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## Catalog Number of KHK Stock Gears

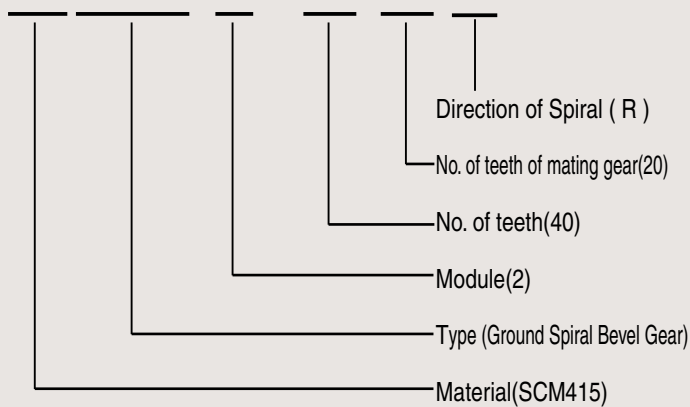
The Catalog Number for KHK stock gears is based on the simple formula listed below.

Please order KHK gears by specifying their Catalog Numbers.

(Example)

Bevel Gears

**M BSG 2 - 40 20 R**



### Material

S	S45C
M	SCM415
SU	SUS303
P	MC901
D	Duracon(M90-44)

### Type

B	Bevel Gears
BS	Spiral Bevel Gears
BSG	Ground Spiral Bevel Gears
HP	High Ratio Hypoid Gears

# 7

# Bevel Gears





# Bevel Gears

## Large Selection of Modules, Gear Ratios, Materials and Styles!



### Characteristics

KHK stock bevel gears are available in two types, spiral and straight tooth, in gear ratios of 1.5 to 5, and are offered in a large variety of modules, numbers of teeth, materials and styles.

#### Main Features of Types of Bevel Gears Offered

The following table lists the main features for easy selection

Type	Catalog No.	Module	Gear Ratio	Material	Heat Treatment	Tooth surface finish	Precision JIS B 1704	Secondary Operations	Main Characteristic
Hypoid Gear	MHP	1~1.5	15~200	SCM415	Gear tooth Carburizing	Cut	3	△	High speed reduction ratio, high efficiency, high rigidity and compact gear assembly.
	MBSG	2~4	2	SCM415	Carburized (bore & hubs are masked) NOTE 2	Ground	2	△	High strength, abrasion-resistant and compact for high-speed & torque use.
Spiral bevel gears	SBSG	2~4	1.5~3	S45C	Gear teeth induction hardened	Ground	2	△	Reasonably priced ground gear, yet remachinable except for the gear teeth.
	MBSA(B) NOTE 1	2~6	1.5~3	SCM415	Overall carburized NOTE 3	Cut	4	×	Ready to use without performing secondary operations. Strong and abrasion resistant.
	SBS	1~5	1.5~4	S45C	Gear teeth induction hardened	Cut	4	△	Large nos. of teeth and modules are offered in these affordable spiral bevel gears.
	SB·SBY	1~8	1.5~5	S45C (CB FC200)	—	Cut	3 (CB 4)	○	Popular series of straight bevel gears for many uses.
Straight bevel gears	SUB	1.5~3	1.5~3	SUS303	—	Cut	3	○	Suitable for food machinery due to SUS303's rust-resistant quality.
	PB	1~3	1.5~3	MC901	—	Cut	4	○	MC nylon products are light and can be used without lubricant.
	DB	0.5~1	2	M90-44	—	Injection molded	8	△	Injection molded, mass-produced productions, suitable for office machines.

NOTE 1: The catalog numbers with (B) at the end are identical in all features as the one without (B) except for bore and keyway dimensions.

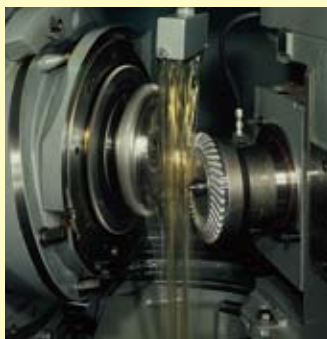
NOTE 2: Even though the bore and the hub portions are masked during the carburization and can be modified, care should be exercised since the hardness is somewhat higher.

NOTE 3: MMSA(B) spiral bevel gears are carburized and do not allow secondary operations. However, the back surface of B7 style gears is masked during the process so that it is possible to drill and pin on this surface.

○ Possible △ Partly possible × Not possible

### Combination of Our Know-How and Up-to-Date Manufacturing Techniques is at Your Disposal!

Our popular KHK stock bevel gears with a large selection of sizes and types are the results of our know-how and modern manufacturing capabilities. We deliver reliable, high precision, superior products to you.





## Selection Hints

Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables. It is also important to read all applicable “CAUTION” notes shown below before the final selection.

### 1. Caution in Selecting the Mating Gears

Basically, KHK stock bevel gears should be selected as shown in the catalog in pairs (Ex: MBSG2-4020R should mate with MBSG2-2040L). But, for straight tooth bevel gears, there is some interchangeability with different series. For plastic bevel gears, we recommend metal mating gears for good heat conductivity.

■ Selection Chart for Straight Bevel Gears (○ Allowable × Not allowable)

Pinion \ Gear	SB	SUB	PB	DB
SB	○	○	○	×
SUB	○	○	○	×
PB	○	○	○	×
DB	×	×	×	○

### ■ Calculation of Bending Strength of Gears

Catalog No. \ Item	MBSG	MBSA(B)	SBSG SBS	SB SBY	SUB	PB	DB
Formula <small>NOTE1</small>	Formula of bevel gears on bending strength(JGMA403-01)					The Lewis formula	
No. of teeth of mating gears	No. of teeth of mating gears of same set					—	
Rotation	100min <sup>-1</sup> (600min <sup>-1</sup> for MBSG & SBSG)					100min <sup>-1</sup>	
Durability	Over 10 <sup>7</sup> cycles					—	
Impact from motor	Uniform load					Allowable bending stress	
Impact from load	Uniform load						
Direction of load	Bidirectional						
Allowable bending stress at root $\sigma_{Flim}$ <small>NOTE2</small>	31.33kgf/mm <sup>2</sup>	31.33kgf/mm <sup>2</sup>	14kgf/mm <sup>2</sup>	12.67kgf/mm <sup>2</sup>	7kgf/mm <sup>2</sup>	1.15kgf/mm <sup>2</sup> (40°C with no lubricant)	<small>NOTE3</small> m 0.5 4.5 m 0.8 4.0 m 1.0 3.5 kgf/mm <sup>2</sup>
Safety factor $K_R$	1.2						

### ■ Calculation of Surface Durability (Except those in common with bending strength)

Formula <small>NOTE1</small>	Formula of bevel gears on surface durability (JGMA404-01)				
Kinematic viscosity of lubricant	100cSt(50°C)				
Gear support	Shafts & gear box have normal stiffness, and gears are supported on one end				
Allowable Hertz stress $\sigma_{Hlim}$	166kgf/mm <sup>2</sup>	166kgf/mm <sup>2</sup>	90kgf/mm <sup>2</sup>	49kgf/mm <sup>2</sup>	41.3kgf/mm <sup>2</sup>
Safety factor $C_R$	1.15				

**NOTE 1:** The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications. “MC Nylon Technical Data” by Nippon Polyenco Limited and “Duracon Gear Data” by Polyplastic Co. Also, the units (min<sup>-1</sup>) of number of rotations and unit (kgf/mm<sup>2</sup>) of stress are adjusted to the units needed in the formula.

**NOTE 2:** Since the load is bidirectional, the allowable bending stress at root  $\sigma_{Flim}$ , used in JGMA 403-01 formula is set to 2/3 of the value.

**NOTE 3:** The value for DB m0.5 was assumed by KHK.

### 4. Other Points to Consider in the Selection Process

See the similarly titled section for miter gears.

### 2. Caution in Selecting Gears Based on Gear Strength

The gear strength values shown in the product pages were computed by assuming a certain application environment. Therefore, they should be used as reference only. We recommend that each user computes their own values by applying the actual usage conditions. The table below contains the assumptions established for these products in order to compute gear strengths.

**CAUTION:** The allowable torque of MHP High Ratio Hypoid Gears is the actual measured value when the pinion is rotating at 600 min<sup>-1</sup>.

### 3. Caution with Regard to the Special Characteristics of Bevel Gears

- ① MBSA(B) finished bore spiral bevel gears are carburized throughout so that they do not permit any secondary operations. However, the back surface of B7 style gears (ring type) is masked during the process so that it is possible to drill and pin on this surface.
- ② The keyway sizes of MBSA(B) finished bore spiral bevel gears are made according to JIS B 1301, medium quality (Js9), but the final heat treating may cause some deformation.
- ③ The bore of SBS spiral bevel gears may somewhat be deformed due to heat treatment and do not reach H7 tolerance.
- ④ Due to the characteristics of the material, PB plastic bevel gears' product quality may be affected by heat or moisture absorption.



# Bevel Gears

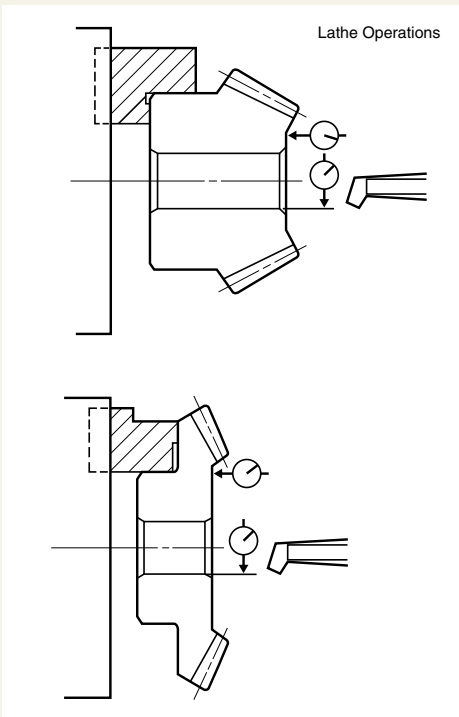


## Application Hints

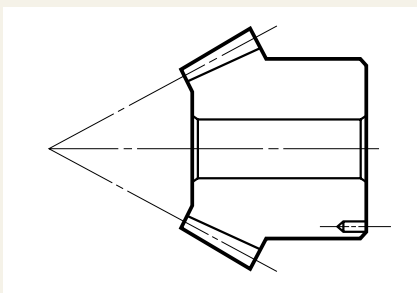
In order to use KHK stock gears safely, carefully read the Application Hints before proceeding. For “Notes on Starting Operations” and “Other Points to Consider in Applications”, please see the Application Hints of Miter Gear Selection.

### 1. Caution on Performing Secondary Operations

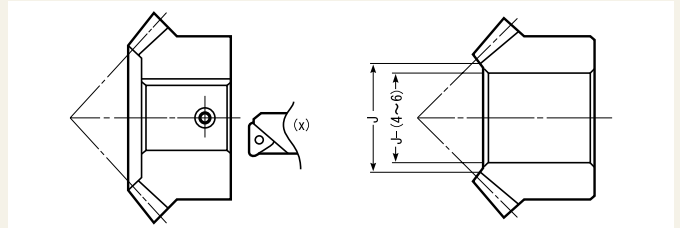
- ① If you are reboring, it is important to pay special attention to locating the center in order to avoid runout.
- ② The reference datum for gear cutting is the bore. Therefore, it is best to use the bore for locating the center. If it is too difficult to do for small bores, the alternative is to use one spot on the bore and the runout of the side surface.
- ③ If reworking using scroll chucks, we recommend the use of new or rebored jaws for improved precision. Please exercise caution not to crush the teeth by applying too much pressure. Any scarring will cause noise during operation.



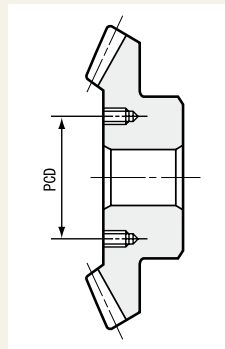
- ④ The production of bevel gears module 2.5 and over with a pinning hole on the back of the hub in non-ground teeth has been phased out as of August 2003. However, we may have some stock of this configuration.



- ⑤ MBSA(B) finished bore spiral bevel gears are carburized throughout, so that no secondary operations can be performed (except B7 style items). For items with induction hardened teeth, such as SBSG and SBS series, the hardness is high near the tooth root. When machining the front end, the machined area should be 4 to 6mm smaller than the dimension, J.



- ⑥ For tapping and keyway operations, see the examples given in “1. Caution on Performing Secondary Operations” in KHK Stock Spur Gear section. When cutting keyways, to avoid stress concentration, always leave radii on corners.
- ⑦ PB plastic bevel gears are susceptible to changes due to temperature and humidity. Dimensions may change between during and after remachining operations.
- ⑧ When heat treating S45C products, it is possible to get thermal stress cracks. It is best to subject them to penetrant inspection afterwards. While the teeth strength may increase four fold, the precision of the gear will drop approximately one grade.
- ⑨ For the handling conveniences, SB and SBY series listed below has the tapped holes (180° apart, 2 places) on the holding surface.

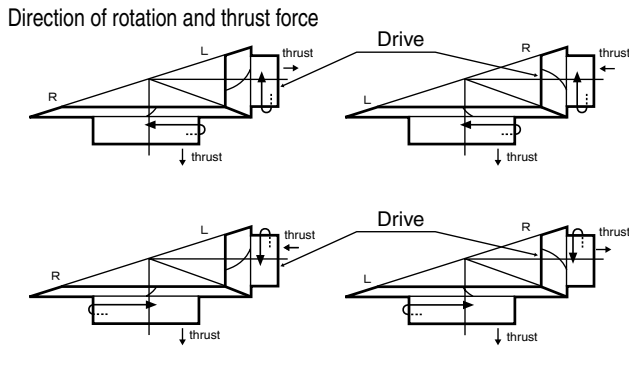


Catalog No.	PCD(mm)	Tap Size
SB6-4515	130	M10 deep 15
SBY8-4020	180	M10 deep 20
SBY8-4515	210	M10 deep 20
SBY5-6015	180	M10 deep 15
SBY6-6015	220	M10 deep 20

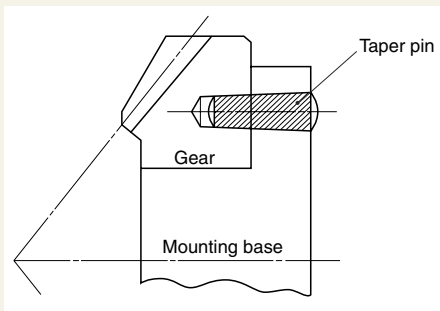


## 2. Points of Caution in Assembling

① Since bevel gears are cone shaped, they produce axial thrust forces. Especially for spiral bevel gears, the directions of thrust change with the hand of spiral and the direction of rotation. This is illustrated below. The bearings must be selected properly to be able to handle these thrust forces.



- ② KHK stock bevel gears are designed such that, when assembled according to the specified mounting distance with a tolerance of H7~H8, the backlash shown in the table is obtained. Mounting distance error, offset error and shaft angle error must be minimized to avoid excessive noise and wear. For various conditions of teeth contact, please see page 198 "Correct Tooth Contact" and "Incorrect Tooth Contact".
- ③ If a bevel gear is mounted on a shaft far from the bearings, the shaft may bend. We recommend mounting bevel gears as close to the bearings as possible. This is especially important since most bevel gears are supported on one end. The bending of shafts will cause abnormal noise and wear, and may even cause fatigue failure of the shafts. Both shafts and bearings must be designed with sufficient strength.
- ④ Due to the thrust load of bevel gears, the gears, shafts and bearings have the tendency to loosen up during operation. Bevel gears should be fastened to the shaft with keys and set screws, taper pins, step shafts, etc.
- ⑤ When installing MBSA(B) spiral bevel gears in B7 style (ring type), always secure the gears onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.



## PRODUCT IMPROVEMENT ANNOUNCEMENT

In order to increase the gear strength of KHK standard Bevel Gears, starting in June 2004, the following changes have been introduced. During this transition, some of the specifications will change.

### 1. Applicable Series

MBSG Ground Spiral Bevel Gears – (8 Items)

### 2. Improvement Details

Increase in gear strength (Approximately 15% higher bending strength compared to previous one)

### 3. Change in the specifications

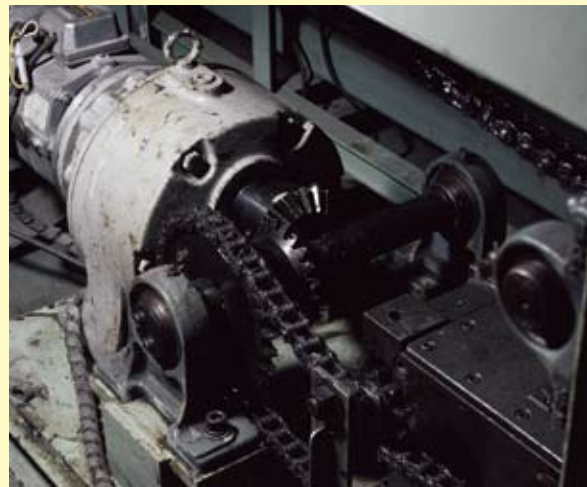
	Before	After
Heat treatment	Teeth induction hardened after carburizing	Carburizing (bore & hub portion masked)
Surface Treatment	Black oxide	No black Oxide

The corner tips of the gear-teeth of KHK stock Bevel Gears are machine chamfered for safety and for prevention of damages.

■ The chamfering of the corner gear tips for bevel gear (unit: mm)

Module	Outside edge R	Inside edge R
0.5 up to 1	0.5	all burrs removed
1 up to 2.5	1	0.5
2.5 up to 5	2	1
over 5	3	1.5

## Example of KHK Gear Applications



Components of automated line (Bevel Gears)



# Bevel Gears

## Features of MHP High Ratio Hypoid Gears

A pair of MHP high-ratio hypoid gears are able to produce an amazing speed of reduction of 200:1 in one stage.

### 1. Total-cost reduction

The MHP provides a compact gearing body replacing several stages of reduction gears. This reduces the cost sharply.

### 2. High efficiency

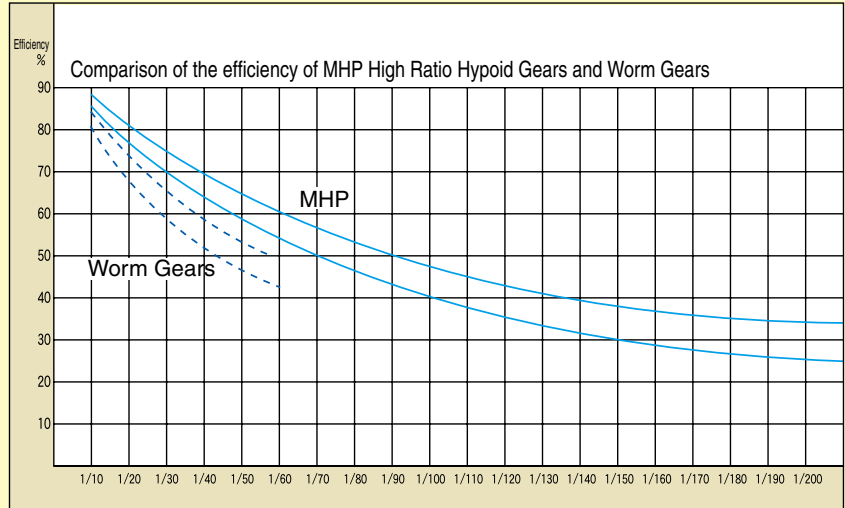
Compared to worm gear drives, the MHP has less sliding contact. The resulting higher efficiency allows the use of smaller motors (See the graph on the right).

### 3. High rigidity

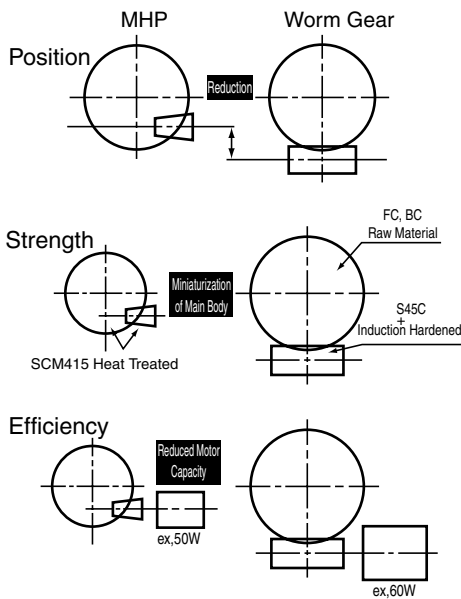
The carburized hypoid gears lead to smaller size than comparable worms gears.

### 4. Compact gear assembly

The size of the gear housing is nearly the same as outer diameter of the large gear. (See the diagrams below)



### Comparison of MHP and worm Gears



## How to determine the radial and thrust loads

Before using the MHP high-ratio hypoid gears, be sure to confirm the direction of radial and thrust loads. Following equations are used to compute these loads. The radial and thrust load coefficients are given on the product pages.

### Radial load calculation

$W_{RP}$ : Radial load on the pinion or L(N)

$$W_{RP} = W_{KP} \times T_G \times \frac{n}{z}$$

Where

$W_{KP}$ : Radial load coefficient of pinion or L (given on the product pages)

$T_G$ : Torque of gear or R(N-m)

$n$ : Number of teeth of pinion or L

$z$ : Number of teeth of gear or R

$W_{RG}$ : Radial load on the gear or R(N)

$$W_{RG} = W_{KG} \times T_G$$

Where

$W_{KG}$ : Radial load coefficient of gear or R (given on the product pages)

$T_G$ : Torque of gear or R(N-m)

### Thrust load calculation

$W_{XP}$ : Thrust load on the pinion or L(N)

$$W_{XP} = W_{NP} \times T_G \times \frac{n}{z}$$

Where

$W_{NP}$ : Thrust load coefficient of pinion or L (given on the product page)

$T_G$ : Torque of gear or R(N-m)

$n$ : Number of teeth of pinion or L

$z$ : Number of teeth of gear or R

$W_{XG}$ : Thrust load of gear of R(N)

$$W_{XG} = W_{NG} \times T_G$$

Where

$W_{NG}$ : Thrust load coefficient of gear or R (given on the product pages)

$T_G$ : Torque of gear or R(N-m)

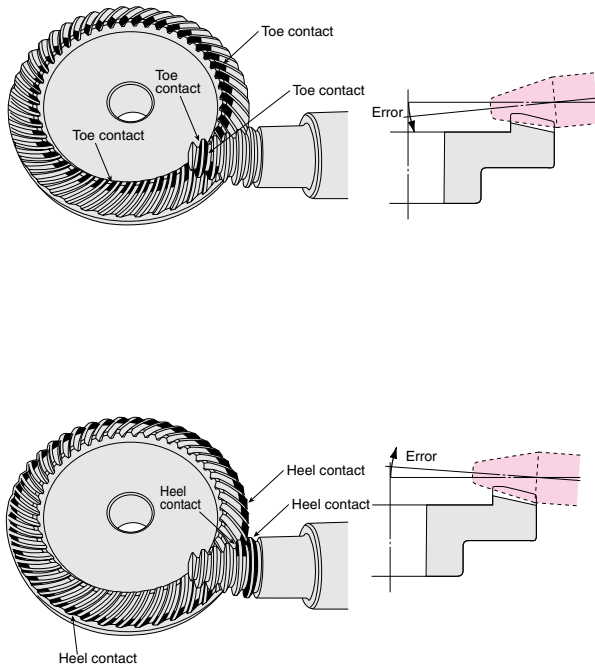
R: Right-hand thread at speed ratio 1/1

L: Left-hand thread at speed ratio 1/1

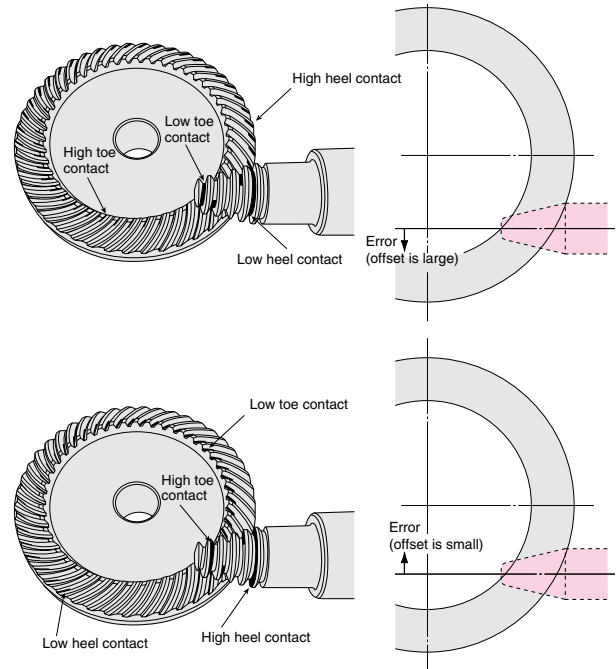
## Variations in tooth contact due to poor alignment of gears

If the gear engagement position is out of the normal position, variations in tooth contact, as illustrated below, may appear.

