

THRUST BEARINGS

SINGLE-DIRECTION THRUST BALL BEARINGS

With Flat Seat, Aligning Seat, or Aligning Seat Washer	Bore Diameter	10 – 100mm	B210
	Bore Diameter	110 – 360mm	B214

DOUBLE-DIRECTION THRUST BALL BEARINGS

With Flat Seat, Aligning Seat, or Aligning Seat Washer	Bore Diameter	10 – 190mm	B218
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THRUST CYLINDRICAL ROLLER BEARINGS	Bore Diameter	35 – 320mm	B224
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THRUST SPHERICAL ROLLER BEARINGS	Bore Diameter	60 – 500mm	B228
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Angular Contact Thrust Ball Bearings are described on pages B234 to B243.



DESIGN, TYPES, AND FEATURES

THRUST BALL BEARINGS

Thrust ball bearings are classified into those with flat seats or aligning seats depending on the shape of the outer ring seat (housing washer). They can sustain axial loads but no radial loads.

The series of thrust ball bearings available are shown in Table 1.

For Single-Direction Thrust Ball Bearings, pressed steel cages and machined brass cages are usually used as shown in Table 2. The cages in Double-Direction Thrust Ball Bearings are the same as those in Single-Direction Thrust Ball Bearings of the same diameter series.

The basic load ratings listed in the bearing tables are based on the standard cage type shown in Table 2. If the type of cage is different for bearings with the same number, the number of balls may vary, in such a case, the load rating will differ from the one listed in the bearing tables.

Table1 Series of Thrust Ball Bearings

	W/Flat Seat	W/Aligning Seat	W/Aligning Seat Washer
Single- Direction	511	—	—
	512	532	532U
	513	533	533U
	514	534	534U
Double- Direction	522	542	542U
	523	543	543U
	524	544	544U

Table 2 Standard Cages for Thrust Ball Bearings

Pressed Steel	Machined Brass
51100 – 51152X 51200 – 51236X 51305 – 5136X	51156X – 51172X 51238X – 51272X 5138X – 51340X
51405 – 51418X 53200 – 53236X 53305 – 5336X 53405 – 53418X	51420X – 51436X 53238X – 53272X 5338X – 53340X 53420X – 53436X

THRUST CYLINDRICAL ROLLER BEARINGS

These are thrust bearings containing cylindrical rollers. They can sustain only axial loads, but they are suitable for heavy loads and have high axial rigidity.

The cages are machined brass.

THRUST SPHERICAL ROLLER BEARINGS

These are thrust bearings containing convex rollers. They have a self-aligning capability and are free of any influence of mounting error or shaft deflection. Besides the original type, the E type with pressed cages for high load capacity is also available. Their bearing numbers are suffixed by E.

For horizontal shaft or high speed application, machined brass cages are recommended. For details, contact NSK.

Since there are several places where lubrication is difficult, such as the area between the roller heads and inner ring rib, the sliding surfaces between cage and guide sleeve, etc., oil lubrication should be used even at low speed.

The cages in the original type are machined brass.

TOLERANCES AND RUNNING ACCURACY

THRUST BALL BEARINGSTable 8.6 (Pages A72 to A74)

THRUST CYLINDRICAL ROLLER BEARINGS
.....According to Table 8.2 (Pages A72 to A74)

THRUST SPHERICAL ROLLER BEARINGSTable 8.7 (Pages A75)

RECOMMENDED FITS

THRUST BALL BEARINGSTable 9.3 (Pages A84)
.....Table 9.5 (Pages A85)

THRUST CYLINDRICAL ROLLER BEARINGS.....Table 9.3 (Pages A84)
.....Table 9.5 (Pages A85)

THRUST SPHERICAL ROLLER BEARINGSTable 9.3 (Pages A84)
.....Table 9.5 (Pages A85)

DIMENSIONS RELATED TO MOUNTING

The dimensions related to mounting of thrust spherical roller bearings are listed in the Bearing Table.

If the bearing load is heavy, it is necessary to design the shaft shoulder with ample strength in order to provide sufficient support for the shaft washer.

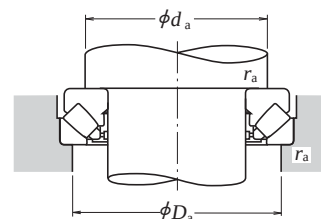
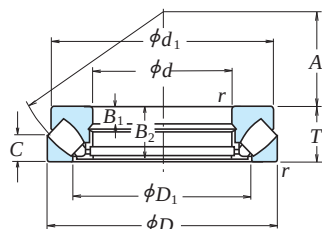
PERMISSIBLE MISALIGNMENT

The permissible misalignment of thrust spherical roller bearings varies depending on the size, but it is approximately 0.018 to 0.036 radian (1° to 2°) with average loads.

MINIMUM AXIAL LOAD

It is necessary to apply some axial load to thrust bearings to prevent slippage between the rolling elements and raceways. For more details, please refer to Page A99.

Bore Diameter 220 – 420 mm



Dynamic Equivalent Load

$$P = 1.2F_r + F_a$$

Static Equivalent Load

$$P_0 = 2.8F_r + F_a$$

However, $F_r/F_a \leq 0.55$ must be satisfied.

