

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



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.

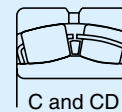
An oil groove and holes are provided in the outer ring to supply lubricant and the bearing numbers are suffixed with E4.

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.



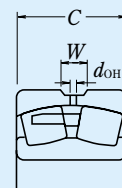
EA



C and CD



CA



TOLERANCES AND RUNNING ACCURACYTable 8.2 (Pages A60 to A63)

RECOMMENDED FITSTable 9.2 (Page A84)

Table 9.4 (Page A85)

INTERNAL CLEARANCETable 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 Outer Ring Width C		Oil Groove Width W	Hole Diameter d_{OH}
over	incl.		
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

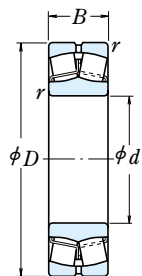
Table 2 Number of Oil Holes

Nominal Outer Ring Dia D (mm)		Number of Holes
over	incl.	
—	180	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

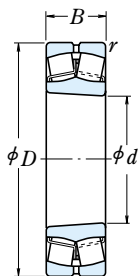
And if the load on spherical roller bearings becomes too small during operation or if the ratio of axial and radial loads is larger than the value of 'e' (listed in the bearing tables), slippage occurs between the rollers and raceways, which may result in smearing. The higher the weight of the rollers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

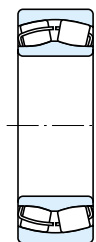
Bore Diameter 20 – 55 mm



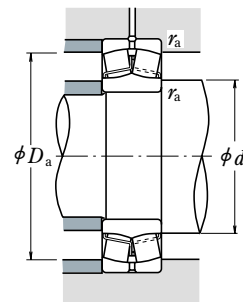
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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.

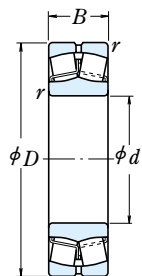
Boundary Dimensions (mm)				Basic Load Ratings				Limiting Speeds		Bearing
d	D	B	$r_{min.}$	(N)		{kgf}		(min ⁻¹)		
				C_r	C_{0r}	C_r	C_{0r}	Grease	Oil	Cylindrical Bore
20	52	15	1.1	29 300	26 900	2 980	2 740	6 300	8 200	21304CDE4
25	52	18	1	37 500	37 000	3 850	3 800	7 100	9 000	22205CE4
	62	17	1.1	43 000	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

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

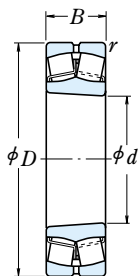
Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d_a		D_a		r_a		e	Y_2	Y_3	
Tapered Bore(1)	min.	max.	max.	min.	max.					approx.
21304CDKE4	27	28	45	42	1	0.31	3.2	2.1	2.1	0.17
22205CKE4 21305CDKE4	31	31	46	45	1	0.35	2.9	1.9	1.9	0.17
	32	34	55	51	1	0.29	3.4	2.3	2.3	0.26
22206CKE4 21306CDKE4	36	37	56	54	1	0.33	3.1	2.1	2.0	0.27
	37	40	65	59	1	0.28	3.6	2.4	2.3	0.39
22207CKE4 21307CDKE4	42	43	65	63	1	0.32	3.1	2.1	2.0	0.42
	44	47	71	67	1.5	0.28	3.6	2.4	2.4	0.53
*22208EAKE4 *21308EAKE4 *22308EAKE4	47	49	73	70	1	0.28	3.6	2.4	2.4	0.50
	49	54	81	75	1.5	0.25	3.9	2.7	2.6	0.73
	49	52	81	77	1.5	0.35	2.8	1.9	1.9	0.98
*22209EAKE4 *21309EAKE4 *22309EAKE4	52	54	78	75	1	0.25	3.9	2.7	2.6	0.55
	54	65	91	89	1.5	0.23	4.3	2.9	2.8	0.96
	54	59	91	86	1.5	0.34	2.9	2.0	1.9	1.34
*22210EAKE4 *21310EAKE4 *22310EAKE4	57	60	83	81	1	0.24	4.3	2.9	2.8	0.61
	60	72	100	98	2	0.23	4.4	3.0	2.9	1.21
	60	64	100	93	2	0.35	2.8	1.9	1.9	1.78
*22211EAKE4 *21311EAKE4 *22311EAKE4	64	65	91	89	1.5	0.23	4.3	2.9	2.8	0.81
	65	72	110	98	2	0.23	4.4	3.0	2.9	1.58
	65	73	110	103	2	0.34	2.9	2.0	1.9	2.3

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 0.10 C_r); and Heavy Loads (>0.10 C_r).
 3. For the dimensions of adapters and withdrawal sleeves, refer to Pages **B358 – B359**, and **B366**.

