

SPHERICAL ROLLER BEARINGS

SPHERICAL ROLLER BEARINGS

Cylindrical Bores, Tapered Bores	Bore Diameter	20 – 150mm	B184
	Bore Diameter	160 – 560mm	B192
	Bore Diameter	600 – 1400mm	B202



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DESIGN, TYPES, AND FEATURES

Shown in the figures, types EA, C, CD, CA, which are designed for high load capacity, are available. Types EA, C and CD have pressed steel cages, and type CA has machined brass cages. The EA type bearings listed here are classified as NSKHPS bearings, which offer particularly high load-carrying capacity, high limiting speeds, and are highly functional under high-temperature operating conditions of up to 200°C.

An oil groove and holes are provided in the outer ring to supply lubricant and the bearing numbers are suffixed with E4.

To use bearings with oil grooves and holes, it is recommended to provide an oil groove in the housing bore, since the depth of the groove in the bearing is limited. The number and dimensions of the oil groove and holes are shown in Tables 1 and 2.

When bearings with a hole for a locking pin to prevent outer ring rotation are required, please inform NSK.



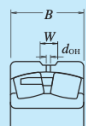
EA



C and CD



CA



TOLERANCES AND RUNNING ACCURACY	Table 8.2 (Pages A60 to A63)
RECOMMENDED FITS	Table 9.2 (Page A84) Table 9.4 (Page A85)
INTERNAL CLEARANCE	Table 9.15 (Page A92)

PERMISSIBLE MISALIGNMENT

The permissible misalignment of spherical roller bearings varies depending on the size and load, but it is approximately 0.018 to 0.045 radian (1° to 2.5°) with normal loads.

LIMITING SPEEDS

The limiting speeds listed in the bearing tables should be adjusted depending on the bearing load conditions. Also, higher speeds are attainable by making changes in the lubrication method, cage design, etc. Refer to Page A37 for detailed information.

Table 1 Dimensions of Oil Grooves and Holes
Units : mm

Nominal Width B	Oil Groove		Hole Diameter	
	over	incl.	Width W	d _{OH}
18	30	5	2.5	
30	40	6	3	
40	50	7	4	
50	65	8	5	
65	80	10	6	
80	100	12	8	
100	120	15	10	
120	160	20	12	
160	200	25	15	
200	250	30	20	
250	315	35	20	
315	400	40	25	
400	—	40	25	

Table 2 Number of Oil Holes

Nominal Outer Ring Dia D (mm)	Number of Holes	
	over	incl.
180	250	4
180	250	6
250	315	6
315	400	6
400	500	6
500	630	8
630	800	8
800	1000	8
1000	1250	8
1250	1600	8
1600	2000	8

And if the load on spherical roller bearings becomes too small during operation or if the ratio of axial and radial loads is larger than the value of 'e' (listed in the bearing tables), slippage occurs between the rollers and raceways, which may result in smearing. The higher the weight of the rollers and cage, the higher this tendency becomes, especially for large spherical roller bearings.

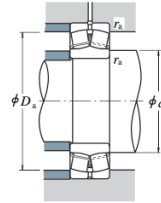
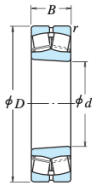
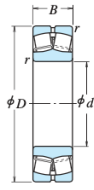
If very small bearing loads are expected, please contact NSK for selection of an appropriate bearing.

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SPHERICAL ROLLER BEARINGS



Bore Diameter 20 – 55 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$
The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)				Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
d	D	B	r_{min}	(N)		(kgf)		Grease	Oil	
20	52	15	1.1	29 300	26 900	2 980	2 740	6 300	8 200	21304CDE4
25	52	18	1	37 500	37 000	3 850	3 800	7 100	9 000	22205CE4
	62	17	1.1	43 000	40 500	4 350	4 150	5 300	6 700	21305CDE4
30	62	20	1	50 000	50 000	5 100	5 100	6 000	7 500	22206CE4
	72	19	1.1	55 000	54 000	5 600	5 500	4 500	6 000	21306CDE4
35	72	23	1.1	69 000	71 000	7 050	7 200	5 300	6 700	22207CE4
	80	21	1.5	71 500	76 000	7 250	7 750	4 000	5 300	21307CDE4
40	80	23	1.1	113 000	99 500	11 500	10 100	6 700	8 500	*22208EAE4
	90	23	1.5	118 000	111 000	12 000	11 300	6 000	7 500	*21308EAE4
	90	33	1.5	170 000	153 000	17 300	15 600	5 300	6 700	*22308EAE4
45	85	23	1.1	118 000	111 000	12 000	11 300	6 000	7 500	*22209EAE4
	100	25	1.5	149 000	144 000	15 200	14 600	5 000	6 300	*21309EAE4
	100	36	1.5	207 000	195 000	21 100	19 900	4 500	5 600	*22309EAE4
50	90	23	1.1	124 000	119 000	12 600	12 100	5 600	7 100	*22210EAE4
	110	27	2	178 000	174 000	18 100	17 800	4 500	5 600	*21310EAE4
	110	40	2	246 000	234 000	25 100	23 900	4 300	5 300	*22310EAE4
55	100	25	1.5	149 000	144 000	15 200	14 600	5 300	6 700	*22211EAE4
	120	29	2	178 000	174 000	18 100	17 800	4 500	5 600	*21311EAE4
	120	43	2	292 000	292 000	29 800	29 800	3 800	4 800	*22311EAE4

Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	min. d_a		max. d_a			e	Y_2	Y_3	Y_0	
21304CDKE4	27	28	45	42	0.31	3.2	2.1	2.1	0.17	
22205CKE4 21305CDKE4	31	31	46	45	0.35	2.9	1.9	1.9	0.17	
	32	34	55	51	0.29	3.4	2.3	2.3	0.26	
22206CKE4 21306CDKE4	36	37	56	54	0.33	3.1	2.1	2.0	0.27	
	37	40	65	59	0.28	3.6	2.4	2.3	0.39	
22207CKE4 21307CDKE4	42	43	65	63	0.32	3.1	2.1	2.0	0.42	
	44	47	71	67	0.28	3.6	2.4	2.4	0.53	
*22208EAKE4 *21308EAKE4 *22308EAKE4	47	49	73	70	0.28	3.6	2.4	2.4	0.50	
	49	54	81	75	0.25	3.9	2.7	2.6	0.73	
	49	52	81	77	0.35	2.8	1.9	1.9	0.98	
*22209EAKE4 *21309EAKE4 *22309EAKE4	52	54	78	75	0.25	3.9	2.7	2.6	0.55	
	54	65	91	89	0.23	4.3	2.9	2.8	0.96	
	54	59	91	86	0.34	2.9	2.0	1.9	1.34	
*22210EAKE4 *21310EAKE4 *22310EAKE4	57	60	83	81	0.24	4.3	2.9	2.8	0.61	
	60	72	100	98	0.23	4.4	3.0	2.9	1.21	
	60	64	100	93	0.35	2.8	1.9	1.9	1.78	
*22211EAKE4 *21311EAKE4 *22311EAKE4	64	65	91	89	0.23	4.3	2.9	2.8	0.81	
	65	72	110	98	0.23	4.4	3.0	2.9	1.58	
	65	73	110	103	0.34	2.9	2.0	1.9	2.3	

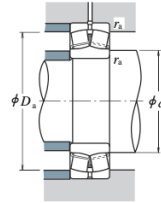
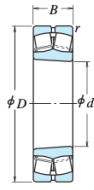
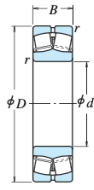
- Remarks**
- The bearings denoted by an asterisk (*) are NSK/HPS bearings and an oil groove and holes are standard for them.
 - When making a selection of the recommended fit (Tolerance of Shaft) on Page A84 of the NSK Rolling Bearings catalog, in case of NSK/HPS bearings, the conditions are different.
The segmentations are: Light Loads ($\leq 0.05C_2$); Normal Loads (0.05 to 0.10 C_2); and Heavy Loads ($> 0.10C_2$).
 - For the dimensions of adapters and withdrawal sleeves, refer to Pages B358 – B359, and B366.

Note (*) The suffix K represents bearings with tapered bores (taper 1 : 12).

