



Drawn cup needle roller bearings



TECHNICAL SUPPLEMENT T048 - 049

PRODUCT INFORMATION P051 - 057



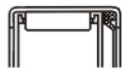
HK

P051 - 055



BK

P051 - 055



HK..RS

P056 - 057



HK..2RS

P056 - 057



BK..RS

P056 - 057

1. Types and designs

SLB Drawn Cup Needle Roller Bearings can be classified into open-end and closed-end types according to the form of their outer ring. The open-end design is further subcategorized into the series HK (metric standard series). The closed-end design is further classified into series BK (metric standard series). Sealed **SLB** Drawn Cup Needle Roller Bearings (suffix RS or 2RS) having a synthetic rubber seal on one or both ends are pre-filled with lithium soap grease. The allowable operating temperature range with this bearing variant is -25°C to $+100^{\circ}\text{C}$. Its rollers are shorter than those in an open-ended type of the same dimension, so its load rating is accordingly smaller.



Fig. 1 Series HK

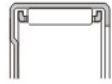


Fig. 2 Series BK

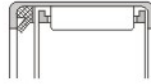


Fig. 3 Series HK . . RS

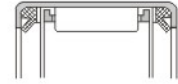


Fig. 4 Series HK . . 2RS

The cages used for drawn cup needle roller bearings are usually pressed-steel cages. Also, certain small drawn cup needle roller bearings use molded polyamide cages reinforced with glass fiber or carbon fiber.

2. Interpreting bearing numbers

As summarized in Fig. 5, the bearing numbers of **SLB** Drawn Cup Needle Roller Bearings comprise a series number, dimension code (inscribed enveloping circle diameter \times width dimension), and suffix.

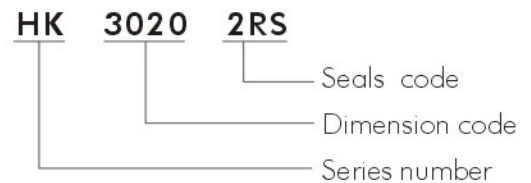


Fig. 5

3. Bearing fits

The fit of an **SLB** Drawn Cup Needle Roller Bearing to a housing is usually a tight fit where the inscribed enveloping circle diameter (F_{iw}) of press-fit rollers satisfies ISO tolerance class F8. However, the inscribed enveloping circle diameter (F_{iw}) of press-fit rollers varies with the material and rigidity of the housing. Therefore, actual bearing fit (interference) should be measured and determined through trials before the bearing is mounted.

If a housing has sufficient rigidity, selecting a fit to housing or shaft from Table 1 can result in an inscribed enveloping circle diameter (F_{iw}) of press-fit rollers close to F8 and a radial clearance close to normal clearance.

Table 1 Fit to housing and shaft

Series number	Housing		Shaft	
	Steel	Light alloy	Without inner ring	With inner ring
HK, BK	N6 (N7)	R6 (R7)	h5 (h6)	K5 (j6)

4. Housing bore accuracy

Because the outer ring has a thinner wall, the performance of drawn cup needle roller bearings is significantly affected by the surface roughness and the dimensional and form accuracy of the housing bore to which a bearing is press-fit. The housing bore must satisfy the accuracy of Table 2.

Table 2 Recommended fits

Characteristics	Tolerance
Circularity (max.)	IT4 or less
Cylindricity (max.)	IT4 or less
Surface roughness (max.)	1.6a

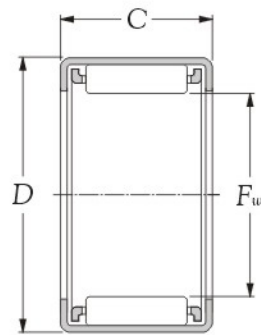
5. Bearing tolerances and measuring methods

The outer ring of a drawn cup needle roller bearing is thin-walled. Therefore, some deformation of the outer ring unavoidably develops during the manufacturing process, particularly during heat treatment. However, when the outer ring is press-fit into a correctly dimensioned housing, the deformation is corrected, restoring the design functions of the outer ring. For this reason, measuring the dimensional accuracy of a drawn cup needle roller bearing before it is press-fit is meaningless. Therefore, its accuracy is evaluated by measuring its inscribed enveloping circle diameter (F_w) after it has been press-fit into a ring gauge of correct dimensions (wall thickness 20 mm or greater).

