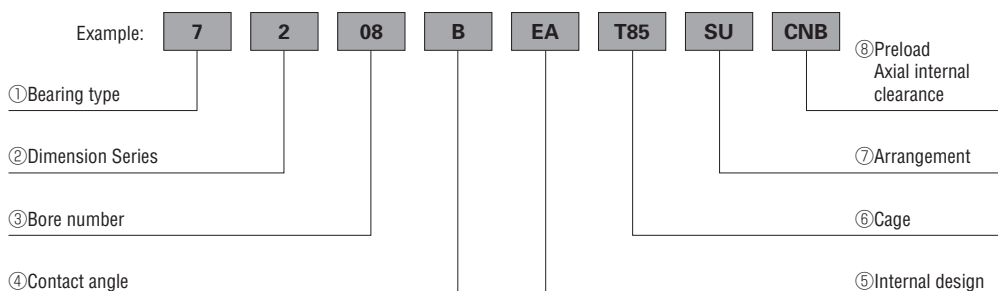
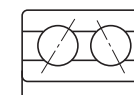


ANGULAR CONTACT BALL BEARINGS**Formulation of Bearing Designations**

Single-Row Matched Angular Contact Ball Bearings



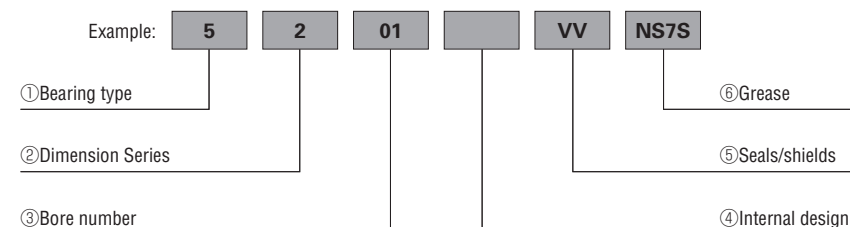
- ① Bearing type 7: Single-row angular contact ball bearings, matched angular contact ball bearings
- ② Dimension Series 2: 02 Series, 3: 03 Series, 9: 19 Series, 0: 10 Series
- ③ Bore number Bore diameter for 03 and under—00: 10 mm, 01: 12 mm, 02: 15 mm, 03: 17 mm
04 and over—Bore diameter = Bore number × 5 (mm)
- ④ Contact angle C: 15°, A5: 25°, A: 30°, B: 40°
- ⑤ Internal design EA: High Load Capacity
- ⑥ Cage 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
- ⑦ Arrangement SU: Universal arrangement (single-row), DU: Universal arrangement (double-row),
DB: Back-to-back arrangement, DF: Face-to-face arrangement, DT: Tandem arrangement
- ⑧ Preload / 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



- ① Bearing type 5: Double-row angular contact ball bearings
- ② Dimension Series 2: 02 Series 3: 03 Series
- ③ Bore 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)
- ④ Internal design ZZ: Steel shield on both sides, DDU: Rubber contact seal on both sides VV: Rubber non-contact seal on both sides
- ⑤ Seals/shields Z: Steel shield on one sides, DU: Rubber contact seal on one side, V: Rubber non-contact seal on one side
- ⑥ Grease* NS7: NS HI-LUBE

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

**Four-Point-Contact Ball Bearings**

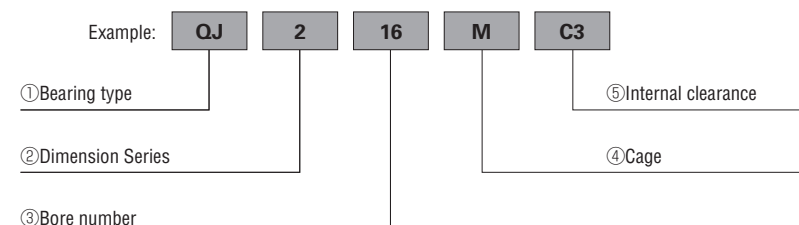
The inner ring is split radially into two pieces. This design allows one bearing to sustain significant axial loads in either direction.