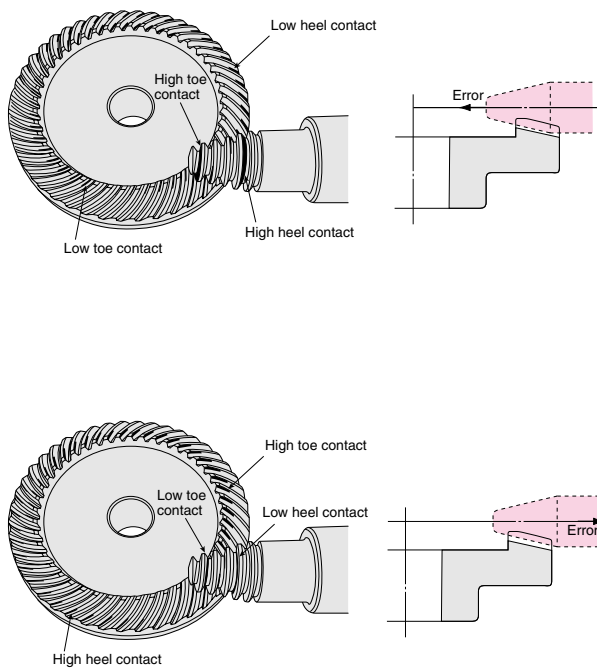
(1) Tooth contact in case of a shaft-angle error



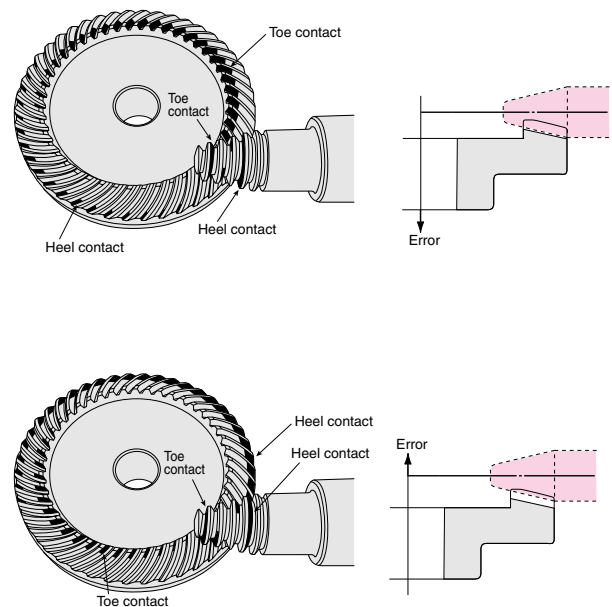
(2) Tooth contact in case of a shaft-offset error



(3) Tooth contact in case of a pinion set position error

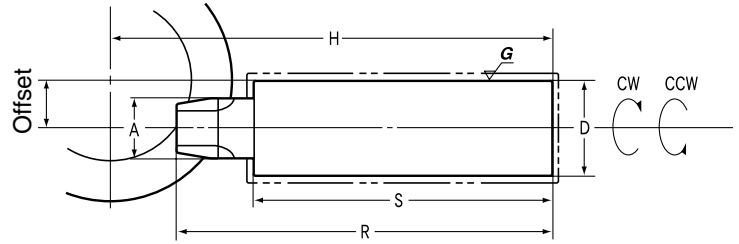


(4) Tooth contact in case of a gear set position error





# MHP High Ratio Hypoid Gears Modules 1~1.5



B8 Shape

## Modules 1~1.5

Catalog No.	Reduction ratio	Nominal module	Actual module	No. of teeth	Direction of spiral	Shape	Bore · Shaft Dia.		Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Hub width	Length of bore and shaft
							A (Bore: H7 · Shaft: h7)	B							
MHP1-0453R	15	m1	1.067	45	R	B9	12	30	48	48	19	16.3	7	14	
MHP1-3045L						B8	22.1	—	10.3	10.3	127	113	—	94	
MHP1.5-0453R	15	m1.5	1.733	45	R	B9	14	40	78	78	28	23.7	10	20	
MHP1.5-3045L						B8	31.1	—	17.6	17.6	170	148	—	116	
MHP1-0603R	20	m1	1.05	60	R	B9	12	34	63	63	21	18.1	8	16	
MHP1-3060L						B8	26.1	—	11.7	11.7	142	125	—	102	
MHP1.5-0603R	20	m1.5	1.633	60	R	B9	20	50	98	98	33	28.7	13	25	
MHP1.5-3060L						B8	36.1	—	15.7	15.7	199	168	—	135	
MHP1-0602R	30	m1	1.05	60	R	B9	12	34	63	63	21	17.8	8	16	
MHP1-2060L						B8	22.1	—	12.8	12.8	134	120	—	94	
MHP1.5-0602R	30	m1.5	1.633	60	R	B9	20	50	98	98	33	28.2	13	25	
MHP1.5-2060L						B8	31.1	—	17.7	17.7	175	149	—	116	
MHP1-0451R	45	m1	1.067	45	R	B9	12	30	48	48	19	16.5	7	14	
MHP1-1045L						B8	20.1	—	10.1	10.1	115	104	—	85	
MHP1.5-0451R	45	m1.5	1.733	45	R	B9	14	40	78	78	28	23.9	10	20	
MHP1.5-1045L						B8	26.1	—	18.3	18.3	152	138	—	102	
MHP1-0601R	60	m1	1.05	60	R	B9	12	34	63	63	21	17.9	8	16	
MHP1-1060L						B8	22.1	—	12.9	12.9	134	122	—	94	
MHP1.5-0601R	60	m1.5	1.633	60	R	B9	20	50	98	98	33	28.2	13	25	
MHP1.5-1060L						B8	31.1	—	17.7	17.7	175	151	—	116	
MHP1-0901R	90	m1	1.089	90	R	B9	20	50	98	98	33	28.8	13	25	
MHP1-1090L						B8	31.1	—	15.7	15.7	170	149	—	116	
MHP1-1201R	120	m1	0.817	120	R	B9	20	50	98	98	33	29.3	13	25	
MHP1-1120L						B8	31.1	—	13.4	13.4	170	149	—	116	
MHP1-1801R	180	m1	1	180	R	B9	25	70	180	180	47	40.1	18	35	
MHP1-1180L						B8	42.1	—	22.4	22.4	242	200	—	154	
MHP1-2001R	200	m1	1	200	R	B9	25	70	200	200	47	40.6	18	35	
MHP1-1200L						B8	42.1	—	21.5	21.5	252	205	—	154	

### Twist direction and offset position

The hypoid-gear engagement position is dependent on the twist direction of the pinion thread.

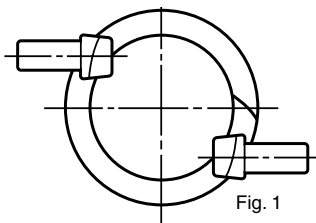


Fig. 1: Below center  
The engagement position with the left-hand pinion is called the below center.

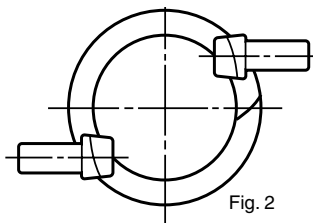
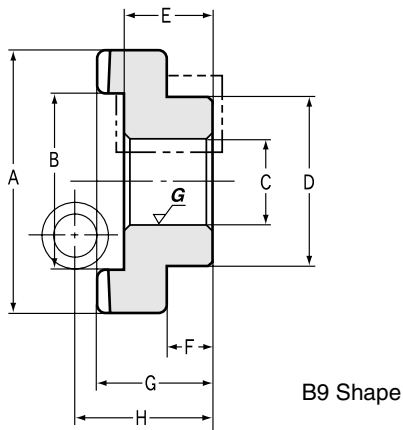


Fig. 2: Above Center  
The engagement position with the right-hand thread pinion is called the above center.

**NOTE 3:** KHK stock Hypoid Gears are available in Below Center type (Fig. 1) only. Above Center type (Fig. 2) is unavailable.





B9 Shape

## Specifications

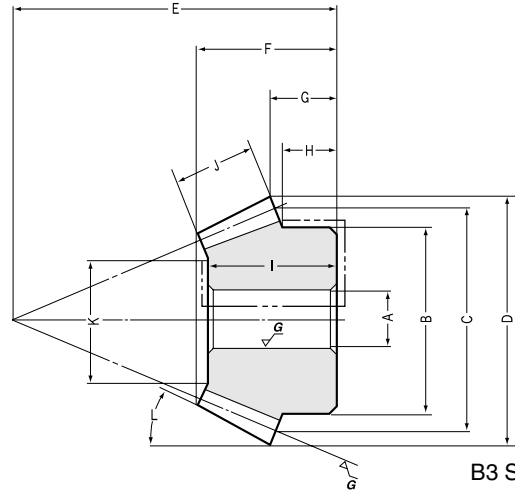
Precision grade	JIS B 1704 grade 3	Tooth hardness	60~63HRC
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Material	SCM415	Datum reference surface for gear cutting	Bore (Shaft if pinion)
Heat treatment	Carburizing <small>NOTE 4</small>	Secondary Operations	Possible except tooth area

**NOTE 4:** The areas marked with ---- on the diagram are masked during the carburizing and can be modified, even though the hardness is somewhat higher.

Face width (J)	Holding surface dia. K	Offset L	Radial load coefficient <small>NOTE 1</small>		Thrust load coefficient <small>NOTE 1</small>		Allowable torque (N · m) <small>NOTE 2</small>	Allowable torque (kgf · m)	Backlash (mm)	Weight (kg)	Catalog No.
			CW	CCW	CW	CCW					
(6)	35.1 —	10	48.48 147.3	-37.67 523.74	13 969.92	31.74 -831.16	10.3	1.05	0.05~0.15	0.15 0.29	MHP1-0453R MHP1-3045L
(10)	56.5 —	18	26.78 100.09	-18.67 338.45	8.98 566.72	21.19 -466.63	41.2	4.20	0.10~0.20	0.50 0.73	MHP1.5-0453R MHP1.5-3045L
(8)	46.4 —	15	33.88 159.43	-26.2 502.91	10.11 956.55	23.73 -829.74	23.3	2.38	0.05~0.15	0.29 0.45	MHP1-0603R MHP1-3060L
(10)	76.8 —	22	20.44 119.32	-16.54 194.45	7.15 577.56	13.95 -511.77	82.4	8.40	0.10~0.20	0.94 1.15	MHP1.5-0603R MHP1.5-3060L
(8)	46.4 —	18	33.59 186.59	-24.15 784.31	8.21 1461.23	24.77 -1248.6	24.1	2.46	0.05~0.15	0.29 0.28	MHP1-0602R MHP1-2060L
(10)	76.7 —	28	20.39 142.71	-15.29 466.2	5.96 899.1	14.75 -782.21	87.3	8.90	0.10~0.20	0.94 0.77	MHP1.5-0602R MHP1.5-2060L
(6)	34.9 —	14	48.04 400.81	-35.58 1579.79	11.13 3014.6	34.11 -2605.26	11.3	1.15	0.05~0.15	0.16 0.22	MHP1-0451R MHP1-1045L
(10)	56 —	25	26.36 233.59	-16.04 1034.08	6.88 1755.84	22.02 -1439.58	46.6	4.75	0.10~0.20	0.50 0.48	MHP1.5-0451R MHP1.5-1045L
(8)	46.3 —	20	33.34 357.61	-23.12 1564.81	7.41 2936.72	25.14 -2514.09	25.3	2.58	0.05~0.15	0.29 0.28	MHP1-0601R MHP1-1060L
(10)	76.8 —	30	22.63 303.06	-17.19 974.4	5.82 1912.11	15.81 -1675.65	94.0	9.58	0.10~0.20	0.94 0.77	MHP1.5-0601R MHP1.5-1060L
(10)	76.2 —	32	21.08 464.7	-15.72 1404.28	5.71 2777.98	15.17 -2443.73	71.4	7.28	0.05~0.15	0.94 0.76	MHP1-0901R MHP1-1090L
(10)	76.4 —	32	21.17 720.78	-16.46 1811.47	6.39 3718.13	14.76 -3326.46	51.8	5.28	0.03~0.10	0.94 0.75	MHP1-1201R MHP1-1120L
(15)	148.2 —	60	11.69 614.04	-9.25 1458.9	3.53 3026.67	7.96 -2721.83	260	26.5	0.05~0.15	3.99 1.88	MHP1-1801R MHP1-1180L
(18)	162.4 —	65	10.77 695.62	-8.9 1430.75	3.58 3074.35	7.05 -2808.83	333	34.0	0.05~0.15	4.76 1.88	MHP1-2001R MHP1-1200L

**NOTE 1:** Factors to be used for calculating radial and thrust loads, CW and CCW stand for clockwise and counterclockwise rotation, respectively. See B8 Shape above. A plus sign means that two gears in a set are apart from each other when load is applied. A minus sign means that they approach each other when load is applied. For the method of calculation, see "How to determine the radial and thrust loads" on page 232.

**NOTE 2:** The allowable torques are obtained from the results of experimentation with the pinion at 600 min<sup>-1</sup> lubricated with Kingstar SG-O (NIHON GREASE).



B3 Shape

## Modules 2~4

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length
						A <sub>H7</sub>	B	C	D	E	F	G
<b>MBSG2-4020R</b> <b>MBSG2-2040L</b>	2	<b>m2</b>	40	R	B4	15	45	80	81.1	45	31.78	26.1
			20	L	B3	12	35	40	44.1	55	28.16	16.02
<b>m2.5</b>		40	R	B4	16	55	100	101.29	50	33.35	26.29	
		20	L	B3	12	43	50	55.12	65	31.01	16.28	
<b>MBSG3-4020R</b> <b>MBSG3-2040L</b>	<b>m3</b>	40	R	B4	20	65	120	121.57	60	39.81	31.57	
		20	L	B3	16	52	60	66.03	80	38.9	21.51	
<b>MBSG4-4020R</b> <b>MBSG4-2040L</b>	<b>m4</b>	40	R	B4	25	80	160	162.06	75	48.27	37.06	
		20	L	B3	20	70	80	88.46	100	45.38	22.12	

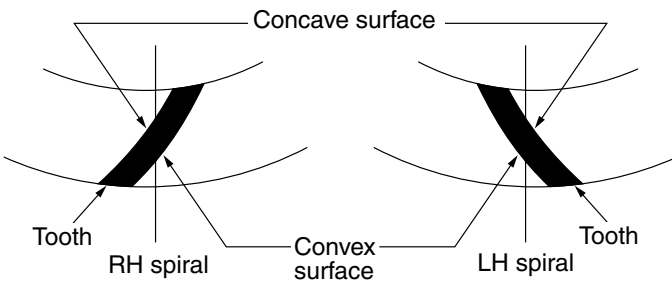
CAUTION: Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

Bevel Gears

Gears

## Contact Surface of Spiral Bevel Gears

Tooth surfaces of spiral gears have concave and convex sides. Changes in the rotational direction of the driving gear alters the contact surface accordingly. The illustrations show top views of RH and LH spiral gears, and the tables on the right explain the different contact surface depending on the situation.



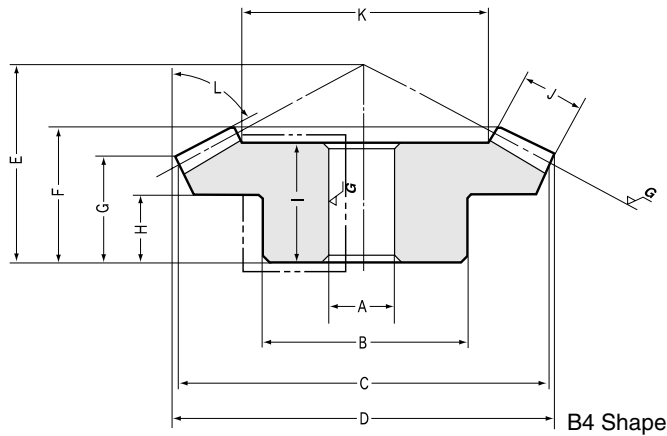
### RH spiral as a driving gear

Rotating direction of driving gear <small>NOTE 1</small>	Contact surface	
	Driving gear (RH spiral)	Driven gear (LH spiral)
RH rotation (clockwise)	Convex surface	Concave surface
LH rotation (counterclockwise)	Concave surface	Convex surface

### LH spiral as a driving gear

Rotating direction of driving gear <small>NOTE 1</small>	Contact surface	
	Driving gear (LH spiral)	Driven gear (RH spiral)
RH rotation (clockwise)	Concave surface	Convex surface
LH rotation (counterclockwise)	Convex surface	Concave surface

NOTE 1: Rotational directions given in the tables are for viewing the gears from the hub side.



## Specifications

Precision grade	JIS B 1704 grade 2	Tooth hardness	55~60HRC
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Helix angle	35°	Datum reference surface for gear grinding	Bore
Material	SCM415	Secondary Operations	Possible for portion not carburizing
Heat treatment	Carburizing <small>NOTE 1</small>		

**NOTE 1:** The areas marked with ---- on the diagram are masked during the carburizing and can be modified, even though the hardness is somewhat higher.

Hub width H	Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <small>NOTE 2</small>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
				Bending strength	Surface durability	Bending strength	Surface durability			
18 13.75	29 27	14	52.7 25.39	51.8 25.9	87.2 43.6	5.28 2.65	8.89 4.45	0.05~0.11	0.55 0.17	<b>MBSG2-4020R</b> <b>MBSG2-2040L</b>
16 13.25	30 29	17	66.99 29.97	99.3 49.7	170 85.1	10.1 5.07	17.4 8.68	0.06~0.12	0.96 0.27	<b>MBSG2.5-4020R</b> <b>MBSG2.5-2040L</b>
20 18	35 36.5	20	80.28 36.56	169 84.9	295 147	17.3 8.65	30.1 15.0	0.07~0.13	1.52 0.55	<b>MBSG3-4020R</b> <b>MBSG3-2040L</b>
22 17.5	42 43	27	106.63 51.25	405 203	722 361	41.3 20.7	73.7 36.8	0.10~0.16	3.30 1.10	<b>MBSG4-4020R</b> <b>MBSG4-2040L</b>

**NOTE 2:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.

## Forces Acting on Spiral Bevel Gear Teeth

For a spiral bevel gear with shaft angle  $\Sigma = 90^\circ$ , pressure angle  $\alpha_n = 20^\circ$  and spiral angle  $\beta_m = 35^\circ$ , the tables below show the axial thrust force  $F_a$  and the radial force  $F_r$  when a tangential force  $F_u$  of 100 units is applied at the center of face width.

The tables show the values of  $\frac{\text{axial thrust force } F_a}{\text{radial force } F_r}$

### (1) Forces acting upon pinion

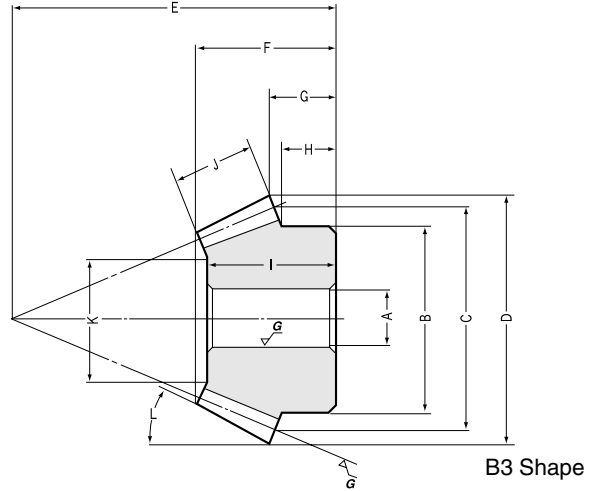
Contact surface	Gear ratio $z_2/z_1$						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave surface	80.9	82.9	82.5	81.5	80.5	78.7	77.4
	-18.1	-1.9	8.4	15.2	20.0	26.1	29.8
Convex surface	-18.1	-33.6	-42.8	-48.5	-52.4	-57.2	-59.9
	80.9	75.8	71.1	67.3	64.3	60.1	57.3

### (2) Forces acting upon gear

Contact surface	Gear ratio $z_2/z_1$						
	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Concave surface	80.9	75.8	71.1	67.3	64.3	60.1	57.3
	-18.1	-33.6	-42.8	-48.5	-52.4	-57.2	-59.9
Convex surface	-18.1	-1.9	8.4	15.2	20.0	26.1	29.8
	80.9	82.9	82.5	81.5	80.5	78.7	77.4



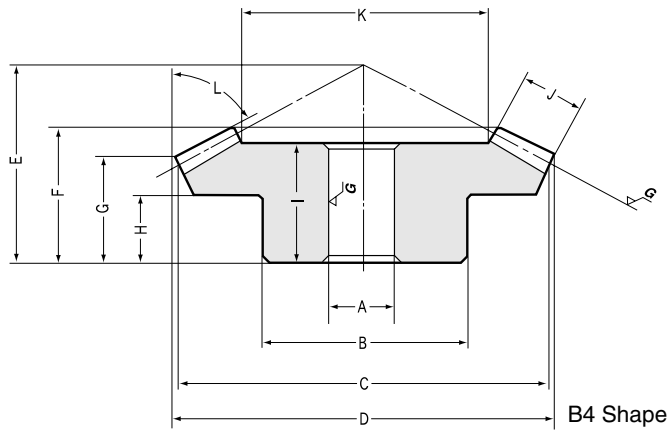
# SBSG Ground Spiral Bevel Gears Module 2~4



## Modules 2~4

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length
						A <sub>H7</sub>	B	C	D	E	F	G
SBSG2-3020R SBSG2-2030L	1.5	m2	30	R	B4	12	35	60	61.6	40	26.6	21.2
			20	L	B3	10	30	40	43.55	45	24.91	16.18
SBSG2.5-3020R SBSG2.5-2030L		m2.5	30	R	B4	15	45	75	77.09	50	33.86	26.56
			20	L	B3	12	40	50	54.43	55	30.88	18.98
SBSG3-3020R SBSG3-2030L		m3	30	R	B4	16	50	90	92.21	55	35.34	26.66
			20	L	B3	16	45	60	65.58	70	40.17	26.86
SBSG4-3020R SBSG4-2030L	m4	30	R	B4	20	70	120	122.85	75	47.49	37.14	
		20	L	B3	20	60	80	87.34	90	48.17	32.45	
SBSG2-4020R SBSG2-2040L	2	m2	40	R	B4	12	40	80	80.99	45	32.26	25.99
			20	L	B3	12	32	40	44.1	60	34	21
SBSG2.5-4020R SBSG2.5-2040L		m2.5	40	R	B4	15	50	100	101.27	55	39.65	31.27
			20	L	B3	12	40	50	55.2	75	43.61	26.3
SBSG3-4020R SBSG3-2040L		m3	40	R	B4	20	60	120	121.48	65	45.76	36.47
			20	L	B3	16	50	60	66.07	90	50.63	31.52
SBSG4-4020R SBSG4-2040L	m4	40	R	B4	20	70	160	162.07	80	53.69	42.07	
		20	L	B3	20	60	80	88.5	120	66.24	42.12	
SBSG2-4515R SBSG2-1545L	3	m2	45	R	B4	12	40	90	90.67	40	30.29	26.01
			15	L	B3	10	24	30	34.78	60	29.66	15.8
SBSG2.5-4515R SBSG2.5-1545L		m2.5	45	R	B4	15	50	112.5	113.32	50	38.25	32.47
			15	L	B3	12	30	37.5	43.36	75	38.27	19.73
SBSG3-4515R SBSG3-1545L		m3	45	R	B4	20	60	135	135.99	55	40.59	33.98
			15	L	B3	15	38	45	52.08	90	44.98	23.68

CAUTION: Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.



