 180   |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 180             | 200   | +242 | +285<br>+170 | +355 | +146 | +172<br>+100 | +215 | +79  | +96<br>+50  | +122 | +44 | +61<br>+15 | +29 | +46 | +72 | +115<br>0 | +185 | +290 | +460 | +720 |     |     |
| 200             | 225   |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 225             | 250   |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 250             | 280   | +271 | +320<br>+190 | +400 | +162 | +191<br>+110 | +240 | +88  | +108<br>+56 | +137 | +49 | +69<br>+17 | +32 | +52 | +81 | +130<br>0 | +210 | +320 | +520 | +810 |     |     |
| 280             | 315   |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 315             | 355   | +299 | +350<br>+210 | +440 | +182 | +214<br>+125 | +265 | +98  | +119<br>+62 | +151 | +54 | +75<br>+18 | +36 | +57 | +89 | +140<br>0 | +230 | +360 | +570 | +890 |     |     |
| 355             | 400   |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |
| 400             | 450   | +327 | +385<br>+230 | +480 | +198 | +232<br>+135 | +290 | +108 | +131<br>+68 | +165 | +60 | +83<br>+20 | +40 | +63 | +97 | +155<br>0 | +250 | +400 | +630 | +970 |     |     |
| 450             | 500   |      |              |      |      |              |      |      |             |      |     |            |     |     |     |           |      |      |      |      |     |     |

Remark : For each cell in the table above, values in the top row shows upper limit of tolerance and values in the bottom row shows lower limit of tolerance.

# Commonly used fitting tolerances for bore dimensions

Unit :  $\mu\text{m}$

| Dimensions<br>(mm) |       | Js     |        |        |        | K            |             | M           |              | N          |            | P          |             | R            | S            | T            | U            | X          |
|--------------------|-------|--------|--------|--------|--------|--------------|-------------|-------------|--------------|------------|------------|------------|-------------|--------------|--------------|--------------|--------------|------------|
| Above              | Below | Js6    | Js7    | Js8    | Js9    | K6           | K7          | M6          | M7           | N6         | N7         | P6         | P7          | R7           | S7           | T7           | U7           | X7         |
| -                  | 3     | ± 3    | ± 5    | ± 7    | ± 12.5 | 0<br>-6      | 0<br>-10    | -2<br>-8    | -2<br>-12    | -4<br>-10  | -4<br>-14  | -6<br>-12  | -6<br>-16   | -10<br>-20   | -14<br>-24   | -            | -18<br>-28   | -20<br>-30 |
| 3                  | 6     | ± 4    | ± 6    | ± 9    | ± 15   | +2<br>-6     | +3<br>-9    | -1<br>-9    | 0<br>-12     | -5<br>-13  | -4<br>-16  | -9<br>-17  | -8<br>-20   | -11<br>-23   | -15<br>-27   | -            | -19<br>-31   | -24<br>-36 |
| 6                  | 10    | ± 4.5  | ± 7.5  | ± 11   | ± 18   | +2<br>-7     | +5<br>-10   | -3<br>-12   | 0<br>-15     | -7<br>-16  | -4<br>-19  | -12<br>-21 | -9<br>-24   | -13<br>-28   | -17<br>-32   | -            | -22<br>-37   | -28<br>-43 |
| 10                 | 14    | ± 5.5  | ± 9    | ± 13.5 | ± 21.5 | +2<br>-9     | +6<br>-12   | -4<br>-15   | 0<br>-18     | -9<br>-20  | -5<br>-23  | -15<br>-26 | -11<br>-29  | -16<br>-34   | -21<br>-39   | -            | -26<br>-44   | -33<br>-51 |
| 14                 | 18    |        |        |        |        | -38<br>-56   |             |             |              |            |            |            |             |              |              |              |              |            |
| 18                 | 24    | ± 6.5  | ± 10.5 | ± 16.5 | ± 26   | +2<br>-11    | +6<br>-15   | -4<br>-17   | 0<br>-21     | -11<br>-24 | -7<br>-28  | -18<br>-31 | -14<br>-35  | -20<br>-41   | -27<br>-48   | -            | -33<br>-54   | -46<br>-67 |
| 24                 | 30    |        |        |        |        | -33<br>-54   | -40<br>-61  | -56<br>-77  |              |            |            |            |             |              |              |              |              |            |
| 30                 | 40    | ± 8    | ± 12.5 | ± 19.5 | ± 31   | +3<br>-13    | +7<br>-18   | -4<br>-20   | 0<br>-25     | -12<br>-28 | -8<br>-33  | -21<br>-37 | -17<br>-42  | -25<br>-50   | -31<br>-59   | -39<br>-64   | -51<br>-61   | -          |
| 40                 | 50    |        |        |        |        | -45<br>-70   | -61<br>-86  |             |              |            |            |            |             |              |              |              |              |            |
| 50                 | 65    | ± 9.5  | ± 15   | ± 23   | ± 37   | +4<br>-15    | +9<br>-21   | -5<br>-24   | 0<br>-30     | -14<br>-33 | -9<br>-39  | -26<br>-45 | -21<br>-51  | -30<br>-60   | -42<br>-72   | -55<br>-85   | -76<br>-106  | -          |
| 65                 | 80    |        |        |        |        | -32<br>-62   | -48<br>-78  | -64<br>-94  | -91<br>-121  |            |            |            |             |              |              |              |              |            |
| 80                 | 100   | ± 11   | ± 17.5 | ± 27   | ± 43.5 | +4<br>-18    | +10<br>-25  | -6<br>-28   | 0<br>-35     | -16<br>-38 | -10<br>-45 | -30<br>-52 | -21<br>-59  | -38<br>-73   | -58<br>-93   | -78<br>-113  | -111<br>-146 | -          |
| 100                | 120   |        |        |        |        | -41<br>-76   | -66<br>-101 | -91<br>-126 | -131<br>-166 |            |            |            |             |              |              |              |              |            |
| 120                | 140   | ± 12.5 | ± 20   | ± 31.5 | ± 50   | +4<br>-21    | +12<br>-28  | -8<br>-33   | 0<br>-40     | -20<br>-45 | -12<br>-52 | -36<br>-61 | -28<br>-68  | -48<br>-88   | -77<br>-117  | -107<br>-147 | -            | -          |
| 140                | 160   |        |        |        |        |              |             |             |              |            |            |            |             | -50<br>-90   | -85<br>-125  | -119<br>-159 |              |            |
| 160                | 180   |        |        |        |        |              |             |             |              |            |            |            |             | -53<br>-93   | -93<br>-133  | -131<br>-171 |              |            |
| 180                | 200   | ± 14.5 | ± 23   | ± 36   | ± 57.5 | +5<br>-24    | +13<br>-33  | -8<br>-37   | 0<br>-46     | -22<br>-51 | -14<br>-60 | -41<br>-70 | -33<br>-79  | -60<br>-106  | -105<br>-151 | -            | -            | -          |
| 200                | 225   |        |        |        |        |              |             |             |              |            |            |            |             | -63<br>-109  | -113<br>-159 |              |              |            |
| 225                | 250   |        |        |        |        |              |             |             |              |            |            |            |             | -67<br>-113  | -123<br>-169 |              |              |            |
| 250                | 280   | ± 16   | ± 26   | ± 40.5 | ± 65   | +5<br>-27    | +16<br>-36  | -9<br>-41   | 0<br>-52     | -25<br>-57 | -14<br>-66 | -47<br>-79 | -36<br>-88  | -74<br>-126  | -            | -            | -            | -          |
| 280                | 315   |        |        |        |        | -78<br>-130  |             |             |              |            |            |            |             |              |              |              |              |            |
| 315                | 355   | ± 18   | ± 28.5 | ± 44.5 | ± 70   | +7<br>-29    | +17<br>-40  | -10<br>-46  | 0<br>-57     | -26<br>-62 | -16<br>-73 | -51<br>-87 | -41<br>-93  | -87<br>-144  | -            | -            | -            | -          |
| 355                | 400   |        |        |        |        | -93<br>-150  |             |             |              |            |            |            |             |              |              |              |              |            |
| 400                | 450   | ± 20   | ± 31.5 | ± 48.5 | ± 77.5 | +8<br>-32    | +18<br>-45  | -10<br>-50  | 0<br>-63     | -27<br>-67 | -17<br>-80 | -55<br>-95 | -45<br>-108 | -103<br>-166 | -            | -            | -            | -          |
| 450                | 500   |        |        |        |        | -109<br>-172 |             |             |              |            |            |            |             |              |              |              |              |            |

Remark : For each cell in the table above, values in the top row shows upper limit of tolerance and values in the bottom row shows lower limit of tolerance.