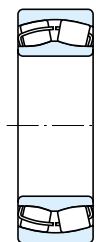
Bore Diameter 60 – 85 mm



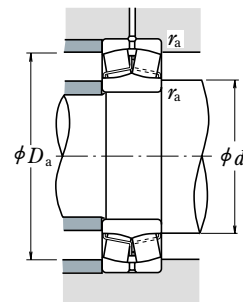
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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		Bearing			
	d	D	B	$r_{min.}$	(N)	{kgf}		(min^{-1})	Cylindrical Bore	
				C_r	C_{0r}	C_r	C_{0r}	Grease	Oil	
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	24 900	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	3 600	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

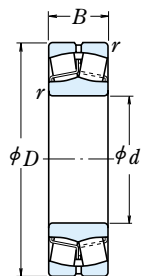
Note (1) The suffix K represents bearings with tapered bores (taper 1 : 12).

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	Tapered Bore(1)		d_a	D_a	r_a		e	Y_2	Y_3	
	min.	max.	max.	min.	max.					approx.
23012CKE4 *22212EAKE4 *21312EAKE4 *22312EAKE4	67	68	88	85	1	0.26	3.9	2.6	2.5	0.68
	69	72	101	98	1.5	0.23	4.4	3.0	2.9	1.1
	72	87	118	117	2	0.22	4.5	3.0	3.0	1.98
	72	79	118	111	2	0.34	3.0	2.0	1.9	2.89
*22213EAKE4 *21313EAKE4 *22313EAKE4	74	80	111	107	1.5	0.24	4.2	2.8	2.7	1.51
	77	94	128	126	2	0.22	4.6	3.1	3.0	2.45
	77	84	128	119	2	0.33	3.0	2.0	2.0	3.52
*22214EAKE4 *21314EAKE4 *22314EAKE4	79	84	116	111	1.5	0.23	4.3	2.9	2.8	1.58
	82	101	138	135	2	0.22	4.6	3.1	3.0	3.0
	82	91	138	129	2	0.33	3.0	2.0	2.0	4.28
*22215EAKE4 *21315EAKE4 *22315EAKE4	84	87	121	117	1.5	0.22	4.5	3.0	3.0	1.64
	87	101	148	134	2	0.22	4.6	3.1	3.0	3.64
	87	97	148	137	2	0.33	3.0	2.0	2.0	5.26
*22216EAKE4 *21316EAKE4 *22316EAKE4	90	94	130	126	2	0.22	4.6	3.1	3.0	2.01
	92	109	158	146	2	0.23	4.4	3.0	2.9	4.32
	92	103	158	145	2	0.33	3.0	2.0	2.0	6.23
*22217EAKE4 *21317EAKE4 *22317EAKE4	95	101	140	135	2	0.22	4.6	3.1	3.0	2.54
	99	108	166	142	2.5	0.24	4.3	2.9	2.8	5.2
	99	110	166	155	2.5	0.33	3.1	2.1	2.0	7.23

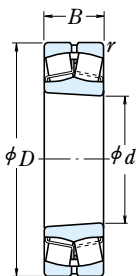
Remarks

- The bearings denoted by an asterisk (*) are NSKHPS 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 NSKHPS 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 (>0.10 C_r).
- For the dimensions of adapters and withdrawal sleeves, refer to Pages **B359 – B361**, and **B366**.

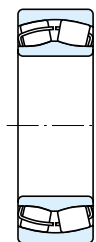
Bore Diameter 90 – 110 mm



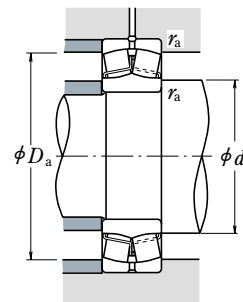
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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.

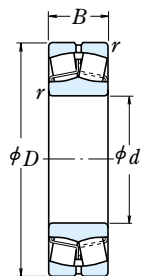
Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds		Bearing
	C_r	C_{0r}	C_r	C_{0r}	Grease	Oil	
d D B $r_{min.}$	(N)	{kgf}	(min ⁻¹)	Cylindrical Bore			
90	160 40 2	360 000 395 000	37 000 40 000	3 200 4 000	*22218EAE4		
	160 52.4 2	340 000 490 000	34 500 50 000	1 800 2 400	23218CE4		
	190 43 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	*22219EAE4		
	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		