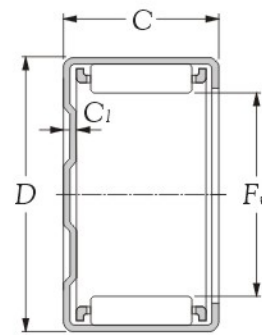
The tolerances of the bore diameter of the ring gauges and the inscribed enveloping circle diameter (F_w) are given in Tables 3, which apply to the series HK and BK (standard metric series). When measuring the inscribed enveloping circle diameter (F_w) with a plug gauge, the dimension at GO side must satisfy "Low" tolerance for inscribed enveloping circle diameter, and that at NO GO side must satisfy "Height" tolerance plus 2 μm . These values comply with the relevant ISO standard.

Table 3 Enveloping circle diameter tolerance (series HK and BK) (Unit: mm)

Enveloping circle dia. F_w	Outside dia. of outer ring D	Ring gauge bore dia.	Enveloping circle dia. tolerance	
			high	low
3	6.5	6.4840	3.016	3.006
4	8	7.9840	4.022	4.010
5	9	8.9840	5.022	5.010
6	10	9.9840	6.022	6.010
7	11	10.980	7.028	7.013
8	12	11.980	8.028	8.013
9	13	12.980	9.028	9.013
10	14	13.980	10.028	10.013
12	16	15.980	12.034	12.016
12	18	17.980	12.034	12.016
13	19	18.976	13.034	13.016
14	20	19.976	14.034	14.016
15	21	20.976	15.034	15.016
16	22	21.976	16.034	16.016
17	23	22.976	17.034	17.016
18	24	23.976	18.034	18.016
20	26	25.976	20.041	20.020
22	28	27.976	22.041	22.020
25	32	31.972	25.041	25.020
28	35	34.972	28.041	28.020
30	37	36.972	30.041	30.020
35	42	41.972	35.050	35.025
40	47	46.972	40.050	40.025
45	52	51.967	45.050	45.025
50	58	57.967	50.050	50.025
55	63	62.967	55.060	55.030
60	68	67.967	60.060	60.030



