■ Adjustment of tooth contact

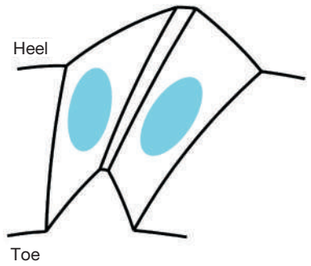
<Center of tooth contact>

(1) Near the center of the tooth length for the length direction

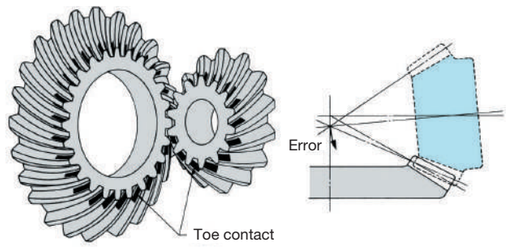
(2) Ideally, the tooth width direction should be at the center of the width or slightly closer to the toe.

When adjusting the backlash and mounting the gear in the case, adjust the case in order to achieve the tooth contact as shown in the figure below.

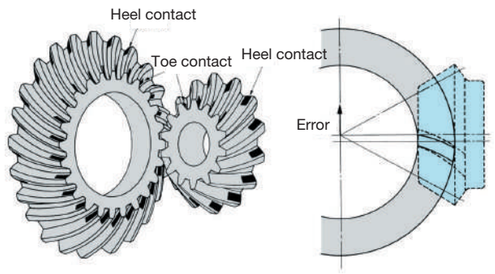
Deviation of the tooth contact from the normal position may adversely affect the strength and quietness.



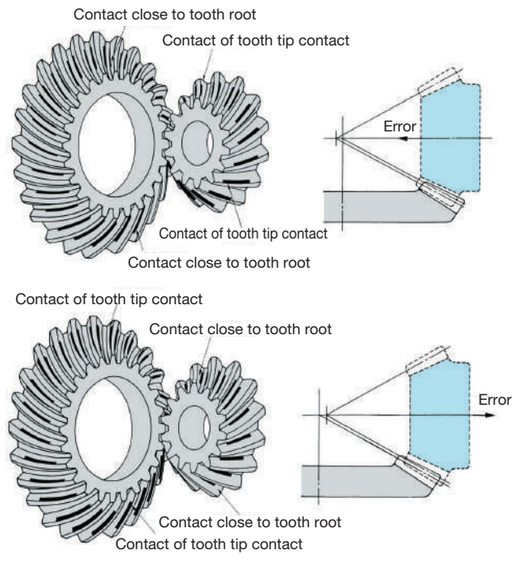
(1) Tooth contact in case of a shaft-angle error



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



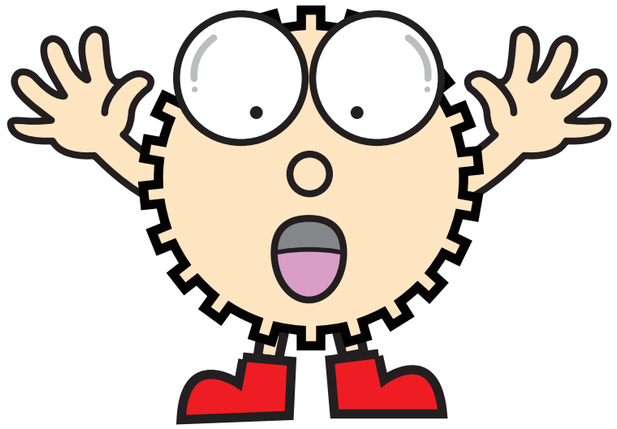
(3) Tooth contact in case of a pinion set position error



Screw Gears

SN-H Hardened Screw Gears	SN Screw Gears	SUN Stainless Steel Screw Gears	AN Screw Gears	PN Plastic Screw Gears
NEW (J)(H)	(J)	(J)	(J)(M)	(J)
Material: S45C	Material: S45C	Material: SUS303	Material: CAC702 (A ℓ BC2)	Material: MC901
*m*1~4 Page 380	*m*1~4 Page 380	*m*1~3 Page 384	*m*1~3 Page 386	*m*1~3 Page 388

(M) Includes Made to Order



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 the Catalog Numbers.

