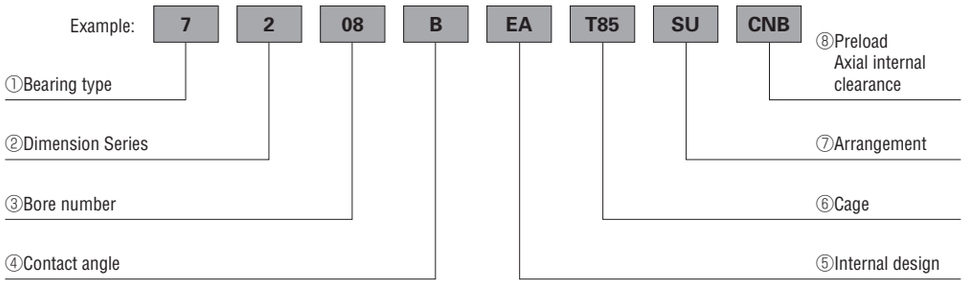
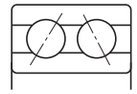
■ANGULAR CONTACT BALL BEARINGS

□ Formulation of Bearing Designations

Single-Row Matched Angular Contact Ball Bearings



①Bearing type	7: Single-row angular contact ball bearings, matched angular contact ball bearings
②Dimension Series	2: 02 Series, 3: 03 Series, 9: 19 Series, 0: 10 Series
③Bore number	Bore diameter for 03 and under—00: 10 mm, 01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Contact angle	C: 15°, A5: 25°, A: 30°, B: 40°
⑤Internal design	EA: High Load Capacity
⑥Cage	W: Pressed steel Cage, MR: Machined brass cage (ball-guided), No designation: Machined brass cage (inner ring guided), TYN: Polyamide resin cage, T85: Polyamide 46 resin cage, T7: L-PPS resin cage
⑦Arrangement	SU: Universal arrangement (single-row), DU: Universal arrangement (double-row), DB: Back-to-back arrangement, DF: Face-to-face arrangement, DT: Tandem arrangement
⑧Preload / Axial internal clearance	EL: Extra light preload, L: Light preload, M: Medium preload, H: Heavy preload Omitted: CN clearance, C3: Clearance greater than CN, C4: Clearance greater than C3, CNB: CN Clearance equivalent (universal arrangement)

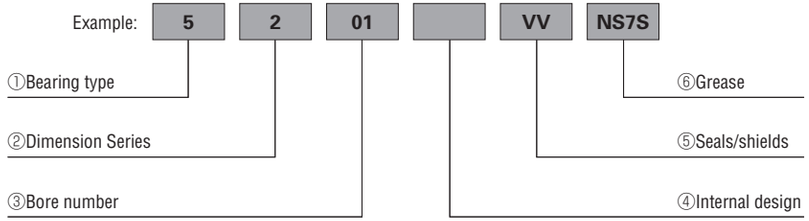


DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS

Double-row angular contact ball bearings are essentially a back-to-back mounting of two single-row angular contact ball bearings, but their inner and outer rings are each integrated into one. These bearings can sustain axial loads in both directions and offer good capacity for sustaining moment loads. They are often used as fixed-end bearings and contain cages made of pressed steel.

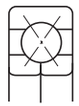
□ Formulation of Bearing Designations

Double-Row Angular Contact Ball Bearings



①Bearing type	5: Double-row angular contact ball bearings
②Dimension Series	2: 02 Series 3: 03 Series
③Bore number	Bore diameter for 03 and under—00: 10 mm, 01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Internal design	ZZ: Steel shield on both sides, DDU: Rubber contact seal on both sides VV: Rubber non-contact seal on both sides
⑤Seals/shields	Z: Steel shield on one sides, DU: Rubber contact seal on one side, V: Rubber non-contact seal on one side
⑥Grease*	NS7: NS HI-LUBE

＊A grease code is required when using shields or seals on both sides.



Four-Point-Contact Ball Bearings

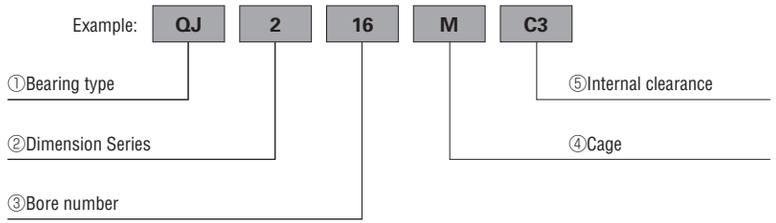
The inner ring is split radially into two pieces. This design allows one bearing to sustain significant axial loads in either direction.