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



- ① Bearing type QJ: Four-point contact ball bearings
- ② Dimension Series 10: 10 Series, 2: 02 Series, 3: 03 Series
- ③ Bore 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)
- ④ Cage M: Machined-brass Cage (outer ring guided)
- ⑤ Internal 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)

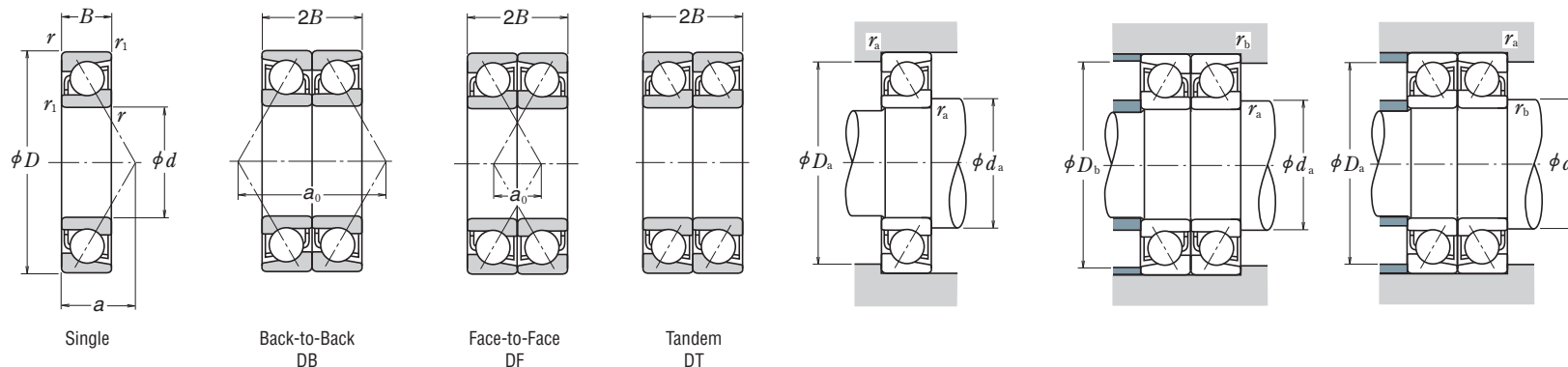
LIMITING SPEEDS (Grease/Oil)

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.

■ ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

Bore Diameter 17 – 25 mm

Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$i f_0 F_a^* / C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			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 DTStatic Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
	30°	40°	30°	40°	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor f_0	Limiting Speeds ⁽¹⁾ (min ⁻¹)		Eff. Load Center (mm) a	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	Bearing Designations ⁽²⁾ Cage Designation ⁽⁴⁾				Basic Load Ratings (Matched) (N)		Limiting Speeds ⁽¹⁾ (Matched) (min ⁻¹)		Load Center Spacings (mm) a_0		Abutment and Fillet Dimensions (mm)		
d	D	B	r min.	r_1 min.	C_r	C_{0r}		Grease	Oil		d_a min.	D_a max.	r_a max.		Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB	DF	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
	47	14	1	0.6	16 300	8 150	—	13 000	19 000	21.1	26	41	1	0.103	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
20	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
	52	15	1	0.6	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
25	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

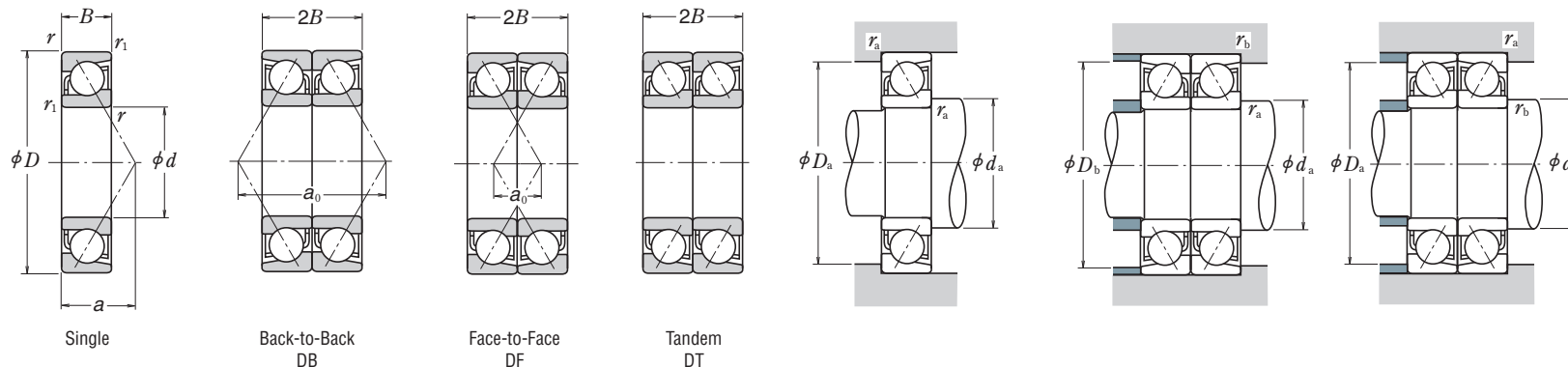
- Notes** ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.
⁽²⁾ Suffixes A and B represent contact angles of 30° and 40° respectively.
⁽³⁾ Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