SPHERICAL ROLLER BEARINGS



Bore Diameter 60 – 85 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_r / F_a \leq e$		$F_r / F_a > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)				Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
d	D	B	r min.	(N)		(kgf)		Grease	Oil	Cylindrical Bore
				C _r	C _{0r}	C _r	C _{0r}			
60	95	26	1.1	98 500	141 000	10 000	14 400	3 600	4 500	23012CE4
	110	28	1.5	178 000	174 000	18 100	17 800	4 800	6 000	*22212EAE4
	130	31	2.1	238 000	244 000	24 200	24 800	3 800	4 800	*21312EAE4
	130	46	2.1	340 000	340 000	34 500	35 000	3 600	4 500	*22312EAE4
65	120	31	1.5	221 000	230 000	22 500	23 500	4 300	5 300	*22213EAE4
	140	33	2.1	264 000	275 000	27 000	28 000	3 800	4 500	*21313EAE4
	140	48	2.1	375 000	380 000	38 000	38 500	3 200	4 000	*22313EAE4
70	125	31	1.5	225 000	232 000	22 900	23 600	4 000	5 300	*22214EAE4
	150	35	2.1	310 000	325 000	32 000	33 500	3 200	4 000	*21314EAE4
	150	51	2.1	425 000	435 000	43 500	44 000	3 000	3 800	*22314EAE4
75	130	31	1.5	238 000	244 000	24 200	24 900	4 000	5 000	*22215EAE4
	160	37	2.1	310 000	325 000	32 000	33 500	3 200	4 000	*21315EAE4
	160	55	2.1	485 000	505 000	49 500	51 500	2 800	3 600	*22315EAE4
80	140	33	2	264 000	275 000	27 000	28 000	3 600	4 500	*22216EAE4
	170	39	2.1	355 000	375 000	36 000	38 000	3 000	3 800	*21316EAE4
	170	58	2.1	540 000	565 000	55 000	58 000	2 600	3 400	*22316EAE4
85	150	36	2	310 000	325 000	32 000	33 500	3 400	4 300	*22217EAE4
	180	41	3	360 000	395 000	37 000	40 000	3 000	4 000	*21317EAE4
	180	60	3	600 000	630 000	61 000	64 000	2 400	3 200	*22317EAE4

Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	Tapered Bore(*)		max. D _a			e	Y ₂	Y ₃	Y ₀	
	min. d _a	max. d _a	min. D _a	max. D _a					approx.	
23012CKE4	67	68	88	85	1	0.26	3.9	2.6	2.5	0.68
*22212EAE4	69	72	101	98	1.5	0.23	4.4	3.0	2.9	1.1
*21312EAE4	72	87	118	117	2	0.22	4.5	3.0	3.0	1.98
*22312EAE4	72	79	118	111	2	0.34	3.0	2.0	1.9	2.89
*22213EAE4	74	80	111	107	1.5	0.24	4.2	2.8	2.7	1.51
*21313EAE4	77	94	128	126	2	0.22	4.6	3.1	3.0	2.45
*22313EAE4	77	84	128	119	2	0.33	3.0	2.0	2.0	3.52
*22214EAE4	79	84	116	111	1.5	0.23	4.3	2.9	2.8	1.58
*21314EAE4	82	101	138	135	2	0.22	4.6	3.1	3.0	3.0
*22314EAE4	82	91	138	129	2	0.33	3.0	2.0	2.0	4.28
*22215EAE4	84	87	121	117	1.5	0.22	4.5	3.0	3.0	1.64
*21315EAE4	87	101	148	134	2	0.22	4.6	3.1	3.0	3.64
*22315EAE4	87	97	148	137	2	0.33	3.0	2.0	2.0	5.26
*22216EAE4	90	94	130	126	2	0.22	4.6	3.1	3.0	2.01
*21316EAE4	92	109	158	146	2	0.23	4.4	3.0	2.9	4.32
*22316EAE4	92	103	158	145	2	0.33	3.0	2.0	2.0	6.23
*22217EAE4	95	101	140	135	2	0.22	4.6	3.1	3.0	2.54
*21317EAE4	99	108	166	142	2.5	0.24	4.3	2.9	2.8	5.2
*22317EAE4	99	110	166	155	2.5	0.33	3.1	2.1	2.0	7.23

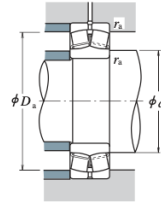
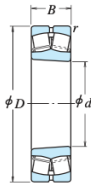
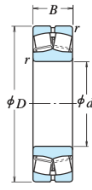
Note (*) The suffix K represents bearings with tapered bores (taper 1 : 12).

- Remarks**
- The bearings denoted by an asterisk (*) are NSK/HPS bearings and an oil groove and holes are standard for them.
 - When making a selection of the recommended fit (Tolerance of Shaft) on Page A84 of the NSK Rolling Bearings catalog, in case of NSK/HPS bearings, the conditions are different.
The segmentations are: Light Loads (<0.05C_r); Normal Loads (0.05 to 0.10C_r); and Heavy Loads (>0.10C_r).
 - For the dimensions of adapters and withdrawal sleeves, refer to Pages B359 – B361, and B366.

SPHERICAL ROLLER BEARINGS



Bore Diameter 90 – 110 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$
The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
	C_r	C_{Or}	C_r	C_{Or}	Grease	Oil	
d D B r_{min}	(N)		(kgf)				Cylindrical Bore
90 160 40 2	360 000	395 000	37 000	40 000	3 200	4 000	*2218EAE4
160 52.4 2	340 000	490 000	34 500	50 000	1 800	2 400	2318CE4
190 43 3	415 000	450 000	42 000	46 000	2 800	3 600	*21318EAE4
190 64 3	665 000	705 000	68 000	72 000	2 400	3 000	*22318EAE4
95 170 43 2.1	415 000	450 000	42 000	46 000	3 000	3 800	*2219EAE4
170 55.6 2.1	370 000	525 000	37 500	53 500	1 700	2 200	23219CAE4
200 45 3	345 000	435 000	35 000	44 500	1 500	2 000	21319CE4
200 67 3	735 000	780 000	75 000	79 500	2 200	2 800	*22319EAE4
100 150 37 1.5	212 000	335 000	21 600	34 500	2 200	2 800	23020CDE4
150 50 1.5	276 000	470 000	28 100	48 000	1 800	2 400	24020CE4
165 52 2	345 000	530 000	35 500	54 000	1 700	2 200	23120CE4
165 65 2	345 000	535 000	35 000	55 000	1 700	2 200	24120CAE4
180 46 2.1	455 000	490 000	46 500	50 000	2 800	3 600	*22220EAE4
180 60.3 2.1	420 000	605 000	42 500	61 500	1 600	2 200	23220CE4
215 47 3	395 000	485 000	40 500	49 500	1 400	1 900	21320CE4
215 73 3	860 000	930 000	88 000	94 500	2 000	2 600	*22320EAE4
110 170 45 2	293 000	465 000	29 900	47 500	2 000	2 400	23022CDE4
170 60 2	380 000	645 000	38 500	66 000	1 600	2 200	24022CE4
180 56 2	385 000	630 000	39 500	64 000	1 600	2 000	23122CE4
180 69 2	460 000	750 000	47 000	76 500	1 600	2 000	24122CE4
200 53 2.1	605 000	645 000	61 500	66 000	2 600	3 200	*22222EAE4
200 69.8 2.1	515 000	760 000	52 500	77 500	1 500	1 900	23222CE4
240 50 3	450 000	545 000	46 000	55 500	1 300	1 700	21322CAE4
240 80 3	1030 000	1 120 000	105 000	115 000	1 900	2 400	*22322EAE4

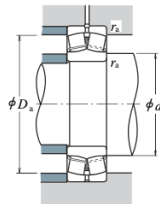
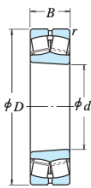
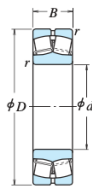
Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	Tapered Bore ⁽¹⁾		max. D_a			e	Y_2	Y_3	Y_0	
*22218EAKE4	min. d_a	max. d_a	max. D_a	r_a					approx.	
23218CKE4	100	108	150	142	0.24	4.3	2.9	2.8	3.3	
*21318EAKE4	100	105	150	138	0.32	3.2	2.1	2.1	4.51	
*22318EAKE4	104	115	176	152	0.24	4.3	2.9	2.8	6.1	
*22318EAKE4	104	115	176	163	0.33	3.1	2.1	2.0	8.56	
*22219EAKE4	107	115	158	152	0.24	4.3	2.9	2.8	4.04	
23219CAE4	107	—	158	146	0.32	3.1	2.1	2.0	5.33	
21319CE4	109	127	186	172	0.22	4.6	3.1	3.0	6.92	
*22319EAKE4	109	121	186	172	0.33	3.1	2.1	2.0	9.91	
23020CDE4	109	112	141	136	0.22	4.6	3.1	3.0	2.31	
24020CK30E4	109	110	141	132	0.30	3.4	2.3	2.2	3.08	
23120CKE4	110	113	155	144	0.30	3.4	2.3	2.2	4.38	
24120CAK30E4	110	—	155	143	0.35	2.9	1.9	1.9	5.42	
*22220EAKE4	112	119	168	160	0.24	4.3	2.9	2.8	4.84	
23220CKE4	112	118	168	155	0.32	3.2	2.1	2.1	6.6	
21320CKE4	114	133	201	184	0.21	4.7	3.2	3.1	8.46	
*22320EAKE4	114	130	201	184	0.33	3.0	2.0	2.0	12.7	
23022CDE4	120	124	160	153	0.24	4.2	2.8	2.8	3.76	
24022CK30E4	120	121	160	148	0.32	3.1	2.1	2.1	4.96	
23122CKE4	120	127	170	158	0.28	3.5	2.4	2.3	5.7	
24122CK30E4	120	123	170	154	0.36	2.8	1.9	1.8	6.84	
*22222EAKE4	122	129	188	178	0.25	4.0	2.7	2.6	6.99	
23222CKE4	122	130	188	170	0.34	3.0	2.0	1.9	9.54	
21322CAKE4	124	—	226	206	0.22	4.6	3.1	3.0	11.2	
*22322EAKE4	124	145	226	206	0.33	3.1	2.1	2.0	17.6	

- Remarks**
- The bearings denoted by an asterisk (*) are NSK/HPS bearings and an oil groove and holes are standard for them.
 - When making a selection of the recommended fit (Tolerance of Shaft) on Page A84 of the NSK Rolling Bearings catalog, in case of NSK/HPS bearings, the conditions are different.
The segmentations are: Light Loads ($\leq 0.05C_r$); Normal Loads (0.05 to 0.10 C_r); and Heavy Loads ($> 0.10C_r$).
 - For the dimensions of adapters and withdrawal sleeves, refer to Pages B360 – B361, and B366 – B367.