The contact angle is 35°, so axial load capacity is high. These bearings are suitable for carrying pure axial loads or combined loads where axial loads are high.

The cages used are made of machined brass.

□ Formulation of Bearing Designations

Four-Point-Contact Ball Bearings



①Bearing type	QJ: Four-point contact ball bearings
②Dimension Series	10: 10 Series, 2: 02 Series, 3: 03 Series
③Bore number	Bore diameter for 03 and under—00: 10 mm, 01: 12 mm, 02: 15 mm, 03: 17 mm 04 and over—Bore diameter = Bore number × 5 (mm)
④Cage	M: Machined-brass Cage (outer ring guided)
⑤Internal clearance	Omitted: CN clearance, C3: Clearance greater than CN, C4: Clearance greater than C3

PRECAUTIONS FOR USE OF ANGULAR CONTACT BALL BEARINGS

Under severe operating conditions where speed and temperature are close to bearing limits, lubrication is marginal, and vibration and moment loads are heavy, angular contact ball bearings may not be suitable, particularly when using certain types of cages. In such cases, please consult with NSK beforehand.

If the load on angular contact ball bearings becomes too small, or if the ratio of the axial and radial loads for matched bearings exceeds '*e*' (listed in the bearing tables) during operation, slippage occurs between the balls and raceways, which may result in smearing. This is especially true with large bearings since the weight of the balls and cage is high. If such load conditions are expected, please consult with NSK for bearing selection.

TOLERANCES AND RUNNING ACCURACY

SINGLE-ROW ANGULAR CONTACT BALL BEARINGS ..... Table 7.2 (Pages A128 to A131)
HIGH-ACCURACY ANGULAR CONTACT BALL BEARINGS Tolerances: Class 6, Running Accuracy: Class 5 ..... Table 7.2 (Pages A128 to A131)
MATCHED ANGULAR CONTACT BALL BEARINGS ..... Table 7.2 (Pages A128 to A131)
DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS ..... Table 7.2 (Pages A128 to A131)
FOUR-POINT-CONTACT BALL BEARINGS ..... Table 7.2 (Pages A128 to A131)

RECOMMENDED FITS

SINGLE-ROW ANGULAR CONTACT BALL BEARINGS AND HIGH-ACCURACY ANGULAR CONTACT BALL BEARINGS ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)
MATCHED ANGULAR CONTACT BALL BEARINGS .. Table 8.3 (Page A164)
Table 8.5 (Page A165)
DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)
FOUR-POINT-CONTACT BALL BEARINGS ..... Table 8.3 (Page A164)
Table 8.5 (Page A165)

INTERNAL CLEARANCES

MATCHED ANGULAR CONTACT BALL BEARINGS ..... Table 8.18 (Page A174)

Matched angular contact ball bearings with precision classes over P5 are primarily used in the main spindles of machine tools; as such, they are used with a preload for rigidity. For ease of selection, internal clearances are adjusted to produce Very Light, Light, Medium, and Heavy preloads. These bearings also use a special fitting; please refer to Tables 9.1 and 9.5 (Pages A194 and A197) for more information.

The clearance (or preload) of matched bearings is obtained by axially tightening a pair of bearings till the side faces of their inner or outer rings are pressed against each other.

HIGH-ACCURACY ANGULAR CONTACT BALL BEARINGS

Axial Internal Clearance (Measured Clearances) Units : μm

Nominal Bore Diameter *d* (mm)		Axial Internal Clearance			
		CNB		GA	
over	incl.	min.	max.	min.	max.
12	**18**	17	25	–2	6
18	**30**	20	28		
30	**50**	24	32		
50	**80**	29	41	–3	9

DOUBLE-ROW ANGULAR CONTACT BALL BEARINGS

For the clearance in double-row angular contact ball bearings, please consult with NSK.

FOUR-POINT CONTACT BALL BEARINGS ..... Table 8.19 (Page A174)

LIMITING SPEEDS (Grease/Oil)

Limiting speeds (grease/oil) listed in the bearing tables are for matched angular contact ball bearings with standard cages. Please consult NSK regarding bearings with optional cages, as limiting speeds (grease/oil) may differ from those listed. For example, limiting speeds (grease/oil) of machined cages (no designation) are 1.25 times higher than pressed cages.