(Example) Screw Gears

S N 1 - 13 R

- R — Direction of Helix (Right)
- 13 — No. of Teeth (13)
- 1 — Module (1)
- N — Type (Screw Gears)
- S — Material (S45C)

Material		Type	
S	S45C	N	Screw Gears
SU	Stainless Steel		
A	CAC702		
P	MC901		

Features

KHK stock screw gears come in four materials, S45C, SUS303, CAC702 (old JIS A ℓ BC2) and MC nylon, in modules 1~4 and numbers of teeth from 10 to 30.

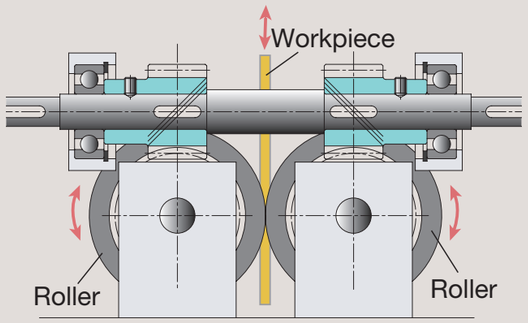
Catalog Number	Module	Material	Heat Treatment	Tooth Surface Finish	Precision JIS B 1702-1:1998	Secondary Operations	Features
SN	1~4	S45C	—	Cut	N9	○	Many lineups are available at a low price. The teeth can be hardened.
SUN	1~3	SUS303	—	Cut	N9	○	Stainless steel gears with rust resistance.
AN	1~3	CAC702 (A ℓ BC2)	—	Cut	N9	○	Aluminum bronze made gears with excellent wear resistance.
PN	1~3	MC901	—	Cut	N10	○	Nylon gears can be used with no lubrication.

○ Possible △ Partly possible × Not possible

Application Examples

KHK stock screw gears are used in various labor-saving machines including conveyor machine and transport.

■ Design example of feeding device (not a design for machinery or a device in actual use)



Rotate the roller in reverse with one input shaft and move the pinched workpiece vertically

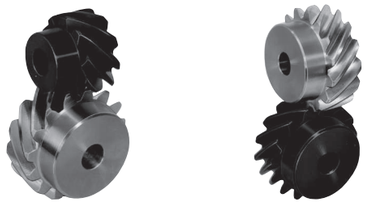
Selection Hints

Please select the most suitable products by carefully considering the characteristics of items and contents of the product tables. Since screw gears come in right- or left-hand helix, make sure to include the letter “R” or “L” in the catalog number when you order.

1. Caution in Selecting the Mating Gears

Screw gears are used for offset shafts. Whether the shafts are paralleled offset or skewed offset depends on the helix directions of the mating gears.

Direction of shaft	Arrangement of helix hands
Skewed Axes	RH-RH or LH-LH
Parallel Axes	RH-LH



Right (R) Left (L)

Arrangements of helix directions of screw gears

2. Caution in Selecting Gears Based on Gear Strength

The allowable surface strengths listed in the product pages were derived using the Niemann formula as reference values. (Used with skewed shafts) There is a paucity of data on the strength of screw gears. The values of constant K_0 used in the calculations, which depend on the material of the mating gears, are our estimates. The mathematic expression below shows the Niemann formula to determine allowable tangential force Ft (kgf) and allowable torque T (kgf·m) on a basic circle.

$$Ft = 1.43 d_1^2 fz Ks$$

$$T = \frac{Ft d_1}{2000}$$

Here, d_1 : standard pitch diameter of pinion (mm)
fz : coefficient based on no. of teeth combination
Ks : coefficient based on materials and sliding speed

$$Ks = K_0 \frac{2}{2+Vs}$$

Here, K_0 : coefficient based on material selection
Vs : sliding speed (m/s)

$$Vs = \frac{\pi n d_1}{60000 \cos \beta}$$

Here, n : rotational speed (rpm)
β : helix angle (45°)