# Commonly used fitting tolerances for axis dimensions

Unit :  $\mu\text{m}$ 

| Dimensions (mm) |       | js         |            |            |            | k         |     | m          |     | n          | p           | r            | s            | t            | u            | x          |
|-----------------|-------|------------|------------|------------|------------|-----------|-----|------------|-----|------------|-------------|--------------|--------------|--------------|--------------|------------|
| Above           | Below | js5        | js6        | js7        | js8        | k5        | k6  | m5         | m6  | n6         | p6          | r6           | s6           | t6           | u6           | x6         |
| -               | 3     | $\pm 2$    | $\pm 3$    | $\pm 5$    | $\pm 7$    | +4<br>0   | +6  | +6<br>+2   | +8  | +10<br>+4  | +12<br>+6   | +16<br>+10   | +20<br>+14   | -            | +24<br>+18   | +26<br>+20 |
| 3               | 6     | $\pm 2.5$  | $\pm 4$    | $\pm 6$    | $\pm 9$    | +6<br>+1  | +9  | +9<br>+4   | +12 | +16<br>+8  | +20<br>+12  | +23<br>+15   | +27<br>+19   | -            | +31<br>+23   | +36<br>+28 |
| 6               | 10    | $\pm 3$    | $\pm 4.5$  | $\pm 7.5$  | $\pm 11$   | +7<br>+1  | +10 | +12<br>+6  | +15 | +19<br>+10 | +24<br>+15  | +28<br>+19   | +32<br>+23   | -            | +37<br>+28   | +43<br>+34 |
| 10              | 14    | $\pm 4$    | $\pm 5.5$  | $\pm 9$    | $\pm 13.5$ | +9<br>+1  | +12 | +15<br>+7  | +18 | +23<br>+12 | +29<br>+18  | +34<br>+23   | +39<br>+28   | -            | +44<br>+33   | +51<br>+40 |
| 14              | 18    |            |            |            |            |           |     |            |     |            |             |              |              |              |              | +56<br>+45 |
| 18              | 24    | $\pm 4.5$  | $\pm 6.5$  | $\pm 10.5$ | $\pm 16.5$ | +11<br>+2 | +15 | +17<br>+8  | +21 | +28<br>+15 | +35<br>+22  | +41<br>+28   | +48<br>+35   | -            | +54<br>+41   | +67<br>+54 |
| 24              | 30    |            |            |            |            |           |     |            |     |            |             |              |              | +54<br>+41   | +61<br>+48   | +77<br>+64 |
| 30              | 40    | $\pm 5.5$  | $\pm 8$    | $\pm 12.5$ | $\pm 19.5$ | +13<br>+2 | +18 | +20<br>+9  | +25 | +33<br>+17 | +42<br>+26  | +50<br>+34   | +59<br>+43   | +64<br>+48   | +76<br>+60   | -          |
| 40              | 50    |            |            |            |            |           |     |            |     |            |             |              |              | +70<br>+54   | +86<br>+70   |            |
| 50              | 65    | $\pm 6.5$  | $\pm 9.5$  | $\pm 15$   | $\pm 23$   | +15<br>+2 | +21 | +24<br>+11 | +30 | +30<br>+20 | +51<br>+32  | +60<br>+41   | +72<br>+53   | +85<br>+66   | +106<br>+87  | -          |
| 65              | 80    |            |            |            |            |           |     |            |     |            |             | +62<br>+43   | +78<br>+59   | +94<br>+75   | +121<br>+102 |            |
| 80              | 100   | $\pm 7.5$  | $\pm 11$   | $\pm 17.5$ | $\pm 27$   | +18<br>+3 | +25 | +28<br>+13 | +35 | +45<br>+23 | +59<br>+37  | +73<br>+51   | +93<br>+71   | +113<br>+104 | +146<br>+124 | -          |
| 100             | 120   |            |            |            |            |           |     |            |     |            |             | +76<br>+54   | +101<br>+79  | +126<br>+104 | +166<br>+144 |            |
| 120             | 140   | $\pm 9$    | $\pm 12.5$ | $\pm 20$   | $\pm 31.5$ | +21<br>+3 | +28 | +33<br>+15 | +40 | +52<br>+27 | +68<br>+43  | +88<br>+63   | +117<br>+92  | +147<br>+122 | -            | -          |
| 140             | 160   |            |            |            |            |           |     |            |     |            |             | +90<br>+65   | +125<br>+100 | +159<br>+134 |              |            |
| 160             | 180   |            |            |            |            |           |     |            |     |            |             | +93<br>+68   | +133<br>+108 | +171<br>+146 |              |            |
| 180             | 200   | $\pm 10$   | $\pm 14.5$ | $\pm 23$   | $\pm 36$   | +24<br>+4 | +33 | +37<br>+17 | +46 | +60<br>+31 | +79<br>+50  | +106<br>+77  | +151<br>+122 | -            | -            | -          |
| 200             | 225   |            |            |            |            |           |     |            |     |            |             | +109<br>+80  | +159<br>+130 |              |              |            |
| 225             | 250   |            |            |            |            |           |     |            |     |            |             | +113<br>+84  | +169<br>+140 |              |              |            |
| 250             | 280   | $\pm 11.5$ | $\pm 16$   | $\pm 26$   | $\pm 40.5$ | +27<br>+4 | +36 | +43<br>+20 | +52 | +66<br>+34 | +88<br>+56  | +126<br>+94  | -            | -            | -            | -          |
| 280             | 315   |            |            |            |            |           |     |            |     |            |             | +130<br>+98  |              |              |              |            |
| 315             | 355   | $\pm 12.5$ | $\pm 18$   | $\pm 28.5$ | $\pm 44.5$ | +29<br>+4 | +40 | +46<br>+21 | +57 | +73<br>+37 | +98<br>+62  | +144<br>+108 | -            | -            | -            | -          |
| 355             | 400   |            |            |            |            |           |     |            |     |            |             | +150<br>+114 |              |              |              |            |
| 400             | 450   | $\pm 13.5$ | $\pm 20$   | $\pm 31.5$ | $\pm 48.5$ | +32<br>+5 | +45 | +50<br>+23 | +63 | +80<br>+40 | +108<br>+68 | +166<br>+126 | -            | -            | -            | -          |
| 450             | 500   |            |            |            |            |           |     |            |     |            |             | +172<br>+132 |              |              |              |            |

Remark : For each cell in the table above, values in the top row shows upper limit of tolerance and values in the bottom row shows lower limit of tolerance.