- 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

Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$i f_0 F_a / C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			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 DTStatic Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
	30°	40°	30°	40°	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single)		Factor	Limiting Speeds ⁽¹⁾ (min ⁻¹)		Eff. Load Center (mm) <i>a</i>	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	Bearing Designations ⁽²⁾ Cage Designation ⁽⁴⁾				Basic Load Ratings (Matched)		Limiting Speeds ⁽¹⁾ (Matched)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> min.	<i>r</i> ₁ min.	<i>C</i> _r ^(N)	<i>C</i> _{0r}		Grease	Oil		<i>d</i> _a min.	<i>D</i> _a max.	<i>r</i> _a max.		Single	Standard	Option	Arrangement	<i>C</i> _r ^(N)	<i>C</i> _{0r}	Grease ^(min⁻¹)	Oil	DB	DF	<i>a</i> ₀	<i>D</i> _b min.	<i>D</i> _b 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 *7305 BEA T85 MR, T7	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			—	—	—	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 7206 A W (M), T, TYN 7206 B W (M), T *7206 BEA T85 MR, T7 7306 A W (M), T 7306 B W (M), T *7306 BEA T85 MR, T7	DB DF DT DB DF DT DB DF DT — — — DB DF DT 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			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			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			—	—	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			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			55 500	38 500	5 000	7 100	61.8	23.8	35	67	0.6		
35	72	19	1.1	0.6	38 000	20 600	—	9 000	13 000	30.9	37	65	1	0.336	—	—	7 100	10 000	61.8	23.8	35	67	0.6				
	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 7207 A W (M), T, TYN 7207 B W (M), T *7207 BEA T85 MR, T7 7307 A W (M), T *7307 BEA T85 MR, T7 7307 BEA W MR, T7	DB DF DT DB DF DT DB DF DT — — — DB DF DT — — — 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			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			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			—	—	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			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	—			—	6 300	9 000	69.2	27.2	41	74	1			
40	80	21	1.5	1	42 000	24 400	—	5 600	7 500	34.6	44	71	1.5	0.469	68 500	49 000	4 500	6 000	69.2	27.2	41	74	1				
	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 7208 A W (M), T, TYN 7208 B W (M), T	DB DF DT DB DF DT 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			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			57 500	46 000	4 300	6 000	68.3	32.3	45	75	0.6		

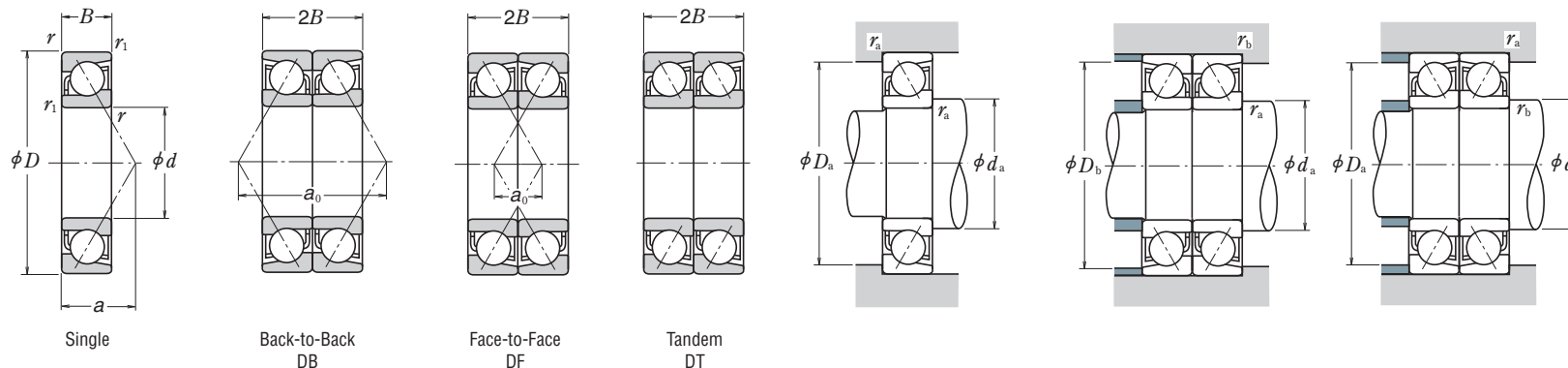
- Notes (1) For applications operating near the limiting speed, refer to Page C077.
 (2) Suffixes A and B represent contact angles of 30° and 40° respectively.
 (3) Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.