■ fz value

Z_2 \ Z_1	10	13	15	20	26	30
10	1.538					
13	2.005	1.538				
15	2.279	1.786	1.538			
20	2.963	2.329	2.053	1.538		
26	3.695	2.963	2.588	2.005	1.538	
30	4.161	3.350	2.963	2.279	1.786	1.538

■ Setting values depending on usage conditions

Catalog Number	Mating gear	K0 value	Maximum allowable sliding speed m/s	No. of teeth of mating gears	Rotational Speed
SN	SN	0.0030	2.5	Same no. of teeth	100rpm
SUN	SN	0.0030 Note 1	2.5 Note 1		
AN	SN	0.0050	5		
PN	SN	0.0030 Note 1 (0.0021)	2.5 Note 1 (1.0)		

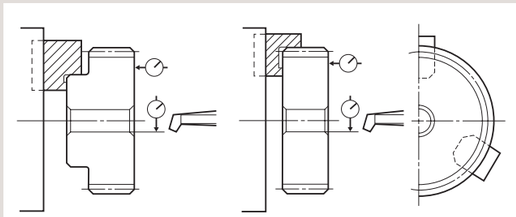
[NOTE 1] K0 values and the maximum allowable sliding speed of SUN & PN products are set by KHK. Screw gears are basically used with lubrication. In case of using PN products without lubrication, the parenthetical values shown in the table are applied.

Application Hints

In order to use KHK stock screw gears safely, read the Application Hints carefully before proceeding.
Please refer to Page 48 for “Cautions on Handling” and Page 49 for “Cautions on Starting”.

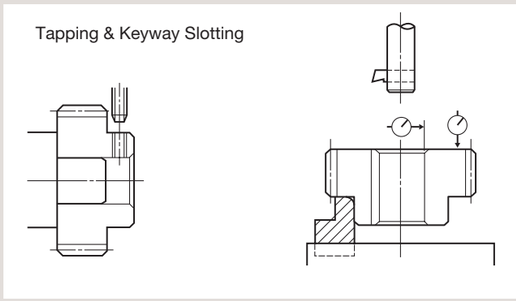
1. Caution on Performing Secondary Operations

① If reboring, it is important to pay special attention to locating the center in order to avoid runout.
② The reference datum for gear machining is the bore. Therefore, 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.



Lathe Operations

④ The maximum bore size is dictated by the requirement that the strength of the hub is to be higher than that of the gear teeth. The maximum bore size should be 60% to 70% of the hub diameter (or tooth root diameter), and 50% to 60% for keyway applied modifications.
⑤ In order to avoid stress concentration, round the keyway corners.

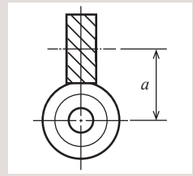


2. Points of Caution during Assembly

① The recommended center distance tolerance of KHK stock screw gears is H7 for ground gears and H8 for cut gears. The amount of backlash is given in the product table for each gear.

$$a = \frac{d_1 + d_2}{2}$$

Where
a : Center distance
d_1 : Pitch diameter of pinion
d_2 : Pitch diameter of gear



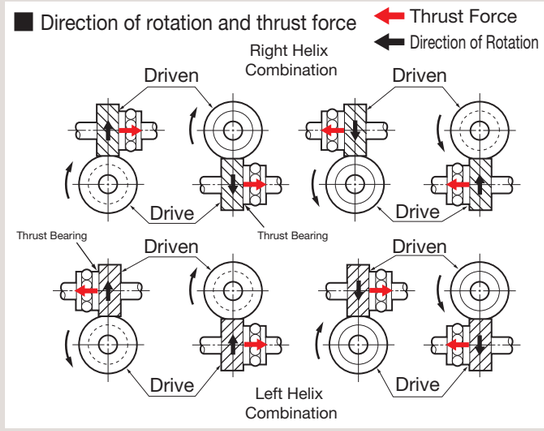
② Total Length Tolerance for Screw Gears

Total Length (mm)	Tolerance
30 or less	0 −0.10
31 to 100	0 −0.15

[NOTE] HardenedPlus, PN Plastic Screw Gears are excluded.