Boundary Dimensions (mm)				Basic Load Ratings				Limiting Speeds (min ⁻¹) Oil	Bearing Numbers
<i>d</i>	<i>D</i>	<i>T</i>	<i>r</i> min.	(N) <i>C_a</i>	(N) <i>C_{0a}</i>	{kgf} <i>C_a</i>	{kgf} <i>C_{0a}</i>		
220	300	48	2	560 000	2 500 000	57 000	255 000	1 400	29244
	360	85	4	1 340 000	5 200 000	137 000	530 000	950	29344
	420	122	6	2 350 000	8 650 000	240 000	880 000	800	29444
240	340	60	2.1	800 000	3 450 000	82 000	350 000	1 200	29248
	380	85	4	1 360 000	5 400 000	139 000	550 000	950	29348
	440	122	6	2 420 000	9 100 000	247 000	930 000	750	29448
260	360	60	2.1	855 000	3 850 000	87 500	395 000	1 200	29252
	420	95	5	1 700 000	6 800 000	173 000	695 000	800	29352
	480	132	6	2 820 000	10 700 000	287 000	1 090 000	710	29452
280	380	60	2.1	885 000	4 100 000	90 000	420 000	1 100	29256
	440	95	5	1 830 000	7 650 000	187 000	780 000	800	29356
	520	145	6	3 400 000	13 100 000	345 000	1 330 000	630	29456
	520	145	6	3 950 000	14 900 000	400 000	1 520 000	630	29456 EM
300	420	73	3	1 160 000	5 150 000	118 000	525 000	950	29260
	480	109	5	2 190 000	9 100 000	224 000	925 000	710	29360
	540	145	6	3 500 000	13 700 000	355 000	1 390 000	630	29460
320	440	73	3	1 190 000	5 450 000	122 000	555 000	950	29264
	500	109	5	2 230 000	9 400 000	227 000	960 000	670	29364
	580	155	7.5	3 650 000	14 600 000	370 000	1 490 000	560	29464
340	460	73	3	1 230 000	5 750 000	125 000	590 000	900	29268
	540	122	5	2 640 000	11 200 000	269 000	1 140 000	630	29368
	620	170	7.5	4 400 000	17 400 000	450 000	1 780 000	530	29468
360	500	85	4	1 550 000	7 300 000	158 000	745 000	800	29272
	560	122	5	2 670 000	11 500 000	272 000	1 180 000	600	29372
	640	170	7.5	4 200 000	17 200 000	430 000	1 750 000	500	29472
	640	170	7.5	5 450 000	20 400 000	555 000	2 800 000	500	29472 EM
380	520	85	4	1 620 000	7 800 000	165 000	795 000	800	29276
	600	132	6	3 300 000	14 500 000	335 000	1 480 000	560	29376
	670	175	7.5	4 800 000	19 500 000	490 000	1 990 000	480	29476
400	540	85	4	1 640 000	8 000 000	167 000	815 000	750	29280
	620	132	6	3 250 000	14 500 000	330 000	1 480 000	530	29380
	710	185	7.5	5 400 000	22 100 000	550 000	2 250 000	450	29480
420	580	95	5	2 010 000	9 800 000	205 000	1 000 000	670	29284
	650	140	6	3 500 000	15 700 000	355 000	1 600 000	500	29384
	730	185	7.5	5 650 000	23 500 000	575 000	2 400 000	450	29484

Note (1) For heavy load applications, a d_a value should be chosen which is large enough to support the shaft washer rib.

Dimensions (mm)						Abutment and Fillet Dimensions (mm)			Mass (kg)
<i>d</i> ₁	<i>D</i> ₁	<i>B</i> ₁	<i>B</i> ₂	<i>C</i>	<i>A</i>	<i>d</i> _a ⁽¹⁾ min.	<i>D</i> _a max.	<i>r</i> _a max.	approx.
285	254	15	46	24	117	260	275	2	9.2
335	280	29	81	41	125	285	315	3	33
385	308	43	117	58	132	310	355	5	74
325	283	19	57	30	130	285	305	2	16.5
355	300	29	81	41	135	300	330	3	35.5
405	326	43	117	59	142	330	375	5	79
345	302	19	57	30	139	305	325	2	18
390	329	32	91	45	148	330	365	4	48.5
445	357	48	127	64	154	360	405	5	105
365	323	19	57	30	150	325	345	2	19
410	348	32	91	46	158	350	390	4	52.5
480	384	52	140	68	166	390	440	5	132
480	380	52	140	70	166	410	445	5	134
400	353	21	69	38	162	355	380	2.5	30
450	379	37	105	50	168	380	420	4	74
500	402	52	140	70	175	410	460	5	140
420	372	21	69	38	172	375	400	2.5	32.5
470	399	37	105	53	180	400	440	4	77
555	436	55	149	75	191	435	495	6	175
440	395	21	69	37	183	395	420	2.5	33.5
510	428	41	117	59	192	430	470	4	103
590	462	61	164	82	201	465	530	6	218
480	423	25	81	44	194	420	455	3	51
525	448	41	117	59	202	450	495	4	107
610	480	61	164	82	210	485	550	6	228
580	474	61	164	83	210	495	550	6	220
496	441	27	81	42	202	440	475	3	52
568	477	44	127	63	216	480	525	5	140
640	504	63	168	85	230	510	575	6	254
517	460	27	81	42	212	460	490	3	55
590	494	44	127	64	225	500	550	5	150
680	536	67	178	89	236	540	610	6	306
553	489	30	91	46	225	490	525	4	72
620	520	48	135	68	235	525	575	5	170
700	556	67	178	89	244	560	630	6	323