# Commonly used fitting tolerances for axis dimensions

Unit :  $\mu\text{m}$

| Dimensions (mm) |       | d            |      | e            |      |      | f           |      |      | g          |     | h                                             |    |    |    |    |     |     |     |     |  |  |
|-----------------|-------|--------------|------|--------------|------|------|-------------|------|------|------------|-----|-----------------------------------------------|----|----|----|----|-----|-----|-----|-----|--|--|
| Above           | Below | d8           | d9   | e7           | e8   | e9   | f6          | f7   | f8   | g5         | g6  | h5                                            | h6 | h7 | h8 | h9 | h10 | h11 | h12 | h13 |  |  |
| -               | 3     | -20<br>-34   | -45  | -14<br>-24   | -28  | -39  | -6<br>-12   | -16  | -20  | -2<br>-6   | -8  | 0<br>-4 -6 -10 -14 -25 -40 -60 -100 -140      |    |    |    |    |     |     |     |     |  |  |
| 3               | 6     | -30<br>-48   | -60  | -20<br>-32   | -38  | -50  | -10<br>-18  | -22  | -28  | -4<br>-9   | -12 | 0<br>-5 -8 -12 -18 -30 -48 -75 -120 -180      |    |    |    |    |     |     |     |     |  |  |
| 6               | 10    | -40<br>-62   | -76  | -25<br>-40   | -47  | -61  | -13<br>-22  | -28  | -35  | -5<br>-11  | -14 | 0<br>-6 -9 -15 -22 -36 -58 -90 -150 -220      |    |    |    |    |     |     |     |     |  |  |
| 10              | 14    | -50<br>-77   | -93  | -32<br>-50   | -59  | -75  | -16<br>-27  | -34  | -43  | -6<br>-14  | -17 | 0<br>-8 -11 -18 -27 -43 -70 -110 -180 -270    |    |    |    |    |     |     |     |     |  |  |
| 14              | 18    |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 18              | 24    | -65<br>-98   | -117 | -40<br>-61   | -73  | -92  | -20<br>-33  | -41  | -53  | -7<br>-16  | -20 | 0<br>-9 -13 -21 -33 -52 -84 -130 -210 -330    |    |    |    |    |     |     |     |     |  |  |
| 24              | 30    |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 30              | 40    | -80<br>-119  | -142 | -50<br>-75   | -89  | -112 | -25<br>-41  | -50  | -64  | -9<br>-20  | -25 | 0<br>-11 -16 -25 -39 -62 -100 -160 -250 -390  |    |    |    |    |     |     |     |     |  |  |
| 40              | 50    |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 50              | 65    | -100<br>-146 | -174 | -60<br>-90   | -106 | -134 | -30<br>-49  | -60  | -76  | -10<br>-23 | -29 | 0<br>-13 -19 -30 -46 -74 -120 -190 -300 -460  |    |    |    |    |     |     |     |     |  |  |
| 65              | 80    |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 80              | 100   | -120<br>-174 | -207 | -72<br>-107  | -126 | -159 | -36<br>-58  | -71  | -90  | -12<br>-27 | -34 | 0<br>-15 -22 -35 -54 -87 -140 -220 -350 -540  |    |    |    |    |     |     |     |     |  |  |
| 100             | 120   |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 120             | 140   | -145<br>-208 | -245 | -85<br>-125  | -148 | -185 | -43<br>-68  | -83  | -106 | -14<br>-32 | -39 | 0<br>-18 -25 -40 -63 -100 -160 -250 -400 -630 |    |    |    |    |     |     |     |     |  |  |
| 140             | 160   |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 160             | 180   |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 180             | 200   | -170<br>-242 | -285 | -100<br>-146 | -172 | -215 | -50<br>-79  | -96  | -122 | -15<br>-35 | -44 | 0<br>-20 -29 -46 -72 -115 -185 -290 -460 -720 |    |    |    |    |     |     |     |     |  |  |
| 200             | 225   |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 225             | 250   |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 250             | 280   | -190<br>-271 | -320 | -110<br>-162 | -191 | -240 | -56<br>-88  | -108 | -137 | -17<br>-40 | -49 | 0<br>-23 -32 -52 -81 -130 -210 -320 -520 -810 |    |    |    |    |     |     |     |     |  |  |
| 280             | 315   |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 315             | 355   | -210<br>-299 | -350 | -125<br>-182 | -214 | -265 | -62<br>-98  | -119 | -151 | -18<br>-43 | -54 | 0<br>-25 -36 -57 -89 -140 -230 -260 -570 -890 |    |    |    |    |     |     |     |     |  |  |
| 355             | 400   |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |
| 400             | 450   | -230<br>-327 | -385 | -135<br>-198 | -232 | -290 | -68<br>-108 | -131 | -165 | -20<br>-47 | -60 | 0<br>-27 -40 -63 -97 -155 -250 -400 -630 -970 |    |    |    |    |     |     |     |     |  |  |
| 450             | 500   |              |      |              |      |      |             |      |      |            |     |                                               |    |    |    |    |     |     |     |     |  |  |

Remark : For each cell in the table above, values in the top row shows upper limit of tolerance and values in the bottom row shows lower limit of tolerance.



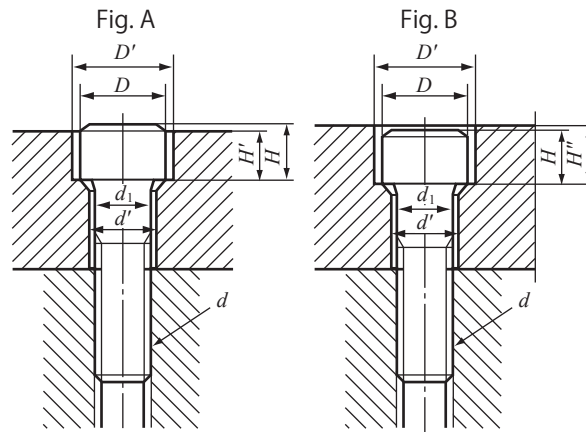
# Metric coarse and fine screw threads, and reference pilot hole dimensions

Unit : mm

| Nominal threads | Pitch        |            |      |      | Reference pilot hole dimensions |          |
|-----------------|--------------|------------|------|------|---------------------------------|----------|
|                 | Coarse screw | Fine screw |      |      | Coarse screw                    | Helisert |
| M1              | 0.25         | 0.2        |      |      | 0.75                            |          |
| M1.1            | 0.25         | 0.2        |      |      | 0.85                            |          |
| M1.2            | 0.25         | 0.2        |      |      | 0.95                            |          |
| M1.4            | 0.3          | 0.2        |      |      | 1.1                             |          |
| M1.6            | 0.35         | 0.2        |      |      | 1.25                            |          |
| M1.8            | 0.35         | 0.2        |      |      | 1.45                            |          |
| M2              | 0.4          | 0.25       |      |      | 1.6                             | 2.1      |
| M2.2            | 0.45         | 0.25       |      |      | 1.75                            | 2.4      |
| M2.5            | 0.45         | 0.35       |      |      | 2.1                             | 2.6      |
| M3              | 0.5          | 0.35       |      |      | 2.5                             | 3.1      |
| M3.5            | 0.6          | 0.35       |      |      | 2.9                             | 3.7      |
| M4              | 0.7          | 0.5        |      |      | 3.3                             | 4.2      |
| M4.5            | 0.75         | 0.5        |      |      | 3.8                             | 3.6      |
| M5              | 0.8          | 0.5        |      |      | 4.2                             | 5.2      |
| M6              | 1            | 0.75       |      |      | 5                               | 6.3      |
| M8              | 1.25         | 0.75       | 1    |      | 6.8                             | 8.4      |
| M10             | 1.5          | 0.75       | 1    | 1.25 | 8.5                             | 10.5     |
| M12             | 1.75         | 1          | 1.25 | 1.5  | 10.3                            | 12.5     |
| M14             | 2            | 1          | 1.25 | 1.5  | 12                              | 14.5     |
| M16             | 2            | 1          | 1.5  | 1.5  | 14                              | 16.5     |
| M18             | 2.5          | 1          | 1.5  | 2    | 15.5                            | 19       |
| M20             | 2.5          | 1          | 1.5  | 2    | 17.5                            | 21       |
| M22             | 2.5          | 1          | 1.5  | 2    | 19.5                            | 23       |
| M24             | 3            | 1          | 1.5  | 2    | 21                              | 25       |
| M27             | 3            | 1          | 1.5  | 2    | 24                              | 28       |
| M30             | 3.5          | 1          | 1.5  | 2    | 26.5                            | 31       |

Extracted from JIS B0205, 0207

Following details are for reference only and not part of JIS standard.



## Spot facing and Thread hole for Hexagon socket head cap screws

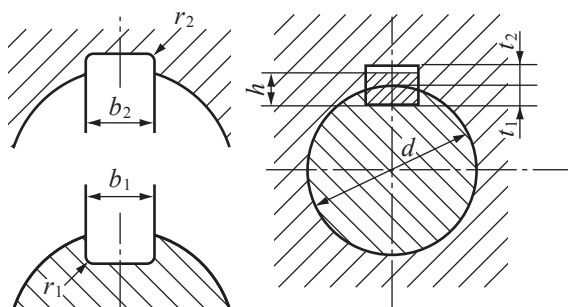
Unit: mm

| Nominal thread (d) | M3  | M4  | M5  | M6  | M8  | M10  | M12 | M14  | M16  | M18  | M20  | M22  | M24  | M27 | M30 | M33 | M36 | M39 | M42 | M45 | M48 | M52 |
|--------------------|-----|-----|-----|-----|-----|------|-----|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| $d_1$              | 3   | 4   | 5   | 6   | 8   | 10   | 12  | 14   | 16   | 18   | 20   | 22   | 24   | 27  | 30  | 33  | 36  | 39  | 42  | 45  | 48  | 52  |
| $d'$               | 3.4 | 4.5 | 5.5 | 6.6 | 9   | 11   | 14  | 16   | 18   | 20   | 22   | 24   | 26   | 30  | 33  | 36  | 39  | 42  | 45  | 48  | 52  | 56  |
| $D$                | 5.5 | 7   | 8.5 | 10  | 13  | 16   | 18  | 21   | 24   | 27   | 30   | 33   | 36   | 40  | 45  | 50  | 54  | 58  | 63  | 68  | 72  | 78  |
| $D'$               | 6.5 | 8   | 9.5 | 11  | 14  | 17.5 | 20  | 23   | 26   | 29   | 32   | 35   | 39   | 43  | 48  | 54  | 58  | 62  | 67  | 72  | 76  | 82  |
| $H$                | 3   | 4   | 5   | 6   | 8   | 10   | 12  | 14   | 16   | 18   | 20   | 22   | 24   | 27  | 30  | 33  | 36  | 39  | 42  | 45  | 48  | 52  |
| $H'$               | 2.7 | 3.6 | 4.6 | 5.5 | 7.4 | 9.2  | 11  | 12.8 | 14.5 | 16.5 | 18.5 | 20.5 | 22.5 | 25  | 28  | 31  | 34  | 37  | 39  | 42  | 45  | 49  |
| $H''$              | 3.3 | 4.4 | 5.4 | 6.5 | 8.6 | 10.8 | 13  | 15.2 | 17.5 | 19.5 | 21.5 | 23.5 | 25.5 | 29  | 32  | 35  | 38  | 41  | 44  | 47  | 50  | 54  |