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

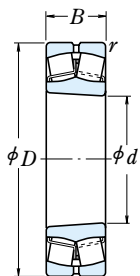
Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	Tapered Bore ⁽¹⁾		d_a	D_a	r_a		e	Y_2	Y_3	
*22218EAKE4	100	108	150	142	2	0.24	4.3	2.9	2.8	3.3
23218CKE4	100	105	150	138	2	0.32	3.2	2.1	2.1	4.51
*21318EAKE4	104	115	176	152	2.5	0.24	4.3	2.9	2.8	6.1
*22318EAKE4	104	115	176	163	2.5	0.33	3.1	2.1	2.0	8.56
*22219EAKE4	107	115	158	152	2	0.24	4.3	2.9	2.8	4.04
23219CAKE4	107	—	158	146	2	0.32	3.1	2.1	2.0	5.33
21319CKE4	109	127	186	172	2.5	0.22	4.6	3.1	3.0	6.92
*22319EAKE4	109	121	186	172	2.5	0.33	3.1	2.1	2.0	9.91
23020CDKE4	109	112	141	136	1.5	0.22	4.6	3.1	3.0	2.31
24020CK30E4	109	110	141	132	1.5	0.30	3.4	2.3	2.2	3.08
23120CKE4	110	113	155	144	2	0.30	3.4	2.3	2.2	4.38
24120CAK30E4	110	—	155	143	2	0.35	2.9	1.9	1.9	5.42
*22220EAKE4	112	119	168	160	2	0.24	4.3	2.9	2.8	4.84
23220CKE4	112	118	168	155	2	0.32	3.2	2.1	2.1	6.6
21320CKE4	114	133	201	184	2.5	0.21	4.7	3.2	3.1	8.46
*22320EAKE4	114	130	201	184	2.5	0.33	3.0	2.0	2.0	12.7
23022CDKE4	120	124	160	153	2	0.24	4.2	2.8	2.8	3.76
24022CK30E4	120	121	160	148	2	0.32	3.1	2.1	2.1	4.96
23122CKE4	120	127	170	158	2	0.28	3.5	2.4	2.3	5.7
24122CK30E4	120	123	170	154	2	0.36	2.8	1.9	1.8	6.84
*22222EAKE4	122	129	188	178	2	0.25	4.0	2.7	2.6	6.99
23222CKE4	122	130	188	170	2	0.34	3.0	2.0	1.9	9.54
21322CAKE4	124	—	226	206	2.5	0.22	4.6	3.1	3.0	11.2
*22322EAKE4	124	145	226	206	2.5	0.33	3.1	2.1	2.0	17.6

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 0.10 C_r); and Heavy Loads (>0.10 C_r).
 3. For the dimensions of adapters and withdrawal sleeves, refer to Pages B360 – B361, and B366 – B367.

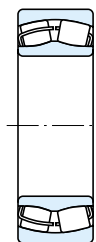
Bore Diameter 120 – 150 mm



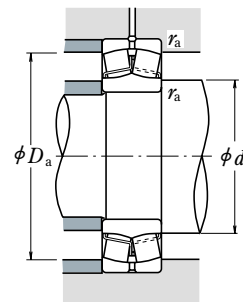
Cylindrical Bore



Tapered Bore



Without an Oil Groove or Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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		Bearing				
	d	D	B	$r_{min.}$	(N)	{kgf}		(min^{-1})	Cylindrical Bore		
				C_r	C_{0r}	C_r	C_{0r}	Grease	Oil		
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	1 190 000	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	
140	280	93	4	995 000	1 350 000	101 000	137 000	1 300	1 600	22326CE4	
	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	
150	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	
	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		

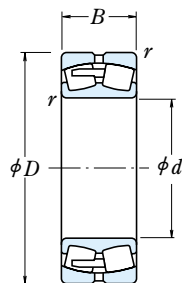
Note (1) The suffix K or K30 represents bearings with tapered bores (taper 1 : 12 or 1 : 30).

Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)	
	Tapered Bore(1)	d_a min.	d_a max.	D_a max.	d_a min.		r_a max.	e	Y_2		Y_3
23024CDKE4 24024CK30E4 23124CKE4		130	134	170	163	2	0.22	4.5	3.0	2.9	4.11
		130	131	170	158	2	0.32	3.2	2.1	2.1	5.33
		130	138	190	175	2	0.29	3.5	2.4	2.3	7.85
24124CK30E4 *22224EAKE4 23224CKE4 *22324EAKE4		130	136	190	171	2	0.37	2.7	1.8	1.8	10
		132	142	203	190	2	0.25	3.9	2.7	2.6	8.8
		132	140	203	182	2	0.34	2.9	2.0	1.9	12.1
		134	157	246	222	2.5	0.32	3.1	2.1	2.0	22.2
23026CDKE4 24026CK30E4 23126CKE4		140	147	190	180	2	0.23	4.3	2.9	2.8	5.98
		140	143	190	175	2	0.31	3.2	2.2	2.1	7.84
		140	149	200	184	2	0.28	3.6	2.4	2.4	8.69
24126CK30E4 *22226EAKE4 23226CKE4 22326CKE4		140	146	200	180	2	0.35	2.9	1.9	1.9	10.7
		144	152	216	204	2.5	0.26	3.8	2.6	2.5	11
		144	150	216	196	2.5	0.34	2.9	2.0	1.9	14.3
		148	166	262	236	3	0.34	2.9	2.0	1.9	28.1
23028CDKE4 24028CK30E4 23128CKE4		150	157	200	190	2	0.22	4.5	3.0	2.9	6.49
		150	154	200	186	2	0.29	3.4	2.3	2.2	8.37
		152	158	213	198	2	0.28	3.6	2.4	2.3	10.5
24128CK30E4 22228CDKE4 23228CKE4 22328CKE4		152	156	213	193	2	0.35	2.9	1.9	1.9	13
		154	167	236	219	2.5	0.25	4.0	2.7	2.6	14.5
		154	163	236	213	2.5	0.35	2.9	1.9	1.9	18.8
		158	177	282	253	3	0.35	2.9	1.9	1.9	35.4
23030CDKE4 24030CK30E4 23130CKE4		162	168	213	203	2	0.22	4.6	3.1	3.0	7.9
		162	165	213	198	2	0.30	3.4	2.3	2.2	10.5
		162	174	238	218	2	0.30	3.4	2.3	2.2	15.8
24130CK30E4 22230CDKE4 23230CKE4 22330CAE4		162	169	238	212	2	0.38	2.6	1.8	1.7	19.8
		164	179	256	236	2.5	0.26	3.9	2.6	2.5	18.4
		164	176	256	230	2.5	0.35	2.9	1.9	1.9	24.2
		168	—	302	270	3	0.35	2.9	1.9	1.9	41.5

