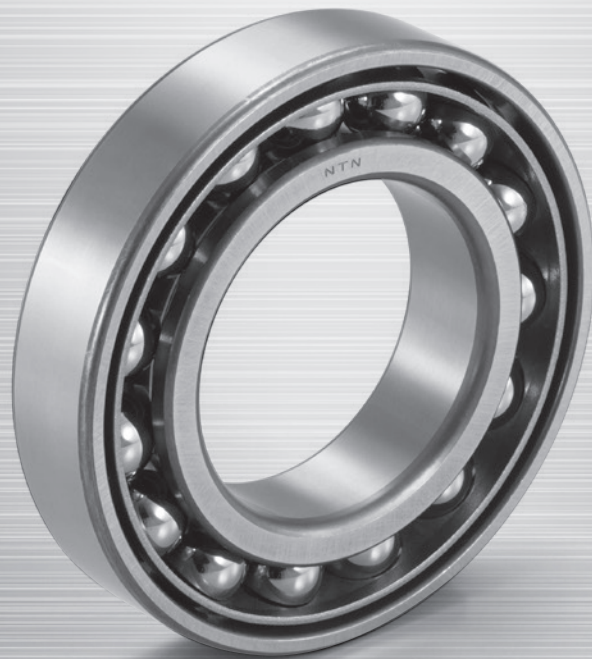


# Angular Contact Ball Bearings



Angular contact ball bearing



Four-point contact ball bearing



Double row angular contact ball bearing

## 1. Design features and characteristics

### 1.1 Angular contact ball bearing

Angular contact ball bearings are non-separable bearings with a defined contact angle in the radial direction relative to the straight line that runs through the point where each ball makes contact with the inner and outer rings (see Fig. 1). Table 1 provides information on contact angles and their designated codes.

In addition to radial loads, angular contact ball bearings can accommodate single direction axial loads. Since an axial load is generated from a radial force, these bearings are generally used in pairs. Table 2 shows general angular contact ball bearing characteristics, Table 3 shows information on using duplex (side by side) angular contact ball bearings, and Table 4 shows information on

multiple-row angular contact ball bearings.

For bearings with a contact angle of 15° and bearing tolerance JIS Class 5 or higher, see special catalog "Precision Rolling Bearings (CAT. No. 2260/E)."

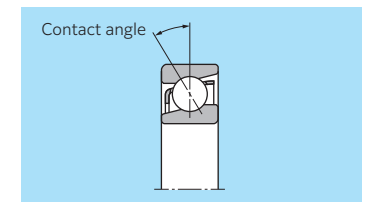


Fig. 1

Table 1 Contact angle and contact angle codes

Contact angle	15°	30°	40°
Contact angle code	C	A <sup>1)</sup>	B

1) Contact angle code A is omitted from part number.

Table 2 Angular contact ball bearing types and characteristics

Type	Design	Characteristics
Standard type		<ul style="list-style-type: none"> <li>Available in bearing series 79, 70, 72, 72B, 73, and 73B.</li> <li>Contact angles: 30° and 40° (with B) available.</li> <li>Standard bearing cage type differs depending on bearing number (see Table 5).</li> </ul>

Table 3 Duplex angular contact ball bearings — types and characteristics

Duplex type	Design	Characteristics
Back-to-back arrangement (DB)		<ul style="list-style-type: none"> <li>Can accommodate radial loads and axial loads in either direction.</li> <li>Has a large distance between the acting load centers of the bearings, and therefore a large momentary force load capacity.</li> <li>Allowable misalignment angle is small.</li> </ul>
Face-to-face arrangement (DF)		<ul style="list-style-type: none"> <li>Can accommodate radial loads and axial loads in either direction.</li> <li>Has a smaller distance between the acting load centers of the bearings, and therefore a smaller momentary force load capacity.</li> <li>Has a larger allowable misalignment angle than back-to-back duplex type.</li> </ul>
Tandem arrangement (DT)		<ul style="list-style-type: none"> <li>Can accommodate radial loads and single direction axial loads.</li> <li>Axial loads are received by both bearings as a set, and therefore heavy axial loads can be accommodated.</li> </ul>

Note: 1. Duplex angular contact ball bearings are manufactured in a set to specified clearance and preload; therefore, they must be assembled side by side with identically numbered bearings and not be mixed with other arrangements.

2. To satisfy specified clearance and preload, tightening must be performed until the inner ring width surfaces or outer ring width surfaces come in contact with each other.

