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## Catalog Number of KHK Stock Gears

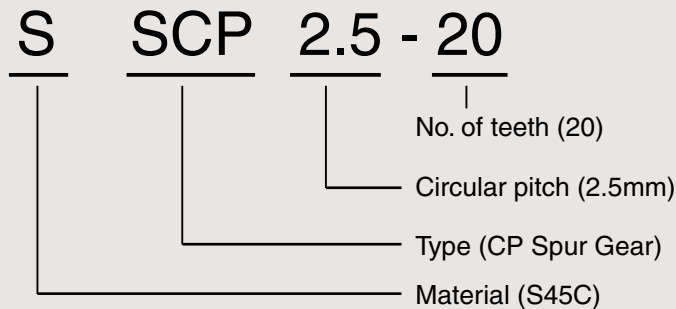
Catalog Numbers of KHK stock gears are based on simple principles as follows.

Please order KHK gears by specifying their Catalog Numbers.

(Example)

### CP Racks & Pinions

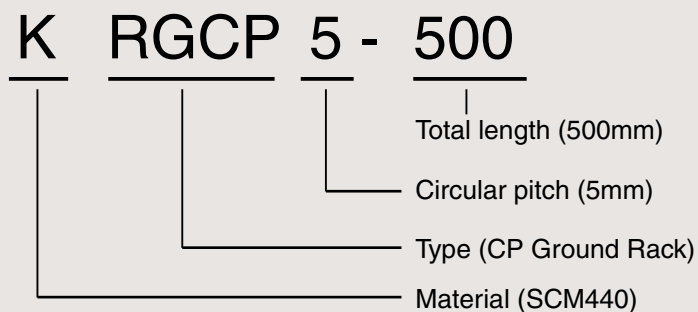
#### Pinions



#### Pinions

Material	Type
S S45C (S45C-D)	SCP CP Spur Gears
SU SUS303, SUS304	SCPG CP Ground Spur Gears
K SCM440	SCP GS 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



# 5

# CP Racks & Pinions



## For Accurate Positioning in Linear Motion Applications.

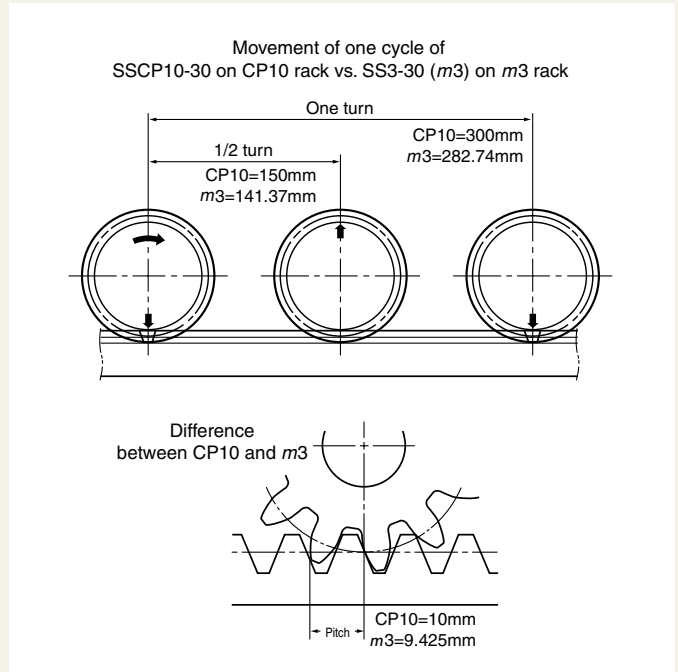


### Characteristics

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  $\pi$  (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

&lt;Racks&gt;

&lt;Pinions&gt;

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 <sup>-1</sup>			600min <sup>-1</sup>	100min <sup>-1</sup>		
Durability	Over 10 <sup>7</sup> cycles						
Impact from motor	Uniform load						
Impact from load	Uniform load						
Direction of load	Bidirectional						
Allowable root bending stress $\sigma_{Flim}$ <small>NOTE 2</small>	21.33kgf/mm <sup>2</sup>	13.33kgf/mm <sup>2</sup>	7kgf/mm <sup>2</sup>	14 (16.67) kgf/mm <sup>2</sup>	19kgf/mm <sup>2</sup>	12.67kgf/mm <sup>2</sup>	7kgf/mm <sup>2</sup>
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 $\sigma_{Hlim}$	79kgf/mm <sup>2</sup>	52.5kgf/mm <sup>2</sup>	41.3kgf/mm <sup>2</sup>	90 (99) kgf/mm <sup>2</sup>	74.5kgf/mm <sup>2</sup>	49kgf/mm <sup>2</sup>	41.3kgf/mm <sup>2</sup>
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<sup>-1</sup>) and the stress (kgf/mm<sup>2</sup>) are adjusted to the units needed in the formula.

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



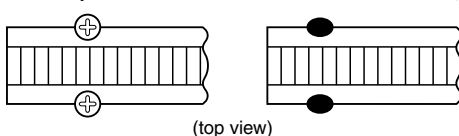
## Application Hints

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

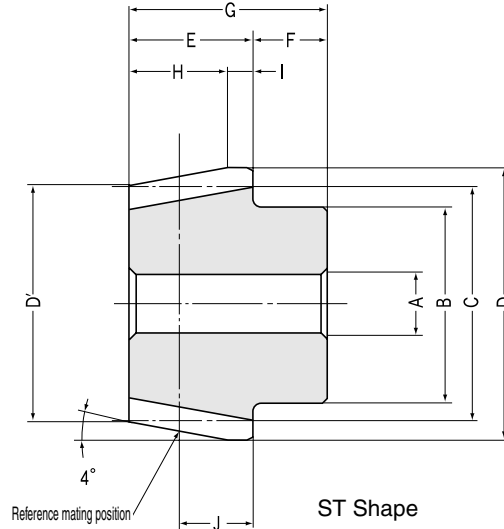
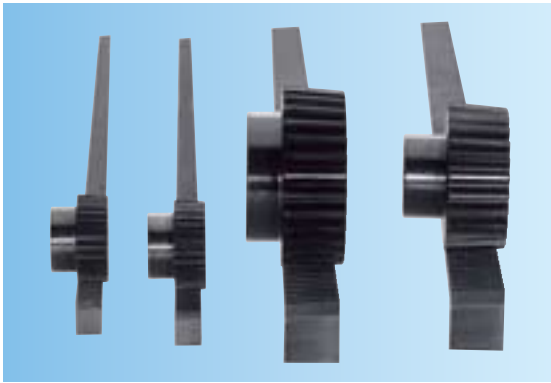
■ Fixed by spot welding



### Example of KHK Gear Applications



Automatic material handling equipment (CP racks & pinions)