Type HK

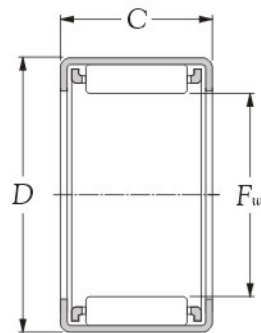


Type BK

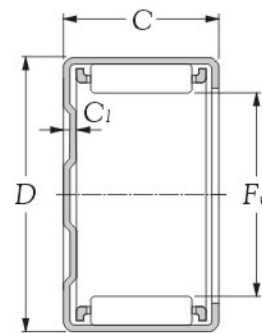
Inner bore <i>F_w</i> mm	Bearing number		Principal dimensions			Basic load ratings				Max runout speed		Appropriate inner ring (as a reference)	Weight kg.
	Open end design	Closed end design	<i>D</i>	<i>C</i> <small>0-0.2 mm</small>	<i>C_l</i> <small>max</small>	dynamic <i>C</i>	static <i>C_o</i>	dynamic <i>C</i>	static <i>C_o</i>	grease	oil		
						N		kgf		r/min			
3	HK 0306	-	6.5	6	-	1250	835	128	85	33000	50000	-	0.0006
3	-	BK 0306	6.5	6	0.8	1250	835	128	85	33000	50000	-	0.0007
4	HK 0408	-	8.0	8	-	1770	1270	180	129	30000	45000	-	0.0016
4	-	BK 0408	8.0	8	1.6	1770	1270	180	129	30000	45000	-	0.0018
5	HK 0509	-	9.0	9	-	2640	2190	269	224	27000	40000	-	0.0019
5	-	BK 0509	9.0	9	1.6	2640	2190	269	224	27000	40000	-	0.0021
6	HK 0609	-	10.0	9	-	2660	2280	272	233	25000	37000	-	0.0022
6	-	BK 0609	10.0	9	1.6	2660	2280	272	233	25000	37000	-	0.0024
7	HK 0709	-	11.0	9	-	3400	3250	345	330	23000	34000	-	0.0025
7	-	BK 0709	11.0	9	1.6	3400	3250	345	330	23000	34000	-	0.0027
8	HK 0810	-	12.0	10	-	3850	3950	395	400	20000	30000	IR 5x8x12	0.0032
8	-	BK 0810	12.0	10	1.6	3850	3950	395	400	20000	30000	IR 5x8x12	0.0034
9	HK 0910	-	13.0	10	-	4600	5050	465	515	18000	27000	IR 6x9x12	0.0035
9	-	BK 0910	13.0	10	1.6	4600	5050	465	515	18000	27000	IR 6x9x12	0.0039
9	HK 0912	-	13.0	12	-	5650	6650	575	680	18000	27000	IR 6x9x12	0.0042
9	-	BK 0912	13.0	12	1.6	5650	6650	575	680	18000	27000	IR 6x9x12	0.0045
10	HK 1010	-	14.0	10	-	4500	5100	460	520	16000	24000	IR 7x10x10.5	0.0038
10	-	BK 1010	14.0	10	1.6	4500	5100	460	520	16000	24000	IR 7x10x10.5	0.0042
10	HK 1012	-	14.0	12	-	5900	7250	605	735	16000	24000	IR 7x1x16	0.0045
10	-	BK 1012	14.0	12	1.6	5900	7250	605	735	16000	24000	IR 7x10x16	0.0050
10	HK 1015	-	14.0	15	-	7100	9150	725	935	16000	24000	IR 7x10x16	0.0056
10	-	BK 1015	14.0	15	1.6	7100	9150	725	935	16000	24000	IR 7x10x16	0.0062
12	HK 1210	-	16.0	10	-	5050	6250	515	635	13000	20000	IR 8x12x10.5	0.0046
12	-	BK 1210	16.0	10	1.6	5050	6250	515	635	13000	20000	IR 8x12x10.5	0.0052

Technical supplement

	Cages	Precision	Grease
	Steel- <input checked="" type="checkbox"/>		
	Polymid- <input checked="" type="checkbox"/>	Normal (ISO)	Nil
	Brass- <input checked="" type="checkbox"/>		



Type HK



Type BK

Inner bore <i>F_w</i> mm	Bearing number		Principal dimensions			Basic load ratings				Max runout speed		Appropriate inner ring (as a reference)	Weight kg.
	Open end design	Closed end design	<i>D</i>	<i>C</i> <small>0/0.2 mm</small>	<i>C_l</i> <small>max</small>	dynamic <i>C</i> N	static <i>C_o</i> N	dynamic <i>C</i> kgf	static <i>C_o</i> kgf	grease r/min	oil r/min		
12	HK 1212	-	18	12	-	6600	7300	675	745	13000	20000	IR 8x12x12.5	0.0091
12	-	BK 1212	18	12	2.7	6600	7300	675	745	13000	20000	IR 8x12x12.5	0.0100
13	HK 1312	-	19	12	-	7300	8450	745	865	12000	18000	IR10x13x12.5	0.0100
13	-	BK 1312	19	12	2.7	7300	8450	745	865	12000	18000	IR10x13x12.5	0.0110
14	HK 1412	-	20	12	-	7200	8500	735	865	11000	17000	IR 10x14x13	0.0110
14	-	BK 1412	20	12	2.7	7200	8500	735	865	11000	17000	IR 10x14x13	0.0120
14	HK 1416	-	20	16	-	10700	14000	1090	1430	11000	17000	-	0.0150
14	-	BK 1416	20	16	2.7	10700	14000	1090	1430	11000	17000	-	0.0160
15	HK 1512	-	21	12	-	7500	9100	765	930	11000	16000	IR 12x15x12.5	0.011
15	-	BK 1512	21	12	2.7	7500	9100	765	930	11000	16000	IR 12x15x12.5	0.013
15	HK 1516	-	21	16	-	10700	14400	1090	1470	11000	16000	IR 12x15x16.5	0.015
15	-	BK 1516	21	16	2.7	10700	14400	1090	1470	11000	16000	IR 12x15x16.5	0.017
16	HK 1612	-	22	12	-	7750	9700	795	990	10000	15000	IR 12x16x13	0.012
16	-	BK 1612	22	12	2.7	7750	9700	795	990	10000	15000	IR 12x16x13	0.014
16	HK 1616	-	22	16	-	11100	15300	1130	1570	10000	15000	IR 12x16x20	0.016
16	-	BK 1616	22	16	2.7	11100	15300	1130	1570	10000	15000	IR 12x16x20	0.018
17	HK 1712	-	23	12	-	8500	11100	865	1130	9500	14000	-	0.012
17	-	BK 1712	23	12	2.7	8500	11100	865	1130	9500	14000	-	0.015
18	HK 1812	-	24	12	-	8300	10900	845	1110	8500	13000	IR 15x18x12.5	0.013
18	-	BK 1812	24	12	2.7	8300	10900	845	1110	8500	13000	IR 15x18x12.5	0.015
18	HK 1816	-	24	16	-	11800	17300	1210	1760	8500	13000	IR 15x18x16.5	0.018
18	-	BK 1816	24	16	2.7	11800	17300	1210	1760	8500	13000	IR 15x18x16.5	0.020
20	HK 2012	-	26	12	-	9250	13000	945	1330	8000	12000	IR 15x20x13	0.014
20	-	BK 2012	26	12	2.7	9250	13000	945	1330	8000	12000	IR 15x20x13	0.017