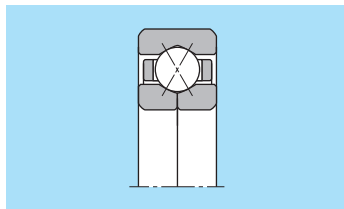
**Table 4** Combination examples of multiple-row angular contact ball bearings

Duplex type	3-row arrangement	4-row arrangement
Back-to-back arrangement	(DBT)	(DTBT)
Face-to-face arrangement	(DFT)	(DTFT)
Tandem arrangement	(DTT)	(DTTT)

Note: Other combinations are also available. Consult **NTN Engineering** for details.

## 1.2 Four-point angular contact ball bearings

Four-point angular contact ball bearings have a contact angle of 30° and a split inner ring. As shown in **Fig. 2**, when the inner and outer rings receive a radial load, the ball contacts the inner and outer rings at four points. This construction enables a single bearing to accommodate axial loads from either direction, and when under a simple axial load or heavy axial load, the bearing relies on two contact points like ordinary bearings.

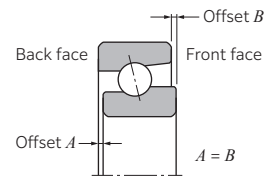


**Fig. 2**

### ■ Flush ground

"Flush ground" is the name given to the finishing method shown in **Fig. 3** where the offset of the front and back faces of the bearing are ground to the same value. This allows a designated clearance or preload to be achieved when using bearings with identical codes in DB or DF orientations. DT series bearings can also be used in various arrangements to achieve uniform load distribution.

General angular contact ball bearings are not flush ground. If it is necessary to flush grind any of these other bearings, please consult **NTN Engineering**.



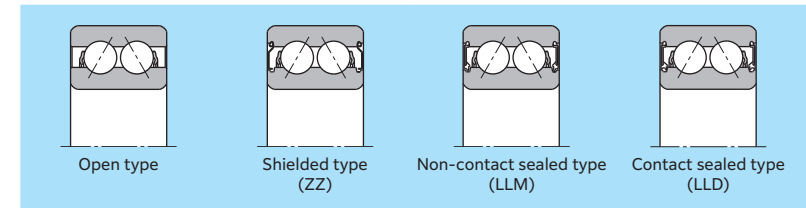
**Fig. 3**

## 1.3 Double row angular contact ball bearings

The structure of double row angular contact ball bearings is designed by arranging two single row angular contact bearings back-to-back in duplex (DB) to form a single bearing with a contact angle of 25°.

These bearings are capable of accommodating radial loads, axial loads in either direction, and have a high capacity for moment loads.

As shown in **Fig. 4**, sealed and shielded type double row angular contact ball bearings are also available. Rated loads vary from those of open type bearings.



**Fig. 4**

## 2. Standard cage type

**Table 5** lists the standard cage types for angular contact ball bearings.

**Table 5** Standard cages for angular contact ball bearings

Type	Bearing series	Resin cage	Pressed cage	Machined cage
Standard type	79	7904 to 7913	—	7914 to 7960
	70	7000 to 7024	—	7026 to 7040
	72	—	7200 to 7222	7224 to 7240
	73	—	7300 to 7322	7324 to 7340
	72B	—	7200B to 7222B	7224B to 7240B
	73B	—	7300B to 7322B	7324B to 7340B
4-point contact	QJ2	—	—	QJ208 to QJ224
	QJ3	—	—	QJ306 to QJ324
Double row	52	—	5200S to 5217S	—
	53	—	5302S to 5314S	—

Note: Depending on the usage conditions, some cage types may not be suitable. For example, due to the material characteristics of resin cages, use at application temperatures in excess of 120 °C is not possible. For details, please contact **NTN Engineering**.