SPHERICAL ROLLER BEARINGS



Bore Diameter 120 – 150 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$P_0 = F_r + Y_0 F_a$
The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
	C_r	C_{Or}	C_r	C_{Or}	Grease	Oil	
d D B r_{min}	(N)				(kgf)		Cylindrical Bore
120 180 46 2	315 000	525 000	32 000	53 500	1 800	2 200	23024CDE4
180 60 2	395 000	705 000	40 500	72 000	1 500	2 000	24024CE4
200 62 2	465 000	720 000	47 500	73 500	1 400	1 800	23124CE4
200 80 2	575 000	950 000	58 500	96 500	1 400	1 800	24124CE4
215 58 2.1	685 000	765 000	70 000	78 000	2 400	3 000	*22224EAE4
215 76 2.1	630 000	970 000	64 500	99 000	1 300	1 700	23224CE4
260 86 3	1190 000	1 320 000	122 000	134 000	1 700	2 200	*22324EAE4
130 200 52 2	400 000	655 000	40 500	67 000	1 700	2 000	23026CDE4
200 69 2	495 000	865 000	50 500	88 000	1 400	1 800	24026CE4
210 64 2	505 000	825 000	51 500	84 500	1 300	1 700	23126CE4
210 80 2	590 000	1 010 000	60 000	103 000	1 300	1 700	24126CE4
230 64 3	820 000	940 000	83 500	96 000	2 200	2 600	*22226EAE4
230 80 3	700 000	1 080 000	71 500	110 000	1 200	1 600	23226CE4
280 83 4	895 000	1 350 000	101 000	137 000	1 300	1 600	22326CE4
140 210 53 2	420 000	715 000	43 000	73 000	1 600	1 900	23028CDE4
210 69 2	525 000	945 000	53 500	96 500	1 300	1 700	24028CE4
225 68 2.1	580 000	945 000	59 000	96 500	1 200	1 600	23128CE4
225 85 2.1	670 000	1 160 000	68 500	118 000	1 200	1 600	24128CE4
250 68 3	645 000	930 000	65 500	95 000	1 400	1 700	22228CDE4
250 88 3	835 000	1 300 000	85 000	133 000	1 100	1 500	23228CE4
300 102 4	1 160 000	1 590 000	118 000	162 000	1 200	1 500	22328CE4
150 225 56 2.1	470 000	815 000	48 000	83 000	1 400	1 800	23030CDE4
225 75 2.1	590 000	1 090 000	60 500	111 000	1 200	1 500	24030CE4
250 80 2.1	725 000	1 180 000	74 000	121 000	1 100	1 400	23130CE4
250 100 2.1	890 000	1 530 000	91 000	156 000	1 100	1 400	24130CE4
270 73 3	765 000	1 120 000	78 000	114 000	1 300	1 600	22230CDE4
270 96 3	975 000	1 560 000	99 500	159 000	1 100	1 400	23230CE4
320 108 4	1 220 000	1 690 000	125 000	172 000	1 100	1 400	22330CAE4

Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	min. d_a		max. D_a			e	Y_2	Y_3	Y_0	
Tapered Bore ⁽¹⁾						approx.				
23024CDKE4	130	134	170	163	0.22	4.5	3.0	2.9	4.11	
24024CK30E4	130	131	170	158	0.32	3.2	2.1	2.1	5.33	
23124CKE4	130	138	190	175	0.29	3.5	2.4	2.3	7.85	
24124CK30E4	130	136	190	171	0.37	2.7	1.8	1.8	10	
*22224EAE4	132	142	203	190	0.25	3.9	2.7	2.6	8.8	
23224CKE4	132	140	203	182	0.34	2.9	2.0	1.9	12.1	
*22324EAE4	134	157	246	222	0.32	3.1	2.1	2.0	22.2	
23026CDKE4	140	147	190	180	0.23	4.3	2.9	2.8	5.98	
24026CK30E4	140	143	190	175	0.31	3.2	2.2	2.1	7.84	
23126CKE4	140	149	200	184	0.28	3.6	2.4	2.4	8.69	
24126CK30E4	140	146	200	180	0.35	2.9	1.9	1.9	10.7	
*22226EAE4	144	152	216	204	0.26	3.8	2.6	2.5	11	
23226CKE4	144	150	216	196	0.34	2.9	2.0	1.9	14.3	
22326CKE4	148	166	262	236	0.34	2.9	2.0	1.9	28.1	
23028CDKE4	150	157	200	190	0.22	4.5	3.0	2.9	6.49	
24028CK30E4	150	154	200	186	0.29	3.4	2.3	2.2	8.37	
23128CKE4	152	158	213	198	0.28	3.6	2.4	2.3	10.5	
24128CK30E4	152	156	213	193	0.35	2.9	1.9	1.9	13	
*22228EAE4	154	167	236	219	0.25	4.0	2.7	2.6	14.5	
23228CKE4	154	163	236	213	0.35	2.9	1.9	1.9	18.8	
22328CKE4	158	177	282	253	0.35	2.9	1.9	1.9	35.4	
23030CDKE4	162	168	213	203	0.22	4.6	3.1	3.0	7.9	
24030CK30E4	162	165	213	198	0.30	3.4	2.3	2.2	10.5	
23130CKE4	162	174	238	218	0.30	3.4	2.3	2.2	15.8	
24130CK30E4	162	169	238	212	0.38	2.6	1.8	1.7	19.8	
22230CDKE4	164	179	256	236	0.26	3.9	2.6	2.5	18.4	
23230CKE4	164	176	256	230	0.35	2.9	1.9	1.9	24.2	
22330CAE4	168	—	302	270	0.35	2.9	1.9	1.9	41.5	

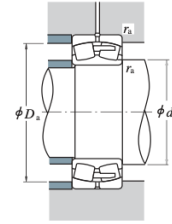
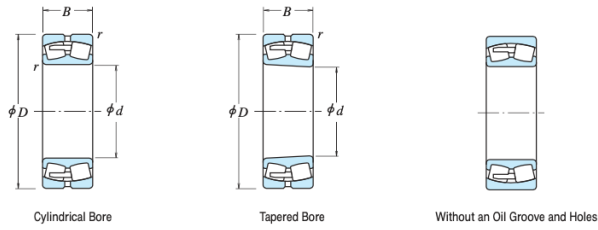
Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).

Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS bearings and an oil groove and holes are standard for them.
2. When making a selection of the recommended fit (Tolerance of Shaft) on Page A84 of the NSK Rolling Bearings catalog, in case of NSKHPS bearings, the conditions are different.
The segmentations are: Light Loads ($\leq 0.05C_r$); Normal Loads (0.05 to 0.10C_r); and Heavy Loads ($> 0.10C_r$).
3. For the dimensions of adapters and withdrawal sleeves, refer to Pages B361 – B362, and B367 – B368.

