

Angular Contact Ball Bearing Specifications

Standard	5S	-	70	01	C	GD2 /GN	P4
Ceramic balls	←						
Series	←						
Bore Diameter	←						
Contact Angles	←						
Mounting Config.	←						
Preload	←						
Precision/Tolerance	←						

Contact Angles

No Suffix—30°
Suffix B—40°
Suffix C—15°

Mounting Configuration

G—Single universal flushground (can be mounted in any configuration)
GD2—pair of universal

DB—duplex—back to back
DF—duplex—face to face
DT—duplex—tandem
DBT, DFT, DTT—triplex set
DBTT, DFTT, DTBT, DTFT—quad set

Cages

See Table 3 note 4 for standard cages that do not carry a suffix and special cages that do.

Preload

GL—Light } low preload
GN—Normal } low load
GM—Medium, moderate } high speed
applications
GH—Heavy, high rigidity and stiffness, high loads moderate speed

Precision/Tolerance Class

0—ISO class 0 (ABEC 1) (NTN standard, no suffix)
P6—ISO class 6 (ABEC 3)
P5—ISO class 5 (ABEC 5)
P4—ISO class 4 (ABEC 7)
P2—ISO class 2 (ABEC 9)

Ultra High Speed	5S	-	HSB	0	20	C	DB	GL	P2
Ceramic balls	←								
Series	←								
Dimension Series	←								
Bore Diameter	←								
Contact Angles	←								
Mounting Config.	←								
Preload	←								
Precision/Tolerance	←								

Contact Angles

Standard—30°
B—40°
C—15° BNT Standard

Mounting Configuration

G—Single universal flushground (can be mounted in any configuration)

GD2—pair of universal
DB—duplex—back to back
DF—duplex—face to face
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DBT, DFT, DTT—triplex set
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Preload

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Precision/Tolerance Class

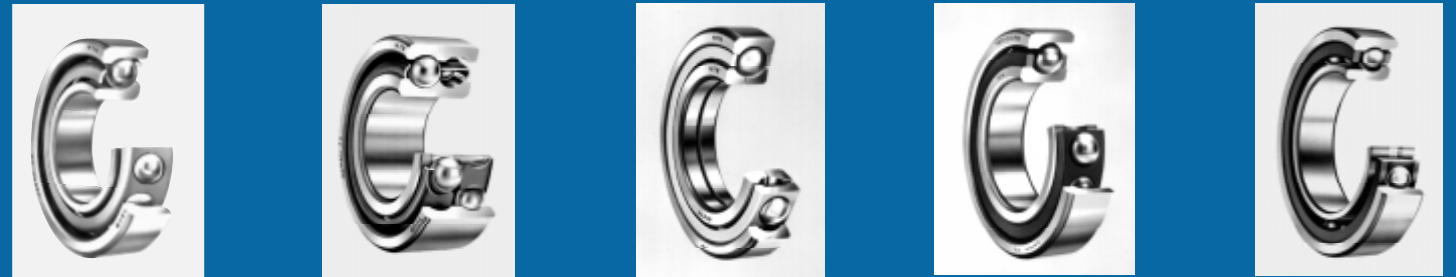
0—ISO class 0 (ABEC 1) (NTN standard, no suffix)
P6—ISO class 6 (ABEC 3)
P5—ISO class 5 (ABEC 5)
P4—ISO class 4 (ABEC 7)
P2—ISO class 2 (ABEC 9)

Ask for NTN Angular Contact Bearings for your replacement needs!

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Angular Contact Ball Bearings



NTN offers the 7900, 7000, 7200, 7300, Angular Contact Ball Bearing Series (Consult NTN regarding the 7400 series)

Contact angle



NTN standard angular contact bearings have 30° or 40° contact angles. For normal loads, the 30° angle bearings (no P/N suffix) are usually used. For high axial load applications, 40° angle bearings are available (P/N suffix B). Both of these come with normal precision tolerances.

For high-speed applications, a 15° angle is usually used (P/N suffix C). These bearings have high precision tolerances, ISO class 5 or better, and a high speed molded resin cage. They come in standard angular contact configuration and also in special ultra high-speed BNT and HSB configurations with smaller balls and other features. For still higher speeds, these bearings are available with ceramic balls (P/N prefix 5S-)

Special versions of bearing with 30° and 40° angles are available with the same high precision tolerances and other features as the high speed bearings for use in moderately high speed applications with heavier axial loads or in applications having lower speed but requiring high rotational accuracy. The ultra high-speed HSB series is also available with a 30° angle for heavier axial load applications.