Dynamic Equivalent Load of Triplex Angular Contact Ball Bearings

Three separate single-row bearings may be used side by side as shown in the figure when angular contact ball bearings are used to carry a large axial load. There are three combination patterns, which are expressed by combination designations DBD, DFD, and DTD.

As in the case of single-row and double-row bearings, the dynamic equivalent load, which is determined from the radial and axial loads acting on a bearing, is used to calculate the fatigue life for these combined bearings.

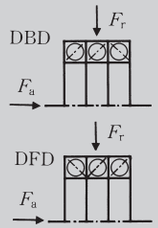
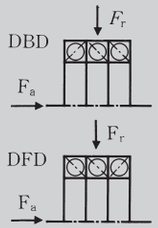
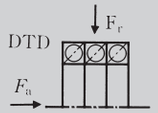
Assuming the dynamic equivalent radial load as P_r, the radial load as F_r, and axial load as F_a, the relationship between the dynamic equivalent radial load and bearing load may be approximated as follows:

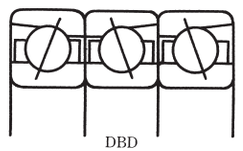
$$P_r = XF_r + YF_a \quad \cdots\cdots (1)$$

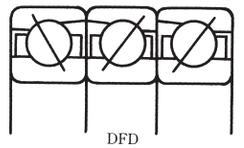
where X : Radial load factor, Y : Axial load factor } See Table 1

The axial load factor varies with contact angle. A small contact angle in an angular contact ball bearing varies substantially when axial load increases.

A change in the contact angle can be expressed by the ratio between the basic static load rating C_{0r} and axial load F_a. Axial load factors corresponding to this ratio at a contact angle of 15° are shown in Table 1. If angular contact ball bearings have contact angles of 25°, 30° and 40°, the effect of change in the contact angle on the axial load factor may be ignored and thus the axial load factor is assumed as constant.

Arrangement	Load Direction
3-row matched stack, axial load is supported by 2 rows. (Symbol DBD or DFD)	
3-row matched stack, axial load is supported by 1 row. (Symbol DBD or DFD)	
3-row tandem matched stack (Symbol DTD)	





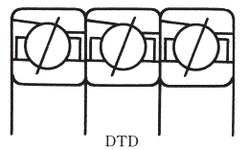


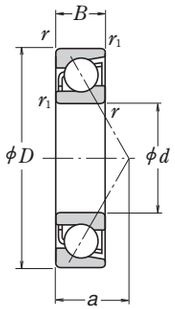
Table 1 Factors X and Y for Triplex Angular Contact Ball Bearing

Contact Angle α	j	$\frac{C_{0r}}{jF_a}$	$\frac{F_a}{F_r} \leqq e$		$\frac{F_a}{F_r} > e$		e	Basic Load Rating of 3-Row Ball Bearings	
			X	Y	X	Y		C_r	C_{0r}
15°	1.5	5	1	0.64	0.58	1.46	0.51	2.16 times that of a single bearing	3 times that of a single bearing
		10		0.70		1.61	0.47		
		15		0.74		1.70	0.44		
		20		0.76		1.75	0.42		
		25		0.78		1.81	0.41		
		30		0.80		1.83	0.40		
		50		0.83		1.91	0.39		
25°	—	—	1	0.48	0.54	1.16	0.68		
30°	—	—	1	0.41	0.52	1.01	0.80		
40°	—	—	1	0.29	0.46	0.76	1.14		
15°	3	5	1	2.28	0.95	2.37	0.51	2.16 times that of a single bearing	3 times that of a single bearing
		10		2.51		2.61	0.47		
		15		2.64		2.76	0.44		
		20		2.73		2.85	0.42		
		25		2.80		2.93	0.41		
		30		2.85		2.98	0.40		
		50		2.98		3.11	0.39		
25°	—	—	1	1.70	0.88	1.88	0.68		
30°	—	—	1	1.45	0.84	1.64	0.80		
40°	—	—	1	1.02	0.76	1.23	1.14		
15°	1	5	1	0	0.44	1.10	0.51	2.16 times that of a single bearing	3 times that of a single bearing
		10				1.21	0.47		
		15				1.28	0.44		
		20				1.32	0.42		
		25				1.36	0.41		
		30				1.38	0.40		
		50				1.44	0.39		
25°	—	—	1	0	0.41	0.87	0.68		
30°	—	—	1	0	0.39	0.76	0.80		
40°	—	—	1	0	0.35	0.57	1.14		

