



ROLLING BEARINGS for INDUSTRIAL MACHINERY

1. TYPES AND FEATURES OF ROLLING BEARINGS

1.1 Design and Classification

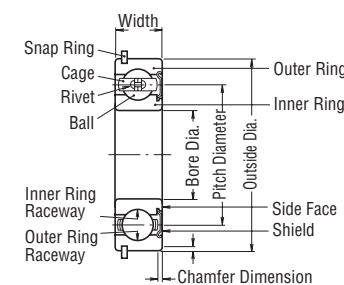
Rolling bearings generally consist of rolling elements, two rings, and a cage. They are classified into radial bearings or thrust bearings depending on the direction of the main load. In addition, depending on the type of rolling elements, they are classified into ball bearings or roller bearings and further divided by differences in their design or specific purpose. The most common bearing types and part names are shown in Fig. 1.1, and a general classification of rolling bearings is shown in Fig. 1.2.

1.2 Characteristics of Rolling Bearings

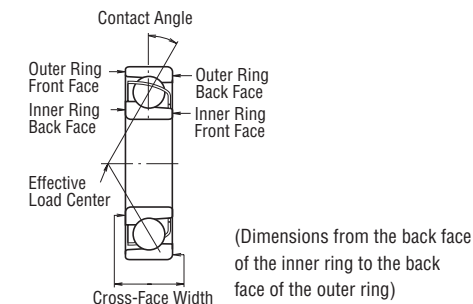
Compared with plain bearings, rolling bearings have the following major advantages:

- (1) Their starting torque or friction is low and the difference between the starting torque and running torque is small.
- (2) With the advancement of worldwide standardization, rolling bearings are internationally available and interchangeable.
- (3) Maintenance, replacement, and inspection are easy because of the simple structure surrounding rolling bearings.
- (4) Many rolling bearings are capable of taking both radial and axial loads simultaneously or independently.
- (5) Rolling bearings can be used under a wide range of temperatures.
- (6) Rolling bearings can be preloaded to produce a negative clearance and achieve greater rigidity.

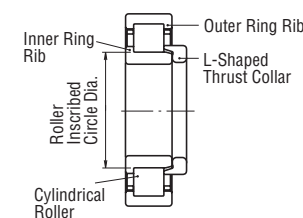
Furthermore, different types of rolling bearings have their own individual advantages. The features of the most common rolling bearings are described on Pages A010 to A013 and in Table 1.1 (Pages A014 and A015).



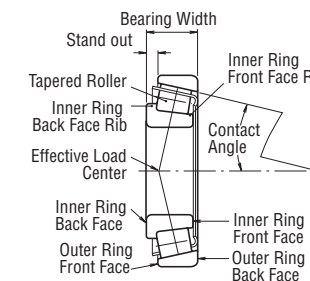
Single-Row Deep Groove Ball Bearing



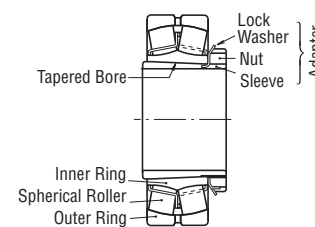
Single-Row Angular Contact Ball Bearing



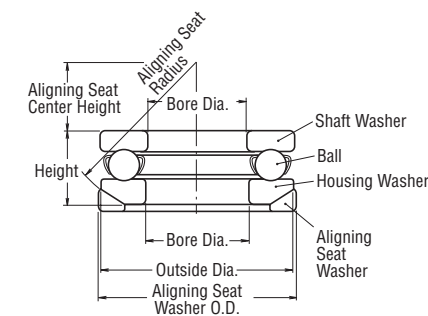
Cylindrical Roller Bearing



Tapered Roller Bearing



Spherical Roller Bearing



Single-Direction Thrust Ball Bearing

Fig. 1.1 Names of Bearing Parts

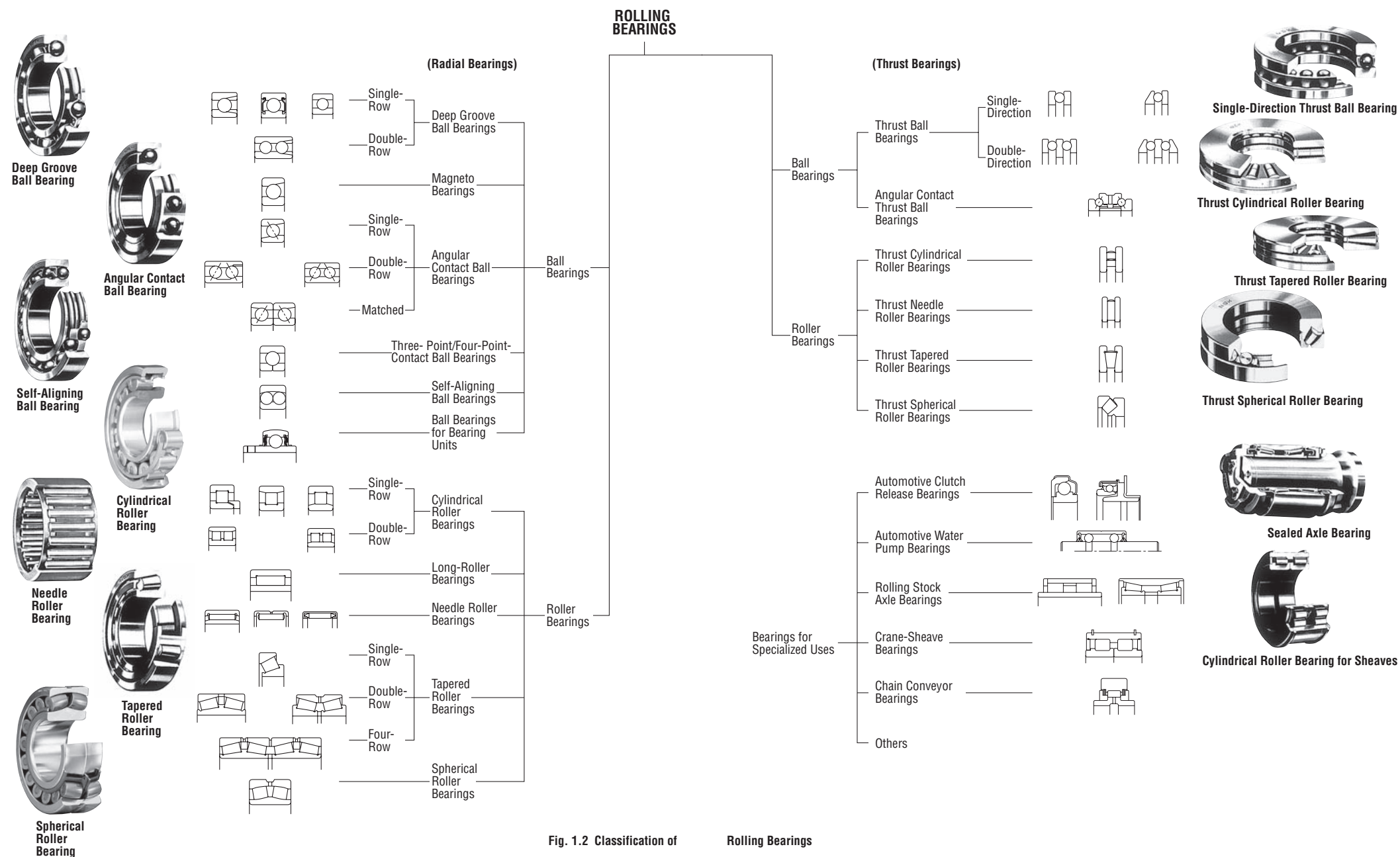
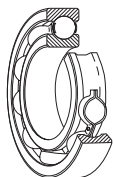


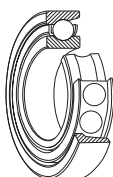
Fig. 1.2 Classification of Rolling Bearings

Single-Row Deep Groove Ball Bearings



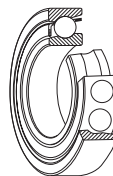
Single-row deep groove ball bearings are the most common type of rolling bearing and are in widespread use. The raceway grooves on both the inner and outer rings have circular arcs of slightly larger radii than those of the balls. They are capable of taking radial loads. In addition, axial loads can be applied in either direction. Because of their low torque, they are highly suitable for applications where high speeds and low power loss are required. While they can be used as open bearings, single-row deep groove bearings often have steel shields or rubber seals installed on one or both sides and are prelubricated with grease. In addition, snap rings are sometimes used on the periphery. Pressed-steel cages are most commonly used.

Magneto Bearings



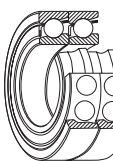
The inner groove of magneto bearings is slightly more shallow than that of deep groove bearings. Since the outer ring has a shoulder on only one side, the outer ring may be removed, which is often advantageous for mounting. In general, two such bearings are used in a paired mounting. Magneto bearings are small bearings with a bore diameter of 4 to 20 mm and are mainly used for small magnetos, gyroscopes, instruments, etc. Pressed-brass cages are generally used.

Single-Row Angular Contact Ball Bearings



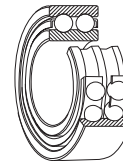
Individual bearings of this type are capable of taking axial loads in one direction and radial loads. Four contact angles of 15°, 25°, 30°, and 40° are available. The larger the contact angle, the higher the axial load capacity. For high-speed operation however, smaller contact angles are preferred. Usually, two bearings are used in a paired mounting, and the clearance between them must be adjusted properly. Pressed-steel and machined-brass cages are commonly used; however, for high precision bearings with a contact angle less than 30°, polyamide resin cages are often used.

Paired Mounting



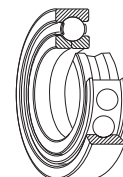
A combination of two radial bearings is called a paired mounting. Usually, they are formed using angular contact ball bearings or tapered roller bearings. Possible arrangements include: face-to-face (type DF), in which the outer ring faces are oriented towards each other; back-to-back (type DB); or same-direction (type DT), in which both front faces are oriented in the same direction. DF and DB arrangements are capable of taking radial loads and axial loads in both directions. Type DT is used when there is a strong axial load in one direction and it is necessary to divide the load equally across each bearing.

Double-Row Angular Contact Ball Bearings



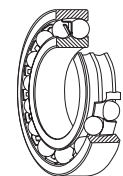
Double-row angular contact ball bearings are like two single-row angular contact ball bearings mounted back-to-back, except that they have only one inner ring and one outer ring. They have a narrower width than two single bearings, and can take thrust loads in both directions.

Four-Point-Contact Ball Bearings



The inner and outer rings of four-point-contact ball bearings are separable because the inner ring is split in a radial plane. They can take axial loads from either direction, and the balls have a contact angle of 35° with each ring. Radial loads are not recommended. Just one bearing of this type can replace a combination of face-to-face or back-to-back angular contact bearings. Machined-brass cages are generally used.

Self-Aligning Ball Bearings



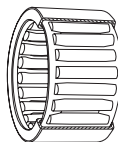
The inner ring of this type of bearing has two raceways, and the outer ring has a single spherical raceway with its center of curvature coincident with the bearing axis. Therefore, the axis of the inner ring, balls, and cage can deflect to some extent around the bearing center. Consequently, minor angular misalignment of the shaft and housing caused by machining or mounting error is automatically corrected. This type of bearing often has a tapered bore for mounting using an adapter sleeve.

Cylindrical Roller Bearings



In bearings of this type, the cylindrical rollers are in linear contact with the raceways. They have a high radial load capacity and are suitable for high speeds. NU, NJ, NUP, N, and NF are single-row bearing types, while NNU and NN are double-row bearing types, with designations depending on the design or absence of side ribs. The outer and inner rings of all types are separable. Some cylindrical roller bearings have no ribs on either the inner or outer ring, so that the rings can move axially relative to each other. These can be used as free-end bearings. Cylindrical roller bearings, in which either the inner or outer ring has two ribs and the other ring has one, are capable of taking some axial load in one direction. Double-row cylindrical roller bearings have high radial rigidity and are used primarily for precision machine tools. Pressed steel or machined brass cages are generally used, but sometimes molded polyamide cages are employed.

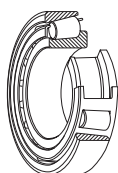
Needle Roller Bearings



Needle roller bearings contain many slender rollers with a length 3 to 10 times their diameter. As a result, the ratio of the bearing outside diameter to the inscribed circle diameter is small, and they have a rather high radial load capacity.

There are numerous types available, and many have no inner ring. The drawn-cup type has a pressed-steel outer ring and the solid type has a machined outer ring. There are also cage and roller assemblies without rings. Most bearings have pressed-steel cages, but some do not use cages.

Tapered Roller Bearings



Bearings of this type use conical rollers guided by a back-face rib on the inner ring. These bearings are capable of taking high radial loads and also axial loads in one direction. The HR Series features a greater quantity of larger rollers, allowing for even higher load capacity.

They are generally mounted in pairs in a manner similar to single-row angular contact ball bearings. In this case, the proper internal clearance can be obtained by adjusting the axial distance between the inner or outer rings of the two opposed bearings. Since they are separable, the inner ring assemblies and outer rings can be mounted independently.

Tapered roller bearings are divided into three types depending on contact angle; these are normal angle, medium angle, and steep angle. Double-row and four-row tapered roller bearings are also available. Pressed-steel cages are generally used.

Spherical Roller Bearings



These bearings have barrel-shaped rollers between the inner ring, which has two raceways, and the outer ring, which has one spherical raceway. Since the center of curvature of the outer ring raceway surface coincides with the bearing axis, they are self-aligning in a manner similar to that of self-aligning ball bearings. Therefore, if there is deflection of the shaft or housing or misalignment of their axes, it is automatically corrected so that excessive force is not applied to the bearings.

Spherical roller bearings can take not only heavy radial loads, but also some axial loads in either direction. They have excellent radial load-carrying capacity and are suitable for use where there are heavy or impact loads.

Some bearings have tapered bores and may be mounted directly on tapered shafts or cylindrical shafts using adapters or withdrawal sleeves.

Pressed-steel and machined-brass cages are used.

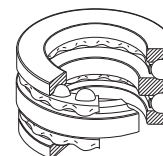
Single-Direction Thrust Ball Bearings



Single-direction thrust ball bearings are composed of washer-like bearing rings with raceway grooves. The ring attached to the shaft is called the shaft washer (or inner ring) while the ring attached to the housing is called the housing washer (or outer ring).

Double-direction thrust ball bearings have three rings with the middle ring (center ring) fixed to the shaft.

Double-Direction Thrust Ball Bearings



As their names imply, single-direction thrust bearings can take axial loads in one direction, while double-direction thrust bearings can take axial loads in both directions.

There are also thrust ball bearings with an aligning seat washer beneath the housing washer in order to compensate for shaft misalignment or mounting error.

Pressed-steel cages are usually used in smaller bearings and machined cages in larger bearings.

Spherical Thrust Roller Bearings



These bearings have a spherical raceway in the housing washer and barrel-shaped rollers obliquely arranged around it. Since the raceway in the housing washer is spherical, these bearings are self-aligning. They have a very high axial load capacity and are capable of taking moderate radial loads when an axial load is applied.