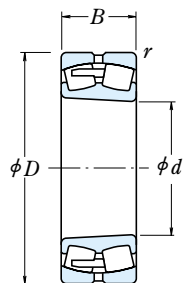
Remarks 1. The bearings denoted by an asterisk (*) are NSKHPS bearings and an oil groove and holes are standard for them.
 2. When making a selection of the recommended fit (Tolerance of Shaft) on Page A84 of the NSK Rolling Bearings catalog, in case of NSKHPS bearings, the conditions are different.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



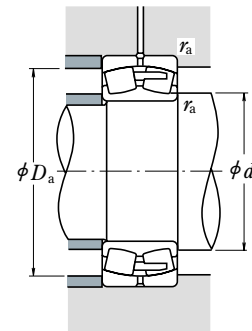
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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.

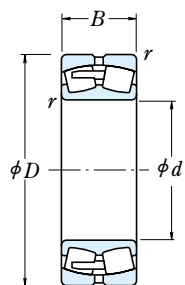
Boundary Dimensions (mm)	Basic Load Ratings (N)				Limiting Speeds (min^{-1})		Bearing Cylindrical Bore			
	d	D	B	r_{min}	C_r	C_{0r}		Grease	Oil	
160	220	45	2	360 000	675 000	37 000	69 000	1 400	1 800	23932CAE4
	240	60	2.1	540 000	955 000	55 000	97 500	1 300	1 700	23032CDE4
	240	80	2.1	680 000	1 260 000	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
180	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
	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
190	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
	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
190	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

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

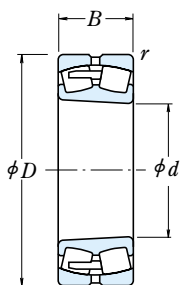
Numbers	Abutment and Fillet Dimensions (mm)					Constant e	Axial Load Factors			Mass (kg) approx.	
	d_a min.	d_a max.	D_a max.	D_a min.	r_a max.		Y_2	Y_3	Y_0		
Tapered Bore(1)	23932CAKE4	170	—	210	203	2	0.18	5.6	3.8	3.7	4.97
	23032CDKE4	172	179	228	216	2	0.22	4.5	3.0	2.9	9.66
	24032CK30E4	172	177	228	212	2	0.30	3.4	2.3	2.2	12.7
	23132CKE4	172	185	258	234	2	0.30	3.4	2.3	2.2	20.3
	24132CK30E4	172	179	258	229	2	0.39	2.6	1.7	1.7	25.4
	22232CDKE4	174	190	276	255	2.5	0.26	3.8	2.6	2.5	23.1
	23232CKE4	174	189	276	245	2.5	0.34	2.9	2.0	1.9	30.5
	22332CAKE4	178	—	322	287	3	0.35	2.9	1.9	1.9	49.3
	23934BCAKE4	180	—	220	213	2	0.17	5.8	3.9	3.8	5.38
	23034CDKE4	182	191	248	233	2	0.23	4.3	2.9	2.8	13
	24034CK30E4	182	188	248	228	2	0.31	3.2	2.2	2.1	17.3
	23134CKE4	182	194	268	245	2	0.29	3.5	2.3	2.3	21.8
	24134CK30E4	182	190	268	239	2	0.37	2.7	1.8	1.8	26.6
	22234CDKE4	188	206	292	270	3	0.26	3.8	2.6	2.5	28.8
	23234CKE4	188	201	292	261	3	0.34	2.9	2.0	1.9	36.4
	22334CAKE4	188	—	342	304	3	0.35	2.9	1.9	1.9	57.9
	23936CAKE4	190	—	240	230	2	0.18	5.5	3.7	3.6	7.64
	23036CDKE4	192	202	268	249	2	0.24	4.2	2.8	2.8	17.1
24036CK30E4	192	200	268	245	2	0.32	3.1	2.1	2.0	22.7	
23136CKE4	194	206	286	260	2.5	0.30	3.4	2.3	2.2	27.5	
24136CK30E4	194	202	286	255	2.5	0.37	2.7	1.8	1.8	33.1	
22236CDKE4	198	212	302	278	3	0.26	3.9	2.6	2.6	30.2	
23236CKE4	198	211	302	274	3	0.33	3.0	2.0	2.0	38.9	
22336CAKE4	198	—	362	322	3	0.34	2.9	2.0	1.9	67	
23938CAKE4	200	—	250	240	2	0.18	5.7	3.8	3.7	8.03	
23038CAKE4	202	—	278	261	2	0.24	4.2	2.8	2.8	17.6	
24038CK30E4	202	210	278	253	2	0.31	3.2	2.2	2.1	24	
23138CKE4	204	219	306	276	2.5	0.31	3.3	2.2	2.2	34.5	
24138CK30E4	204	211	306	269	2.5	0.40	2.5	1.7	1.6	41.5	
22238CAKE4	208	—	322	296	3	0.26	3.8	2.6	2.5	35.5	
23238CKE4	208	222	322	288	3	0.35	2.9	1.9	1.9	47.6	
22338CAKE4	212	—	378	338	4	0.34	2.9	2.0	1.9	77.6	