### KTSCP Tapered Pinion CP5

Catalog No.	Pitch mm (m)	No. of teeth	Bore	Hub dia.	Pitch dia.	Outside dia. (major)	Outside dia. (minor)	Face width	Hub width	Total length	Distance traveled in one turn <small>Note 1</small>
		z	AH7	B	C	D	D'	E	F	G	
KTSCP5 -20	CP5 (1.5915)	20	8	25	31.83	36.06	33.97	18	15	33	100
KTSCP5 -25	CP5 (1.5915)	25	10	32	39.79	44.02	41.92	18	15	33	125
KTSCP5 -30	CP5 (1.5915)	30	10	38	47.75	51.98	49.88	18	15	33	150
KTSCP5 -40	CP5 (1.5915)	40	12	45	63.66	67.89	65.8	18	15	33	200

### KTSCP Tapered Pinion CP10

KTSCP10-20	CP10 (3.1831)	20	15	50	63.66	72.13	67.93	36	20	56	200
KTSCP10-25	CP10 (3.1831)	25	20	60	79.58	88.04	83.85	36	20	56	250
KTSCP10-30	CP10 (3.1831)	30	20	75	95.49	103.96	99.76	36	20	56	300
KTSCP10-40	CP10 (3.1831)	40	20	80	127.32	135.79	131.59	36	20	56	400

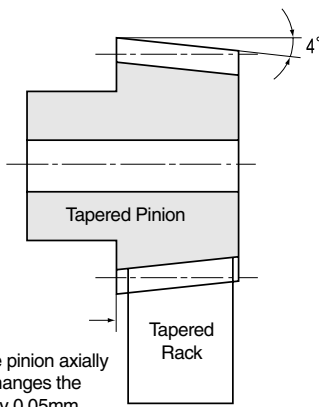
**NOTE 1:** The amount denotes the distance in mm tapered pinion travels on the racks in one revolution.

### STRCPF Tapered Rack

Catalog No.	Pitch mm (m)	Total length	Face width	Height (major)	Height (minor)	Reference mating height	Reference position	Effective No. of teeth
		A	B	C	C'	D	E	
STRCPF 5-1000	5 (1.5915)	1000	15	19.5	18.45	17.38	7.5	200
STRCPF10-1000	10 (3.1831)	1000	30	34.5	32.4	30.27	15	100

### Adjustable backlash:

Moving the pinion axially by 1mm changes the backlash by 0.05mm

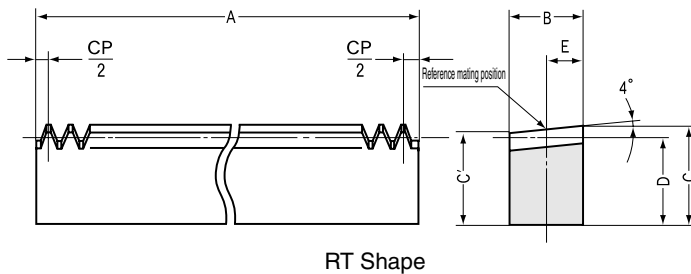


Moving the pinion axially by 1mm changes the backlash by 0.05mm

#### For example

- SRCP5-1000 & SSCP5-30 Backlash value → 0.1~0.2
- STRCPF5-1000 & KTSCP5-30 Backlash value → 0.05 or less.

- \* **NOTE:** The above backlash values are the theoretical values.
- \* **NOTE:** Tapered rack& pinion are not interchangeable with KHK stock CP racks and pinions.
- \* **NOTE:** Different modules, number of teeth, ground gear versions and custom-made items are available as special orders.



### KTSCP Specifications

Precision grade	JIS N8 grade (JIS B1702-1: 1998) OLD JIS 4 grade (JIS B1702: 1976)	Tooth hardness	225~260HB
Gear teeth		Surface treatment	Black oxide
Pressure angle		Tooth surface finish	Cut
Material		Datum reference surface for gear cutting	Bore
Heat treatment	Thermal refining only	Secondary Operations	Possible

### STRCPF Specifications

Precision grade	KHK R 001 grade 4	Tooth hardness	89~95HRB
Gear teeth	Standard full depth	Surface treatment	Black oxide
Pressure angle	20°	Tooth surface finish	Cut
Material	S45C-D	Datum reference surface for gear cutting	Bottom surface
Heat treatment	Stress relief annealing	Secondary Operations	Possible

Reference face width	Adjustable width	Reference position	Shape	Allowable torque (N·m) <small>NOTE 2</small>		Allowable torque (kgf·m)		Backlash (mm) <small>Note 3</small>	Weight (kgf)	Catalog No.
				Bending strength	Surface durability	Bending strength	Surface durability			
H	I	J								
15	3	10.5	ST	39.3	3.57	( 4.01 )	( 0.364 )	0 ~ 0.11	0.16	KTSCP5 -20 KTSCP5 -25 KTSCP5 -30 KTSCP5 -40
15	3	10.5	ST	54.1	5.89	( 5.52 )	( 0.6 )	0 ~ 0.11	0.26	
15	3	10.5	ST	69.4	8.76	( 7.07 )	( 0.893 )	0 ~ 0.11	0.36	
15	3	10.5	ST	100.8	16.02	( 10.28 )	( 1.634 )	0 ~ 0.11	0.6	

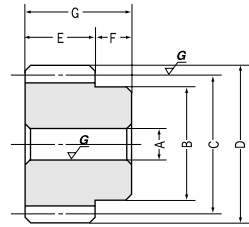
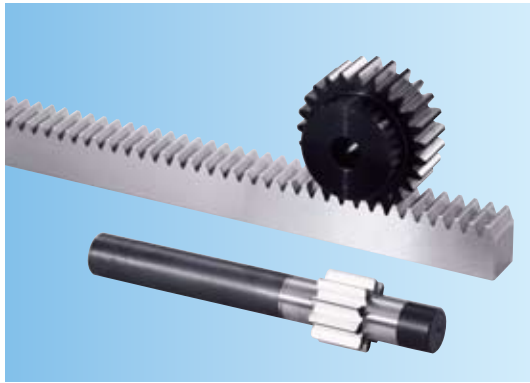
30	6	21	ST	315	30.8	( 32.1 )	( 3.14 )	0 ~ 0.12	1.16	KTSCP10-20 KTSCP10-25 KTSCP10-30 KTSCP10-40
30	6	21	ST	433	50.6	( 44.1 )	( 5.16 )	0 ~ 0.12	1.74	
30	6	21	ST	555	75.3	( 56.6 )	( 7.68 )	0 ~ 0.12	2.6	
30	6	21	ST	807	138.6	( 82.3 )	( 14.13 )	0 ~ 0.12	4.28	

**NOTE 2:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.

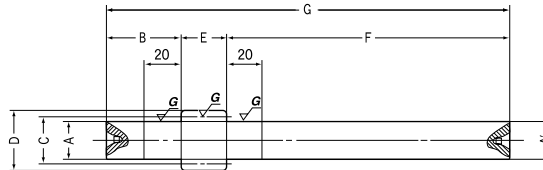
**NOTE 3:** The backlash values shown in the table are the theoretical values when these gears and the STRCP Tapered Racks are in mesh.