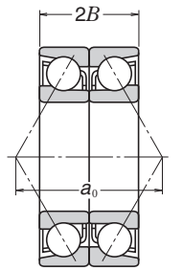
■ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

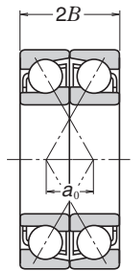
Bore Diameter 17 – 25 mm



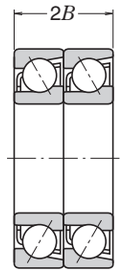
Single



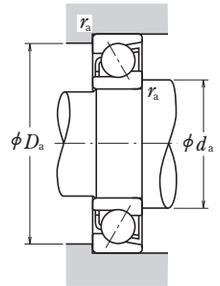
Back-to-Back
DB

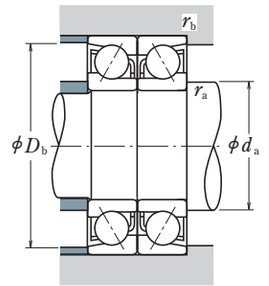


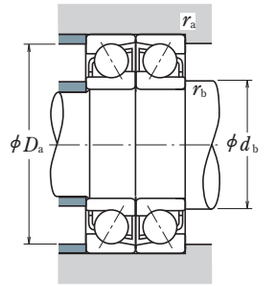
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$\frac{if_0F_a^*}{C_{or}}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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

*For i, use 2 for DB and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or 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

Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
d	D	B	r min.	r_1 min.	C_r	C_{0r}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB a_0	DF a_0	d_b(3) min.	D_b max.	r_b(3) max.
17	35	10	0.3	0.15	7 050	3 800	—	17 000	24 000	12.5	19.5	32.5	0.3	0.040	**7003 A**	**W**	**(M), T,TYN**	**DB DF DT**	11 500	7 650	14 000	19 000	25.0	5.0	18.2	33.8	0.15
	40	12	0.6	0.3	11 900	6 000	—	16 000	22 000	14.2	22	35	0.6	0.067	**7203 A**	**W**	**(M), T,TYN**	**DB DF DT**	19 300	12 000	13 000	17 000	28.5	4.5	19.5	37.5	0.3
	40	12	0.6	0.3	10 900	5 500	—	11 000	15 000	18.0	22	35	0.6	0.068	**7203 B**	**W**	**(M),T**	**DB DF DT**	17 800	11 000	9 000	12 000	35.9	11.9	19.5	37.5	0.3
	40	12	0.6	0.3	12 100	6 100	—	16 000	22 000	18.2	22	35	0.6	0.065	***7203 BEA**	**T85**	**T7**	— — —	—	—	13 000	18 000	36.3	12.3	19.5	37.5	0.3
	47	14	1	0.6	17 500	8 650	—	11 000	15 000	16.2	23	41	1	0.116	**7303 A**	**W**	**(M), T**	**DB DF DT**	28 500	17 300	9 000	12 000	32.5	4.5	22	42	0.6
	47	14	1	0.6	16 300	8 000	—	10 000	14 000	20.4	23	41	1	0.118	**7303 B**	**W**	**(M), T**	**DB DF DT**	26 400	16 000	8 000	11 000	40.9	12.9	22	42	0.6
	47	14	1	0.6	17 600	8 300	—	14 000	20 000	20.4	23	41	1	0.113	***7303 BEA**	**T85**	—	— — —	—	—	11 000	16 000	40.9	12.9	22	42	0.6
20	42	12	0.6	0.3	11 900	6 600	—	14 000	20 000	14.9	25	37	0.6	0.068	**7004 A**	**W**	**(M), T,TYN**	**DB DF DT**	19 400	13 200	12 000	16 000	29.9	5.9	22.5	39.5	0.3
	47	14	1	0.6	15 900	8 300	—	13 000	18 000	16.7	26	41	1	0.106	**7204 A**	**W**	**(M), T,TYN**	**DB DF DT**	25 900	16 600	11 000	15 000	33.3	5.3	25	42	0.6
	47	14	1	0.6	14 700	7 650	—	9 500	13 000	21.1	26	41	1	0.109	**7204 B**	**W**	**(M),T**	**DB DF DT**	23 800	15 300	7 500	11 000	42.1	14.1	25	42	0.6
	47	14	1	0.6	16 300	8 150	—	13 000	19 000	21.1	26	41	1	0.103	***7204 BEA**	**T85**	**T7**	— — —	—	—	11 000	16 000	42.1	14.1	25	42	0.6
	52	15	1.1	0.6	20 600	10 400	—	10 000	13 000	17.9	27	45	1	0.146	**7304 A**	**W**	**(M), T**	**DB DF DT**	33 500	20 800	8 000	11 000	35.8	5.8	25	47	0.6
	52	15	1.1	0.6	19 100	9 650	—	9 000	12 000	22.6	27	45	1	0.150	**7304 B**	**W**	**(M), T**	**DB DF DT**	31 000	19 300	7 100	10 000	45.2	15.2	25	47	0.6
	52	15	1.1	0.6	20 800	10 500	—	13 000	18 000	22.6	27	45	1	0.149	***7304 BEA**	**T85**	**MR, T7**	— — —	—	—	10 000	14 000	45.2	15.2	25	47	0.6
25	47	12	0.6	0.3	12 400	7 400	—	12 000	17 000	16.4	30	42	0.6	0.079	**7005 A**	**W**	**(M), T,TYN**	**DB DF DT**	20 200	14 800	10 000	14 000	32.8	8.8	27.5	44.5	0.3
	52	15	1	0.6	17 800	10 300	—	12 000	16 000	18.6	31	46	1	0.130	**7205 A**	**W**	**(M), T,TYN**	**DB DF DT**	29 000	20 500	9 500	13 000	37.2	7.2	30	47	0.6
	52	15	1	0.6	16 300	9 400	—	8 500	11 000	23.7	31	46	1	0.133	**7205 B**	**W**	**(M),T**	**DB DF DT**	26 400	18 800	6 700	9 000	47.3	17.3	30	47	0.6
	52	15	1	0.6	18 400	10 200	—	12 000	17 000	23.7	31	46	1	0.127	***7205 BEA**	**T85**	**T7**	— — —	—	—	9 500	14 000	47.3	17.3	30	47	0.6
	62	17	1.1	0.6	29 100	15 800	—	8 500	11 000	21.1	32	55	1	0.235	**7305 A**	**W**	**(M), T**	**DB DF DT**	47 000	31 500	6 700	9 000	42.1	8.1	30	57	0.6

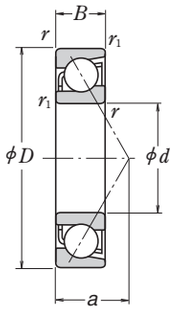
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.

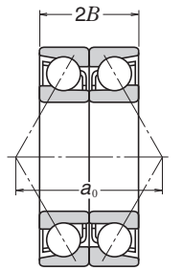
■ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

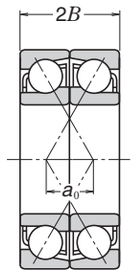
Bore Diameter 25 – 40 mm



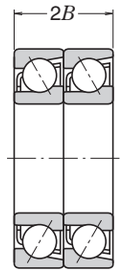
Single



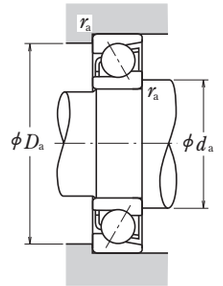
Back-to-Back
DB

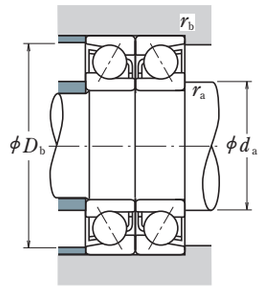


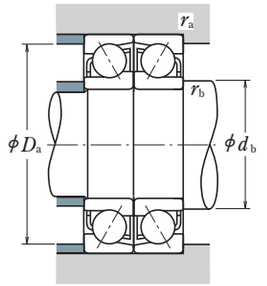
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$\frac{if_0F_a^*}{C_{0r}}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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

*For i, use 2 for DB and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or 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