All of the above can carry radial loads as well as unidirectional axial load. When paired (mounted in duplex), the pair takes on new features. Placing them back to back (DB) or front to front (DF), increases the radial load rating and enables axial loads to be accommodated in either direction. The DB has much greater moment load capacity but the DF has much greater misalignment capability. Placing bearings in tandem (DT) increases the radial and axial capacity over that of one bearing but the axial loading must still be unidirectional.

All paired bearings must be flush ground on the faces between the bearings. By controlling the offset of the inner ring with respect to the outer ring, a specified clearance or preload can be achieved when the pair is compressed together with a nut or other means. High preload increases rigidity under load but also increases loads and running torque and reduces limiting speed.

Universal flush ground bearings or pairs have both sides flush ground and can be mounted in any configuration (DB, DF, DT) and the preload will be maintained so long as the identical codes are used for the bearings in the pair. All of the above also applies to larger sets such as triplex sets or quad sets.

NTN also provides other types of angular contact bearings that are available but are not included in this brochure:

5200 and 5300 series double row angular contact bearings are roughly equivalent to 30° DB pairs in a single unit. They carry loads in both directions and provide vibration and shock resistance but they have reduced speed and accuracy (runout) capability.

BST ball screw support bearings are made with an extra high contact angle of 60° for extreme axial rigidity.

QJ four point angular contact bearings have a 30° contact angle and split inner rings. This configuration allows a single narrow series bearing to carry high axial load in either direction. It also reduces the high axial clearance seen in deep groove ball bearings. This bearing requires a substantial axial load to maintain the typical two point contact desirable in angular contact bearings, with a very predominate radial load, the bearing runs with a four point contact and this is not desirable in most cases.

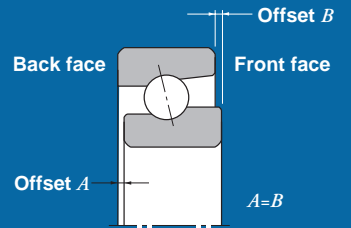


Table 1. Angular contact ball bearing types and characteristics





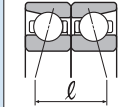
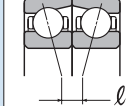
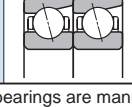
Type	Design	Characteristics
Standard type		<ul style="list-style-type: none"> Available in bearing series 79, 70, 72, 72B, 73, and 73B. Contact angles: 30° (no suffix) and 40° (P/N suffix B) available. Standard bearing cage type differs depending on bearing no. (Refer to Table 3)
High speed use		<ul style="list-style-type: none"> Available in bearing series 78C, 79C, 70C, 72C, and 73C. Contact angles: 15° (NTN P/N Suffix C) All bearing accuracies ISO Class 5 or higher. Standard bearing cage type differs depending on bearing number. (Refer to Table 3) For machine tool applications.
Ultra high speed use	 	<ul style="list-style-type: none"> Available in bearing series HSB9C, HSB0C, BNT0, and BNT2; all boundary dimensions agree with ISO series dimensions. BNT and HSB series bearings have more but smaller balls than the equivalent 7000 high speed bearings and therefore have less torque and higher speed capability. For even higher speed applications, use bearings with ceramic balls. The inner ring bore diameter and outer ring inner diameter of the HSB series have a ground undercut on one side enabling easy oil flow. For standard cage types refer to Table 3; molded resin cages are also available for some varieties. For machine tool applications.

Table 2. Duplex angular contact ball bearing types and characteristics

Duplex type	Characteristics
Back-to-back duplex (DB) 	<ul style="list-style-type: none"> Can accommodate radial loads and axial loads in either direction. Has a large distance l between the acting load center of the bearing, and therefore a large moment load capacity. Allowable misalignment angle is small. For DB type, the inner rings must be clamped together.
Face-to-face duplex (DF) 	<ul style="list-style-type: none"> Can accommodate radial loads and axial loads in either direction. Has a smaller distance l between the acting load center of the bearing, and therefore a smaller moment load capacity. Has a larger allowable misalignment angle than back-to-back duplex type. For DF type, the outer rings must be clamped together.
Tandem duplex (DT) 	<ul style="list-style-type: none"> Can accommodate radial loads and single direction axial loads. Axial loads are received by both bearings as a set, and therefore heavy axial loads can be accommodated.