Technical supplement

Cages Precision Grease

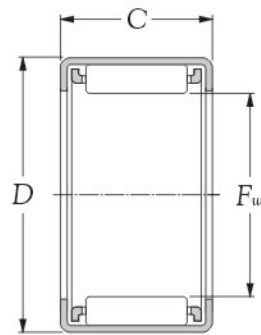
Steel- ✓

Polymid- X

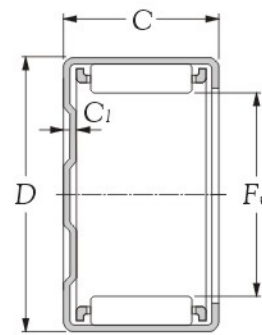
Brass- X

Normal
(ISO)

Nil



Type HK

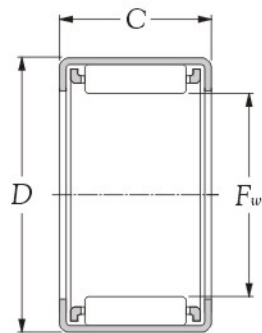


Type BK

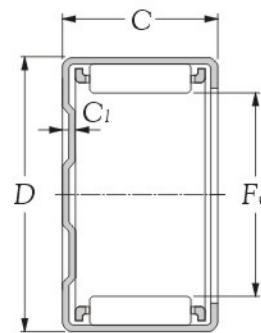
Inner bore F_w mm	Bearing number		Principal dimensions			Basic load ratings				Max runout speed		Appropriate inner ring (as a reference)	Weight kg.
	Open end design	Closed end design	D	C <small>0/0.2</small> mm	C_l <small>max</small>	dynamic C N	static C_o kgf	dynamic C kgf	static C_o kgf	grease	oil		
20	HK 2016	-	26	16	-	13000	20100	1320	2050	8000	12000	IR 17x20x16.5	
20	-	BK 2016	26	16	2.7	13000	20100	1320	2050	8000	12000	IR 17x20x16.5	0.019
20	HK 2020	-	26	20	-	16400	27100	1670	2760	8000	12000	IR 17x20x20.5	0.022
20	-	BK 2020	26	20	2.7	16400	27100	1670	2760	8000	12000	IR 17x20x20.5	0.024
22	HK 2212	-	28	12	-	9750	14300	995	1460	7500	11000	IR 17x22x13	0.027
22	-	BK 2212	28	12	2.7	9750	14300	995	1460	7500	11000	IR 17x22x13	0.013
22	HK 2216	-	28	16	-	13600	22100	1390	2250	7500	11000	IR 17x22x18	0.015
22	-	BK 2216	28	16	2.7	13600	22100	1390	2250	7500	11000	IR 17x22x18	0.021
22	HK 2220	-	28	20	-	17200	29800	1760	3050	7500	11000	IR 17x22x20.5	0.028
22	-	BK 2220	28	20	2.7	17200	29800	1760	3050	7500	11000	IR 17x22x20.5	0.030
25	HK 2512	-	32	12	-	11800	16300	1200	1660	6500	9500	IR 20x25x12.5	0.021
25	-	BK 2512	32	12	2.7	11800	16300	1200	1660	6500	9500	IR 20x25x12.5	0.023
25	HK 2516	-	32	16	-	15900	24000	1620	2450	6500	9500	IR 20x25x17	0.027
25	-	BK 2516	32	16	2.7	15900	24000	1620	2450	6500	9500	IR 20x25x17	0.031
25	HK 2520	-	32	20	-	20300	33000	2070	3350	6500	9500	IR 20x25x20.5	0.034
25	-	BK 2520	32	20	2.7	20300	33000	2070	3350	6500	9500	IR 20x25x20.5	0.039
25	HK 2526	-	32	26	-	26400	46000	2690	4700	6500	9500	IR 20x25x26.5	0.045
25	-	BK 2526	32	26	2.7	26400	46000	2690	4700	6500	9500	IR 20x25x26.5	0.049
28	HK 2816	-	35	16	-	17300	27600	1760	2820	5500	8500	IR 22x28x17	0.030
28	-	BK 2816	35	16	2.7	17300	27600	1760	2820	5500	8500	IR 22x28x17	0.034
28	HK 2820	-	35	20	-	21300	36000	2170	3700	5500	8500	IR 22x28x20.5	0.038
28	-	BK 2820	35	20	2.7	21300	36000	2170	3700	5500	8500	IR 22x28x20.5	0.043
30	HK 3012	-	37	12	-	13000	19500	1320	1990	5500	8000	IR 25x30x12.5	0.024
30	-	BK 3012	37	12	2.7	13000	19500	1320	1990	5500	8000	IR 25x30x12.5	0.028