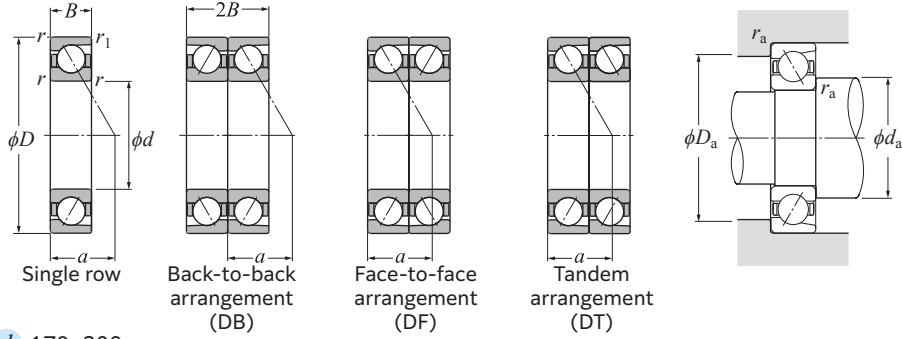








# ● Single and Duplex Angular Contact Ball Bearings NTN

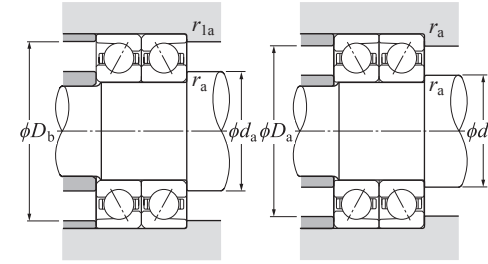


d 170–300 mm

	Boundary dimensions					Basic load rating		Fatigue load limit kN $C_u$	Allowable speed		Bearing number <sup>1)</sup>	Load center mm $a$	Mass kg Single row (approx.)
	mm					dynamic kN $C_r$	static kN $C_{0r}$		$\text{min}^{-1}$				
$d$	$D$	$B$	$2B$	$r_s \text{ min}^{-2)$	$r_{1s} \text{ min}^{-2)$	$C_r$	$C_{0r}$	Grease lubrication	Oil lubrication				
<b>170</b>	360	72	144	4	1.5	395	445	21.3	1 700	2 300	<b>7334B</b>	147	35.3
<b>180</b>	250	33	66	2	1	145	163	7.40	2 500	3 300	<b>7936</b>	78.5	4.87
	280	46	92	2.1	1.1	242	266	12.3	2 300	3 100	<b>7036</b>	89.5	10.4
	320	52	104	4	1.5	340	385	18.6	2 100	2 800	<b>7236</b>	98	17.7
	320	52	104	4	1.5	305	350	16.1	1 800	2 400	<b>7236B</b>	131	17.7
	380	75	150	4	1.5	455	535	24.9	1 900	2 500	<b>7336</b>	118	40.9
	380	75	150	4	1.5	415	490	22.8	1 600	2 100	<b>7336B</b>	155	40.9
<b>190</b>	260	33	66	2	1	147	169	7.45	2 400	3 200	<b>7938</b>	81.5	5.1
	290	46	92	2.1	1.1	248	280	12.6	2 200	2 900	<b>7038</b>	92.5	10.8
	340	55	110	4	1.5	335	390	17.9	2 000	2 600	<b>7238</b>	104	21.3
	340	55	110	4	1.5	300	355	15.5	1 700	2 200	<b>7238B</b>	139	21.3
	400	78	156	5	2	475	585	26.6	1 800	2 300	<b>7338</b>	124	47
	400	78	156	5	2	430	535	24.0	1 500	2 000	<b>7338B</b>	163	47
<b>200</b>	280	38	76	2.1	1.1	205	231	9.90	2 200	3 000	<b>7940</b>	88.5	7.15
	310	51	102	2.1	1.1	279	325	14.3	2 100	2 800	<b>7040</b>	99	14
	360	58	116	4	1.5	375	450	20.2	1 900	2 500	<b>7240</b>	110	25.3
	360	58	116	4	1.5	335	410	17.6	1 600	2 100	<b>7240B</b>	146	25.3
	420	80	160	5	2	500	610	27.0	1 700	2 200	<b>7340</b>	130	53.1
	420	80	160	5	2	455	555	24.7	1 400	1 900	<b>7340B</b>	170	53.1
<b>220</b>	300	38	76	2.1	1.1	207	239	9.85	2 000	2 700	<b>7944</b>	94	7.74
<b>240</b>	320	38	76	2.1	1.1	213	255	10.1	1 800	2 400	<b>7948</b>	100	8.34
<b>260</b>	360	46	92	2.1	1.1	285	375	14.1	1 700	2 200	<b>7952</b>	112	14
<b>280</b>	380	46	92	2.1	1.1	289	385	14.1	1 500	2 100	<b>7956</b>	118	14.8
<b>300</b>	420	56	112	3	1.1	360	520	18.2	1 400	1 900	<b>7960</b>	132	23.7

1) Bearing numbers appended with the code "B" have a contact angle of 40°; bearings without this code have a contact angle of 30°.  
 2) Smallest allowable dimension for chamfer dimension  $r$  or  $r_1$ .