Note: 1. Duplex bearings are manufactured in a set to specified clearance and preload values, therefore they must be assembled together with identically numbered bearings and not mixed with other arrangements.
 2. Triplex arrangements of angular contact bearings are also available. Consult NTN for details.

Table 3. Standard cages for angular contact ball bearings

Type	Series	Molded resin cage	Pressed cage	Machined cage	
Standard	79	—	—	7905 ~ 7960	
	70	7000-7010	—	7011 ~ 7040	
	72	—	7200 ~ 7222	7224 ~ 7240	
	73	—	7300 ~ 7322	7324 ~ 7340	
	72B 73B	—	7200B-7222B 7300B-7322B	7224B ~ 7240B 7324B ~ 7340B	
High speed use	78C	—	—	7805C ~ 7834C	
	79C	7901C-7912C	—	7913C ~ 7934C	
	70C	7000C-7024C	—	7026C ~ 7040C	
	72C 73C	7200C-7220C 7304C-7312C	—	7221C ~ 7240C 7300C ~ 7303C 7313C ~ 7340C	
Ultra high speed use	BNT0 BNT2 HSB9C HSB0C	— — — —	— — — —	BNT000 ~ BNT009 BNT200 ~ BNT209 HSB910C ~ HSB934C HSB010C ~ HSB034C	
	4-point contact	QJ2 QJ3	— —	— —	QJ208 ~ QJ224 QJ306 ~ QJ324
		Double row	52 53	— —	5200 ~ 5218 5302 ~ 5315

Note: 1. Standard cages for 5S-BNT and 5S-HSB type bearings are the same as cages for BNT and HSB type bearings.
 2. Due to the material characteristics of molded resin cages, use at application temperatures in excess of 120°C is not possible.
 3. Standard pressed cages are generally steel. Standard machined cages are generally brass.
 4. No suffixes are assigned to standard cages. Special cages are available in many sizes and do carry part number suffixes: (L1) brass, (T1) phenolic or (T2) molded resin (glass reinforced nylon).



Note for tables 4 and 5: For the purpose of preload comparisons, NTN's GL would be considered an extra light, GN would be considered a light, GM would be considered a medium, GH would be considered a heavy. Consult NTN engineering for exact details.

Table 4. Basic preload with duplex angular contact ball bearings (contact angles 30° or 40°)

Nominal bore diameter d mm over incl.	79, HSB9				70, HSB0				72, 72B				73, 73B																	
	Normal		Medium		Heavy		Light		Normal		Medium		Heavy		Light		Normal		Medium		Heavy									
	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)								
— 12	9	4	18	8	33	15	7	3	18	8	33	15	44	20	7	3	22	10	44	20	66	30	11	5	33	15	66	30	88	40
12 18	11	5	33	15	44	20	7	3	18	8	33	15	66	30	7	3	22	10	66	30	88	40	11	5	33	15	88	40	110	50
18 32	22	10	44	20	66	30	11	5	33	15	66	30	110	50	18	8	44	20	110	50	177	80	22	10	66	30	133	60	220	100
32 40	33	15	66	30	133	60	18	8	66	30	133	60	198	90	22	10	88	40	198	90	331	150	33	15	110	50	220	100	441	200
40 50	44	20	88	40	143	70	18	8	66	30	133	60	220	100	33	15	133	60	220	100	441	200	44	20	177	80	331	150	551	250
50 65	55	25	110	50	177	80	33	15	110	50	198	90	331	150	44	20	177	80	331	150	661	300	66	30	220	100	551	250	877	400
65 80	88	40	177	80	265	120	33	15	133	60	331	150	441	200	66	30	220	100	551	250	877	400	88	40	331	150	776	350	1102	500
80 90	110	50	220	100	265	150	44	20	198	90	441	200	661	300	110	50	331	150	661	300	1102	500	133	60	441	200	877	400	1322	600
90 95	110	50	220	100	265	150	44	20	198	90	441	200	661	300	110	50	441	200	877	400	1326	600	133	60	551	250	1102	500	1541	700
95 100	154	70	286	130	441	200	44	20	198	90	441	200	661	300	110	50	441	200	877	400	1326	600	133	60	551	250	1102	500	1542	700
100 105	154	70	286	130	441	200	66	30	220	100	551	250	877	400	133	60	551	250	1102	500	1765	800	154	70	661	300	1326	600	1978	900
105 110	154	70	286	130	441	200	66	30	220	100	551	250	877	400	133	60	551	250	1102	500	1765	800	154	70	661	300	1326	600	1978	900
110 120	198	90	400	180	661	300	66	30	220	100	551	250	877	400	133	60	551	250	1102	500	1765	800	154	70	661	300	1326	600	1978	900
120 140	220	100	441	200	776	350	110	50	331	150	776	350	1326	600	177	80	661	300	1326	600	2203	1000	198	90	877	400	1765	800	2653	1200
140 150	286	130	551	250	989	450	110	50	331	150	776	350	1326	600	177	80	661	300	1326	600	2203	1000	198	90	877	400	1765	800	2653	1200
150 160	286	130	551	250	989	450	154	70	551	250	1102	500	1978	900	198	90	877	400	1765	800	2653	1200	220	100	989	450	1978	900	3080	1400
160 170	286	130	551	250	989	450	154	70	551	250	1102	500	1978	900	198	90	877	400	1765	800	2653	1200	220	100	989	450	1978	900	3080	1400
170 180	400	180	776	350	1326	600	154	70	551	250	1102	500	1978	900	198	90	877	400	1765	800	2653	1200	220	100	989	450	1978	900	3080	1400
180 190	400	180	776	350	1326	600	198	90	776	350	1540	700	2203	1000	220	100	989	450	1978	900	3080	1400	331	150	1326	600	2653	1200	3530	1600
190 200	551	250	1102	500	1765	800	198	90	776	350	1540	700	2203	1000	220	100	989	450	1978	900	3080	1400	331	150	1326	600	2653	1200	3530	1600