Technical supplement

	Cages	Precision	Grease
	Steel - <input checked="" type="checkbox"/>		
	Polymid - <input type="checkbox"/>	Normal (ISO)	Nil
	Brass - <input type="checkbox"/>		



Type HK

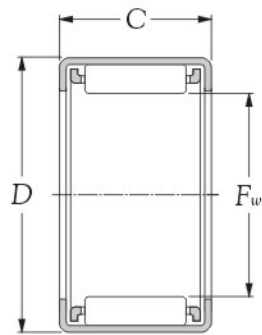


Type BK

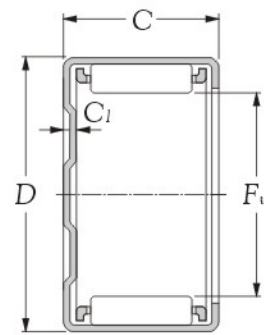
Inner bore <i>F_w</i> mm	Bearing number		Principal dimensions			Basic load ratings				Max runout speed		Appropriate inner ring (as a reference)	Weight kg.
	Open end design	Closed end design	<i>D</i>	<i>C</i> <small>0/0.2</small> mm	<i>C_l</i> <small>max</small>	dynamic <i>C</i> N	static <i>C_o</i> kgf	dynamic <i>C</i> kgf	static <i>C_o</i> kgf	grease r/min	oil r/min		
30	HK 3016	-	37	16	-	18100	30000	1850	3050	5500	8000	IR 25x30x17	0.032
30	-	BK 3016	37	16	2.7	18100	30000	1850	3050	5500	8000	IR 25x30x17	0.037
30	HK 3020	-	37	20	-	22300	39500	2280	4000	5500	8000	IR 25x30x20.5	0.040
30	-	BK 3020	37	20	2.7	22300	39500	2280	4000	5500	8000	IR 25x30x20.5	0.047
30	HK 3026	-	37	26	-	29100	55000	2960	5650	5500	8000	IR 25x30x26.5	0.053
30	-	BK 3026	37	26	2.7	29100	55000	2960	5650	5500	8000	IR 25x30x26.5	0.059
35	HK 3512	-	42	12	-	14000	22800	1430	2320	4700	7000	-	0.028
35	-	BK 3512	42	12	2.7	14000	22800	1430	2320	4700	7000	-	0.033
35	HK 3516	-	42	16	-	19700	35000	2000	3600	4700	7000	-	0.037
35	-	BK 3516	42	16	2.7	19700	35000	2000	3600	4700	7000	-	0.044
35	HK 3520	-	42	20	-	24800	47500	2530	4850	4700	7000	-	0.046
35	-	BK 3520	42	20	2.7	24800	47500	2530	4850	4700	7000	-	0.055
40	HK 4012	-	47	12	-	15100	26000	1540	2660	4000	6000	IR 35x40x12.5	0.031
40	-	BK 4012	47	12	2.7	15100	26000	1540	2660	4000	6000	IR 35x40x12.5	0.038
40	HK 4016	-	47	16	-	21100	40000	2150	4100	4000	6000	IR 35x40x17	0.041
40	-	BK 4016	47	16	2.7	21100	40000	2150	4100	4000	6000	IR 35x40x17	0.051
40	HK 4020	-	47	20	-	25900	52500	2650	5350	4000	6000	IR 35x40x20.5	0.052
40	-	BK 4020	47	20	2.7	25900	52500	2650	5350	4000	6000	IR 35x40x20.5	0.064
45	HK 4516	-	52	16	-	21600	43000	2210	4400	3700	5500	IR 40x45x17	0.046
45	-	BK 4516	52	16	2.7	21600	43000	2210	4400	3700	5500	IR 40x45x17	0.058
45	HK 4520	-	52	20	-	27600	59000	2810	6000	3700	5500	IR 40x45x20.5	0.058
45	-	BK 4520	52	20	2.7	27600	59000	2810	6000	3700	5500	IR 40x45x20.5	0.072
50	HK 5020	-	58	20	-	31500	63000	3200	6450	3200	4800	IR 40x50x22	0.072
50	-	BK 5020	58	20	2.7	31500	63000	3200	6450	3200	4800	IR 40x50x22	0.087