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

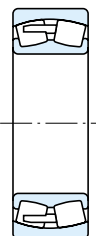
Bore Diameter 200 – 260 mm



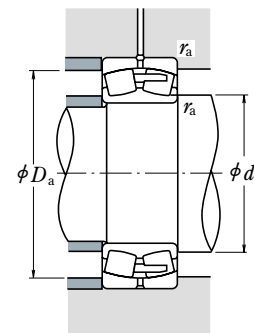
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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.

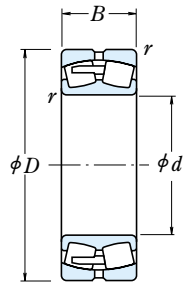
Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds		Bearing			
	d	D	B	r min.	(N)	{kgf}		(min ⁻¹)	Cylindrical Bore	
					C_r	C_{0r}	Grease	Oil		
200	280	60	2.1	570 000	1 060 000	58 000	1 100	1 400	23940CAE4	
	310	82	2.1	940 000	1 700 000	96 000	1 000	1 300	23040CAE4	
	310	109	2.1	1 140 000	2 120 000	116 000	850	1 100	24040CE4	
	340	112	3	1 360 000	2 330 000	139 000	800	1 000	23140CE4	
	340	140	3	1 570 000	2 670 000	160 000	800	1 000	24140CE4	
	360	98	4	1 300 000	2 010 000	133 000	950	1 200	22240CAE4	
	360	128	4	1 660 000	2 750 000	169 000	750	1 000	23240CE4	
	420	138	5	2 000 000	2 990 000	204 000	850	1 000	22340CAE4	
	220	300	60	2.1	625 000	1 240 000	64 000	1 000	1 300	23944CAE4
		340	90	3	1 090 000	1 980 000	111 000	950	1 200	23044CAE4
340		118	3	1 360 000	2 600 000	138 000	750	1 000	24044CE4	
370		120	4	1 570 000	2 710 000	160 000	710	950	23144CE4	
370		150	4	1 800 000	3 200 000	183 000	710	950	24144CE4	
400		108	4	1 570 000	2 430 000	160 000	850	1 000	22244CAE4	
400		144	4	2 020 000	3 400 000	206 000	670	900	23244CE4	
460		145	5	2 350 000	3 400 000	240 000	750	950	22344CAE4	
240		320	60	2.1	635 000	1 300 000	65 000	950	1 200	23948CAE4
		360	92	3	1 160 000	2 140 000	118 000	850	1 100	23048CAE4
	360	118	3	1 390 000	2 730 000	141 000	710	950	24048CE4	
	400	128	4	1 790 000	3 100 000	182 000	670	850	23148CE4	
	400	160	4	2 130 000	3 800 000	217 000	670	850	24148CE4	
	440	120	4	1 870 000	2 890 000	191 000	750	950	22248CAE4	
	440	160	4	2 440 000	4 050 000	249 000	630	800	23248CAE4	
	500	155	5	2 600 000	3 800 000	265 000	670	850	22348CAE4	
	260	360	75	2.1	930 000	1 870 000	95 000	850	1 000	23952CAE4
		400	104	4	1 430 000	2 580 000	145 000	800	950	23052CAE4
400		140	4	1 810 000	3 500 000	185 000	630	850	24052CAE4	
440		144	4	2 160 000	3 750 000	221 000	600	800	23152CAE4	
440		180	4	2 560 000	4 700 000	261 000	600	800	24152CAE4	
480		130	5	2 180 000	3 400 000	222 000	670	850	22252CAE4	
480		174	5	2 740 000	4 550 000	279 000	560	750	23252CAE4	
540		165	6	3 100 000	4 600 000	320 000	630	800	22352CAE4	