Pressed-steel cages or machined-brass cages are usually used.

Table 1. 1 Types and Characteristics

Bearing Type		Deep Groove Ball Bearings	Magneto Bearings	Angular Contact Ball Bearings	Double-Row Angular Contact Ball Bearings	Duplex Angular Contact Ball Bearings	Four-Point-Contact Ball Bearings	Self-Aligning Ball Bearings	Cylindrical Roller Bearings	Double-Row Cylindrical Roller Bearings	Cylindrical Roller Bearings with Single Rib
Features											
Load Capacity	Radial Loads										
	Axial Loads										
	Combined Loads										
High Speeds											
High Accuracy											
Low Noise and Torque											
Rigidity											
Angular Misalignment											
Self-Aligning Capability											
Ring Separability											
Fixed-End Bearing											
Free-End Bearing											
Inner Ring Tapered Bore											
Remarks			Two bearings are usually mounted in opposition.	Contact angles of 15°, 25°, 30° and 40°. Two bearings are usually mounted in opposition. Clearance adjustment is necessary.		Combination of DF and DT pairs is possible, but not for use on free-end.	Contact angle of 35°		Including N type	Including MNU type	Including NF type
Page No.		C005 C053	C005 C050	C072	C072 C106	C072	C072 C108	C114	C124	C124 C158	C124

Excellent
 Good
 Fair
 Poor
 Unsuitable
 One direction only
 Two directions

☆ Applicable
 ★ Applicable, allow for shaft contraction/elongation at bearing fitting surfaces.

of Rolling Bearings

Cylindrical Roller Bearings with Thrust Collars	Needle Roller Bearings	Tapered Roller Bearings	Double- and Multi-Row Tapered Roller Bearings	Spherical Roller Bearings	Thrust Ball Bearings	Thrust Ball Bearings with Aligning Seat	Double-Direction Angular Contact Thrust Ball Bearings	Thrust Cylindrical Roller Bearings	Thrust Tapered Roller Bearings	Thrust Spherical Roller Bearings	Page No.
											—
											—
											—
											A022 A098
											A023 A126 A151
											A023
											A023 A192
											A022 Blue pages of each brg. type
											A022
											A023 A024
											A026 to A029
											A026 to A029
											A150 B008 B012
Including NUP type		Two bearings are usually mounted in opposition. Clearance adjustment is necessary.	KH and KV types are also available but not for use on free-end.					Including needle roller thrust bearings		To be used with oil lubrication	
C124	C341	C182	C182 C246	C258	C296	C296	—	C314	C322	C332	

1.3 Contact Angle and Bearing Types

The contact angle (α) refers to the angle between a vertical plane of the rotation axis of the bearing and a straight line between the points where the rolling element comes in contact with the inner ring raceway and outer ring raceway.

Radial bearings and thrust bearings are classified depending on the size of the contact angle.

Figure 1.3 shows the relation between contact angle and loading direction on the bearing.

Radial bearing α : Less than 45°
(A primarily radial load is applied.)

Thrust bearing α : Over 45°
(A primarily axial load is applied.)

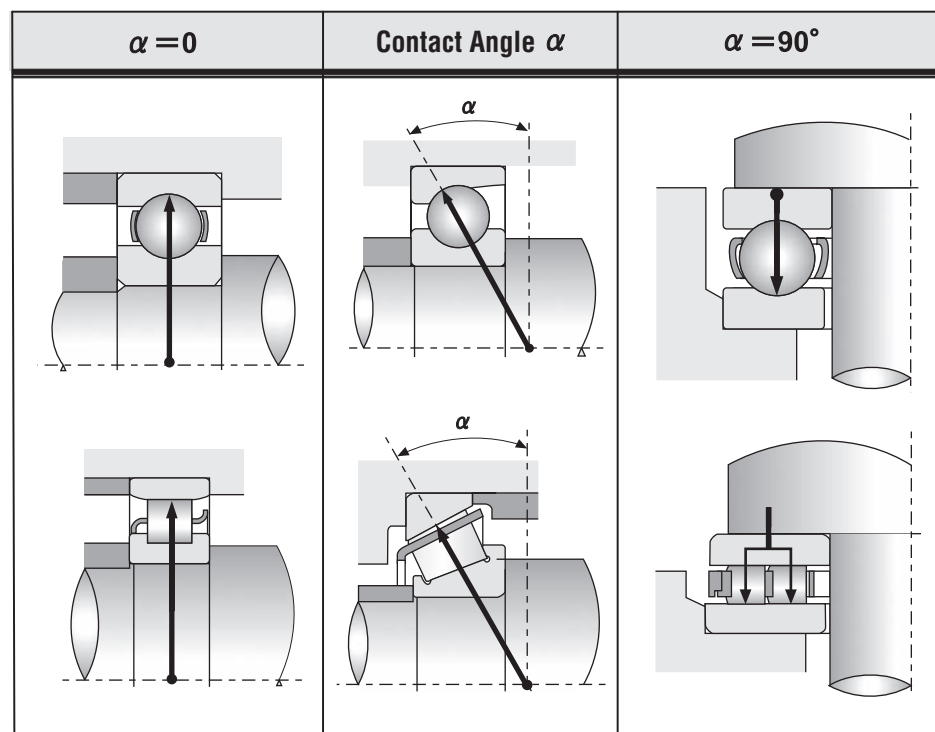


Fig. 1.3 Contact Angle α

1.4 Types of Load on Bearings

An example deep groove ball bearing is shown below in Figure 1.4 along with the types of load applied to a rolling bearing. These are:

- (a) Radial load
- (b) Axial load
- (c) Combined radial and axial load
- (d) Moment load

It is important to select the optimum bearing type according to the type and magnitude of the load.

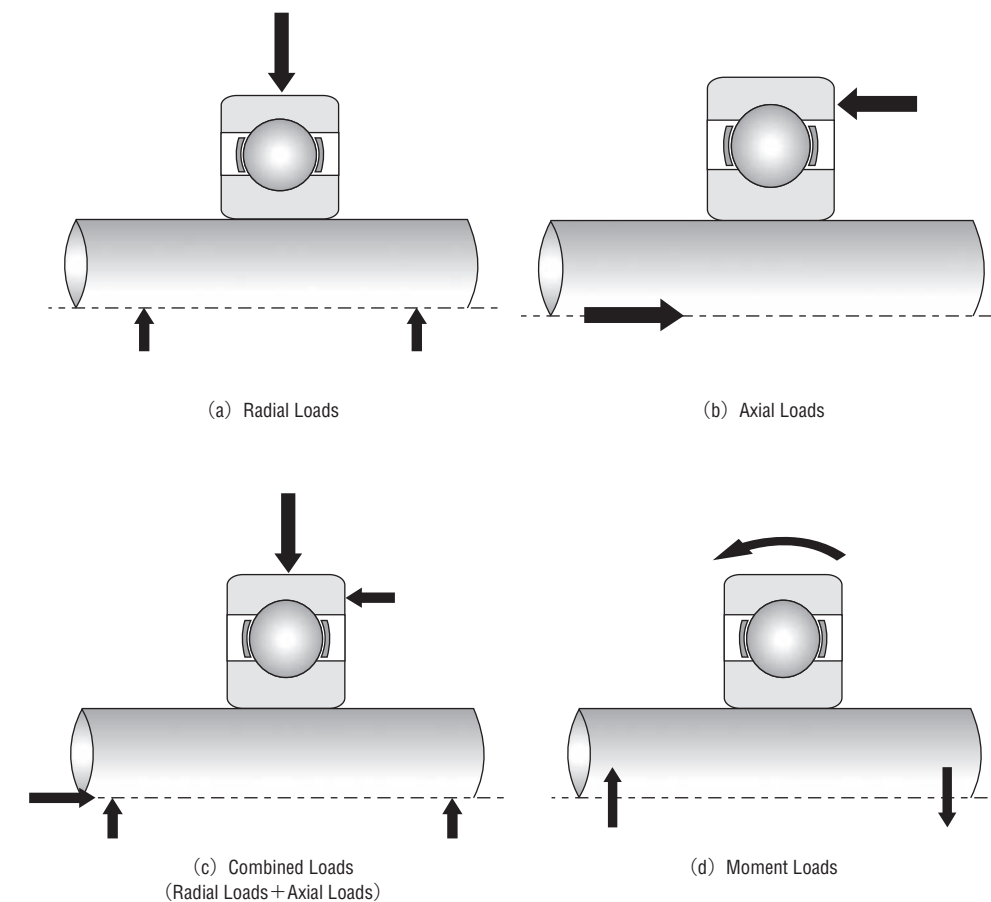
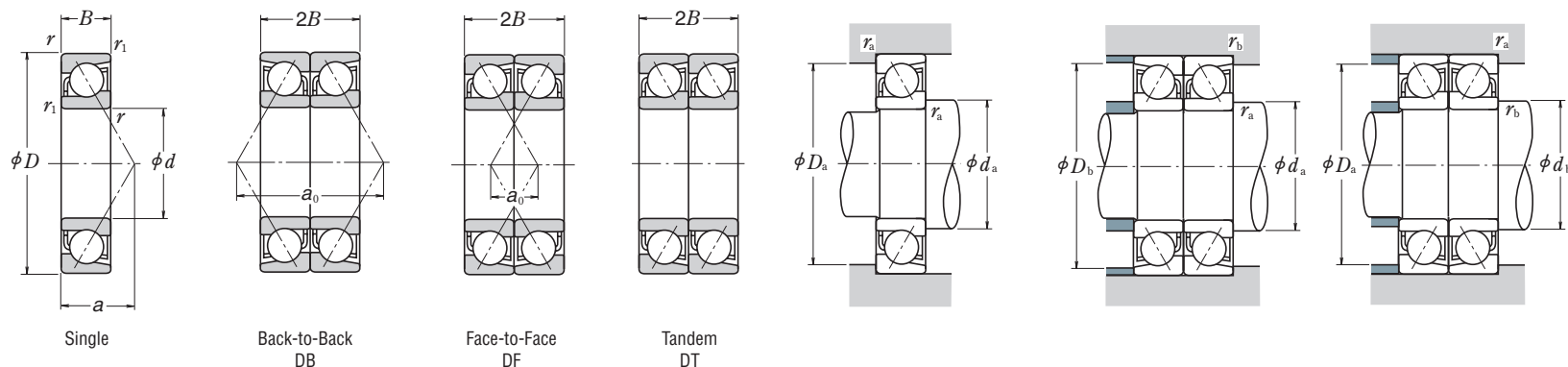


Fig. 1.4 Types of Load

■ ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

Bore Diameter 10 – 15 mm

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

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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

	Boundary Dimensions (mm)					Factor	Basic Load Ratings (Single) (N)		Limiting Speeds (1) (min ⁻¹)	Eff. Load Center (mm) a	Abutment and Fillet Dimensions (mm)			Mass (kg) approx.	Bearing Designations (2)				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}			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.
10	22	6	0.3	0.15	2 880	1 450	—	40 000	56 000	6.7	12.5	19.5	0.3	0.010	7900 A5	TYN	(M)	DB DF DT	4 700	2 900	32 000	43 000	13.5	1.5	—	20.8	0.15
	22	6	0.3	0.15	3 000	1 520	14.1	48 000	63 000	5.1	12.5	19.5	0.3	0.010	7900 C	TYN	(M), T	DB DF DT	4 900	3 050	38 000	53 000	10.3	1.7	—	20.8	0.15
	26	8	0.3	0.15	5 350	2 600	—	24 000	34 000	9.2	12.5	23.5	0.3	0.019	7000 A	W	(M), T, TYN	DB DF DT	8 750	5 200	20 000	28 000	18.4	2.4	11.2	24.8	0.15
	26	8	0.3	0.15	5 300	2 490	12.6	45 000	63 000	6.4	12.5	23.5	0.3	0.019	7000 C	TYN	W, (M), T	DB DF DT	8 650	5 000	36 000	50 000	12.8	3.2	—	24.8	0.15
	30	9	0.6	0.3	5 400	2 710	—	22 000	30 000	10.3	15	25	0.6	0.032	7200 A	W	(M), T	DB DF DT	8 800	5 400	18 000	24 000	20.5	2.5	12.5	27.5	0.3
	30	9	0.6	0.3	5 000	2 500	—	16 000	22 000	12.9	15	25	0.6	0.032	7200 B	W	(M), T	DB DF DT	8 100	5 000	13 000	18 000	25.8	7.8	12.5	27.5	0.3
	30	9	0.6	0.3	5 400	2 610	13.2	40 000	56 000	7.2	15	25	0.6	0.032	7200 C	TYN	W, (M), T	DB DF DT	8 800	5 200	32 000	45 000	14.4	3.6	—	27.5	0.3
	35	11	0.6	0.3	9 300	4 300	—	16 000	22 000	12.0	15	30	0.6	0.053	7300 A	W	(M), T	DB DF DT	15 100	8 600	13 000	17 000	24.0	2.0	12.5	32.5	0.3
	35	11	0.6	0.3	8 750	4 050	—	14 000	20 000	14.9	15	30	0.6	0.054	7300 B	W	(M), T	DB DF DT	14 200	8 100	11 000	16 000	29.9	7.9	12.5	32.5	0.3
	24	6	0.3	0.15	3 200	1 770	—	38 000	53 000	7.2	14.5	21.5	0.3	0.011	7901 A5	TYN	(M), T	DB DF DT	5 200	3 550	30 000	43 000	14.4	2.4	—	22.8	0.15
	24	6	0.3	0.15	3 350	1 860	14.7	45 000	63 000	5.4	14.5	21.5	0.3	0.011	7901 C	TYN	(M), T	DB DF DT	5 450	3 700	36 000	50 000	10.8	1.2	—	22.8	0.15
	28	8	0.3	0.15	5 800	2 980	—	22 000	30 000	9.8	14.5	25.5	0.3	0.021	7001 A	W	(M), T, TYN	DB DF DT	9 400	5 950	18 000	24 000	19.5	3.5	13.2	26.8	0.15
12	28	8	0.3	0.15	5 800	2 900	13.2	40 000	56 000	6.7	14.5	25.5	0.3	0.021	7001 C	TYN	W, (M), T	DB DF DT	9 400	5 800	32 000	45 000	13.4	2.6	—	26.8	0.15
	32	10	0.6	0.3	8 000	4 050	—	20 000	28 000	11.4	17	27	0.6	0.037	7201 A	W	(M), T, TYN	DB DF DT	13 000	8 050	16 000	22 000	22.7	2.7	14.5	29.5	0.3
	32	10	0.6	0.3	7 450	3 750	—	15 000	20 000	14.2	17	27	0.6	0.038	7201 B	W	(M), T	DB DF DT	12 100	7 500	12 000	16 000	28.5	8.5	14.5	29.5	0.3
	32	10	0.6	0.3	8 150	3 750	—	20 000	30 000	14.2	17	27	0.6	0.036	*7201 BEA	T85	—	—	—	—	16 000	24 000	28.5	8.5	14.5	29.5	0.3
	32	10	0.6	0.3	7 900	3 850	12.5	36 000	50 000	7.9	17	27	0.6	0.036	7201 C	TYN	W, (M), T	DB DF DT	12 800	7 700	30 000	40 000	15.9	4.1	—	29.5	0.3
	37	12	1	0.6	9 450	4 500	—	15 000	20 000	13.1	18	31	1	0.060	7301 A	W	(M), T	DB DF DT	15 400	9 000	12 000	16 000	26.1	2.1	17	32	0.6
	37	12	1	0.6	8 850	4 200	—	13 000	18 000	16.3	18	31	1	0.062	7301 B	W	(M), T	DB DF DT	14 400	8 400	10 000	14 000	32.6	8.6	17	32	0.6
	37	12	1	0.6	11 100	4 950	—	18 000	26 000	16.3	18	31	1	0.061	*7301 BEA	T85	—	—	—	—	15 000	22 000	32.6	8.6	17	32	0.6
	28	7	0.3	0.15	4 550	2 530	—	32 000	43 000	8.5	17.5	25.5	0.3	0.016	7902 A5	TYN	(M), T	DB DF DT	7 400	5 050	26 000	34 000	17.0	3.0	—	26.8	0.15
	28	7	0.3	0.15	4 750	2 640	14.5	38 000	53 000	6.4	17.5	25.5	0.3	0.016	7902 C	TYN	(M), T	DB DF DT	7 750	5 300	30 000	43 000	12.8	1.2	—	26.8	0.15
	32	9	0.3	0.15	6 100	3 450	—	19 000	26 000	11.3	17.5	29.5	0.3	0.030	7002 A	W	(M), T, TYN	DB DF DT	9 950	6 850	15 000	22 000	22.6	4.6	16.2	30.8	0.15
	32	9	0.3	0.15	6 250	3 400	14.1	34 000	48 000	7.6	17.5	29.5	0.3	0.030	7002 C	TYN	W, (M), T	DB DF DT	10 100	6 750	28 000	38 000	15.3	2.7	—	30.8	0.15
15	35	11	0.6	0.3	8 650	4 650	—	18 000	24 000	12.7	20	30	0.6	0.045	7202 A	W	(M), T, TYN	DB DF DT	14 000	9 300	14 000	20 000	25.4	3.4	17.5	32.5	0.3
	35	11	0.6	0.3	7 950	4 300	—	13 000	18 000	16.0	20	30	0.6	0.046	7202 B	W	(M), T	DB DF DT	12 900	8 600	10 000	14 000	32.0	10.0	17.5	32.5	0.3
	35	11	0.6	0.3	9 800	4 800	—	18 000	26 000	16.0	20	30	0.6	0.044	*7202 BEA	T85	—	—	—	—	14 000	20 000	32.0	10.0	17.5	32.5	0.3
	35	11	0.6	0.3	8 650	4 550	13.2	32 000	45 000	8.8	20	30	0.6	0.045	7202 C	TYN	W, (M), T	DB DF DT	14 100	9 050	26 000	36 000	17.7	4.3	—	32.5	0.3
	42	13	1	0.6	13 400	7 100	—	13 000	17 000	14.7	21	36	1	0.084	7302 A	W	(M), T	DB DF DT	21 800	14 200	10 000	13 000	29.5	3.5	20	37	0.6
	42	13	1	0.6	12 500	6 600	—	11 000	15 000	18.5	21	36	1	0.086	7302 B	W	(M), T	DB DF DT	20 200	13 200	9 000	12 000	36.9	10.9	20	37	0.6
	42	13	1	0.6	14 300	6 900	—	16 000	22 000	18.5	21	36	1	0.084	*7302 BEA	T85	—	—	—	—	13 000	18 000	36.9	10.9	20	37	0.6