Technical supplement

	Cages	Precision	Grease
	Steel- <input checked="" type="checkbox"/>		
	Polymid- <input checked="" type="checkbox"/>	Normal (ISO)	Nil
	Brass- <input checked="" type="checkbox"/>		




Type HK



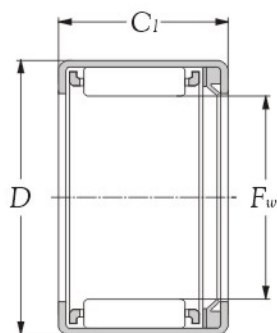
Type BK

Inner bore F_w mm	Bearing number		Principal dimensions			Basic load ratings				Max runout speed		Appropriate inner ring (as a reference)	Weight kg.
	Open end design	Closed end design	D	C <small>0-0.2</small> mm	C_l <small>max</small>	dynamic	static	dynamic	static	grease r/min	oil r/min		
						C N	C_o	C kgf	C_o				
50	HK 5025	-	58	25	-	38500	82000	3900	8400	3200	4800	IR 45x50x25.5	0.090
50	-	BK 5025	58	25	2.7	38500	82000	3900	8400	3200	4800	IR 45x50x25.5	0.109

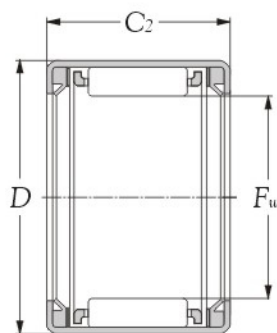


Technical supplement

Cages	Precision	Grease
Steel - <input checked="" type="checkbox"/>		
Polymid - <input checked="" type="checkbox"/>	Normal (ISO)	Nil
Brass - <input checked="" type="checkbox"/>		



Type HK.RS
(Open end, single seal)

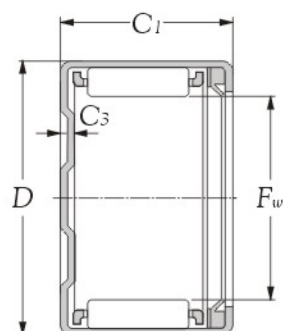


Type HK..2RS
(Open end, double seals)