## Specifications

Precision grade	JIS B 1704 grade 2	Tooth hardness	48~53HRC
Gear teeth	Gleason	Surface treatment	Black oxide except ground surface
Pressure angle	20°	Tooth surface finish	Ground
Helix angle	35°	Datum reference surface for gear grinding	Bore
Material	S45C	Secondary Operations	Possible except tooth areas
Heat treatment	Teeth induction hardened		

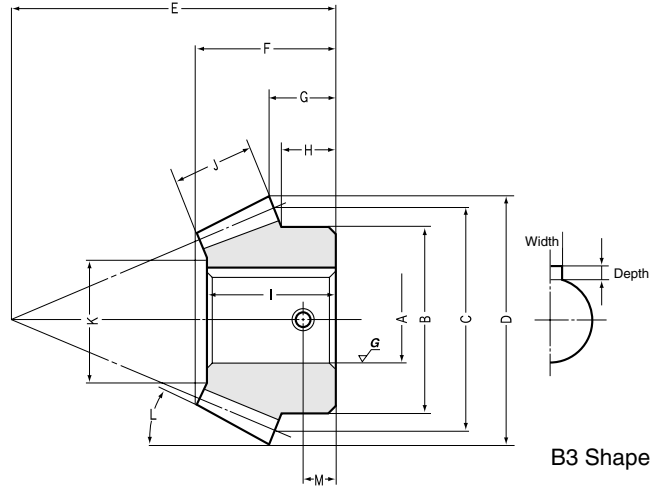
Hub width H	Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <small>NOTE 1</small>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
				Bending strength	Surface durability	Bending strength	Surface durability			
15 11.67	23 22	11	37.56 21.34	14.1 9.61	14.2 9.44	1.44 0.98	1.44 0.96	0.05~0.11	0.25 0.12	SBSG2-3020R SBSG2-2030L
18 14.17	30 28	15	45.61 27.42	29.0 19.8	29.7 19.8	2.96 2.02	3.03 2.02	0.06~0.12	0.55 0.23	SBSG2.5-3020R SBSG2.5-2030L
17 20	31 37	17	57.14 34.71	48.4 33.1	50.4 33.6	4.94 3.37	5.14 3.42	0.07~0.13	0.80 0.50	SBSG3-3020R SBSG3-2030L
25 23.33	40 43	20	78.59 46.89	106 72.2	113 75.3	10.8 7.36	11.5 7.68	0.10~0.16	1.80 1.10	SBSG4-3020R SBSG4-2030L
18 18	27 32	15	48.46 21.11	25.5 12.8	26.7 13.4	2.60 1.30	2.73 1.36	0.05~0.11	0.50 0.19	SBSG2-4020R SBSG2-2040L
20 22.5	34 40	20	59.26 20.53	51.7 25.9	55.1 27.6	5.27 2.64	5.62 2.81	0.06~0.12	1.10 0.40	SBSG2.5-4020R SBSG2.5-2040L
24 27.5	38 47	22	73.78 29.63	84.8 42.5	91.9 46.0	8.65 4.33	9.38 4.69	0.07~0.13	1.60 0.70	SBSG3-4020R SBSG3-2040L
28 35	45 62	28	102.39 42.8	195 97.9	217 109	19.9 9.98	22.2 11.1	0.10~0.16	3.30 1.50	SBSG4-4020R SBSG4-2040L
17 14	26 29	15	59.07 19.15	34.8 11.2	28.1 9.38	3.55 1.14	2.87 0.96	0.05~0.11	0.70 0.10	SBSG2-4515R SBSG2-1545L
22 17.5	35 37	20	72.82 20.48	59.0 18.9	48.3 16.1	6.01 1.93	4.93 1.64	0.06~0.12	1.00 0.20	SBSG2.5-4515R SBSG2.5-1545L
20 21.33	35 44	23	88.2 28.52	99.3 31.8	82.5 27.5	10.1 3.24	8.41 2.80	0.07~0.13	1.80 0.35	SBSG3-4515R SBSG3-1545L

NOTE 1: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



# MBSA(B) Finished Bore Spiral Bevel Gears

Modules 2~6



B3 Shape

## Modules 2~6

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	Length of bore
						A <sub>H7</sub>	B	C	D	E	F	G	H	I
MBSA2-3020R MBSB2-3020R	1.5	m2	30	R	B4	20	40	60	61.36	40	26.8	21.02	14	23
MBSA2-2030L MBSB2-2030L						22								
MBSA2.5-3020R MBSB2.5-3020R		m2	20	L	BK	15	35	40	43.49	45	24.96	16.16	13.33	23
						MBSA2.5-2030L MBSB2.5-2030L								
MBSA3-3020R MBSB3-3020R		m2.5	30	R	B4	22	48	75	76.74	50	33.6	26.31	18	30
						MBSA2.5-2030L MBSB2.5-2030L								
MBSA3-2030L MBSB3-2030L		m2.5	20	L	BK	18	43	50	54.43	55	30.08	18.98	15.17	28
						MBSA3-3020R MBSB3-3020R								
MBSA4-3020R MBSB4-3020R		m3	30	R	B4	25	60	90	92.21	60	40.34	31.66	21	36
						MBSA3-2030L MBSB3-2030L								
MBSA4-2030L MBSB4-2030L		m3	20	L	BK	22	53	60	65.58	65	35.17	21.86	17.67	32.5
						MBSA4-3020R MBSB4-3020R								
MBSA5-3020R MBSA5-2030L MBSB5-2030L		m4	30	R	B4	35	75	120	122.91	70	43.99	32.18	21	39
						MBSA4-2030L MBSB4-2030L								
MBSA5-3020R MBSA5-2030L MBSB5-2030L		m4	20	L	BK	30	70	80	87.34	85	45.53	27.45	21.67	42
						MBSA5-3020R MBSA5-2030L MBSB5-2030L								
MBSA6-3020R MBSA6-2030L MBSB6-2030L	m5	30	R	B7	80	—	150	—	70	35.53	23.8	—	31	
					MBSA5-2030L MBSB5-2030L	40		100				109.2		105
MBSA6-3020R MBSA6-2030L MBSB6-2030L	m5	20	L	BK	35	87	100	109.2	105	55.05	33.07	25.67	51	
					MBSA6-3020R MBSA6-2030L MBSB6-2030L									40
MBSA6-3020R MBSA6-2030L MBSB6-2030L	m6	30	R	B7	90	—	180	—	80	38.86	24.37	—	33	
					MBSA6-2030L MBSB6-2030L	50		105				120		130.48

CAUTION: With the exception of B7 type gears, dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

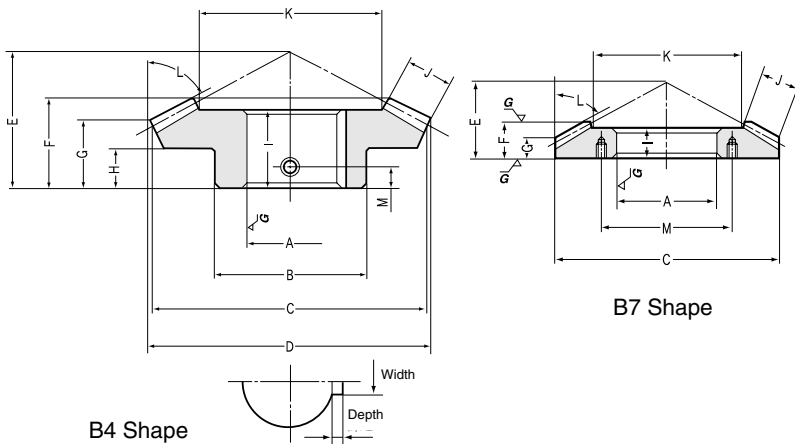
CAUTION: The products which are hardened by carburizing allow no secondary machining, however, the back surface of B7 type gears is masked during the process so that it is possible to drill and pin on this surface.

Bevel Gears

MBSA · MBSB



# Finished Bore Spiral Bevel Gears



## Specifications

Precision grade	JIS B 1704 grade 4	Tooth hardness	55~60HRC
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Helix angle	35°	Datum reference surface for gear cutting	Bore
Material	SCM415	Secondary Operations	Not Possible except the mounting surface on B7 shape
Heat treatment	Overall Carburizing NOTE 4		

NOTE 4: It is possible to perform secondary operations on the mounting surface of B7 shape due to masking during carburizing.

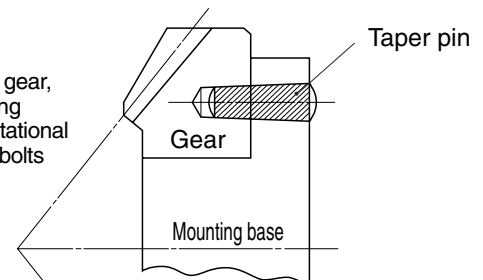
Face width J	Holding surface dia. K	Keyway NOTE 1 Width × Depth	Threaded hole NOTE 2 Thread size L	Allowable torque (N · m) NOTE 3		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.	
				Bending strength	Surface durability	Bending strength	Surface durability				
11	37.56	6 x 2.8 6 x 2.8	M6 M6	7	34.4	38.4	3.51	3.91	0.06~0.16	0.27 0.26	MBSA2-3020R MBSB2-3020R
11	24.34	5 x 2.3 6 x 2.8	M5 M6	6.5	23.5	25.6	2.39	2.61	0.06~0.16	0.15 0.13	MBSA2-2030L MBSB2-2030L
14	48.01	6 x 2.8 8 x 3.3	M6 M8	9	68.0	76.8	6.93	7.84	0.07~0.17	0.55 0.52	MBSA2.5-3020R MBSB2.5-3020R
14	31.02	6 x 2.8 6 x 2.8	M6 M6	7.5	46.4	51.2	4.73	5.22	0.07~0.17	0.27 0.26	MBSA2.5-2030L MBSB2.5-2030L
17	57.14	8 x 3.3 8 x 3.3	M8 M8	11	118	135	12.1	13.8	0.08~0.18	1.10 1.00	MBSA3-3020R MBSB3-3020R
17	36.2	6 x 2.8 8 x 3.3	M6 M8	9	80.7	90.1	8.23	9.19	0.08~0.18	0.49 0.46	MBSA3-2030L MBSB3-2030L
23	76.72	10 x 3.3 12 x 3.3	M8 M8	10	283	328	28.9	33.5	0.12~0.27	2.00 1.90	MBSA4-3020R MBSB4-3020R
23	48.07	8 x 3.3 10 x 3.3	M8 M8	11	193	219	19.7	22.3	0.12~0.27	1.10 1.00	MBSA4-2030L MBSB4-2030L
28	97.36	—	6-M10	110	544	637	55.4	64.9	0.14~0.34	3.00	MBSA5-3020R
28	62.04	10 x 3.3 12 x 3.3	M8 M8	13	371	425	37.8	43.3	0.14~0.34	2.10 2.00	MBSA5-2030L MBSB5-2030L
34	115.61	—	6-M10	120	927	1120	94.6	114	0.16~0.36	4.80	MBSA6-3020R
34	72.41	14 x 3.8 14 x 3.8	M8 M8	15	633	745	64.5	76.0	0.16~0.36	3.40 3.20	MBSA6-2030L MBSB6-2030L

NOTE 1: Although the dimensions of the keyway are made to the JIS (Js9) tolerance, there may be some deviations due to the effects of the heat treatment.

NOTE 2: A set screw comes with these products.

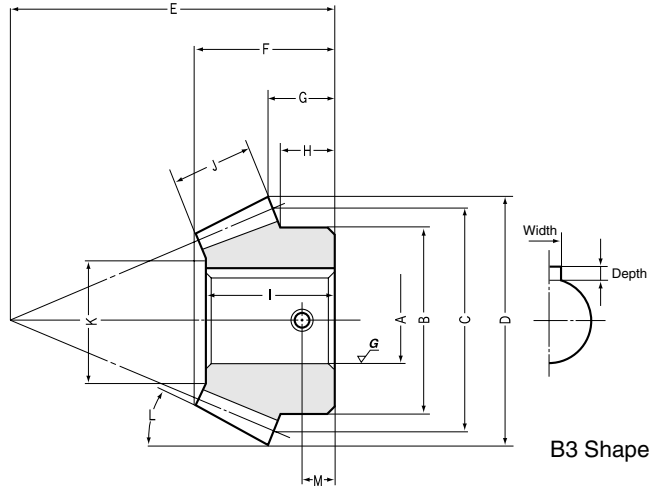
NOTE 3: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.

When installing B7 shape (ring type) gear, always secure them onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.





# MBSA(B) Finished Bore Spiral Bevel Gears Modules 2~6



## Modules 2~6

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	Length of bore
						A <sub>H7</sub>	B	C	D	E	F	G	H	I
MBSA2-4020R MBSB2-4020R	2	m2	40	R	B4	20	45	80	81.06	45	31.83	26.06	18	29
22														
MBSA2-2040L MBSB2-2040L		m2	20	L	BK	15	35	40	44.2	55	28.16	16.05	13.75	27
18														
MBSA2.5-4020R MBSB2.5-4020R		m2.5	40	R	B4	25	55	100	101.29	50	33.35	26.29	16	30
28														
MBSA2.5-2040L MBSB2.5-2040L		m2.5	20	L	BK	20	43	50	55.12	65	31.01	16.28	13.25	29
22														
MBSA3-4020R MBSB3-4020R		m3	40	R	B4	30	65	120	121.57	60	39.81	31.57	21	35
35														
MBSA3-2040L MBSB3-2040L		m3	20	L	BK	22	53	60	66.03	80	38.9	21.51	18.25	36.5
25														
MBSA4-4020R MBSB4-4020R	m4	40	R	B7	80	—	160	—	60	32.08	22.53	—	28	
30					88.46	17.5								
MBSA4-2040L MBSB4-2040L	m4	20	L	BK	30	70	80	88.46	100	45.38	22.12	17.5	43	
35														
MBSA5-4020R MBSA5-2040L MBSB5-2040L	m5	40	R	B7	90	—	200	—	70	35.2	22.98	—	30	
40					109.91	21.75								
MBSA6-4020R MBSA6-2040L MBSB6-2040L	m6	40	R	B7	110	—	240	—	80	37.89	23.62	—	32	
50					132.04	26.25								
MBSA6-2040L MBSB6-2040L	m6	20	L	BK	50	105	120	132.04	150	67.8	33.01	26.25	64	
55														

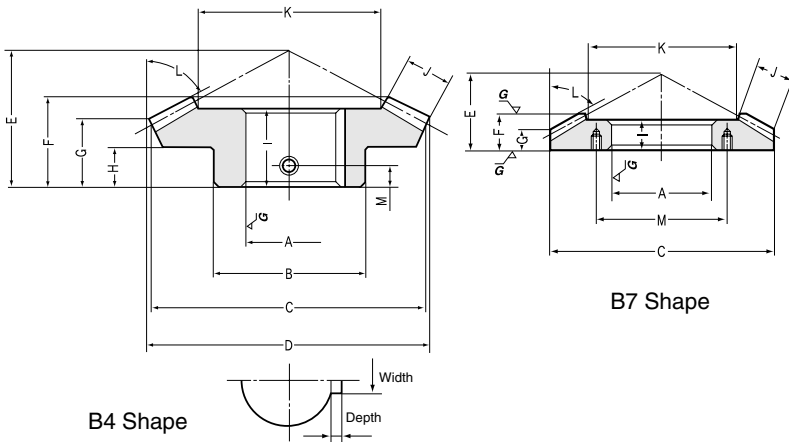
CAUTION: With the exception of B7 type gears, dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

CAUTION: The products which are hardened by carburizing allow no secondary machining, however, the back surface of B7 type gears is masked during the process so that it is possible to drill and pin on this surface.





# Finished Bore Spiral Bevel Gears



## Specifications

Precision grade	JIS B 1704 grade 4	Tooth hardness	55~60HRC
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Helix angle	35°	Datum reference surface for gear cutting	Bore
Material	SCM415	Secondary Operations	Not Possible except the mounting surface on B7 shape
Heat treatment	Overall Carburizing <small>NOTE 4</small>		

**NOTE 4:** It is possible to perform secondary operations on the mounting surface of B7 shape due to masking during carburizing.

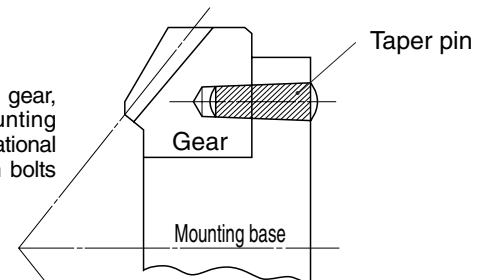
Face width J	Holding surface dia. K	Keyway <small>NOTE 1</small> Width × Depth	Threaded hole <small>NOTE 2</small> Thread size L	Allowable torque (N · m) <small>NOTE 3</small>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.	
				Bending strength	Surface durability	Bending strength	Surface durability				
14	52.7	6 x 2.8 6 x 2.8	M6 M6	9	59.6	69.6	6.08	7.09	0.06~0.16	0.55 0.53	MBSA2-4020R MBSB2-4020R
14	25.39	5 x 2.3 6 x 2.8	M5 M6	7	29.9	34.8	3.05	3.55	0.06~0.16	0.17 0.16	MBSA2-2040L MBSB2-2040L
17	66.99	8 x 3.3 8 x 3.3	M8 M8	8	114	135	11.7	13.8	0.07~0.17	0.96 0.93	MBSA2.5-4020R MBSB2.5-4020R
17	29.97	6 x 2.8 6 x 2.8	M6 M6	7	57.3	67.6	5.84	6.89	0.07~0.17	0.27 0.25	MBSA2.5-2040L MBSB2.5-2040L
20	80.28	8 x 3.3 10 x 3.3	M8 M8	11	195	233	19.9	23.7	0.08~0.18	1.52 1.45	MBSA3-4020R MBSB3-4020R
20	36.56	6 x 2.8 8 x 3.3	M6 M8	9.5	97.7	116	9.97	11.9	0.08~0.18	0.55 0.51	MBSA3-2040L MBSB3-2040L
27	107.63	—	6-M10	110	466	564	47.5	57.5	0.12~0.27	3.20	MBSA4-4020R
27	51.25	8 x 3.3 10 x 3.3	M8 M8	9	234	282	23.8	28.8	0.12~0.27	1.10 1.00	MBSA4-2040L MBSB4-2040L
34	133.97	—	6-M10	120	915	1120	93.3	114	0.14~0.34	5.70	MBSA5-4020R
34	61.95	12 x 3.3 14 x 3.8	M8 M8	11	458	559	46.7	57.0	0.14~0.34	2.10 2.00	MBSA5-2040L MBSB5-2040L
40	162.56	—	6-M10	140	1530	1920	156	196	0.16~0.36	8.60	MBSA6-4020R
40	77.11	14 x 3.8 16 x 4.3	M8 M10	14	766	961	78.1	97.9	0.16~0.36	3.50 3.30	MBSA6-2040L MBSB6-2040L

**NOTE 1:** Although the dimensions of the keyway are made to the JIS (Js9) tolerance, there may be some deviations due to the effects of the heat treatment.

**NOTE 2:** A set screw comes with these products.

**NOTE 3:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.

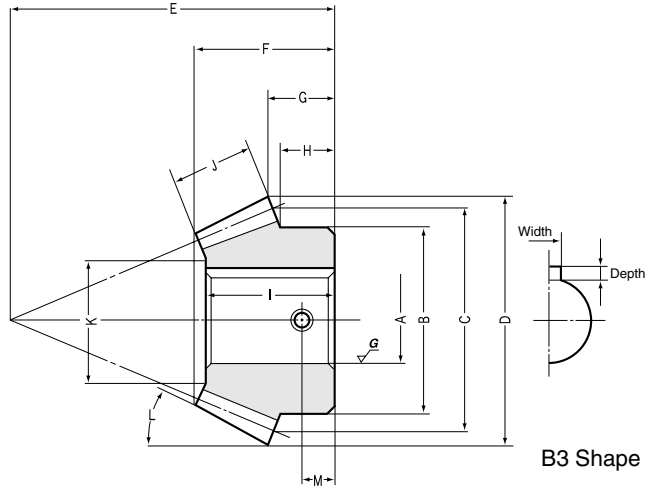
When installing B7 shape (ring type) gear, always secure them onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.





# MBSA(B) Finished Bore Spiral Bevel Gears

Module 2~6



B3 Shape

## Modules 2~6

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	Length of bore
						A <sub>H7</sub>	B	C	D	E	F	G	H	I
MBSA2-4518R MBSB2-4518R	2.5	<b>m2</b>	45	R	B4	20 25	48	90	90.79	40	27.67	22.98	15	25
MBSA2-1845L MBSB2-1845L		<b>m2</b>	18	L	BK	12 16	32	36	40.42	60	28.54	15.88	14.2	27.5
MBSA2.5-4518R MBSB2.5-4518R		<b>m2.5</b>	45	R	B4	25 30	55	112.5	113.49	50	34.94	28.74	19	31
MBSA2.5-1845L MBSB2.5-1845L		<b>m2.5</b>	18	L	BK	15 20	40	45	50.35	72	33.19	16.82	14.75	31.5
MBSA3-4518R MBSB3-4518R		<b>m3</b>	45	R	B4	30 35	65	135	136.24	60	41.65	34.55	22	37
MBSA3-1845L MBSB3-1845L		<b>m3</b>	18	L	BK	20 25	48	54	60.69	85	37.82	18.84	16.3	36
MBSA4-4518R MBSB4-1845L		<b>m4</b>	45	R	B7	80	—	180	—	55	29.77	21.25	—	25
MBSA4-1845L MBSB4-1845L		<b>m4</b>	18	L	BK	28 32	63	72	80.86	110	48.03	21.77	18.2	46
MBSA5-4518R MBSA5-1845L MBSB5-1845L		<b>m5</b>	45	R	B7	100	—	225	—	65	33.37	22.82	—	28
		<b>m5</b>	18	L	BK	35 42	80	90	101.07	135	57.3	24.71	20.5	54.5
MBSA6-4518R MBSA6-1845L MBSB6-1845L		<b>m6</b>	45	R	B7	110	—	270	—	75	36.97	24.19	—	30
		<b>m6</b>	18	L	BK	45 50	95	108	120.55	160	66.73	27.51	22.4	63

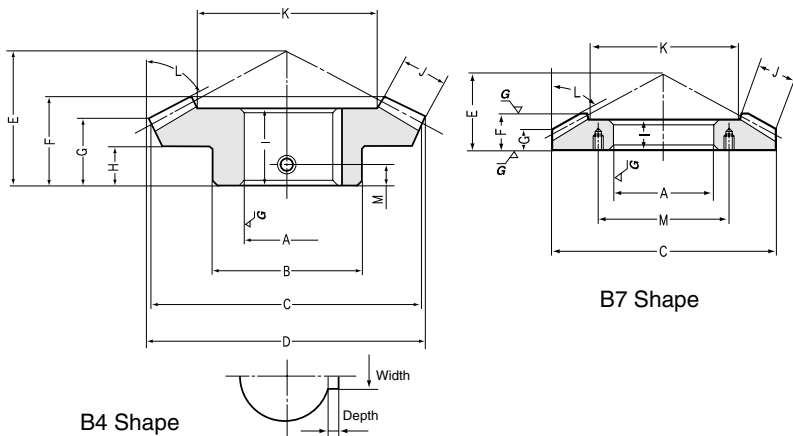
CAUTION: With the exception of B7 type gears, dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

CAUTION: The products which are hardened by carburizing allow no secondary machining, however, the back surface of B7 type gears is masked during the process so that it is possible to drill and pin on this surface.

Bevel Gears MBSA · MBSB



# Finished Bore Spiral Bevel Gears



## Specifications

Precision grade	JIS B 1704 grade 4	Tooth hardness	55~60HRC
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Helix angle	35°	Datum reference surface for gear cutting	Bore
Material	SCM415	Secondary Operations	Not Possible except the mounting surface on B7 shape
Heat treatment	Overall Carburizing <small>NOTE 4</small>		

**NOTE 4:** It is possible to perform secondary operations on the mounting surface of B7 shape due to masking during carburizing.