Single or DT mounting When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (4)				Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
d	D	B	r min.	r_1 min.	C_r	C_{0r}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB a_0	DF a_0	d_b(3) min.	D_b max.	r_b(3) max.
25	62	17	1.1	0.6	26 800	14 600	—	7 500	10 000	26.7	32	55	1	0.241	**7305 B**	**W**	**(M), T**	**DB DF DT**	43 500	29 300	6 000	8 000	53.5	19.5	30	57	0.6
	62	17	1.1	0.6	28 400	14 900	—	10 000	15 000	26.8	32	55	1	0.229	**∗7305 BEA**	**T85**	**MR, T7**	— — —	—	—	8 500	12 000	53.5	19.5	30	57	0.6
30	55	13	1	0.6	16 000	10 100	—	11 000	14 000	18.8	36	49	1	0.116	**7006 A**	**W**	**(M), T,TYN**	**DB DF DT**	26 000	20 200	8 500	12 000	37.5	11.5	35	50	0.6
	62	16	1	0.6	24 800	14 800	—	9 500	13 000	21.3	36	56	1	0.197	**7206 A**	**W**	**(M), T,TYN**	**DB DF DT**	40 000	29 500	8 000	11 000	42.6	10.6	35	57	0.6
	62	16	1	0.6	22 600	13 500	—	7 100	9 500	27.3	36	56	1	0.202	**7206 B**	**W**	**(M),T**	**DB DF DT**	36 500	27 000	5 600	7 500	54.6	22.6	35	57	0.6
	62	16	1	0.6	24 900	14 300	—	10 000	14 000	27.3	36	56	1	0.194	**∗7206 BEA**	**T85**	**MR, T7**	— — —	—	—	8 000	11 000	54.6	22.6	35	57	0.6
	72	19	1.1	0.6	37 000	20 900	—	7 100	9 500	24.2	37	65	1	0.346	**7306 A**	**W**	**(M), T**	**DB DF DT**	60 000	41 500	5 600	7 500	48.4	10.4	35	67	0.6
	72	19	1.1	0.6	34 000	19 300	—	6 300	8 500	30.9	37	65	1	0.354	**7306 B**	**W**	**(M), T**	**DB DF DT**	55 500	38 500	5 000	7 100	61.8	23.8	35	67	0.6
	72	19	1.1	0.6	38 000	20 600	—	9 000	13 000	30.9	37	65	1	0.336	**∗7306 BEA**	**T85**	**MR, T7**	— — —	—	—	7 100	10 000	61.8	23.8	35	67	0.6
35	62	14	1	0.6	20 100	13 400	—	9 000	13 000	21.0	41	56	1	0.153	**7007 A**	**W**	**(M), T,TYN**	**DB DF DT**	32 500	26 800	7 500	10 000	42.0	14.0	40	57	0.6
	72	17	1.1	0.6	32 500	20 100	—	8 500	12 000	23.9	42	65	1	0.287	**7207 A**	**W**	**(M), T,TYN**	**DB DF DT**	53 000	40 000	6 700	9 500	47.9	13.9	40	67	0.6
	72	17	1.1	0.6	29 800	18 400	—	6 000	8 000	30.9	42	65	1	0.294	**7207 B**	**W**	**(M),T**	**DB DF DT**	48 500	36 500	4 800	6 700	61.9	27.9	40	67	0.6
	72	17	1.1	0.6	34 000	19 600	—	8 500	12 000	30.9	42	65	1	0.271	**∗7207 BEA**	**T85**	**MR, T7**	— — —	—	—	6 700	9 500	61.9	27.9	40	67	0.6
	80	21	1.5	1	44 000	26 300	—	6 300	8 500	27.1	44	71	1.5	0.464	**7307 A**	**W**	**(M), T**	**DB DF DT**	71 500	52 500	5 000	6 700	54.2	12.2	41	74	1
	80	21	1.5	1	42 000	24 400	—	8 000	11 000	34.6	44	71	1.5	0.451	**∗7307 BEA**	**T85**	**MR, T7**	— — —	—	—	6 300	9 000	69.2	27.2	41	74	1
	80	21	1.5	1	42 000	24 400	—	5 600	7 500	34.6	44	71	1.5	0.469	**7307 BEA**	**W**	**MR, T7**	**DB DF DT**	68 500	49 000	4 500	6 000	69.2	27.2	41	74	1
40	68	15	1	0.6	21 500	15 400	—	8 500	11 000	23.1	46	62	1	0.190	**7008 A**	**W**	**(M), T,TYN**	**DB DF DT**	35 000	31 000	6 700	9 000	46.2	16.2	45	63	0.6
	80	18	1.1	0.6	39 000	25 100	—	7 500	10 000	26.3	47	73	1	0.375	**7208 A**	**W**	**(M), T,TYN**	**DB DF DT**	63 000	50 500	6 000	8 500	52.6	16.6	45	75	0.6
	80	18	1.1	0.6	35 500	23 000	—	5 300	7 500	34.2	47	73	1	0.383	**7208 B**	**W**	**(M),T**	**DB DF DT**	57 500	46 000	4 300	6 000	68.3	32.3	45	75	0.6

