

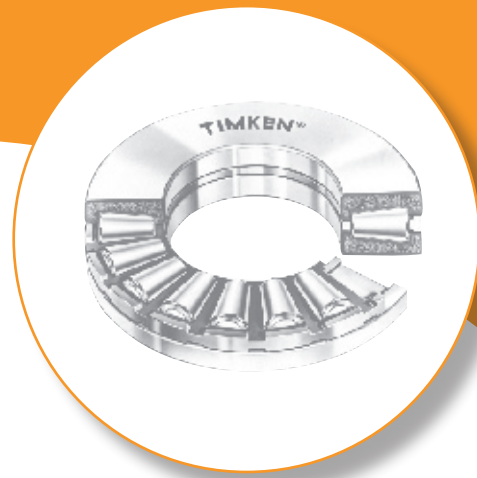
THRUST BEARINGS

Overview: Timken thrust bearings are designed specifically to manage thrust loads and provide high-shock-load resistance in industrial and automotive applications. We manufacture seven basic designs of thrust bearings that include ball, crossed roller, cylindrical, machined tapered (TTHD, V-Flat, screwdown), stamped tapered, spherical and needle.

- **Sizes:** 35 mm - 2940 mm (1375 in. - 115.75 in.).
- **Markets:** Aggregate, Machine Tool, Metals, Oil, Power Generation.
- **Applications:** Cone crushers, crane hooks, oil well swivels, extruders, pulverizer drives, rolling mills, machine tool spindles & tables, drilling rig hydraulic heads, gear boxes, pre-heater fans.
- **Benefits:** High performance and application flexibility. Large range of product offering.



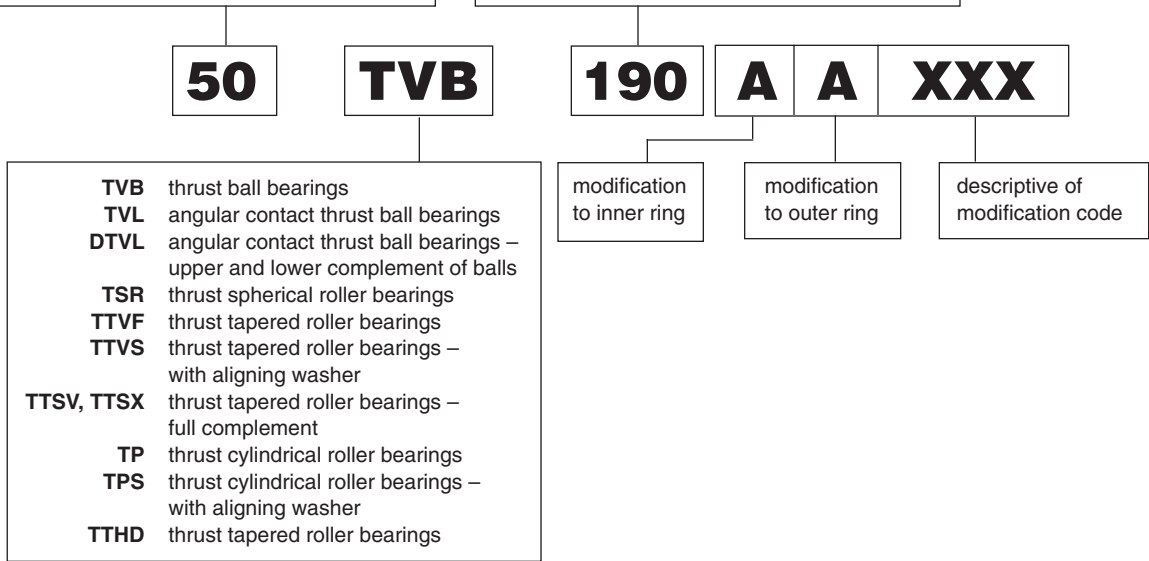
B



Ball and Roller Thrust Bearings

From the three-digit "Series" number, it is known this is an inch size bearing. "50" is read as "5.0" and represents approximate or actual bore.

The series number (always three numerals) represents a specific size cage assembly.



Ball and Roller Thrust Bearings

	<i>Page</i>
Introduction	B438
Ball and Roller Thrust Bearing Types	B438

DIMENSIONS – LOAD RATINGS

Ball Thrust Bearing Type TVB	B442
Angular Contact Ball Thrust Bearing Type TVL	B443
Angular Contact Ball Thrust Bearing Type DTVL	B444
Spherical Roller Thrust Bearing Type TSR	B445
Cylindrical Roller Thrust Bearing Type TP	B447
Cylindrical Roller Thrust Bearing Type TPS	B449
Crossed Roller Thrust Bearing Type XR and JXR	B451
Tapered Roller Thrust Bearing Type TTHD	B452
Tapered Roller Thrust Bearing Type TTVF	B457
Tapered Roller Thrust Bearing Type TTVS	B458
Tapered Roller Thrust Bearing Type TTSX	B459
Tapered Roller Thrust Bearing Type TTSV	B460
Stamped Roller Thrust Bearing Type TTSP	B461
Stamped Tapered Roller Thrust Bearing Type TTC, TTCS ..	B463





INTRODUCTION

Six basic designs of ball and roller thrust bearings are available: ball, cross roller, cylindrical, machine tapered (TTHD, V-Flat, Screwdown), stamped tapered and spherical tapered roller. Dimensional data for all styles are presented in order by bore size.

Engineering data such as tolerances, shaft and housing fits, and life and load rating calculations are found in the engineering section of this catalog.

B

BEARING TYPES

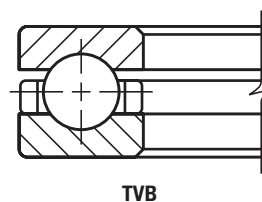
BALL THRUST BEARINGS

Ball thrust bearings provide optimum performance in high-speed installations, particularly where loads are generally lighter. Two types including axial (TVB), and angular contact (TVL) are available. The DTVL Type is offered with both an upper and lower complement of angular contact balls and three race elements. The standard tolerances for ball thrust bearings (both types) are equivalent to ABEC 1 where applicable. Higher precision tolerances are available. Consult your Timken representative for information on such installations.

TVB

TVB Types are separable, consisting of two hardened and ground steel washers. Precision ground and lapped balls run in a grooved raceway separated by a bronze cage. Other materials may be specified for the cage, depending on the application.

Most TVB bearings include washers of the same bore and outside diameter. Housings should be designed to clear the O.D. of rotating races, with shafts stepped to clear the bore of stationary washers. Provides axial rigidity, but are not suggested if radial load is expected. The TVB is exceptionally easy to mount with the rotating washer usually shaft mounted. The stationary washer should be housed with an outside diameter clearance that allows the bearing to assume a normal operating position.



TVB

TVL

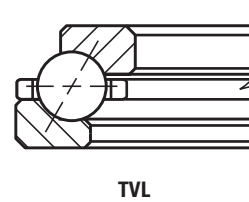
TVL Types provide exceptionally low friction, are cool running and have quiet operation when operated at high speeds. They are also less sensitive to misalignment. Consult your Timken representative for assistance in determining limits of such loading for specific applications.

Although ball thrust bearings have been designed exclusively for thrust loads, the TVL bearing will accommodate some radial loading. Consult your Timken representative for assistance in determining the limits of such loading for specific applications.

Hardened and ground steel races of TVL bearings enclose a complement of precision ground and lapped steel balls, separated by a bronze cage. Other material may be specified as required.

Not strictly an annular ball bearing, the larger ring is identified as the outer ring; the smaller as the inner. Inner ring is usually the rotating element and is shaft mounted. Outer ring is normally stationary and should be mounted with an outside diameter clearance that allows the bearing to assume a normal operating position. If combined loads are expected, the outer ring must be radially located in the housing.

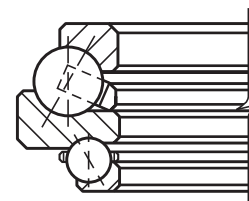
TVL bearings should always be operated under thrust loading. If a constant thrust load is not normally present, it should be imposed by springs or other devices.



TVL

DTVL

The DTVL has an upper and lower complement of angular contact balls and three race elements. It is capable of carrying thrust in one direction, comparable to the TVL Series and lighter thrust in the opposite direction.



DTVL

SPHERICAL ROLLER THRUST BEARINGS

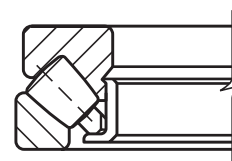
TSR

A combination radial and thrust bearing designed to operate even if shaft and housing are, or become, misaligned under load. A favored bearing when conditions include heavy loads, difficulties in establishing or maintaining housing alignment or when shaft deflection can be expected.