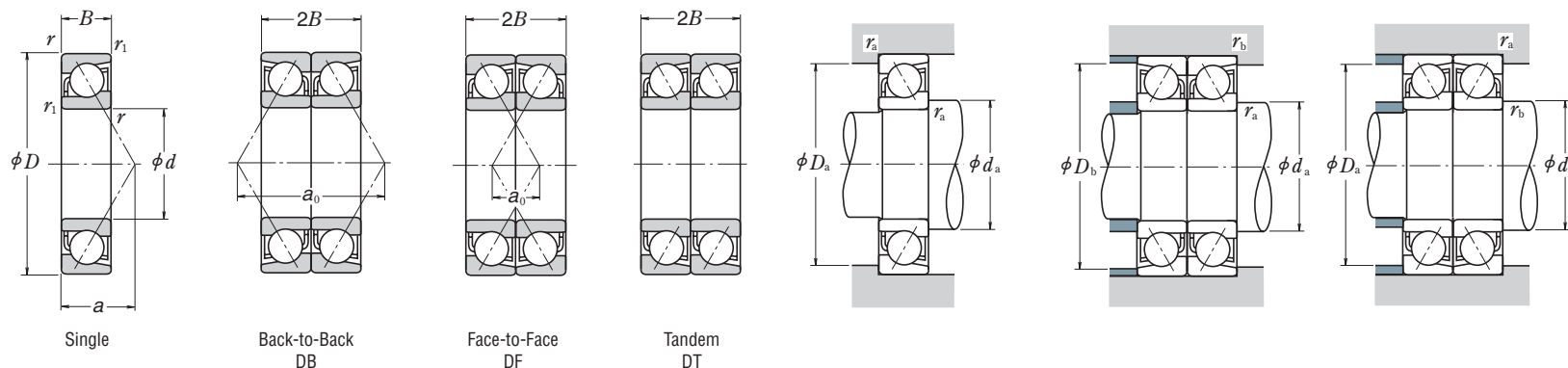
- Notes (1) For applications operating near the limiting speed, refer to Page C077.
 (2) Suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively.
 (3) Use the values of d_a (min) and r_a (max) for bearings with “—” in the d_b column.

- Note (4) Cage designation (M) is usually omitted from the bearing designation.
 Remark Bearings with an asterisk (*) are NSKHPS 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 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
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	30	7	0.3	0.15	4 750	2 800	—	30 000	40 000	9.0	19.5	27.5	0.3	0.017	7903 A5	TYN	(M), T	DB DF DT	7 750	5 600	24 000	32 000	18.0	4.0	—	28.8	0.15
	30	7	0.3	0.15	5 000	2 940	14.8	34 000	48 000	6.6	19.5	27.5	0.3	0.017	7903 C	TYN	(M), T	DB DF DT	8 150	5 850	28 000	38 000	13.3	0.7	—	28.8	0.15
	35	10	0.3	0.15	6 400	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	10 400	7 650	14 000	19 000	25.0	5.0	18.2	33.8	0.15
	35	10	0.3	0.15	6 600	3 800	14.5	32 000	43 000	8.5	19.5	32.5	0.3	0.040	7003 C	TYN	W, (M), T	DB DF DT	10 700	7 600	26 000	34 000	17.0	3.0	—	33.8	0.15
	40	12	0.6	0.3	10 800	6 000	—	16 000	22 000	14.2	22	35	0.6	0.067	7203 A	W	(M), T, TYN	DB DF DT	17 600	12 000	13 000	17 000	28.5	4.5	19.5	37.5	0.3
	40	12	0.6	0.3	9 950	5 500	—	11 000	15 000	18.0	22	35	0.6	0.068	7203 B	W	(M), T	DB DF DT	16 100	11 000	9 000	12 000	35.9	11.9	19.5	37.5	0.3
	40	12	0.6	0.3	11 600	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
	40	12	0.6	0.3	10 900	5 850	13.3	28 000	38 000	9.8	22	35	0.6	0.065	7203 C	TYN	W, (M), T	DB DF DT	17 600	11 700	22 000	32 000	19.6	4.4	—	37.5	0.3
	47	14	1	0.6	15 900	8 650	—	11 000	15 000	16.2	23	41	1	0.116	7303 A	W	(M), T	DB DF DT	25 900	17 300	9 000	12 000	32.5	4.5	22	42	0.6
	47	14	1	0.6	14 800	8 000	—	10 000	14 000	20.4	23	41	1	0.118	7303 B	W	(M), T	DB DF DT	24 000	16 000	8 000	11 000	40.9	12.9	22	42	0.6
	47	14	1	0.6	16 800	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
	37	9	0.3	0.15	6 600	4 050	—	24 000	32 000	11.1	22.5	34.5	0.3	0.037	7904 A5	TYN	(M), T	DB DF DT	10 700	8 100	19 000	26 000	22.3	4.3	—	35.8	0.15
	37	9	0.3	0.15	6 950	4 250	14.9	28 000	38 000	8.3	22.5	34.5	0.3	0.036	7904 C	TYN	(M), T	DB DF DT	11 300	8 500	22 000	32 000	16.6	1.4	—	35.8	0.15
	42	12	0.6	0.3	10 800	6 600	—	14 000	20 000	14.9	25	37	0.6	0.068	7004 A	W	(M), T, TYN	DB DF DT	17 600	13 200	12 000	16 000	29.9	5.9	22.5	39.5	0.3
	42	12	0.6	0.3	11 100	6 550	14.0	26 000	36 000	10.1	25	37	0.6	0.068	7004 C	TYN	W, (M), T	DB DF DT	18 000	13 100	20 000	30 000	20.3	3.7	—	39.5	0.3
	47	14	1	0.6	14 500	8 300	—	13 000	18 000	16.7	26	41	1	0.106	7204 A	W	(M), T, TYN	DB DF DT	23 500	16 600	11 000	15 000	33.3	5.3	25	42	0.6
	47	14	1	0.6	13 300	7 650	—	9 500	13 000	21.1	26	41	1	0.109	7204 B	W	(M), T	DB DF DT	21 600	15 300	7 500	11 000	42.1	14.1	25	42	0.6
20	47	14	1	0.6	15 600	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
	47	14	1	0.6	14 600	8 050	13.3	24 000	34 000	11.5	26	41	1	0.104	7204 C	TYN	W, (M), T	DB DF DT	23 600	16 100	19 000	26 000	23.0	5.0	—	42	0.6
	52	15	1.1	0.6	18 700	10 400	—	10 000	13 000	17.9	27	45	1	0.146	7304 A	W	(M), T	DB DF DT	30 500	20 800	8 000	11 000	35.8	5.8	25	47	0.6
	52	15	1.1	0.6	17 300	9 650	—	9 000	12 000	22.6	27	45	1	0.150	7304 B	W	(M), T	DB DF DT	28 200	19 300	7 100	10 000	45.2	15.2	25	47	0.6
	52	15	1.1	0.6	19 800	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
	42	9	0.3	0.15	7 450	5 150	—	20 000	28 000	12.3	27.5	39.5	0.3	0.043	7905 A5	TYN	(M), T	DB DF DT	12 100	10 300	16 000	22 000	24.6	6.6	—	40.8	0.15
	42	9	0.3	0.15	7 850	5 400	15.5	24 000	34 000	9.0	27.5	39.5	0.3	0.043	7905 C	TYN	(M), T	DB DF DT	12 700	10 800	19 000	26 000	18.0	0.0	—	40.8	0.15
	47	12	0.6	0.3	11 300	7 400	—	12 000	17 000	16.4	30	42	0.6	0.079	7005 A	W	(M), T, TYN	DB DF DT	18 300	14 800	10 000	14 000	32.8	8.8	27.5	44.5	0.3
	47	12	0.6	0.3	11 700	7 400	14.7	22 000	30 000	10.8	30	42	0.6	0.078	7005 C	TYN	W, (M), T	DB DF DT	19 000	14 800	18 000	26 000	21.6	2.4	—	44.5	0.3
	52	15	1	0.6	16 200	10 300	—	12 000	16 000	18.6	31	46	1	0.130	7205 A	W	(M), T, TYN	DB DF DT	26 300	20 500	9 500	13 000	37.2	7.2	30	47	0.6
	52	15	1	0.6	14 800	9 400	—	8 500	11 000	23.7	31	46	1	0.133	7205 B	W	(M), T	DB DF DT	24 000	18 800	6 700	9 000	47.3	17.3	30	47	0.6
	52	15	1	0.6	17 600	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
	52	15	1	0.6	16 600	10 200	14.0	22 000	28 000	12.7	31	46	1	0.129	7205 C	TYN	W, (M), T	DB DF DT	27 000	20 400	17 000	24 000	25.3	4.7	—	47	0.6
	62	17	1.1	0.6	26 400	15 800	—	8 500	11 000	21.1	32	55	1	0.235	7305 A	W	(M), T	DB DF DT	43 000	31 500	6 700	9 000	42.1	8.1	30	57	0.6

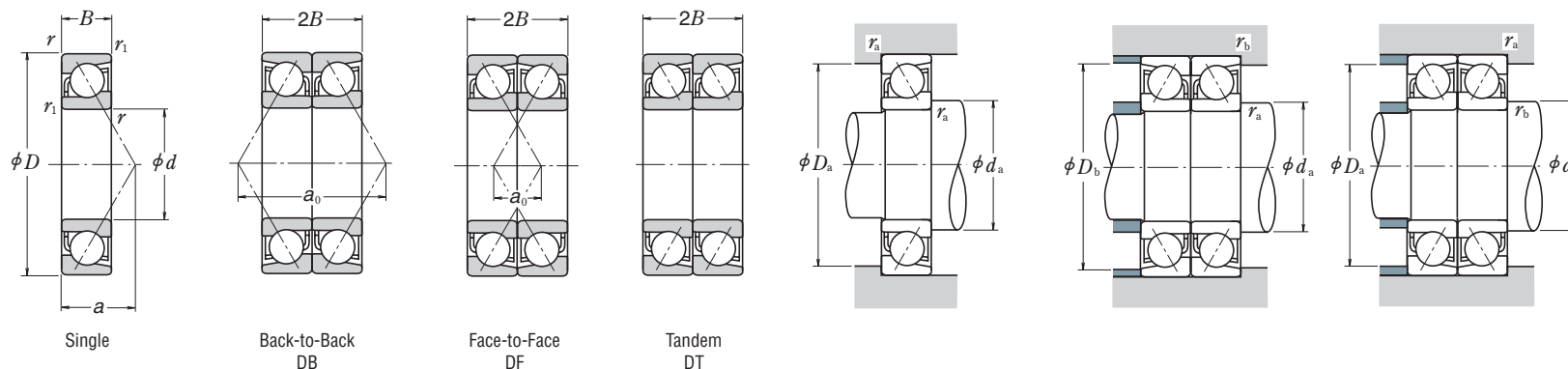
- Notes** ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.
⁽²⁾ Suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively.
⁽³⁾ Use the values of d_a (min) and r_a (max) for bearings with “—” in the d_b column.