# ● Single and Duplex Angular Contact Ball Bearings NTN



Dynamic equivalent radial load

$$P_r = X F_r + Y F_a$$

Contact angle	$e$	Single, DT				DB, DF			
		$F_a/F_r \leq e$	$F_a/F_r > e$	$F_a/F_r \leq e$	$F_a/F_r > e$	$F_a/F_r \leq e$	$F_a/F_r > e$	$F_a/F_r \leq e$	$F_a/F_r > e$
30°	0.80	1	0	0.39	0.76	1	0.78	0.63	1.24
40°	1.14	1	0	0.35	0.57	1	0.55	0.57	0.93

Static equivalent radial load

$$P_{0r} = X_0 F_r + Y_0 F_a$$

Contact angle	Single, DT		DB, DF	
	$X_0$	$Y_0$	$X_0$	$Y_0$
30°	0.5	0.33	1	0.66
40°	0.5	0.26	1	0.52

For single and DT arrangement, when  $P_{0r} < F_r$  use  $P_{0r} = F_r$ .

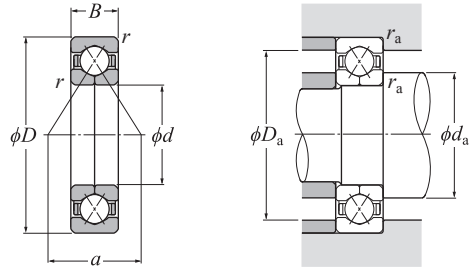
Basic load rating dynamic (duplex) kN $C_r$	static (duplex) kN $C_{0r}$	Allowable speed <sup>1)</sup> $\text{min}^{-1}$		Bearing number			Installation-related dimensions				
		Grease lubrication	Oil lubrication	DB	DF	DT	$d_a$ Min.	$D_a$ Max.	mm $D_b$ Max.	$r_{as}$ Max.	$r_{1as}$ Max.
640	890	1 400	1 800	<b>DB</b>	<b>DF</b>	<b>DT</b>	188	342	351.5	3	1.5
236	325	2 000	2 700	<b>DB</b>	<b>DF</b>	<b>DT</b>	190	240	244.5	2	1
395	530	1 900	2 500	<b>DB</b>	<b>DF</b>	<b>DT</b>	192	268	273	2	1
550	770	1 700	2 200	<b>DB</b>	<b>DF</b>	<b>DT</b>	198	302	311.5	3	1.5
495	700	1 400	1 900	<b>DB</b>	<b>DF</b>	<b>DT</b>	198	302	311.5	3	1.5
735	1 070	1 500	2 000	<b>DB</b>	<b>DF</b>	<b>DT</b>	198	362	371.5	3	1.5
670	975	1 300	1 700	<b>DB</b>	<b>DF</b>	<b>DT</b>	198	362	371.5	3	1.5
239	335	1 900	2 500	<b>DB</b>	<b>DF</b>	<b>DT</b>	200	250	254.5	2	1
405	560	1 800	2 300	<b>DB</b>	<b>DF</b>	<b>DT</b>	202	278	283	2	1
545	780	1 600	2 100	<b>DB</b>	<b>DF</b>	<b>DT</b>	208	322	331.5	3	1.5
490	705	1 400	1 800	<b>DB</b>	<b>DF</b>	<b>DT</b>	208	322	331.5	3	1.5
770	1 170	1 400	1 900	<b>DB</b>	<b>DF</b>	<b>DT</b>	212	378	390	4	2
700	1 070	1 200	1 600	<b>DB</b>	<b>DF</b>	<b>DT</b>	212	378	390	4	2
335	465	1 800	2 400	<b>DB</b>	<b>DF</b>	<b>DT</b>	212	268	273	2	1
455	650	1 700	2 200	<b>DB</b>	<b>DF</b>	<b>DT</b>	212	298	303	2	1
605	900	1 500	2 000	<b>DB</b>	<b>DF</b>	<b>DT</b>	218	342	351.5	3	1.5
545	815	1 300	1 700	<b>DB</b>	<b>DF</b>	<b>DT</b>	218	342	351.5	3	1.5
810	1 220	1 300	1 800	<b>DB</b>	<b>DF</b>	<b>DT</b>	222	398	410	4	2
740	1 110	1 200	1 500	<b>DB</b>	<b>DF</b>	<b>DT</b>	222	398	410	4	2
335	475	1 600	2 100	<b>DB</b>	<b>DF</b>	<b>DT</b>	232	288	293	2	1
345	510	1 500	1 900	<b>DB</b>	<b>DF</b>	<b>DT</b>	252	308	313	2	1
465	750	1 300	1 800	<b>DB</b>	<b>DF</b>	<b>DT</b>	272	348	353	2	1
470	775	1 200	1 600	<b>DB</b>	<b>DF</b>	<b>DT</b>	292	368	373	2	1
590	1 040	1 100	1 500	<b>DB</b>	<b>DF</b>	<b>DT</b>	314	406	413	2.5	1