Remark: Thread holes ( $d'$ ) provide Class 2 from JIS B 1001 (Thread holes and Spot facing holes)

# Shape and dimensions of keyway for parallel key

Cross section of keyway



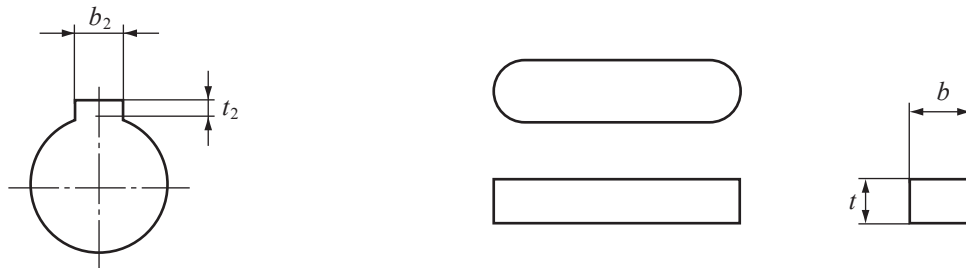
Unit : mm

| Normal size of key<br>$b \times h$ | Basic dimensions<br>of $b_1$ and $b_2$ | Sliding fit       |                     | Normal fit         |                    | Tight fit         | $r_1$ and $r_2$ | Basic dimensions<br>of $t_1$ | Basic dimensions<br>of $t_2$ | Tolerance<br>of $t_1$ and $t_2$ | Suitable<br>shaft dia.<br>$d$ (Reference) | Corresponding<br>KG gear bore<br>dia. |
|------------------------------------|----------------------------------------|-------------------|---------------------|--------------------|--------------------|-------------------|-----------------|------------------------------|------------------------------|---------------------------------|-------------------------------------------|---------------------------------------|
|                                    |                                        | $b_1$             | $b_2$               | $b_1$              | $b_2$              | $b_1$ and $b_2$   |                 |                              |                              |                                 |                                           |                                       |
|                                    |                                        | Tolerance<br>(H9) | Tolerance<br>(D 10) | Tolerance<br>(N 9) | Tolerance<br>(Js9) | Tolerance<br>(P9) |                 |                              |                              |                                 |                                           |                                       |
| 2 × 2                              | 2                                      | +0.025<br>0       | +0.060<br>+0.020    | -0.004<br>-0.029   | ± 0.0125           | -0.006<br>-0.031  | 0.08 ~ 0.16     | 1.2                          | 1.0                          | +0.1<br>0                       | 6 ~ 8                                     |                                       |
| 3 × 3                              | 3                                      |                   |                     |                    |                    |                   |                 | 1.8                          | 1.4                          |                                 | 8 ~ 10                                    | 8,10                                  |
| 4 × 4                              | 4                                      |                   |                     |                    |                    |                   |                 | 2.5                          | 1.8                          |                                 | 10 ~ 12                                   | 12                                    |
| 5 × 5                              | 5                                      |                   |                     |                    |                    |                   |                 | 3.0                          | 2.3                          |                                 | 12 ~ 17                                   | 14,15,16                              |
| 6 × 6                              | 6                                      | +0.030<br>0       | +0.078<br>-0.030    | 0<br>-0.030        | ± 0.0150           | -0.012<br>-0.042  | 0.16 ~ 0.25     | 3.5                          | 2.8                          | +0.2<br>0                       | 17 ~ 22                                   | 18,20,22                              |
| (7 × 7)                            | 7                                      |                   |                     |                    |                    |                   |                 | 4.0                          | 3.3                          |                                 | 20 ~ 25                                   |                                       |
| 8 × 7                              | 8                                      |                   |                     |                    |                    |                   |                 | 4.0                          | 3.3                          |                                 | 22 ~ 30                                   | 25,28,30                              |
| 10 × 8                             | 10                                     |                   |                     |                    |                    |                   |                 | 5.0                          | 3.3                          |                                 | 30 ~ 38                                   | 32,35                                 |
| 12 × 8                             | 12                                     | +0.036<br>0       | +0.098<br>+0.040    | 0<br>-0.036        | ± 0.0180           | -0.015<br>-0.051  | 0.25 ~ 0.40     | 5.0                          | 3.3                          | +0.2<br>0                       | 38 ~ 44                                   | 40                                    |
| 14 × 9                             | 14                                     |                   |                     |                    |                    |                   |                 | 5.0                          | 3.3                          |                                 | 44 ~ 50                                   | 45,50                                 |
| (15 × 10)                          | 15                                     |                   |                     |                    |                    |                   |                 | 5.5                          | 3.8                          |                                 | 50 ~ 55                                   |                                       |
| 16 × 10                            | 16                                     |                   |                     |                    |                    |                   |                 | 5.0                          | 5.3                          |                                 | 50 ~ 58                                   |                                       |
| 18 × 11                            | 18                                     | +0.043<br>0       | +0.120<br>+0.050    | 0<br>-0.043        | ± 0.0215           | -0.018<br>-0.061  | 0.40 ~ 0.60     | 6.0                          | 4.3                          | +0.2<br>0                       | 58 ~ 65                                   |                                       |
| 20 × 12                            | 20                                     |                   |                     |                    |                    |                   |                 | 7.0                          | 4.4                          |                                 | 65 ~ 75                                   |                                       |
| 22 × 14                            | 22                                     |                   |                     |                    |                    |                   |                 | 7.5                          | 4.9                          |                                 | 75 ~ 85                                   |                                       |
| (24 × 16)                          | 24                                     |                   |                     |                    |                    |                   |                 | 8.0                          | 8.4                          |                                 | 80 ~ 90                                   |                                       |
| 25 × 14                            | 25                                     | +0.052<br>0       | +0.149<br>+0.065    | 0<br>-0.052        | ± 0.0260           | -0.022<br>-0.074  | 0.70 ~ 1.00     | 9.0                          | 5.4                          | +0.3<br>0                       | 85 ~ 95                                   |                                       |
| 28 × 16                            | 28                                     |                   |                     |                    |                    |                   |                 | 9.0                          | 5.4                          |                                 | 95 ~ 110                                  |                                       |
| 32 × 18                            | 32                                     |                   |                     |                    |                    |                   |                 | 10.0                         | 6.4                          |                                 | 110 ~ 130                                 |                                       |
| (35 × 22)                          | 35                                     |                   |                     |                    |                    |                   |                 | 11.0                         | 7.4                          |                                 | 125 ~ 140                                 |                                       |
| 36 × 20                            | 36                                     | +0.062<br>0       | +0.180<br>+0.080    | 0<br>-0.062        | ± 0.0310           | -0.026<br>-0.088  | 1.20 ~ 1.60     | 12.0                         | 8.4                          | +0.3<br>0                       | 130 ~ 150                                 |                                       |
| (38 × 24)                          | 38                                     |                   |                     |                    |                    |                   |                 | 12.0                         | 12.4                         |                                 | 140 ~ 160                                 |                                       |
| 40 × 22                            | 40                                     |                   |                     |                    |                    |                   |                 | 13.0                         | 9.4                          |                                 | 150 ~ 170                                 |                                       |
| (42 × 26)                          | 42                                     |                   |                     |                    |                    |                   |                 | 13.0                         | 13.4                         |                                 | 160 ~ 180                                 |                                       |
| 45 × 25                            | 45                                     | +0.074<br>0       | +0.220<br>+0.100    | 0<br>-0.072        | ± 0.0370           | -0.032<br>-0.106  | 2.00 ~ 2.50     | 15.0                         | 10.4                         | +0.3<br>0                       | 170 ~ 200                                 |                                       |
| 50 × 28                            | 50                                     |                   |                     |                    |                    |                   |                 | 17.0                         | 11.4                         |                                 | 200 ~ 230                                 |                                       |
| 56 × 32                            | 56                                     |                   |                     |                    |                    |                   |                 | 20.0                         | 12.4                         |                                 | 230 ~ 260                                 |                                       |
| 63 × 32                            | 63                                     |                   |                     |                    |                    |                   |                 | 20.0                         | 12.4                         |                                 | 260 ~ 290                                 |                                       |
| 70 × 36                            | 70                                     | +0.087<br>0       | +0.260<br>+0.120    | 0<br>-0.087        | ± 0.0435           | -0.037<br>-0.124  | 2.00 ~ 2.50     | 22.0                         | 14.4                         | +0.3<br>0                       | 290 ~ 330                                 |                                       |
| 80 × 40                            | 80                                     |                   |                     |                    |                    |                   |                 | 25.0                         | 15.4                         |                                 | 330 ~ 380                                 |                                       |
| 90 × 45                            | 90                                     |                   |                     |                    |                    |                   |                 | 28.0                         | 17.4                         |                                 | 380 ~ 440                                 |                                       |
| 100 × 50                           | 100                                    |                   |                     |                    |                    |                   |                 | 31.0                         | 19.5                         |                                 | 440 ~ 500                                 |                                       |

Based on JIS B 1301

## Parallel key and Key Way

Dimensions and tolerances for KG-gear with Key way are equivalent to JIS B1301.