- Note** ⁽⁴⁾ Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are NSKHPS 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
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.
25	62	17	1.1	0.6	24 400	14 600	—	7 500	10 000	26.7	32	55	1	0.241	*7305 BEA	W	(M), T MR, T7	DB DF DT	39 500	29 300	6 000	8 000	53.5	19.5	30	57	0.6
	62	17	1.1	0.6	27 200	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	47	9	0.3	0.15	7 850	5 950	—	18 000	24 000	13.5	32.5	44.5	0.3	0.050	7906 A5	TYN	(M), T	DB DF DT	12 800	11 900	14 000	19 000	27.0	9.0	—	45.8	0.15
	47	9	0.3	0.15	8 300	6 250	15.9	22 000	28 000	9.7	32.5	44.5	0.3	0.049					13 500	12 500	17 000	24 000	19.3	1.3	—	45.8	0.15
	55	13	1	0.6	14 500	10 100	—	11 000	14 000	18.8	36	49	1	0.116					23 600	20 200	8 500	12 000	37.5	11.5	35	50	0.6
	55	13	1	0.6	15 100	10 300	14.9	19 000	26 000	12.2	36	49	1	0.115	7206 C	TYN	W, (M), T	DB DF DT	24 600	20 500	15 000	22 000	24.4	1.6	—	50	0.6
	62	16	1	0.6	22 500	14 800	—	9 500	13 000	21.3	36	56	1	0.197		W	(M), T, TYN	DB DF DT	36 500	29 500	8 000	11 000	42.6	10.6	35	57	0.6
	62	16	1	0.6	20 500	13 500	—	7 100	9 500	27.3	36	56	1	0.202					33 500	27 000	5 600	7 500	54.6	22.6	35	57	0.6
	62	16	1	0.6	23 700	14 300	—	10 000	14 000	27.3	36	56	1	0.194	*7206 BEA	T85	MR, T7	DB DF DT	—	—	8 000	11 000	54.6	22.6	35	57	0.6
	62	16	1	0.6	23 000	14 700	13.9	18 000	24 000	14.2	36	56	1	0.197					37 500	29 300	14 000	20 000	28.3	3.7	—	57	0.6
	72	19	1.1	0.6	33 500	20 900	—	7 100	9 500	24.2	37	65	1	0.346		W	(M), T	DB DF DT	54 500	41 500	5 600	7 500	48.4	10.4	35	67	0.6
	72	19	1.1	0.6	31 000	19 300	—	6 300	8 500	30.9	37	65	1	0.354	*7306 B	W	(M), T	DB DF DT	50 500	38 500	5 000	7 100	61.8	23.8	35	67	0.6
	72	19	1.1	0.6	36 500	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
35	55	10	0.6	0.3	11 400	8 700	—	15 000	20 000	15.5	40	50	0.6	0.075	7907 A5	TYN	(M), T	DB DF DT	18 600	17 400	12 000	17 000	31.0	11.0	—	52.5	0.3
	55	10	0.6	0.3	12 100	9 150	15.7	18 000	24 000	11.0	40	50	0.6	0.075		W	(M), T, TYN	DB DF DT	19 600	18 300	14 000	20 000	22.1	2.1	—	52.5	0.3
	62	14	1	0.6	18 300	13 400	—	9 000	13 000	21.0	41	56	1	0.153					29 700	26 800	7 500	10 000	42.0	14.0	40	57	0.6
	62	14	1	0.6	19 100	13 700	15.0	17 000	22 000	13.5	41	56	1	0.153	7207 C	TYN	W, (M), T	DB DF DT	31 000	27 300	13 000	19 000	27.0	1.0	—	57	0.6
	72	17	1.1	0.6	29 700	20 100	—	8 500	12 000	23.9	42	65	1	0.287		W	(M), T, TYN	DB DF DT	48 500	40 000	6 700	9 500	47.9	13.9	40	67	0.6
	72	17	1.1	0.6	27 100	18 400	—	6 000	8 000	30.9	42	65	1	0.294					44 000	36 500	4 800	6 700	61.9	27.9	40	67	0.6
	72	17	1.1	0.6	32 500	19 600	—	8 500	12 000	30.9	42	65	1	0.271	*7207 BEA	T85	MR, T7	DB DF DT	—	—	6 700	9 500	61.9	27.9	40	67	0.6
	72	17	1.1	0.6	30 500	19 900	13.9	15 000	20 000	15.7	42	65	1	0.320		W	(M), T, TYN	DB DF DT	49 500	40 000	12 000	17 000	31.3	2.7	—	67	0.6
	80	21	1.5	1	40 000	26 300	—	6 300	8 500	27.1	44	71	1.5	0.464					65 000	52 500	5 000	6 700	54.2	12.2	41	74	1
	80	21	1.5	1	40 500	24 400	—	8 000	11 000	34.6	44	71	1.5	0.451	*7307 BEA	T85	MR, T7	DB DF DT	—	—	6 300	9 000	69.2	27.2	41	74	1
	80	21	1.5	1	40 500	24 400	—	5 600	7 500	34.6	44	71	1.5	0.469					65 500	49 000	4 500	6 000	69.2	27.2	41	74	1
40	62	12	0.6	0.3	14 300	11 200	—	14 000	18 000	17.9	45	57	0.6	0.110	7908 A5	TYN	(M), T	DB DF DT	23 300	22 300	11 000	15 000	35.8	11.8	—	59.5	0.3
	62	12	0.6	0.3	15 100	11 700	15.7	16 000	22 000	12.8	45	57	0.6	0.109		W	(M), T, TYN	DB DF DT	24 600	23 500	13 000	18 000	25.7	1.7	—	59.5	0.3
	68	15	1	0.6	19 500	15 400	—	8 500	11 000	23.1	46	62	1	0.190					31 500	31 000	6 700	9 000	46.2	16.2	45	63	0.6
	68	15	1	0.6	20 600	15 900	15.4	15 000	20 000	14.7	46	62	1	0.213	7208 C	(M)	W, T, TYN	DB DF DT	33 500	32 000	12 000	17 000	29.5	0.5	—	63	0.6
	80	18	1.1	0.6	35 500	25 100	—	7 500	10 000	26.3	47	73	1	0.375					57 500	50 500	6 000	8 500	52.6	16.6	45	75	0.6
	80	18	1.1	0.6	32 000	23 000	—	5 300	7 500	34.2	47	73	1	0.383		W	(M), T	DB DF DT	52 000	46 000	4 300	6 000	68.3	32.3	45	75	0.6
	80	18	1.1	0.6	32 000	23 000	—	5 300	7 500	34.2	47	73	1	0.383					—	—	—	—	—	—	—	—	—

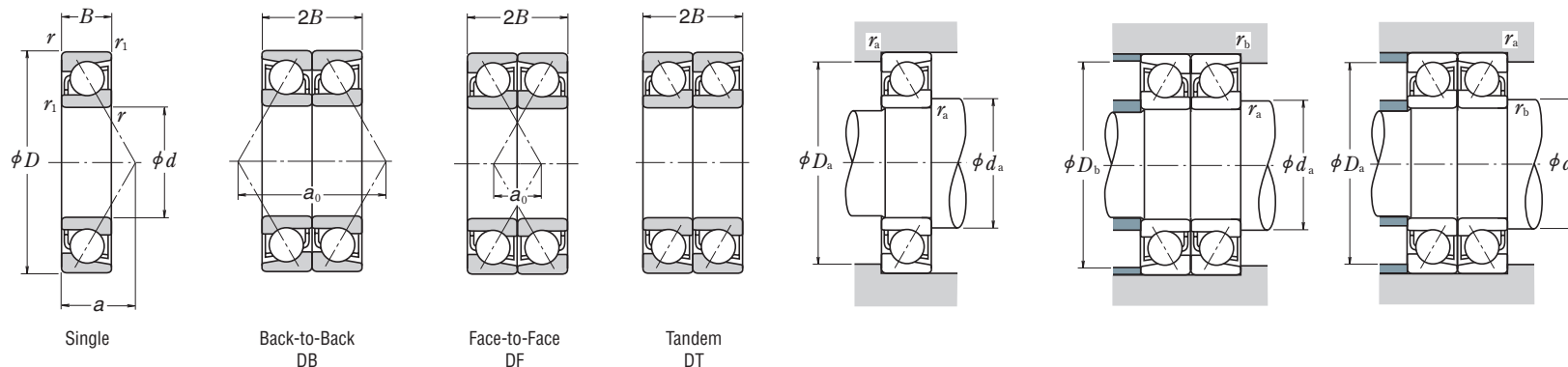
- Notes** ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.
⁽²⁾ Suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively.
⁽³⁾ Use the values of d_a (min) and r_a (max) for bearings with “—” in the d_b column.

- Note** ⁽⁴⁾ Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are NSKHPs 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single)		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)		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}		Grease	Oil		d_a min.	D_a max.	r_a max.		Single	Standard	Option	Arrangement	C_r	C_{0r}	Grease	Oil	DB a_0	DF	d_b ⁽³⁾ min.	D_b max.	r_b ⁽³⁾ max.
40	80	18	1.1	0.6	38 500	24 500	—	7 500	11 000	34.2	47	73	1	0.357	*7208 BEA	T85 (M)	MR, T7 W, T, TYN (M), T	— — —	— —	— —	6 000	8 500	68.3	32.3	45	75	0.6
	80	18	1.1	0.6	36 500	25 200	14.1	14 000	19 000	17.0	47	73	1	0.418				DB DF DT	59 000	50 500	11 000	15 000	34.1	1.9	—	75	0.6
	90	23	1.5	1	49 000	33 000	—	5 600	7 500	30.3	49	81	1.5	0.633				DB DF DT	79 500	66 000	4 500	6 000	60.5	14.5	46	84	1
	90	23	1.5	1	53 000	33 000	—	7 100	10 000	38.8	49	81	1.5	0.619	*7308 BEA	T85 (M)	MR, T7 W, T, TYN (M), T	— — —	— —	— —	5 600	8 000	77.5	31.5	46	84	1
	90	23	1.5	1	53 000	33 000	—	5 000	6 700	38.8	49	81	1.5	0.644				DB DF DT	86 500	65 500	4 000	5 300	77.5	31.5	46	84	1
	68	12	0.6	0.3	15 100	12 700	—	12 000	17 000	19.2	50	63	0.6	0.130	7909 A5	(M)	T, TYN (M), T, TYN	DB DF DT	24 600	25 400	9 500	13 000	38.4	14.4	—	65.5	0.3
	68	12	0.6	0.3	16 000	13 400	16.0	14 000	20 000	13.6	50	63	0.6	0.129				DB DF DT	26 000	26 800	12 000	16 000	27.1	3.1	—	65.5	0.3
	75	16	1	0.6	23 100	18 700	—	7 500	10 000	25.3	51	69	1	0.250				DB DF DT	37 500	37 500	6 000	8 500	50.6	18.6	50	70	0.6
	75	16	1	0.6	24 400	19 300	15.4	14 000	19 000	16.0	51	69	1	0.274	7909 C	(M)	W, TYN (M), T, TYN	DB DF DT	39 500	38 500	11 000	15 000	32.1	0.1	—	70	0.6
	85	19	1.1	0.6	39 500	28 700	—	6 700	9 500	28.3	52	78	1	0.411				DB DF DT	64 500	57 500	5 600	7 500	56.5	18.5	50	80	0.6
	85	19	1.1	0.6	36 000	26 200	—	5 000	6 700	36.8	52	78	1	0.421				DB DF DT	58 500	52 500	4 000	5 300	73.5	35.5	50	80	0.6
45	85	19	1.1	0.6	40 500	27 100	—	7 100	10 000	36.8	52	78	1	0.400	*7209 BEA	T85 (M)	MR, T7 W, T, TYN (M), T	— — —	— —	— —	5 600	8 000	73.5	35.5	50	80	0.6
	85	19	1.1	0.6	41 000	28 800	14.2	12 000	17 000	18.2	52	78	1	0.468				DB DF DT	66 500	57 500	10 000	14 000	36.4	1.6	—	80	0.6
	100	25	1.5	1	63 500	43 500	—	5 000	6 700	33.4	54	91	1.5	0.848				DB DF DT	103 000	87 000	4 000	5 300	66.9	16.9	51	94	1
	100	25	1.5	1	62 500	39 500	—	6 300	9 000	42.9	54	91	1.5	0.823	*7309 BEA	T85 (M)	MR, T7 W, T, TYN (M), T	— — —	— —	— —	5 000	7 100	85.8	35.8	51	94	1
	100	25	1.5	1	62 500	39 500	—	4 500	6 000	42.9	54	91	1.5	0.860				DB DF DT	102 000	79 500	3 600	4 800	85.8	35.8	51	94	1
	72	12	0.6	0.3	15 900	14 200	—	11 000	15 000	20.2	55	67	0.6	0.132	7910 A5	(M)	T, TYN (M), T, TYN	DB DF DT	25 900	28 400	9 000	12 000	40.5	16.5	—	69.5	0.3
	72	12	0.6	0.3	16 900	15 000	16.2	13 000	18 000	14.2	55	67	0.6	0.130				DB DF DT	27 400	30 000	11 000	15 000	28.3	4.3	—	69.5	0.3
	80	16	1	0.6	24 500	21 100	—	6 700	9 500	26.8	56	74	1	0.263				DB DF DT	40 000	42 000	5 600	7 500	53.5	21.5	55	75	0.6
	80	16	1	0.6	26 000	21 900	15.7	12 000	17 000	16.7	56	74	1	0.293	7910 C	(M)	W, T, TYN (M), T, TYN	DB DF DT	42 000	44 000	10 000	14 000	33.4	1.4	—	75	0.6
	90	20	1.1	0.6	41 500	31 500	—	6 300	9 000	30.2	57	83	1	0.466				DB DF DT	67 000	63 000	5 000	7 100	60.4	20.4	55	85	0.6
	90	20	1.1	0.6	37 500	28 600	—	4 500	6 300	39.4	57	83	1	0.477				DB DF DT	60 500	57 000	3 600	5 000	78.7	38.7	55	85	0.6
50	90	20	1.1	0.6	42 000	29 700	—	6 300	9 500	39.4	57	83	1	0.453	*7210 BEA	T85 (M)	MR, T7 W, T, TYN (M), T	— — —	— —	— —	5 000	7 500	78.7	38.7	55	85	0.6
	90	20	1.1	0.6	43 000	31 500	14.5	12 000	16 000	19.4	57	83	1	0.528				DB DF DT	69 500	63 500	9 500	13 000	38.7	1.3	—	85	0.6
	110	27	2	1	74 000	52 000	—	4 500	6 000	36.6	60	100	2	1.10				DB DF DT	121 000	104 000	3 600	4 800	73.2	19.2	56	104	1
	110	27	2	1	78 000	50 500	—	5 600	8 000	47.1	60	100	2	1.07	*7310 BEA	T85 (M)	MR, T7 W, T, TYN (M), T	— — —	— —	— —	4 500	6 700	94.1	40.1	56	104	1
	110	27	2	1	78 000	50 500	—	4 000	5 600	47.1	60	100	2	1.11				DB DF DT	127 000	101 000	3 200	4 500	94.1	40.1	56	104	1
	80	13	1	0.6	18 100	16 800	—	10 000	14 000	22.2	61	74	1	0.184	7911 A5	(M)	T, TYN (M), T, TYN	DB DF DT	29 300	33 500	8 000	11 000	44.5	18.5	—	75	0.6
	80	13	1	0.6	19 100	17 700	16.3	12 000	16 000	15.5	61	74	1	0.182				DB DF DT	31 000	35 500	9 500	13 000	31.1	5.1	—	75	0.6
	90	18	1.1	0.6	32 500	27 700	—	6 300	8 500	29.9	62	83	1	0.391				DB DF DT	52 500	55 500	5 000	6 700	59.9	23.9	60	85	0.6