Shape	Allowable force (N) <small>NOTE 4</small>		Allowable force (kgf)		Weight (kgf)	Catalog No.
	Bending strength	Surface durability	Bending strength	Surface durability		
RT	2290	468	( 233 )	( 46.7 )	2.06	STRCPF 5-1000 STRCPF10-1000
RT	9150	1870	( 933 )	( 190 )	7.1	

**NOTE4:** The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.



S1 Shape



S7 Shape

CP5 Ground Pinion Shafts

Catalog No.	Pitch mm (m)	No. of teeth	Coefficient of profile shift NOTE 1	Shaft dia.	Shaft length (L)		Pitch dia.	Outside dia.	Face width	Shaft length (R)		Total length	Distance traveled in one turn NOTE 2
		z		A	B	C	D	E	F	G			
SSCPG5-15	CP5 (1.5915)	15	0	19.2	25	23.87	27.06	15	100	140	75		
SSCPG5-20	CP5 (1.5915)	20	0	27.2	25	31.83	35.01	15	100	140	100		
SSCPG5-25	CP5 (1.5915)	25	0	30.2	25	39.79	42.97	15	100	140	125		

CP10 Ground Pinion Shafts

SSCPG10-10	CP10 (3.1831)	10	+0.5	25.2	40	31.83	41.05	30	150	220	100
SSCPG10-15	CP10 (3.1831)	15	0	35.2	40	47.75	54.11	30	150	220	150
SSCPG10-20	CP10 (3.1831)	20	0	40.2	40	63.66	70.03	30	150	220	200

NOTE 1: Please see the SSGS ground Spur gears section for the center distance table of profile shifted gears.

CP5 Ground Spur Gears

Catalog No.	Pitch mm (m)	No. of teeth	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Hub width	Total length	Distance traveled in one turn NOTE 2
		z	AH7	B	C	D	E	F	G	
SSCPG5-20	CP5 (1.5915)	20	8	25	31.83	35.01	15	15	30	100
SSCPG5-25	CP5 (1.5915)	25	10	32	39.79	42.97	15	15	30	125
SSCPG5-30	CP5 (1.5915)	30	10	38	47.74	50.93	15	15	30	150
SSCPG5-40	CP5 (1.5915)	40	12	50	63.66	66.84	15	15	30	200

CP10 Ground Spur Gears

SSCPG10-20	CP10 (3.1831)	20	15	50	63.66	70.03	30	20	50	200
SSCPG10-25	CP10 (3.1831)	25	20	60	79.57	85.94	30	20	50	250
SSCPG10-30	CP10 (3.1831)	30	20	75	95.49	101.86	30	20	50	300
SSCPG10-40	CP10 (3.1831)	40	25	80	127.32	133.69	30	20	50	400

NOTE 2: The amount denotes the distance in mm the CP spur gear travels on the rack in one revolution.

CP5~10 Ground Racks

Catalog No.	Pitch mm (m)	Total length	Face width	Height	Height to pitch Line		Effective No. of teeth	Shape	Allowable force (N) NOTE 5		Allowable force (kgf)	
					A	D			Bending strength	Surface durability	Bending strength	Surface durability
					KRGCP 5-100	CP 5 (1.5915)			98	15	20	18.41
KRGCP10-100	CP10 (3.1831)	98	30	35	31.82	10	R1	14640	6228	( 1493 )	( 635.1 )	
KRGCP 5-500	CP 5 (1.5915)	505	15	20	18.41	101	R1	3660	1557	( 373.2 )	( 158.8 )	
KRGCP10-500	CP10 (3.1831)	505	30	35	31.82	50	R1	14640	6228	( 1493 )	( 635.1 )	

NOTE 3: These racks may be used as the joining gauges for the ground racks with machined ends.

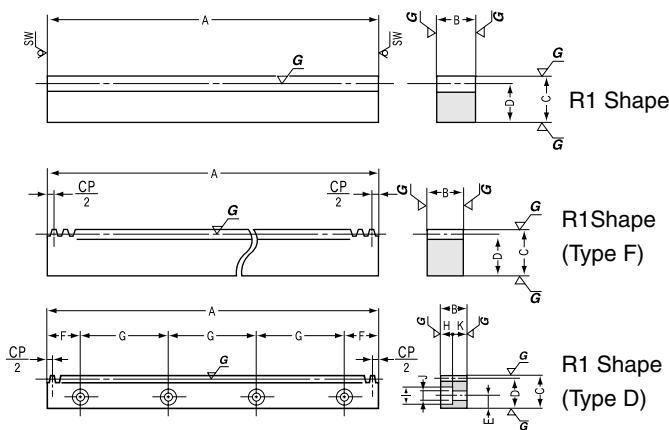
CP5~10 Ground Racks Type F

KRGCPF 5-1000	CP 5 (1.5915)	1000	15	20	18.41	200	R1	3660	1557	( 373.2 )	( 158.8 )
KRGCPF10-1000	CP10 (3.1831)	1000	30	35	31.82	100	R1	14640	6228	( 1493 )	( 635.1 )

CP5~10 Ground Racks Type D

Catalog No.	Pitch mm (m)	Total length	Face width	Height	Height to pitch Line		Effective No. of teeth	Mounting hole dimension NOTE 4			No. of mounting holes	Mounting screw size
					A	D		E	F	G		
					KRGCPD 5-500	CP 5 (1.5915)		500	15	20		
KRGCPD10-500	CP10 (3.1831)	500	30	35	31.82	50	14	40	140	4	M10	

NOTE 4: The dimensions "E" and "F" have the general tolerance.



\*SW is saw blade finish.