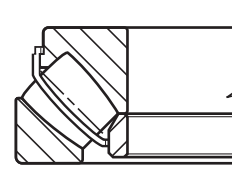
Shaft deflections and housing distortions caused by shock or heavy loads (which lead to misalignment) are compensated for by the internal self-alignment of the bearing elements during operation. Corner loading of rollers, a condition that limits service life on other types of bearings, cannot develop in spherical roller thrust bearings.

The TSR achieves high thrust capacity and allows axial misalignment between the inner ring and the outer ring of up to $\pm 2.5^\circ$. Spherically contoured rollers, arranged in a steep angular position, not only accept high axial loads, but also moderate radial loads. "E" styles, (EM-machined bronze cage, EJ- stamped steel cage) have increased capacity. Should extreme conditions of loading and/or speed under misalignment be anticipated, contact your Timken representative before ordering.

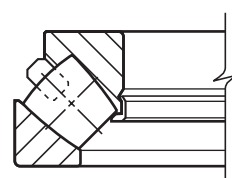
The inherent compensation for misalignment, provided by the spherical roller bearings, offers the designer the opportunity to use weldments for housing frames instead of complex castings. This eliminates high-cost machining operations. When castings are preferred, bore alignment is less critical if spherical roller bearings are specified.



TSR



TSR-EJ



TSR-EM

CYLINDRICAL ROLLER THRUST BEARINGS

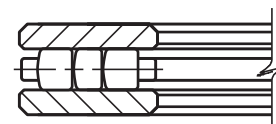
Timken's cylindrical roller thrust bearings are designed to operate under heavy loads at moderate speeds. Standard versions can be operated at peripheral speeds (bearing O.D.) of up to 3000 feet per minute. Special design features are available for both the bearing and mounting permitting even higher rotational speeds for this type of bearing. Two types of cylindrical roller thrust bearings, TP and TPS, are available.

TP

Type TP bearings include two flat hardened and ground steel washers with a cage retainer holding one or more controlled contour rollers in each pocket. If specifications call for two or more rollers per pocket, they are manufactured to different lengths. The longer rollers are placed in alternate positions in adjacent pockets. Overlapping roller paths prevent "grooving" of the races and prolong bearing life. Due to the simplicity of design, standard TP thrust bearings are among the most economical to buy and install.

Minor radial displacement of the races does not affect the operation of the TP bearing, resulting in manufacturing economies and simplified installation.

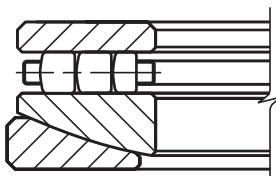
Shaft and housing seats must be square to the axis of rotation to prevent initial misalignment problems.



TP

TPS

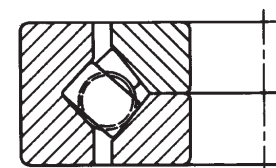
The TPS design is similar to the TP style, except the bottom washer assembly is comprised of two races, with the contacting faces spherically ground. The TPS bearing is self-adjusting to initial misalignment. It is not suggested for installations where alignment may be continuously changing (dynamic misalignment).



TPS

TXR

The crossed roller bearing is ideal for machine tool applications such as vertical boring mills, vertical grinding machines and other similar applications. A crossed roller bearing is comprised of two sets of bearing races and rollers brought together at right angles to each other – with alternate rollers facing in opposite directions – and within a section height not much greater than that of a single bearing housing.



TXR



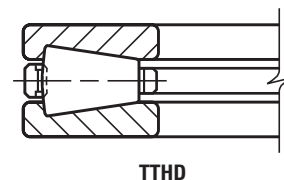


TAPERED ROLLER THRUST BEARINGS

Timken true rolling tapered roller thrust bearings include rollers that have conical sections. These bearings have been engineered so that the rollers and raceways form a cone in which the vertex is on the center line of the bearing. This bearing geometry assures a true rolling motion. In addition, the large end of each tapered roller is spherically ground so that its curvature conforms with the concave face of the washer rib. Pressure between the rib and roller, under load, guides the rollers accurately. Timken manufactures five types of tapered roller thrust bearings: standard (TTHD), V-Flat (TTVF) self-aligning V-Flat (TTVS), concave washer (TTSV), and convex washer (TTSX).

TTHD

The TTHD design has an identical pair of hardened and ground steel washers with tapered raceways. Both washers have the same bore and O.D., therefore housings should be designed to clear the O.D. of rotating washers and shafts stepped to clear the bore of stationary washers. Controlled contour tapered rollers are equally spaced by a cage. The TTHD bearing is well-suited for applications where extremely high thrust loads and heavy shock may be encountered as in crane hooks. For very low speed applications with unusually high loading, TTHD bearings can be supplied with a full complement of rollers. These bearings are identified in the tables by suffix 00278 following the bearing number. Applications for full-complement bearings should be reviewed by your Timken representative to ensure selection of the proper bearing.



TTVF, TTVS, TTSV, TTSX

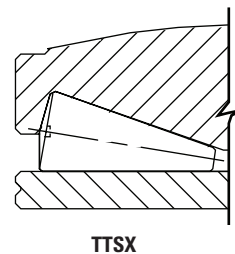
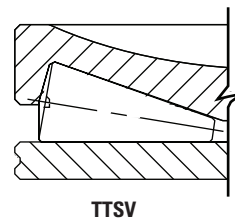
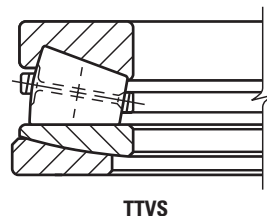
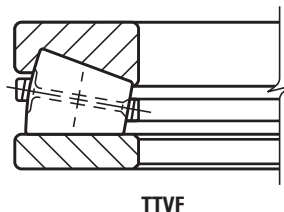
V-Flat Tapered Roller thrust bearings (TTVF and TTVS) combine the outstanding features of tapered thrust and cylindrical roller bearings, offering the highest possible capacity of any thrust bearing of its size. The V-Flat design includes one flat washer and one with a tapered raceway matching the rollers. The design was originally developed for screwdown applications in metal rolling mills where thrust loads exceeding one million pounds are common. The V-Flat bearings have exceptional dynamic capacity within a given envelope and provides static capacity. They have been highly successful in heavily loaded extruders, in cone crushers and other applications where a wide range of operating conditions are found. Most sizes utilize cages with hardened pins through the center of the rollers, allowing closer spacing of the rollers to maximize capacity.

Smaller sizes have brass cages, designed for unidirectional retention of rollers.

Both the pin type and brass cage are designed to permit a full flow of lubricant to all critical surfaces, providing cooler operation.

Self-aligning V-Flat bearings (TTVS) employ the same basic roller and raceway design, except the lower washer is in two pieces, with the contacting faces spherically ground permitting self-alignment under conditions of initial misalignment. TTVS bearings should not be used if dynamic misalignment (changing under load) is expected.

- The contact surface of each roller of the V-Flat bearings has a controlled contour wherein the ends are slightly relieved. This optimizes stress distribution by avoiding concentration of stress in the raceways at the ends of the rollers.
- Conformity between roller end and the rib is controlled to enhance the flow of lubricant between these surfaces, allowing the development of a hydrodynamic oil film between the end of the roller and the guiding surface of the rib.
- Full roller complement designs (TTSV and TTSX) do not have conventional bores, but are provided with center inserts for attachment purposes as well as for lifting.
- The TTSV and TTSX designs offer the highest capacity but at a somewhat reduced speed capability as compared with other V-Flat types.
- The TTSV and TTSX bearings encompass tapered rollers between two raceways. One raceway is flat and the other raceway forms the surface of a cone. The conical raceway has a washer with a rib to resist the radial component of the thrust force caused by the inclined plane and to guide the rollers.



- Lines extended from the TTSV and TTSX roller-to-raceway contact surfaces converge to form a cone. The vertex of this cone is common with the centerline of the bearing and the plane of the raceway surface of the flat washer.
- The TTSV and TTSX design achieves true rolling motion between the tapered rollers and both raceways with no sliding or skidding at any point on the rolling surfaces. The flat raceway permits radial displacement without affecting the operation of the bearing.

TTSP

The types TTSP and TTSPS (not shown) thrust bearings are made up of two tapered thrust races, rollers, cage and outside retainer which holds the components together during shipping and installation. The types TTSP and TTSPS thrust bearings are employed extensively in the steering pivot positions of automotive and industrial applications.

TTC, TTCS

The types TTC, TTCS and TTCL (not shown) thrust bearings consist of two tapered thrust races, rollers and an outside retainer and are cageless. The outside retainer holds the assembly together for shipping and installation. Types TTC, TTCS and TTCL bearings are thrust bearings specifically designed for oscillating applications. These types are identical with the exception of the retainer construction.

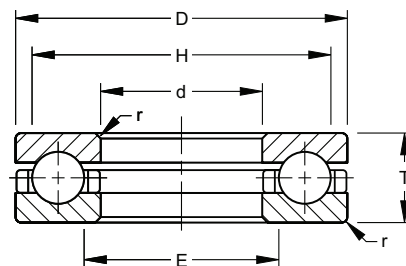




BALL THRUST BEARINGS

TYPE TVB

- Designed for optimum performance in high speed installations.
- Provide axial rigidity, but are not suggested if radial loading is expected.
- Exceptionally easy to mount, with the rotating washer usually shaft-mounted.