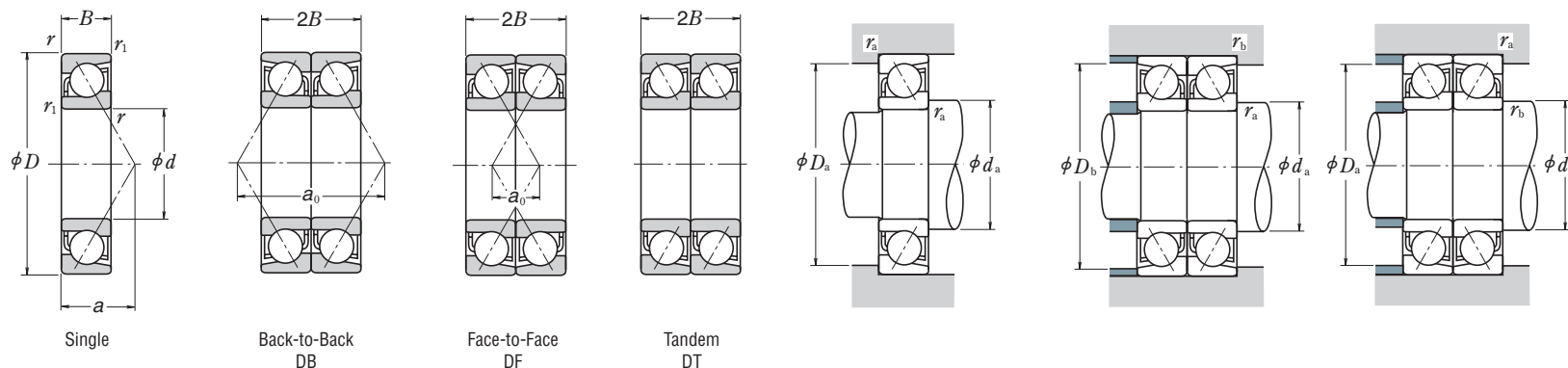
- Notes** ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.
⁽²⁾ Suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively.
⁽³⁾ Use the values of d_a (min) and r_a (max) for bearings with “—” in the d_b column.

- Note** ⁽⁴⁾ Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are NSKHPS 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 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
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)		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 a_0	DF	d_b ⁽³⁾ min.	D_b max.	r_b ⁽³⁾ max.
55	90	18	1.1	0.6	34 000	28 600	15.5	11 000	15 000	18.7	62	83	1	0.430	7011 C	(M)	W, T, TYN	DB	55 500	57 500	9 000	12 000	37.4	1.4	—	85	0.6
	100	21	1.5	1	51 000	39 500	—	5 600	8 000	32.9	64	91	1.5	0.613	7211 A	W	(M), T, TYN	DB	83 000	79 000	4 500	6 300	65.7	23.7	61	94	1
	100	21	1.5	1	46 500	36 000	—	4 000	5 600	43.0	64	91	1.5	0.627	7211 B	W	(M), T	DB	75 000	72 000	3 400	4 500	86.0	44.0	61	94	1
	100	21	1.5	1	51 500	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
	100	21	1.5	1	53 000	40 000	14.5	10 000	14 000	20.9	64	91	1.5	0.688	7211 C	(M)	W, T, TYN	DB	86 000	80 000	8 500	12 000	41.7	0.3	—	94	1
	120	29	2	1	86 000	61 500	—	4 000	5 600	39.8	65	110	2	1.41	7311 A	W	(M), T	DB	139 000	123 000	3 200	4 300	79.5	21.5	61	114	1
	120	29	2	1	89 000	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	89 000	58 500	—	3 600	5 000	51.2	65	110	2	1.42	7311 BEA	W	MR, T7	DB	145 000	117 000	3 000	4 000	102.4	44.4	61	114	1
	120	29	2	1	89 000	58 500	—	3 600	5 000	51.2	65	110	2	1.42	7311 BEA	W	MR, T7	DB	145 000	117 000	3 000	4 000	102.4	44.4	61	114	1
	120	29	2	1	89 000	58 500	—	3 600	5 000	51.2	65	110	2	1.42	7311 BEA	W	MR, T7	DB	145 000	117 000	3 000	4 000	102.4	44.4	61	114	1
60	85	13	1	0.6	18 300	17 700	—	9 500	13 000	23.4	66	79	1	0.197	7912 A5	(M)	T, TYN	DB	29 800	35 500	7 500	10 000	46.8	20.8	—	80	0.6
	85	13	1	0.6	19 400	18 700	16.5	11 000	15 000	16.2	66	79	1	0.194	7912 C	(M)	T, TYN	DB	31 500	37 500	9 000	12 000	32.4	6.4	—	80	0.6
	95	18	1.1	0.6	33 000	29 500	—	5 600	8 000	31.4	67	88	1	0.417	7012 A	W	(M), T, TYN	DB	53 500	59 000	4 500	6 300	62.7	26.7	65	90	0.6
	95	18	1.1	0.6	35 000	30 500	15.7	10 000	14 000	19.4	67	88	1	0.460	7012 C	(M)	W, T, TYN	DB	57 000	61 500	8 500	12 000	38.8	2.8	—	90	0.6
	110	22	1.5	1	62 000	48 500	—	5 300	7 100	35.5	69	101	1.5	0.798	7212 A	W	(M), T, TYN	DB	100 000	97 500	4 300	6 000	71.1	27.1	66	104	1
	110	22	1.5	1	56 000	44 500	—	3 800	5 300	46.7	69	101	1.5	0.815	7212 B	W	(M), T	DB	91 000	89 000	3 000	4 000	93.3	49.3	66	104	1
	110	22	1.5	1	61 500	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
	110	22	1.5	1	64 000	49 000	14.4	9 500	13 000	22.4	69	101	1.5	0.889	7212 C	(M)	W, T, TYN	DB	104 000	98 500	7 500	11 000	44.8	0.8	—	104	1
	130	31	2.1	1.1	98 000	71 500	—	3 800	5 000	42.9	72	118	2	1.74	7312 A	W	(M), T	DB	159 000	143 000	3 000	4 000	85.9	23.9	67	123	1
	130	31	2.1	1.1	102 000	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	102 000	68 500	—	3 400	4 500	55.4	72	118	2	1.77	7312 BEA	W	MR, T7	DB	166 000	137 000	2 600	3 800	110.7	48.7	67	123	1
65	90	13	1	0.6	19 100	19 400	—	9 000	12 000	24.6	71	84	1	0.211	7913 A5	(M)	T, TYN	DB	31 000	39 000	7 100	9 500	49.1	23.1	—	85	0.6
	90	13	1	0.6	20 200	20 500	16.7	10 000	14 000	16.9	71	84	1	0.208	7913 C	(M)	T, TYN	DB	33 000	41 000	8 500	12 000	33.8	7.8	—	85	0.6
	100	18	1.1	0.6	35 000	33 000	—	5 300	7 500	32.8	72	93	1	0.455	7013 A	W	(M), T, TYN	DB	56 500	65 500	4 300	6 000	65.6	29.6	70	95	0.6
	100	18	1.1	0.6	37 000	34 500	15.9	10 000	13 000	20.0	72	93	1	0.493	7013 C	(M)	W, T, TYN	DB	60 500	68 500	8 000	11 000	40.1	4.1	—	95	0.6
	120	23	1.5	1	70 500	58 000	—	4 800	6 700	38.2	74	111	1.5	1.03	7213 A	W	(M), T, TYN	DB	114 000	116 000	3 800	5 300	76.4	30.4	71	114	1
	120	23	1.5	1	63 500	52 500	—	3 400	4 800	50.3	74	111	1.5	1.05	7213 B	W	(M), T	DB	103 000	105 000	2 800	3 800	100.6	54.6	71	114	1
	120	23	1.5	1	70 000	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
	120	23	1.5	1	73 000	58 500	14.6	9 000	12 000	23.9	74	111	1.5	1.14	7213 C	(M)	W, T, TYN	DB	119 000	117 000	7 100	9 500	47.8	1.8	—	114	1
	140	33	2.1	1.1	111 000	82 000	—	3 600	4 800	46.1	77	128	2	2.12	7313 A	W	(M), T	DB	180 000	164 000	2 800	3 800	92.2	26.2	72	133	1
	140	33	2.1	1.1	114 000	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	114 000	77 000	—	3 200	4 300	59.5	77	128	2	2.17	7313 BEA	W	MR, T7	DB	184 000	154 000	2 400	3 400	119.0	53.0	72	133	1

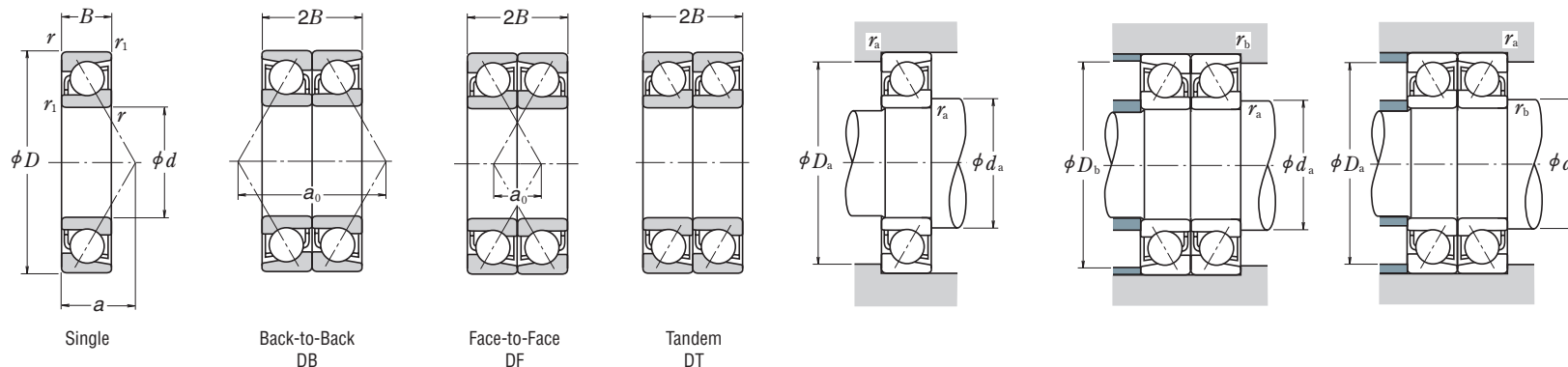
- Notes** ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.
⁽²⁾ Suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively.
⁽³⁾ Use the values of d_a (min) and r_a (max) for bearings with “—” in the d_b column.

- Note** ⁽⁴⁾ Cage designation (M) is usually omitted from the bearing designation.
Remark Bearings with an asterisk (*) are NSKHPS 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 70 – 80 mm

Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$i f_a F_a^*$ 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
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) (N)		Limiting Speeds (1) (Matched) (min ⁻¹)		Load Center Spacings (mm) <i>a</i> ₀		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	Oil	DB	DF	<i>d</i> _b ⁽³⁾ min.	<i>D</i> _{b max.}	<i>r</i> _b ⁽³⁾ max.
70	100	16	1	0.6	26 500	26 300	—	8 000	11 000	27.8	76	94	1	0.341	7914 A5	(M)	T, TYN	DB DF DT	43 000	52 500	6 300	9 000	55.6	23.6	—	95	0.6
	100	16	1	0.6	28 100	27 800	16.4	9 500	13 000	19.4	76	94	1	0.338	7914 C	(M)	T, TYN, T85	DB DF DT	45 500	55 500	7 500	11 000	38.8	6.8	—	95	0.6
	110	20	1.1	0.6	44 000	41 500	—	5 000	6 700	36.0	77	103	1	0.625	7014 A	W	(M), T, TYN	DB DF DT	71 500	82 500	4 000	5 600	72.0	32.0	75	105	0.6
	110	20	1.1	0.6	47 000	43 000	15.7	9 000	12 000	22.1	77	103	1	0.698	7014 C	(M)	W, T, TYN	DB DF DT	76 000	86 000	7 100	10 000	44.1	4.1	—	105	0.6
	125	24	1.5	1	76 500	63 500	—	4 500	6 300	40.1	79	116	1.5	1.11	7214 A	W	(M), T, TYN	DB DF DT	124 000	127 000	3 600	5 000	80.3	32.3	76	119	1
	125	24	1.5	1	69 000	58 000	—	3 200	4 500	52.9	79	116	1.5	1.14	7214 B	W	(M), T	DB DF DT	112 000	116 000	2 600	3 600	105.8	57.8	76	119	1
	125	24	1.5	1	75 500	58 500	—	4 500	6 700	52.9	79	116	1.5	1.08	*7214 BEA	T85	MR, T7	— — —	—	—	3 600	5 300	105.8	57.8	76	119	1
	125	24	1.5	1	79 500	64 500	14.6	8 500	11 000	25.1	79	116	1.5	1.24	7214 C	(M)	W, T, TYN, T7	DB DF DT	129 000	129 000	6 700	9 000	50.1	2.1	—	119	1
	150	35	2.1	1.1	125 000	93 500	—	3 200	4 300	49.3	82	138	2	2.60	7314 A	W	(M), T	DB DF DT	203 000	187 000	2 600	3 400	98.5	28.5	77	143	1
	150	35	2.1	1.1	124 000	87 500	—	4 000	6 000	63.7	82	138	2	2.53	*7314 BEA	T85	MR, T7	— — —	—	—	3 200	4 800	127.3	57.3	77	143	1
	150	35	2.1	1.1	124 000	87 500	—	2 800	4 000	63.6	82	138	2	2.62	7314 BEA	W	MR, T7	DB DF DT	201 000	175 000	2 400	3 200	127.3	57.3	77	143	1
	75	105	16	1	0.6	26 900	27 700	—	7 500	10 000	29.0	81	99	1	0.355	7915 A5	(M)	TYN	DB DF DT	44 000	55 500	6 000	8 500	58.0	26.0	—	100
105		16	1	0.6	28 600	29 300	16.6	9 000	12 000	20.1	81	99	1	0.357	7915 C	(M)	T, TYN	DB DF DT	46 500	58 500	7 100	10 000	40.1	8.1	—	100	0.6
115		20	1.1	0.6	45 000	43 500	—	4 800	6 300	37.4	82	108	1	0.661	7015 A	W	(M), T, TYN	DB DF DT	73 000	87 500	3 800	5 300	74.8	34.8	80	110	0.6
115		20	1.1	0.6	48 000	45 500	15.9	8 500	12 000	22.7	82	108	1	0.748	7015 C	(M)	W, T, TYN	DB DF DT	78 000	91 500	6 700	9 500	45.4	5.4	—	110	0.6
130		25	1.5	1	76 000	64 500	—	4 300	6 000	42.1	84	121	1.5	1.19	7215 A	W	(M), T, TYN	DB DF DT	123 000	129 000	3 600	4 800	84.2	34.2	81	124	1
130		25	1.5	1	68 500	58 500	—	3 200	4 300	55.5	84	121	1.5	1.22	7215 B	W	(M), T	DB DF DT	112 000	117 000	2 400	3 400	111.0	61.0	81	124	1
130		25	1.5	1	78 500	63 500	—	4 300	6 300	55.5	84	121	1.5	1.18	*7215 BEA	T85	MR	— — —	—	—	3 600	5 000	111.0	61.0	81	124	1
130		25	1.5	1	83 000	70 000	14.8	8 000	11 000	26.2	84	121	1.5	1.36	7215 C	(M)	W, T, TYN, T7	DB DF DT	134 000	140 000	6 300	9 000	52.4	2.4	—	124	1
160		37	2.1	1.1	136 000	106 000	—	3 000	4 000	52.4	87	148	2	3.13	7315 A	W	(M), T	DB DF DT	221 000	212 000	2 400	3 200	104.8	30.8	82	153	1
160		37	2.1	1.1	134 000	98 500	—	3 800	5 600	67.8	87	148	2	3.03	*7315 BEA	T85	MR	— — —	—	—	3 000	4 500	135.6	61.6	82	153	1
160		37	2.1	1.1	134 000	98 500	—	2 800	3 800	67.8	87	148	2	3.13	7315 BEA	W	MR, T7	DB DF DT	217 000	197 000	2 200	3 000	135.6	61.6	82	153	1
80		110	16	1	0.6	27 300	29 000	—	7 100	10 000	30.2	86	104	1	0.380	7916 A5	(M)	T, TYN	DB DF DT	44 500	58 000	5 600	8 000	60.3	28.3	—	105
	110	16	1	0.6	29 000	30 500	16.7	8 500	12 000	20.7	86	104	1	0.376	7916 C	(M)	T, TYN	DB DF DT	47 000	61 500	6 700	9 500	41.5	9.5	—	105	0.6
	125	22	1.1	0.6	55 000	53 000	—	4 300	6 000	40.6	87	118	1	0.880	7016 A	W	(M), T, TYN	DB DF DT	89 500	106 000	3 600	4 800	81.2	37.2	85	120	0.6
	125	22	1.1	0.6	58 500	55 500	15.7	8 000	11 000	24.7	87	118	1	0.966	7016 C	(M)	W, T, TYN	DB DF DT	95 500	111 000	6 300	9 000	49.4	5.4	—	120	0.6
	140	26	2	1	89 000	76 000	—	4 000	5 600	44.8	90	130	2	1.46	7216 A	W	(M), T, TYN	DB DF DT	145 000	152 000	3 200	4 500	89.5	37.5	86	134	1
	140	26	2	1	80 500	69 500	—	2 800	4 000	59.1	90	130	2	1.49	7216 B	W	(M), T	DB DF DT	131 000	139 000	2 400	3 200	118.3	66.3	86	134	1
	140	26	2	1	87 500	70 000	—	4 000	6 000	59.2	90	130	2	1.42	*7216 BEA	T85	MR, T7	— — —	—	—	3 200	4 800	118.3	66.3	86	134	1
	140	26	2	1	93 000	77 500	14.7	7 500	10 000	27.7	90	130	2	1.63	7216 C	(M)	W, T, TYN	DB DF DT	151 000	155 000	6 000	8 000	55.5	3.5	—	134	1
	170	39	2.1	1.1	147 000	119 000	—	2 800	3 800	55.6	92	158	2	3.71	7316 A	W	(M), T	DB DF DT	239 000	238 000	2 200	3 000	111.2	33.2	87	163	1
	170	39	2.1	1.1	144 000	110 000	—	3 600	5 300	71.9	92	158	2	3.59	*7316 BEA	T85	MR, T7	— — —	—	—	2 800	4 300	143.9	65.9	87	163	1
	170	39	2.1	1.1	144 000	110 000	—	2 600	3 400	71.9	92	158	2	3.84	7316 BEA	W	MR, T7	DB DF DT	235 000	220 000	2 000	2 800	143.9	65.9	87	163	1