Specifications			
Catalog No.	SSCPG	SSCPGS	KRGCP(F)(D)
Precision grade	JIS N7 grade (JIS B1702-1: 1998) OLD JIS 3 grade (JIS B1702: 1976)	JIS N7 grade (JIS B1702-1: 1998) OLD JIS 3 grade (JIS B1702: 1976)	KHK R 001 grade 1
Gear teeth	Standard full depth	Standard full depth	Standard full depth
Pressure angle	20°	20°	20°
Material	S45C	S45C	SCM440
Heat treatment	Induction hardened teeth	Tooth induction hardened after thermal refining	Thermal refining only
Tooth hardness	48~53HRC	48~53HRC	250~285HB
Surface treatment	Black oxide except ground surfaces	Black oxide except ground surfaces	—
Tooth surface finish	Ground	Ground	Ground
Datum reference surface for gear grinding	Bore	Shaft (Ground portion)	Bottom surface
Secondary Operations	Possible except tooth area	Possible except tooth area	Possible

Shape	Allowable torque (N·m) NOTE 5		Allowable torque (kgf·m)		Backlash (mm) NOTE 6	Weight (kgf)	Catalog No.
	Bending strength	Surface durability	Bending strength	Surface durability			
S7	18.47	5.997	(1.883)	(0.6115)	0.04 ~ 0.13	0.34	SSCPG5-20 SSCPG5-25 SSCPG5-30 SSCPG5-40
S7	28.72	11.28	(2.929)	(1.15)	0.04 ~ 0.13	0.66	
S7	32.95	15.23	(3.36)	(1.553)	0.04 ~ 0.13	0.85	

S7	90.57	27.69	(9.236)	(2.824)	0.05 ~ 0.15	0.97	SSCPGS10-10 SSCPGS10-15 SSCPGS10-20
S7	123.2	42.13	(12.56)	(4.296)	0.05 ~ 0.15	1.87	
S7	191.5	79.72	(19.53)	(8.129)	0.06 ~ 0.16	2.64	

Shape	Allowable torque (N·m) NOTE 5		Allowable torque (kgf·m)		Backlash (mm) NOTE 6	Weight (kgf)	Catalog No.
	Bending strength	Surface durability	Bending strength	Surface durability			
S1	24.13	9.323	(2.461)	(0.9507)	0.04 ~ 0.13	0.16	SSCPG5-20 SSCPG5-25 SSCPG5-30 SSCPG5-40
S1	27.67	12.58	(2.822)	(1.283)	0.04 ~ 0.13	0.22	
S1	35.48	18.4	(3.618)	(1.876)	0.04 ~ 0.13	0.4	
S1	51.58	33.53	(5.26)	(3.419)	0.05 ~ 0.14	0.58	

S1	160.9	65.89	(16.41)	(6.719)	0.06 ~ 0.16	1.1	SSCPG10-20 SSCPG10-25 SSCPG10-30 SSCPG10-40
S1	221.3	107	(22.57)	(10.91)	0.06 ~ 0.16	1.7	
S1	283.9	156.8	(28.95)	(15.99)	0.06 ~ 0.16	2.5	
S1	380.9	265.7	(38.84)	(27.09)	0.07 ~ 0.17	3.59	

NOTE 5: The allowable torque values shown in the table are the calculated values according to the assumed usage conditions.

NOTE 6: The backlash values shown in the table are the theoretical values when these gears are meshed with KRGCP racks.

Weight (kgf)	Catalog No.
0.22	KRGCP 5-100 KRGCP10-100
0.75	
1.1	KRGCP 5-500 KRGCP10-500
3.8	

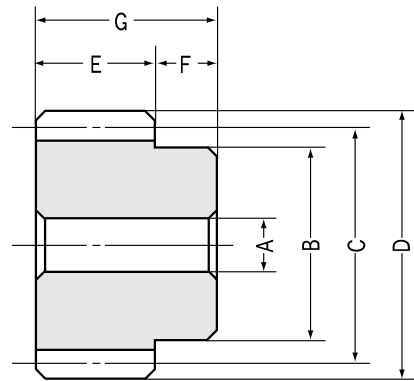
2.2	KRGCPF 5-1000 KRGCPF10-1000
7.5	

Counterbore and hole dimensions				Shape	Allowable force (N) NOTE 7		Allowable force (kgf)		Weight (kgf)	Catalog No.
H	I	J	K		Bending strength	Surface durability	Bending strength	Surface durability		
6	10	6	9	R1	3660	1557	(373.2)	(158.8)	1	KRGCPD 5-500 KRGCPD10-500
11	17.5	11	19	R1	14640	6228	(1493)	(635.1)	3.6	

NOTE 7: The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.



# SSCP CP Spur Gears Circular Pitches 2.5~20



S1 Shape

## CP2.5 (m 0.7958)

Catalog No.	Pitch mm (m)	No. of teeth	Bore	Hub dia.	Pitch dia	Outside dia	Face width	Hub width	Total length	Distance traveled in one turn <small>NOTE1</small>	Shape
		z	AH7	B	C	D	E	F	G		
<b>SSCP2.5-20</b>	CP2.5 (0.7958)	20	6	13	15.92	17.51	10	10	20	50	S1
<b>SSCP2.5-25</b>	CP2.5 (0.7958)	25	8	17	19.89	21.49	10	10	20	62.5	
<b>SSCP2.5-30</b>	CP2.5 (0.7958)	30	8	21	23.87	25.46	10	10	20	75	
<b>SSCP2.5-40</b>	CP2.5 (0.7958)	40	10	28	31.83	33.42	10	10	20	100	

## CP5 (m 1.5915)

<b>SSCP5 -20</b>	CP5 (1.5915)	20	8	25	31.83	35.01	15	15	30	100	S1
<b>SSCP5 -25</b>	CP5 (1.5915)	25	10	32	39.79	42.97	15	15	30	125	S1
<b>SSCP5 -30</b>	CP5 (1.5915)	30	10	38	47.74	50.92	15	15	30	150	S1
<b>SSCP5 -40</b>	CP5 (1.5915)	40	12	45	63.66	66.84	15	15	30	200	S1

## CP10 (m 3.1831)

<b>SSCP10 -20</b>	CP10 (3.1831)	20	15	50	63.66	70.03	30	20	50	200	S1
<b>SSCP10 -25</b>	CP10 (3.1831)	25	20	60	79.57	85.93	30	20	50	250	S1
<b>SSCP10 -30</b>	CP10 (3.1831)	30	20	75	95.49	101.86	30	20	50	300	S1
<b>SSCP10 -40</b>	CP10 (3.1831)	40	20	80	127.32	133.69	30	20	50	400	S1

## CP15 (m 4.7746)

<b>SSCP15 -20</b>	CP15 (4.7746)	20	22	75	95.49	105.04	50	27	77	300	S1
<b>SSCP15 -25</b>	CP15 (4.7746)	25	25	100	119.37	128.92	50	27	77	375	S1
<b>SSCP15 -30</b>	CP15 (4.7746)	30	25	110	143.24	152.79	50	27	77	450	S1

## CP20 (m 6.3662)

<b>SSCP20 -20</b>	CP20 (6.3662)	20	25	100	127.32	140.06	60	30	90	400	S1
<b>SSCP20 -25</b>	CP20 (6.3662)	25	30	130	159.16	171.89	60	30	90	500	S1
<b>SSCP20 -30</b>	CP20 (6.3662)	30	30	150	190.99	203.72	60	30	90	600	S1

**CAUTION:** SSCP and SS spur gears are similar in appearance and dimensions. Please check the identifying marking before use.