DIMENSIONS – LOAD RATINGS

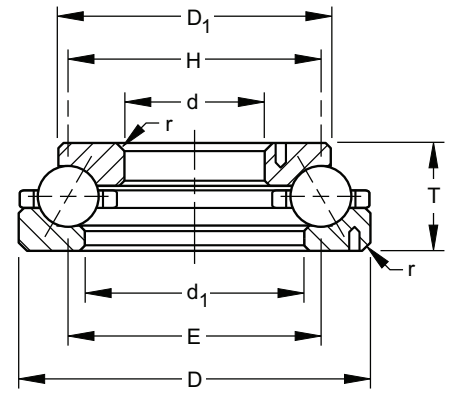
Bearing Number	Bore d	O.D. D	Height T (min.)	Shoulder Diameter		Fillet Radius ⁽¹⁾ r (max.)	Wt.	Load Rating	
				Shaft H (min.)	Housing E (max.)			Static Load Rating C _{0a}	Dynamic Load Rating C _t
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.
50TVB190	127.000 5.0000	184.150 7.2500	41.275 1.6250	170.7 6.72	140.5 5.53	2.4 0.09	3.4 7.2	583.0 131000	169.0 38000
52TVB253	133.350 5.2500	203.200 8.0000	50.800 2.0000	185.7 7.31	150.8 5.94	2.4 0.09	5.5 12.2	756.0 170000	223.0 50200
55TVB245	139.700 5.5000	209.550 8.2500	47.625 1.8750	192.1 7.56	157.2 6.19	2.4 0.09	5.1 11.3	770.0 173000	231.0 52000
57TVB248	146.050 5.7500	215.900 8.5000	47.625 1.8750	198.4 7.81	163.5 6.44	2.4 0.09	5.3 11.7	810.0 182000	239.0 53800
60TVB252	152.400 6.0000	222.250 8.7500	47.625 1.8750	204.8 8.06	169.9 6.69	2.4 0.09	5.6 12.4	832.0 187000	238.0 53500
62TVB291	158.750 6.2500	228.600 9.0000	47.625 1.8750	215.1 8.47	172.2 6.78	2.4 0.09	5.8 12.8	867.0 195000	245.0 55100
65TVB293	165.100 6.5000	241.300 9.5000	57.150 2.2500	224.6 8.84	181.8 7.16	3.2 0.12	7.7 17.0	1060.0 238000	317.0 71300
67TVB296	171.450 6.7500	247.650 9.7500	57.150 2.2500	229.4 9.03	189.7 7.47	3.2 0.12	7.9 17.5	1110.0 251000	328.0 73800
70TVB298	177.800 7.0000	254.000 10.0000	57.150 2.2500	235.7 9.28	196.1 7.72	3.2 0.12	8.2 18.1	1170.0 263000	339.0 76300
75TVB343	190.500 7.5000	266.700 10.5000	57.150 2.2500	250 9.84	207.2 8.16	3.2 0.12	9.1 20.0	1140.0 255000	321.0 72300
75TVB344	190.500 7.5000	276.225 10.8750	69.850 2.7500	258.8 10.19	208 8.19	3.2 0.12	12.7 27.9	1390.0 313000	407.0 91400
80TVB346	203.200 8.0000	279.400 11.0000	57.150 2.2500	262.7 10.34	219.9 8.66	3.2 0.12	8.8 19.3	1370.0 309000	395.0 88900
80TVB347	203.200 8.0000	295.275 11.6250	76.200 3.0000	273.1 10.75	222.2 8.75	6.4 0.25	15.6 34.5	1700.0 382000	504.0 113000
85TVB391	215.900 8.5000	292.100 11.5000	57.150 2.2500	275.4 10.84	232.6 9.16	3.2 0.12	10.1 22.2	1280.0 289000	349.0 78400
90TVB393	228.600 9.0000	304.800 12.0000	57.150 2.2500	288.1 11.34	245.3 9.66	3.2 0.12	9.7 21.3	1620.0 365000	442.0 99400
95TVB431	241.300 9.5000	317.500 12.5000	57.150 2.2500	300.8 11.84	258 10.16	3.2 0.12	11.1 24.4	1380.0 311000	366.0 82400
100TVB433	254.000 10.0000	342.900 13.5000	57.150 2.2500	324.6 12.78	272.3 10.72	6.4 0.25	13.4 29.5	1560.0 351000	431.0 96800
105TVB471	266.700 10.5000	355.600 14.0000	57.150 2.2500	337.3 13.28	285.0 11.22	6.4 0.25	13.9 30.7	1810.0 407000	476.0 107000
110TVB472	279.400 11.0000	368.300 14.5000	57.150 2.2500	350 13.78	297.7 11.72	6.4 0.25	14.5 31.9	1870.0 421000	486.0 109000
120TVB511	304.800 12.0000	393.700 15.5000	57.150 2.2500	375.4 14.78	323.1 12.72	6.4 0.25	15.6 34.5	2000.0 450000	507.0 114000
130TVB551	330.200 13.0000	419.100 16.5000	63.500 2.5000	400.8 15.78	348.5 13.72	6.4 0.25	18 39.6	2470.0 555000	627.0 141000
140TVB581	355.600 14.0000	444.500 17.5000	63.500 2.5000	426.2 16.78	373.9 14.72	6.4 0.25	19.2 42.3	2620.0 590000	649.0 146000
150TVB610	381.000 15.0000	482.600 19.0000	63.500 2.5000	460.4 18.12	403.6 15.89	6.4 0.25	24.8 54.7	2620.0 590000	649.0 146000
160TVB640	406.400 16.0000	508.000 20.0000	63.500 2.5000	482.6 19.00	431.8 17.00	6.4 0.25	26.3 57.9	2780.0 624000	677.0 152000

⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.

ANGULAR CONTACT BALL THRUST BEARINGS

TYPE TVL

- Provides exceptionally low friction, cool running and quiet operation when run at high speeds.
- Although designed exclusively for thrust loads, will accommodate some radial loading.



DIMENSIONS – LOAD RATINGS(2)