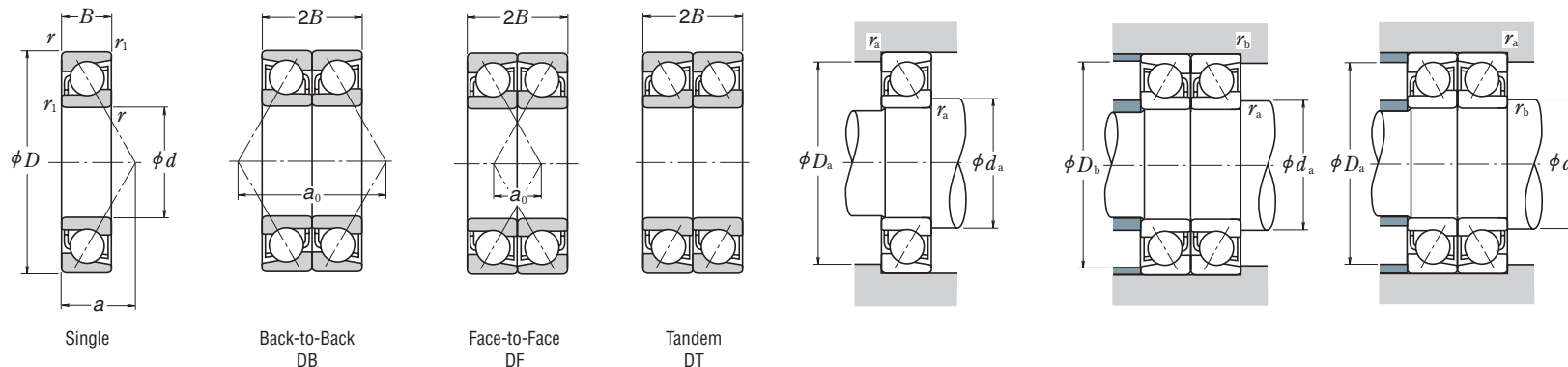
Notes ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.
⁽²⁾ Suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively.
⁽³⁾ Use the values of d_a (min) and r_a (max) for bearings with “—” in the d_b column.

Note ⁽⁴⁾ Cage designation (M) is usually omitted from the bearing designation.
 Remark Bearings with an asterisk (*) are NSK HPS 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 85 – 100 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

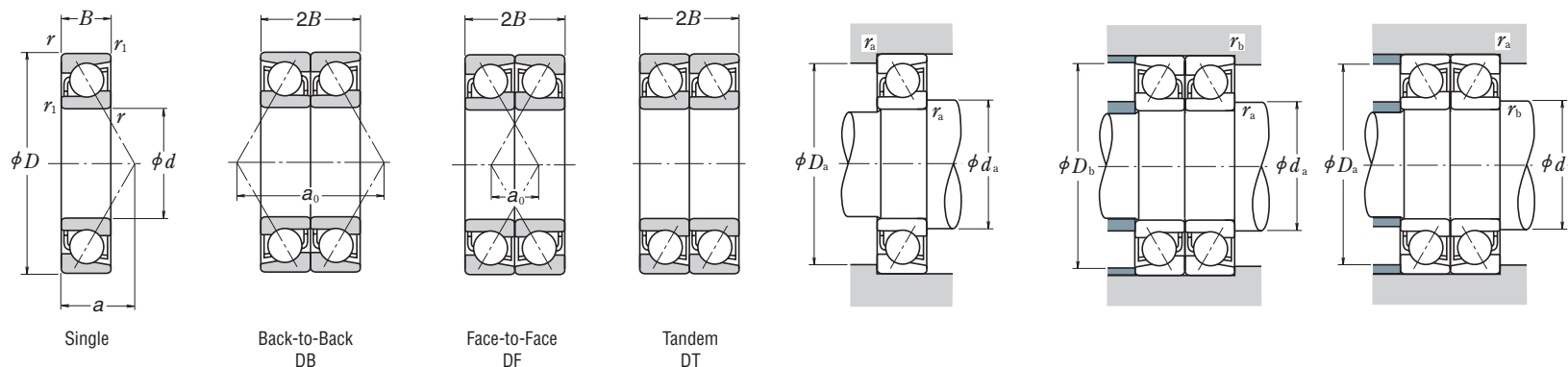
Boundary Dimensions (mm)					Basic Load Ratings (Single)		Factor	Limiting Speeds (1)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2)				Basic Load Ratings (Matched)		Limiting Speeds (1) (Matched)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)		
d	D	B	r min.	r1 min.	Cr (N)	C0r		Grease	Oil		da min.	Da max.	ra max.		Single	Standard	Option	Arrangement	Cr (N)	C0r	Grease	Oil	DB	DF	da(3) min.	Db max.	rb(3) max.
85	120	18	1.1	0.6	36 500	38 500	—	6 700	9 000	32.9	92	113	1	0.541	7917 A5 (M) T, TYN	DB DF DT	59 500	77 000	5 300	7 500	65.8	29.8	—	115	0.6		
	120	18	1.1	0.6	39 000	40 500	16.5	8 000	11 000	22.7	92	113	1	0.534	7917 C (M) T, TYN	DB DF DT	63 000	81 500	6 300	9 000	45.5	9.5	—	115	0.6		
	130	22	1.1	0.6	56 500	56 000	—	4 300	5 600	42.0	92	123	1	0.913	7017 A (M) (M), T, TYN	DB DF DT	91 500	112 000	3 400	4 500	84.1	40.1	90	125	0.6		
	130	22	1.1	0.6	60 000	58 500	15.9	7 500	10 000	25.4	92	123	1	1.01	7017 C (M) W, T, TYN	DB DF DT	98 000	117 000	6 000	8 500	50.8	6.8	—	125	0.6		
	150	28	2	1	103 000	89 000	—	3 800	5 300	47.9	95	140	2	1.83	7217 A (M) (M), T, TYN	DB DF DT	167 000	178 000	3 000	4 300	95.8	39.8	91	144	1		
	150	28	2	1	93 000	81 000	—	2 800	3 800	63.3	95	140	2	1.87	7217 B (M) (M), T	DB DF DT	151 000	162 000	2 200	3 000	126.6	70.6	91	144	1		
	150	28	2	1	96 000	81 500	—	3 800	5 600	63.3	95	140	2	1.75	7217 BEA T85	—	—	3 200	4 500	126.6	70.6	91	144	1			
	150	28	2	1	107 000	90 500	14.7	6 700	9 500	29.7	95	140	2	2.04	7217 C (M) W, T, TYN	DB DF DT	174 000	181 000	5 600	7 500	59.5	3.5	—	144	1		
	180	41	3	1.1	159 000	133 000	—	2 600	3 600	58.8	99	166	2.5	4.33	7317 A (M) (M), T	DB DF DT	258 000	265 000	2 200	2 800	117.5	35.5	92	173	1		
	180	41	3	1.1	146 000	122 000	—	2 400	3 200	76.1	99	166	2.5	4.42	7317 B (M) (M), T	DB DF DT	236 000	244 000	1 900	2 600	152.2	70.2	92	173	1		
	180	41	3	1.1	157 000	133 000	—	3 400	5 000	76.1	99	166	2.5	4.34	7317 BEA T85 MR, T7	—	—	2 800	4 000	152.2	70.2	92	173	1			
	125	18	1.1	0.6	39 500	43 500	—	6 300	8 500	34.1	97	118	1	0.560	7918 A5 (M) T, TYN	DB DF DT	64 000	87 000	5 000	7 100	68.1	32.1	—	120	0.6		
	125	18	1.1	0.6	41 500	46 000	16.6	7 500	10 000	23.4	97	118	1	0.563	7918 C (M) T, TYN	DB DF DT	67 500	92 000	6 000	8 500	46.8	10.8	—	120	0.6		
	140	24	1.5	1	67 500	66 500	—	3 800	5 300	45.2	99	131	1.5	1.19	7018 A (M) (M), T, TYN	DB DF DT	109 000	133 000	3 200	4 300	90.4	42.4	96	134	1		
	140	24	1.5	1	71 500	69 000	15.7	7 100	9 500	27.4	99	131	1.5	1.34	7018 C (M) W, T, TYN	DB DF DT	116 000	138 000	5 600	8 000	54.8	6.8	—	134	1		
	160	30	2	1	118 000	103 000	—	3 600	4 800	51.1	100	150	2	2.25	7218 A (M) (M), T, TYN	DB DF DT	191 000	206 000	2 800	4 000	102.2	42.2	96	154	1		
	160	30	2	1	107 000	94 000	—	2 600	3 400	67.4	100	150	2	2.29	7218 B (M) (M), T	DB DF DT	173 000	188 000	2 000	2 800	134.9	74.9	96	154	1		
160	30	2	1	109 000	93 500	—	3 600	5 300	67.4	100	150	2	2.19	7218 BEA T85 MR	—	—	3 000	4 300	134.9	74.9	96	154	1				
160	30	2	1	123 000	105 000	14.6	6 300	9 000	31.7	100	150	2	2.51	7218 C (M) W, T, TYN	DB DF DT	199 000	209 000	5 300	7 100	63.5	3.5	—	154	1			
190	43	3	1.1	171 000	147 000	—	2 600	3 400	61.9	104	176	2.5	5.06	7318 A (M) (M), T	DB DF DT	277 000	294 000	2 000	2 800	123.8	37.8	97	183	1			
190	43	3	1.1	156 000	135 000	—	2 200	3 000	80.2	104	176	2.5	5.17	7318 B (M) (M), T	DB DF DT	254 000	270 000	1 800	2 400	160.5	74.5	97	183	1			
190	43	3	1.1	169 000	146 000	—	3 200	4 500	80.2	104	176	2.5	4.97	7318 BEA T85 MR	—	—	2 600	3 600	160.5	74.5	97	183	1				
95	130	18	1.1	0.6	40 000	45 500	—	6 000	8 500	35.2	102	123	1	0.597	7919 A5 (M) T, TYN	DB DF DT	64 500	91 000	4 800	6 700	70.5	34.5	—	125	0.6		
	130	18	1.1	0.6	42 500	48 000	16.7	7 100	10 000	24.1	102	123	1	0.591	7919 C (M) T, TYN	DB DF DT	68 500	96 000	5 600	8 000	48.1	12.1	—	125	0.6		
	145	24	1.5	1	67 000	67 000	—	4 500	6 300	46.6	104	136	1.5	1.43	7019 A (M) T, TYN	DB DF DT	109 000	134 000	3 800	5 000	93.3	45.3	—	139	1		
	145	24	1.5	1	73 500	73 000	15.9	6 700	9 000	28.1	104	136	1.5	1.42	7019 C (M) T, TYN	DB DF DT	119 000	146 000	5 300	7 500	56.1	8.1	—	139	1		
	170	32	2.1	1.1	128 000	111 000	—	3 400	4 500	54.2	107	158	2	2.68	7219 A (M) (M), T, TYN	DB DF DT	208 000	221 000	2 600	3 600	108.5	44.5	102	163	1		
	170	32	2.1	1.1	116 000	101 000	—	2 400	3 200	71.6	107	158	2	2.74	7219 B (M) (M), T	DB DF DT	188 000	202 000	1 900	2 600	143.2	79.2	102	163	1		
	170	32	2.1	1.1	123 000	107 000	—	3 400	5 000	71.6	107	158	2	2.67	7219 BEA T85 MR, T7	—	—	2 800	4 000	143.2	79.2	102	163	1			
	170	32	2.1	1.1	133 000	112 000	14.6	6 000	8 500	33.7	107	158	2	3.05	7219 C (M) W, T, TYN	DB DF DT	216 000	224 000	4 800	6 700	67.5	3.5	—	163	1		
	200	45	3	1.1	183 000	162 000	—	2 400	3 200	65.1	109	186	2.5	5.83	7319 A (M) (M), T	DB DF DT	297 000	325 000	1 900	2 600	130.2	40.2	102	193	1		
	200	45	3	1.1	167 000	149 000	—	2 200	3 000	84.3	109	186	2.5	5.98	7319 B (M) (M), T	DB DF DT	272 000	298 000	1 700	2 400	168.7	78.7	102	193	1		
	200	45	3	1.1	180 000	160 000	—	3 000	4 500	84.3	109	186	2.5	5.82	7319 BEA T85 MR	—	—	2 400	3 600	168.7	78.7	102	193	1			
	100	140	20	1.1	0.6	47 500	51 500	—	5 600	8 000	38.0	107	133	1	0.804	7920 A5 (M) T, TYN	DB DF DT	77 000	103 000	4 500	6 300	76.0	36.0	—	135	0.6	
140		20	1.1	0.6	50 000	54 000	16.5	6 700	9 000	26.1	107	133	1	0.794	7920 C (M) T, TYN	DB DF DT	81 500	108 000	5 300	7 500	52.2	12.2	—	135	0.6		
150		24	1.5	1	68 500	70 500	—	4 500	6 000	48.1	109	141	1.5	1.48	7020 A (M) T, TYN	DB DF DT	111 000	141 000	3 600	5 000	96.2	48.2	—	144	1		