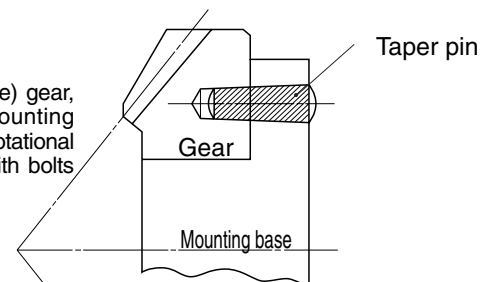
Face width J	Holding surface dia. K	Keyway <small>NOTE 1</small> Width × Depth	Threaded hole <small>NOTE 2</small> Thread size L	Allowable torque (N · m) <small>NOTE 3</small>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.	
				Bending strength	Surface durability	Bending strength	Surface durability				
14	62.24	6 x 2.8 8 x 3.3	M6 M8	8	69.3	74.3	7.06	7.58	0.06~0.16	0.59 0.54	MBSA2-4518R MBSB2-4518R
14	23.11	4 x 1.8 5 x 2.3	M5 M5	7	27.2	29.7	2.77	3.03	0.06~0.16	0.15 0.13	MBSA2-1845L MBSB2-1845L
18	76.53	8 x 3.3 8 x 3.3	M8 M8	10	138	150	14.1	15.3	0.07~0.17	1.13 1.08	MBSA2.5-4518R MBSB2.5-4518R
18	26.82	5 x 2.3 6 x 2.8	M5 M6	8	54.1	59.9	5.52	6.11	0.07~0.17	0.27 0.24	MBSA2.5-1845L MBSB2.5-1845L
21	92.96	8 x 3.3 10 x 3.3	M8 M8	11	234	256	23.8	26.1	0.08~0.18	1.95 1.90	MBSA3-4518R MBSB3-4518R
21	33.41	6 x 2.8 8 x 3.3	M6 M8	9	91.8	103	9.36	10.5	0.08~0.18	0.42 0.37	MBSA3-1845L MBSB3-1845L
29	122.33	—	6-M10	110	567	630	57.8	64.3	0.12~0.27	4.00	MBSA4-4518R
29	45.83	8 x 3.3 10 x 3.3	M8 M8	10	223	252	22.7	25.7	0.12~0.27	0.92 0.85	MBSA4-1845L MBSB4-1845L
36	153.85	—	6-M10	130	1100	1240	112	126	0.14~0.34	6.90	MBSA5-4518R
36	56.13	10 x 3.3 12 x 3.3	M8 M8	11	433	495	44.2	50.5	0.14~0.34	1.70 1.60	MBSA5-1845L MBSB5-1845L
43	184.57	—	6-M10	140	1860	2150	190	219	0.16~0.36	11.0	MBSA6-4518R
43	66.44	14 x 3.8 14 x 3.8	M8 M8	12	731	859	74.6	87.6	0.16~0.36	2.70 2.50	MBSA6-1845L MBSB6-1845L

**NOTE 1:** Although the dimensions of the keyway are made to the JIS (Js9) tolerance, there may be some deviations due to the effects of the heat treatment.

**NOTE 2:** A set screw comes with these products.

**NOTE 3:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.

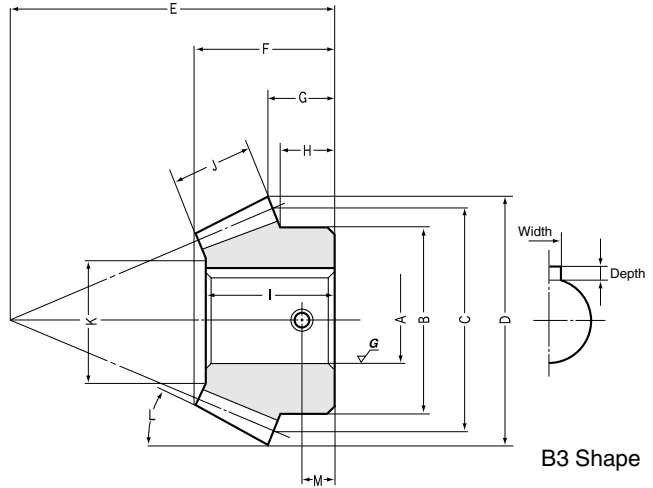
When installing B7 shape (ring type) gear, always secure them onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.





# MBSA(B) Finished Bore Spiral Bevel Gears

Modules 2~6



B3 Shape

## Modules 2~6

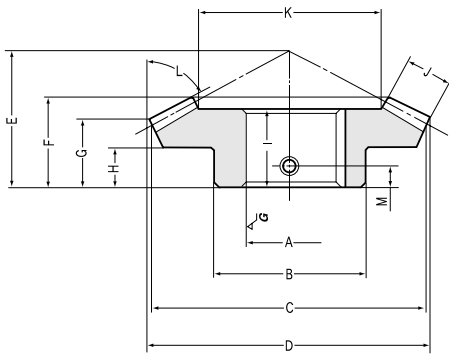
Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	Length of bore
						A <sub>H7</sub>	B	C	D	E	F	G	H	I
MBSA2-4515R MBSB2-4515R	3	m2	45	R	B4	20 22	48	90	90.66	40	30.01	25.99	18	27
MBSA2-1545L MBSB2-1545L		m2	15	L	BT BK	10 12	26	30	34.59	55	23.78	10.77	9.33	22.5
MBSA2.5-4515R MBSB2.5-4515R		m2.5	45	R	B4	22 25	55	112.5	113.28	45	32.43	27.42	18	28
MBSA2.5-1545L MBSB2.5-1545L		m2.5	15	L	BK	12 15	32	37.5	43.06	70	30.51	14.68	12.84	29
MBSA3-4515R MBSB3-4515R		m3	45	R	B4	30 32	65	135	136.03	55	39.94	34.05	22	35
MBSA3-1545L MBSB3-1545L		m3	15	L	BK	18 20	38	45	52	85	38.12	18.67	16.33	36.5
MBSA4-4515R MBSB4-1545L		m4	45	R	B7	80	—	180	—	50	28.85	22.14	—	25
MBSA4-1545L MBSB4-1545L		m4	15	L	BK	22 25	52	60	69.24	110	47.51	21.54	18.67	45.5
MBSA5-4515R MBSB5-1545L		m5	45	R	B7	90	—	225	—	60	33.57	25.16	—	28
MBSA5-1545L MBSB5-1545L		m5	15	L	BK	28 32	65	75	86.55	135	56.89	24.43	20.83	54
MBSA6-4515R MBSB6-1545L		m6	45	R	B7	110	—	270	—	70	38.28	28.05	—	32
MBSA6-1545L MBSB6-1545L		m6	15	L	BK	35 40	78	90	103.13	160	66.39	27.19	23	63

CAUTION: With the exception of B7 type gears, dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

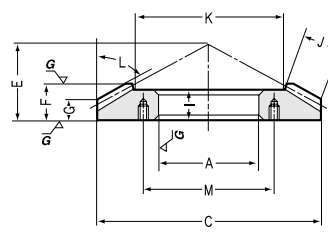
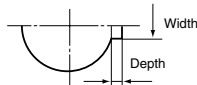
CAUTION: The products which are hardened by carburizing allow no secondary machining, however, the back surface of B7 type gears is masked during the process so that it is possible to drill and pin on this surface.



# Finished Bore Spiral Bevel Gears



B4 Shape



B7 Shape

## Specifications

Precision grade	JIS B 1704 grade 4	Tooth hardness	55~60HRC
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Helix angle	35°	Datum reference surface for gear cutting	Bore
Material	SCM415	Secondary Operations	Not Possible except the mounting surface on B7 shape
Heat treatment	Overall Carburizing <small>NOTE 4</small>		

**NOTE 4:** It is possible to perform secondary operations on the mounting surface of B7 shape due to masking during carburizing.

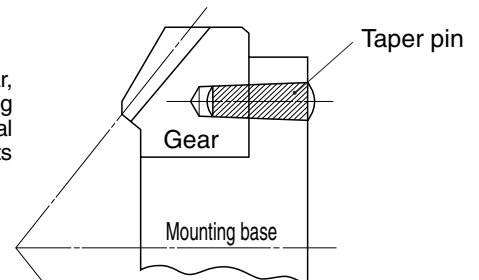
Face width J	Holding surface dia. K	Keyway <small>NOTE 1</small> Width × Depth	Threaded hole <small>NOTE 2</small>		Allowable torque (N · m) <small>NOTE 3</small>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
			Thread size	L	Bending strength	Surface durability	Bending strength	Surface durability			
14	61.82	6 x 2.8 6 x 2.8	M6 M6	9	67.8	61.3	6.91	6.25	0.06~0.16	0.62 0.61	MBSA2-4515R MBSB2-4515R
14	16.46	— 4 x 1.8	M4 M5	5	21.7	20.4	2.22	2.08	0.06~0.16	0.08 0.07	MBSA2-1545L MBSB2-1545L
17	77.83	6 x 2.8 8 x 3.3	M6 M8	9	130	119	13.3	12.1	0.07~0.17	0.99 0.96	MBSA2.5-4515R MBSB2.5-4515R
17	21.48	4 x 1.8 5 x 2.3	M5 M5	7	41.6	39.6	4.24	4.04	0.07~0.17	0.16 0.14	MBSA2.5-1545L MBSB2.5-1545L
21	92.39	8 x 3.3 10 x 3.3	M8 M8	11	229	211	23.3	21.6	0.08~0.18	1.80 1.77	MBSA3-4515R MBSB3-4515R
21	26.18	6 x 2.8 6 x 2.8	M6 M6	9	73.3	70.5	7.48	7.18	0.08~0.18	0.25 0.23	MBSA3-1545L MBSB3-1545L
28	124.3	—	6-M10	110	542	508	55.3	51.8	0.12~0.27	4.00	MBSA4-4515R
28	35.91	6 x 2.8 8 x 3.3	M6 M8	10	174	169	17.7	17.3	0.12~0.27	0.64 0.60	MBSA4-1545L MBSB4-1545L
35	154.88	—	6-M10	120	1060	1000	108	102	0.14~0.34	7.30	MBSA5-4515R
35	42.64	8 x 3.3 10 x 3.3	M8 M8	11	339	334	34.6	34.1	0.14~0.34	1.20 1.10	MBSA5-1545L MBSB5-1545L
42	186.12	—	6-M10	140	1790	1740	183	178	0.16~0.36	12.0	MBSA6-4515R
42	52.37	10 x 3.3 12 x 3.3	M8 M8	12	575	581	58.6	59.3	0.16~0.36	1.90 1.80	MBSA6-1545L MBSB6-1545L

**NOTE 1:** Although the dimensions of the keyway are made to the JIS (Js9) tolerance, there may be some deviations due to the effects of the heat treatment.

**NOTE 2:** A set screw comes with these products.

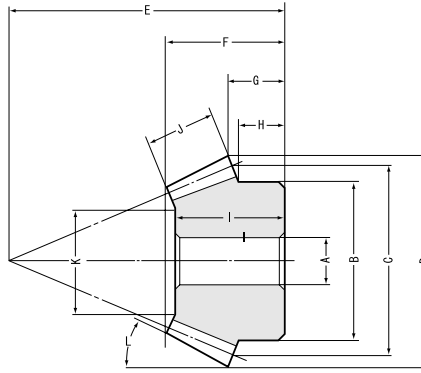
**NOTE 3:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.

When installing B7 shape (ring type) gear, always secure them onto the mounting base with taper pins to absorb the rotational loads. It is dangerous to secure with bolts only.

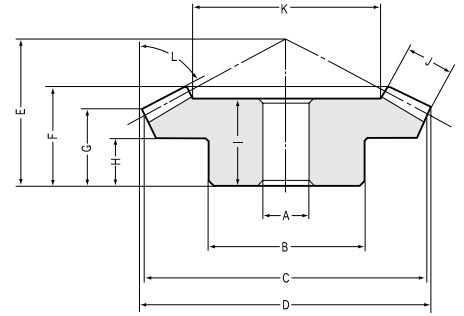




# SBS Spiral Bevel Gears Modules 1~5



B3 Shape



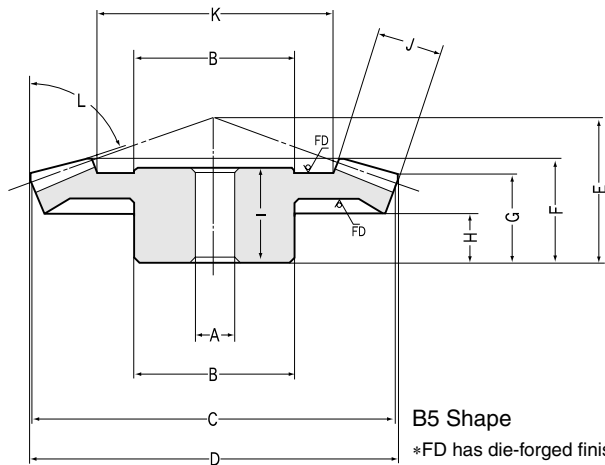
B4 Shape

## Modules 1~5

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Shape	Bore <small>NOTE 1</small>		Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length
						A	B						
SBS2-3020R	1.5	m2	30	R	B4	12	35	60	61.36	40	26.8	21.02	
SBS2-2030L			20	L	B3	10	30	40	43.49	45	24.96	16.16	
SBS2.5-3020R		m2.5	30	R	B4	15	45	75	77.09	50	33.86	26.56	
SBS2.5-2030L			20	L	B3	12	40	50	54.43	55	30.88	18.98	
SBS3-3020R		m3	30	R	B4	16	50	90	92.21	55	35.34	26.66	
SBS3-2030L			20	L	B3	16	45	60	65.58	70	40.17	26.86	
SBS4-3020R		m4	30	R	B4	20	70	120	122.85	75	47.49	37.14	
SBS4-2030L			20	L	B3	20	60	80	87.34	90	48.17	32.45	
SBS5-3020R		m5	30	R	B4	25	90	150	153.67	90	58.08	42.75	
SBS5-2030L			20	L	B3	22	80	100	109.2	110	61.62	38.07	
SBS1-4020R		2	m1	40	R	B4	8	25	40	40.52	22	15.02	12.52
SBS1-2040L				20	L	B3	6	16	20	22.08	28	13.73	8.52
SBS1.5-4020R	m1.5		40	R	B4	10	38	60	60.75	35	24.93	20.75	
SBS1.5-2040L			20	L	B3	8	25	30	33.08	46	25.45	16.77	
SBS2-4020R	m2		40	R	B4	12	40	80	81	45	32.27	26	
SBS2-2040L			20	L	B3	12	32	40	44.1	60	34.04	21.02	
SBS2.5-4020R	m2.5		40	R	B4	15	50	100	101.27	55	39.65	31.27	
SBS2.5-2040L			20	L	B3	12	40	50	55.2	75	43.61	26.3	
SBS3-4020R	m3		40	R	B4	20	60	120	121.48	65	45.76	36.47	
SBS3-2040L			20	L	B3	16	50	60	66.07	90	50.63	31.52	
SBS4-4020R	m4		40	R	B4	20	70	160	162.07	80	53.69	42.07	
SBS4-2040L			20	L	B3	20	60	80	88.5	120	66.24	42.12	
SBS5-4020R	m5	40	R	B5	25	100	200	202.54	90	55.02	42.54		
SBS5-2040L		20	L	B3	22	80	100	110.45	140	68.48	42.61		
SBS2.5-3618R	2	m2.5	36	R	B4	15	55	90	91.29	43	28.38	21.79	
SBS2.5-1836L			18	L	B3	12	38	45	50.3	64	34.06	20.32	
SBS3-3618R		m3	36	R	B4	20	60	108	109.53	52	34.82	26.53	
SBS3-1836L			18	L	B3	16	46	54	60.28	75	39.78	22.57	
SBS4-3618R		m4	36	R	B4	20	70	144	145.99	72	48.84	37.99	
SBS4-1836L			18	L	B3	20	60	72	80.19	100	52.51	30.05	

**CAUTION:** Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

**NOTE1:** Due to heat treating, some deformation of the bore may occur. It may be necessary to ream the bore to bring it to the stated dimensions.



## Specifications

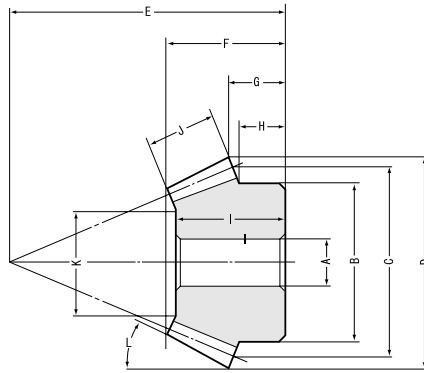
Precision grade	JIS B 1704 grade 4	Tooth hardness	48~53HRC
Gear teeth	Gleason	Surface treatment	Black oxide
Pressure angle	20°	Tooth surface finish	Cut
Helix angle	35°	Datum reference surface for gear cutting	Bore
Material	S45C	Secondary Operations	Possible except tooth areas
Heat treatment	Teeth induction hardened		

Hub width H	Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <small>NOTE 2</small>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
				Bending strength	Surface durability	Bending strength	Surface durability			
15 11.67	23 22	11	37.56 21.34	15.4 10.5	11.3 7.52	1.57 1.07	1.15 0.77	0.06~0.16	0.25 0.12	SBS2-3020R SBS2-2030L
18 14.17	30 28	15	45.61 27.42	31.7 21.6	23.6 15.7	3.23 2.20	2.40 1.60	0.07~0.17	0.55 0.23	SBS2.5-3020R SBS2.5-2030L
17 20	31 37	17	57.14 34.71	52.9 36.1	39.7 26.5	5.39 3.68	4.05 2.70	0.08~0.18	0.80 0.50	SBS3-3020R SBS3-2030L
25 23.33	40 43	20	78.59 46.89	115 78.7	88.1 58.8	11.8 8.03	8.99 5.99	0.12~0.27	1.80 1.10	SBS4-3020R SBS4-2030L
24 28.33	50 56	30	91.22 54.83	253 173	195 130	25.8 17.6	19.9 13.3	0.14~0.34	4.40 2.50	SBS5-3020R SBS5-2030L
8 7	12 12	6	26.58 9.17	3.01 1.51	2.22 1.11	0.31 0.15	0.23 0.11	0.03~0.13	0.07 0.02	SBS1-4020R SBS1-2040L
15 14.75	22 24	10	39.64 17.28	10.9 5.46	8.22 4.11	1.11 0.56	0.84 0.42	0.05~0.15	0.23 0.09	SBS1.5-4020R SBS1.5-2040L
18 18	27 32	15	48.46 20.92	27.8 13.9	21.3 10.7	2.83 1.42	2.17 1.09	0.06~0.16	0.50 0.19	SBS2-4020R SBS2-2040L
20 22.5	34 40	20	59.26 20.53	56.4 28.2	43.7 21.9	5.75 2.88	4.46 2.23	0.07~0.17	1.10 0.40	SBS2.5-4020R SBS2.5-2040L
24 27.5	38 47	22	73.78 29.63	92.5 46.4	72.6 36.3	9.44 4.73	7.40 3.70	0.08~0.18	1.60 0.70	SBS3-4020R SBS3-2040L
28 35	45 62	28	102.39 42.8	213 107	170 84.8	21.7 10.9	17.3 8.65	0.12~0.27	3.30 1.50	SBS4-4020R SBS4-2040L
26 35	50 63	30	138.94 57.84	376 188	302 151	38.3 19.2	30.8 15.4	0.14~0.34	6.00 2.90	SBS5-4020R SBS5-2040L
13 17.25	24 32	16	57.74 25.43	41.7 20.9	29.3 14.7	4.26 2.13	2.99 1.49	0.07~0.17	0.75 0.30	SBS2.5-3618R SBS2.5-1836L
17 19	30 37	20	68.27 28.59	74.0 37.0	52.4 26.2	7.54 3.78	5.35 2.67	0.08~0.18	1.75 0.50	SBS3-3618R SBS3-1836L
25 25	42 49	26	91.87 39.74	173 86.4	124 62.1	17.6 8.81	12.7 6.33	0.12~0.27	2.70 1.50	SBS4-3618R SBS4-1836L

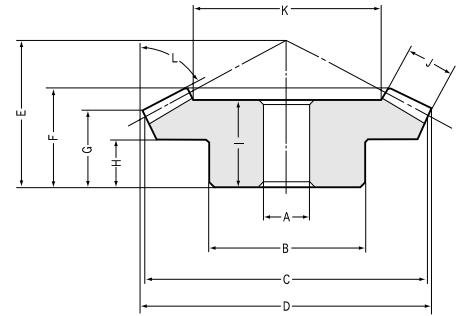
NOTE 2: The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



# SBS Spiral Bevel Gears Modules 1.5~5



B3 Shape



B4 Shape

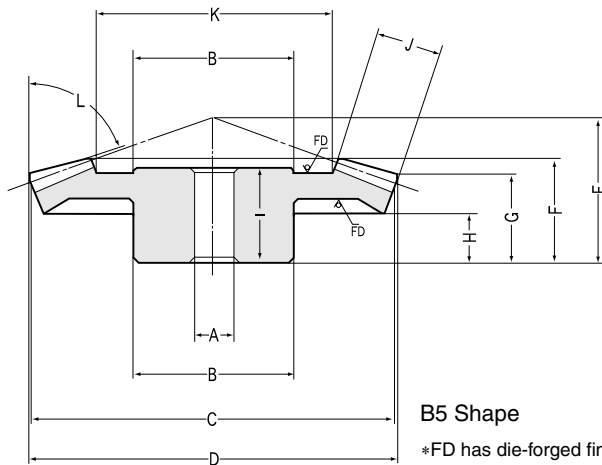
## Modules 1.5~5

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Shape	Bore <small>NOTE 1</small>	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length
						A <sub>H7</sub>	B	C	D	E	F	G
SBS2-4518R SBS2-1845L		m2	45	R	B4	12	48	90	90.79	40	27.67	22.98
			18	L	B3	10	32	36	40.42	60	28.54	15.88
SBS2.5-4518R SBS2.5-1845L		m2.5	45	R	B4	15	55	112.5	113.49	50	34.94	28.74
			18	L	B3	12	40	45	50.35	72	33.19	16.82
SBS3-4518R SBS3-1845L	2.5	m3	45	R	B4	20	65	135	136.24	60	41.65	34.55
			18	L	B3	16	48	54	60.69	85	37.82	18.84
SBS4-4518R SBS4-1845L		m4	45	R	B4	25	80	180	181.57	75	50.98	40.96
			18	L	B3	20	62	72	80.86	110	48.03	21.77
SBS5-4518R SBS5-1845L		m5	45	R	B4	30	100	225	225.81	90	57.9	46.01
			18	L	B3	22	80	90	103.87	135	56.02	25.27
SBS2-4515R SBS2-1545L		m2	45	R	B4	12	40	90	90.67	40	30.29	26.01
			15	L	B3	10	24	30	34.78	60	29.66	15.8
SBS2.5-4515R SBS2.5-1545L		m2.5	45	R	B4	15	50	112.5	113.32	50	38.25	32.47
			15	L	B3	12	30	37.5	43.36	75	38.27	19.73
SBS3-4515R SBS3-1545L	3	m3	45	R	B4	20	60	135	135.99	55	40.59	33.98
			15	L	B3	15	38	45	52.08	90	44.98	23.68
SBS4-4515R SBS4-1545L		m4	45	R	B5	20	80	180	181.3	70	50.62	41.95
			15	L	B3	16	50	60	69.3	115	54.37	26.55
SBS5-4515R SBS5-1545L		m5	45	R	B5	30	90	225	226.61	75	50.05	39.92
			15	L	B3	20	60	75	86.55	145	66.89	34.43
SBS1.5-6015R SBS1.5-1560L		m1.5	60	R	B4	12	60	90	90.36	32	24.08	21.48
			15	L	B3	8	18	22.5	26.09	56	22.95	11.45
SBS2-6015R SBS2-1560L		m2	60	R	B4	15	80	120	120.46	42	31.5	27.91
			15	L	B3	10	24	30	34.68	75	30.94	15.58
SBS2.5-6015R SBS2.5-1560L		m2.5	60	R	B4	20	100	150	150.5	53	39.68	35.24
			15	L	B3	12	30	37.5	44.16	94	38.9	19.83
SBS3-6015R SBS3-1560L		m3	60	R	B4	20	120	180	180.57	64	47.61	42.64
			15	L	B3	15	38	45	52.64	112	44.01	22.96

CAUTION: Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

NOTE1: Due to heat treating, some deformation of the bore may occur. It may be necessary to ream the bore to bring it to the stated dimensions.





B5 Shape

\*FD has die-forged finish.