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

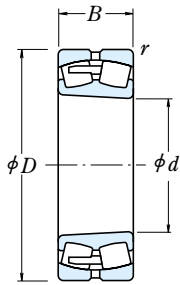
Numbers	Abutment and Fillet Dimensions (mm)						Constant	Axial Load Factors			Mass (kg)
	Tapered Bore ⁽¹⁾		d_a	D_a	r_a	e		Y_2	Y_3	Y_0	
	min.	max.	max.	min.	max.					approx.	
23940CAKE4 23040CAKE4 24040CK30E4	212	—	268	258	2	0.20	5.1	3.4	3.3	11	
	212	—	298	279	2	0.25	4.0	2.7	2.6	22.6	
	212	223	298	271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

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

Bore Diameter 280 – 340 mm



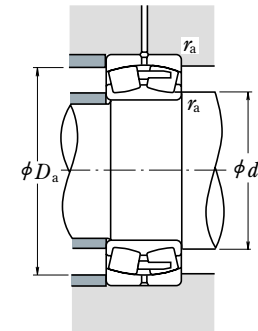
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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.

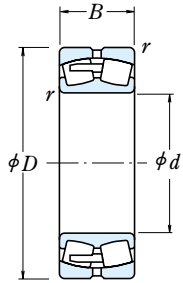
Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds		Bearing				
	d	D	B	r min.	(N)	{kgf}		(min ⁻¹)	Cylindrical Bore		
					C_r	C_{0r}	Grease	Oil			
280	380	75	2.1	925 000	1 950 000	94 500	199 000	800	950	23956CAE4	
	420	106	4	1 540 000	2 950 000	157 000	300 000	710	900	23056CAE4	
	420	140	4	1 880 000	3 800 000	191 000	385 000	600	800	24056CAE4	
	460	146	5	2 230 000	4 000 000	228 000	410 000	560	750	23156CAE4	
	460	180	5	2 640 000	5 000 000	269 000	505 000	560	750	24156CAE4	
	500	130	5	2 280 000	3 650 000	233 000	370 000	630	800	22256CAE4	
	500	176	5	2 880 000	4 900 000	294 000	500 000	530	670	23256CAE4	
	580	175	6	3 500 000	5 150 000	355 000	525 000	560	710	22356CAE4	
	300	420	90	3	1 230 000	2 490 000	125 000	254 000	710	900	23960CAE4
		460	118	4	1 920 000	3 700 000	196 000	375 000	670	850	23060CAE4
		460	160	4	2 310 000	4 600 000	235 000	470 000	530	710	24060CAE4
		500	160	5	2 670 000	4 800 000	273 000	490 000	500	670	23160CAE4
500		200	5	3 100 000	5 800 000	315 000	595 000	500	670	24160CAE4	
540		140	5	2 610 000	4 250 000	266 000	430 000	600	750	22260CAE4	
540	192	5	3 400 000	5 900 000	350 000	600 000	480	630	23260CAE4		
320	440	90	3	1 300 000	2 750 000	132 000	281 000	670	850	23964CAE4	
	480	121	4	1 960 000	3 850 000	200 000	395 000	630	800	23064CAE4	
	480	160	4	2 440 000	5 050 000	249 000	515 000	500	670	24064CAE4	
	540	176	5	3 050 000	5 500 000	315 000	560 000	480	600	23164CAE4	
	540	218	5	3 550 000	6 650 000	360 000	675 000	480	600	24164CAE4	
	580	150	5	2 990 000	4 850 000	305 000	495 000	530	670	22264CAE4	
580	208	5	3 900 000	6 900 000	395 000	700 000	450	600	23264CAE4		
340	460	90	3	1 330 000	2 840 000	136 000	289 000	630	800	23968CAE4	
	520	133	5	2 280 000	4 400 000	232 000	445 000	560	710	23068CAE4	
	520	180	5	2 920 000	6 050 000	298 000	615 000	480	600	24068CAE4	
	580	190	5	3 600 000	6 600 000	370 000	670 000	430	560	23168CAE4	
	580	243	5	4 250 000	7 900 000	430 000	810 000	430	560	24168CAE4	
	620	224	6	4 400 000	7 800 000	450 000	795 000	400	530	23268CAE4	