③ Due to the helix of screw gears, they produce axial thrust forces. The bearings must be selected properly to be able to handle these thrust forces. The directions of thrust change with the direction of helix and the direction of rotation as illustrated below.
For details, use gear calculation software GCSW.

■ Direction of rotation and thrust force



[NOTE] For parallel shaft applications, see the Application Hints for KHK Helical Gears (Page 193).

KHK considers safety a priority in the use of our products.
When handling, adding secondary operations, assembling, and operating KHK products, please be aware of the following issues in order to prevent accidents.

⚠ Warning: Precautions for preventing physical and property damage

1. When using KHK products, follow relevant safety regulations (Occupational Safety and Health Regulations, etc.).
2. Pay attention to the following items when installing, removing, or performing maintenance and inspection of the product.
   ① Turn off the power switch.
   ② Do not reach or crawl under the product.
   ③ Wear appropriate clothing and protective equipment for the work.

⚠ Caution: Cautions in Preventing Accidents

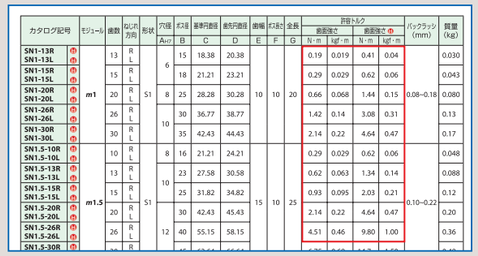
1. Before using a KHK product, read the precautions in the catalog carefully in order to use it correctly.
2. Avoid use in environments that may adversely affect the product.
3. Our products are manufactured under a superior quality control system based on the ISO9000 quality management system; if you notice any malfunctions upon purchasing a product, please contact the supplier.

Selecting the Gears

Step 1 Determine the calculated load torque applied to the gear and the gear type suitable for the purpose.

Step 2 Select provisionally from the allowable torque table in this catalog based on the load torque.