- 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

Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$i f_0 F_a^* / C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			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 DTStatic Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
	30°	40°	30°	40°	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single) (N)		Factor f_0	Limiting Speeds ⁽¹⁾ (min ⁻¹)		Eff. Load Center (mm) a	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	Bearing Designations ⁽²⁾ Cage Designation ⁽⁴⁾				Basic Load Ratings (Matched) (N)		Limiting Speeds ⁽¹⁾ (Matched) (min ⁻¹)		Load Center Spacings (mm) a_0		Abutment and Fillet Dimensions (mm)		
d	D	B	r min.	r_1 min.	C_r	C_{0r}		Grease	Oil		d_a min.	D_a max.	r_a max.		Single	Standard	Option	Arrangement	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
	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
	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

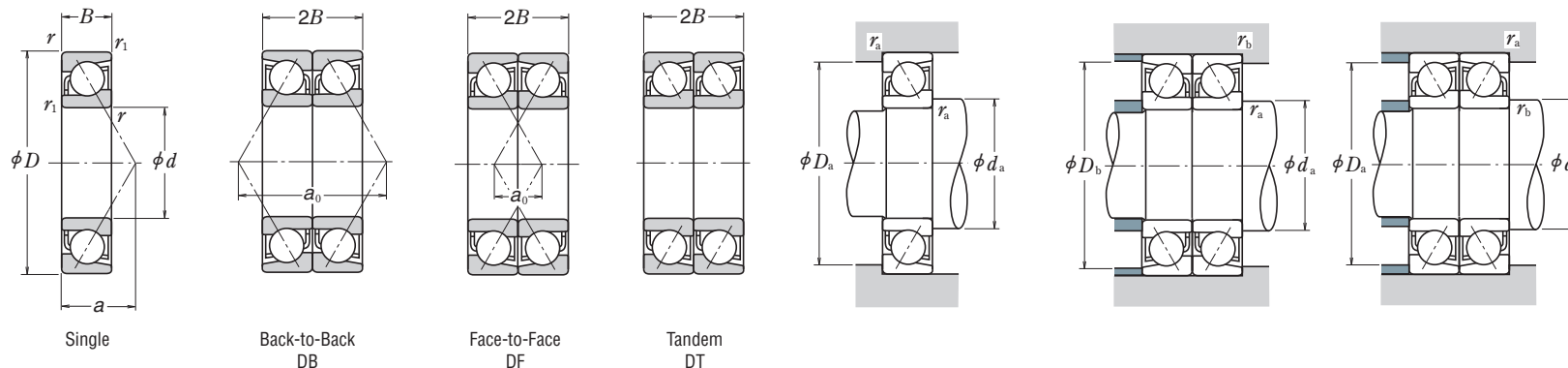
Notes ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.⁽²⁾ Suffixes A and B represent contact angles of 30° and 40° respectively.⁽³⁾ Use the values of d_a (min) and r_a (max) for bearings with "—" in the d_b column.Note ⁽⁴⁾ Cage designation (M) is usually omitted from the bearing designation.

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■ ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

Bore Diameter 55 – 65 mm

Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$i f_0 F_a^* / C_{0r}$	e	Single, DT				DB or DF			
			$F_a/F_r \leq e$		$F_a/F_r > e$		$F_a/F_r \leq e$		$F_a/F_r > e$	
			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 DTStatic Equivalent Load $P_0 = X_0 F_r + Y_0 F_a$

Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
	30°	40°	30°	40°	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single)		Factor	Limiting Speeds ⁽¹⁾ (min ⁻¹)		Eff. Load Center (mm) <i>a</i>	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	Bearing Designations ⁽²⁾ Cage Designation ⁽⁴⁾				Basic Load Ratings (Matched)		Limiting Speeds ⁽¹⁾ (Matched)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)				
<i>d</i>	<i>D</i>	<i>B</i>	<i>r</i> min.	<i>r</i> ₁ min.	<i>C</i> _r (N)	<i>C</i> _{0r}		Grease	Oil		<i>d</i> _a min.	<i>D</i> _a max.	<i>r</i> _a max.		Single	Standard	Option	Arrangement	<i>C</i> _r (N)	<i>C</i> _{0r}	Grease (min ⁻¹)	Oil	DB <i>a</i> ₀	DF	<i>d</i> _b ⁽³⁾ min.	<i>D</i> _b max.	<i>r</i> _b ⁽³⁾ max.		
55	100	21	1.5	1	56 000	39 500	—	5 600	8 000	32.9	64	91	1.5	0.613	7211 A	W	(M), T, TYN	DB	DF	DT	91 500	79 000	4 500	6 300	65.7	23.7	61	94	1
	100	21	1.5	1	51 000	36 000	—	4 000	5 600	43.0	64	91	1.5	0.627	7211 B	W	(M), T	DB	DF	DT	83 000	72 000	3 400	4 500	86.0	44.0	61	94	1
	100	21	1.5	1	54 000	37 000	—	6 000	8 500	43.0	64	91	1.5	0.596	* 7211 BEA	T85	MR, T7	—	—	—	—	—	4 500	6 700	86.0	44.0	61	94	1
	120	29	2	1	94 500	61 500	—	4 000	5 600	39.8	65	110	2	1.41	7311 A	W	(M), T	DB	DF	DT	153 000	123 000	3 200	4 300	79.5	21.5	61	114	1
	120	29	2	1	93 500	58 500	—	5 000	7 500	51.2	65	110	2	1.36	* 7311 BEA	T85	MR, T7	—	—	—	—	—	4 000	6 000	102.4	44.4	61	114	1
	120	29	2	1	93 500	58 500	—	3 600	5 000	51.2	65	110	2	1.42	7311 BEA	W	MR, T7	DB	DF	DT	152 000	117 000	3 000	4 000	102.4	44.4	61	114	1
60	95	18	1.1	0.6	36 500	29 500	—	5 600	8 000	31.4	67	88	1	0.417	7012 A	W	(M), T, TYN	DB	DF	DT	59 000	59 000	4 500	6 300	62.7	26.7	65	90	0.6
	110	22	1.5	1	68 000	48 500	—	5 300	7 100	35.5	69	101	1.5	0.798	7212 A	W	(M), T, TYN	DB	DF	DT	110 000	97 500	4 300	6 000	71.1	27.1	66	104	1
	110	22	1.5	1	61 500	44 500	—	3 800	5 300	46.7	69	101	1.5	0.815	7212 B	W	(M), T	DB	DF	DT	100 000	89 000	3 000	4 000	93.3	49.3	66	104	1
	110	22	1.5	1	64 500	45 000	—	5 300	7 500	46.7	69	101	1.5	0.791	* 7212 BEA	T85	MR, T7	—	—	—	—	—	4 300	6 000	93.3	49.3	66	104	1
	130	31	2.1	1.1	108 000	71 500	—	3 800	5 000	42.9	72	118	2	1.74	7312 A	W	(M), T	DB	DF	DT	175 000	143 000	3 000	4 000	85.9	23.9	67	123	1
	130	31	2.1	1.1	107 000	68 500	—	4 800	6 700	55.4	72	118	2	1.70	* 7312 BEA	T85	MR, T7	—	—	—	—	—	3 800	5 600	110.7	48.7	67	123	1
130	31	2.1	1.1	107 000	68 500	—	3 400	4 500	55.4	72	118	2	1.77	7312 BEA	W	MR, T7	DB	DF	DT	174 000	137 000	2 600	3 800	110.7	48.7	67	123	1	
65	100	18	1.1	0.6	38 500	33 000	—	5 300	7 500	32.8	72	93	1	0.455	7013 A	W	(M), T, TYN	DB	DF	DT	62 000	65 500	4 300	6 000	65.6	29.6	70	95	0.6
	120	23	1.5	1	77 500	58 000	—	4 800	6 700	38.2	74	111	1.5	1.03	7213 A	W	(M), T, TYN	DB	DF	DT	126 000	116 000	3 800	5 300	76.4	30.4	71	114	1
	120	23	1.5	1	70 000	52 500	—	3 400	4 800	50.3	74	111	1.5	1.05	7213 B	W	(M), T	DB	DF	DT	114 000	105 000	2 800	3 800	100.6	54.6	71	114	1
	120	23	1.5	1	73 500	53 500	—	4 800	7 100	50.3	74	111	1.5	1.01	* 7213 BEA	T85	MR, T7	—	—	—	—	—	3 800	5 600	100.6	54.6	71	114	1
	140	33	2.1	1.1	122 000	82 000	—	3 600	4 800	46.1	77	128	2	2.12	7313 A	W	(M), T	DB	DF	DT	198 000	164 000	2 800	3 800	92.2	26.2	72	133	1
	140	33	2.1	1.1	119 000	77 000	—	4 300	6 300	59.5	77	128	2	2.09	* 7313 BEA	T85	MR, T7	—	—	—	—	—	3 600	5 000	119.0	53.0	72	133	1
140	33	2.1	1.1	119 000	77 000	—	3 200	4 300	59.5	77	128	2	2.17	7313 BEA	W	MR, T7	DB	DF	DT	193 000	154 000	2 400	3 400	119.0	53.0	72	133	1	

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