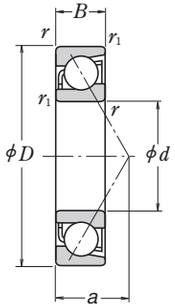
Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (∗) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.

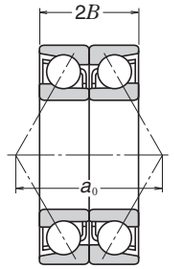
■ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

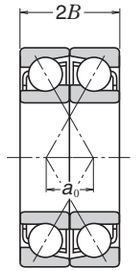
Bore Diameter 40 – 55 mm



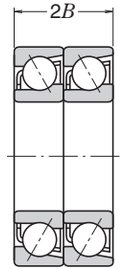
Single



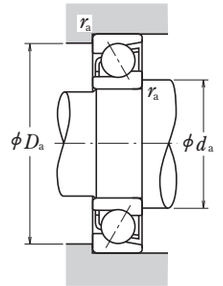
Back-to-Back
DB

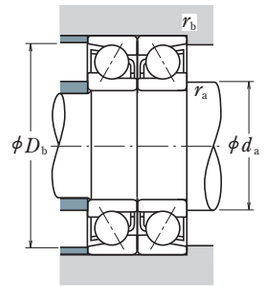


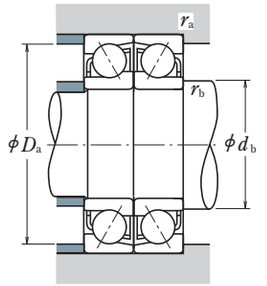
Face-to-Face
DF



Tandem
DT







Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$\frac{if_0F_a^*}{C_{or}}$	e	Single, DT				DB or DF			
			$F_a/F_r \leqq e$		$F_a/F_r > e$		$F_a/F_r \leqq e$		$F_a/F_r > e$	
			X	Y	X	Y	X	Y	X	Y
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

*For i, use 2 for DB and DF and 1 for DT

Static Equivalent Load $P_0 = X_0F_r + Y_0F_a$

Contact Angle	Single, DT		DB or 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