SPHERICAL ROLLER BEARINGS



Bore Diameter 160 – 190 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
	C_r	C_{Or}	C_t	C_{Ot}	Grease	Oil	
d D B r min.	(N)				(kgf)		Cylindrical Bore
160 220 45 2	360 000	675 000	37 000	69 000	1 400	1 800	23932CAE4
240 60 2.1	540 000	955 000	55 000	97 500	1 300	1 700	23032CDE4
240 80 2.1	680 000	1 260 000	69 000	128 000	1 100	1 400	24032CE4
270 86 2.1	855 000	1 400 000	87 000	143 000	1 000	1 300	23132CE4
270 109 2.1	1 040 000	1 760 000	106 000	179 000	1 000	1 300	24132CE4
290 80 3	910 000	1 320 000	93 000	135 000	1 200	1 500	22232CDE4
290 104 3	1 100 000	1 770 000	112 000	180 000	1 000	1 300	23232CE4
340 114 4	1 360 000	1 900 000	139 000	193 000	1 100	1 300	22332CAE4
170 230 45 2	350 000	660 000	35 500	67 500	1 400	1 800	23934BCAE4
260 67 2.1	640 000	1 090 000	65 000	112 000	1 200	1 600	23034CDE4
260 90 2.1	825 000	1 520 000	84 000	155 000	1 000	1 300	24034CE4
280 88 2.1	940 000	1 570 000	96 000	160 000	1 000	1 300	23134CE4
280 109 2.1	1 080 000	1 860 000	110 000	190 000	1 000	1 300	24134CE4
310 86 4	990 000	1 500 000	101 000	153 000	1 100	1 400	22234CDE4
310 110 4	1 200 000	1 910 000	122 000	195 000	900	1 200	23234CE4
360 120 4	1 580 000	2 110 000	161 000	215 000	1 000	1 200	22334CAE4
180 250 52 2	470 000	890 000	48 000	90 500	1 200	1 600	23936CAE4
280 74 2.1	750 000	1 270 000	76 000	129 000	1 200	1 400	23036CDE4
280 100 2.1	965 000	1 750 000	98 500	178 000	950	1 200	24036CE4
300 96 3	1 050 000	1 760 000	108 000	180 000	900	1 200	23136CE4
300 118 3	1 190 000	2 040 000	121 000	208 000	900	1 200	24136CE4
320 86 4	1 020 000	1 540 000	104 000	157 000	1 100	1 300	22236CDE4
320 112 4	1 300 000	2 110 000	133 000	215 000	850	1 100	23236CE4
380 126 4	1 740 000	2 340 000	177 000	238 000	950	1 200	22336CAE4
190 260 52 2	460 000	875 000	47 000	89 500	1 200	1 500	23938CAE4
290 75 2.1	775 000	1 350 000	79 000	138 000	1 100	1 400	23038CDE4
290 100 2.1	975 000	1 840 000	99 500	188 000	900	1 200	24038CE4
320 104 3	1 190 000	2 020 000	121 000	206 000	850	1 100	23138CE4
320 128 3	1 370 000	2 330 000	140 000	238 000	850	1 100	24138CE4
340 92 4	1 140 000	1 730 000	116 000	176 000	1 000	1 200	22238CAE4
340 120 4	1 440 000	2 350 000	147 000	240 000	800	1 100	23238CE4
400 132 5	1 890 000	2 590 000	193 000	264 000	900	1 100	22338CAE4

Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	Tapered Bore ⁽¹⁾		Cylindrical Bore			e	Y_2	Y_3	Y_0	
23932CAE4	min. 170	max. —	min. 210	max. 203	0.18	5.6	3.8	3.7	4.97	
23032CDE4	172	179	228	216	0.22	4.5	3.0	2.9	9.66	
24032CK30E4	172	177	228	212	0.30	3.4	2.3	2.2	12.7	
23132CE4	172	185	258	234	0.30	3.4	2.3	2.2	20.3	
24132CK30E4	172	179	258	229	0.39	2.6	1.7	1.7	25.4	
22232CDE4	174	190	276	255	2.5	0.26	3.8	2.6	23.1	
23232CE4	174	189	276	245	2.5	0.34	2.9	2.0	30.5	
22332CAE4	178	—	322	287	3	0.35	2.9	1.9	49.3	
23934BCAE4	180	—	220	213	2	0.17	5.8	3.9	3.8	
23034CDE4	182	191	248	233	2	0.23	4.3	2.9	2.8	
24034CK30E4	182	188	248	228	2	0.31	3.2	2.2	2.1	
23134CE4	182	194	268	245	2	0.29	3.5	2.3	2.3	
24134CK30E4	182	190	268	239	2	0.37	2.7	1.8	1.8	
22234CDE4	188	206	292	270	3	0.26	3.8	2.6	2.5	
23234CE4	188	201	292	261	3	0.34	2.9	2.0	1.9	
22334CAE4	188	—	342	304	3	0.35	2.9	1.9	1.9	
23936CAE4	190	—	240	230	2	0.18	5.5	3.7	3.6	
23036CDE4	192	202	268	249	2	0.24	4.2	2.8	2.8	
24036CK30E4	192	200	268	245	2	0.32	3.1	2.1	2.0	
23136CE4	194	206	286	260	2.5	0.30	3.4	2.3	2.2	
24136CK30E4	194	202	286	255	2.5	0.37	2.7	1.8	1.8	
22236CDE4	198	212	302	278	3	0.26	3.9	2.6	2.6	
23236CE4	198	211	302	274	3	0.33	3.0	2.0	2.0	
22336CAE4	198	—	362	322	3	0.34	2.9	2.0	1.9	
23938CAE4	200	—	250	240	2	0.18	5.7	3.8	3.7	
23038CDE4	202	—	278	261	2	0.24	4.2	2.8	2.8	
24038CK30E4	202	210	278	253	2	0.31	3.2	2.2	2.1	
23138CE4	204	219	306	276	2.5	0.31	3.3	2.2	2.2	
24138CK30E4	204	211	306	269	2.5	0.40	2.5	1.7	1.6	
22238CAE4	208	—	322	296	3	0.26	3.8	2.6	2.5	
23238CE4	208	222	322	288	3	0.35	2.9	1.9	1.9	
22338CAE4	212	—	378	338	4	0.34	2.9	2.0	1.9	

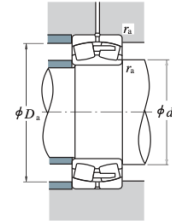
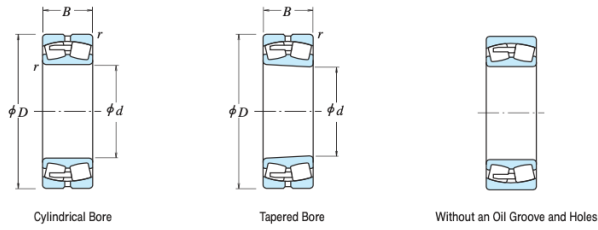
Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).

Remarks For the dimensions of adapters and withdrawal sleeves, refer to Pages B362 and B368.

SPHERICAL ROLLER BEARINGS



Bore Diameter 200 – 260 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_3	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
	C_r	C_{Or}	C_r	C_{Or}	Grease	Oil	
d D B r min.	(N)				(kgf)		Cylindrical Bore
200 280 60 2.1	570 000	1 060 000	58 000	108 000	1 100	1 400	23940CAE4
310 82 2.1	940 000	1 700 000	96 000	174 000	1 000	1 300	23040CAE4
310 109 2.1	1 140 000	2 120 000	116 000	216 000	850	1 100	24040CE4
340 112 3	1 360 000	2 330 000	139 000	238 000	800	1 000	23140CE4
340 140 3	1 570 000	2 670 000	160 000	272 000	800	1 000	24140CE4
360 98 4	1 300 000	2 010 000	133 000	204 000	950	1 200	22240CAE4
360 128 4	1 660 000	2 750 000	169 000	281 000	750	1 000	23240CE4
420 138 5	2 000 000	2 990 000	204 000	305 000	850	1 000	22340CAE4
220 300 60 2.1	625 000	1 240 000	64 000	126 000	1 000	1 300	23944CAE4
340 90 3	1 090 000	1 980 000	111 000	202 000	950	1 200	23044CAE4
340 118 3	1 360 000	2 600 000	138 000	265 000	750	1 000	24044CE4
370 120 4	1 570 000	2 710 000	160 000	276 000	710	950	23144CE4
370 150 4	1 800 000	3 200 000	183 000	325 000	710	950	24144CE4
400 108 4	1 570 000	2 430 000	160 000	247 000	850	1 000	22244CAE4
400 144 4	2 020 000	3 400 000	206 000	350 000	670	900	23244CE4
460 145 5	2 350 000	3 400 000	240 000	345 000	750	950	22344CAE4
240 320 60 2.1	635 000	1 300 000	65 000	133 000	950	1 200	23948CAE4
360 92 3	1 160 000	2 140 000	118 000	218 000	850	1 100	23048CAE4
360 118 3	1 390 000	2 730 000	141 000	278 000	710	950	24048CE4
400 128 4	1 790 000	3 100 000	182 000	320 000	670	850	23148CE4
400 160 4	2 130 000	3 800 000	217 000	385 000	670	850	24148CE4
440 120 4	1 870 000	2 890 000	191 000	294 000	750	950	22248CAE4
440 160 4	2 440 000	4 050 000	249 000	415 000	630	800	23248CAE4
500 155 5	2 600 000	3 800 000	265 000	385 000	670	850	22348CAE4
260 360 75 2.1	930 000	1 870 000	95 000	191 000	850	1 000	23952CAE4
400 104 4	1 430 000	2 580 000	145 000	263 000	800	950	23052CAE4
400 140 4	1 810 000	3 500 000	185 000	360 000	630	850	24052CAE4
440 144 4	2 160 000	3 750 000	221 000	385 000	600	800	23152CAE4
440 180 4	2 560 000	4 700 000	261 000	480 000	600	800	24152CAE4
480 130 5	2 180 000	3 400 000	222 000	345 000	670	850	22252CAE4
480 174 5	2 740 000	4 550 000	279 000	460 000	560	750	23252CAE4
540 165 6	3 100 000	4 600 000	320 000	470 000	630	800	22352CAE4

Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	Tapered Bore ⁽¹⁾		Cylindrical Bore			e	Y_2	Y_3	Y_0	
23940CAKE4	212	—	268	258	2	0.20	5.1	3.4	3.3	11
23040CAKE4	212	—	298	279	2	0.25	4.0	2.7	2.6	22.6
24040CK30E4	212	223	298	271	2	0.32	3.1	2.1	2.0	30.4
23140CKE4	214	232	326	293	2.5	0.31	3.2	2.2	2.1	42.7
24140CK30E4	214	226	326	290	2.5	0.39	2.6	1.8	1.7	51.3
22240CAKE4	218	—	342	315	3	0.26	3.8	2.6	2.5	42.6
23240CKE4	218	237	342	307	3	0.34	2.9	2.0	1.9	57.1
22340CAKE4	222	—	398	352	4	0.34	2.9	2.0	1.9	92.6
23944CAKE4	232	—	288	278	2	0.18	5.7	3.8	3.7	12.2
23044CAKE4	234	—	326	302	2.5	0.24	4.1	2.8	2.7	29.7
24044CK30E4	234	244	326	296	2.5	0.31	3.2	2.1	2.1	40.5
23144CKE4	238	254	352	320	3	0.30	3.3	2.2	2.2	53
24144CK30E4	238	248	352	313	3	0.39	2.6	1.7	1.7	66.7
22244CAKE4	238	—	382	348	3	0.27	3.7	2.5	2.4	59
23244CKE4	238	260	382	337	3	0.35	2.9	1.9	1.9	80.4
22344CAKE4	242	—	438	391	4	0.33	3.0	2.0	2.0	116
23948CAKE4	252	—	308	298	2	0.17	6.0	4.0	3.9	13.3
23048CAKE4	254	—	346	324	2.5	0.24	4.2	2.8	2.7	32.6
24048CK30E4	254	265	346	317	2.5	0.29	3.4	2.3	2.2	43.4
23148CKE4	258	275	382	347	3	0.30	3.3	2.2	2.2	66.9
24148CK30E4	258	268	382	341	3	0.38	2.7	1.8	1.8	79.5
22248CAKE4	258	—	422	383	3	0.27	3.7	2.5	2.4	80.2
23248CKE4	258	—	422	372	3	0.37	2.7	1.8	1.8	106
22348CAKE4	262	—	478	423	4	0.32	3.2	2.1	2.1	147
23952CAKE4	272	—	348	333	2	0.19	5.4	3.6	3.5	23
23052CAKE4	278	—	382	356	3	0.25	4.1	2.7	2.7	46.6
24052CAK30E4	278	—	382	348	3	0.32	3.1	2.1	2.1	62.6
23152CAKE4	278	—	422	380	3	0.32	3.2	2.1	2.1	88.2
24152CAK30E4	278	—	422	371	3	0.39	2.6	1.7	1.7	109
22252CAKE4	282	—	458	418	4	0.27	3.7	2.5	2.5	104
23252CAKE4	282	—	458	406	4	0.37	2.7	1.8	1.8	137
22352CAKE4	288	—	512	462	5	0.32	3.2	2.1	2.1	180

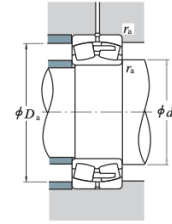
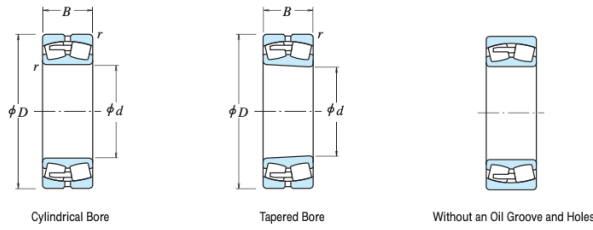
Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).

Remarks For the dimensions of adapters and withdrawal sleeves, refer to Pages B363 and B369.

SPHERICAL ROLLER BEARINGS



Bore Diameter 280 – 340 mm



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
	C_r	C_{Or}	C_r	C_{Or}	Grease	Oil	
d D B r min.	(N)				(kgf)		Cylindrical Bore
280 380 75 2.1 420 106 4 420 140 4	925 000 1 540 000 1 880 000	1 950 000 2 950 000 3 800 000	94 500 157 000 191 000	199 000 300 000 385 000	800 710 600	950 900 800	23956CAE4 23056CAE4 24056CAE4
460 146 5 460 180 5 500 130 5	2 230 000 2 640 000 2 280 000	4 000 000 5 000 000 3 650 000	228 000 269 000 233 000	410 000 505 000 370 000	560 560 630	750 750 800	23156CAE4 24156CAE4 22256CAE4
500 176 5 580 175 6	2 880 000 3 500 000	4 900 000 5 150 000	294 000 355 000	500 000 525 000	530 560	670 710	23256CAE4 22356CAE4
300 420 90 3 460 118 4 460 160 4	1 230 000 1 920 000 2 310 000	2 490 000 3 700 000 4 600 000	125 000 196 000 235 000	254 000 375 000 470 000	710 670 530	900 850 710	23960CAE4 23060CAE4 24060CAE4
500 160 5 500 200 5	2 670 000 3 100 000	4 800 000 5 800 000	273 000 315 000	490 000 595 000	500 500	670 670	23160CAE4 24160CAE4
540 140 5 540 192 5	2 610 000 3 400 000	4 250 000 5 900 000	266 000 350 000	430 000 600 000	600 480	750 630	22260CAE4 23260CAE4
320 440 90 3 480 121 4 480 160 4	1 300 000 1 960 000 2 440 000	2 750 000 3 850 000 5 050 000	132 000 200 000 249 000	281 000 395 000 515 000	670 630 500	850 800 670	23964CAE4 23064CAE4 24064CAE4
540 176 5 540 218 5	3 050 000 3 550 000	5 500 000 6 650 000	315 000 360 000	560 000 675 000	480 480	600 600	23164CAE4 24164CAE4
580 150 5 580 208 5	2 990 000 3 900 000	4 850 000 6 900 000	305 000 395 000	495 000 700 000	530 450	670 600	22264CAE4 23264CAE4
340 460 90 3 520 133 5 520 180 5	1 330 000 2 280 000 2 920 000	2 840 000 4 400 000 6 050 000	136 000 232 000 298 000	289 000 445 000 615 000	630 560 480	800 710 600	23988CAE4 23088CAE4 24088CAE4
580 190 5 580 243 5 620 224 6	3 600 000 4 250 000 4 400 000	6 600 000 7 900 000 7 800 000	370 000 430 000 450 000	670 000 810 000 795 000	430 430 400	560 560 530	23168CAE4 24168CAE4 23268CAE4

Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	d_a min.	D_a max.	D_a min.	r_a max.		e	Y_2	Y_3	Y_0	
23956CAE4 23056CAE4 24056CAK30E4	292 298 298	368 402 402	351 377 369	2 3 3	0.18 0.24 0.31	5.7 4.2 3.3	3.9 2.8 2.2	3.8 2.7 2.2	24.5 50.5 66.4	
23156CAE4 24156CAK30E4 22256CAE4	302 302 302	438 438 478	400 392 439	4 4 4	0.30 0.37 0.25	3.3 2.7 4.0	2.2 1.8 2.7	2.2 1.8 2.6	94.3 115 110	
23256CAE4 22356CAE4	302 308	478 552	425 496	4 5	0.35 0.31	2.9 3.2	1.9 2.1	1.9 2.1	147 221	
23960CAE4 23060CAE4 24060CAK30E4	314 318 318	406 442 442	386 413 400	2.5 3 3	0.19 0.24 0.32	5.2 4.2 3.1	3.5 2.8 2.1	3.4 2.7 2.0	38.2 70.5 93.6	
23160CAE4 24160CAK30E4	322 322	478 478	433 423	4 4	0.31 0.38	3.3 2.6	2.2 1.8	2.2 1.7	125 152	
22260CAE4 23260CAE4	322 322	518 518	473 458	4	0.25 0.35	4.0 2.9	2.7 1.9	2.6 1.9	139 189	
23964CAE4 23064CAE4 24064CAK30E4	334 338 338	426 462 462	406 432 422	2.5 3 3	0.18 0.24 0.31	5.5 4.2 3.3	3.7 2.8 2.2	3.6 2.8 2.2	40.6 75.6 99.7	
23164CAE4 24164CAK30E4	342 342	518 518	466 456	4	0.31 0.39	3.2 2.6	2.1 1.7	2.1 1.7	162 196	
22264CAE4 23264CAE4	342 342	558 558	508 488	4	0.26 0.36	3.9 2.8	2.6 1.9	2.6 1.8	174 239	
23988CAE4 23088CAE4 24088CAK30E4	354 362 362	446 498 498	427 465 454	2.5 4 4	0.18 0.24 0.32	5.7 4.2 3.2	3.8 2.8 2.1	3.7 2.8 2.1	42.4 101 135	
23168CAE4 24168CAK30E4 23268CAE4	362 362 368	558 558 592	499 489 521	4 4 5	0.31 0.40 0.36	3.2 2.5 2.8	2.1 1.7 1.9	2.1 1.7 1.8	206 257 295	

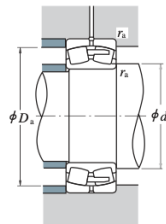
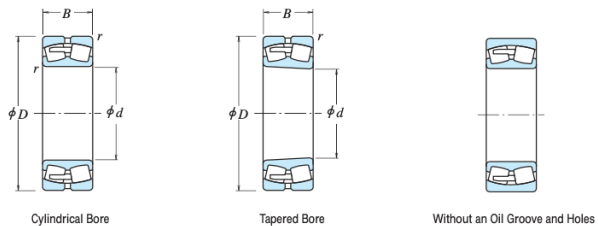
Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).

