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Catalog Number of KHK Stock Gears

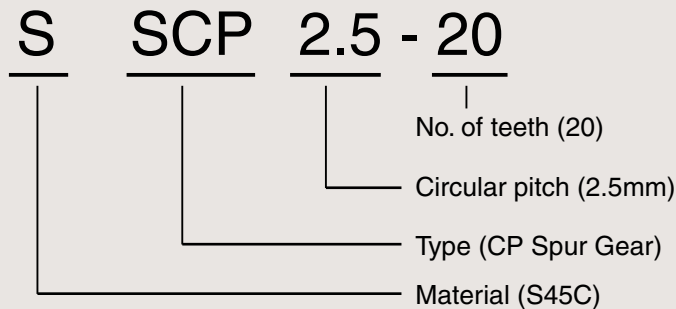
Catalog Numbers of KHK stock gears are based on simple principles as follows.

Please order KHK gears by specifying their Catalog Numbers.

(Example)

CP Racks & Pinions

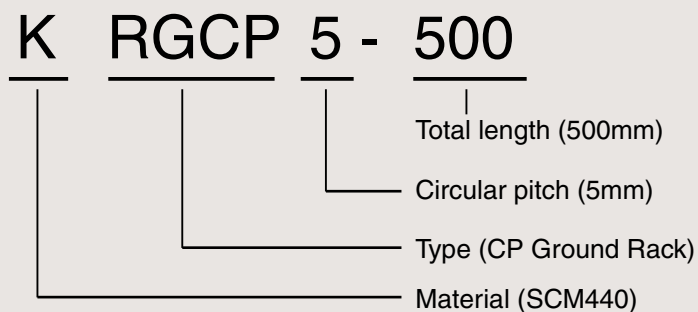
Pinions



Pinions

Material	Type
S S45C (S45C-D)	SCP CP Spur Gears
SU SUS303, SUS304	SCPG CP Ground Spur Gears
K SCM440	SCPGS CP Ground Pinion Shafts
	TSCP CP Tapered Pinions

Racks



Racks

Material	Type
S S45C	RCP CP Racks
K SCM440	RCPF CP Racks with Machined Ends
SU SUS304	RCPD CP Racks with Bolt Holes
F SS400	RGCP CP Ground Racks
	RGCPF Ground CP Racks with Machined Ends
	RGCPD Ground CP Racks with Bolt Holes
	ROCP CP Round Racks
	TRCPF CP Tapered Racks with Machined Ends



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CP Racks & Pinions



For Accurate Positioning in Linear Motion Applications.

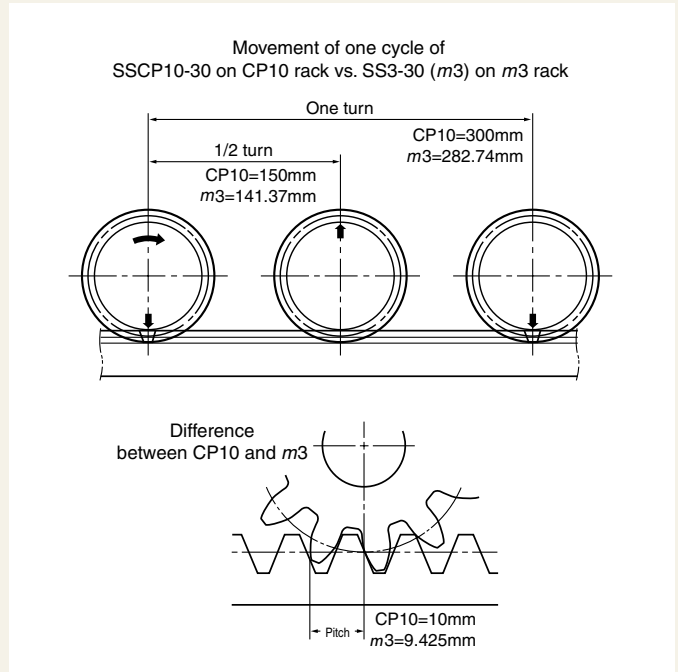


Characteristics

KHK stock CP racks and pinions are suitable in applications where very accurate positioning in linear motion is required. For your convenience, we offer circular pitches of 2.5 to 20mm and in lengths of 100 to 2000mm. (FRCP is available to 4000mm)

About CP Racks & Pinions

The reference pitch of a metric module is computed by multiplying the number of module by π (3.14159). For example, the reference pitch of $m3$ rack is 9.425mm ($3 \times \pi$). When using a rack and a pinion in a linear motion application, the fact that the pitch is not an integral number presents a difficulty in accurate positioning. This problem is solved by CP racks and pinions where one rotation of a pinion moves it precisely 50, 100, 150, ... or 600mm. The difference in movement of one rotation of a 30 tooth CP10 vs. SS3 spur gear is illustrated on the right.