Bearing Number	Bore d	O.D. D	Height T	Washers		Shoulder Diam.		Dowel Pin (one per Washer)			Fillet(1) Radius r	Weight	Load Rating		
				Small Diameter O.D. D1	Large Bore I.D. d1	Shaft H (Min.)	Housing E (Max.)	Pin Diameter	Hole Location from Centerline				kg. lbs.	Static Load Rating Coa	Dynamic Load Rating Ct
									Small Bore Washer	Large Bore Washer					
90TVL710	228.600 9.0000	295.275 11.6250	38.100 1.5000	277.81 10.938	246.06 9.688	261.9 10.31	261.9 10.31	— —	— —	— —	3.2 0.12	6.2 13.6	636.0 143000	164.0 36900	
120TVL700	304.800 12.0000	406.400 16.0000	57.150 2.2500	368.30 14.500	342.90 13.500	355.6 14.00	355.6 14.00	9.52 0.375	165.1 6.50	190.5 7.50	3.2 0.12	18.5 40.8	1600.0 359000	429.0 96400	
150TVL701	381.000 15.0000	520.700 20.5000	84.125 3.3120	482.60 19.000	419.10 16.500	450.8 17.75	450.8 17.75	12.70 0.500	206.4 8.12	244.5 9.62	4.8 0.19	50.2 110.7	2700.0 606000	721.0 162000	
170TVL500	431.800 17.0000	635.000 25.0000	88.900 3.5000	565.15 22.250	488.95 19.250	533.4 21.00	533.4 21.00	12.70 0.500	235 9.25	298.4 11.75	7.9 0.31	89.6 197.5	4390.0 986000	1130.0 254000	
180TVL605	457.200 18.0000	625.475 24.6250	92.075 3.6250	549.28 21.625	508 20.000	541.3 21.31	541.3 21.31	15.88 0.625	247.6 9.75	285.8 11.25	3.2 0.12	78.4 172.9	4790.0 1076000	1280.0 288000	
195TVL470	495.300 19.5000	584.200 23.0000	57.150 2.2500	571.50 22.500	508 20.000	539.8 21.25	539.8 21.25	9.52 0.375	258.8 10.19	281 11.06	3.2 0.12	28.4 62.7	2600.0 585000	596.0 134000	
200TVL850	508.000 20.0000	704.850 27.7500	117.475 4.6250	628.68 24.750	565.15 22.250	606.4 23.88	606.4 23.88	15.88 0.625	276.2 10.88	330.2 13.00	6.4 0.25	127.3 280.7	5160.0 1160000	1350.0 303000	
201TVL615	511.175 20.1250	628.650 24.7500	66.675 2.6250	590.55 23.250	549.28 21.625	569.9 22.44	569.9 22.44	12.70 0.500	268.3 10.56	300 11.81	3.2 0.12	41.9 92.3	3320.0 746000	787.0 177000	
202TVL620	514.350 20.5000	704.850 27.7500	114.300 4.5000	622.30 24.500	571.50 22.500	609.6 24.00	609.6 24.00	20.64 0.812	279.4 11.00	327 12.88	6.4 0.25	122.3 269.7	5910.0 1330000	1560.0 351000	
227TVL302	577.850 22.7500	774.700 30.5000	117.475 4.6250	704.85 27.750	622.30 24.500	676.3 26.62	676.3 26.62	20.64 0.812	311.2 12.25	365.1 14.38	6.4 0.25	149.8 330.2	6620.0 1490000	1690.0 379000	
233TVL303	593.725 23.3750	790.575 31.1250	117.475 4.6250	720.72 28.375	650.88 25.625	692.2 27.25	692.2 27.25	22.22 0.875	320.7 12.62	369.9 14.56	6.4 0.25	150.7 332.2	6850.0 1540000	1730.0 388000	
238TVL304	606.425 23.8750	847.725 35.3950	133.350 5.2500	739.78 29.125	688.98 27.125	727.1 28.62	727.1 28.62	22.22 0.875	327 12.88	396.9 15.62	6.4 0.25	212.6 468.7	8510.0 1910000	2200.0 494000	
245TVL716	622.300 24.5000	768.350 30.2500	82.550 3.2500	733.42 28.875	680.47 26.790	695.3 27.38	695.3 27.38	12.70 0.500	323.8 12.75	371.5 14.62	3.2 0.12	76.2 168.0	3830.0 861000	863.0 194000	
245TVL612	622.300 24.5000	831.850 32.7500	117.475 4.6250	742.95 29.250	679.45 26.750	727.1 28.62	727.1 28.62	15.88 0.625	330.2 13.00	396.9 15.62	6.4 0.25	164.5 362.7	7070.0 1590000	1770.0 397000	
252TVL505	341.350 25.2500	793.750 31.2500	88.900 3.5000	746.12 29.375	708.02 27.875	717.6 28.25	717.6 28.25	12.70 0.500	342.9 13.50	376.2 14.81	6.4 0.25	89.3 197.0	5430.0 1220000	1300.0 293000	
260TVL635	660.400 26.0000	893.350 35.2500	133.350 5.2500	790.58 31.125	727.08 28.625	777.9 30.62	777.9 30.62	20.64 0.812	355.6 14.00	422.3 16.62	6.4 0.25	226.9 500.4	9520.0 2140000	2370.0 533000	
302TVL510	768.350 30.2500	920.750 36.2500	88.900 3.5000	873.12 34.375	835.02 32.875	844.6 33.25	844.6 33.25	12.70 0.500	408 16.06	439.7 17.31	6.4 0.25	105.2 231.9	6360.0 1430000	1450.0 325000	
302TVL624	768.350 30.2500	1006.475 39.6250	139.700 5.5000	901.7 35.500	838.2 33.000	887.4 34.94	887.4 34.94	22.22 0.875	409.6 16.12	476.2 18.75	6.4 0.25	271.1 597.8	10600.0 2370000	2540.0 570000	
303TVL706	771.525 30.3750	898.525 35.3750	63.500 2.5000	860.42 33.875	809.62 31.875	835 32.88	835 32.88	12.70 0.500	403.2 15.88	431.8 17.00	6.4 0.25	58 128.0	3900.0 877000	778.0 175000	
309TVL707	785.812 30.9375	952.500 37.5000	95.250 3.7500	882.65 34.750	857.25 33.750	870 34.25	870 34.25	15.88 0.625	415.9 16.38	454 17.88	6.4 0.25	117.9 260.0	4230.0 952000	1100.0 248000	
310TVL625	787.400 31.0000	1025.525 40.3750	139.700 5.5000	917.58 36.125	893.76 35.188	906.5 35.69	906.5 35.69	22.22 0.875	422.3 16.62	485.8 19.12	6.4 0.25	263.5 581.0	10900.0 2450000	2590.0 582000	
317TVL307	806.450 31.7500	1025.525 40.3750	127.000 5.0000	933.45 36.750	873.12 34.375	914.4 36.00	914.4 36.00	22.22 0.875	427 16.81	476.2 18.75	6.4 0.25	240.6 530.6	10900.0 2450000	2590.0 582000	
402TVL717	1022.350 40.2500	1181.100 46.5000	88.900 3.5000	1133.48 44.625	1069.98 42.125	1101.7 43.38	1101.7 43.38	19.05 0.750	530.2 20.88	571.5 22.50	6.4 0.25	147.8 326.0	8180.0 1840000	1710.0 384000	
410TVL718	1041.400 41.0000	1260.475 49.6250	127.000 5.0000	1189.04 46.812	1112.84 43.812	1150.9 45.31	1150.9 45.31	19.05 0.750	544.5 21.44	606.4 23.88	6.4 0.25	308.8 681.0	14000.0 3140000	3060.0 687000	
420TVL721	1066.800 42.0000	1285.875 50.6250	127.000 5.0000	1214.44 47.812	1138.24 44.812	1176.3 46.31	1176.3 46.31	22.22 0.875	560.4 22.06	616 24.25	6.4 0.25	315.2 695.0	14000.0 3140000	3060.0 687000	
530TVL719	1346.200 53.0000	1517.650 59.7500	104.775 4.1250	1457.32 57.375	1406.52 55.375	1431.9 56.38	1431.9 56.38	22.22 0.875	695.3 27.38	733.4 28.88	6.4 0.25	229.99 507.0	9080.0 2040000	1830.0 412000	
540TVL720	1371.600 54.0000	1619.250 63.7500	139.700 5.5000	1533.52 60.375	1457.32 57.375	1495.4 58.88	1495.4 58.88	22.22 0.875	714.4 28.12	781 30.75	6.4 0.25	480.3 1059.0	18000.0 4060000	3630.0 815000	

(1) Maximum shaft or housing fillet radius that bearing corners will clear.

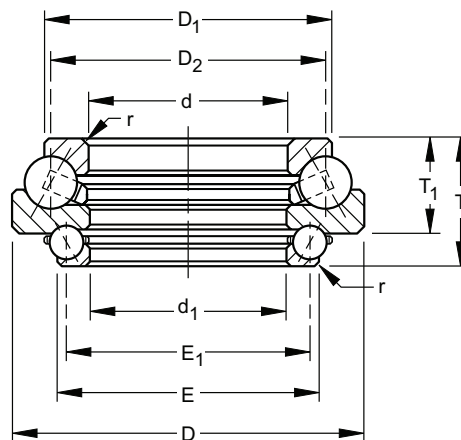
(2) See engineering section for application of Equivalent Thrust Load Factors: $X = 0.76$, $Y = 1.00$, $\frac{T}{R} (\text{min}) = 1.56$. $\left[\frac{T}{R} \right]$ is Thrust Load ÷ Radial Load



ANGULAR CONTACT BALL THRUST BEARINGS

TYPE DTVL

- Capable of carrying thrust in one direction, plus a lighter thrust in the opposite direction.
- Designed with an upper and lower complement of angular contact balls and three race elements.