# Four-Point Contact Ball Bearings



QJ type



Dynamic equivalent axial load  
 $P_a = F_a$   
 Static equivalent axial load  
 $P_{0a} = F_a$

d 30–90 mm

Boundary dimensions	Basic load rating		Fatigue load limit	Allowable speed		Bearing number	Installation-related dimensions			Load center	Mass			
	mm	dynamic		static	min <sup>-1</sup>		mm	mm	mm			mm	kg	
d	D	B	$r_s$ min <sup>-1</sup>	$C_a$	$C_{0a}$	kN	$C_u$	Grease lubrication	Oil lubrication	$d_a$ Min.	$D_a$ Max.	$r_{as}$ Max.	a	(approx.)
30	72	19	1.1	44.0	57.5	2.46	8 000	11 000	<b>QJ306</b>	37	65	1	30	0.42
35	80	21	1.5	55.0	73.0	3.15	7 000	9 300	<b>QJ307</b>	43.5	71.5	1.5	33	0.57
40	80	18	1.1	49.0	70.5	3.05	6 900	9 200	<b>QJ208</b>	47	73	1	34.5	0.45
	90	23	1.5	67.0	91.5	3.95	6 200	8 200	<b>QJ308</b>	48.5	81.5	1.5	37.5	0.78
45	85	19	1.1	55.0	81.0	3.50	6 200	8 200	<b>QJ209</b>	52	78	1	37.5	0.52
	100	25	1.5	87.0	121	5.20	5 500	7 400	<b>QJ309</b>	53.5	91.5	1.5	42	1.05
50	90	20	1.1	57.5	89.0	3.80	5 600	7 500	<b>QJ210</b>	57	83	1	40.5	0.603
	110	27	2	102	145	6.20	5 000	6 700	<b>QJ310</b>	60	100	2	46	1.38
55	100	21	1.5	71.0	112	4.80	5 100	6 800	<b>QJ211</b>	63.5	91.5	1.5	44.5	0.78
	120	29	2	118	170	7.30	4 600	6 100	<b>QJ311</b>	65	110	2	50.5	1.76
60	110	22	1.5	86.0	138	5.90	4 700	6 300	<b>QJ212</b>	68.5	101.5	1.5	49	0.98
	130	31	2.1	135	198	8.50	4 200	5 700	<b>QJ312</b>	72	118	2	55	2.18
65	120	23	1.5	93.5	153	6.55	4 400	5 800	<b>QJ213</b>	73.5	111.5	1.5	53.5	1.24
	140	33	2.1	153	228	9.70	3 900	5 200	<b>QJ313</b>	77	128	2	59	2.7
70	125	24	1.5	102	168	7.15	4 000	5 400	<b>QJ214</b>	78.5	116.5	1.5	56.5	1.36
	150	35	2.1	172	260	10.7	3 600	4 800	<b>QJ314</b>	82	138	2	63.5	3.27
75	130	25	1.5	106	183	7.55	3 800	5 000	<b>QJ215</b>	83.5	121.5	1.5	59	1.53
	160	37	2.1	187	294	11.7	3 400	4 500	<b>QJ315</b>	87	148	2	68	3.9
80	140	26	2	124	217	8.65	3 500	4 700	<b>QJ216</b>	90	130	2	63.5	1.83
	170	39	2.1	202	330	12.7	3 200	4 200	<b>QJ316</b>	92	158	2	72	4.64
85	150	28	2	139	252	9.65	3 300	4 400	<b>QJ217</b>	95	140	2	68	2.3
	180	41	3	218	370	13.8	3 000	4 000	<b>QJ317</b>	99	166	2.5	76.5	5.43
90	160	30	2	164	293	11.1	3 100	4 200	<b>QJ218</b>	100	150	2	72	2.76
	190	43	3	235	410	14.8	2 800	3 800	<b>QJ318</b>	104	176	2.5	81	6.31

1) Smallest allowable dimension for chamfer dimension r.

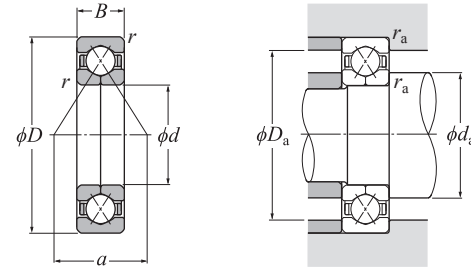
Note: 1. These bearings are also manufactured with a slot in the chamfer section of the outer ring to stop whirling.