Remarks For the dimensions of adapters and withdrawal sleeves, refer to Pages B363 – B364, and B369 – B370.

SPHERICAL ROLLER BEARINGS



Bore Diameter 360 – 440 mm



Dynamic Equivalent Load
 $P = X F_r + Y F_a$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load
 $P_0 = F_r + Y_0 F_a$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
	C_r	C_{0r}	C_r	C_{0r}	Grease	Oil	
d D B r min.	(N)				(kgf)		Cylindrical Bore
360 480 90 3	1 390 000	3 050 000	142 000	315 000	600	750	23972CAE4
540 134 5	2 390 000	4 700 000	244 000	480 000	530	670	23072CAE4
540 180 5	2 930 000	6 100 000	299 000	625 000	450	600	24072CAE4
600 192 5	3 800 000	7 100 000	390 000	725 000	400	530	23172CAE4
600 243 5	4 200 000	8 000 000	430 000	815 000	400	530	24172CAE4
650 232 6	4 800 000	8 550 000	490 000	870 000	380	500	23272CAE4
380 520 106 4	1 870 000	4 100 000	190 000	420 000	530	670	23976CAE4
560 135 5	2 500 000	5 100 000	255 000	520 000	530	630	23076CAE4
560 180 5	3 050 000	6 600 000	315 000	670 000	430	560	24076CAE4
620 194 5	4 000 000	7 600 000	405 000	775 000	400	500	23176CAE4
620 243 5	4 350 000	8 450 000	440 000	865 000	400	500	24176CAE4
680 240 6	5 150 000	9 200 000	525 000	940 000	360	480	23276CAE4
400 540 106 4	1 890 000	4 250 000	193 000	435 000	530	630	23980CAE4
600 148 5	2 970 000	5 900 000	305 000	605 000	480	600	23080CAE4
600 200 5	3 600 000	7 600 000	370 000	775 000	400	500	24080CAE4
650 200 6	4 150 000	7 900 000	420 000	805 000	380	480	23180CAE4
650 256 6	4 950 000	10 100 000	505 000	1 030 000	380	480	24180CAE4
720 256 6	5 800 000	10 400 000	590 000	1 060 000	340	450	23280CAE4
420 560 106 4	1 870 000	4 250 000	191 000	430 000	500	600	23984CAE4
620 150 5	2 910 000	5 850 000	297 000	595 000	450	560	23084CAE4
620 200 5	3 750 000	8 100 000	380 000	825 000	380	480	24084CAE4
700 224 6	5 000 000	9 400 000	510 000	960 000	340	450	23184CAE4
700 280 6	6 000 000	12 000 000	610 000	1 220 000	340	450	24184CAE4
760 272 7.5	6 450 000	11 700 000	660 000	1 190 000	320	430	23284CAE4
440 600 118 4	2 190 000	4 800 000	223 000	490 000	450	560	23988CAE4
650 157 6	3 150 000	6 350 000	320 000	645 000	430	530	23088CAE4
650 212 6	4 150 000	9 100 000	425 000	930 000	360	450	24088CAE4
720 226 6	5 300 000	10 300 000	540 000	1 060 000	320	430	23188CAE4
720 280 6	6 000 000	12 100 000	610 000	1 230 000	320	430	24188CAE4
790 280 7.5	6 900 000	12 800 000	705 000	1 300 000	300	400	23288CAE4

Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	d_a min.	D_a max.	r_a min.	r_a max.		e	Y_2	Y_3	Y_0	
Tapered Bore ⁽¹⁾						approx.				
23972CAE4	374	466	447	2.5	0.17	6.0	4.1	4.0	44.7	
23072CAE4	382	518	485	4	0.24	4.2	2.8	2.8	106	
24072CAK30E4	382	518	476	4	0.32	3.2	2.1	2.1	139	
23172CAE4	382	578	520	4	0.31	3.2	2.2	2.1	217	
24172CAK30E4	382	578	507	4	0.40	2.5	1.7	1.7	264	
23272CAE4	388	622	549	5	0.36	2.8	1.9	1.8	342	
23976CAE4	398	502	482	3	0.18	5.5	3.7	3.6	65.4	
23076CAE4	402	538	506	4	0.22	4.5	3.0	3.0	113	
24076CAK30E4	402	538	496	4	0.29	3.4	2.3	2.3	148	
23176CAE4	402	598	540	4	0.30	3.3	2.2	2.2	229	
24176CAK30E4	402	598	529	4	0.38	2.6	1.8	1.7	275	
23276CAE4	408	652	578	5	0.35	2.9	1.9	1.9	372	
23980CAE4	418	522	501	3	0.18	5.7	3.9	3.8	69.1	
23080CAE4	422	578	540	4	0.23	4.4	3.0	2.9	146	
24080CAK30E4	422	578	527	4	0.31	3.3	2.2	2.2	193	
23180CAE4	428	622	569	5	0.29	3.4	2.3	2.3	257	
23080CAK30E4	428	622	551	5	0.37	2.7	1.8	1.8	316	
23280CAE4	428	692	610	5	0.36	2.8	1.9	1.9	449	
23984CAE4	438	542	521	3	0.17	6.0	4.0	3.9	71.6	
23084CAE4	442	598	562	4	0.23	4.3	2.9	2.8	151	
24084CAK30E4	442	598	549	4	0.31	3.2	2.2	2.1	199	
23184CAE4	448	672	607	5	0.31	3.3	2.2	2.2	341	
24184CAK30E4	448	672	598	5	0.38	2.6	1.8	1.7	421	
23284CAE4	456	724	644	6	0.35	2.9	1.9	1.9	534	
23988CAE4	458	582	555	3	0.18	5.7	3.9	3.8	96.3	
23088CAE4	468	622	587	5	0.23	4.3	2.9	2.8	173	
24088CAK30E4	468	622	576	5	0.31	3.2	2.1	2.1	237	
23188CAE4	468	692	627	5	0.3	3.3	2.2	2.2	360	
24188CAK30E4	468	692	617	5	0.37	2.7	1.8	1.8	433	
23288CAE4	476	754	669	6	0.35	2.9	1.9	1.9	594	

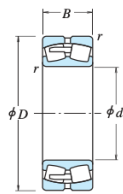
Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).

Remarks For the dimensions of adapters and withdrawal sleeves, refer to Pages B364, and B370 – B371.

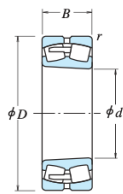
SPHERICAL ROLLER BEARINGS



Bore Diameter 460 – 560 mm



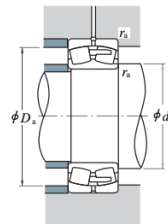
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing
	C_r	C_{0r}	C_r	C_{0r}	Grease	Oil	
d D B r min.	(N)				(kgf)		Cylindrical Bore
460 620 118 4	2 220 000	4 950 000	227 000	505 000	430	530	23992CAE4
680 163 6	3 450 000	7 100 000	355 000	725 000	400	500	23092CAE4
680 218 6	4 500 000	9 950 000	460 000	1 010 000	340	430	24092CAE4
760 240 7.5	5 700 000	10 900 000	580 000	1 110 000	300	400	23192CAE4
760 300 7.5	6 300 000	12 400 000	640 000	1 270 000	300	400	24192CAE4
830 296 7.5	7 350 000	13 700 000	750 000	1 400 000	280	380	23292CAE4
480 650 128 5	2 580 000	5 850 000	263 000	595 000	400	500	23996CAE4
700 165 6	3 800 000	7 950 000	385 000	810 000	400	480	23096CAE4
700 218 6	4 600 000	10 200 000	470 000	1 040 000	320	430	24096CAE4
790 248 7.5	6 050 000	11 700 000	620 000	1 200 000	300	380	23196CAE4
790 308 7.5	7 150 000	14 600 000	730 000	1 490 000	300	380	24196CAE4
870 310 7.5	7 850 000	14 400 000	805 000	1 470 000	260	360	23296CAE4
500 670 128 5	2 460 000	5 550 000	250 000	565 000	400	500	239/500CAE4
720 167 6	3 750 000	8 100 000	385 000	825 000	380	480	230/500CAE4
720 218 6	4 450 000	9 900 000	450 000	1 010 000	300	400	240/500CAE4
830 264 7.5	6 850 000	13 400 000	700 000	1 360 000	280	360	231/500CAE4
830 325 7.5	8 000 000	16 000 000	815 000	1 630 000	280	360	241/500CAE4
920 326 7.5	9 000 000	16 600 000	915 000	1 690 000	260	320	232/500CAE4
530 710 136 5	2 930 000	6 800 000	299 000	695 000	360	450	239/530CAE4
780 185 6	4 400 000	9 200 000	450 000	940 000	340	430	230/530CAE4
780 250 6	5 400 000	11 800 000	550 000	1 210 000	280	360	240/530CAE4
870 272 7.5	7 150 000	14 100 000	730 000	1 440 000	260	340	231/530CAE4
870 335 7.5	8 500 000	17 500 000	870 000	1 790 000	260	340	241/530CAE4
980 355 9.5	10 100 000	18 800 000	1 030 000	1 920 000	240	300	232/530CAE4
560 750 140 5	3 100 000	7 250 000	320 000	740 000	340	430	239/560CAE4
820 195 6	5 000 000	10 700 000	510 000	1 090 000	320	400	230/560CAE4
820 258 6	5 950 000	13 300 000	605 000	1 360 000	260	340	240/560CAE4
920 280 7.5	7 850 000	15 500 000	800 000	1 580 000	240	320	231/560CAE4
920 355 7.5	9 400 000	19 600 000	960 000	2 000 000	240	320	241/560CAE4
1 030 365 9.5	10 900 000	20 500 000	1 110 000	2 090 000	220	280	232/560CAE4