■ For provisional selection from this catalog

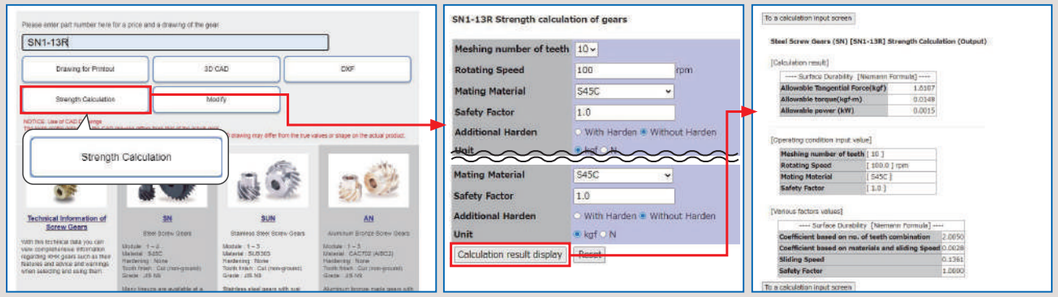


カタログ記号	モジュール	歯数	ねじれ方向	形状	穴径	ボス径	基準円直径	歯先円直径	歯幅	ボス長さ	全長	許容トルク 歯元強さ N・m	歯元強さ N・m	歯元強さ kgf・m	歯元強さ kgf・m	バックラッシ (mm)	質量 (kg)
					A H7	B	C	D	E	F	G						
SN1-13R SN1-13L	m1	13	R L	S1	6	15	18.38	20.38	10	10	20	0.19	0.019	0.41	0.04	0.08–0.18	0.030
SN1-15R SN1-15L		15	R L			18	21.21	23.21				0.29	0.029	0.62	0.06		0.043
SN1-20R SN1-20L		20	R L		8	25	28.28	30.28				0.66	0.068	1.44	0.15		0.080
SN1-26R SN1-26L		26	R L		10	30	36.77	38.77				1.42	0.14	3.08	0.31		0.13
SN1-30R SN1-30L		30	R L			35	42.43	44.43				2.14	0.22	4.64	0.47		0.17
SN1.5-10R SN1.5-10L	m1.5	10	R L	S1	8	16	21.21	24.21	15	10	25	0.29	0.029	0.62	0.06	0.10–0.22	0.048
SN1.5-13R SN1.5-13L		13	R L		10	23	27.58	30.58				0.62	0.063	1.34	0.14		0.088
SN1.5-15R SN1.5-15L		15	R L			25	31.82	34.82				0.93	0.095	2.03	0.21		0.12
SN1.5-20R SN1.5-20L		20	R L		12	30	42.43	45.43				2.14	0.22	4.64	0.47		0.20
SN1.5-26R SN1.5-26L		26	R L			40	55.15	58.15				4.51	0.46	9.80	1.00		0.36
SN1.5-30R			R														

Step 3 Calculate the strength under the actual usage conditions.

Calculate the strength formally using the various gear strength formulas. We recommend using the simple strength calculation available on our website.

■ Use the strength calculation function on our website.



■ Surface durability

Calculated values of the strength at which the gear teeth do not wear due to surface fatigue damage.

Example of wear due to insufficient surface durability

Product Precautions

Common Notes

[Caution on Product Characteristics]

(1) The allowable torque shown in the table are calculated values according to the assumed usage conditions. Please see Page 376 for more details.
(2) The backlash values shown in the table are the theoretical values for the backlash in the normal direction of a pair of identical gears in mesh.
(3) Variations in temperature or humidity can cause dimensional changes in plastic gears, including tooth diameter, bore, and backlash. The accuracy and tolerances shown in the catalog are values obtained when machining is performed.
(4) When mating screw gears are made of the same material, they may cause abrasion and scoring. It is recommended to mate screw gears composed of different materials.
(5) For offset shaft applications, match a RH with a RH, or LH with a LH, to make a set of screw gears. For parallel shaft applications, mesh opposite hands (RH and LH) of helical gear sets. See Page 376 for more details on selection precautions.
(6) For bores of ϕ 4 or below, the bore tolerance is H8. As well, the tolerance is H8 for ϕ 5 or ϕ 6 bores with hole length (total length) 3x the bore or more.
(7) Keyways are made according to JIS B1301 standards, Js9 tolerance. Also note that keyway tooth position alignment is not performed.
(8) For products having a tapped hole, a set screw is included.
(9) These bevel gears produce axial thrust forces. Please see Page 377 for more details.

[Caution on Secondary Operations]

(1) Please read "Cautions on Performing Secondary Operations" (Page 377) when performing modifications and/or secondary operations for safety concerns.
(2) Due to the gear teeth being induction hardened, no secondary operations can be performed on tooth areas including the bottom land (approx. 2 to 3 mm).
(3) See Page 22 for more details on Hardened Plus (H Series and HJ Series).

[J Series]

(1) Cancellation is not possible for made-to-order products. For lead time details, see Page 38.
(2) Certain products which would otherwise have a very long tapped hole are counterbored. For details, see the KHK website.
(3) Black oxide is not re-applied to parts undergoing secondary operations.

When selecting KHK standard gears, glance over the Cautions on Product Characteristics and Cautions on Performing Secondary Operations above.

① Products not listed in this catalog or materials, modules, number of teeth and the like not listed in the dimensional tables can be manufactured as custom items. Please see Page 26 for more details.
② The color and shape of the product images listed on the dimension table page of each product may differ from the actual product.
Be sure to confirm the shape in the dimension table before selection.
③ The details (specifications, dimensions, etc.) listed in the catalog may be changed without prior notice. Changes are announced on the KHK website.

Website URL: https://khkgears.net/new/
Overseas Sales Department: Phone: +81-48-254-1744 Fax: +81-48-254-1765
E-mail: info@khkgears.net