## Specifications

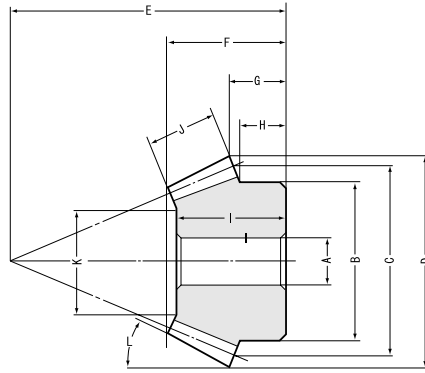
Precision grade	JIS B 1704 grade 4	Tooth hardness	48~53HRC
Gear teeth	Gleason	Surface treatment	Black oxide
Pressure angle	20°	Tooth surface finish	Cut
Helix angle	35°	Datum reference surface for gear cutting	Bore
Material	S45C	Secondary Operations	Possible except tooth areas
Heat treatment	Teeth induction hardened		

Hub width H	Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <small>NOTE 2</small>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
				Bending strength	Surface durability	Bending strength	Surface durability			
15 14.2	25 27.5	14	62.24 23.11	31.0 12.2	21.9 8.74	3.16 1.24	2.23 0.89	0.06~0.16	0.66 0.16	SBS2-4518R SBS2-1845L
18 14.75	31 31.5	18	76.53 26.82	61.6 24.2	44.0 17.6	6.28 2.47	4.49 1.80	0.07~0.17	1.27 0.29	SBS2.5-4518R SBS2.5-1845L
22 16.3	37 36	21	92.96 33.41	104 41.0	75.4 30.2	10.7 4.18	7.69 3.07	0.08~0.18	2.05 0.45	SBS3-4518R SBS3-1845L
24 18	45 46	29	122.33 45.83	253 99.5	185 74.1	25.8 10.2	18.9 7.56	0.12~0.27	4.80 1.00	SBS4-4518R SBS4-1845L
28 20.5	51 52.5	34	156.56 56.9	474 186	350 140	48.4 19.0	35.7 14.3	0.14~0.34	8.70 2.00	SBS5-4518R SBS5-1845L
17 14	26 29	15	59.07 19.15	31.7 10.1	18.8 6.27	3.23 1.03	1.92 0.64	0.06~0.16	0.70 0.10	SBS2-4515R SBS2-1545L
22 17.5	35 37	20	72.82 20.48	64.3 20.6	38.7 12.9	6.56 2.10	3.94 1.31	0.07~0.17	1.00 0.17	SBS2.5-4515R SBS2.5-1545L
20 21.33	35 44	23	88.2 28.52	108 34.7	65.8 21.9	11.1 3.54	6.71 2.24	0.08~0.18	1.80 0.35	SBS3-4515R SBS3-1545L
24 23.33	45 52	30	118.08 32.24	253 81.1	156 52.0	25.8 8.27	15.9 5.30	0.12~0.27	4.00 0.70	SBS4-4515R SBS4-1545L
20 30	44 65	35	152.88 48.64	473 152	295 98.2	48.3 15.5	30.0 10.0	0.14~0.34	6.00 1.40	SBS5-4515R SBS5-1545L
12 10.43	21 22.5	12	65.39 15.55	20.7 4.89	12.3 3.07	2.12 0.50	1.25 0.31	0.05~0.15	0.70 0.04	SBS1.5-6015R SBS1.5-1560L
16 14.25	27 30	16	87.02 18.06	49.2 11.6	29.6 7.39	5.01 1.18	3.01 0.75	0.06~0.16	1.60 0.10	SBS2-6015R SBS2-1560L
20 18.06	34 37.5	20	108.64 20.58	96.1 22.6	58.4 14.6	9.79 2.31	5.95 1.49	0.07~0.17	3.24 0.20	SBS2.5-6015R SBS2.5-1560L
25 21.12	41 43	22	134.4 31.58	156 36.8	95.7 23.9	15.9 3.75	9.76 2.44	0.08~0.18	5.44 0.35	SBS3-6015R SBS3-1560L

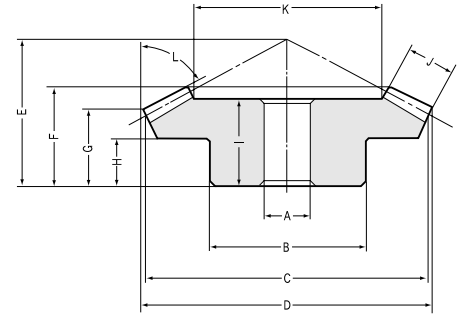
**NOTE 2:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



# SB Bevel Gears Modules 1.5~6



B3 Shape

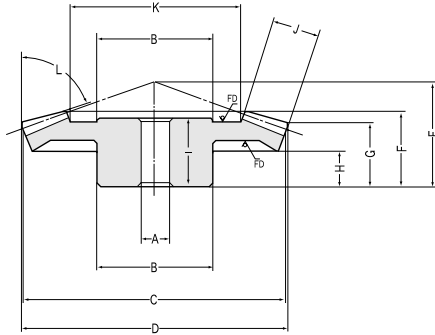


B4 Shape

## Modules 1.5~6

Catalog No.	Gear ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	
					A <sub>H7</sub>	B	C	D	E	F	G	H	
<b>SB1.5-3020</b>	1.5	<b>m1.5</b>	30	B4	10	30	45	46.24	28	18.53	13.93	8	
<b>SB1.5-2030</b>			20	B3	8	25	30	33.13	33	18.63	11.54	8.83	
<b>SB2-3020</b>		<b>m2</b>	30	B4	10	35	60	61.65	40	26.87	21.24	15	
<b>SB2-2030</b>			20	B3	10	30	40	44.18	45	25.06	16.39	11.67	
<b>SB2.5-3020</b>		<b>m2.5</b>	30	B4	15	45	75	77.07	50	34.22	26.55	18	
<b>SB2.5-2030</b>			20	B3	12	35	50	55.22	55	31.06	19.24	12.5	
<b>SB3-3020</b>		<b>m3</b>	30	B4	15	50	90	92.48	55	35.56	26.86	17	
<b>SB3-2030</b>			20	B3	15	45	60	66.27	70	40.48	27.09	20	
<b>SB4-3020</b>		<b>m4</b>	30	B4	20	70	120	123.3	75	47.71	37.48	25	
<b>SB4-2030</b>			20	B3	15	60	80	88.32	90	48.53	32.77	23.23	
<b>SB5-3020</b>	<b>m5</b>	30	B4	25	90	150	154.13	90	58.45	43.1	24		
<b>SB5-2030</b>		20	B3	20	80	100	110.45	110	62.11	38.48	28.33		
<b>SB1.5-3015</b>	2	<b>m1.5</b>	30	B4	8	25	45	45.88	25	17.85	14.63	9	
<b>SB1.5-1530</b>			15	B3	6	16	22.5	26.11	32	17.23	10.4	7.88	
<b>SB2-3015</b>		<b>m2</b>	30	B4	10	30	60	61.17	31	21.6	17.17	10	
<b>SB2-1530</b>			15	B3	8	22	30	34.81	40	20.59	11.2	8	
<b>SB2.5-3015</b>		<b>m2.5</b>	30	B4	15	40	75	76.46	40	28.75	22.71	15	
<b>SB2.5-1530</b>			15	B3	12	30	37.5	43.51	55	31.81	19	15.63	
<b>SB3-3015</b>		<b>m3</b>	30	B4	16	50	90	91.76	50	37.3	29.26	18	
<b>SB3-1530</b>			15	B3	12	35	45	52.22	70	43.88	26.8	22.5	
<b>SB4-3015</b>		<b>m4</b>	30	B4	20	60	120	122.34	60	42.4	32.34	20	
<b>SB4-1530</b>			15	B3	16	50	60	69.62	85	48.74	27.41	22.5	
<b>SB5-3015</b>		<b>m5</b>	30	B5	20	70	150	152.93	75	52.5	40.43	25	
<b>SB5-1530</b>			15	B3	20	60	75	87.03	110	63.61	38.01	31.25	
<b>SB6-3015</b>		<b>m6</b>	30	B5	25	80	180	183.5	90	62.6	48.52	28	
<b>SB6-1530</b>			15	B3	25	70	90	104.44	125	68.5	38.6	30	
<b>SB2.5-3618</b>		2	<b>m2.5</b>	36	B4	15	55	90	91.46	43	28.52	21.96	13
<b>SB2.5-1836</b>				18	B3	12	38	45	51.01	64	34.27	20.5	17.25
<b>SB3-3618</b>			<b>m3</b>	36	B4	20	60	108	109.76	52	34.95	26.76	17
<b>SB3-1836</b>				18	B3	16	46	54	61.22	75	40.01	22.8	19
<b>SB4-3618</b>	<b>m4</b>		36	B4	20	70	144	146.34	72	49	38.34	25	
<b>SB4-1836</b>			18	B3	20	60	72	81.62	100	52.77	30.41	25	

**CAUTION:** Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.



**B5 Shape (Type SB)**  
\*FD has die-forged finish.

## Specifications

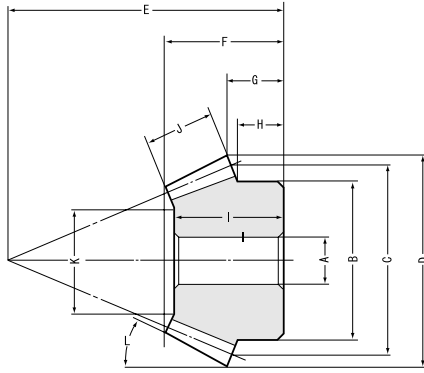
Precision grade	JIS B 1704 grade 3	Tooth hardness	Less than 194HB
Gear teeth	Gleason	Surface treatment	Black oxide
Pressure angle	20°	Tooth surface finish	Cut
Material	S45C	Datum reference surface for gear cutting	Bore
Heat treatment	—	Secondary Operations	Possible

Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <i>NOTE 1</i>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
			Bending strength	Surface durability	Bending strength	Surface durability			
16 17	9	27.37 17.05	5.82 4.04	0.65 0.44	0.59 0.41	0.07 0.04	0.05~0.15	0.13 0.06	<b>SB1.5-3020</b> <b>SB1.5-2030</b>
23 22	11	37.56 21.34	13.1 9.07	1.52 1.01	1.33 0.92	0.16 0.10	0.06~0.16	0.25 0.12	<b>SB2-3020</b> <b>SB2-2030</b>
30 28	15	45.61 27.42	26.9 18.7	3.21 2.14	2.75 1.91	0.33 0.22	0.07~0.17	0.55 0.23	<b>SB2.5-3020</b> <b>SB2.5-2030</b>
31 37	17	57.14 34.71	44.9 31.2	5.45 3.63	4.58 3.18	0.56 0.37	0.08~0.18	0.80 0.50	<b>SB3-3020</b> <b>SB3-2030</b>
40 43	20	78.59 46.89	98.2 68.1	12.3 8.20	10.0 6.95	1.25 0.84	0.12~0.27	1.80 1.10	<b>SB4-3020</b> <b>SB4-2030</b>
50 56	30	91.22 54.83	215 150	27.6 18.4	22.0 15.3	2.81 1.87	0.14~0.34	4.40 2.50	<b>SB5-3020</b> <b>SB5-2030</b>
15 15.5	8	28.36 10.72	5.02 2.60	0.47 0.24	0.51 0.26	0.05 0.02	0.05~0.15	0.06 0.03	<b>SB1.5-3015</b> <b>SB1.5-1530</b>
18 19	11	37.4 16.81	12.1 6.28	1.18 0.59	1.24 0.64	0.12 0.06	0.06~0.16	0.20 0.06	<b>SB2-3015</b> <b>SB2-1530</b>
24 29	15	44.21 16.42	24.9 12.9	2.48 1.24	2.54 1.32	0.25 0.13	0.07~0.17	0.40 0.15	<b>SB2.5-3015</b> <b>SB2.5-1530</b>
30 41	20	47.78 19.56	45.6 23.6	4.60 2.30	4.65 2.41	0.47 0.23	0.08~0.18	0.80 0.30	<b>SB3-3015</b> <b>SB3-1530</b>
36 46	25	70.1 32.2	104 54.0	10.9 5.43	10.7 5.51	1.11 0.55	0.12~0.27	1.60 0.70	<b>SB4-3015</b> <b>SB4-1530</b>
48 58	30	90.41 32.83	199 103	21.3 10.6	20.3 10.5	2.17 1.09	0.14~0.34	2.70 1.30	<b>SB5-3015</b> <b>SB5-1530</b>
57 63	35	109.74 45.47	336 174	36.9 18.5	34.2 17.7	3.77 1.88	0.16~0.36	4.80 1.80	<b>SB6-3015</b> <b>SB6-1530</b>
24 32	16	57.72 25.44	35.9 18.1	4.08 2.04	3.66 1.84	0.42 0.21	0.07~0.17	0.75 0.30	<b>SB2.5-3618</b> <b>SB2.5-1836</b>
30 37	20	68.28 28.56	63.7 32.0	7.34 3.67	6.49 3.27	0.75 0.37	0.08~0.18	1.75 0.50	<b>SB3-3618</b> <b>SB3-1836</b>
42 49	26	91.86 39.72	149 74.8	17.7 8.85	15.2 7.62	1.80 0.90	0.12~0.27	2.70 1.50	<b>SB4-3618</b> <b>SB4-1836</b>

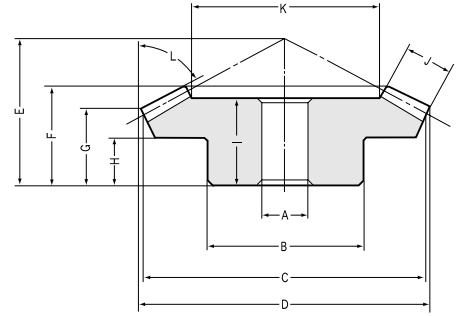
**NOTE 1:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



# SB-SBY Bevel Gears Modules 1~8



B3 Shape

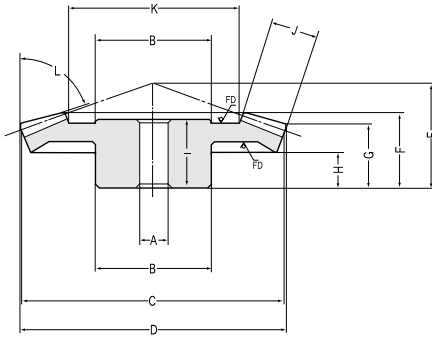


B4 Shape

## Modules 1~8

Catalog No.	Gear ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width
					A <sub>H7</sub>	B	C	D	E	F	G	H
<b>SB1-4020</b> <b>SB1-2040</b>	2	<b>m1</b>	40	B4	8	25	40	40.59	22	15.07	12.59	8
20			B3	6	16	20	22.41	28	13.78	8.6	7	
<b>SB1.25-4020</b> <b>SB1.25-2040</b>		<b>m1.25</b>	40	B4	10	32	50	50.73	27	18.54	15.23	10
20			B3	8	22	25	28.01	36	18.66	11.75	10.25	
<b>SB1.5-4020</b> <b>SB1.5-2040</b>		<b>m1.5</b>	40	B4	10	38	60	60.88	35	25.01	20.88	15
20			B3	8	25	30	33.61	46	25.54	16.9	14.75	
<b>SB2-4020</b> <b>SB2-2040</b>		<b>m2</b>	40	B4	12	40	80	81.17	45	32.37	26.17	18
20			B3	12	32	40	44.81	60	34.16	21.2	18	
<b>SB2.5-4020</b> <b>SB2.5-2040</b>		<b>m2.5</b>	40	B4	15	50	100	101.46	55	39.73	31.46	20
20			B3	12	40	50	56.01	75	43.78	26.5	22.5	
<b>SB3-4020</b> <b>SB3-2040</b>		<b>m3</b>	40	B4	20	60	120	121.76	65	45.85	36.76	24
20			B3	16	50	60	67.22	90	50.81	31.8	27.5	
<b>SB4-4020</b> <b>SB4-2040</b>		<b>m4</b>	40	B4	20	70	160	162.34	80	53.92	42.34	28
20			B3	20	60	80	89.62	120	66.59	42.41	35	
<b>SB5-4020</b> <b>SB5-2040</b>		<b>m5</b>	40	B5	25	100	200	202.93	90	55.33	42.93	26
20			B3	20	80	100	112.03	140	68.92	43.01	35	
<b>SB6-4020</b> <b>SB6-2040</b>	<b>m6</b>	40	B5	25	85	240	243.52	105	65.05	48.52	28	
20		B3	25	90	120	134.44	160	78.16	43.6	32.5		
<b>SBY8-4020</b> <b>SBY8-2040</b>	<b>m8</b>	40	BT	35	180	320	324.69	130	75.36	54.69	25	
20		B3	30	120	160	179.25	210	98	54.81	40		
<b>SB1-4518</b> <b>SB1-1845</b>	2.5	<b>m1</b>	45	B4	8	30	45	45.46	23	16.95	14.57	10
18			B3	6	15	18	20.57	32	16.34	10.02	8.9	
<b>SB1.25-4518</b> <b>SB1.25-1845</b>		<b>m1.25</b>	45	B4	10	34	56.25	56.82	26	18.53	15.46	10
18			B3	8	19	22.5	25.72	40	20.66	12.52	11.17	
<b>SB1.5-4518</b> <b>SB1.5-1845</b>		<b>m1.5</b>	45	B4	10	36	67.5	68.18	30	21.1	17.35	10
18			B3	8	23	27	30.86	45	21.97	12.02	10.45	
<b>SB2-4518</b> <b>SB2-1845</b>		<b>m2</b>	45	B4	12	48	90	90.91	40	27.91	23.14	15
18			B3	10	32	36	41.15	60	28.69	16.03	14.2	
<b>SB2.5-4518</b> <b>SB2.5-1845</b>		<b>m2.5</b>	45	B4	15	55	112.5	113.64	50	35.06	28.92	18
18			B3	12	40	45	51.44	72	33.31	17.04	14.75	
<b>SB3-4518</b> <b>SB3-1845</b>		<b>m3</b>	45	B4	20	65	135	136.37	60	41.86	34.71	22
18			B3	16	48	54	61.72	85	38.04	19.05	16.3	
<b>SB4-4518</b> <b>SB4-1845</b>		<b>m4</b>	45	B4	20	80	180	181.82	75	51.16	41.28	24
18			B3	20	62	72	82.3	110	48.28	22.06	18	
<b>SB5-4518</b> <b>SB5-1845</b>		<b>m5</b>	45	B4	25	100	225	227.28	90	59.43	47.85	28
18			B3	20	80	90	102.87	135	55.82	25.07	20.5	

**CAUTION:** Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.



B5 Shape (Type SB)

\*FD has die-forged finish.

## Specifications

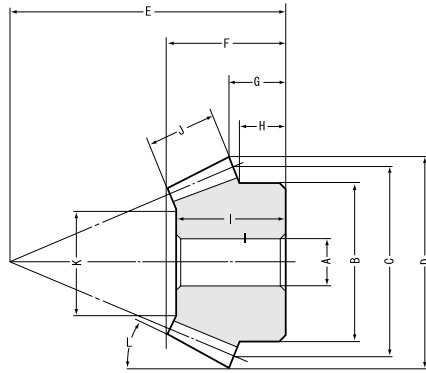
Precision grade	JIS B 1704 grade 3	Tooth hardness	Less than 194HB
Gear teeth	Gleason	Surface treatment	Black oxide
Pressure angle	20°	Tooth surface finish	Cut
Material	S45C	Datum reference surface for gear cutting	Bore
Heat treatment	—	Secondary Operations	Possible

Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <i>NOTE 1</i>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
			Bending strength	Surface durability	Bending strength	Surface durability			
12	6	26.58	2.61	0.29	0.27	0.03	0.07	<b>SB1-4020</b>	
12		9.17	1.32	0.15	0.13	0.02	0.02	<b>SB1-2040</b>	
16	8	33.61	5.33	0.61	0.54	0.06	0.14	<b>SB1.25-4020</b>	
17		13.22	2.69	0.31	0.27	0.03	0.05	<b>SB1.25-2040</b>	
22	10	39.64	9.47	1.11	0.97	0.11	0.23	<b>SB1.5-4020</b>	
24		17.28	4.77	0.56	0.49	0.06	0.09	<b>SB1.5-2040</b>	
27	15	48.46	24.2	2.92	2.46	0.30	0.50	<b>SB2-4020</b>	
32		20.92	12.2	1.46	1.24	0.15	0.20	<b>SB2-2040</b>	
35	20	60.28	49.0	6.04	4.99	0.62	1.10	<b>SB2.5-4020</b>	
41		24.56	24.7	3.02	2.52	0.31	0.40	<b>SB2.5-2040</b>	
38	22	73.81	80.4	10.1	8.20	1.03	1.60	<b>SB3-4020</b>	
47		29.61	40.5	5.06	4.13	0.52	0.70	<b>SB3-2040</b>	
45	28	102.39	185	24.1	18.9	2.46	3.30	<b>SB4-4020</b>	
62		42.78	93.3	12.0	9.51	1.23	1.50	<b>SB4-2040</b>	
50	30	138.92	327	43.9	33.3	4.47	6.00	<b>SB5-4020</b>	
63		57.84	165	21.9	16.8	2.24	2.90	<b>SB5-2040</b>	
58	40	158.56	600	83.2	61.2	8.48	7.90	<b>SB6-4020</b>	
70		61.11	302	41.6	30.8	4.24	4.10	<b>SB6-2040</b>	
61	50	219.2	1350	196	138	20.0	25.0	<b>SBY8-4020</b>	
90		96.39	679	98.1	69.3	10.0	9.40	<b>SBY8-2040</b>	
15	7	30.73	3.35	0.35	0.34	0.04	0.11	<b>SB1-4518</b>	
15.5		10.31	1.33	0.14	0.14	0.01	0.02	<b>SB1-1845</b>	
16	9	37.86	6.67	0.72	0.68	0.07	0.17	<b>SB1.25-4518</b>	
19.5		12.16	2.65	0.29	0.27	0.03	0.04	<b>SB1.25-1845</b>	
18	11	45	11.7	1.29	1.19	0.13	0.29	<b>SB1.5-4518</b>	
21		16.51	4.64	0.51	0.47	0.05	0.06	<b>SB1.5-1845</b>	
25	14	62.24	26.8	3.05	2.74	0.31	0.66	<b>SB2-4518</b>	
27.5		23.11	10.7	1.22	1.09	0.12	0.16	<b>SB2-1845</b>	
31	18	76.53	53.4	6.20	5.44	0.63	1.27	<b>SB2.5-4518</b>	
31.5		26.82	21.2	2.48	2.16	0.25	0.29	<b>SB2.5-1845</b>	
37	21	92.96	90.5	10.7	9.23	1.09	2.05	<b>SB3-4518</b>	
36		33.41	36.0	4.29	3.67	0.44	0.45	<b>SB3-1845</b>	
45	29	122.33	220	26.8	22.4	2.73	4.80	<b>SB4-4518</b>	
46		45.83	87.3	10.7	8.91	1.09	1.00	<b>SB4-1845</b>	
51	34	156.56	411	51.8	41.9	5.28	8.70	<b>SB5-4518</b>	
52.5		56.9	164	20.7	16.7	2.11	2.00	<b>SB5-1845</b>	

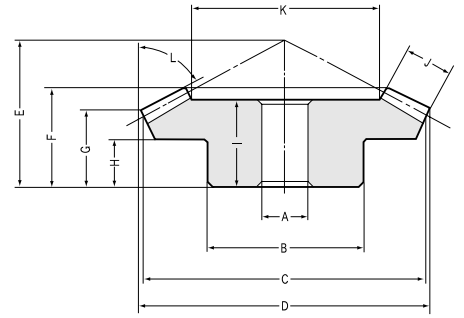
**NOTE 1:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



# SB-SBY Bevel Gears Modules 1~8



B3 Shape



B4 Shape

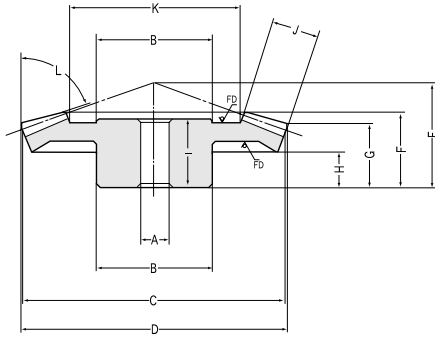
## Modules 1~8

Catalog No.	Gear ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width
					A <sub>H7</sub>	B	C	D	E	F	G	H
<b>SB1-4515</b>	3	<b>m1</b>	45	B4	8	30	45	45.37	17	11.77	10.06	5
<b>SB1-1545</b>			15	B3	6	12	15	17.67	29	12.51	6.95	6
<b>SB1.25-4515</b>		<b>m1.25</b>	45	B4	10	34	56.25	56.72	21	14.61	12.33	6
<b>SB1.25-1545</b>			15	B3	8	15	18.75	22.09	36	15.85	8.43	7.25
<b>SB1.5-4515</b>		<b>m1.5</b>	45	B4	10	36	67.5	68.06	28	20.44	17.59	11
<b>SB1.5-1545</b>			15	B3	8	18	22.5	26.51	47	23.19	13.92	12.5
<b>SB2-4515</b>		<b>m2</b>	45	B4	12	40	90	90.75	40	30.4	26.12	17
<b>SB2-1545</b>			15	B3	10	24	30	35.35	60	29.8	15.89	14
<b>SB2.5-4515</b>		<b>m2.5</b>	45	B4	15	50	112.5	113.43	50	38.35	32.65	22
<b>SB2.5-1545</b>			15	B3	12	30	37.5	44.18	75	38.41	19.86	17.5
<b>SB3-4515</b>		<b>m3</b>	45	B4	20	60	135	136.12	55	40.74	34.18	20
<b>SB3-1545</b>			15	B3	15	38	45	53.02	90	45.17	23.84	21.33
<b>SB4-4515</b>		<b>m4</b>	45	B5	20	80	180	181.5	70	50.79	42.24	24
<b>SB4-1545</b>			15	B3	16	50	60	70.69	115	54.6	26.78	23.33
<b>SB5-4515</b>		<b>m5</b>	45	B5	25	90	225	226.87	75	50.28	40.3	20
<b>SB5-1545</b>			15	B3	20	60	75	88.37	145	67.19	34.73	30
<b>SB6-4515</b>	<b>m6</b>	45	BT	30	160	270	272.24	100	72.62	58.36	30	
<b>SB6-1545</b>		15	B3	25	70	90	106.03	175	89.04	42.67	36.67	
<b>SBY8-4515</b>	<b>m8</b>	45	BT	35	200	360	362.99	125	83.74	69.49	30	
<b>SBY8-1545</b>		15	B3	30	100	120	141.39	230	99.93	53.56	46.67	

**CAUTION:** Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

\*The blue catalog number signify new items. The holding surface of SB6-4515 and SBY8-4515 have tapped tooling holes. See page 230 for more details.