Table 5. Basic preload with duplex angular contact ball bearings (contact angle 15°)

Nominal bore diameter d mm over incl.	78C				79C, BNT9, HSB9C				70C, BNT0, HSB0C				72C, BNT2				73C																							
	Light		Normal		Medium		Heavy		Light		Normal		Medium		Heavy		Light		Normal		Medium		Heavy																	
	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)																
— 12	—	—	—	—	—	—	—	—	—	5	2	7	3	2	10	33	15	5	2	11	5	22	10	7	3	18	8	33	15	66	30									
12 18	—	—	—	—	—	—	—	—	—	5	2	7	3	2	10	44	20	5	2	11	5	33	15	66	30	7	3	18	8	44	20	88	40							
18 32	2	1	7	3	18	8	33	15	5	2	11	5	22	10	44	20	11	5	22	10	66	30	110	50	17	8	33	15	88	40	154	70								
32 40	2	1	7	3	18	8	33	15	7	3	18	8	44	20	66	30	11	5	33	15	66	30	133	60	18	8	44	20	110	50	177	80	220	100						
40 50	5	2	11	5	22	10	44	20	9	4	22	10	55	25	110	50	11	5	33	15	66	30	154	70	22	10	66	30	133	60	220	100	441	200						
50 65	7	3	22	10	44	20	88	40	11	5	27	12	66	30	133	60	22	10	44	20	110	50	220	100	33	15	88	40	331	150	661	300								
65 80	7	3	22	10	44	20	88	40	18	8	44	20	88	40	177	80	22	10	66	30	154	70	331	150	44	20	110	50	220	100	441	200	877	400						
80 90	11	5	33	15	66	30	133	60	22	10	55	25	110	50	220	100	33	15	88	40	220	100	441	200	66	30	154	70	331	150	661	300	88	40	220	100	551	250	1102	500
90 95	11	5	33	15	66	30	133	60	22	10	55	25	110	50	220	100	33	15	88	40	220	100	441	200	66	30	154	70	331	150	661	300	88	40	220	100	663	300	1326	600
95 100	11	5	33	15	66	30	133	60	27	12	66	30	154	70	331	150	33	15	88	40	220	100	441	200	66	30	154	70	331	150	661	300	88	40	220	100	663	300	1326	600
100 105	11	5	33	15	66	30	133	60	27	12	66	30	154	70	331	150	44	20	133	60	331	150	551	250	88	40	220	100	551	250	1102	500	133	60	331	150	776	350	1540	700
105 110	18	8	44	20	110	50	220	100	27	12	66	30	154	70	331	150	44	20	133	60	331	150	551	250	88	40	220	100	551	250	1102	500	133	60	331	150	776	350	1540	700
110 120	18	8	44	20	110	50	220	100	33	15	88	40	198	90	441	200	44	20	133	60	331	150	551	250	88	40	220	100	551	250	1102	500	133	60	331	150	776	350	1540	700
120 140	22	10	66	30	133	60	286	130	44																															