Notes (1) For applications operating near the limiting speed, refer to Page C077.
 (2) Suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° respectively.
 (3) Use the values of d_a (min) and $r_a</$

■ ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

Bore Diameter 100 – 120 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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 $P_0 = X_0 F_r + Y_0 F_a$

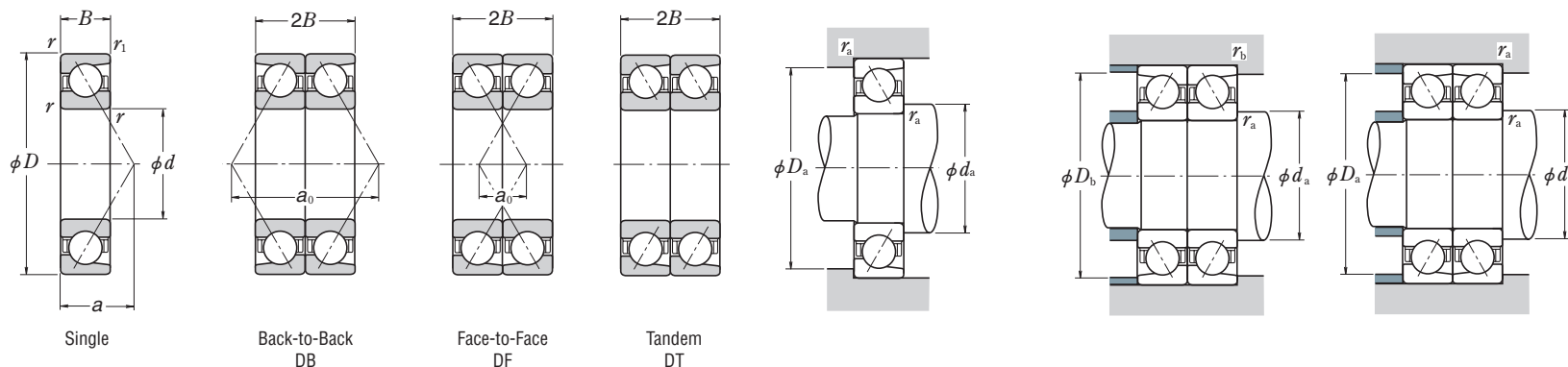
Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single)		Factor	Limiting Speeds ⁽¹⁾		Eff. Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations ⁽²⁾				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_r</i> ^(N)	<i>C</i> _{0<i>r</i>}		Grease	Oil		<i>a</i>	<i>d</i> _{a min.}	<i>D</i> _{a max.}		<i>r</i> _{a max.}	Single	Standard	Option	Arrangement	<i>C_r</i> ^(N)	<i>C</i> _{0<i>r</i>}	Grease	Oil	DB	<i>a</i> ₀	DF	<i>d</i> _b ⁽³⁾ min.	<i>D</i> _{b max.}	<i>r</i> _b ⁽³⁾ max.
100	150	24	1.5	1	75 500	77 000	16.0	6 300	9 000	28.7	109	141	1.5	1.46	7020 C	(M)	T, TYN	DB	DF	DT	122 000	154 000	5 300	7 100	57.5	9.5	—	144	1
	180	34	2.1	1.1	144 000	126 000	—	3 200	4 300	57.4	112	168	2	3.22	7220 A	W	(M), T, TYN	DB	DF	DT	233 000	251 000	2 600	3 400	114.8	46.8	107	173	1
	180	34	2.1	1.1	130 000	114 000	—	2 200	3 000	75.7	112	168	2	3.28	7220 B	W	(M), T	DB	DF	DT	212 000	229 000	1 800	2 400	151.5	83.5	107	173	1
	180	34	2.1	1.1	136 000	122 000	—	3 200	4 500	75.7	112	168	2	3.27	7220 BEA	T85	MR	—	—	—	—	—	2 600	3 600	151.5	83.5	107	173	1
	180	34	2.1	1.1	149 000	127 000	14.5	5 600	8 000	35.7	112	168	2	3.65	7220 C	(M)	W, T, TYN	DB	DF	DT	242 000	254 000	4 500	6 300	71.5	3.5	—	173	1
	215	47	3	1.1	207 000	193 000	—	2 200	3 000	69.0	114	201	2.5	7.29	7320 A	W	(M), T	DB	DF	DT	335 000	385 000	1 800	2 400	137.9	43.9	107	208	1
	215	47	3	1.1	190 000	178 000	—	2 000	2 800	89.6	114	201	2.5	7.43	7320 B	W	(M), T	DB	DF	DT	310 000	355 000	1 600	2 200	179.2	85.2	107	208	1
	215	47	3	1.1	202 000	187 000	—	2 800	4 000	89.6	114	201	2.5	7.14	7320 BEA	T85	MR, T7	—	—	—	—	—	2 200	3 200	179.2	85.2	107	208	1
	145	20	1.1	0.6	48 000	54 000	—	5 600	7 500	39.2	112	138	1	0.820	7921 A5	(M)	T, TYN	DB	DF	DT	78 500	108 000	4 300	6 000	78.3	38.3	—	140	0.6
	145	20	1.1	0.6	51 000	57 000	16.6	6 300	9 000	26.7	112	138	1	0.826	7921 C	(M)	T, TYN	DB	DF	DT	83 000	114 000	5 300	7 100	53.5	13.5	—	140	0.6
105	160	26	2	1	80 000	81 500	—	4 300	5 600	51.2	115	150	2	1.84	7021 A	(M)	T, TYN	DB	DF	DT	130 000	163 000	3 400	4 500	102.5	50.5	—	154	1
	160	26	2	1	88 000	89 500	15.9	6 000	8 500	30.7	115	150	2	1.82	7021 C	(M)	T, TYN	DB	DF	DT	143 000	179 000	4 800	6 700	61.5	9.5	—	154	1
	190	36	2.1	1.1	157 000	142 000	—	3 000	4 000	60.6	117	178	2	3.84	7221 A	W	(M), T	DB	DF	DT	254 000	283 000	2 400	3 400	121.2	49.2	112	183	1
	190	36	2.1	1.1	142 000	129 000	—	2 200	3 000	79.9	117	178	2	3.92	7221 B	W	(M), T	DB	DF	DT	231 000	258 000	1 700	2 400	159.8	87.8	112	183	1
	190	36	2.1	1.1	148 000	133 000	—	3 000	4 500	79.9	117	178	2	3.69	7221 BEA	T85	—	—	—	—	—	2 400	3 600	159.8	87.8	112	183	1	
	190	36	2.1	1.1	162 000	143 000	14.5	5 300	7 500	37.7	117	178	2	4.33	7221 C	(M)	W, T, TYN	DB	DF	DT	264 000	286 000	4 300	6 000	75.5	3.5	—	183	1
	225	49	3	1.1	208 000	193 000	—	2 600	3 600	72.1	119	211	2.5	9.34	7321 A	(M)	T	DB	DF	DT	335 000	385 000	2 200	2 800	144.3	46.3	—	218	1
	225	49	3	1.1	191 000	177 000	—	2 400	3 200	93.7	119	211	2.5	9.43	7321 B	(M)	T	DB	DF	DT	310 000	355 000	1 900	2 600	187.4	89.4	—	218	1
	225	49	3	1.1	213 000	203 000	—	2 600	4 000	93.7	119	211	2.5	8.12	7321 BEA	T85	T7	—	—	—	—	—	2 200	3 200	187.4	89.4	—	218	1
	150	20	1.1	0.6	49 000	56 000	—	5 300	7 100	40.3	117	143	1	0.877	7922 A5	(M)	T, TYN	DB	DF	DT	79 500	112 000	4 300	5 600	80.6	40.6	—	145	0.6
110	150	20	1.1	0.6	52 000	59 500	16.7	6 300	8 500	27.4	117	143	1	0.867	7922 C	(M)	T, TYN	DB	DF	DT	84 500	119 000	5 000	6 700	54.8	14.8	—	145	0.6
	170	28	2	1	96 500	95 500	—	4 000	5 300	54.4	120	160	2	2.28	7022 A	(M)	T, TYN	DB	DF	DT	157 000	191 000	3 200	4 300	108.8	52.8	—	164	1
	170	28	2	1	106 000	104 000	15.6	5 600	8 000	32.7	120	160	2	2.26	7022 C	(M)	T, TYN	DB	DF	DT	172 000	208 000	4 500	6 300	65.5	9.5	—	164	1
	200	38	2.1	1.1	170 000	158 000	—	2 800	3 800	63.7	122	188	2	4.49	7222 A	W	(M), T, TYN	DB	DF	DT	276 000	315 000	2 200	3 200	127.5	51.5	117	193	1
	200	38	2.1	1.1	154 000	144 000	—	2 000	2 800	84.0	122	188	2	4.58	7222 B	W	(M), T	DB	DF	DT	250 000	289 000	1 600	2 200	168.1	92.1	117	193	1
	200	38	2.1	1.1	154 000	144 000	—	2 800	4 300	84.0	122	188	2	4.48	7222 BEA	T85	MR	—	—	—	—	—	2 400	3 400	168.1	92.1	117	193	1
	200	38	2.1	1.1	176 000	160 000	14.5	5 000	7 100	39.8	122	188	2	5.10	7222 C	(M)	W, T, TYN	DB	DF	DT	286 000	320 000	4 000	5 600	79.5	3.5	—	193	1
	240	50	3	1.1	220 000	215 000	—	2 600	3 400	75.5	124	226	2.5	11.1	7322 A	(M)	W, T	DB	DF	DT	360 000	430 000	2 000	2 600	151.0	51.0	—	233	1
	240	50	3	1.1	201 000	197 000	—	2 200	3 000	98.4	124	226	2.5	11.2	7322 B	(M)	W, T	DB	DF	DT	325 000	395 000	1 800	2 400	196.8	96.8	—	233	1
	240	50	3	1.1	226 000	226 000	—	2 600	3 800	98.4	124	226	2.5	9.91	7322 BEA	T85	MR	—	—	—	—	—	2 000	3 000	196.8	96.8	—	233	1
120	165	22	1.1	0.6	67 500	77 000	—	4 800	6 300	44.2	127	158	1	1.15	7924 A5	(M)	T, TYN	DB	DF	DT	110 000	154 000	3 800	5 300	88.5	44.5	—	160	0.6
	165	22	1.1	0.6	72 000	81 000	16.5	5 600	7 500	30.1	127	158	1	1.15	7924 C	(M)	T, TYN	DB	DF	DT	117 000	162 000	4 500	6 300	60.2	16.2	—	160	0.6
	180	28	2	1	102 000	107 000	—	3 600	5 000	57.3	130	170	2	2.45	7024 A	(M)	T, TYN	DB	DF	DT	166 000	213 000	3 000	4 000	114.6	58.6	—	174	1
	215	40	2.1	1.1	183 000	177 000	—	3 200	4 500	68.3	132	203	2	6.22	7224 A	(M)	T	DB	DF	DT	297 000	355 000	2 600	3 600	136.7	56.7	—	208	1
	215	40	2.1	1.1	165 000	162 000	—	2 400	3 200	90.3	132	203	2	6.26	7224 B	(M)	T	DB	DF	DT	269 000	325 000	1 900	2 600	180.5	100.5	—	208	1
	215	40	2.1	1.1	179 000	177 000	—	2 600	3 800	90.3	132	203	2	5.37	7224 BEA	T85	MR, T7	—	—	—	—	—	2 200	3 000	180.5	100.5	—	208	1
	260	55	3	1.1	246 000	252 000	—	2 200	3 000	82.3	134	246	2.5	14.5	7324 A	(M)	T	DB	DF	DT	400 000	505 000	1 800	2 400	164.7	54.7	—	253	1
	260	55	3	1.1	225 000	231 000	—	2 000	2 800	107.2	134	246	2.5	14.4	7324 B	(M)	T	DB	DF	DT	365 000	460 000	1 600	2 200	214.4	104.4	—	253	1
	260	55	3	1.1	238 000	250 000	—	2 200	3 400	107.2	134	246	2.5	12.8	7324 BEA	T85	MR	—	—	—	—	—	1 900	2 800	214.4	104.4	—	253	1

■ ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

Bore Diameter 130 – 170 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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 $P_0 = X_0 F_r + Y_0 F_a$