Inner bore F_w mm	Bearing number			Principal dimensions				Basic load ratings			
	open end single seal	open end double seals	closed end single seal	D	C_1 $_{-0.02}^0$ mm	C_2 $_{-0.02}^0$ mm	C_3 $_{max}$	dynamic C N	static C_o N	dynamic C kgf	static C_o kgf
12	HK 1214 RS	HK 1216 2RS	BK 1214 RS	18	14	16	2.7	6600	7300	675	745
14	HK 1414 RS	HK 1416 2RS	BK 1414 RS	20	14	16	2.7	7200	8500	735	865
15	HK 1514 RS	HK 1516 2RS	BK 1514 RS	21	14	16	2.7	7500	9100	765	930
16	HK 1614 RS	HK 1616 2RS	BK 1614 RS	22	14	16	2.7	7750	9700	795	990
18	HK 1814 RS	HK 1816 2RS	BK 1814 RS	24	14	16	2.7	8300	10900	845	1110
20	-	HK 2016 2RS	-	26	-	16	-	9250	13000	945	1330
20	HK 2018 RS	HK 2020 2RS	BK 2018 RS	26	18	20	2.7	13000	20100	1320	2050
22	-	HK 2216 2RS	-	28	-	16	-	9750	14300	995	1460
22	HK 2218 RS	HK 2220 2RS	BK 2218 RS	28	18	20	2.7	13600	22100	1390	2250
25	-	HK 2516 2RS	-	32	-	16	-	11800	16300	1200	1660
25	HK 2518 RS	HK 2520 2RS	BK 2518 RS	32	18	20	2.7	15900	24000	1620	2450
28	-	HK 2820 2RS	-	35	-	20	-	17300	27600	1760	2820
30	-	HK 3016 2RS	-	37	-	16	-	13000	19500	1320	1990
30	HK 3018 RS	HK 3020 2RS	BK 3018 RS	37	18	20	2.7	18100	30000	1850	3050
35	-	HK 3516 2RS	-	42	-	16	-	14000	22800	1430	2320
35	HK 3518 RS	HK 3520 2RS	BK 3518 RS	42	18	20	2.7	19700	35000	2000	3600
40	-	HK 4016 2RS	-	47	-	16	-	15100	26000	1540	2660
40	HK 4018 RS	HK 4020 2RS	BK 4018 RS	47	18	20	2.7	21100	40000	2150	4100
45	HK 4518 RS	HK 4520 2RS	BK 4518 RS	52	18	20	2.7	21600	43000	2210	4400
50	HK 5022 RS	HK 5024 2RS	BK 5022 RS	58	22	24	2.7	31500	63000	3200	6450

Technical supplement

Cages	Precision	Grease
Steel - <input checked="" type="checkbox"/>		
Polymid - <input checked="" type="checkbox"/>	Normal (ISO)	Nil
Brass - <input checked="" type="checkbox"/>		



Type BK.RS
(Closed end, single seal)

Max runout speed grease	Appropriate inner ring (as a reference)		Weight kg.		
	single seal	double seals	open end single seal	open end double seals	closed end single seal
10000	IR 9×12×16	-	0.011	0.012	0.012
10000	IR 10×14×16	IR 10×14×20	0.012	0.014	0.014
10000	IR 12×15×16.5	IR 12×15×16.5	0.013	0.014	0.014
10000	IR 12×16×16	IR 12×16×20	0.013	0.015	0.015
9000	IR 15×18×16	IR 15×18×17.5	0.015	0.017	0.017
8000	-	IR 15×20×18	-	0.019	-
8000	IR 17×20×20	IR 17×20×20.5	0.021	0.024	0.024
7500	-	IR 17×22×18	-	0.020	-
7500	IR 17×22×20.5	IR 17×22×23	0.024	0.026	0.027
6500	-	IR 20×25×18D	-	0.027	-
6500	IR 20×25×20	IR 20×25×23	0.031	0.033	0.035
5500	-	IR 22×28×23	-	0.037	-
5500	-	IR 25×30×18D	-	0.027	-
5500	IR 25×30×20	IR 25×30×23	0.037	0.039	0.045
4600	-	-	-	0.036	-
4600	-	-	0.037	0.040	0.047
4000	-	IR 35×40×17	-	0.041	-
4000	IR 35×40×20	-	0.047	0.050	0.062
3600	IR 40×45×20	-	0.054	0.057	0.072
3200	IR 45×50×25	IR 45×50×25.5	0.086	0.089	0.104