2. This bearing is widely used in applications where the only type of load is axial. When considering it for use where radial loads are applied, consult NTN Engineering.

# Four-Point Contact Ball Bearings



QJ type



Dynamic equivalent axial load  
 $P_a = F_a$   
 Static equivalent axial load  
 $P_{0a} = F_a$

d 95–120 mm

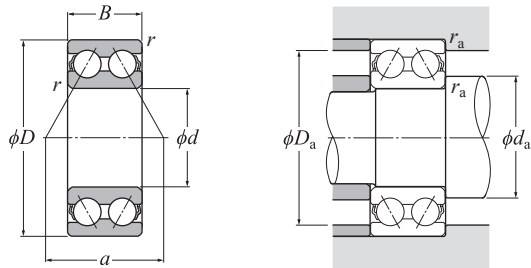
Boundary dimensions	Basic load rating		Fatigue load limit	Allowable speed		Bearing number	Installation-related dimensions			Load center	Mass			
	mm	dynamic		static	min <sup>-1</sup>		mm	mm	mm			mm	kg	
d	D	B	$r_s$ min <sup>-1</sup>	$C_a$	$C_{0a}$	kN	$C_u$	Grease lubrication	Oil lubrication	$d_a$ Min.	$D_a$ Max.	$r_{as}$ Max.	a	(approx.)
95	170	32	2.1	186	335	12.4	3 000	3 900	<b>QJ219</b>	107	158	2	76.5	3.35
	200	45	3	251	450	16.0	2 700	3 500	<b>QJ319</b>	109	186	2.5	85	7.41
100	180	34	2.1	200	355	12.9	2 800	3 700	<b>QJ220</b>	112	168	2	81	4.02
	215	47	3	300	585	20.0	2 500	3 400	<b>QJ320</b>	114	201	2.5	91	9.14
105	190	36	2.1	218	400	14.2	2 700	3 600	<b>QJ221</b>	117	178	2	85	4.75
	225	49	3	305	585	19.6	2 400	3 200	<b>QJ321</b>	119	211	2.5	95.5	10.4
110	200	38	2.1	236	450	15.5	2 500	3 400	<b>QJ222</b>	122	188	2	89.5	5.62
	240	50	3	340	680	22.1	2 300	3 100	<b>QJ322</b>	124	226	2.5	101	12
120	215	40	2.1	266	540	17.7	2 300	3 100	<b>QJ224</b>	132	203	2	96.5	6.75
	260	55	3	360	765	23.8	2 100	2 800	<b>QJ324</b>	134	246	2.5	110	15.9

1) Smallest allowable dimension for chamfer dimension r.

Note: 1. These bearings are also manufactured with a slot in the chamfer section of the outer ring to stop whirling.

2. This bearing is widely used in applications where the only type of load is axial. When considering it for use where radial loads are applied, consult NTN Engineering.

# ● Double Row Angular Contact Ball Bearings



Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
	X	Y	X	Y
0.68	1	0.92	0.67	1.41