### Tolerances for Key

| $b \times t$      | 3 × 3 | 4 × 4 | 5 × 5 | 6 × 6 | 8 × 7 | 10 × 8 | 12 × 8 | 14 × 9 |
|-------------------|-------|-------|-------|-------|-------|--------|--------|--------|
| $b$ Tolerance (h) | h9    | h9    | h9    | h9    | h9    | h9     | h9     | h9     |
| $t$ Tolerance (h) | h9    | h9    | h9    | h9    | h11   | h11    | h11    | h11    |

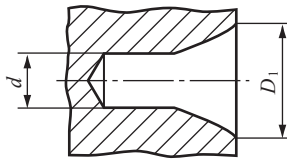
### Key way for KG-STOCK GEARS

Unit : mm

| Dimensions             | Bore dimensions | Key way<br>$b_2 \times t_2$ | Width |                | Depth |             |
|------------------------|-----------------|-----------------------------|-------|----------------|-------|-------------|
|                        |                 |                             | $b_2$ | Tolerance Js 9 | $t_2$ | Tolerance   |
| $\phi\ 8 \sim \phi 10$ | $\phi\ 8$       | $3 \times 1.4$              | 3     | $\pm\ 0.0125$  | 1.4   | $+0.1$<br>0 |
|                        | $\phi 10$       |                             |       |                |       |             |
| $\phi 10 \sim \phi 12$ | $\phi 12$       | $4 \times 1.8$              | 4     | $\pm\ 0.015$   | 1.8   |             |
| $\phi 12 \sim \phi 17$ | $\phi 14$       | $5 \times 2.3$              | 5     |                | 2.3   |             |
|                        | $\phi 15$       |                             |       |                |       |             |
|                        | $\phi 16$       |                             |       |                |       |             |
| $\phi 17 \sim \phi 22$ | $\phi 18$       | $6 \times 2.8$              | 6     |                | 2.8   |             |
|                        | $\phi 20$       |                             |       |                |       |             |
|                        | $\phi 22$       |                             |       |                |       |             |
| $\phi 22 \sim \phi 30$ | $\phi 25$       | $8 \times 3.3$              | 8     | $\pm\ 0.018$   | 3.3   | $+0.2$<br>0 |
|                        | $\phi 28$       |                             |       |                |       |             |
|                        | $\phi 30$       |                             |       |                |       |             |
| $\phi 30 \sim \phi 38$ | $\phi 32$       | $10 \times 3.3$             | 10    | 3.3            |       |             |
|                        | $\phi 35$       |                             |       |                |       |             |
| $\phi 38 \sim \phi 44$ | $\phi 40$       | $12 \times 3.3$             | 12    | $\pm\ 0.0215$  | 3.3   |             |
| $\phi 44 \sim \phi 50$ | $\phi 45$       | $14 \times 3.8$             | 14    |                | 3.8   |             |
|                        | $\phi 50$       |                             |       |                |       |             |

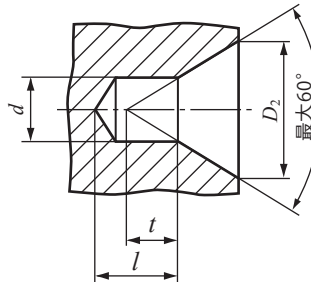
## Centre bore JIS B1011

Type R



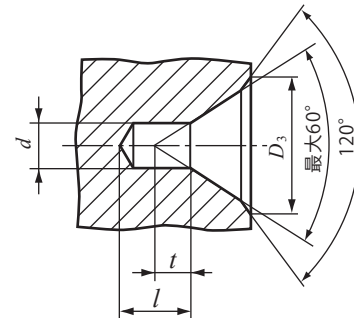
Form with circular arc  
(Drilling centre bore from JIS B4304)

Type A



Form without chamfering  
(Drilling centre bore from JIS B4304)

Type B



Form with chamfering  
(Drilling centre bore from JIS B4304)

Note\* : Length 'l' is based on centre drill but length must be longer than dimension 't'.

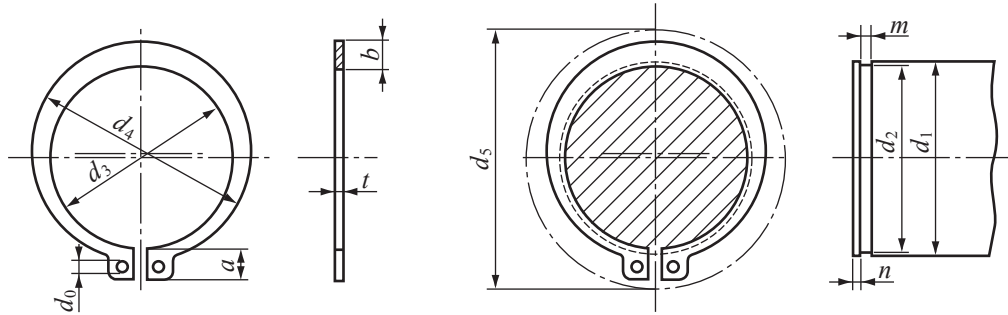
### Centre bore (recommended)

Unit : mm

| Nominal $d$ | Type                |                     |                  |                     |                  |
|-------------|---------------------|---------------------|------------------|---------------------|------------------|
|             | Type R<br>JIS B4304 | Type A<br>JIS B4304 |                  | Type B<br>JIS B4304 |                  |
|             | $D_1$<br>Nominal    | $D_2$<br>Nominal    | $t$<br>Reference | $D_3$<br>Nominal    | $t$<br>Reference |
| (0.5)       |                     | 1.06                | 0.5              |                     |                  |
| (0.63)      |                     | 1.32                | 0.6              |                     |                  |
| (0.8)       |                     | 1.70                | 0.7              |                     |                  |
| 1.0         | 2.12                | 2.12                | 0.9              | 3.15                | 0.9              |
| (1.25)      | 2.65                | 2.65                | 1.1              | 4                   | 1.1              |
| 1.6         | 3.35                | 3.35                | 1.4              | 5                   | 1.4              |
| 2.0         | 4.25                | 4.25                | 1.8              | 6.3                 | 1.8              |
| 2.5         | 5.3                 | 5.30                | 2.2              | 8                   | 2.2              |
| 3.15        | 6.7                 | 6.70                | 2.8              | 10                  | 2.8              |
| 4.0         | 8.5                 | 8.50                | 3.5              | 12.5                | 3.5              |
| (5.0)       | 10.6                | 10.60               | 4.4              | 16                  | 4.4              |
| 6.3         | 13.2                | 13.20               | 5.5              | 18                  | 5.5              |
| (8.0)       | 17.0                | 17.00               | 7.0              | 22.4                | 7.0              |
| 10.0        | 21.2                | 21.20               | 8.7              | 28                  | 8.7              |

Using figures in bracket ( ) is not advisable.

## C-type retaining ring for shaft (reference)



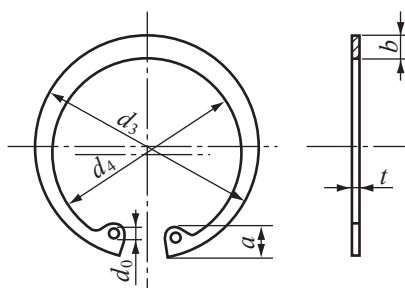
The location of the hole for diameter  $d_0$  should not be hidden by the groove when inserted to a shaft to which the retaining ring is being applied.

$d_5$  is the maximum diameter of the outer circumference when inserting a retaining ring into a shaft.