**NOTE 1:** The amount denotes the distance in mm that a pinion travels on the rack in one revolution.



**Specifications**

Precision grade	JIS N8 grade (JIS B1702-1: 1998) OLD JIS 4 grade (JIS B1702: 1976)	Tooth hardness	Less than 194HB
Gear teeth	Standard full depth	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

Allowable torque (N·m) <small>NOTE 2</small>		Allowable torque (kgf·m)		Backlash (mm) <small>NOTE 3</small>	Weight (kgf)	Catalog No.
Bending strength	Surface durability	Bending strength	Surface durability			
3.637	0.1981	(0.3709)	(0.0202)	0.06 ~ 0.20	0.02	<b>SSCP2.5-20</b> <b>SSCP2.5-25</b> <b>SSCP2.5-30</b> <b>SSCP2.5-40</b>
5.005	0.3236	(0.5104)	(0.033)	0.08 ~ 0.22	0.04	
6.419	0.4844	(0.6546)	(0.0494)	0.08 ~ 0.22	0.06	
9.326	0.8934	(0.951)	(0.0911)	0.08 ~ 0.22	0.11	

21.83	1.317	(2.226)	(0.1343)	0.09 ~ 0.24	0.16	<b>SSCP5 -20</b> <b>SSCP5 -25</b> <b>SSCP5 -30</b> <b>SSCP5 -40</b>
30.04	2.149	(3.063)	(0.2191)	0.10 ~ 0.26	0.22	
38.52	3.156	(3.928)	(0.3218)	0.10 ~ 0.26	0.4	
56.01	5.774	(5.711)	(0.5888)	0.10 ~ 0.26	0.54	

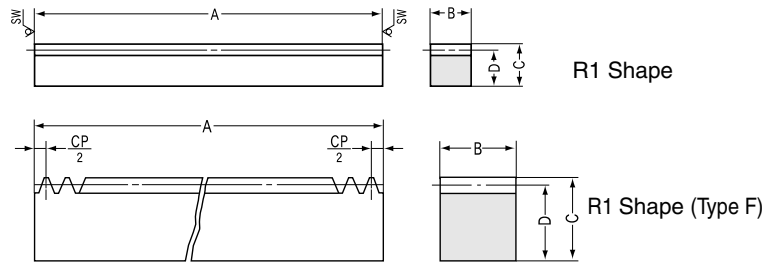
174.7	11.35	(17.81)	(1.157)	0.14 ~ 0.34	1.1	<b>SSCP10 -20</b> <b>SSCP10 -25</b> <b>SSCP10 -30</b> <b>SSCP10 -40</b>
240.4	18.47	(24.51)	(1.883)	0.16 ~ 0.37	1.7	
308.2	27.13	(31.43)	(2.767)	0.16 ~ 0.37	2.5	
448	49.95	(45.68)	(5.094)	0.16 ~ 0.37	3.7	

655	43.87	( 66.79)	( 4.474)	0.19 ~ 0.46	3.5	<b>SSCP15 -20</b> <b>SSCP15 -25</b> <b>SSCP15 -30</b>
901.3	72.15	( 91.91)	( 7.357)	0.21 ~ 0.49	5.8	
1156	107.1	(117.9)	(10.92)	0.21 ~ 0.49	8.9	

1397	98.16	(142.5)	(10.01)	0.21 ~ 0.52	7.5	<b>SSCP20 -20</b> <b>SSCP20 -25</b> <b>SSCP20 -30</b>
1923	160.9	(196.1)	(16.41)	0.23 ~ 0.56	12	
2465	237.1	(251.4)	(24.18)	0.23 ~ 0.56	17	

**NOTE 2:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.

**NOTE 3:** The backlash values shown in the table are the theoretical values when these gears are meshed with SRCP racks.



\*SW is saw blade finish.

CP2.5~20

Catalog No.	Pitch mm (m)	Total length		Face width		Height	Height to pitch line	Effective No. of teeth	Shape	Allowable force (N) <small>NOTE 3</small>		Allowable force (kgf)	
		A	B	C	D					Bending strength	Surface durability	Bending strength	Surface durability
SRCP 5-100 <small>NOTE 1</small>	CP 5 (1.5915)	98	15	20	18.41	18	R1	2288	467.5	( 233.3 )	( 47.67 )		
SRCP10-100 <small>NOTE 1</small>	CP10 (3.1831)	98	30	35	31.82	8	R1	9150	1870	( 933.1 )	( 190.7 )		
SRCP15-100 <small>NOTE 1</small>	CP15 (4.7746)	103	50	50	45.23	5	R1	22880	4528	(2333 )	(461.7 )		
SRCP20-100 <small>NOTE 1</small>	CP20 (6.3662)	98	60	60	53.63	3	R1	36600	7479	(3732 )	(762.7 )		
SRCP2.5-1000	CP 2.5 (0.7958)	1010	10	12	11.20	402	R1	762.6	142.5	( 77.76 )	( 14.53 )		
SRCP 5-1000	CP 5 (1.5915)	1010	15	20	18.41	200	R1	2288	467.5	( 233.3 )	( 47.67 )		
SRCP 10-1000	CP10 (3.1831)	1010	30	35	31.82	100	R1	9150	1870	( 933.1 )	( 190.7 )		

**NOTE 1:** These racks may be used as the joining gauges for the ground racks with machined ends.

CP5~20 Type F

SRCPF 5-1000	CP 5 (1.5915)	1000	15	20	18.41	200	R1	2288	467.5	( 233.3 )	( 47.67 )
SRCPF10-1000	CP10 (3.1831)	1000	30	35	31.82	100	R1	9150	1870	( 933.1 )	( 190.7 )
SRCPF15-1000	CP15 (4.7746)	1005	50	50	45.23	67	R1	22880	4528	(2333 )	(461.7 )
SRCPF20-1000	CP20 (6.3662)	1000	60	60	53.63	50	R1	36600	7479	(3732 )	(762.7 )
SRCPF 5-1500	CP 5 (1.5915)	1500	15	20	18.41	300	R1	2288	467.5	( 233.3 )	( 47.67 )
SRCPF10-1500	CP10 (3.1831)	1500	30	35	31.82	150	R1	9150	1870	( 933.1 )	( 190.7 )
SRCPF15-1500	CP15 (4.7746)	1500	50	50	45.23	100	R1	22880	4528	(2333 )	(461.7 )
SRCPF20-1500	CP20 (6.3662)	1500	60	60	53.63	75	R1	36600	7479	(3732 )	(762.7 )
SRCPF 5-2000	CP 5 (1.5915)	2050	15	20	18.41	410	R1	2288	467.5	( 233.3 )	( 47.67 )
SRCPF10-2000	CP10 (3.1831)	2050	30	35	31.82	205	R1	9150	1870	( 933.1 )	( 190.7 )
SRCPF15-2000	CP15 (4.7746)	2040	50	50	45.23	136	R1	22880	4528	(2333 )	(461.7 )
SRCPF20-2000	CP20 (6.3662)	2040	60	60	53.63	102	R1	36600	7479	(3732 )	(762.7 )