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

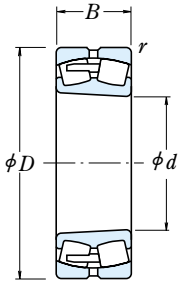
Numbers	Abutment and Fillet Dimensions (mm)					Constant	Axial Load Factors			Mass (kg)
	d_a min.	d_a max.	D_a min.	d_a max.	r_a max.		e	Y_2	Y_3	
Tapered Bore ⁽¹⁾										approx.
23956CAKE4	292	368	351	2	0.18	5.7	3.9	3.8	24.5	
23056CAKE4	298	402	377	3	0.24	4.2	2.8	2.7	50.5	
24056CAK30E4	298	402	369	3	0.31	3.3	2.2	2.2	66.4	
23156CAKE4	302	438	400	4	0.30	3.3	2.2	2.2	94.3	
24156CAK30E4	302	438	392	4	0.37	2.7	1.8	1.8	115	
22256CAKE4	302	478	439	4	0.25	4.0	2.7	2.6	110	
23256CAKE4	302	478	425	4	0.35	2.9	1.9	1.9	147	
22356CAKE4	308	552	496	5	0.31	3.2	2.1	2.1	221	
23960CAKE4	314	406	386	2.5	0.19	5.2	3.5	3.4	38.2	
23060CAKE4	318	442	413	3	0.24	4.2	2.8	2.7	70.5	
24060CAK30E4	318	442	400	3	0.32	3.1	2.1	2.0	93.6	
23160CAKE4	322	478	433	4	0.31	3.3	2.2	2.2	125	
24160CAK30E4	322	478	423	4	0.38	2.6	1.8	1.7	152	
22260CAKE4	322	518	473	4	0.25	4.0	2.7	2.6	139	
23260CAKE4	322	518	458	4	0.35	2.9	1.9	1.9	189	
23964CAKE4	334	426	406	2.5	0.18	5.5	3.7	3.6	40.6	
23064CAKE4	338	462	432	3	0.24	4.2	2.8	2.8	75.6	
24064CAK30E4	338	462	422	3	0.31	3.3	2.2	2.2	99.7	
23164CAKE4	342	518	466	4	0.31	3.2	2.1	2.1	162	
24164CAK30E4	342	518	456	4	0.39	2.6	1.7	1.7	196	
22264CAKE4	342	558	508	4	0.26	3.9	2.6	2.6	174	
23264CAKE4	342	558	488	4	0.36	2.8	1.9	1.8	239	
23968CAKE4	354	446	427	2.5	0.18	5.7	3.8	3.7	42.4	
23068CAKE4	362	498	465	4	0.24	4.2	2.8	2.8	101	
24068CAK30E4	362	498	454	4	0.32	3.2	2.1	2.1	135	
23168CAKE4	362	558	499	4	0.31	3.2	2.1	2.1	206	
24168CAK30E4	362	558	489	4	0.40	2.5	1.7	1.7	257	
23268CAKE4	368	592	521	5	0.36	2.8	1.9	1.8	295	

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

Bore Diameter 360 – 440 mm



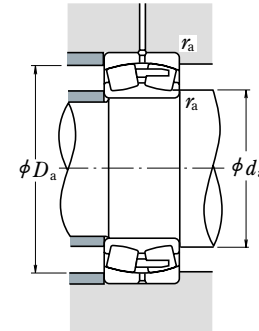
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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.

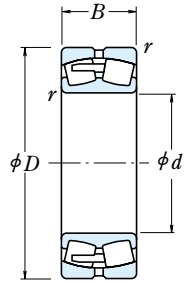
Boundary Dimensions (mm)				Basic Load Ratings				Limiting Speeds		Bearing
d	D	B	r min.	(N)		{kgf}		(min ⁻¹)		
				C_r	C_{0r}	C_r	C_{0r}	Grease	Oil	Cylindrical Bore
360	480	90	3	1 390 000	3 050 000	142 000	315 000	600	750	23972CAE4
	540	134	5	2 390 000	4 700 000	244 000	480 000	530	670	23072CAE4
	540	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	250	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

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

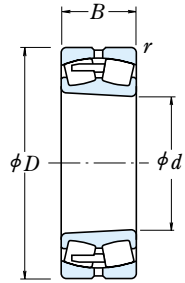
Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors			Mass (kg)
	d_a min.	d_a max.	D_a min.	r_a max.		e	Y_2	Y_3	
Tapered Bore⁽¹⁾									approx.
23972CAKE4	374	466	447	2.5	0.17	6.0	4.1	4.0	44.7
23072CAKE4	382	518	485	4	0.24	4.2	2.8	2.8	106
24072CAK30E4	382	518	476	4	0.32	3.2	2.1	2.1	139
23172CAKE4	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
23272CAKE4	388	622	549	5	0.36	2.8	1.9	1.8	342
23976CAKE4	398	502	482	3	0.18	5.5	3.7	3.6	65.4
23076CAKE4	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
23176CAKE4	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
23276CAKE4	408	652	578	5	0.35	2.9	1.9	1.9	372
23980CAKE4	418	522	501	3	0.18	5.7	3.9	3.8	69.1
23080CAKE4	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
23180CAKE4	428	622	569	5	0.29	3.4	2.3	2.3	257
24180CAK30E4	428	622	551	5	0.37	2.7	1.8	1.8	316
23280CAKE4	428	692	610	5	0.36	2.8	1.9	1.9	449
23984CAKE4	438	542	521	3	0.17	6.0	4.0	3.9	71.6
23084CAKE4	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
23184CAKE4	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
23284CAKE4	456	724	644	6	0.35	2.9	1.9	1.9	534
23988CAKE4	458	582	555	3	0.18	5.7	3.9	3.8	96.3
23088CAKE4	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
23188CAKE4	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
23288CAKE4	476	754	669	6	0.35	2.9	1.9	1.9	594