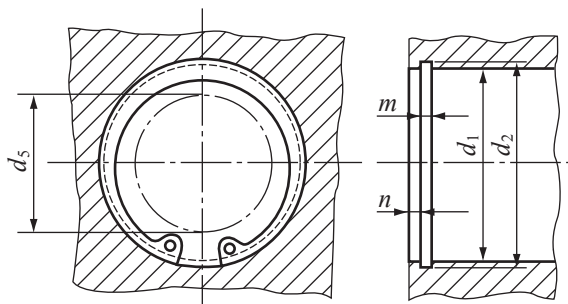
Unit: mm

| Normal diameter |     | Retaining ring  |            |                 |            |     |      |                 | Applicable shaft (reference) |            |                 |            |                 |              |               |
|-----------------|-----|-----------------|------------|-----------------|------------|-----|------|-----------------|------------------------------|------------|-----------------|------------|-----------------|--------------|---------------|
| 1               | 2   | $d_s$           |            | $t$             |            | $b$ | $a$  | $d_0$<br>(Min.) | $d_s$                        | $d_i$      | $d_2$           |            | $m$             |              | $n$<br>(Min.) |
|                 |     | Basic dimension | Tolerance  | Basic dimension | Tolerance  |     |      |                 |                              |            | Basic dimension | Tolerance  | Basic dimension | Tolerance    |               |
| 10              |     | 9.3             | $\pm 0.15$ | 1               | $\pm 0.05$ | 1.6 | 3    | 1.2             | 17                           | 10         | 9.6             | 0<br>-0.09 | 1.15            | $+0.14$<br>0 | 1.5           |
|                 | 11  | 10.2            |            |                 |            | 1.8 | 3.1  |                 | 1.5                          | 18         | 11              | 10.5       |                 |              |               |
| 12              |     | 11.1            | 1.8        |                 |            | 3.2 | 1.7  | 19              |                              | 12         | 11.5            |            |                 |              |               |
| 14              |     | 12.9            | 2          |                 |            | 3.4 |      | 22              | 14                           | 13.4       |                 |            |                 |              |               |
| 15              |     | 13.8            | 2.1        |                 |            | 3.5 |      | 23              | 15                           | 14.3       |                 |            |                 |              |               |
| 16              |     | 14.7            | 2.2        |                 |            | 3.6 |      | 24              | 16                           | 15.2       |                 |            |                 |              |               |
| 17              |     | 15.7            | 2.2        |                 |            | 3.7 |      | 25              | 17                           | 16.2       |                 |            |                 |              |               |
| 18              |     | 16.5            | 2.6        |                 |            | 3.8 | 26   | 18              | 17                           | 0<br>-0.21 |                 |            |                 |              |               |
|                 | 19  | 17.5            | 2.7        |                 |            | 3.8 | 2    | 27              | 19                           |            | 18              | 1.35       |                 |              |               |
| 20              |     | 18.5            | 2.7        | 3.9             | 28         | 20  |      | 19              |                              |            |                 |            |                 |              |               |
| 22              |     | 20.5            | 2.7        | 4.1             | 31         | 22  |      | 21              |                              |            |                 |            |                 |              |               |
|                 | 24  | 22.2            | 3.1        | 4.2             | 33         | 24  |      | 22.9            |                              |            |                 |            |                 |              |               |
| 25              |     | 23.2            | 3.1        | 4.3             | 34         | 25  |      | 23.9            |                              |            |                 |            |                 |              |               |
|                 | 26  | 24.2            | 3.1        | 4.4             | 35         | 26  |      | 24.9            |                              |            |                 |            |                 |              |               |
| 28              |     | 25.9            | 3.1        | 4.6             | 38         | 28  |      | 26.6            | 0<br>-0.25                   | 1.75       |                 |            |                 |              |               |
| 30              |     | 27.9            | 3.5        | 4.8             | 40         | 30  | 28.6 |                 |                              |            |                 |            |                 |              |               |
| 32              |     | 29.6            | 3.5        | 5               | 43         | 32  | 30.3 | 0<br>-0.25      |                              |            | 1.95            |            |                 |              |               |
| 35              |     | 32.2            | 4          | 5.4             | 46         | 35  | 33   |                 |                              |            |                 |            |                 |              |               |
|                 | 36  | 33.2            | 4          | 5.4             | 47         | 36  | 34   |                 |                              |            |                 |            |                 |              |               |
|                 | 38  | 35.2            | $\pm 0.25$ | 1.8             | $\pm 0.07$ | 4.5 | 5.6  | 50              | 38                           | 36         | 0<br>-0.3       | 2.2        |                 |              |               |
| 40              |     | 37              |            |                 |            | 4.5 | 5.8  | 53              | 40                           | 38         |                 |            |                 |              |               |
|                 | 42  | 38.5            |            |                 |            | 4.5 | 6.2  | 55              | 42                           | 39.5       |                 |            |                 |              |               |
| 45              |     | 41.5            |            |                 |            | 4.8 | 6.3  | 58              | 45                           | 42.5       |                 |            |                 |              |               |
|                 | 48  | 44.5            |            |                 |            | 4.8 | 6.5  | 62              | 48                           | 45.5       |                 |            |                 |              |               |
| 50              |     | 45.8            |            |                 |            | 5   | 6.7  | 64              | 50                           | 47         |                 |            |                 |              |               |
| 55              |     | 50.8            |            |                 |            | 5   | 7    | 70              | 55                           | 52         |                 |            |                 |              |               |
|                 | 56  | 51.8            | 5          |                 |            | 7   | 71   | 56              | 53                           | 0<br>-0.35 | 2.7             |            |                 |              |               |
| 60              |     | 55.8            | 5.5        |                 |            | 7.2 | 75   | 60              | 57                           |            |                 |            |                 |              |               |
| 65              |     | 60.8            | 6.4        | 7.4             | 81         | 65  | 62   |                 |                              |            |                 |            |                 |              |               |
| 70              |     | 65.5            | $\pm 0.45$ | 2.5             | $\pm 0.08$ | 6.4 | 7.8  | 86              | 70                           | 67         | 0<br>-0.54      | 4.2        |                 |              |               |
| 75              |     | 70.5            |            |                 |            | 7   | 7.9  | 92              | 75                           | 72         |                 |            |                 |              |               |
| 80              |     | 74.5            |            |                 |            | 7.4 | 8.2  | 97              | 80                           | 76.5       |                 |            |                 |              |               |
| 85              |     | 79.5            |            |                 |            | 8   | 8.4  | 103             | 85                           | 81.5       |                 |            |                 |              |               |
| 90              |     | 84.5            |            |                 |            | 8   | 8.7  | 108             | 90                           | 86.5       |                 |            |                 |              |               |
| 95              |     | 89.5            |            |                 |            | 8.6 | 9.1  | 114             | 95                           | 91.5       |                 |            |                 |              |               |
| 100             |     | 94.5            |            |                 |            | 9   | 9.5  | 119             | 100                          | 96.5       |                 |            |                 |              |               |
|                 | 105 | 98              | 9.5        |                 |            | 9.8 | 3    | 125             | 105                          | 101        | 0<br>-0.35      | 3.2        |                 |              |               |
| 110             |     | 103             | 9.5        |                 |            | 10  |      | 131             | 110                          | 106        |                 |            |                 |              |               |
| 120             |     | 113             | 10.3       | 10.9            | 143        | 120 |      | 116             |                              |            |                 |            |                 |              |               |

## C-type retaining ring for hole (reference)



The location of the hole for diameter  $d_0$  should not be hidden by the groove when inserted to a shaft to which the retaining ring is being applied.



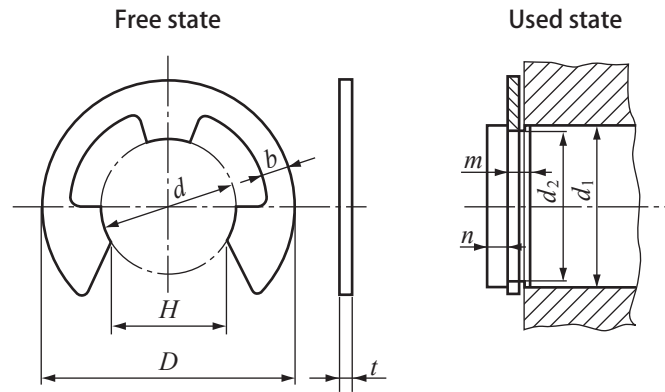
$d_5$  is the minimum diameter of the inner circumference when fitting a retaining ring into a hole.