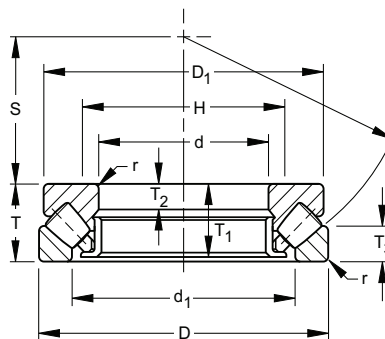
DIMENSIONS – LOAD RATINGS⁽²⁾

Bearing Number	Bore		O.D. D	Height T	Upper Race		Lower Race		T ₁	Fillet ⁽¹⁾ Radius r (Max.)	Weight	Load Rating		
	Upper d	Lower d ₁			O.D. D ₁	Shoulder D ₂	O.D. E	Shoulder E ₁				Upper Static Load Rating C _{0a}	Dynamic Load Rating C ₁	Lower Static Load Rating C _{0a}
	mm in.	mm in.												
200DTV1722	508.000 20.0000	508.000 20.0000	742.95 29.2500	171.45 6.7500	679.45 26.750	616 24.250	587.38 23.125	558.8 22.00	127.000 5.000	6.4 0.25	177.3 391.0	5340 1200000	1560 351000	2310 519000
202DTV1723	514.350 20.2500	511.175 20.1250	704.85 27.7500	158.75 6.2500	622.30 24.500	609.60 24.000	590.55 23.250	569.9 22.44	114.3 4.50	6.4 0.25	133.3 294.0	5430 1220000	1480 332000	3750 844000
235DTV1724	596.900 23.5000	590.550 23.2500	838.2 33.0000	184.15 7.2500	774.70 30.500	711.20 28.000	676.28 26.625	647.7 25.50	139.7 5.50	6.4 0.25	246.2 543.0	7560 1700000	1970 443000	3660 822000
245DTV1725	622.300 24.5000	619.125 24.3750	815.975 32.1250	158.75 6.2500	730.25 28.750	717.60 28.250	698.50 27.500	677.9 26.68	114.3 4.50	6.4 0.25	157.4 347.0	6410 1440000	1640 369000	4430 995000
266DTV1726	676.275 26.6250	673.100 26.5000	914.4 36.0000	193.675 7.6250	876.30 34.500	787.40 31.000	787.4 31.00	743 29.25	142.88 5.625	6.4 0.25	296.6 654.0	8510 1910000	2480 558000	6320 1420000
305DTV1727	774.700 30.5000	768.35 30.2500	971.55 38.2500	158.75 6.2500	885.82 34.875	873.10 34.380	847.72 33.38	827.1 32.56	114.3 4.50	6.4 0.25	194.6 429.0	7780 1750000	1880 423000	5390 1210000
312DTV1728	793.750 31.2500	787.400 31.0000	1006.475 39.6250	200.025 7.8750	1000.12 39.375	895.40 35.250	901.7 35.50	863.6 34.00	139.7 5.50	6.4 0.25	325.2 717.0	10200 2300000	2480 557000	7200 1620000
405DTV1729	1028.700 40.5000	1025.525 40.3750	1231.9 48.5000	158.75 6.2500	1143 45.000	1130.30 44.500	1104.9 43.50	1084.3 42.69	114.3 4.50	6.4 0.25	254.4 561.0	10200 2280000	2240 504000	6540 1470000
412DTV1730	1047.750 41.2500	1041.400 41.0000	1260.475 49.6250	200.025 7.8750	1254.12 49.375	1149.40 45.250	1155.7 45.50	1117.6 44.00	139.7 5.50	6.4 0.25	417.2 920.0	12300 2760000	2780 625000	8230 1850000
541DTV1731	1374.775 54.1250	1371.600 54.0000	1597.025 62.8750	247.65 9.7500	1536.70 60.500	1481.10 58.310	1489.08 58.625	1447.8 57.00	168.28 6.625	6.4 0.25	654.4 1443.0	17700 3980000	3580 804000	11100 2500000

⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.

⁽²⁾ See engineering section for application of Equivalent Thrust Load Factors: X = 0.76, Y = 1.00, $\frac{T}{R}$ (min) = 1.56. $\left[\frac{T}{R}\right]$ is Thrust Load ÷ Radial Load

SPHERICAL ROLLER THRUST BEARINGS



TYPE TSR

- Design achieves a high thrust capacity with low friction and continuous roller alignment.
- Spherically contoured rollers, arranged in steep angular position, not only accommodates high thrust loads, but supports moderate radial loads as well.
- Low friction of the bearing results from a combination of bearing geometry and manufacturing technology.

TYPE TSR-EM

- Utilize bronze retainers and enhanced internal geometry allowing for higher dynamic load ratings and improved lubrication characteristics.
- Utilizes spherically contoured rollers arranged in a steep angular configuration to accommodate high thrust load alone or in combination with moderate radial loads.
- Possesses inherent dynamic misalignment capabilities.

DIMENSIONS – LOAD RATINGS

Bearing Number	Bore d	O.D. D	Height T	Shoulder Diameter		Inner Ring			Outer Ring Height T ₃	S	Fillet Radius r (Max.)	Wt.	Load Rating		Approx. Limiting Speed (for Oil Bath Only)	k ⁽²⁾
				d ₁ Housing (Min.)	H Shaft (Max.)	O.D. D ₁	Assembly Height T ₁	Pilot Height T ₂					Static Load Rating C _{0a}	Dynamic Load Rating C ₁		
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.	RPM	
29422	110 4.3307	230 9.0551	73 2.8740	162 6.378	165 6.496	220 8.661	69 2.717	26 1.024	35 1.378	69 2.717	2.5 0.10	33.4 33.4	1150 260000	800 176000	1500	30
29424	120 4.7244	250 9.8425	78 3.0709	174 6.850	180 7.087	236 9.291	74 2.913	29 1.142	37 1.476	74 2.933	3.0 0.12	18.5 40.7	1180 256000	965 216000	1350	40
29326	130 5.1181	225 8.8583	58 2.2835	171 6.744	177 6.963	215 8.465	55 2.165	19 0.748	29 1.130	75 2.972	2.0 0.08	9.8 21.6	880 197000	600 132000	1700	22
29426	130 5.1181	270 10.6299	85 3.3464	187 7.375	195 7.677	255 10.039	81 3.189	31 1.22	42 1.669	81 3.189	3.0 0.12	23.9 52.6	1730 388000	1120 253000	1250	60
29330	150 5.9055	250 9.8425	60 2.3622	194 7.638	195 7.677	240 9.449	57 2.244	20 0.787	29 1.142	87 3.425	2.0 0.08	12.5 27.5	1140 255000	670 150000	1550	30
29430	150 5.9055	300 11.8110	90 3.5433	213 8.405	220 8.661	285 11.220	86 3.386	32 1.260	44 1.732	92 3.622	3.0 0.12	29.3 64.5	1930 440000	1220 275000	1100	80
29334	170 6.6929	280 11.0236	67 2.6378	216 8.504	220 8.661	270 10.630	64 2.520	23 0.906	32 1.280	96 3.780	2.5 0.10	16.5 36.3	1500 340000	880 196000	1350	50
29434	170 6.6929	340 13.3858	103 4.0551	243 9.567	245 9.646	324 12.756	99 3.898	37 1.457	50 1.968	104 4.094	4.0 0.16	42.4 93.5	2650 600000	1630 365000	950	140
29338EJ	190 7.4803	320 12.5984	78 3.0709	246 9.685	250 9.843	308 12.126	74 2.913	27 1.063	38 1.496	110 4.331	3.0 0.12	25.6 56.5	2442 549000	1481 333000	1150	80
29438EJ	190 7.4803	380 14.9606	115 4.5276	271 10.669	275 10.827	360 14.173	111 4.370	41 1.614	55 2.185	117 4.606	4.0 0.16	60.3 133.0	4168 937000	2482 558000	850	210
29340	200 7.8740	340 13.3858	85 3.3465	264 10.3937	265 10.4331	325 12.7953	81 3.2452	29 1.1417	40 1.5748	114 4.4882	3.0 0.12	29 63	2157 485000	1236 278000	950	100
29440	200 7.8740	400 15.7480	122 4.8031	286 11.254	290 11.417	380 14.961	117 4.606	43 1.693	59 2.323	122 4.803	4.0 0.16	69.8 154.0	3625 815000	2135 480000	800	260
29344	220 8.6614	360 14.1732	85 3.3464	280 11.024	285 11.220	345 13.583	81 3.189	29 1.142	41 1.614	125 4.921	3.0 0.12	33.9 74.8	2500 550000	1340 300000	1000	120
29444	220 8.6614	420 16.5354	122 4.8031	307 12.106	310 12.205	400 15.748	117 4.606	43 1.693	59 2.323	133 5.236	5.1 0.20	73.9 163.0	3800 865000	2200 500000	750	300
29348	240 9.4488	380 14.9606	85 3.3464	300 11.811	300 11.811	365 14.370	81 3.189	29 1.142	41 1.614	135 5.315	3.0 0.12	41.9 92.4	2650 600000	1400 315000	950	140
29448EM	240 9.4488	440 17.3228	122 4.8031	315 12.4016	322 12.6772	385 15.1575	87 3.4252	46 1.8110	61 2.4016	142 5.5906	6.1 0.24	78 171	4884 1098000	2736 615000	750	350

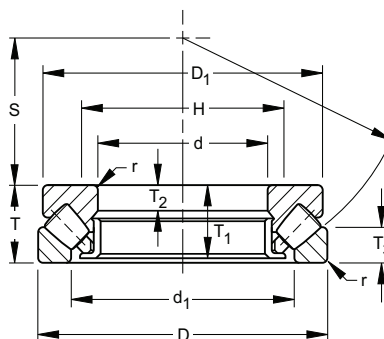
⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.

⁽²⁾ Centrifugal force constant. See engineering section for calculations using this factor.