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

Bore Diameter 460 – 560 mm



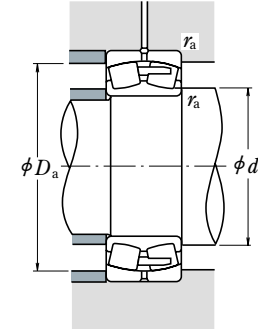
Cylindrical Bore



Tapered Bore



Without an Oil Groove and Holes



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

$F_a/F_r \leq e$		$F_a/F_r > e$	
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.

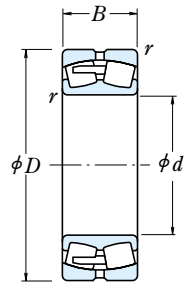
Boundary Dimensions (mm)	Basic Load Ratings				Limiting Speeds		Bearing			
	d	D	B	r min.	(N)	{kgf}		(min^{-1})		
				C_r	C_{0r}	C_r	C_{0r}	Grease	Oil	Cylindrical Bore
460	620	118	4	2 220 000	4 950 000	227 000	505 000	430	530	23992CAE4
	680	163	6	3 450 000	7 100 000	355 000	725 000	400	500	23092CAE4
	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	336	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).

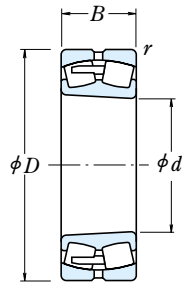
Numbers	Abutment and Fillet Dimensions (mm)				Constant	Axial Load Factors			Mass (kg)
	d_a min.	d_a max.	D_a min.	r_a max.		e	Y_2	Y_3	
Tapered Bore ⁽¹⁾									approx.
23992CAKE4	478	602	575	3	0.17	5.9	4.0	3.9	100
23092CAKE4	488	652	615	5	0.22	4.6	3.1	3.0	201
24092CAK30E4	488	652	604	5	0.29	3.4	2.3	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	782	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.

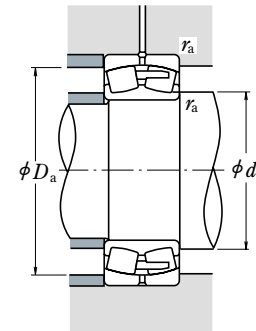
Bore Diameter 850 – 1400 mm



Cylindrical Bore



Tapered Bore



Dynamic Equivalent Load

$$P = XF_r + YF_a$$

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

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.	D_a min.	D_a max.	r_a max.		e	Y_2	Y_3	
Tapered Bore(1)										approx.
239/850CAKE4 230/850CAKE4	878	1 092	1 046	5	0.16	6.2	4.2	4.1	523	
	886	1 184	1 109	6	0.21	4.8	3.2	3.1	1 020	
240/850CAK30E4 232/850CAKE4	886	1 184	1 093	6	0.28	3.6	2.4	2.4	1 350	
	914	1 436	1 274	12	0.35	2.8	1.9	1.9	3 890	
239/900CAKE4 230/900CAKE4	928	1 152	1 103	5	0.16	6.4	4.3	4.2	591	
	936	1 244	1 169	6	0.20	4.9	3.3	3.2	1 160	
240/900CAK30E4 232/900CAKE4	936	1 244	1 147	6	0.28	3.6	2.4	2.4	1 520	
	964	1 516	1 354	12	0.33	3.0	2.0	2.0	4 300	
239/950CAKE4 230/950CAKE4	986	1 214	1 169	6	0.16	6.3	4.2	4.1	732	
	986	1 324	1 241	6	0.21	4.8	3.2	3.2	1 400	
240/950CAK30E4 232/950CAKE4	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	3.1	2.1	2.1	4 800	
239/1000CAKE4 230/1000CAKE4	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	4.9	3.3	3.2	1 560	
240/1000CAK30E4	1 036	1 384	1 275	6	0.27	3.7	2.5	2.4	2 010	
239/1060CAKE4 230/1060CAKE4	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	4.9	3.3	3.2	1 790	
240/1060CAK30E4	1 104	1 456	1 346	8	0.28	3.6	2.4	2.4	2 410	
230/1120CAKE4 240/1120CAK30E4	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	3.7	2.5	2.5	2 790	
240/1180CAK30E4	1 224	1 616	1 494	8	0.27	3.7	2.5	2.4	3 180	
240/1250CAK30E4	1 294	1 706	1 579	8	0.25	4.0	2.7	2.6	3 700	
240/1320CAK30E4	1 374	1 796	1 656	10	0.26	3.9	2.6	2.6	4 400	
240/1400CAK30E4	1 454	1 896	1 767	10	0.25	4.0	2.7	2.6	4 900	