Unit: mm

| Normal diameter |     | Retaining ring  |           |                 |           |         |         |       | Applicable shaft (reference) |       |       |             |                 |             |               |                 |             |   |  |       |      |             |   |
|-----------------|-----|-----------------|-----------|-----------------|-----------|---------|---------|-------|------------------------------|-------|-------|-------------|-----------------|-------------|---------------|-----------------|-------------|---|--|-------|------|-------------|---|
|                 |     | $d_3$           |           | $t$             |           | $b$     | $a$     | $d_0$ | $d_5$                        | $d_1$ | $d_2$ |             | $m$             |             | $n$<br>(Min.) |                 |             |   |  |       |      |             |   |
| 1               | 2   | Basic dimension | Tolerance | Basic dimension | Tolerance | Approx. | Approx. | Min.  |                              |       |       |             | Basic dimension | Tolerance   |               | Basic dimension | Tolerance   |   |  |       |      |             |   |
| 10              |     | 10.7            | ± 0.18    | 1               | ± 0.05    | 1.8     | 3.1     | 1.2   | 3                            | 10    | 10.4  | + 0.11<br>0 | 1.15            |             | 1.5           |                 |             |   |  |       |      |             |   |
| 11              |     | 11.8            |           |                 |           | 1.8     | 3.2     |       | 4                            | 11    | 11.4  |             |                 |             |               |                 |             |   |  |       |      |             |   |
| 12              |     | 13.0            |           |                 |           | 1.8     | 3.3     | 1.5   | 5                            | 12    | 12.5  |             |                 |             |               |                 |             |   |  |       |      |             |   |
|                 | 13  | 14.1            |           |                 |           | 1.8     | 3.5     |       | 6                            | 13    | 13.6  |             |                 |             |               |                 |             |   |  |       |      |             |   |
| 14              |     | 15.1            |           |                 |           | 2.0     | 3.6     | 1.7   | 7                            | 14    | 14.6  |             |                 |             |               |                 |             |   |  |       |      |             |   |
|                 | 15  | 16.2            |           |                 |           | 2.0     | 3.6     |       | 8                            | 15    | 15.7  |             |                 |             |               |                 |             |   |  |       |      |             |   |
| 16              |     | 17.3            | 2.0       |                 |           | 3.7     | 8       |       | 16                           | 16.8  |       |             |                 |             |               |                 |             |   |  |       |      |             |   |
|                 | 17  | 18.3            | 2.0       |                 |           | 3.8     | 9       |       | 17                           | 17.8  |       |             |                 |             |               |                 |             |   |  |       |      |             |   |
| 18              |     | 19.5            | ± 0.20    |                 |           |         |         | 2.5   | 4.0                          |       | 10    | 18          |                 |             |               | 19.0            | + 0.21<br>0 |   |  |       |      |             |   |
| 19              |     | 20.5            |           |                 |           |         |         | 2.5   | 4.0                          |       | 11    | 19          |                 |             |               | 20.0            |             |   |  |       |      |             |   |
| 20              |     | 21.5            |           |                 |           |         |         | 2.5   | 4.0                          |       | 12    | 20          |                 |             |               | 21.0            |             |   |  |       |      |             |   |
| 22              |     | 23.5            |           |                 |           |         |         | 2.5   | 4.1                          |       | 13    | 22          |                 |             |               | 23.0            |             |   |  |       |      |             |   |
|                 | 24  | 25.9            |           | 1.2             | ± 0.06    |         |         | 2     | 15                           | 24    | 25.2  | + 0.25<br>0 | 1.35            |             |               |                 |             |   |  |       |      |             |   |
| 25              |     | 26.9            |           |                 |           |         |         |       | 3.0                          | 4.4   | 16    |             |                 |             | 25            | 26.2            |             |   |  |       |      |             |   |
|                 | 26  | 27.9            |           |                 |           |         |         |       | 3.0                          | 4.6   | 16    |             |                 |             | 26            | 27.2            |             |   |  |       |      |             |   |
| 28              |     | 30.1            |           |                 |           |         |         |       | 3.0                          | 4.6   | 18    |             |                 |             | 28            | 29.4            |             |   |  |       |      |             |   |
| 30              |     | 32.1            |           |                 |           |         |         |       | 3.0                          | 4.7   | 20    |             |                 |             | 30            | 31.4            |             |   |  |       |      |             |   |
| 32              |     | 34.4            |           |                 |           |         |         |       | 3.5                          | 5.2   | 21    |             |                 |             | 32            | 33.7            |             |   |  |       |      |             |   |
| 35              |     | 37.8            |           | 1.6             |           |         |         |       |                              | 3.5   | 5.2   |             | 24              |             | 35            | 37.0            | + 0.25<br>0 |   |  |       | 1.75 | + 0.14<br>0 | 2 |
|                 | 36  | 38.8            |           |                 |           |         |         |       |                              | 3.5   | 5.2   |             | 25              |             | 36            | 38.0            |             |   |  |       |      |             |   |
| 37              |     | 39.8            | 3.5       |                 |           | 5.2     | 26      |       |                              | 37    | 39.0  |             |                 |             |               |                 |             |   |  |       |      |             |   |
|                 | 38  | 40.8            | 4.0       |                 |           | 5.3     | 27      |       |                              | 38    | 40.0  |             |                 |             |               |                 |             |   |  |       |      |             |   |
| 40              |     | 43.5            | 4.0       |                 |           | 5.7     | 28      |       |                              | 40    | 42.5  |             |                 |             |               |                 |             |   |  |       |      |             |   |
| 42              |     | 45.5            | 4.0       |                 |           | 5.8     | 30      |       |                              | 42    | 44.5  |             |                 |             |               |                 |             |   |  |       |      |             |   |
| 45              |     | 48.5            | 1.8       | ± 0.07          |           | 4.5     | 5.9     |       |                              |       | 33    | 45          | 47.5            | + 0.30<br>0 | 1.95          |                 |             |   |  |       |      |             |   |
| 47              |     | 50.5            |           |                 |           | 4.5     | 6.1     |       |                              |       | 34    | 47          | 49.5            |             |               |                 |             |   |  |       |      |             |   |
|                 | 48  | 51.5            |           |                 |           | 4.5     | 6.2     |       |                              |       | 35    | 48          | 50.5            |             |               |                 |             |   |  |       |      |             |   |
| 50              |     | 54.2            |           |                 |           | 4.5     | 6.5     |       |                              |       | 37    | 50          | 53.0            |             |               |                 |             |   |  |       |      |             |   |
| 52              |     | 56.2            |           |                 |           | 5.1     | 6.5     |       |                              |       | 39    | 52          | 55.0            |             |               |                 |             |   |  |       |      |             |   |
| 55              |     | 59.2            |           |                 |           | 5.1     | 6.5     |       |                              |       | 41    | 55          | 58.0            |             |               |                 |             |   |  |       |      |             |   |
|                 | 56  | 60.2            | 2         |                 |           | ± 0.08  |         | 5.1   | 6.6                          |       | 42    | 56          | 59.0            | + 0.30<br>0 | 2.2           |                 |             |   |  |       |      |             |   |
| 60              |     | 64.2            |           |                 |           |         |         | 5.5   | 6.8                          |       | 46    | 60          | 63.0            |             |               |                 |             |   |  |       |      |             |   |
| 62              |     | 66.2            |           |                 |           |         |         | 5.5   | 6.9                          |       | 48    | 62          | 65.0            |             |               |                 |             |   |  |       |      |             |   |
|                 | 63  | 67.2            |           |                 |           |         |         | 5.5   | 6.9                          |       | 49    | 63          | 66.0            |             |               |                 |             |   |  |       |      |             |   |
|                 | 65  | 69.2            |           |                 |           |         |         | 5.5   | 7.0                          |       | 50    | 65          | 68.0            |             |               |                 |             |   |  |       |      |             |   |
| 68              |     | 72.5            |           |                 |           |         |         | 6.0   | 7.4                          |       | 53    | 68          | 71.0            |             |               |                 |             |   |  |       |      |             |   |
|                 | 70  | 74.5            | 2.5       |                 |           |         |         | 6.0   | 7.4                          |       | 55    | 70          | 73.0            | + 0.35<br>0 | 2.7           | 2.5             |             |   |  |       |      |             |   |
| 72              |     | 76.5            |           |                 |           |         |         | 6.6   | 7.4                          |       | 57    | 72          | 75.0            |             |               |                 |             |   |  |       |      |             |   |
| 75              |     | 79.5            |           |                 |           |         |         | 6.6   | 7.8                          |       | 60    | 75          | 78.0            |             |               |                 |             |   |  |       |      |             |   |
| 80              |     | 85.5            |           |                 |           |         |         | 7.0   | 8.0                          |       | 64    | 80          | 83.5            |             |               |                 |             |   |  |       |      |             |   |
| 85              |     | 90.5            |           |                 |           |         |         | 7.0   | 8.0                          |       | 69    | 85          | 88.5            |             |               |                 |             |   |  |       |      |             |   |
| 90              |     | 95.5            |           |                 |           |         |         | 7.6   | 8.3                          |       | 73    | 90          | 93.5            |             |               |                 |             |   |  |       |      |             |   |
| 95              |     | 100.5           | 3         |                 |           | ± 0.09  |         | 8.0   | 8.5                          |       | 77    | 95          | 98.5            | + 0.54<br>0 | 3.2           |                 |             | 3 |  |       |      |             |   |
| 100             |     | 105.5           |           |                 |           |         |         | 8.3   | 8.8                          |       | 82    | 100         | 103.5           |             |               |                 |             |   |  |       |      |             |   |
|                 | 105 | 112.0           |           |                 |           |         |         | 8.9   | 9.1                          |       | 86    | 105         | 109.0           |             |               |                 |             |   |  |       |      |             |   |
| 110             |     | 117.0           |           |                 |           |         |         | 8.9   | 10.2                         |       | 89    | 110         | 114.0           |             |               |                 |             |   |  |       |      |             |   |
|                 | 112 | 119.0           |           |                 |           |         |         | 8.9   | 10.2                         |       | 90    | 112         | 116.0           |             |               |                 |             |   |  |       |      |             |   |
|                 | 115 | 122.0           |           |                 |           |         |         | 9.5   | 10.2                         |       | 94    | 115         | 119.0           |             |               |                 |             |   |  |       |      |             |   |
| 120             |     | 127.0           | 4         |                 |           |         |         | 9.5   | 10.7                         |       | 98    | 120         | 124.0           | + 0.63<br>0 | 4.2           | + 0.18<br>0     | 4           |   |  |       |      |             |   |
| 125             |     | 132.0           |           |                 |           |         |         | 10.0  | 10.7                         |       | 3.5   | 103         | 125             |             |               |                 |             |   |  | 129.0 |      |             |   |