Static equivalent radial load

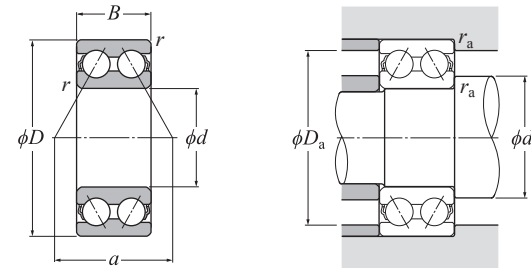
$$P_{0r} = F_r + 0.76F_a$$

d 10–65 mm

Boundary dimensions	Basic load rating		Fatigue load limit	Allowable speed		Bearing number	Installation-related dimensions			Load center	Mass			
	mm	dynamic		static	min <sup>-1</sup>		mm	mm	mm			kg		
d	D	B	$r_s$ min <sup>1)</sup>	$C_r$	$C_{0r}$	$C_u$	Grease lubrication	Oil lubrication	$d_a$ Min.	$D_a$ Max.	$r_{as}$ Max.	a	(approx.)	
10	30	14.3	0.6	7.15	3.90	0.230	17 000	22 000	5200S	15	25	0.6	14.5	0.05
12	32	15.9	0.6	10.5	5.80	0.350	15 000	20 000	5201S	17	27	0.6	16.7	0.06
15	35	15.9	0.6	11.7	7.05	0.420	13 000	17 000	5202S	20	30	0.6	18.3	0.07
	42	19	1	17.6	10.2	0.620	11 000	15 000	5302S	21	36	1	22	0.13
17	40	17.5	0.6	14.6	9.05	0.540	11 000	15 000	5203S	22	35	0.6	20.8	0.1
	47	22.2	1	21.0	12.6	0.770	10 000	13 000	5303S	23	41	1	25	0.18
20	47	20.6	1	19.6	12.4	0.750	10 000	13 000	5204S	26	41	1	24.3	0.16
	52	22.2	1.1	24.6	15.0	0.930	9 000	12 000	5304S	27	45	1	26.7	0.22
25	52	20.6	1	21.3	14.7	0.880	8 500	11 000	5205S	31	46	1	26.8	0.18
	62	25.4	1.1	32.5	20.7	1.30	7 500	10 000	5305S	32	55	1	31.8	0.35
30	62	23.8	1	29.6	21.1	1.30	7 100	9 500	5206S	36	56	1	31.6	0.3
	72	30.2	1.1	40.5	28.1	1.70	6 300	8 500	5306S	37	65	1	36.5	0.57
35	72	27	1.1	39.0	28.7	1.70	6 300	8 000	5207S	42	65	1	36.6	0.46
	80	34.9	1.5	51.0	36.0	2.20	5 600	7 500	5307S	44	71	1.5	41.6	0.76
40	80	30.2	1.1	44.0	33.5	2.00	5 600	7 100	5208S	47	73	1	41.5	0.62
	90	36.5	1.5	56.5	41.0	2.50	5 300	6 700	5308S	49	81	1.5	45.5	1.03
45	85	30.2	1.1	49.5	38.0	2.30	5 000	6 700	5209S	52	78	1	43.4	0.67
	100	39.7	1.5	68.5	51.0	3.10	4 500	6 000	5309S	54	91	1.5	50.6	1.37
50	90	30.2	1.1	53.0	43.5	2.70	4 800	6 000	5210S	57	83	1	45.9	0.72
	110	44.4	2	81.5	61.5	3.80	4 300	5 600	5310S	60	100	2	55.6	1.84
55	100	33.3	1.5	56.0	49.0	3.00	4 300	5 600	5211S	64	91	1.5	50.1	1.01
	120	49.2	2	95.0	73.0	4.50	3 800	5 000	5311S	65	110	2	60.6	2.4
60	110	36.5	1.5	69.0	62.0	3.80	3 800	5 000	5212S	69	101	1.5	56.5	1.33
	130	54	2.1	125	98.5	6.00	3 400	4 500	5312S	72	118	2	69.2	2.92
65	120	38.1	1.5	76.5	69.0	4.20	3 600	4 500	5213S	74	111	1.5	59.7	1.71
	140	58.7	2.1	142	113	7.00	3 200	4 300	5313S	77	128	2	72.8	3.67

1) Smallest allowable dimension for chamfer dimension r.

# ● Double Row Angular Contact Ball Bearings



Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
	X	Y	X	Y
0.68	1	0.92	0.67	1.41

Static equivalent radial load

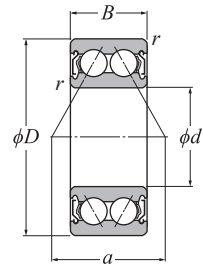
$$P_{0r} = F_r + 0.76F_a$$

d 70–85 mm

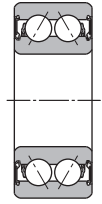
Boundary dimensions	Basic load rating		Fatigue load limit	Allowable speed		Bearing number	Installation-related dimensions			Load center	Mass			
	mm	dynamic		static	min <sup>-1</sup>		mm	mm	mm			kg		
d	D	B	$r_s$ min <sup>1)</sup>	$C_r$	$C_{0r}$	$C_u$	Grease lubrication	Oil lubrication	$d_a$ Min.	$D_a$ Max.	$r_{as}$ Max.	a	(approx.)	
70	125	39.7	1.5	94.0	82.0	5.00	3 400	4 500	5214S	79	116	1.5	63.8	1.75
	150	63.5	2.1	159	128	7.90	3 000	3 800	5314S	82	138	2	78.3	4.55
75	130	41.3	1.5	93.5	83.0	5.10	3 200	4 300	5215S	84	121	1.5	66.1	1.88
80	140	44.4	2	99.0	93.0	5.70	3 000	3 800	5216S	90	130	2	69.6	2.51
85	150	49.2	2	116	110	6.70	2 800	3 600	5217S	95	140	2	75.3	3.16

1) Smallest allowable dimension for chamfer dimension r.