Bevel gears  
YBS · BS



**B5 Shape (Type SB)**

\*FD has die-forged finish.

## Specifications

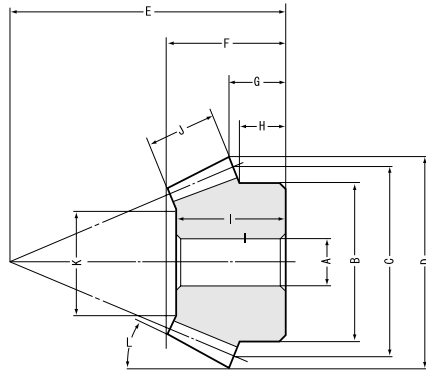
Precision grade	JIS B 1704 grade 3	Tooth hardness	Less than 194HB
Gear teeth	Gleason	Surface treatment	Black oxide
Pressure angle	20°	Tooth surface finish	Cut
Material	S45C	Datum reference surface for gear cutting	Bore
Heat treatment	—	Secondary Operations	Possible

Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <i>NOTE 1</i>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
			Bending strength	Surface durability	Bending strength	Surface durability			
9 12	6	32.02 10.05	2.84 0.98	0.27 0.09	0.29 0.10	0.027 0.0091	0.03~0.13	0.09 0.01	<b>SB1-4515</b> <b>SB1-1545</b>
12 15	8	39.63 10.9	5.80 2.00	0.56 0.19	0.59 0.20	0.057 0.019	0.04~0.14	0.20 0.02	<b>SB1.25-4515</b> <b>SB1.25-1545</b>
17 22.5	10	46.58 14.75	10.3 3.56	1.02 0.34	1.05 0.36	0.10 0.035	0.05~0.15	0.25 0.05	<b>SB1.5-4515</b> <b>SB1.5-1545</b>
26 29	15	59.04 19.13	26.4 9.10	2.68 0.89	2.69 0.93	0.27 0.091	0.06~0.16	0.70 0.10	<b>SB2-4515</b> <b>SB2-1545</b>
35 37	20	72.84 20.51	53.6 18.5	5.55 1.85	5.46 1.89	0.57 0.19	0.07~0.17	1.00 0.20	<b>SB2.5-4515</b> <b>SB2.5-1545</b>
35 43	23	88.18 22.53	90.2 31.2	9.53 3.18	9.20 3.18	0.97 0.32	0.08~0.18	1.80 0.35	<b>SB3-4515</b> <b>SB3-1545</b>
45 52	30	118.09 32.26	211 72.8	23.0 7.67	21.5 7.43	2.35 0.78	0.12~0.27	4.00 0.70	<b>SB4-4515</b> <b>SB4-1545</b>
44 65	35	152.88 48.64	394 136	44.3 14.8	40.2 13.9	4.52 1.51	0.14~0.34	6.00 1.40	<b>SB5-4515</b> <b>SB5-1545</b>
62 86	50	169.26 49.77	751 259	87.0 39.9	76.6 26.4	8.87 4.06	0.16~0.36	17.5 2.40	<b>SB6-4515</b> <b>SB6-1545</b>
67 93	50	255.92 61.77	1470 506	179 59.7	150 51.6	18.3 6.09	0.20~0.45	35.0 5.90	<b>SBY8-4515</b> <b>SBY8-1545</b>

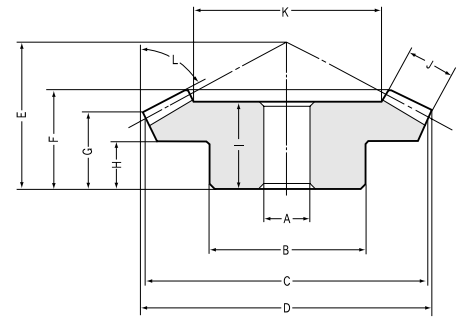
**NOTE 1:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



# SB·SBY Bevel Gears Modules 1.5~6



B3 Shape



B4 Shape

## Modules 1.5~6

Catalog No.	Gear ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width
					A <sub>H7</sub>	B	C	D	E	F	G	H
<b>SB1.5-6015</b>	4	<b>m1.5</b>	60	B4	12	50	90	90.41	32	24.2	21.58	12
<b>SB1.5-1560</b>			15	B3	8	18	22.5	26.66	56	23.01	11.52	10.43
<b>SB2-6015</b>		<b>m2</b>	60	B4	15	60	120	120.55	42	31.6	28.1	16
<b>SB2-1560</b>			15	B3	10	24	30	35.55	75	31.01	15.69	14.25
<b>SB2.5-6015</b>		<b>m2.5</b>	60	B4	20	70	150	150.69	53	40	35.63	20
<b>SB2.5-1560</b>			15	B3	12	30	37.5	44.44	94	39.02	19.87	18.06
<b>SB3-6015</b>		<b>m3</b>	60	B4	20	80	180	180.83	64	47.97	43.15	25
<b>SB3-1560</b>			15	B3	15	38	45	53.33	112	44.1	23.04	21.12
<b>SB4-6015</b>		<b>m4</b>	60	B5	25	85	240	241.1	80	59.2	52.2	36
<b>SB4-1560</b>			15	B3	16	50	60	71.1	150	62	31.4	28.75
<b>SBY5-6015</b>		<b>m5</b>	60	BT	30	180	300	301.38	80	54.01	45.26	20
<b>SBY5-1560</b>			15	B3	25	60	75	88.9	185	75.03	36.74	33.13
<b>SBY6-6015</b>		<b>m6</b>	60	BT	35	200	360	361.66	100	68.16	58.31	25
<b>SBY6-1560</b>			15	B3	25	75	90	106.66	220	85.17	42.08	38.13

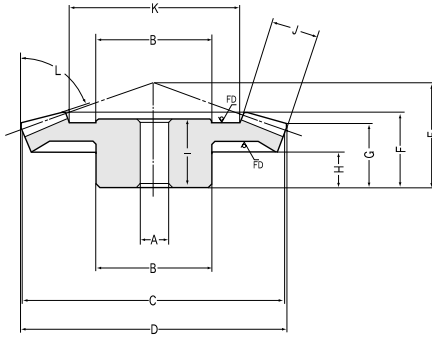
\*The blue catalog number signify new items. The holding surface of SBY5-6015 and SBY6-6015 have tapped tooling holes. See page 230 for more details.

**CAUTION:** Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

Bevel gears

SB·SBY





B5 Shape (Type SB)

\*FD has die-forged finish.

## Specifications

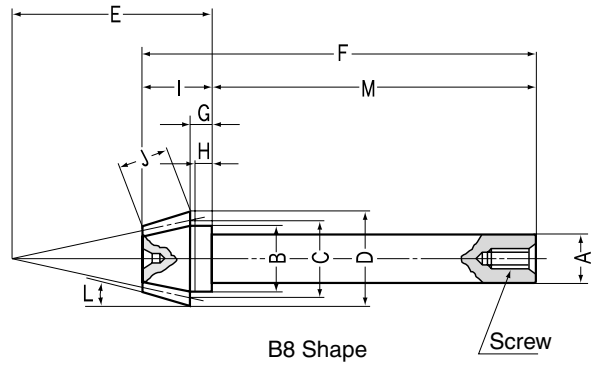
Precision grade	JIS B 1704 grade 3	Tooth hardness	Less than 194HB
Gear teeth	Gleason	Surface treatment	Black oxide
Pressure angle	20°	Tooth surface finish	Cut
Material	S45C	Datum reference surface for gear cutting	Bore
Heat treatment	—	Secondary Operations	Possible

Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <i>NOTE 2</i>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
			Bending strength	Surface durability	Bending strength	Surface durability			
21 22.5	12	65.38 15.54	17.3 4.46	1.75 0.44	1.77 0.45	0.18 0.045	0.05~0.15	0.62 0.04	<b>SB1.5-6015</b> <b>SB1.5-1560</b>
27 30	16	87.02 18.06	41.3 10.6	4.30 1.07	4.21 1.08	0.44 0.11	0.06~0.16	1.30 0.10	<b>SB2-6015</b> <b>SB2-1560</b>
34 37.5	20	108.64 20.57	80.2 20.6	8.54 2.13	8.18 2.10	0.87 0.22	0.07~0.17	2.50 0.20	<b>SB2.5-6015</b> <b>SB2.5-1560</b>
41 43	22	134.4 31.58	130 33.5	14.2 3.54	13.3 3.42	1.44 0.36	0.08~0.18	4.20 0.35	<b>SB3-6015</b> <b>SB3-1560</b>
53 60	32	174.03 36.12	328 84.5	37.0 9.24	33.5 8.62	3.77 0.94	0.12~0.27	6.00 0.90	<b>SB4-6015</b> <b>SB4-1560</b>
45 73	40	218.79 49.15	642 165	74.4 18.6	65.4 16.8	7.59 1.90	0.14~0.34	17.1 1.60	<b>SBY5-6015</b> <b>SBY5-1560</b>
56 82	45	267.73 54.92	1050 270	126 31.5	107 27.5	12.8 3.21	0.16~0.36	30.0 2.90	<b>SBY6-6015</b> <b>SBY6-1560</b>

**NOTE 2:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



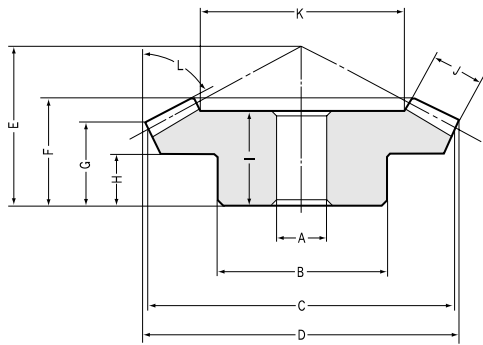
# SB Bevel Gears & Pinion shafts Modules 1.5~3



## Modules 1.5~3

Catalog No.	Gear ratio	Module	No. of teeth	Shape	Bore · Shaft dia.	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	Length of bore · shaft
					B	C	D	E	F	G	H	I	
<b>SB1.5-6012</b> <b>SB1.5-1260</b>	5	<b>m1.5</b>	60	B4	12	50	90	90.33	30	23.89	21.82	12	21
			12	B8	12.2	15	18	22.24	50	97.06	5.42	4.7	17.06
<b>SB2-6012</b> <b>SB2-1260</b>		<b>m2</b>	60	B4	15	60	120	120.43	40	31.85	29.09	16	24
			12	B8	15.2	20	24	29.65	66	117.08	6.56	5.6	22.08
<b>SB2.5-6012</b> <b>SB2.5-1260</b>		<b>m2.5</b>	60	B4	20	70	150	150.54	50	39.81	36.36	20	34
			12	B8	20.2	25	30	37.06	83	143.1	8.7	7.5	28.1
<b>SB3-6012</b> <b>SB3-1260</b>	<b>m3</b>	60	B4	20	80	180	180.65	60	47.43	43.64	25	41	
		12	B8	25.25	30	36	44.48	100	172.19	10.85	9.4	32.19	

**CAUTION:** Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.



B4 Shape

## Specifications

Precision grade	<b>JIS B 1704 grade 3</b>	Tooth hardness	Less than 194HB (pinion are less than 225~260HB)
Gear teeth	<b>Gleason</b>	Surface treatment	—
Pressure angle	<b>20°</b>	Tooth surface finish	<b>Cut</b>
Material	<b>S45C</b>	Datum reference surface for gear cutting	Bore except shaft for pinion
Heat treatment	Thermal refined (pinion only) <small>NOTE 1</small>	Secondary Operations	<b>Possible</b>

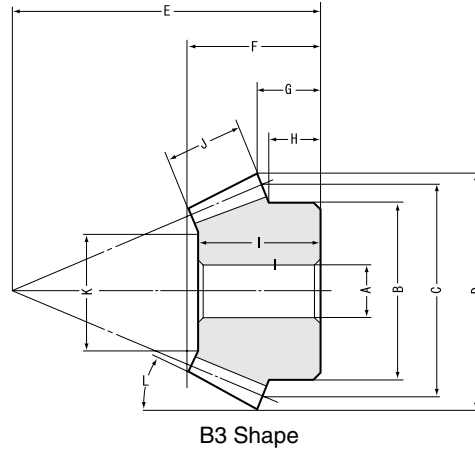
**NOTE 1:** The pinion is thermally with refined in order to increase stiffness.

Face width J	Holding surface dia. K	Shaft length M	Screw size	Allowable torque (N · m) <small>NOTE 1</small>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
				Bending strength	Surface durability	Bending strength	Surface durability			
12	65.52 —	— 80	— M5	18.0 4.01	1.41 0.46	1.83 0.41	0.14 0.047	0.05~0.15	0.42 0.10	<b>SB1.5-6012</b> <b>SB1.5-1260</b>
16	86.96 —	— 95	— M6	42.6 9.50	3.43 1.12	4.34 0.97	0.35 0.11	0.06~0.16	1.30 0.20	<b>SB2-6012</b> <b>SB2-1260</b>
20	108.8 —	— 115	— M8	83.2 18.5	6.85 2.23	8.48 1.89	0.70 0.23	0.07~0.17	2.50 0.41	<b>SB2.5-6012</b> <b>SB2.5-1260</b>
22	134.73 —	— 140	— M8	135 30.1	11.4 3.70	13.8 3.07	1.16 0.38	0.08~0.18	4.20 0.75	<b>SB3-6012</b> <b>SB3-1260</b>

**NOTE 2:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



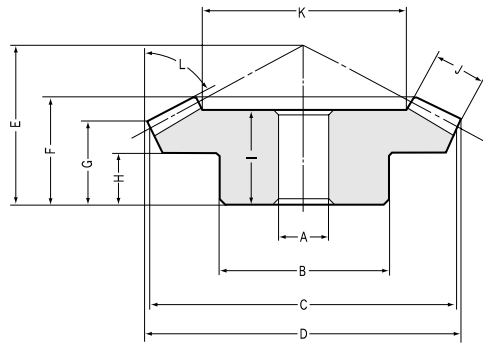
# SUB Stainless Steel Bevel Gears Modules 1.5~3



## Modules 1.5~3

Catalog No.	Gear ratio	Module	No. of teeth	Shape	Bore	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	
					A <sub>H7</sub>	B	C	D	E	F	G	H	
SUB1.5-3020 SUB1.5-2030	1.5	m1.5	30	B4	10	30	45	46.24	28	18.53	13.93	8	
			20	B3	8	25	30	33.13	33	18.63	11.54	8.83	
SUB2-3020 SUB2-2030		m2	30	B4	10	35	60	61.65	40	26.87	21.24	15	
			20	B3	10	35	40	44.18	45	25.06	16.39	13.33	
SUB2.5-3020 SUB2.5-2030		m2.5	30	B4	15	45	75	77.07	50	34.22	26.55	18	
			20	B3	12	40	50	55.22	55	31.06	19.24	14.16	
SUB3-3020 SUB3-2030		m3	30	B4	15	60	90	92.48	55	35.56	26.86	17	
			20	B3	15	50	60	66.27	70	40.48	27.09	21.66	
SUB1.5-4020 SUB1.5-2040		2	m1.5	40	B4	10	38	60	60.88	35	25.01	20.88	15
				20	B3	8	25	30	33.61	46	25.54	16.9	14.75
SUB2-4020 SUB2-2040	m2		40	B4	12	50	80	81.17	45	32.37	26.17	18	
			20	B3	12	32	40	44.81	60	34.16	21.2	18	
SUB2.5-4020 SUB2.5-2040	m2.5		40	B4	15	60	100	101.46	55	39.73	31.46	20	
			20	B3	12	40	50	56.02	75	43.78	26.5	22.5	
SUB3-4020 SUB3-2040	m3		40	B4	20	70	120	121.76	65	45.85	36.76	24	
			20	B3	16	50	60	67.22	90	50.81	31.8	27.5	
SUB1.5-4515 SUB1.5-1545	3		m1.5	45	B4	10	36	67.5	68.06	28	20.44	17.59	11
				15	B3	8	18	22.5	26.51	47	23.19	13.92	12.5
SUB2-4515 SUB2-1545		m2	45	B4	12	60	90	90.75	40	30.4	26.12	17	
			15	B3	10	24	30	35.35	60	29.8	15.89	14	
SUB2.5-4515 SUB2.5-1545		m2.5	45	B4	15	60	112.5	113.43	50	38.35	32.65	22	
			15	B3	12	30	37.5	44.18	75	38.41	19.86	17.5	
SUB3-4515 SUB3-1545		m3	45	B4	20	80	135	136.12	55	40.74	34.18	20	
			15	B3	15	38	45	53.02	90	45.17	23.84	21.33	

**CAUTION:** Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.



B4 Shape

## Specifications

Precision grade	JIS B 1704 grade 3	Tooth hardness	Less than 187HB
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Material	SUS303	Datum reference surface for gear cutting	Bore
Heat treatment	—	Secondary Operations	Possible

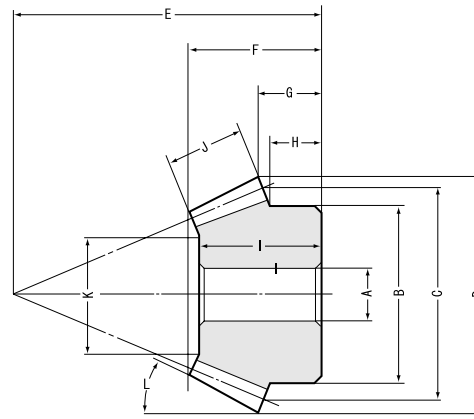
\*Available on special order: Same gear made from SUS304.

Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <i>NOTE 1</i>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
			Bending strength	Surface durability	Bending strength	Surface durability			
16 17	9	27.37 17.05	3.22 2.23	0.46 0.31	0.33 0.23	0.047 0.032	0.05~0.15	0.12 0.06	SUB1.5-3020 SUB1.5-2030
23 22	11	37.56 21.34	7.22 5.01	1.08 0.72	0.74 0.51	0.11 0.074	0.06~0.16	0.26 0.16	SUB2-3020 SUB2-2030
30 28	15	45.61 27.42	14.9 10.3	2.28 1.52	1.52 1.05	0.23 0.15	0.07~0.17	0.55 0.28	SUB2.5-3020 SUB2.5-2030
31 37	17	57.14 34.71	24.8 17.2	3.87 2.58	2.53 1.76	0.39 0.26	0.08~0.18	0.95 0.55	SUB3-3020 SUB3-2030
22 24	10	39.64 17.28	5.23 2.64	0.79 0.40	0.53 0.27	0.081 0.040	0.05~0.15	0.27 0.09	SUB1.5-4020 SUB1.5-2040
27 32	15	48.46 20.92	13.4 6.72	2.07 1.04	1.36 0.69	0.21 0.11	0.06~0.16	0.62 0.20	SUB2-4020 SUB2-2040
35 41	20	60.28 24.56	27.1 13.6	4.29 2.15	2.76 1.39	0.44 0.22	0.07~0.17	1.23 0.40	SUB2.5-4020 SUB2.5-2040
38 47	22	73.81 29.61	44.4 22.4	7.19 3.60	4.53 2.28	0.73 0.37	0.08~0.18	1.90 0.70	SUB3-4020 SUB3-2040
17 22.5	10	46.58 14.75	5.70 1.97	0.72 0.24	0.58 0.20	0.074 0.025	0.05~0.15	0.25 0.04	SUB1.5-4515 SUB1.5-1545
26 29	15	59.04 19.13	14.6 5.03	1.90 0.63	1.49 0.51	0.19 0.065	0.06~0.16	0.81 0.10	SUB2-4515 SUB2-1545
35 37	20	72.84 20.51	29.6 10.2	3.94 1.31	3.02 1.04	0.40 0.13	0.07~0.17	1.30 0.20	SUB2.5-4515 SUB2.5-1545
35 43	23	88.18 22.53	49.9 17.2	6.77 2.26	5.09 1.76	0.69 0.23	0.08~0.18	2.30 0.35	SUB3-4515 SUB3-1545

**NOTE 1:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 229 for more details.



# PB Plastic Bevel Gears Modules 1~3



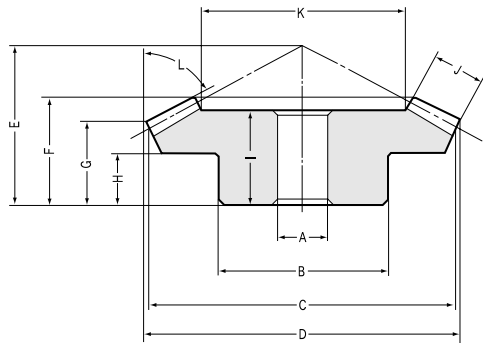
B3 Shape

## Modules 1.5~3

Catalog No.	Gear ratio	Module	No. of teeth	Shape	Bore <i>NOTE 1</i>		Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length	Hub width	
					A	B							
<b>PB1.5-3020</b>	1.5	<b>m1.5</b>	30	B4	10	30	45	46.24	28	18.53	13.93	8	
<b>PB1.5-2030</b>			20	B3	8	25	30	33.13	33	18.63	11.54	8.83	
<b>PB2-3020</b>		<b>m2</b>	30	B4	10	35	60	61.65	40	26.87	21.24	15	
<b>PB2-2030</b>			20	B3	10	35	40	44.18	45	25.06	16.39	13.33	
<b>PB2.5-3020</b>		<b>m2.5</b>	30	B4	15	45	75	77.07	50	34.22	26.55	18	
<b>PB2.5-2030</b>			20	B3	12	40	50	55.22	55	31.06	19.24	14.16	
<b>PB3-3020</b>		<b>m3</b>	30	B4	15	60	90	92.48	55	35.56	26.86	17	
<b>PB3-2030</b>			20	B3	15	50	60	66.27	70	40.48	27.09	21.66	
<b>PB1-4020</b>		2	<b>m1</b>	40	B4	8	25	40	40.59	22	15.07	12.59	8
<b>PB1-2040</b>				20	B3	6	16	20	22.41	28	13.78	8.6	7
<b>PB1.25-4020</b>	<b>m1.25</b>		40	B4	10	32	50	50.73	27	18.54	15.23	10	
<b>PB1.25-2040</b>			20	B3	8	22	25	28.01	36	18.66	11.75	10.25	
<b>PB1.5-4020</b>	<b>m1.5</b>		40	B4	10	38	60	60.88	35	25.01	20.88	15	
<b>PB1.5-2040</b>			20	B3	8	25	30	33.61	46	25.54	16.9	14.75	
<b>PB2-4020</b>	<b>m2</b>		40	B4	12	40	80	81.17	45	32.37	26.17	18	
<b>PB2-2040</b>			20	B3	12	32	40	44.81	60	34.16	21.2	18	
<b>PB2.5-4020</b>	<b>m2.5</b>		40	B4	15	50	100	101.47	55	39.73	31.47	20	
<b>PB2.5-2040</b>			20	B3	12	40	50	56.01	75	43.78	26.5	22.5	
<b>PB3-4020</b>	<b>m3</b>		40	B4	20	60	120	121.76	65	45.85	36.76	24	
<b>PB3-2040</b>			20	B3	16	50	60	67.22	90	50.81	31.8	27.5	
<b>PB1.5-4515</b>	3	<b>m1.5</b>	45	B4	10	40	67.5	68.06	28	20.44	17.59	11	
<b>PB1.5-1545</b>			15	B3	8	18	22.5	26.51	47	23.19	13.92	12.5	
<b>PB2-4515</b>		<b>m2</b>	45	B4	12	60	90	90.75	40	30.4	26.12	17	
<b>PB2-1545</b>			15	B3	10	24	30	35.35	60	29.8	15.89	14	
<b>PB2.5-4515</b>		<b>m2.5</b>	45	B4	15	60	112.5	113.43	50	38.35	32.65	22	
<b>PB2.5-1545</b>			15	B3	12	30	37.5	44.18	75	38.41	19.86	17.5	
<b>PB3-4515</b>		<b>m3</b>	45	B4	20	80	135	136.12	55	40.74	34.18	20	
<b>PB3-1545</b>			15	B3	15	38	45	53.02	90	45.17	23.84	21.33	

**CAUTION:** Dimensions of the outside diameter, the overall length and crown to back length are all theoretical values, and some differences will occur due to the corner chamfering of the gear tips.