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).

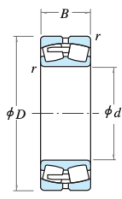
Numbers	Abutment and Fillet Dimensions (mm)			Constant	Axial Load Factors				Mass (kg)
	d_a min.	D_a max.	r_a max.		e	Y_2	Y_3	Y_0	
Tapered Bore(1)	Cylindrical Bore							approx.	
23992CAKE4	478	602	575	3	0.17	5.9	4.0	3.9	100
23092CAKE4	488	652	615	5	0.22	4.6	3.1	3.0	201
24092CAK30E4	488	652	604	5	0.29	3.4	2.3	2.3	266
23192CAKE4	496	724	661	6	0.31	3.3	2.2	2.2	423
24192CAK30E4	496	724	646	6	0.39	2.6	1.7	1.7	512
23292CAKE4	496	794	702	6	0.36	2.8	1.9	1.8	691
23996CAKE4	502	628	602	4	0.18	5.7	3.8	3.7	121
23096CAKE4	508	672	633	5	0.22	4.6	3.1	3.0	211
24096CAK30E4	508	672	625	5	0.30	3.4	2.3	2.2	270
23196CAKE4	516	754	688	6	0.31	3.3	2.2	2.2	475
24196CAK30E4	516	754	670	6	0.39	2.6	1.7	1.7	567
23296CAKE4	516	834	733	6	0.36	2.8	1.9	1.8	795
239/500CAKE4	522	648	622	4	0.17	6.0	4.0	3.9	124
230/500CAKE4	528	692	655	5	0.21	4.8	3.2	3.1	220
240/500CAK30E4	528	692	643	5	0.30	3.4	2.3	2.2	276
231/500CAKE4	536	794	720	6	0.31	3.2	2.2	2.1	567
241/500CAK30E4	536	794	703	6	0.39	2.6	1.7	1.7	666
232/500CAKE4	536	884	773	6	0.38	2.7	1.8	1.8	969
239/530CAKE4	552	688	659	4	0.17	6.0	4.0	3.9	149
230/530CAKE4	558	752	706	5	0.22	4.6	3.1	3.0	298
240/530CAK30E4	558	752	690	5	0.31	3.3	2.2	2.2	390
231/530CAKE4	566	834	758	6	0.30	3.3	2.2	2.2	628
241/530CAK30E4	566	834	740	6	0.38	2.6	1.8	1.7	773
232/530CAKE4	574	936	824	8	0.38	2.7	1.8	1.7	1 170
239/560CAKE4	582	728	697	4	0.16	6.1	4.1	4.0	172
230/560CAKE4	588	792	742	5	0.22	4.5	3.0	2.9	344
240/560CAK30E4	588	792	729	5	0.30	3.3	2.2	2.2	440
231/560CAKE4	596	884	804	6	0.30	3.4	2.3	2.2	727
241/560CAK30E4	596	884	870	6	0.39	2.6	1.8	1.7	886
232/560CAKE4	604	986	870	8	0.36	2.8	1.9	1.8	1 320

Remarks For the dimensions of adapters and withdrawal sleeves, refer to Pages B365 and B371.

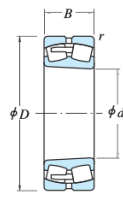
SPHERICAL ROLLER BEARINGS



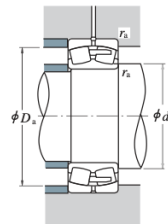
Bore Diameter 600 – 800 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$$P = X F_r + Y F_a$$

$F_a / F_r \leq e$		$F_a / F_r > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_r + Y_0 F_a$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)				Basic Load Ratings (N)				Basic Load Ratings (kgf)				Limiting Speeds (min ⁻¹)		Bearing
d	D	B	r min.	C_r	C_{0r}	C_r	C_{0r}	C_r	C_{0r}	Grease	Oil	Cylindrical Bore		
600	800	150	5	3 450 000	8 100 000	350 000	830 000	320	400	239/600CAE4				
	870	200	6	5 450 000	12 200 000	555 000	1 240 000	300	360	230/600CAE4				
	870	272	6	6 600 000	15 100 000	675 000	1 540 000	240	320	240/600CAE4				
	980	300	7.5	8 750 000	17 500 000	895 000	1 790 000	220	280	231/600CAE4				
630	850	165	6	4 000 000	9 350 000	405 000	950 000	300	360	239/630CAE4				
	920	212	7.5	5 900 000	12 700 000	600 000	1 300 000	280	340	230/630CAE4				
	920	290	7.5	7 550 000	17 700 000	770 000	1 810 000	220	300	240/630CAE4				
	1030	315	7.5	9 600 000	19 400 000	980 000	1 970 000	200	260	231/630CAE4				
670	900	170	6	4 350 000	10 300 000	445 000	1 050 000	260	340	239/670CAE4				
	980	230	7.5	6 850 000	15 000 000	700 000	1 530 000	240	320	230/670CAE4				
	980	308	7.5	8 450 000	19 500 000	860 000	1 990 000	200	260	240/670CAE4				
	1090	336	7.5	10 600 000	21 600 000	1 080 000	2 200 000	190	240	231/670CAE4				
710	1090	412	7.5	12 400 000	26 500 000	1 270 000	2 700 000	190	240	241/670CAE4				
	1220	438	12	14 900 000	28 700 000	1 520 000	2 920 000	170	220	232/670CAE4				
	950	180	6	4 800 000	11 700 000	490 000	1 200 000	240	300	239/710CAE4				
	1030	236	7.5	7 100 000	15 800 000	725 000	1 610 000	240	280	230/710CAE4				
750	1030	315	7.5	8 850 000	20 700 000	905 000	2 110 000	190	240	240/710CAE4				
	1150	438	9.5	13 900 000	30 500 000	1 410 000	3 100 000	170	220	241/710CAE4				
	1280	450	12	15 700 000	30 500 000	1 600 000	3 100 000	160	200	232/710CAE4				
	1000	185	6	5 250 000	12 800 000	535 000	1 310 000	220	280	239/750CAE4				
800	1090	250	7.5	7 750 000	17 200 000	790 000	1 750 000	220	260	230/750CAE4				
	1090	335	7.5	10 100 000	24 000 000	1 030 000	2 450 000	180	220	240/750CAE4				
	1360	475	15	17 700 000	35 500 000	1 800 000	3 600 000	140	190	232/750CAE4				
	1060	195	6	5 600 000	13 700 000	570 000	1 400 000	220	260	239/800CAE4				
800	1150	258	7.5	8 350 000	19 100 000	850 000	1 950 000	200	240	230/800CAE4				
	1150	345	7.5	10 900 000	26 300 000	1 110 000	2 680 000	160	200	240/800CAE4				
	1280	375	9.5	13 800 000	29 200 000	1 410 000	2 970 000	150	190	231/800CAE4				
	1420	488	15	20 300 000	41 000 000	2 070 000	4 150 000	130	170	232/800CAE4				