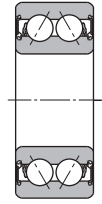
# Sealed and Shielded Double Row Angular Contact Ball Bearings



Shielded type (ZZ)



Non-contact sealed type (LLM)



Contact sealed type (LLD)

d 10–40 mm

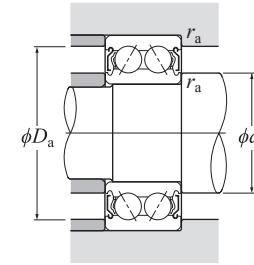
Boundary dimensions	Basic load rating		Fatigue load limit	Allowable speed			Bearing number <sup>2)</sup>					
	dynamic	static		Grease lubrication	Oil lubrication		Shielded type	Non-contact sealed type	Contact sealed type			
mm	kN	kN	kN	min <sup>-1</sup>	min <sup>-1</sup>	min <sup>-1</sup>						
d	D	B	r <sub>s min</sub> <sup>1)</sup>	C <sub>r</sub>	C <sub>0r</sub>	C <sub>u</sub>	ZZ, LLM	Z, LM	LLD, LD			
10	30	14.3	0.6	7.15	3.90	0.230	17 000	22 000	15 000	5200SCZZ	LLM	LLD
12	32	15.9	0.6	8.50	5.30	0.310	15 000	20 000	12 000	5201SCZZ	LLM	LLD
15	35	15.9	0.6	8.50	5.30	0.310	13 000	17 000	12 000	5202SCZZ	LLM	LLD
17	40	17.5	0.6	12.7	8.30	0.490	11 000	15 000	10 000	5203SCZZ	LLM	LLD
	47	22.2	1	19.6	12.4	0.750	10 000	13 000	9 500	5303SCZZ	LLM	LLD
20	47	20.6	1	15.9	10.7	0.640	10 000	13 000	9 000	5204SCZZ	LLM	LLD
25	52	20.6	1	16.9	12.3	0.740	8 500	11 000	7 500	5205SCZZ <sup>3)</sup>	LLM	LLD
	62	25.4	1.1	25.2	18.2	1.10	7 500	10 000	6 300	5305SCZZ	LLM	LLD
30	62	23.8	1	25.2	18.2	1.10	7 100	9 500	6 300	5206SCZZ	LLM	LLD
	72	30.2	1.1	39.0	28.7	1.70	6 300	8 500	5 300	5306SCZZ	LLM	LLD
35	72	27.0	1.1	34.0	25.3	1.50	6 300	8 500	5 300	5207SCZZ	LLM	LLD
	80	34.9	1.5	44.0	33.5	2.00	5 600	7 500	4 800	5307SCZZ	LLM	LLD
40	80	30.2	1.1	36.5	29.0	1.70	5 600	7 100	4 800	5208SCZZ <sup>3)</sup>	LLM	LLD
	90	36.5	1.5	49.5	38.0	2.30	5 300	6 700	4 500	5308SCZZ	LLM	LLD

1) Smallest allowable dimension for chamfer dimension r.

2) This bearing number is for double sealed and double shielded type bearings, but single sealed and single shielded types are also available.

3) Resin cage is standard for 5205SC and 5208SC.

# Sealed and Shielded Double Row Angular Contact Ball Bearings



Dynamic equivalent radial load

$$P_r = XF_r + YF_a$$

e	$\frac{F_a}{F_r} \leq e$		$\frac{F_a}{F_r} > e$	
	X	Y	X	Y
0.68	1	0.92	0.67	1.41

Static equivalent radial load

$$P_{0r} = F_r + 0.76F_a$$

Installation-related dimensions	Load center	Mass (approx.)			
			mm	mm	kg
Min.	Max.	Max.	Max.	Sealed type	
14	15.5	26	0.6	14.5	0.05
16	19	28	0.6	16.3	0.06
19	19	31	0.6	16.3	0.07
21	23.5	36	0.6	20.1	0.10
23	25.5	41	1	24.3	0.18
26	26.5	41	1	23	0.16
31	32	46	1	25.4	0.18
32	38.5	55	1	30.9	0.36
36	38.5	56	1	30.9	0.30
37	44.5	65	1	36.6	0.57
42	45	65	1	36.3	0.46
44	50.5	71	1.5	41.5	0.79
47	50.5	73	1	39.4	0.63
49	53	81	1.5	43	1.04