**NOTE1:** The bore tolerance at the time of production is H8. Significant variations in temperature or humidity can cause dimensional changes in plastic gears (MC Nylon). Please see page 32 for more details.



B4 Shape

## Specifications

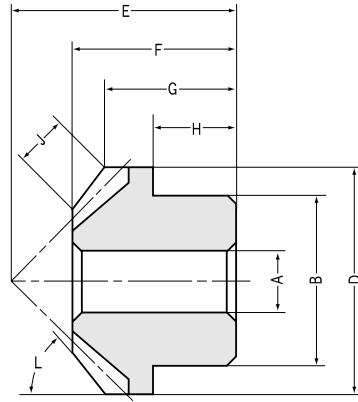
Precision grade	JIS B 1704 grade 4	Tooth hardness	115~120HRR
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Material	MC901	Datum reference surface for gear cutting	Bore
Heat treatment	—	Secondary Operations	Possible

Length of bore I	Face width J	Holding surface dia. K	Allowable torque (N · m) <i>NOTE 2</i>		Allowable torque (kgf · m)		Backlash (mm)	Weight (kg)	Catalog No.
			Bending strength	Surface durability	Bending strength	Surface durability			
16 17	9	27.37 17.05	1.34 0.73	—	0.14 0.074	—	0.10~0.20	0.018 0.0090	PB1.5-3020 PB1.5-2030
23 22	11	37.56 21.34	3.08 1.67	—	0.31 0.17	—	0.11~0.21	0.039 0.023	PB2-3020 PB2-2030
30 28	15	45.61 27.42	6.19 3.37	—	0.63 0.34	—	0.12~0.22	0.082 0.04	PB2.5-3020 PB2.5-2030
31 37	17	57.14 34.71	10.5 5.71	—	1.07 0.58	—	0.13~0.23	0.14 0.081	PB3-3020 PB3-2030
12 12	6	26.58 9.17	0.64 0.24	—	0.065 0.025	—	0.08~0.18	0.01 0.0030	PB1-4020 PB1-2040
16 17	8	33.61 13.22	1.29 0.48	—	0.13 0.049	—	0.09~0.19	0.02 0.0070	PB1.25-4020 PB1.25-2040
22 24	10	39.64 17.28	2.27 0.85	—	0.23 0.087	—	0.10~0.20	0.034 0.013	PB1.5-4020 PB1.5-2040
27 32	15	48.46 20.92	5.60 2.10	—	0.57 0.21	—	0.11~0.21	0.07 0.03	PB2-4020 PB2-2040
35 41	20	60.28 24.56	11.1 4.17	—	1.13 0.43	—	0.12~0.22	0.16 0.06	PB2.5-4020 PB2.5-2040
38 47	22	73.81 29.61	18.8 7.04	—	1.91 0.72	—	0.13~0.23	0.24 0.10	PB3-4020 PB3-2040
17 22.5	10	46.58 14.75	2.74 0.59	—	0.28 0.056	—	0.10~0.20	0.04 0.0060	PB1.5-4515 PB1.5-1545
26 29	15	59.04 19.13	6.80 1.46	—	0.69 0.15	—	0.11~0.21	0.12 0.013	PB2-4515 PB2-1545
35 37	20	72.84 20.51	13.6 2.91	—	1.38 0.30	—	0.12~0.22	0.20 0.027	PB2.5-4515 PB2.5-1545
35 43	23	88.18 22.54	23.1 4.96	—	2.36 0.51	—	0.13~0.23	0.35 0.05	PB3-4515 PB3-1545

**NOTE 2:** The allowable torques shown in the table are the calculated values using the Lewis formula.



# DB Injection Molded Bevel Gears Modules 0.5~1



B1 Shape

## Modules 0.5~1

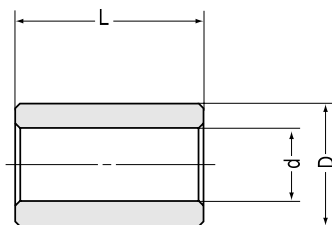
Catalog No.	Gear ratio	Module	No. of teeth	Shape	Bore <small>NOTE 1</small>	Hub dia.	Pitch dia.	Outside dia.	Mounting distance	Total length	Crown to back length
					A <sub>H7</sub>	B	C	D	E	F	G
<b>DB0.5-4020</b>	2	<b>m0.5</b>	40	B9	4	12	20	20.29	12	8.33	7.29
<b>DB0.5-2040</b>			20	B1	3	8	10	11.2	16	8.46	6.3
<b>DB0.8-4020</b>		<b>m0.8</b>	40	B9	5	15	32	32.47	18	11.91	10.47
<b>DB0.8-2040</b>			20	B1	4	12	16	17.92	24	11.5	8.48
<b>DB1-4020</b>		<b>m1</b>	40	B9	6	18	40	40.59	22	14.45	12.58
<b>DB1-2040</b>			20	B1	5	15	20	22.4	30	14.49	10.6

**NOTE1:** The bore tolerance is generally  $-0.05$  to  $-0.1$  but may be + value at the central portion of the hole. Re-machining the bore is not recommended since reworking material may expose voids.



# BB Sintered Metal Bushings

The table shows a series of standard metal bushings that can be pressed into standard injection molded gears. They can be used as bearing metal on idler gears or to reduce the bore of the gears.

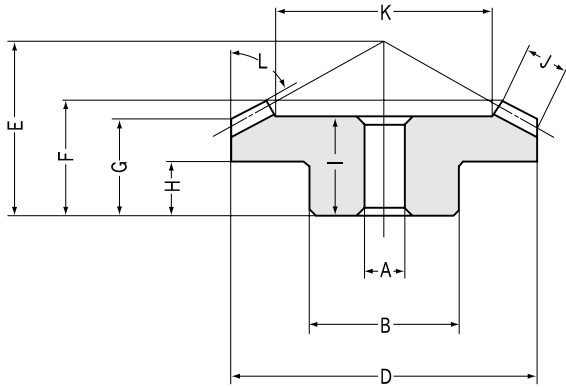


(unit: mm)

Catalog No.	I.D. of bushing	O.D. of bushing	Length	Products that can use the bushing
	$d_0^{+0.02}$	$D_{-0.01}^{+0.02}$	$L_{-0.3}^0$	
<b>BB30507</b>	3	5	7	DS0.5, DM0.8, DB0.8
<b>BB30608</b>	3	6	8	DS0.5, DS0.8, DM1
<b>BB40609</b>	4	6	9	DS0.8, DM1
<b>BB40612</b>	4	6	12	DS1, DB1
<b>BB50812</b>	5	8	12	DS1
<b>BB50814</b>	5	8	14	DS1, DM1.5

**Material:** Oil impregnated sintered bronze.





B9 Shape

## Specifications

Precision grade	JIS B 1704 grade 8	Tooth hardness	110~120HRR
Gear teeth	Gleason	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Injection molded
Material	Duracon(M90-44)	Datum reference surface for tooth forming	Bore
Heat treatment	—	Secondary Operations	Not recommended (may expose voids)

Hub width H	Length of bore I	Face width J	Holding surface dia. K	Allowable torque (NOTE 2)		Backlash (mm)	Weight (kg)	Catalog No.
				Allowable torque (N · m) Bending strength	Allowable torque (kgf · m) Bending strength			
4	7	2.5	14.41	0.24	0.025	0.03~0.09	2	DB0.5-4020 DB0.5-2040
4	—	—	—	0.092	0.0094			
6	10	3.5	24.17	0.91	0.093	0.03~0.11	6	DB0.8-4020 DB0.8-2040
5	—	—	—	0.34	0.035			
7	12	4.5	29.94	1.59	0.16	0.03~0.13	12	DB1-4020 DB1-2040
7	—	—	—	0.60	0.061			

**NOTE 2:** The allowable torques shown in the table are the calculated values using the Lewis formula.

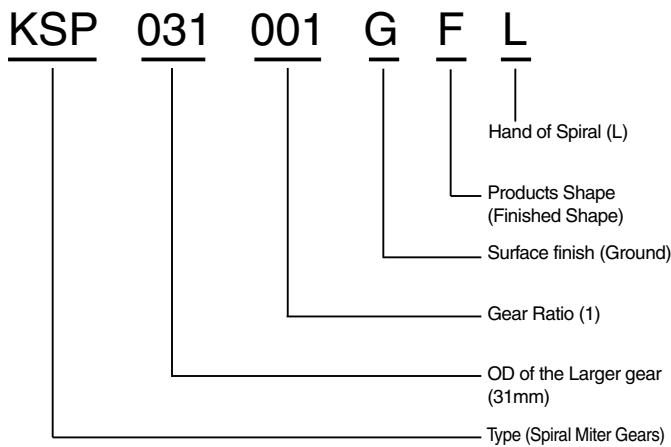
■ Dimensional tolerance table (unit: mm)

Range	Tolerance
below 3	±0.2
3 up to 6	±0.25
6 up to 10	±0.3
10 up to 18	±0.35
18 up to 30	±0.4
over 30	±0.5



### ■ Catalog Number of NISSEI Spiral Bevel Gears

The catalog number systems of KSP Ground Spiral Miter Gears differs from other miter gears.



### ■ The Characteristics of KSP Spiral Bevel Gears

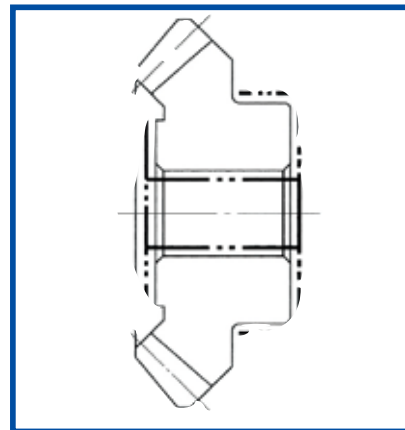
1. JIS Grade 0, high strength, high precision products
2. Superior performance with regard to high speed, low noise, and low vibration.
3. Module range from 1.5 to 6
4. Three gear ratios: 1, 1.5 and 2

### ■ Products Shape

Type F - Finished Shape

Type U - Shape to Allow Secondary Operations

\*The heavy lines in the figure below indicate the masked areas during carburizing





# Ground Spiral Bevel Gears

## Regarding the Transmission Capability Table

- The values given in the table are for a service factor of 1. Using the table on the right, please modify the value according to the actual conditions.
- For speed increaser applications (where the gear is the driver and the pinion is driven), the torque on the pinion is the value in the table multiplied by the speed ratio. (Ex.) For speed ratio of 1/1.5, the torque on the pinion is 1/1.5 times the value given in the table.

Impact from Prime Mover	Impact from Load Side of Machine		
	Uniform Load	Medium Impact Load	Heavy Impact Load
Uniform Load (Motor, Turbine, Hydraulic Motor)	1.0	1.25	1.75
Light Impact Load (Multicylinder Engine)	1.25	1.5	2.0
Medium Impact Load (Single Cylinder Engine)	1.5	1.75	2.25

## Transmission Capability Table (Gear ratio: 1)

Upper Transmission Capability (kw) Lower Torqu (N · m)

Model	Rotation (rpm)	50	100	300	600	900	1200	1800	3000
KSP031001		0.035	0.068	0.195	0.375	0.548	0.716	1.04	1.65
		6.65	6.51	6.20	5.98	5.82	5.69	5.51	5.25
KSP040001		0.092	0.179	0.511	0.980	1.43	1.86	2.69	4.25
		17.6	17.2	16.3	15.6	15.2	14.8	14.3	13.5
KSP053001		0.211	0.412	1.17	2.23	3.25	4.22	6.08	9.55
		40.4	39.3	37.3	35.6	34.5	33.6	32.3	30.4
KSP066001		0.367	0.715	2.02	3.85	5.59	7.26	10.4	16.3
		70.2	68.3	64.4	61.4	59.3	57.8	55.4	52.0
KSP078001		0.577	1.12	3.16	6.00	8.68	11.2	16.1	25.1
		109.8	106.9	101.0	95.5	92.2	89.5	85.5	79.8
KSP092001		0.901	1.75	4.91	9.31	13.5	17.4	24.9	38.6
		172.6	166.7	156.9	148.1	143.2	138.3	132.4	122.6
KSP105001		1.44	2.78	7.80	14.7	21.2	27.4	39.1	60.3
		274.6	265.8	248.1	234.4	225.6	218.7	207.9	192.2
KSP132001		2.33	4.50	12.6	23.6	34.0	43.7	62.0	95.0
		445.2	430.5	400.1	376.6	360.9	348.1	329.5	302.0
KSP157001		3.68	7.10	19.7	37.0	53.0	68.1	96.2	146
		704.1	678.6	628.6	589.4	562.9	542.3	510.9	466.8
KSP184001		5.31	10.2	28.3	52.8	75.5	96.8	136	206
		1010	976.7	901.2	841.4	801.2	770.8	722.8	656.1

## Transmission Capability Table (Gear ratio: 1.5)

Upper Transmission Capability (kw) Lower Torqu (N · m)

Model	Rotation (rpm)	50	100	300	600	900	1200	1800	3000
KSP0481.5		0.077	0.151	0.432	0.830	1.21	1.58	2.29	3.64
		22.2	21.6	20.6	19.8	19.3	18.9	18.2	17.4
KSP0611.5		0.159	0.309	0.882	1.69	2.46	3.21	4.64	7.33
		45.4	44.3	42.2	40.4	39.2	38.3	37.0	35.0
KSP0741.5		0.277	0.540	1.53	2.93	4.27	5.55	8.00	12.6
		79.4	77.4	73.4	70.1	68.0	66.3	63.7	60.1
KSP0901.5		0.466	0.908	2.57	4.90	7.12	9.24	13.3	20.8
		133.4	130.4	122.6	116.7	113.8	110.8	105.9	99.0
KSP1051.5		0.700	1.36	3.84	7.31	10.6	13.7	19.7	30.7
		201.0	195.2	183.4	174.6	168.7	163.8	156.9	147.1
KSP1241.5		1.03	2.00	5.63	10.7	15.5	20.0	28.6	44.5
		295.2	286.4	268.7	255.0	246.1	239.3	227.5	212.8
KSP1411.5		1.56	3.03	8.51	16.1	23.2	30.1	42.9	66.4
		448.2	434.4	406.0	384.4	370.7	358.9	341.3	317.7
KSP1631.5		2.27	4.39	12.3	23.2	33.4	43.1	61.4	94.6
		650.2	628.6	587.4	554.1	532.5	514.8	489.4	452.1
KSP1811.5		2.92	5.64	15.8	29.7	42.7	55.1	78.3	120
		836.5	809.0	754.1	710.0	680.6	658.0	623.7	574.7

## Transmission Capability Table (Gear ratio: 2)

Upper Transmission Capability (kw) Lower Torqu (N · m)

Model	Rotation (rpm)	50	100	300	600	900	1200	1800	3000
KSP039002		0.025	0.049	0.142	0.275	0.404	0.528	0.770	1.23
		9.63	9.45	9.07	8.76	8.57	8.41	8.17	7.83
KSP056002		0.075	0.147	0.423	0.814	1.19	1.55	2.26	3.59
		28.8	28.1	27.0	26.0	25.3	24.8	23.9	22.8
KSP075002		0.185	0.361	1.03	1.98	2.89	3.76	5.45	8.61
		70.7	69.0	65.7	63.1	61.3	59.9	57.9	54.8
KSP096002		0.364	0.710	2.02	3.86	5.62	7.31	10.5	16.6
		139.3	135.3	128.5	122.6	119.6	116.7	111.8	105.9
KSP119002		0.649	1.26	3.58	6.82	9.90	12.9	18.5	29.0
		248.1	241.2	227.5	217.7	209.9	205.0	196.1	184.4
KSP145002		1.07	2.08	5.87	11.2	16.2	21.0	30.1	46.9
		408.9	397.2	373.6	356.0	343.2	333.4	319.7	298.1
KSP172002		1.78	3.45	9.72	18.4	26.6	34.5	49.3	76.5
		680.6	660.0	618.8	587.4	565.8	549.2	523.7	487.4

Bevel gears

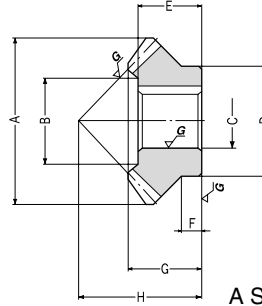
KSP



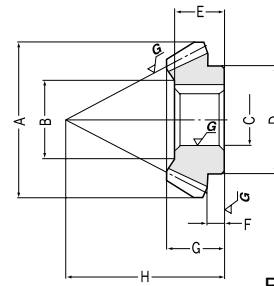
# NISSEI KSP Ground Spiral Miter Gears

Modules **1.5~6**

New Products



A Shape



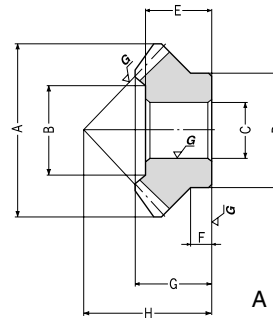
B Shape

## Type F (Finished Style)

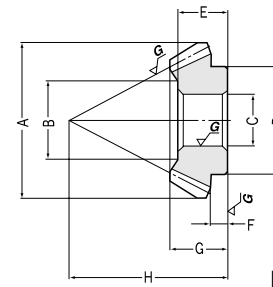
Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Pitch dia.	Face width	Shape	Outside dia.	Holder surface dia.	Bore	Hub dia.	Length of bore
								A	B	C <sub>H7</sub>	D	E
KSP031001GF L KSP031001GF R	1	<b>m1.5</b>	20	L R	30	7	A	31	16.2	12	22	13
KSP040001GF L KSP040001GF R		<b>m2</b>	20	L R	40	9	B	40	22.5	14	31	14
KSP053001GF L KSP053001GF R		<b>m2.5</b>	21	L R	52.5	12	B	53	31.1	19	38	20
KSP066001GF L KSP066001GF R		<b>m3</b>	21	L R	63	15	B	66	33.6	23	47	25
KSP078001GF L KSP078001GF R		<b>m3.5</b>	22	L R	77	18	B	78	43.1	27	54	27
KSP092001GF L KSP092001GF R		<b>m4</b>	22	L R	88	21	B	92	48.6	30	63	32
KSP105001GF L KSP105001GF R		<b>m4.5</b>	23	L R	103.5	25	C	105	50	32	70	35
KSP132001GF L KSP132001GF R		<b>m5</b>	26	L R	130	29	C	132	64	36	82	41
KSP157001GF L KSP157001GF R		<b>m5.5</b>	28	L R	154	34	C	157	76	40	92	47
KSP184001GF L KSP184001GF R		<b>m6</b>	30	L R	180	38	C	184	84	48	101	51

Miter Gears

2527



A Shape



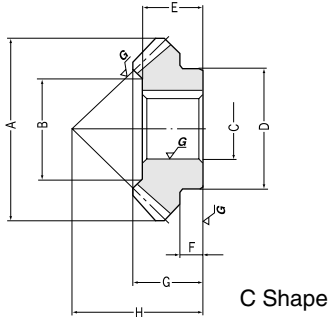
B Shape

## Type U (Style Allowing Modifications)

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Pitch dia.	Face width	Shape	Outside dia.	Holder surface dia.	Bore	Hub dia.	Length of bore
								A	B	C <sub>H7</sub>	D	E
KSP031001GU L KSP031001GU R	1	<b>m1.5</b>	20	L R	30	7	A	31	16.2	10	22	13
KSP040001GU L KSP040001GU R		<b>m2</b>	20	L R	40	9	B	40	22.5	12	31	14
KSP053001GU L KSP053001GU R		<b>m2.5</b>	21	L R	52.5	12	B	53	31.1	14	38	20
KSP066001GU L KSP066001GU R		<b>m3</b>	21	L R	63	15	B	66	33.6	16	47	25
KSP078001GU L KSP078001GU R		<b>m3.5</b>	22	L R	77	18	B	78	43.1	20	54	27
KSP092001GU L KSP092001GU R		<b>m4</b>	22	L R	88	21	B	92	48.6	22	63	32
KSP105001GU L KSP105001GU R		<b>m4.5</b>	23	L R	103.5	25	C	105	50	26	70	35
KSP132001GU L KSP132001GU R		<b>m5</b>	26	L R	130	29	C	132	64	30	82	41
KSP157001GU L KSP157001GU R		<b>m5.5</b>	28	L R	154	34	C	157	76	32	92	47
KSP184001GU L KSP184001GU R		<b>m6</b>	30	L R	180	38	C	184	84	40	101	51



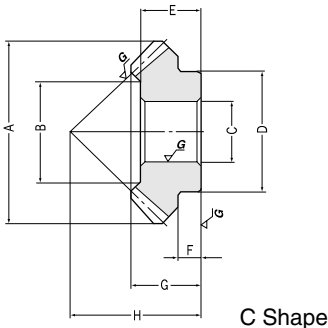
# Ground Spiral Miter Gears



## Specifications

Precision grade	JIS B 1704 grade 0	Tooth hardness	60~63HRC
Gear teeth	Gleason	Surface treatment	None
Pressure angle	20°	Shaft angle	90°
Helix angle	35°	Tooth surface finish	Ground
Material	SCM415 (Module 3.5 and above are SCM420)	Datum reference surface for gear grinding	Bore
Heat treatment	Overall Carburizing	Secondary Operations	Not possible

Hub width F	Total length G	Mounting distance H	Keyway	Allowable torque (kgf·m) <small>NOTE1</small>	Backlash (mm)	Weight of set (kg)	Catalog No.
6	15	25	4 x 1.8	0.61	0 ~0.05	0.08	KSP031001GF L KSP031001GF R
7	16.5	30	5 x 2.3	1.59	0 ~0.05	0.16	KSP040001GF L KSP040001GF R
8	23	40	6 x 2.8	3.63	0.05~0.10	0.36	KSP053001GF L KSP053001GF R
13	29.5	50	7 x 3	6.26	0.05~0.10	0.68	KSP066001GF L KSP066001GF R
12	32	57	8 x 3.3	9.74	0.05~0.10	1.08	KSP078001GF L KSP078001GF R
14	38	66	8 x 3.3	15.1	0.05~0.10	1.76	KSP092001GF L KSP092001GF R
14	39	72	10 x 3.3	23.9	0.05~0.10	2.50	KSP105001GF L KSP105001GF R
14	45	88	10 x 3.3	38.4	0.05~0.10	4.78	KSP132001GF L KSP132001GF R
20	53.5	105	12 x 3.3	60.1	0.05~0.10	7.42	KSP157001GF L KSP157001GF R
17	56.5	118	14 x 3.8	85.8	0.05~0.10	11.1	KSP184001GF L KSP184001GF R



## Specifications

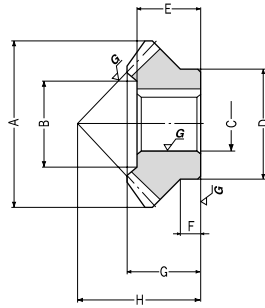
Precision grade	JIS B 1704 grade 0	Tooth hardness	60~63HRC
Gear teeth	Gleason	Surface treatment	None
Pressure angle	20°	Shaft angle	90°
Helix angle	35°	Tooth surface finish	Ground
Material	SCM415 (Module 3.5 and above are SCM420)	Datum reference surface for gear grinding	Bore
Heat treatment	Carburized (bore & hubs are masked)	Secondary Operations	Possible where masked

Hub width F	Total length G	Mounting distance H	Machinable max. bore	Allowable torque (kgf·m) <small>NOTE1</small>	Backlash (mm)	Weight of set (kg)	Catalog No.
6	15	25	12	0.61	0 ~0.05	0.08	KSP031001GU L KSP031001GU R
7	16.5	30	16	1.59	0 ~0.05	0.18	KSP040001GU L KSP040001GU R
8	23	40	22	3.63	0.05~0.10	0.42	KSP053001GU L KSP053001GU R
13	29.5	50	25	6.26	0.05~0.10	0.78	KSP066001GU L KSP066001GU R
12	32	57	32	9.74	0.05~0.10	1.18	KSP078001GU L KSP078001GU R
14	38	66	38	15.1	0.05~0.10	1.92	KSP092001GU L KSP092001GU R
14	39	72	40	23.9	0.05~0.10	2.66	KSP105001GU L KSP105001GU R
14	45	88	48	38.4	0.05~0.10	4.98	KSP132001GU L KSP132001GU R
20	53.5	105	55	60.1	0.05~0.10	7.80	KSP157001GU L KSP157001GU R
17	56.5	118	62	85.8	0.05~0.10	11.6	KSP184001GU L KSP184001GU R

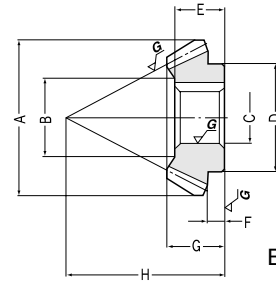
**NOTE 1:** The allowable torques are obtained by conversion from the table on page 269 for 600 min<sup>-1</sup>.