## E-type retaining ring (reference)



Example shape

Unit: mm

| Normal diameter | Retaining ring  |            |                 |           |                 |            |                 |           |          | Applicable shaft (reference)      |             |                       |            |                 |            |                    |
|-----------------|-----------------|------------|-----------------|-----------|-----------------|------------|-----------------|-----------|----------|-----------------------------------|-------------|-----------------------|------------|-----------------|------------|--------------------|
|                 | <i>d</i>        |            | <i>D</i>        |           | <i>H</i>        |            | <i>t</i>        |           | <i>b</i> | Division of <i>d</i> <sub>1</sub> |             | <i>d</i> <sub>2</sub> |            | <i>m</i>        |            | <i>n</i><br>(Min.) |
|                 | Basic dimension | Tolerance  | Basic dimension | Tolerance | Basic dimension | Tolerance  | Basic dimension | Tolerance | Approx.  | Above                             | Below       | Basic dimension       | Tolerance  | Basic dimension | Tolerance  |                    |
| 0.8             | 0.8             | 0<br>-0.08 | 2               | ± 0.1     | 0.7             | 0<br>-0.25 | 0.2             | ± 0.02    | 0.3      | 1                                 | 1.4         | 0.8                   | +0.05<br>0 | 0.3             | +0.05<br>0 | 0.4                |
| 1.2             | 1.2             | 0<br>-0.09 | 3               |           | 1               |            | 0.3             | ± 0.025   | 0.4      | 1.4                               | 2           | 1.2                   | +0.06<br>0 | 0.4             |            | 0.6<br>0.8         |
| 1.5             | 1.5             |            | 4               |           | 1.3             |            | 0.4             | ± 0.03    | 0.6      | 2                                 | 2.5         | 1.5                   |            | 0.5             |            | +0.1<br>0          |
| 2               | 2               |            | 5               | 1.7       | 0.4             |            | 0.7             |           | 2.5      | 3.2                               | 2           |                       |            |                 |            |                    |
| 2.5             | 2.5             |            | 6               | 2.1       | 0.4             |            | 0.8             |           | 3.2      | 4                                 | 2.5         |                       |            |                 |            |                    |
| 3               | 3               |            | 7               | 2.6       | 0.6             |            | 0.9             | 4         | 5        | 3                                 | +0.075<br>0 | 0.7                   | +0.14<br>0 | 4               |            |                    |
| 4               | 4               | 0<br>-0.12 | 9               | 3.5       | 0<br>-0.3       | 0.6        | 1.1             | 5         | 7        | 4                                 |             |                       |            |                 | 0.9        |                    |
| 5               | 5               |            | 11              | 4.3       |                 | 0.6        | 1.2             | 6         | 8        | 5                                 |             |                       |            |                 |            |                    |
| 6               | 6               |            | 12              | 5.2       |                 | 0.8        | 1.4             | 7         | 9        | 6                                 |             |                       |            |                 |            |                    |
| 7               | 7               | 0<br>-0.15 | 14              | ± 0.2     | 6.1             | 0<br>-0.35 | 0.8             | ± 0.04    | 1.6      | 8                                 | 11          | 7                     |            |                 | +0.09<br>0 | 1.15               |
| 8               | 8               |            | 16              |           | 6.9             |            | 0.8             |           | 1.8      | 9                                 | 12          | 8                     |            |                 |            |                    |
| 9               | 9               |            | 18              |           | 7.8             |            | 0.8             |           | 2        | 10                                | 14          | 9                     |            |                 |            |                    |
| 10              | 10              |            | 20              |           | 8.7             |            | 1               |           | 2.2      | 11                                | 15          | 10                    |            |                 |            |                    |
| 12              | 12              | 23         | 10.4            |           | 1               | 2.4        | 13              | 18        | 12       | +0.11<br>0                        | 1.75        | 2.2                   |            |                 |            |                    |
| 15              | 15              | 0<br>-0.18 | 29              |           | 13              | 0<br>-0.45 | 1.6             | ± 0.06    | 2.8      |                                   |             |                       | 16         | 24              | 15         |                    |
| 19              | 19              |            | 37              |           | 16.5            |            | 1.6             |           | 4        |                                   |             |                       | 20         | 31              | 19         |                    |
| 24              | 24              | 0<br>-0.21 | 44              | ± 0.3     | 20.8            | 0<br>-0.5  | 2               | ± 0.07    | 5        | 25                                | 38          | 24                    | +0.13<br>0 |                 |            |                    |

## Explanation of material notation

| Explanation of material notation for KG standard products |                                                                                                                                                                               |                                       |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Material grade                                            | Types of KG standard gears used                                                                                                                                               | Material name / Standard number       |
| S45C                                                      | Spur gear, Helical gear, Rack gear, Miter gear / Bevel gear (straight / spiral), B-LOCK Miter gear (straight), Worm, Anti-backlash spur gear                                  | Carbon steel<br>JIS G 4051            |
| SCM435<br>SCM440                                          | Ground spur gear, Ground miter gear / Ground bevel gear (spiral), Anti-backlash ground spur gear, Anti-backlash spur gear                                                     | Chrome molybdenum steel<br>JIS G 4053 |
| SUS304<br>SUS304L                                         | Spur gear, Helical gear, Rack gear, Miter gear / Bevel gear (straight), MIM (metal injection molding) miter gear, B-LOCK miter gear (straight), Worm, Anti-backlash spur gear | Stainless steel<br>JIS G 4303         |
| C3604B<br>C3771B<br>C3713P                                | Spur gear, Rack gear, Miter gear / Bevel gear (straight), Worm                                                                                                                | Brass<br>JIS H 3250<br>JIS H 3100     |
| C6191BE                                                   | Worm Wheel                                                                                                                                                                    | Aluminum bronze<br>JIS H 3250         |
| CAC702                                                    | Worm Wheel                                                                                                                                                                    | Aluminum bronze casting<br>JIS H 5120 |
| A5056                                                     | Anti-backlash spur gear                                                                                                                                                       | Aluminum<br>JIS H 4040                |
| POM<br>(Polyacetal)                                       | Spur gear, Helical gear, Rack gear, Miter gear (straight), Worm Wheel                                                                                                         | Acetal resin                          |

KG standard gears are manufactured using the above JIS materials. Depending on availability, the above materials may be substituted with materials of equivalent specifications without prior notice.

The chemical composition may differ from other standards, so the above information is just for reference purposes. Please note that some products have surface treatments such as black oxide and alumite treatment.

Parts other than gears, such as springs and retaining rings for anti-backlash spur gears, gear box bodies and bearings, set screws, cap bolts, etc., are excluded.



Edited and Published by KYOUIKU GEAR MFG.CO.,LTD.

URL: <http://www.kggear.co.jp/en/>

For Inquiries: [export@kggear.co.jp](mailto:export@kggear.co.jp)



Head Office 1-8-3,Higashi-ueno Taito-ku Tokyo Japan.110-0015  
Tokyo branch TEL : (81)-3-5812-4337 FAX : (81)-3-5812-4339

Osaka branch 9F SC Sakaisuji Honmachi Bld  
1-4-15,Kita-kyuhoujimachi Chuo-ku Osaka-city Japan.541-0057  
TEL : (81)-6-4705-8177 FAX : (81)-6-4705-8188

Nagoya branch 2-24-9,Ichiban Atsuta-ku Nagoya-city Aichi Japan.456-0053  
TEL : (81)-52-652-7211 FAX : (81)-52-652-7213

Factory  
Overseas Sales Department  
14-9-13,Minami-sakaemachi Kasukabe-city Saitama Japan.344-0057  
TEL : (81)-48-754-5842 FAX : (81)-48-754-1299

**KYOUIKU GEAR MFG.CO.,LTD.**

First Digital Edition :18th JUN 2024

Digital Update : 16th DEC 2024

Digital Update : 30th APR 2025

Attach your Company Seal Here



Kasukabe Factory  
Tokyo branch  
Overseas Sales department  
Osaka branch  
Nagoya branch



Kasukabe Factory