SPHERICAL ROLLER THRUST BEARINGS

TYPE TSR, TSR-EM – *continued*



DIMENSIONS – LOAD RATINGS - *continued*

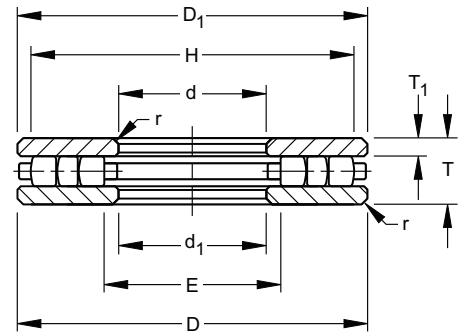
Bearing Number	Bore d	O.D. D	Height T	Shoulder Diameter		Inner Ring			Outer Ring Height T ₃	S	Fillet ⁽¹⁾ r	Wt.	Load Rating		Approx. Limiting Speed (for Oil Bath Only)	k ⁽²⁾
				d ₁ (Housing (Min.))	H Shaft (Max.)	O.D. D ₁	Assembly Height T ₁	Pilot Height T ₂					Static Load Rating C _{0a}	Dynamic Load Rating C _i		
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.	RPM	
29352	260 10.2362	420 16.5354	95 3.7402	329 12.953	330 12.992	405 15.945	91 3.583	32 1.260	45 1.791	148 5.827	4.0 0.16	51.2 113.0	3350 750000	1800 400000	850	230
29452	260 10.2362	480 18.8976	132 5.1968	357 14.055	360 14.173	460 18.110	127 5.000	48 1.890	64 2.520	154 6.063	5.1 0.20	103 227.0	4900 1120000	1800 620000	650	500
29360	300 11.8110	480 18.8976	109 4.2913	379 14.921	380 14.961	460 18.110	105 4.134	37 1.457	50 1.988	168 6.614	4.0 0.16	76.6 169.0	4150 930000	2160 490000	700	350
29460	300 11.8110	540 21.2598	145 5.7086	402 15.827	410 16.142	515 20.276	140 5.512	52 2.047	70 2.776	175 6.890	5.1 0.20	136 301.0	6400 1430000	3450 770000	550	780
29364	320 12.5984	500 19.6850	109 4.2913	399 15.709	400 15.748	482 18.976	105 4.134	37 1.457	53 2.087	180 7.087	4.0 0.16	79.8 176.0	4300 980000	2240 500000	650	380
29468	340 13.3858	620 24.4094	170 6.6929	462 18.189	465 18.307	590 23.228	164 6.457	61 2.402	82 3.248	201 7.913	6.1 0.24	220 486.0	8500 1900000	4500 1020000	450	1350
29372	360 14.1732	560 22.0472	122 4.8031	448 17.638	450 17.717	540 21.260	117 4.606	41 1.614	59 2.343	202 7.953	4.0 0.16	113 249.0	5600 1250000	2800 620000	550	640
29476	380 14.9606	670 26.3780	175 6.8898	504 19.842	510 20.079	640 25.197	168 6.614	63 2.480	85 3.331	220 8.740	6.1 0.24	261 575.0	9000 2040000	4750 1060000	410	1700
29576	380 14.9606	820 32.2835	265 10.4330	570 22.441	578 22.756	780 30.709	226 10.078	100 3.927	128 5.062	241 9.488	9.1 0.36	824 1816.0	17300 3900000	9500 2120000	280	5550
29380	400 15.748	620 24.4094	132 5.1968	494 19.449	500 19.685	596 23.465	127 5.000	44 1.732	64 2.520	225 8.858	5.1 0.20	165 363.0	7100 1600000	3450 780000	500	970
29284EM	420 16.5354	580 22.8346	95 3.7402	479 18.8583	500 19.685	542 21.339	70 2.7559	41 1.6142	50 1.9685	228 8.9764	5.1 0.20	70 154.0	5329 1198000	2624 590000	630	300
29388	440 17.3228	680 26.7717	145 5.7089	548 21.5748	563 22.1654	657 25.866	140 5.5118	49 1.9291	69 2.7165	246 9.6850	5.1 0.20	180 397.0	7588 1706000	3647 820000	480	1400
29488	440 17.3228	780 30.7087	206 8.1102	588 23.150	595 23.425	745 29.331	199 7.835	74 2.913	99 3.917	257 10.118	7.1 0.28	411 906.0	13200 2900000	6700 1500000	320	3400
29392	460 18.1102	710 27.9528	150 5.9055	566 22.293	575 22.638	685 26.969	144 5.669	51 2.008	72 2.857	257 10.118	5.1 0.20	220 486.0	9300 2100000	4400 1000000	400	1700
29496EM	480 18.8976	850 33.4646	224 8.8189	626 24.6457	658 25.9055	770 30.315	159 6.2598	93 3.6614	110 4.3307	279 10.9843	9.7 0.38	550 1212.0	22458 5049000	11342 2550000	290	4700
294/500	500 19.6850	870 34.2520	224 8.8189	661 26.024	670 26.378	830 32.677	216 8.504	81 3.189	107 4.213	290 11.417	7.1 0.28	560 1235.0	16000 3600000	8000 1800000	270	4800
293/530	530 20.8661	800 31.4961	160 6.2992	648 25.512	650 25.591	772 30.394	154 6.063	54 2.126	76 2.992	295 11.614	6.1 0.24	288 634.0	11000 2450000	5100 1140000	350	2500
293/600	600 23.6220	900 35.4331	180 7.0866	727 28.6220	730 28.7402	868 34.173	173 6.8110	61 2.4016	87 3.4252	333 13.1102	5.1 0.20	635 1400.0	16770 3770000	7619 1713000	320	4200
294/630	630 24.8031	1090 42.9134	280 11.0236	831 32.707	850 33.465	1044 41.102	271 10.669	101 3.976	133 5.236	365 14.393	9.1 0.36	1170 2580.0	23000 5200000	11400 2550000	250	12200

(1) Maximum shaft or housing fillet radius that bearing corners will clear.
 (2) Centrifugal force constant. See engineering section for calculations using this factor.

CYLINDRICAL ROLLER THRUST BEARINGS

TYPE TP

- Most economical to buy and install because of design simplicity.
- Minor radial displacement of the races does not affect its operation, resulting in manufacturing economies and simplified installation.