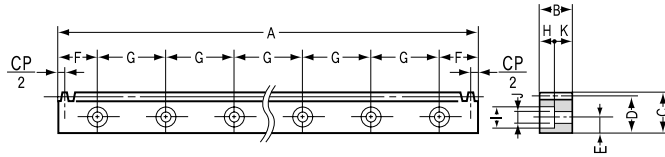
CP5~20 Type D

Catalog No.	Pitch mm (m)	Total length		Face width		Height	Height to pitch line	Effective No. of teeth	Mounting hole dimensions <small>NOTE 2</small>			No. of mounting holes	Mounting screw size
		A	B	C	D				E	F	G		
SRCPFD 5-1000	CP 5 (1.5915)	1000	15	20	18.41	200	8	50	180	6	M 5		
SRCPFD10-1000	CP10 (3.1831)	1000	30	35	31.82	100	14	50	180	6	M10		
SRCPFD15-1000	CP15 (4.7746)	1005	50	50	45.23	67	20	62.5	220	5	M14		
SRCPFD20-1000	CP20 (6.3662)	1000	60	60	53.63	50	23	60	220	5	M16		
SRCPFD 5-1500	CP 5 (1.5915)	1500	15	20	18.41	300	8	30	180	9	M 5		
SRCPFD10-1500	CP10 (3.1831)	1500	30	35	31.82	150	14	30	180	9	M10		
SRCPFD15-1500	CP15 (4.7746)	1500	50	50	45.23	100	20	90	220	7	M14		
SRCPFD20-1500	CP20 (6.3662)	1500	60	60	53.63	75	23	90	220	7	M16		
SRCPFD 5-2000	CP 5 (1.5915)	2050	15	20	18.41	410	8	35	180	12	M 5		
SRCPFD10-2000	CP10 (3.1831)	2050	30	35	31.82	205	14	35	180	12	M10		
SRCPFD15-2000	CP15 (4.7746)	2040	50	50	45.23	136	20	30	220	10	M14		
SRCPFD20-2000	CP20 (6.3662)	2040	60	60	53.63	102	23	30	220	10	M16		

**NOTE 2:** The dimensions "E" and "F" have the general tolerance.

CP5~10 Type F Thermal Refined

Catalog No.	Pitch mm (m)	Total length		Face width		Height	Height to pitch line	Effective No. of teeth	Shape	Allowable force (N) <small>NOTE 3</small>		Allowable force (kgf)	
		A	B	C	D					Bending strength	Surface durability	Bending strength	Surface durability
KRCPF 5-1000	CP 5 (1.5915)	1000	15	20	18.41	200	R1	3660	1038	( 373.2 )	( 105.8 )		
KRCPF10-1000	CP10 (3.1831)	1000	30	35	31.82	100	R1	14640	4479	(1493 )	(456.7 )		



R1 Shape (Type D)

Weight (kgf)	Catalog No.
0.22	<b>SRCP 5 -100</b>
0.75	<b>SRCP10 -100</b>
1.9	<b>SRCP15 -100</b>
2.5	<b>SRCP20 -100</b>
1.1	<b>SRCP2.5-1000</b>
2.2	<b>SRCP 5-1000</b>
7.6	<b>SRCP 10-1000</b>

2.2	<b>SRCPF 5-1000</b>
7.6	<b>SRCPF10-1000</b>
17.7	<b>SRCPF15-1000</b>
25	<b>SRCPF20-1000</b>
3.3	<b>SRCPF 5-1500</b>
11.2	<b>SRCPF10-1500</b>
26.4	<b>SRCPF15-1500</b>
37.5	<b>SRCPF20-1500</b>
4.4	<b>SRCPF 5-2000</b>
15.4	<b>SRCPF10-2000</b>
35.9	<b>SRCPF15-2000</b>
51	<b>SRCPF20-2000</b>

Counterbore and hole dimensions				Shape	Allowable force (N) note 3		Allowable force (kgf)		Weight (kgf)	Catalog No.
H	I	J	K		Bending strength	Surface durability	Bending strength	Surface durability		
6	10	6	9	R1	2288	467.5	( 233.3 )	( 47.67 )	2.1	<b>SRCPFD 5-1000</b> <b>SRCPFD10-1000</b> <b>SRCPFD15-1000</b> <b>SRCPFD20-1000</b>
11	17.5	11	19	R1	9150	1870	( 933.1 )	( 190.7 )	7.4	
16	23	16	34	R1	22880	4528	(2333 )	(461.7 )	17.2	
18	26	18	42	R1	36600	7479	(3732 )	(762.7 )	24.2	
6	10	6	9	R1	2288	467.5	( 233.3 )	( 47.67 )	3.2	<b>SRCPFD 5-1500</b> <b>SRCPFD10-1500</b> <b>SRCPFD15-1500</b> <b>SRCPFD20-1500</b>
11	17.5	11	19	R1	9150	1870	( 933.1 )	( 190.7 )	11	
16	23	16	34	R1	22880	4528	(2333 )	(461.7 )	25.7	
18	26	18	42	R1	36600	7479	(3732 )	(762.7 )	36.4	
6	10	6	9	R1	2288	467.5	( 233.3 )	( 47.67 )	4.4	<b>SRCPFD 5-2000</b> <b>SRCPFD10-2000</b> <b>SRCPFD15-2000</b> <b>SRCPFD20-2000</b>
11	17.5	11	19	R1	9150	1870	( 933.1 )	( 190.7 )	15.1	
16	23	16	34	R1	22880	4528	(2333 )	(461.7 )	34.8	
18	26	18	42	R1	36600	7479	(3732 )	(762.7 )	49.4	