New Products



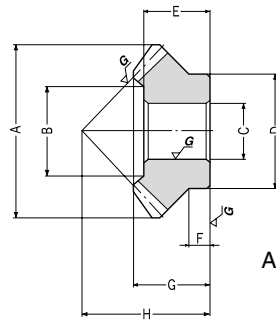
A Shape



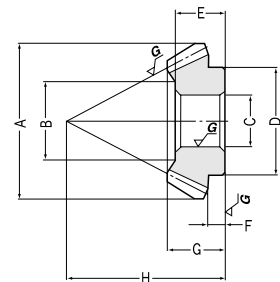
B Shape

**Type F (Finished Style)**

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Pitch dia.	Face width	Shape	Outside dia.	Holding surface dia.	Bore	Hub dia.	Length of bore
								A	B	C <sub>H7</sub>	D	E
KSP0481.5GF P KSP0481.5GF G	1.5	m2	16	L	32	9	A	34	17.6	12	24	13
24			R	48	15	30	17					
KSP0611.5GF P KSP0611.5GF G		m2.25	18	L	40.5	12	A	42	22.4	15	30	17
27			R	60.75	20	40	20					
KSP0741.5GF P KSP0741.5GF G		m2.75	18	L	49.5	15	A	52	28.8	20	40	20
27			R	74.25	25	50	25					
KSP0901.5GF P KSP0901.5GF G		m3	20	L	60	18	B	63	34.1	22	44	24
30			R	90	27	56	29					
KSP1051.5GF P KSP1051.5GF G		m3.5	20	L	70	21	B	74	37.8	25	50	25
30			R	105	30	63	32					
KSP1241.5GF P KSP1241.5GF G	m3.75	22	L	82.5	24	B	87	46.6	27	56	29	
33		R	123.75	33	69	35						
KSP1411.5GF P KSP1411.5GF G	m4.25	22	L	93.5	28	B	99	52.9	30	63	32	
33		R	140.25	41	73	41						
KSP1631.5GF P KSP1631.5GF G	m4.5	24	L	108	32	B	113	64.6	33	69	35	
36		R	162	47	82	47						
KSP1811.5GF P KSP1811.5GF G	m5	24	L	120	35	B	126	71.8	36	73	41	
36		R	180	48	90	48						



A Shape



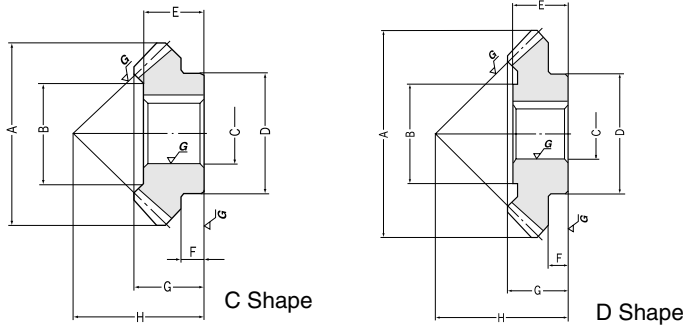
B Shape

**Type U (Style Allowing Modifications)**

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Pitch dia.	Face width	Shape	Outside dia.	Holding surface dia.	Bore	Hub dia.	Length of bore
								A	B	C <sub>H7</sub>	D	E
KSP0481.5GU P KSP0481.5GU G	1.5	m2	16	L	32	9	A	34	17.6	10	24	13
24			R	48	12	30	17					
KSP0611.5GU P KSP0611.5GU G		m2.25	18	L	40.5	12	A	42	22.4	12	30	17
27			R	60.75	14	40	20					
KSP0741.5GU P KSP0741.5GU G		m2.75	18	L	49.5	15	A	52	28.8	14	40	20
27			R	74.25	20	50	25					
KSP0901.5GU P KSP0901.5GU G		m3	20	L	60	18	B	63	34.1	16	44	24
30			R	90	20	56	29					
KSP1051.5GU P KSP1051.5GU G		m3.5	20	L	70	21	B	74	37.8	20	50	25
30			R	105	22	63	32					
KSP1241.5GU P KSP1241.5GU G	m3.75	22	L	82.5	24	B	87	46.6	20	56	29	
33		R	123.75	26	69	35						
KSP1411.5GU P KSP1411.5GU G	m4.25	22	L	93.5	28	B	99	52.9	22	63	32	
33		R	140.25	30	73	41						
KSP1631.5GU P KSP1631.5GU G	m4.5	24	L	108	32	B	113	64.6	26	69	35	
36		R	162	32	82	47						
KSP1811.5GU P KSP1811.5GU G	m5	24	L	120	35	B	126	71.8	30	73	41	
36		R	180	38	90	48						



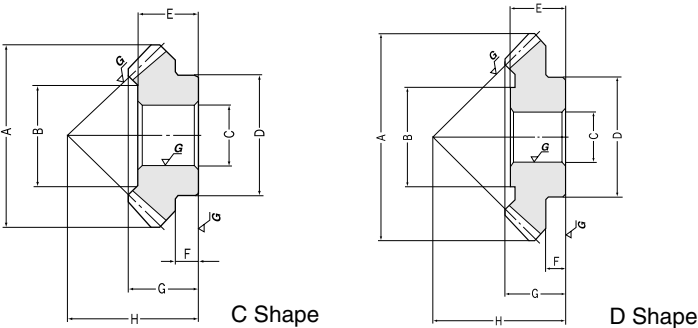
# Ground Spiral Bevel Gears



## Specifications

Precision grade	JIS B 1704 grade 0	Tooth hardness	60~63HRC
Gear teeth	Gleason	Surface treatment	None
Pressure angle	20°	Shaft angle	90°
Helix angle	35°	Tooth surface finish	Ground
Material	SCM415 (Module 3.5 and above are SCM420)	Datum reference surface for gear grinding	Bore
Heat treatment	Overall Carburizing	Secondary Operations	Not possible

Hub width	Total length	Mounting distance	Keyway	Allowable torque (kgf · m) <small>NOTE1</small>	Backlash (mm)	Weight of set (kg)	Catalog No.
F	G	H					
4.3 7	14.5 19	31 30	4 x 1.8 5 x 2.3	2.02	0 ~0.05	0.18	KSP0481.5GF P KSP0481.5GF G
5.1 10	19 23.5	39 37	5 x 2.3 6 x 2.8	4.12	0.05~0.10	0.34	KSP0611.5GF P KSP0611.5GF G
5.7 12	22 29	46 45	6 x 2.8 7 x 3	7.15	0.05~0.10	0.62	KSP0741.5GF P KSP0741.5GF G
8 13	26.5 33	56 53	6 x 2.8 8 x 3.3	11.9	0.05~0.10	1.08	KSP0901.5GF P KSP0901.5GF G
7 13	28.5 34	63 57	7 x 3 8 x 3.3	17.8	0.05~0.10	1.52	KSP1051.5GF P KSP1051.5GF G
7 14	33 36.5	74 64	8 x 3.3 10 x 3.3	26.0	0.05~0.10	2.35	KSP1241.5GF P KSP1241.5GF G
7 17	36 43.5	82 74	8 x 3.3 10 x 3.3	39.2	0.05~0.10	3.42	KSP1411.5GF P KSP1411.5GF G
7 19	38.5 49.5	92 85	10 x 3.3 12 x 3.3	56.5	0.05~0.10	5.20	KSP1631.5GF P KSP1631.5GF G
10 19	45.5 50.5	105 90	10 x 3.3 14 x 3.8	72.4	0.05~0.10	6.77	KSP1811.5GF P KSP1811.5GF G



## Specifications

Precision grade	JIS B 1704 grade 0	Tooth hardness	60~63HRC
Gear teeth	Gleason	Surface treatment	None
Pressure angle	20°	Shaft angle	90°
Helix angle	35°	Tooth surface finish	Ground
Material	SCM415 (Module 3.5 and above are SCM420)	Datum reference surface for gear grinding	Bore
Heat treatment	Carburized (bore & hubs are masked)	Secondary Operations	Possible where masked

Hub width	Total length	Mounting distance	Machinable max. bore	Allowable torque (kgf · m) <small>NOTE1</small>	Backlash (mm)	Weight of set (kg)	Catalog No.
F	G	H					
4.3 7	14.5 19	31 30	— 20	2.02	0 ~0.05	0.19	KSP0481.5GU P KSP0481.5GU G
5.1 10	19 23.5	39 37	16 27	4.12	0.05~0.10	0.38	KSP0611.5GU P KSP0611.5GU G
5.7 12	22 29	46 45	20 35	7.15	0.05~0.10	0.69	KSP0741.5GU P KSP0741.5GU G
8 13	26.5 33	56 53	25 42	11.9	0.05~0.10	1.18	KSP0901.5GU P KSP0901.5GU G
7 13	28.5 34	63 57	28 42	17.8	0.05~0.10	1.65	KSP1051.5GU P KSP1051.5GU G
7 14	33 36.5	74 64	36 48	26.0	0.05~0.10	2.51	KSP1241.5GU P KSP1241.5GU G
7 17	36 43.5	82 74	42 50	39.2	0.05~0.10	3.61	KSP1411.5GU P KSP1411.5GU G
7 19	38.5 49.5	92 85	48 55	56.5	0.05~0.10	5.48	KSP1631.5GU P KSP1631.5GU G
10 19	45.5 50.5	105 90	55 60	72.4	0.05~0.10	7.06	KSP1811.5GU P KSP1811.5GU G

**NOTE1:** The allowable torques are obtained by conversion from the table on page 269 for 600 min<sup>-1</sup>.

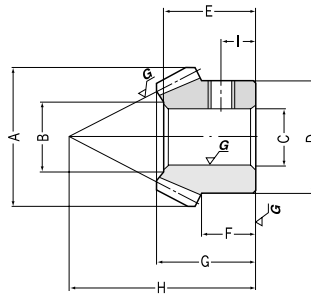
Bevel gears

KSP

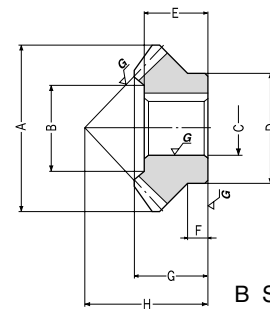


# NISSEI KSP Ground Spiral Bevel Gears Modules 1.5~4.5

New Products



A Shape



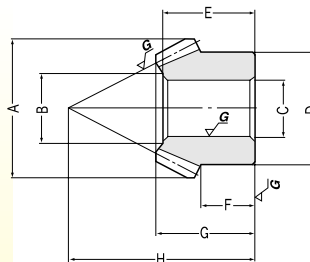
B Shape

## ■ Type F (Finished Style)

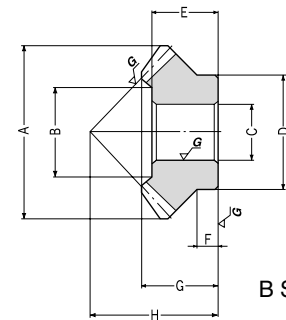
Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Pitch dia.	Face width	Shape	Outside dia.	Holding surface dia.	Bore	Hub dia.	Length of bore
								A	B	C <sub>H7</sub>	D	E
KSP039002GC P KSP039002GF G	2	m1.5	13	L	19.5	7	A	22	10.2	8	16	14
			26	R	39	C	39	24.1	12	24	13	
KSP056002GF P KSP056002GF G		m2	14	L	28	10	B	30	15.3	10	20	12
			28	R	56	C	56	35.6	16	30	18	
KSP075002GF P KSP075002GF G		m2.5	15	L	37.5	14	B	40	16.9	14	30	17
			30	R	75	D	75	36	22	44	24	
KSP096002GF P KSP096002GF G		m3	16	L	48	18	B	53	23.5	17	36	19
			32	R	96	D	96	46	27	56	29	
KSP119002GF P KSP119002GF G	m3.5	17	L	59.5	22	B	65	31.1	22	44	25	
		34	R	119	D	119	54	33	63	34		
KSP145002GF P KSP145002GF G	m4	18	L	72	27	B	78	31.2	26	54	28	
		36	R	144	D	145	60	36	73	39		
KSP172002GF P KSP172002GF G	m4.5	19	L	85.5	32	B	93	44.4	33	69	34	
		38	R	171	D	172	70	42	79	46		

Bevel gears

KSP



A Shape



B Shape

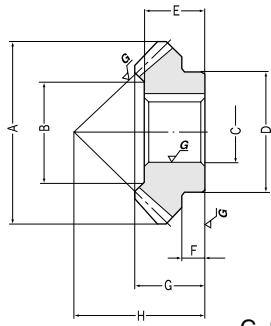
## ■ Type U (Style Allowing Modifications)

Catalog No.	Gear ratio	Module	No. of teeth	Direction of spiral	Pitch dia.	Face width	Shape	Outside dia.	Holding surface dia.	Bore	Hub dia.	Length of bore
								A	B	C <sub>H7</sub>	D	E
KSP039002GU P KSP039002GU G	2	m1.5	13	L	19.5	7	A	22	10.2	8	16	14
			26	R	39	C	39	24.1	10	24	13	
KSP056002GU P KSP056002GU G		m2	14	L	28	10	B	30	15.3	8	20	12
			28	R	56	C	56	35.6	12	30	18	
KSP075002GU P KSP075002GU G		m2.5	15	L	37.5	14	B	40	16.9	12	30	17
			30	R	75	D	75	36	16	44	24	
KSP096002GU P KSP096002GU G		m3	16	L	48	18	B	53	23.5	12	36	19
			32	R	96	D	96	46	20	56	29	
KSP119002GU P KSP119002GU G	m3.5	17	L	59.5	22	B	65	31.1	16	44	25	
		34	R	119	D	119	54	26	63	34		
KSP145002GU P KSP145002GU G	m4	18	L	72	27	B	78	31.2	20	54	28	
		36	R	144	D	145	60	30	73	39		
KSP172002GU P KSP172002GU G	m4.5	19	L	85.5	32	B	93	44.4	26	69	34	
		38	R	171	D	172	70	36	79	46		

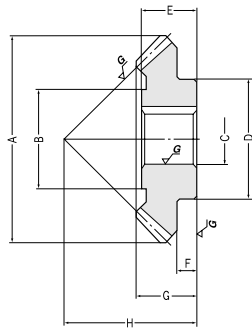




# Ground Spiral Bevel Gears



C Shape

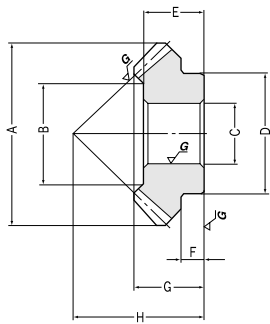


D Shape

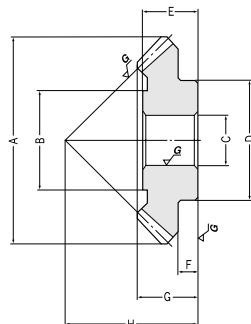
## Specifications

Precision grade	JIS B 1704 grade 0	Tooth hardness	60~63HRC
Gear teeth	Gleason	Surface treatment	None
Pressure angle	20°	Shaft angle	90°
Helix angle	35°	Tooth surface finish	Ground
Material	SCM415 (Module 3.5 and above are SCM420)	Datum reference surface for gear grinding	Bore
Heat treatment	Overall Carburizing	Secondary Operations	Not possible

Hub width	Total length	Mounting distance	Keyway (Screw)	Allowable torque (kgf·m) <small>NOTE1</small>	Backlash (mm)	Weight of set (kg)	Catalog No.
F	G	H					
7.6 7	14.5 15	28 22	(2-M4, l=5) 4 x 1.8	0.89	0 ~0.05	0.08	KSP039002GC P KSP039002GF G
2 8	13 20.5	32 30	3 x 1.4 5 x 2.3	2.65	0 ~0.05	0.21	KSP056002GF P KSP056002GF G
4.6 11	19.5 25.5	44 38	5 x 2.3 6 x 2.8	6.43	0.05~0.10	0.50	KSP075002GF P KSP075002GF G
2 12	21.5 31	53 47	5 x 2.3 8 x 3.3	12.5	0.05~0.10	1.03	KSP096002GF P KSP096002GF G
3.6 15	27.5 35.5	67 55	6 x 2.8 10 x 3.3	22.2	0.05~0.10	1.70	KSP119002GF P KSP119002GF G
3.5 16	33 40.5	80 64	8 x 3.3 10 x 3.3	36.3	0.05~0.10	2.91	KSP145002GF P KSP145002GF G
4.4 20	38 47	94 75	10 x 3.3 12 x 3.3	59.9	0.05~0.10	4.51	KSP172002GF P KSP172002GF G



C Shape



D Shape

## Specifications

Precision grade	JIS B 1704 grade 0	Tooth hardness	60~63HRC
Gear teeth	Gleason	Surface treatment	None
Pressure angle	20°	Shaft angle	90°
Helix angle	35°	Tooth surface finish	Ground
Material	SCM415 (Module 3.5 and above are SCM420)	Datum reference surface for gear grinding	Bore
Heat treatment	Carburized (bore & hubs are masked)	Secondary Operations	Possible where masked

Hub width	Total length	Mounting distance	Machinable max. bore	Allowable torque (kgf·m) <small>NOTE1</small>	Backlash (mm)	Weight of set (kg)	Catalog No.
F	G	H					
7.6 7	14.5 15	28 22	— 20	0.89	0 ~0.05	0.09	KSP039002GU P KSP039002GU G
2 8	13 20.5	32 30	10 20	2.65	0 ~0.05	0.23	KSP056002GU P KSP056002GU G
4.6 11	19.5 25.5	44 38	14 25	6.43	0.05~0.10	0.54	KSP075002GU P KSP075002GU G
2 12	21.5 31	53 47	19 32	12.5	0.05~0.10	1.11	KSP096002GU P KSP096002GU G
3.6 15	27.5 35.5	67 55	25 40	22.2	0.05~0.10	1.81	KSP119002GU P KSP119002GU G
3.5 16	33 40.5	80 64	30 42	36.3	0.05~0.10	3.09	KSP145002GU P KSP145002GU G
4.4 20	38 47	94 75	38 50	59.9	0.05~0.10	4.77	KSP172002GU P KSP172002GU G

**NOTE1:** The allowable torques are obtained by conversion from the table on page 269 for 600 min<sup>-1</sup>.

Bevel gears

KSP

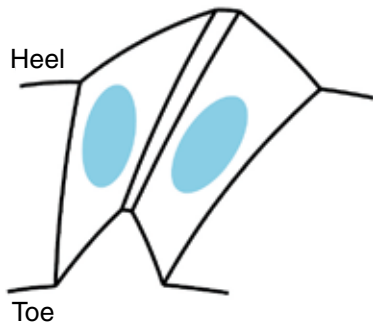


## Adjusting Tooth Contact

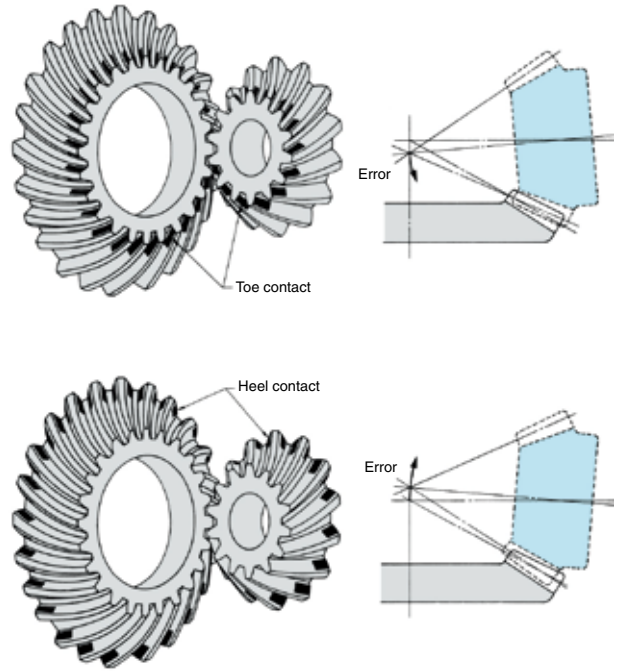
### < Centering tooth contact >

- (1) When assembled correctly, the contact will occur in the middle of the tooth flank.
- (2) The contact in the face width direction should be in the center of the face width, but somewhat closer to toe is ideal.

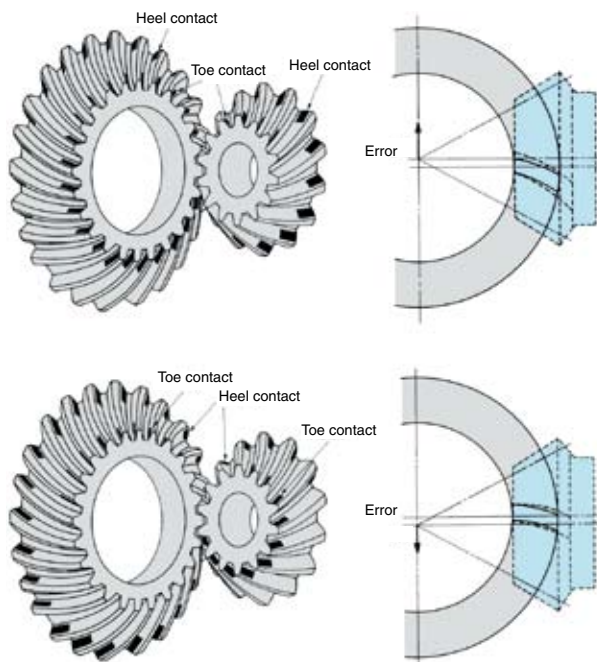
When the gears are assembled in to the gearbox and the backlash is adjusted, adjust the gearbox to obtain the tooth contact as shown below. Inaccurate assembly will lead to irregular noise and uneven wear,



### (1) When there is an angular error of the shafts



### (2) When the pinion shaft is offset



### (3) When the mounting distance of the pinion is incorrect