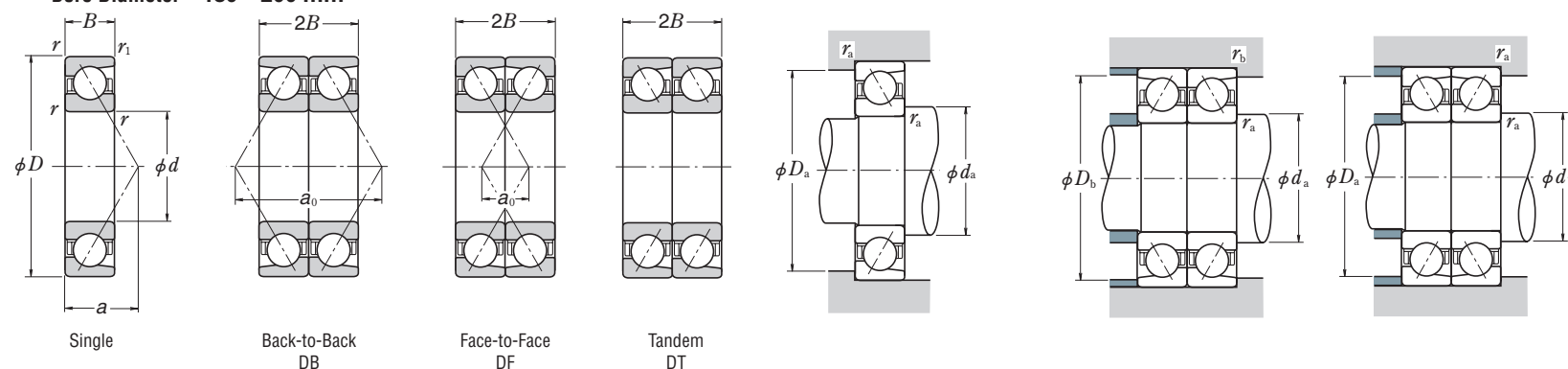
Contact Angle	Single, DT		DB or DF		Single or DT mounting When $F_r > 0.5 F_r + Y_0 F_a$ use $P_0 = F_r$
	X_0	Y_0	X_0	Y_0	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
30°	0.5	0.33	1	0.66	
40°	0.5	0.26	1	0.52	

Boundary Dimensions (mm)					Basic Load Ratings (Single)		Factor	Limiting Speeds (1)		Eff.Load Center (mm)	Abutment and Fillet Dimensions (mm)			Mass (kg)	Bearing Designations (2)				Basic Load Ratings (Matched)		Limiting Speeds (1) (Matched)		Load Center Spacings (mm)		Abutment and Fillet Dimensions (mm)				
d	D	B	r min.	r1 min.	Cr	C0r		Grease	Oil		da min.	Da max.	ra max.		approx.	Single	Standard	Option	Arrangement	Cr	C0r	Grease	Oil	DB	DF	da min.	Db max.	rb max.	
130	180	24	1.5	1	74 000	86 000	—	4 300	6 000	48.1	139	171	1.5	1.54	7926 A5	(M)	T, TYN	DB	DF	DT	120 000	172 000	3 400	4 800	96.3	48.3	—	174	1
	180	24	1.5	1	78 500	91 000	16.5	5 000	7 100	32.8	139	171	1.5	1.50	7926 C	(M)	T, TYN	DB	DF	DT	128 000	182 000	4 000	5 600	65.5	17.5	—	174	1
	200	33	2	1	117 000	125 000	—	3 400	4 500	64.1	140	190	2	3.68	7026 A	(M)	T, TYN	DB	DF	DT	191 000	251 000	2 600	3 600	128.3	62.3	—	194	1
	230	40	3	1.1	189 000	193 000	—	2 400	3 200	72.0	144	216	2.5	7.06	7226 A	(M)	T	DB	DF	DT	310 000	385 000	1 900	2 600	143.9	63.9	—	223	1
	230	40	3	1.1	171 000	175 000	—	2 200	3 000	95.5	144	216	2.5	7.10	7226 B	(M)	T	DB	DF	DT	278 000	350 000	1 700	2 400	191.0	111.0	—	223	1
	280	58	4	1.5	273 000	293 000	—	2 200	2 800	88.2	148	262	3	17.5	7326 A	(M)	T	DB	DF	DT	445 000	585 000	1 700	2 200	176.3	60.3	—	271	1.5
	280	58	4	1.5	250 000	268 000	—	1 900	2 600	115.0	148	262	3	17.6	7326 B	(M)	T	DB	DF	DT	405 000	535 000	1 500	2 000	230.0	114.0	—	271	1.5
	190	24	1.5	1	75 000	90 000	—	4 000	5 600	50.5	149	181	1.5	1.63	7928 A5	(M)	T, TYN	DB	DF	DT	122 000	180 000	3 200	4 500	100.9	52.9	—	184	1
140	190	24	1.5	1	79 500	95 500	16.7	4 800	6 700	34.1	149	181	1.5	1.63	7928 C	(M)	T, TYN	DB	DF	DT	129 000	191 000	3 800	5 300	68.2	20.2	—	184	1
	210	33	2	1	120 000	133 000	—	3 200	4 300	67.0	150	200	2	3.90	7028 A	(M)	T	DB	DF	DT	194 000	265 000	2 600	3 400	134.0	68.0	—	204	1
	250	42	3	1.1	218 000	234 000	—	2 200	3 000	77.3	154	236	2.5	8.92	7228 A	(M)	T	DB	DF	DT	355 000	470 000	1 800	2 400	154.6	70.6	—	243	1
	250	42	3	1.1	197 000	213 000	—	2 000	2 800	102.8	154	236	2.5	8.94	7228 B	(M)	T	DB	DF	DT	320 000	425 000	1 600	2 200	205.6	121.6	—	243	1
	300	62	4	1.5	300 000	335 000	—	2 000	2 600	94.5	158	282	3	21.4	7328 A	(M)	T	DB	DF	DT	490 000	670 000	1 600	2 000	189.0	65.0	—	291	1.5
	300	62	4	1.5	275 000	310 000	—	1 700	2 400	123.3	158	282	3	21.6	7328 B	(M)	T	DB	DF	DT	445 000	615 000	1 400	1 900	246.6	122.6	—	291	1.5
	210	28	2	1	96 500	115 000	—	3 800	5 000	56.0	160	200	2	2.97	7930 A5	(M)	—	DB	DF	DT	157 000	231 000	3 000	4 000	112.0	56.0	—	204	1
	210	28	2	1	102 000	122 000	16.6	4 300	6 000	38.1	160	200	2	2.96	7930 C	(M)	—	DB	DF	DT	166 000	244 000	3 600	4 800	76.2	20.2	—	204	1
150	225	35	2.1	1.1	137 000	154 000	—	2 400	3 000	71.6	162	213	2	4.75	7030 A	(M)	T	DB	DF	DT	222 000	305 000	1 900	2 400	143.3	73.3	—	218	1
	270	45	3	1.1	248 000	280 000	—	2 000	2 800	83.1	164	256	2.5	11.2	7230 A	(M)	—	DB	DF	DT	405 000	560 000	1 600	2 200	166.3	76.3	—	263	1
	270	45	3	1.1	225 000	254 000	—	1 800	2 600	110.6	164	256	2.5	11.2	7230 B	(M)	T	DB	DF	DT	365 000	510 000	1 500	2 000	221.2	131.2	—	263	1
	320	65	4	1.5	315 000	370 000	—	1 800	2 400	100.3	168	302	3	26.0	7330 A	(M)	—	DB	DF	DT	515 000	745 000	1 500	1 900	200.7	70.7	—	311	1.5
	320	65	4	1.5	289 000	340 000	—	1 600	2 200	131.1	168	302	3	25.9	7330 B	(M)	T	DB	DF	DT	470 000	680 000	1 300	1 800	262.2	132.2	—	311	1.5
	220	28	2	1	106 000	133 000	16.7	3 800	5 000	39.4	170	210	2	3.10	7932 C	(M)	TYN	DB	DF	DT	173 000	265 000	3 000	4 000	78.9	22.9	—	214	1
	240	38	2.1	1.1	155 000	176 000	—	2 200	2 800	76.7	172	228	2	5.77	7032 A	(M)	T	DB	DF	DT	252 000	355 000	1 700	2 400	153.5	77.5	—	233	1
	290	48	3	1.1	263 000	305 000	—	1 900	2 600	89.0	174	276	2.5	14.1	7232 A	(M)	T	DB	DF	DT	425 000	615 000	1 500	2 000	177.9	81.9	—	283	1
160	290	48	3	1.1	238 000	279 000	—	1 700	2 400	118.4	174	276	2.5	14.2	7232 B	(M)	—	DB	DF	DT	385 000	555 000	1 400	1 900	236.8	140.8	—	283	1
	340	68	4	1.5	345 000	420 000	—	1 700	2 200	106.2	178	322	3	30.7	7332 A	(M)	T	DB	DF	DT	565 000	845 000	1 400	1 800	212.3	76.3	—	331	1.5
	340	68	4	1.5	315 000	385 000	—	1 500	2 000	138.9	178	322	3	30.8	7332 B	(M)	T	DB	DF	DT	515 000	770 000	1 200	1 700	277.8	141.8	—	331	1.5
	230	28	2	1	113 000	148 000	16.8	3 600	4 800	40.8	180	220	2	3.36	7934 C	(M)	—	DB	DF	DT	183 000	297 000	2 800	3 800	81.6	25.6	—	224	1
	260	42	2.1	1.1	186 000	214 000	—	2 000	2 600	83.1	182	248	2	7.90	7034 A	(M)	—	DB	DF	DT	300 000	430 000	1 600	2 200	166.1	82.1	—	253	1
	310	52	4	1.5	295 000	360 000	—	1 800	2 400	95.3	188	292	3	17.3	7234 A	(M)	—	DB	DF	DT	480 000	715 000	1 400	1 900	190.6	86.6	—	301	1.5
	310	52	4	1.5	266 000	325 000	—	1 600	2 200	126.7	188	292	3	17.6	7234 B	(M)	—	DB	DF	DT	435 000	650 000	1 300	1 700	253.4	149.4	—	301	1.5
	360	72	4	1.5	390 000	485 000	—	1 600	2 200	112.5	188	342	3	35.8	7334 A	(M)	—	DB	DF	DT	630 000	970 000	1 300	1 700	225.0	81.0	—	351	1.5
360	72	4	1.5	355 000	445 000	—	1 400	2 000	147.2	188	342	3	35.6	7334 B	(M)	T	DB	DF	DT	575 000	890 000	1 100	1 600	294.3	150.3	—	351	1.5	

■ ANGULAR CONTACT BALL BEARINGS

SINGLE/MATCHED MOUNTINGS

Bore Diameter 180 – 200 mm

Dynamic Equivalent Load $P = XF_r + YF_a$

Contact Angle	$i f_a F_a^*$ 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
15°	0.178	0.38	1	0	0.44	1.47	1	1.65	0.72	2.39
	0.357	0.40	1	0	0.44	1.40	1	1.57	0.72	2.28
	0.714	0.43	1	0	0.44	1.30	1	1.46	0.72	2.11
	1.07	0.46	1	0	0.44	1.23	1	1.38	0.72	2.00
	1.43	0.47	1	0	0.44	1.19	1	1.34	0.72	1.93
	2.14	0.50	1	0	0.44	1.12	1	1.26	0.72	1.82
	3.57	0.55	1	0	0.44	1.02	1	1.14	0.72	1.66
	5.35	0.56	1	0	0.44	1.00	1	1.12	0.72	1.63
25°	—	0.68	1	0	0.41	0.87	1	0.92	0.67	1.41
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	
15°	0.5	0.46	1	0.92	
25°	0.5	0.38	1	0.76	
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)		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 a_0	DF	d_b ⁽³⁾ min.	D_b max.	r_b ⁽³⁾ max.
180	250	33	2	1	145 000	184 000	16.6	3 200	4 500	45.3	190	240	2	4.90	7936 C	(M)	—	DB DF DT	236 000	370 000	2 600	3 600	90.6	24.6	—	244	1
	280	46	2.1	1.1	207 000	252 000	—	1 900	2 400	89.4	192	268	2	10.5	7036 A	(M)	—	DB DF DT	335 000	505 000	1 500	2 000	178.8	86.8	—	273	1
	320	52	4	1.5	305 000	385 000	—	1 700	2 200	98.2	198	302	3	18.1	7236 A	(M)	—	DB DF DT	495 000	770 000	1 400	1 800	196.3	92.3	—	311	1.5
	320	52	4	1.5	276 000	350 000	—	1 500	2 000	130.9	198	302	3	18.4	7236 B	(M)	—	DB DF DT	450 000	700 000	1 200	1 700	261.8	157.8	—	311	1.5
	380	75	4	1.5	410 000	535 000	—	1 500	2 000	118.3	198	362	3	42.1	7336 A	(M)	—	DB DF DT	665 000	1 070 000	1 200	1 600	236.6	86.6	—	371	1.5
	380	75	4	1.5	375 000	490 000	—	1 300	1 800	155.0	198	362	3	42.6	7336 B	(M)	—	DB DF DT	605 000	975 000	1 100	1 500	309.9	159.9	—	371	1.5
190	260	33	2	1	147 000	192 000	16.7	3 000	4 300	46.6	200	250	2	4.98	7938 C	(M)	TYN	DB DF DT	239 000	385 000	2 400	3 400	93.3	27.3	—	254	1
	290	46	2.1	1.1	224 000	280 000	—	1 800	2 400	92.3	202	278	2	11.3	7038 A	(M)	—	DB DF DT	365 000	560 000	1 400	1 900	184.6	92.6	—	283	1
	340	55	4	1.5	315 000	410 000	—	1 600	2 200	104.0	208	322	3	22.4	7238 A	(M)	—	DB DF DT	510 000	825 000	1 300	1 700	208.0	98.0	—	331	1.5
	340	55	4	1.5	284 000	375 000	—	1 400	2 000	138.7	208	322	3	22.5	7238 B	(M)	—	DB DF DT	460 000	750 000	1 100	1 600	277.3	167.3	—	331	1.5
	400	78	5	2	450 000	600 000	—	1 400	1 900	124.2	212	378	4	47.5	7338 A	(M)	T	DB DF DT	730 000	1 200 000	1 100	1 500	248.3	92.3	—	390	2
	400	78	5	2	410 000	550 000	—	1 300	1 700	162.8	212	378	4	47.2	7338 B	(M)	—	DB DF DT	670 000	1 100 000	1 000	1 400	325.5	169.5	—	390	2
200	280	38	2.1	1.1	189 000	244 000	16.5	2 800	4 000	51.2	212	268	2	6.85	7940 C	(M)	—	DB DF DT	305 000	490 000	2 200	3 200	102.3	26.3	—	273	1
	310	51	2.1	1.1	240 000	310 000	—	1 700	2 200	99.1	212	298	2	13.7	7040 A	(M)	T	DB DF DT	390 000	620 000	1 300	1 800	198.2	96.2	—	303	1
	360	58	4	1.5	335 000	450 000	—	1 500	2 000	109.8	218	342	3	26.5	7240 A	(M)	—	DB DF DT	550 000	900 000	1 200	1 600	219.6	103.6	—	351	1.5
	360	58	4	1.5	305 000	410 000	—	1 300	1 800	146.5	218	342	3	26.6	7240 B	(M)	—	DB DF DT	495 000	815 000	1 100	1 500	292.9	176.9	—	351	1.5
	420	80	5	2	475 000	660 000	—	1 300	1 800	129.5	222	398	4	54.4	7340 A	(M)	T	DB DF DT	770 000	1 320 000	1 100	1 400	259.0	99.0	—	410	2
	420	80	5	2	430 000	600 000	—	1 200	1 600	170.1	222	398	4	55.3	7340 B	(M)	—	DB DF DT	700 000	1 200 000	950	1 300	340.1	180.1	—	410	2

- Notes** ⁽¹⁾ For applications operating near the limiting speed, refer to Page C077.
⁽²⁾ Suffixes A, A5, B, and C represent contact angles of 30°, 25°, 40°, and 15° 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.