**NOTE 3:** The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.

Weight (kgf)	Catalog No.
2.2	<b>KRCPF 5-1000</b>
7.5	<b>KRCPF10-1000</b>

**SRCP(F)(D) Specifications**

Precision grade	<b>KHK R 001 grade 4</b>	Tooth hardness	<b>Less than 95HRB</b>
Gear teeth	<b>Standard full depth</b>	Surface treatment	<b>Black oxide</b>
Pressure angle	<b>20°</b>	Tooth surface finish	<b>Cut</b>
Material	<b>S45C-D</b>	Datum reference surface for gear cutting	<b>Bottom surface</b>
Heat treatment	<b>Stress relief annealing</b>	Secondary Operations	<b>Possible</b>

**KRCPF Specifications**

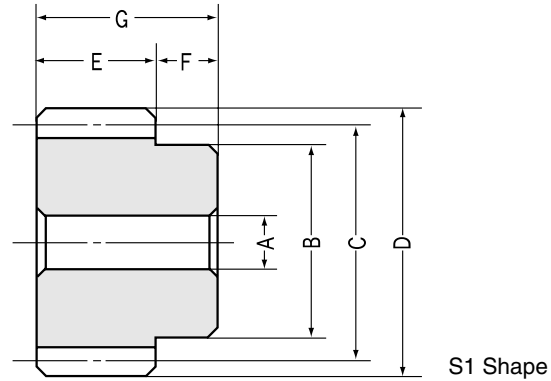
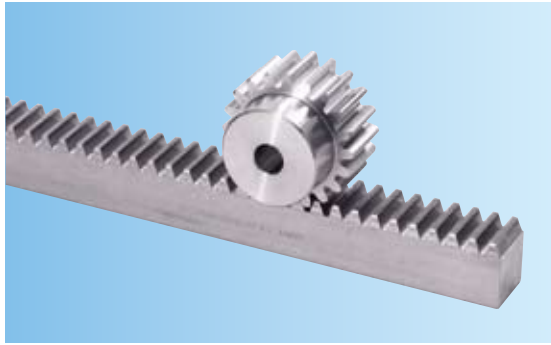
Precision grade	<b>KHK R 001 grade 4</b>	Tooth hardness	<b>250~285HB NOTE 4</b>
Gear teeth	<b>Standard full depth</b>	Surface treatment	—
Pressure angle	<b>20°</b>	Tooth surface finish	<b>Cut</b>
Material	<b>SCM440</b>	Datum reference surface for gear cutting	<b>Bottom surface</b>
Heat treatment	<b>Thermal refining only</b>	Secondary Operations	<b>Possible</b>

**NOTE 4:** Due to the decarburization layer of about 0.5mm thickness, the rectangular surfaces have less than HB187 hardness.



# SUSCP CP Stainless Steel Spur Gears

Circular Pitches 5~10



## CP5 (m 1.5915)

Catalog No.	Pitch mm (m)	No. of teeth	Bore	Hub dia.	Pitch dia.	Outside dia.	Face width	Shaft length (R)	Total length	Distance traveled in one turn	Shape
		z	AH7	B	C	D	E	F	G	NOTE 1	
<b>SUSCP5-20</b>	CP5 (1.5915)	20	8	25	31.83	35.01	15	15	30	100	S1
<b>SUSCP5-25</b>	CP5 (1.5915)	25	10	32	39.79	42.97	15	15	30	125	S1
<b>SUSCP5-30</b>	CP5 (1.5915)	30	10	38	47.75	50.93	15	15	30	150	S1

## CP10 (m 3.1831)

<b>SUSCP10-20</b>	CP10 (3.1831)	20	15	50	63.66	70.03	30	20	50	200	S1
<b>SUSCP10-25</b>	CP10 (3.1831)	25	20	60	79.58	85.94	30	20	50	250	S1
<b>SUSCP10-30</b>	CP10 (3.1831)	30	20	75	95.49	101.86	30	20	50	300	S1

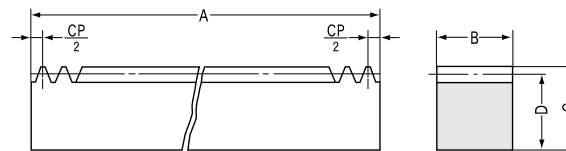
**CAUTION:** SUSCP and SUS spur gears are similar in appearance and dimensions. Please check the identifying marking before use.

**NOTE 1:** The amount denotes the distance in mm that a pinion travels on the rack in one revolution.



# SURCPF(D) CP Stainless Steel Racks

Circular Pitches 5~10



R1 Shape (Type F)

## CP5~10

Catalog No.	Pitch mm (m)	Total length	Face width	Height	Height to pitch Line	Effective No. of teeth	Shape
		A	B	C	D		
<b>SURCPF 5-1000</b>	CP 5 (1.5915)	1000	15	20	18.41	200	R1
<b>SURCPF10-1000</b>	CP10 (3.1831)	1000	30	35	31.82	100	R1

## CP5~10

Catalog No.	Pitch mm (m)	Total length	Face width	Height	Height to pitch Line	Effective No. of teeth	Mounting hole dimensions			No. of mounting holes	Mounting screw size
		A	B	C	D		E	F	G		
<b>SURCPFD 5-1000</b>	CP 5 (1.5915)	1000	15	20	18.41	200	8	50	180	6	M 5
<b>SURCPFD10-1000</b>	CP10 (3.1831)	1000	30	35	31.82	100	14	50	180	6	M10

\*The blue catalog numbers indicate the new products.

## Specifications

Precision grade	JIS N8 grade (JIS1 B1702-1: 1998) OLD JIS 4 grade (JIS B1702: 1974)	Tooth hardness	Less than 187HB
Gear teeth	Standard full depth	Surface treatment	—
Pressure angle	20°	Tooth surface finish	Cut
Material	SUS303	Datum reference surface for gear cutting	Bore
Heat treatment	—	Secondary Operations	Possible

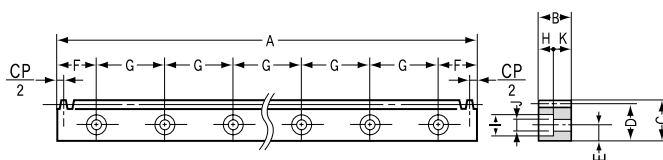
\*Available on special order: Same gears made in SUS304.

Allowable torque (N·m) NOTE 2		Allowable torque (kgf·m)		Backlash (mm) NOTE 3	Weight (kgf)	Catalog No.
Bending strength	Surface durability	Bending strength	Surface durability			
12.06	0.9355	(1.23 )	(0.0954)	0.09 ~ 0.26	0.16	<b>SUSCP5-20</b> <b>SUSCP5-25</b> <b>SUSCP5-30</b>
16.6	1.526	(1.693)	(0.1556)	0.10 ~ 0.28	0.22	
21.29	2.242	(2.171)	(0.2286)	0.10 ~ 0.28	0.4	

96.53	8.06	( 9.843)	(0.8219)	0.14 ~ 0.36	1.1	<b>SUSCP10-20</b> <b>SUSCP10-25</b> <b>SUSCP10-30</b>
132.8	13.12	(13.54 )	(1.338 )	0.16 ~ 0.39	1.7	
170.3	19.28	(17.37 )	(1.966 )	0.16 ~ 0.39	2.5	

**NOTE 2:** The allowable torques shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.

**NOTE 3:** The backlash values shown in the table are the theoretical values when these gears are meshed with SURCPF racks.