Single or DT mounting
When $F_r > 0.5F_r + Y_0F_a$ use $P_0 = F_r$

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor	Limiting Speeds (1) (min⁻¹)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2) Cage Designation (4)				Arrangement			Basic Load Ratings (Matched) (N)		Limiting Speeds (1) (Matched) (min⁻¹)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
d	D	B	r min.	r_1 min.	C_r	C_{0r}	f_0	Grease	Oil	a	d_a min.	D_a max.	r_a max.	approx.	Single	Standard	Option						C_r	C_{0r}	Grease	Oil	DB	DF	d_b(3) min.	D_b max.	r_b(3) max.
40	80	18	1.1	0.6	40 500	24 500	—	7 500	11 000	34.2	47	73	1	0.357	***7208 BEA**	**T85**	**MR, T7**	—	—	—	—	—	6 000	8 500	68.3	32.3	45	75	0.6
	90	23	1.5	1	53 500	33 000	—	5 600	7 500	30.3	49	81	1.5	0.633	**7308 A**	**W**	**(M), T**	**DB**	**DF**	**DT**	87 000	66 000	4 500	6 000	60.5	14.5	46	84	1
	90	23	1.5	1	55 500	33 000	—	7 100	10 000	38.8	49	81	1.5	0.619	***7308 BEA**	**T85**	**MR, T7**	—	—	—	—	—	5 600	8 000	77.5	31.5	46	84	1
	90	23	1.5	1	55 500	33 000	—	5 000	6 700	38.8	49	81	1.5	0.644	**7308 BEA**	**W**	**MR, T7**	**DB**	**DF**	**DT**	90 500	65 500	4 000	5 300	77.5	31.5	46	84	1
45	75	16	1	0.6	25 400	18 700	—	7 500	10 000	25.3	51	69	1	0.250	**7009 A**	**W**	**(M), TYN**	**DB**	**DF**	**DT**	41 500	37 500	6 000	8 500	50.6	18.6	50	70	0.6
	85	19	1.1	0.6	43 500	28 700	—	6 700	9 500	28.3	52	78	1	0.411	**7209 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	71 000	57 500	5 600	7 500	56.5	18.5	50	80	0.6
	85	19	1.1	0.6	39 500	26 200	—	5 000	6 700	36.8	52	78	1	0.421	**7209 B**	**W**	**(M),T**	**DB**	**DF**	**DT**	64 500	52 500	4 000	5 300	73.5	35.5	50	80	0.6
	85	19	1.1	0.6	42 500	27 100	—	7 100	10 000	36.8	52	78	1	0.400	***7209 BEA**	**T85**	**MR, T7**	—	—	—	—	—	5 600	8 000	73.5	35.5	50	80	0.6
	100	25	1.5	1	70 000	43 500	—	5 000	6 700	33.4	54	91	1.5	0.848	**7309 A**	**W**	**(M), T**	**DB**	**DF**	**DT**	113 000	87 000	4 000	5 300	66.9	16.9	51	94	1
	100	25	1.5	1	65 500	39 500	—	6 300	9 000	42.9	54	91	1.5	0.823	***7309 BEA**	**T85**	**MR, T7**	—	—	—	—	—	5 000	7 100	85.8	35.8	51	94	1
	100	25	1.5	1	65 500	39 500	—	4 500	6 000	42.9	54	91	1.5	0.860	**7309 BEA**	**W**	**MR, T7**	**DB**	**DF**	**DT**	107 000	79 500	3 600	4 800	85.8	35.8	51	94	1
50	80	16	1	0.6	26 900	21 100	—	6 700	9 500	26.8	56	74	1	0.263	**7010 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	43 500	42 000	5 600	7 500	53.5	21.5	55	75	0.6
	90	20	1.1	0.6	45 500	31 500	—	6 300	9 000	30.2	57	83	1	0.466	**7210 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	74 000	63 000	5 000	7 100	60.4	20.4	55	85	0.6
	90	20	1.1	0.6	41 000	28 600	—	4 500	6 300	39.4	57	83	1	0.477	**7210 B**	**W**	**(M),T**	**DB**	**DF**	**DT**	67 000	57 000	3 600	5 000	78.7	38.7	55	85	0.6
	90	20	1.1	0.6	44 000	29 700	—	6 300	9 500	39.4	57	83	1	0.453	***7210 BEA**	**T85**	**MR, T7**	—	—	—	—	—	5 000	7 500	78.7	38.7	55	85	0.6
	110	27	2	1	81 500	52 000	—	4 500	6 000	36.6	60	100	2	1.10	**7310 A**	**W**	**(M), T**	**DB**	**DF**	**DT**	133 000	104 000	3 600	4 800	73.2	19.2	56	104	1
	110	27	2	1	82 000	50 500	—	5 600	8 000	47.1	60	100	2	1.07	***7310 BEA**	**T85**	**MR, T7**	—	—	—	—	—	4 500	6 700	94.1	40.1	56	104	1
	110	27	2	1	82 000	50 500	—	4 000	5 600	47.1	60	100	2	1.11	**7310 BEA**	**W**	**MR, T7**	**DB**	**DF**	**DT**	133 000	101 000	3 200	4 500	94.1	40.1	56	104	1
55	90	18	1.1	0.6	35 500	27 700	—	6 300	8 500	29.9	62	83	1	0.391	**7011 A**	**W**	**(M), T,TYN**	**DB**	**DF**	**DT**	57 500	55 500	5 000	6 700	59.9	23.9	60	85	0.6

Notes (1) For applications operating near the limiting speed, refer to Page C077.
(2) Suffixes A and B represent contact angles of 30° and 40° respectively.
(3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

Note (4) Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are high-accuracy angular contact ball bearings. In arrangements, they are limited to SU universal matching types. See Page C073 for details.