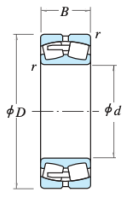
Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	d_a min.	d_a max.	D_a min.	r_a max.		e	Y_2	Y_3	Y_0	
239/600CAE4 230/600CAE4 240/600CAK30E4 231/600CAE4	622	778	745	4	0.17	5.9	3.9	3.9	205	
	628	842	794	5	0.21	4.8	3.3	3.2	389	
	628	842	772	5	0.30	3.3	2.2	2.2	529	
	636	944	856	6	0.30	3.4	2.3	2.2	898	
241/600CAK30E4 232/600CAE4	636	944	836	6	0.39	2.6	1.8	1.7	1 050	
	644	1 046	923	8	0.36	2.8	1.9	1.8	1 590	
	658	822	786	5	0.18	5.6	3.8	3.7	259	
	666	884	835	6	0.22	4.7	3.1	3.1	468	
239/630CAE4 230/630CAE4 240/630CAE4	666	884	815	6	0.30	3.3	2.2	2.2	637	
	666	994	900	6	0.30	3.4	2.3	2.2	1 040	
	666	994	876	6	0.38	2.7	1.8	1.7	1 250	
	684	1 096	970	10	0.36	2.8	1.9	1.8	1 850	
231/630CAE4 241/630CAK30E4 232/630CAE4	698	872	836	5	0.17	5.8	3.9	3.8	300	
	706	944	891	6	0.22	4.7	3.1	3.1	571	
	706	944	868	6	0.30	3.3	2.2	2.2	773	
	706	1 054	952	6	0.30	3.3	2.2	2.2	1 230	
241/670CAE4 230/670CAE4 240/670CAK30E4 231/670CAE4	706	1 054	934	6	0.37	2.7	1.8	1.8	1 440	
	724	1 166	1 024	10	0.37	2.7	1.8	1.8	2 210	
	738	922	863	5	0.17	5.8	3.9	3.8	352	
	746	994	936	6	0.22	4.6	3.1	3.0	647	
239/710CAE4 230/710CAE4 240/710CAK30E4	746	994	916	6	0.29	3.4	2.3	2.2	861	
	754	1 106	961	8	0.38	2.6	1.8	1.7	1 730	
	784	1 226	1 080	10	0.36	2.8	1.9	1.8	2 470	
	778	972	931	5	0.17	6.0	4.1	4.0	398	
239/750CAE4 230/750CAE4 240/750CAK30E4 232/750CAE4	786	1 054	990	6	0.22	4.6	3.1	3.0	768	
	786	1 054	969	6	0.29	3.4	2.3	2.2	1 030	
	814	1 296	1 148	12	0.36	2.8	1.9	1.8	2 980	
	828	1 032	987	5	0.17	6.0	4.0	3.9	462	
239/800CAE4 230/800CAE4 240/800CAK30E4	836	1 114	1 045	6	0.21	4.7	3.2	3.1	870	
	836	1 114	1 029	6	0.27	3.7	2.5	2.5	1 130	
	844	1 236	1 127	8	0.28	3.6	2.4	2.3	1 870	
	864	1 356	1 208	12	0.35	2.8	1.9	1.9	3 250	

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).

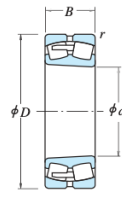
SPHERICAL ROLLER BEARINGS



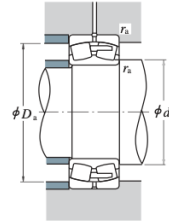
Bore Diameter 850 – 1400 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$$P = X F_x + Y F_y$$

$F_x / F_y \leq e$		$F_x / F_y > e$	
X	Y	X	Y
1	Y_2	0.67	Y_2

Static Equivalent Load

$$P_0 = F_x + Y_0 F_y$$

The values of e , Y_2 , Y_3 , and Y_0 are given in the table below.

Boundary Dimensions (mm)				Basic Load Ratings				Limiting Speeds (min ⁻¹)		Bearing	
d	D	B	r min.	(N)		(kgf)		Grease	Oil		
				C_r	C_{0r}	C_r	C_{0r}			Cylindrical Bore	
850	1 120	200	6	6 100 000	15 200 000	620 000	1 550 000	190	240	239/850CAE4 230/850CAE4	
	1 220	272	7.5	9 300 000	21 400 000	945 000	2 190 000	180	220		
	1 220	365	7.5	11 600 000	28 300 000	1 180 000	2 890 000	150	190	240/850CAE4 232/850CAE4	
	1 500	515	15	22 300 000	45 500 000	2 270 000	4 650 000	120	160		
900	1 180	206	6	6 600 000	16 700 000	670 000	1 700 000	180	220	239/900CAE4 230/900CAE4	
	1 280	280	7.5	9 850 000	22 800 000	1 000 000	2 330 000	160	200		
	1 280	375	7.5	12 800 000	31 500 000	1 300 000	3 250 000	140	180	240/900CAE4 232/900CAE4	
	1 580	515	15	23 400 000	47 500 000	2 380 000	4 850 000	110	140		
950	1 250	224	7.5	7 600 000	19 900 000	775 000	2 030 000	160	200	239/950CAE4 230/950CAE4	
	1 360	300	7.5	11 300 000	26 500 000	1 160 000	2 710 000	150	190		
	1 360	412	7.5	14 500 000	36 500 000	1 480 000	3 700 000	120	160	240/950CAE4 232/950CAE4	
	1 660	530	15	24 700 000	50 500 000	2 520 000	5 150 000	100	130		
1 000	1 320	236	7.5	8 200 000	21 700 000	835 000	2 210 000	150	190	239/1000CAE4 230/1000CAE4	
	1 420	308	7.5	11 900 000	28 100 000	1 210 000	2 860 000	140	170		
	1 420	412	7.5	15 300 000	38 500 000	1 560 000	3 950 000	110	150	240/1000CAE4 239/1000CAE4	
	1 420	412	7.5	15 300 000	38 500 000	1 560 000	3 950 000	110	150		
1 060	1 400	250	7.5	9 300 000	24 400 000	950 000	2 490 000	130	170	239/1060CAE4 230/1060CAE4	
	1 500	325	9.5	13 000 000	31 500 000	1 330 000	3 200 000	120	160		
	1 500	438	9.5	16 800 000	43 000 000	1 720 000	4 350 000	100	130	240/1060CAE4 239/1060CAE4	
	1 500	438	9.5	16 800 000	43 000 000	1 720 000	4 350 000	100	130		
1 120	1 580	345	9.5	15 400 000	38 000 000	1 570 000	3 850 000	110	140	230/1120CAE4 240/1120CAE4	
	1 580	462	9.5	18 700 000	49 500 000	1 910 000	5 050 000	95	120		
	1 180	1660	475	9.5	20 200 000	52 500 000	2 060 000	5 350 000	85	110	240/1180CAE4
	1 250	1 750	500	9.5	21 000 000	59 500 000	2 140 000	6 050 000	75	100	240/1250CAE4
	1 320	1 850	530	12	22 600 000	63 500 000	2 310 000	6 500 000	67	85	240/1320CAE4
	1 400	1 950	545	12	24 500 000	65 000 000	2 500 000	6 650 000	60	75	240/1400CAE4

Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors				Mass (kg)
	d_a min.	max.	D_a min.	r_a max.		e	Y_2	Y_3	Y_0	
239/850CAE4 230/850CAE4	878	1 092	1 046	5	0.16	6.2	4.2	4.1	523	
	886	1 184	1 109	6						0.21
240/850CAK30E4 232/850CAE4	886	1 184	1 093	6	0.28	3.6	2.4	2.4	1 350	
	914	1 436	1 274	12						0.35
239/900CAE4 230/900CAE4	928	1 152	1 103	5	0.16	6.4	4.3	4.2	591	
	936	1 244	1 169	6						0.20
240/900CAK30E4 232/900CAE4	936	1 244	1 147	6	0.28	3.6	2.4	2.4	1 520	
	964	1 516	1 354	12						0.33
239/950CAE4 230/950CAE4	986	1 214	1 169	6	0.16	6.3	4.2	4.1	732	
	986	1 324	1 241	6						0.21
240/950CAK30E4 232/950CAE4	986	1 324	1 219	6	0.28	3.6	2.4	2.3	1 880	
	1 014	1 596	1 428	12						0.32
239/1000CAE4 230/1000CAE4	1 036	1 284	1 229	6	0.16	6.4	4.3	4.2	881	
	1 036	1 384	1 298	6						0.20
240/1000CAK30E4 239/1000CAE4	1 036	1 384	1 275	6	0.27	3.7	2.5	2.4	2 010	
	1 036	1 384	1 275	6						0.27
239/1060CAE4 230/1060CAE4	1 096	1 364	1 302	6	0.16	6.1	4.1	4.0	1 030	
	1 104	1 456	1 368	8						0.21
240/1060CAK30E4 239/1060CAE4	1 104	1 456	1 346	8	0.28	3.6	2.4	2.4	2 410	
	1 104	1 456	1 346	8						0.28
230/1120CAE4 240/1120CAE4	1 164	1 536	1 444	8	0.20	5.0	3.4	3.3	2 120	
	1 164	1 536	1 421	8						0.27
	1 224	1 616	1 494	8	0.27	3.7	2.5	2.4	3 180	
	1 294	1 706	1 579	8	0.25	4.0	2.7	2.6	3 700	
	1 374	1 796	1 656	10	0.26	3.9	2.6	2.6	4 400	
	1 454	1 896	1 767	10	0.25	4.0	2.7	2.6	4 900	

Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).