R1 Shape (Type D)

## Specifications

Precision grade	KHK R 001 grade 5	Tooth hardness	Less than 187HB
Gear teeth	Standard full depth	Surface treatment	Passivation
Pressure angle	20°	Tooth surface finish	Cut
Material	SUS304 NOTE 4	Datum reference surface for gear cutting	Bottom surface
Heat treatment	Solution treatment	Secondary Operations	Possible

**NOTE 4:** Although SURCPF have rust-resistant quality, they are not 100% rust proof. Please exercise caution.

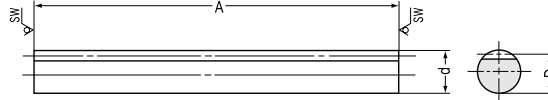
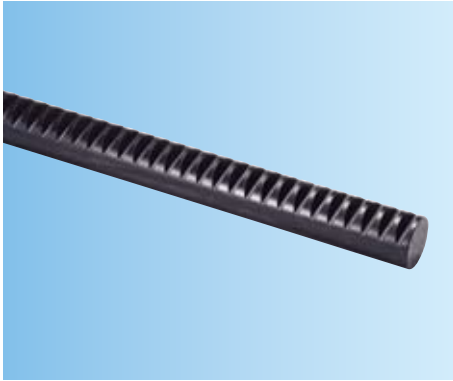
Allowable force (N) NOTE 5		Allowable force (kgf)		Weight (kgf)	Catalog No.
Bending strength	Surface durability	Bending strength	Surface durability		
1091	263	(111.3)	( 26.82)	2.2	<b>SURCPF 5-1000</b> <b>SURCPF10-1000</b>
4367	1052	(445.3)	(107.3 )	7.6	

Counterbore and hole dimensions				Shape	Allowable force (N) NOTE 5		Allowable force (kgf)		Weight (kgf)	Catalog No.
H	I	J	K		Bending strength	Surface durability	Bending strength	Surface durability		
6	10	6	9	R1	1091	263	(111.3)	( 26.82)	2.2	<b>SURCPFD 5-1000</b> <b>SURCPFD10-1000</b>
11	17.5	11	19	R1	4367	1052	(445.3)	(107.3 )	7.4	

**NOTE 5:** The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.



# SROCP CP Round Racks Circular Pitches 2.5~10



R2 Shape

\*SW is saw bale finish.

## Specifications

Precision grade	KHK R 001 grade 4
Gear teeth	Standard full depth
Pressure angle	20°
Material	S45C-D
Heat treatment	Stress relief annealing
Tooth hardness	89~95HRB
Surface treatment	Black oxide
Tooth surface finish	Cut
Datum reference surface for gear cutting	—
Secondary Operations	Possible

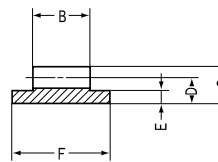
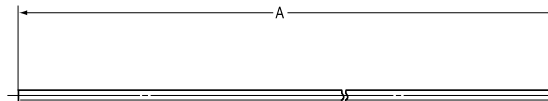
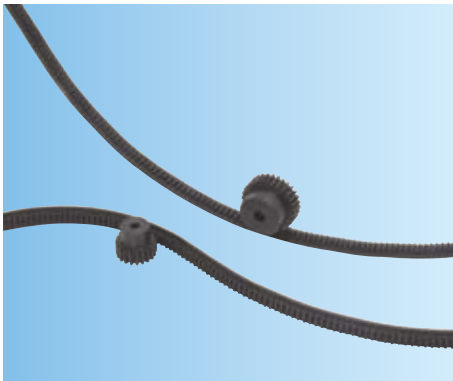
## CP 2.5~10

Catalog No.	Pitch mm (m)	Total length A	Outside dia. d <sub>h</sub> φ	Height to pitch line D	Effective No. of teeth	Shape	Allowable force (N) NOTE 1		Allowable force (kgf)		Weight (kgf)
							Bending strength	Surface durability	Bending strength	Surface durability	
<b>SROCP2.5- 500</b>	CP2.5 (0.7958)	505	10	9.2	200	R2	473.5	91.83	( 48.28 )	( 9.364 )	0.58
<b>SROCP 5- 500</b>	CP5 (1.5915)	505	15	13.4	99	R2	1652	324.4	( 168.5 )	( 33.08 )	0.65
<b>SROCP 10-1000</b>	CP10 (3.1831)	1010	30	26.81	99	R2	6607	1297	( 673.7 )	( 132.3 )	3.6

NOTE 1: The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.



# FRCP CP Metal Flexible Racks Circular Pitch 5



R3 Shape

## Specifications

Precision grade	KHK R 001 grade 8
Gear teeth	Standard full depth
Pressure angle	20°
Material	SS400
Heat treatment	—
Tooth hardness	Less than 187HB
Surface treatment	Black oxide
Tooth surface finish	Cut
Datum reference surface for gear cutting	Bottom surface
Secondary Operations	Possible

## CP 5

Catalog No.	Pitch mm (m)	Total length A	Face width B	Height NOTE 2 C	Height to pitch line D	Thickness of base E	Width of flange NOTE 2 F	Effective No. of teeth	Shape	Allowable force (N) NOTE 1		Weight (kgf)
										Bending strength	Bending strength	
<b>FRCP5-2000</b>	CP5 (1.5915)	2000	10	6	4.41	2	17	397	R3	800.9	( 81.65 )	0.9
<b>FRCP5-3000</b>	CP5 (1.5915)	3000	10	6	4.41	2	17	597	R3	800.9	( 81.65 )	1.36
<b>FRCP5-4000</b>	CP5 (1.5915)	4000	10	6	4.41	2	17	797	R3	800.9	( 81.65 )	1.82

CAUTION: When using the metal flexible rack with a 20 tooth pinion, allow a minimum radius of curvature of 150mm for the teeth on the exterior and 300mm for the teeth in the interior side.

CAUTION: These metal flexible racks are not suitable for applications where positioning accuracy is required.

NOTE 1: The allowable forces shown in the table are the calculated values according to the assumed usage conditions. Please see page 181 for more details.

NOTE 2: The tolerance of the height (C) is  $\pm 0.15$  and the tolerance of the width of the base (F) is  $\pm 0.1$ .