Main Characteristics of CP Racks & Pinions

< Racks >

Catalog No.	Pitch mm	Length mm () denotes no. of teeth	Material	Heat treatment	Tooth surface finish	Precision KHK R 001 () denotes JIS B 1702-1 grades	Main characteristics
STRCPF	5, 10	1000	S45C-D	Straightened & annealed	Hobbed	4	By pairing with KTSCP pinion, the backlash may be adjusted.
KRGCP(F)(D) NOTE1	5, 10	100, 500, 1000	SCM440	Thermal refining	Ground	1	High strength and abrasion-resistant for precision linear motion.
KRCPF	5, 10	1000	SCM440	Thermal refining	Hobbed	4	Increased strength with SCM440 material which is thermal refined.
SRCP (F)(D) NOTE1	2.5, 5, 10, 15, 20	100, 1000, 1500, 2000	S45C-D	Straightened & annealed	Hobbed	4	Widely applicable due to low cost and large selection of pitches and lengths.
SURCPF(D)	5, 10	1000	SUS304	Solution treatment	Hobbed	5	Suitable for food machinery due to SUS304 material's rust-resistant quality.
SROCP	2.5, 5, 10	500	S45C-D	Straightened & annealed	Hobbed	4	Convenient in applications where the rack has reciprocal motion.
FRCP	5	2000, 3000, 4000	SS400	—	Hobbed	8	Cut continuously. Long length and deformable to a contour.

<Pinions>

KTSCP	5, 10	(20~40)	SCM440	Thermal refining	Hobbed	(N8)	By pairing with STRCP rack, the backlash may be adjusted.
SSCPG(S) NOTE2	5, 10	(10~40)	S45C	Induction hardened teeth (SSCPGS is thermal refined)	Ground	(N7)	Perform secondary operations to suit your requirement on these ground CP spur gears.
SSCP	2.5, 5, 10, 15, 20	(20~40)	S45C	—	Hobbed	(N8)	Widely applicable due to low cost and large selection of pitches and numbers of teeth.
SUSCP	5, 10	(20~30)	SUS303	—	Hobbed	(N8)	Suitable for food machinery due to SUS303 material's rust-resistant quality.

NOTE 1: The catalog numbers in the above table with (F) on the end have both ends machined so that they can be butted against each other to make any desired length. The items with (D) have mounting screw holes for easier assembly.

NOTE 2: The pinions with (S) are pinion shafts.



Selection Hints

It is important to thoroughly understand the contents of the product tables as well as “CAUTION” notes before making the selection. In addition, read the section below as well as “1. Caution in Selecting the Mating Gears”, “3. Selecting Racks by Precision”, “4. Caution with Regard to the Special Characteristics”, and “5. Other Points to Consider in the Selection Process” in the KHK stock rack section starting on page 155, and “Selection Hints” of spur gears on pages 27 and 28.

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 his own values by applying the actual usage conditions. The table below contains the assumptions established for these products in order to compute gear strengths.

Calculation of Bending Strength

<Racks>

<Pinions>

Catalog No.	KRGCP KRGCPF KRGCPD KRCPPF	SRCP SRCPF SRCPFD SROCP STRCPF	SURCPF SURCPFD FRCP	SSCPG (SSCPGS)	KTSCP	SSCP	SUSCP
Formula <small>NOTE 1</small>	Formula of spur and helical gears on bending strength (JGMA401-01)						
No. of teeth of mating gears	30			Same number teeth			
Rotation	100min ⁻¹			600min ⁻¹	100min ⁻¹		
Durability	Over 10 ⁷ cycles						
Impact from motor	Uniform load						
Impact from load	Uniform load						
Direction of load	Bidirectional						
Allowable root bending stress σ_{Flim} <small>NOTE 2</small>	21.33kgf/mm ²	13.33kgf/mm ²	7kgf/mm ²	14 (16.67) kgf/mm ²	19kgf/mm ²	12.67kgf/mm ²	7kgf/mm ²
Safety factor S _F	1.2						

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

Formula <small>NOTE 1</small>	Formula of spur and helical gears on surface durability (JGMA402-01)						
Kinematic viscosity of lubricant	100cSt (50°C)						
Gear support	Support on one end			Symmetric support by bearings			
Allowable Hertz stress σ_{Hlim}	79kgf/mm ²	52.5kgf/mm ²	41.3kgf/mm ²	90 (99) kgf/mm ²	74.5kgf/mm ²	49kgf/mm ²	41.3kgf/mm ²
Safety factor S _H	1.15						

NOTE 1: The gear strength formula is based on JGMA (Japanese Gear Manufacturers Association) specifications. The units of number of rotations (min⁻¹) and the stress (kgf/mm²) are adjusted to the units needed in the formula.

NOTE 2: Since the load is bidirectional, the allowable bending stress at root σ_{Flim} is set to 2/3 of the value.



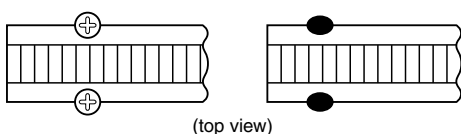
Application Hints

When using KHK stock CP racks and pinions, please carefully read the Application Hints of the rack section starting on page 155.

- CP5 (m1.592) and CP10 (m3.183) are very close in size to m1.5 and m3 respectively. The piece marking should be verified to make sure that the item is correct.
- Examples of fastening methods of FRCP metal flexible racks are shown below.

■ Fixed by flat head screw

■ Fixed by spot welding



Example of KHK Gear Applications



Automatic material handling equipment (CP racks & pinions)