DIMENSIONS – LOAD RATINGS

Bearing Number	Bore d	O.D. D	Height T	Washers			Shoulder Diameter		Fillet ⁽¹⁾ Radius r (Max.)	Wt.	Load Rating	
				Thickness T ₁	Small Diameter O.D. D ₁	Large Bore I.D. d ₁	Shaft H (Min.)	Housing E (Max.)			Static Load Rating C _{0a}	Dynamic Load Rating C _t
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.	
20TP103	50.800 2.0000	152.400 6.0000	34.925 1.3750	9.52 0.375	150.81 5.938	52.39 2.062	141.3 5.56	61.9 2.44	1.6 0.06	3.7 8.1	814 183000	331 74500
20TP104	50.800 2.0000	177.800 7.0000	34.925 1.3750	9.52 0.375	176.21 6.938	52.39 2.062	163.5 6.44	65.1 2.56	1.6 0.06	5.1 11.3	1010 227000	398 89500
30TP106	76.200 3.0000	152.400 6.0000	34.925 1.3750	9.52 0.375	150.81 5.938	77.79 3.062	142.9 5.62	85.7 3.38	1.6 0.06	3.2 7.0	747 168000	340 76500
30TP107	76.200 3.0000	177.800 7.0000	34.925 1.3750	9.52 0.375	176.21 6.938	77.79 3.062	166.7 6.56	87.3 3.44	1.6 0.06	4.6 10.2	1040 234000	414 93200
30TP108	76.200 3.0000	203.200 8.0000	34.925 1.3750	9.52 0.375	201.61 7.938	77.79 3.062	188.9 7.44	90.5 3.56	1.6 0.06	6.3 13.9	1380 311000	520 117000
30TP109	76.200 3.0000	228.600 9.0000	34.925 1.3750	9.52 0.375	227.01 8.938	77.79 3.062	212.7 8.38	92.1 3.62	1.6 0.06	8.2 18.1	1800 405000	636 143000
35TP113	88.900 3.5000	132.558 5.2188	25.400 1.0000	7.14 0.281	130.97 5.156	90.49 3.562	123.8 4.88	97.6 3.84	1.6 0.06	1.4 3.0	381 85600	180 40400
40TP114	101.600 4.0000	177.800 7.0000	44.450 1.7500	12.7 0.500	176.21 6.938	103.19 4.062	168.3 6.62	111.1 4.38	1.6 0.06	5 11.0	1030 231000	503 113000
40TP115	101.600 4.0000	203.200 8.0000	44.450 1.7500	12.7 0.500	201.61 7.938	103.19 4.062	190.5 7.50	114.3 4.50	1.6 0.06	7.1 15.6	1370 308000	589 132000
40TP116	101.600 4.0000	228.600 9.0000	44.450 1.7500	12.7 0.500	227.01 8.938	103.19 4.062	214.3 8.44	115.9 4.56	1.6 0.06	9.5 21.0	1770 397000	676 152000
40TP117	101.600 4.0000	254 10.0000	44.450 1.7500	12.7 0.500	252.41 9.938	103.19 4.062	238.1 9.38	117.5 4.62	1.6 0.06	11.6 25.6	2220 498000	896 202000
50TP119	127 5.0000	203.200 8.0000	44.450 1.7500	12.7 0.500	201.61 7.938	128.59 5.062	190.5 7.50	139.7 5.50	1.6 0.06	5.9 13.1	1280 288000	593 133000
50TP120	127 5.0000	228.600 9.0000	44.450 1.7500	12.7 0.500	227.01 8.938	128.59 5.062	215.9 8.50	139.7 5.50	1.6 0.06	8.3 18.4	1710 385000	716 161000
50TP121	127 5.0000	254 10.0000	50.800 2.0000	14.29 0.562	252.41 9.938	128.59 5.062	239.7 9.44	141.3 5.56	3.2 0.12	12.4 27.4	2180 491000	841 189000
50TP122	127 5.0000	279.400 11.0000	50.800 2.0000	14.29 0.562	277.81 10.938	128.59 5.062	261.9 10.31	144.5 5.69	3.2 0.12	15.8 34.8	2760 620000	996 224000
50TP123	127 5.0000	304.800 12.0000	50.800 2.0000	14.29 0.562	303.21 11.938	128.59 5.062	288.9 11.38	146 5.75	3.2 0.12	19.4 42.8	3290 789000	1170 262000
60TP124	152.400 6.0000	228.600 9.0000	50.800 2.0000	14.29 0.562	227.01 8.938	153.99 6.062	217.5 8.56	163.5 6.44	3.2 0.12	7.6 16.8	1410 317000	600 135000
60TP125	152.400 6.0000	254 10.0000	50.800 2.0000	14.29 0.562	252.41 9.938	153.99 6.062	241.3 9.50	165.1 6.50	3.2 0.12	10.7 23.7	2000 449000	845 190000
60TP126	152.400 6.0000	279.400 11.0000	50.800 2.0000	14.29 0.562	277.81 10.938	153.99 6.062	265.1 10.44	166.7 6.56	3.2 0.12	14.2 31.4	2700 608000	1000 226000
60TP127	152.400 6.0000	304.800 12.0000	50.800 2.0000	14.29 0.562	303.31 11.938	153.99 6.062	287.3 11.31	169.9 6.69	3.2 0.12	17.7 39.4	3220 725000	1110 250000
70TP129	177.800 7.0000	254 10.0000	50.800 2.0000	14.29 0.562	251.62 9.906	180.18 7.094	242.9 9.56	188.9 7.44	3.2 0.12	9.2 20.2	1620 365000	663 149000
70TP130	177.800 7.0000	279.400 11.0000	50.800 2.0000	14.29 0.562	277.02 10.906	180.18 7.094	266.7 10.50	190.5 7.50	3.2 0.12	12.8 28.3	2400 540000	930 209000
70TP131	177.800 7.0000	304.800 12.0000	50.800 2.0000	14.29 0.562	302.42 11.906	180.18 7.094	288.9 11.38	193.7 7.62	3.2 0.12	16.8 37.0	3090 695000	1080 242000
70TP132	177.800 7.0000	355.600 14.0000	76.200 3.0000	20.64 0.812	353.22 13.906	180.18 7.094	335 13.19	198.4 7.81	6.4 0.25	36.3 80.1	4490 1010000	1750 394000

⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.



CYLINDRICAL ROLLER THRUST BEARINGS

TYPE TP – continued

B

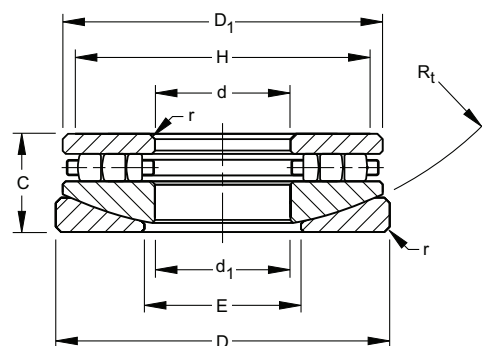
Bearing Number	Bore d	O.D. D	Height T	Washers			Shoulder Diameter		Filler ⁽¹⁾ Radius r (Max.)	Wt.	Load Rating	
				Thickness T ₁	Small Diameter O.D. D ₁	Large Bore I.D. d ₁	Shaft H (Min.)	Housing E (Max.)			Static Load Rating C _{0a}	Dynamic Load Rating C _t
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.	
80TP134	203.2 8.0000	304.8 12.0000	76.2 3.0000	20.64 0.812	302.42 11.906	205.58 8.094	292.1 11.50	215.9 8.50	6.4 0.25	20.5 45.1	2660 599000	1150 258000
80TP135	203.2 8.0000	355.6 14.0000	76.2 3.0000	20.64 0.812	353.22 13.906	205.58 8.094	336.6 13.25	222.2 8.75	6.4 0.25	33 72.8	4230 950000	1730 389000
80TP136	203.2 8.0000	406.4 16.0000	76.2 3.0000	20.64 0.812	404.02 15.906	205.58 8.094	382.6 15.06	227.0 8.94	6.4 0.25	44.5 98.1	5740 1290000	2310 520000
90TP139	228.6 9.0000	355.6 14.0000	76.2 3.0000	20.64 0.812	353.22 13.906	230.98 9.094	339.7 13.38	244.5 9.62	6.4 0.25	29.3 64.5	3910 879000	1460 328000
90TP140	228.6 9.0000	406.4 16.0000	76.2 3.0000	20.64 0.812	404.02 15.906	230.98 9.094	385.8 15.19	249.2 9.81	6.4 0.25	43.6 96.2	5560 1250000	2140 482000
100TP143	254 10.0000	406.4 16.0000	76.2 3.0000	20.64 0.812	404.02 15.906	256.38 10.094	387.4 15.25	273.0 10.75	6.4 0.25	39.5 86.6	5160 1160000	1750 394000
100TP144	254 10.0000	457.2 18.0000	95.25 3.7500	26.19 1.031	454.82 17.906	256.38 10.094	435.0 17.12	276.2 10.88	6.4 0.25	68.8 151.8	7210 1620000	2690 604000
100TP145	254 10.0000	508 20.0000	95.25 3.7500	26.19 1.031	505.62 19.906	256.38 10.094	481.0 18.94	281.0 11.06	6.4 0.25	91.7 202.2	9560 2150000	3670 825000
120TP151	304.8 12.0000	457.2 18.0000	95.25 3.7500	26.19 1.031	454.82 17.906	307.18 12.094	438.2 17.25	323.8 12.75	6.4 0.25	56.7 125.1	6340 1420000	2300 518000
120TP152	304.8 12.0000	508 20.0000	114.3 4.5000	31.75 1.250	505.62 19.906	307.18 12.094	484.2 19.06	328.6 12.94	6.4 0.25	104.5 230.5	7900 1780000	3300 743000
120TP153	304.8 12.0000	609.6 24.0000	114.3 4.5000	31.75 1.250	607.22 23.906	307.18 12.094	584.2 23.00	330.2 13.00	6.4 0.25	168.5 371.5	12900 2900000	4680 1050000
140TP158	355.6 14.0000	508 20.0000	95.25 3.7500	26.19 1.031	504.82 19.875	358.78 14.125	489.0 19.25	374.6 14.75	6.4 0.25	62.6 138.1	7200 1620000	2610 588000
140TP159	355.6 14.0000	558.8 22.0000	95.25 3.7500	26.19 1.031	555.62 21.875	358.78 14.125	535.0 21.06	379.4 14.94	6.4 0.25	89.6 197.5	10000 2250000	3750 802000
140TP160	355.6 14.0000	609.6 24.0000	95.25 3.7500	26.19 1.031	606.4 23.875	358.78 14.125	581.0 22.88	384.2 15.12	6.4 0.25	125.3 276.2	12600 2840000	4040 908000
160TP164	406.4 16.0000	558.8 22.0000	114.3 4.5000	31.75 1.250	555.62 21.875	409.6 16.125	539.8 21.25	425.4 16.75	6.4 0.25	85.9 189.4	7860 1770000	3090 695000
160TP165	406.4 16.0000	609.6 24.0000	114.3 4.5000	31.75 1.250	606.4 23.875	409.6 16.125	585.8 23.06	430.2 16.94	6.4 0.25	121.4 267.7	11200 2510000	4170 937000
160TP166	406.4 16.0000	660.4 26.0000	114.3 4.5000	31.75 1.250	657.2 25.875	409.6 16.125	633.4 24.94	433.4 17.06	6.4 0.25	168.8 372.1	13800 3090000	4710 1060000
180TP168	457.2 18.0000	660.4 26.0000	127 5.0000	34.92 1.375	657.2 25.875	460.4 18.125	635 25.00	482.6 19.00	6.4 0.25	148.8 328.1	11800 2650000	4090 919000
180TP169	457.2 18.0000	711.2 28.0000	127 5.0000	34.92 1.375	708.0 27.875	460.4 18.125	684.2 26.94	484.2 19.06	6.4 0.25	195.3 430.7	15500 3480000	5480 1230000
180TP170	457.2 18.0000	762 30.0000	139.7 5.5000	38.10 1.500	758.8 29.875	460.4 18.125	735.0 28.94	484.2 19.06	6.4 0.25	280.7 618.9	19700 4430000	6840 1540000
200TP171	508 20.0000	711.2 28.0000	139.7 5.5000	38.10 1.500	708.0 27.875	511.2 20.125	685.8 27.00	533.4 21.00	6.4 0.25	178 392.5	13100 2940000	4710 1060000
200TP172	508 20.0000	762 30.0000	139.7 5.5000	38.10 1.500	758.8 29.875	511.2 20.125	736.6 29.00	533.4 21.00	6.4 0.25	232.2 512.0	17500 3930000	6370 1430000
200TP173	508 20.0000	812.8 32.0000	152.4 6.0000	42.07 1.656	809.6 31.875	511.2 20.125	787.4 31.00	533.4 21.00	6.4 0.25	317 698.9	22400 5050000	7610 1700000
220TP174	558.8 22.0000	762 30.0000	139.7 5.5000	38.10 1.500	758.8 29.875	562 22.125	736.6 29.00	584.2 23.00	6.4 0.25	192.7 425.0	14200 3200000	5070 1140000
220TP175	558.8 22.0000	812.8 32.0000	139.7 5.5000	38.10 1.500	809.6 31.875	562.0 22.125	782.6 30.81	589.0 23.19	6.4 0.25	250.6 552.6	19000 4270000	6570 1480000
220TP176	558.8 22.0000	863.6 34.0000	152.4 6.0000	42.07 1.656	860.4 33.875	562.0 22.125	838.2 33.00	584.2 23.00	6.4 0.25	340.9 751.6	24500 5500000	8200 1840000
240TP177	609.6 24.0000	812.8 32.0000	139.7 5.5000	38.10 1.500	809.6 31.875	612.8 24.125	790.6 31.12	631.8 24.88	9.5 0.38	206.5 455.4	16000 3600000	5650 1270000
240TP178	609.6 24.0000	863.6 34.0000	139.7 5.5000	38.10 1.500	860.4 33.875	612.8 24.125	838.2 33.00	635.0 25.00	9.5 0.38	269 593.2	20500 4610000	6880 1550000
240TP179	609.6 24.0000	914.4 36.0000	152.4 6.0000	42.07 1.656	911.2 35.875	612.8 24.125	889.0 35.00	635.0 25.00	9.5 0.38	364.7 804.2	25200 5670000	8450 1900000

⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.

CYLINDRICAL ROLLER THRUST BEARINGS

TYPE TPS

- Similar to Type TP except one washer is spherically ground to seat against an aligning washer. This makes it adaptable to initial misalignment.
- Not suggested for operating conditions where alignment is constantly changing.



DIMENSIONS – LOAD RATINGS

Bearing Number	Bore d	O.D. D	Height C	Aligning Washer radius Rt	Washers		Shoulder Diameter		Fillet ⁽¹⁾ Radius r (Max.)	Wt.	Load Rating	
					Small Diameter O.D. D1	Large Bore I.D. d1	Shaft H (Min.)	Housing E (Max.)			Static Load Rating Coa	Dynamic Load Rating Ct
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.
20TPS103	50.800 2.0000	160.325 6.3120	46.038 1.8125	190.50 7.500	150.81 5.938	52.39 2.062	141.3 5.56	85.7 3.38	1.6 0.06	5.2 11.4	814 183000	331 74500
20TPS104	50.800 2.0000	185.725 7.3120	46.038 1.8125	241.30 9.500	176.21 6.938	52.39 2.062	163.5 6.44	108.0 4.25	1.6 0.06	7.12 15.7	1010 227000	398 89500
30TPS106	76.200 3.0000	160.325 6.3120	46.038 1.8125	152.40 6.000	150.81 5.938	77.79 3.062	142.9 5.62	101.6 4.00	1.6 0.06	4.5 9.9	747 168000	340 76500
30TPS107	76.200 3.0000	185.725 7.3120	46.038 1.8125	241.30 9.500	176.21 6.938	77.79 3.062	166.7 6.56	111.1 4.38	1.6 0.06	6.4 14.2	1040 234000	414 93200
30TPS108	76.200 3.0000	211.125 8.3120	46.038 1.8125	304.80 12.000	201.61 7.938	77.79 3.062	188.9 7.44	133.4 5.25	1.6 0.06	8.7 19.2	1380 311000	520 117000
35TPS113	88.900 3.5000	138.908 5.4688	33.338 1.3125	127.00 5.000	130.97 5.156	91.28 3.594	123.8 4.88	103.2 4.06	1.6 0.06	1.9 4.1	381 85600	180 40400
40TPS114	101.600 4.0000	187.327 7.3750	58.738 2.3125	161.93 6.375	176.21 6.938	103.98 4.094	168.3 6.62	127 5.00	1.6 0.06	7.0 15.4	1030 231000	503 113000
40TPS115	101.600 4.0000	212.725 8.3750	58.738 2.3125	215.90 8.500	201.61 7.938	103.98 4.094	190.5 7.50	133.4 5.25	1.6 0.06	10.0 22.1	1370 308000	589 132000
40TPS116	101.600 4.0000	238.125 9.3750	58.738 2.3125	254.00 10.000	227.01 8.938	103.98 4.094	214.3 8.44	149.2 5.88	1.6 0.06	13.4 29.5	1770 397000	676 152000
40TPS117	101.600 4.0000	266.7 10.5000	58.738 2.3125	355.60 14.000	252.41 9.938	103.98 4.094	238.1 9.38	165.1 6.50	1.6 0.06	17.1 37.7	2220 498000	896 202000
50TPS119	127 5.0000	215.9 8.5000	58.738 2.3125	187.33 7.375	201.61 7.938	130.18 5.125	190.5 7.50	152.4 6.00	1.6 0.06	8.4 18.5	1280 288000	592 133000
50TPS120	127 5.0000	241.3 9.5000	58.738 2.3125	266.70 10.500	227.01 8.938	130.18 5.125	215.9 8.50	155.6 6.12	1.6 0.06	11.8 26.1	1710 385000	716 161000
50TPS121	127 5.0000	266.7 10.5000	66.675 2.6250	323.85 12.750	252.41 9.938	130.18 5.125	239.7 9.44	158.8 6.25	3.2 0.12	17.6 38.7	2180 491000	841 189000
50TPS122	127 5.0000	292.1 11.5000	66.675 2.6250	406.40 16.000	277.81 10.938	130.18 5.125	261.9 10.31	177.8 7.00	3.2 0.12	22.1 48.8	2760 620000	996 224000
50TPS123	127.000 5.0000	317.5 12.5000	66.675 2.6250	501.65 19.750	303.21 11.938	130.18 5.125	288.9 11.38	184.1 7.25	3.2 0.12	27.2 60.0	3290 739000	1170 262000
60TPS124	152.400 6.0000	241.3 9.5000	66.675 2.6250	171.45 6.750	227.01 8.938	155.58 6.125	217.5 8.56	184.1 7.25	3.2 0.12	10.8 23.8	1410 317000	600 135000
60TPS125	152.400 6.0000	266.7 10.5000	66.675 2.6250	241.30 9.500	252.46 9.938	155.58 6.125	241.3 9.50	187.3 7.38	3.2 0.12	15.2 33.5	2000 449000	845 190000
60TPS126	152.400 6.0000	292.1 11.5000	66.675 2.6250	342.90 13.500	277.81 10.938	155.58 6.125	265.1 10.44	187.3 7.38	3.2 0.12	20.1 44.3	2700 607000	1000 225000
60TPS127	152.400 6.0000	317.5 12.5000	66.675 2.6250	431.80 17.000	303.21 11.938	155.58 6.125	287.3 11.31	190.5 7.50	3.2 0.12	25.2 55.6	3220 725000	1110 250000
70TPS129	177.800 7.0000	266.7 10.5000	66.675 2.6250	206.38 8.125	251.62 9.906	180.8 7.125	242.9 9.56	206.4 8.12	3.2 0.12	12.7 27.9	1620 365000	663 149000
70TPS130	177.800 7.0000	292.100 11.5000	66.675 2.6250	292.10 11.500	277.02 10.906	180.98 7.125	266.7 10.50	209.6 8.25	3.2 0.12	17.7 39.1	2400 540000	930 209000
70TPS131	177.800 7.0000	317.500 12.5000	66.675 2.6250	390.53 15.375	302.42 11.906	180.98 7.125	288.9 11.38	209.6 8.25	3.2 0.12	23.3 51.3	3090 695000	1080 242000

⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.



CYLINDRICAL ROLLER THRUST BEARINGS

TYPE TPS – *continued*

B

DIMENSIONS – LOAD RATINGS - *continued*

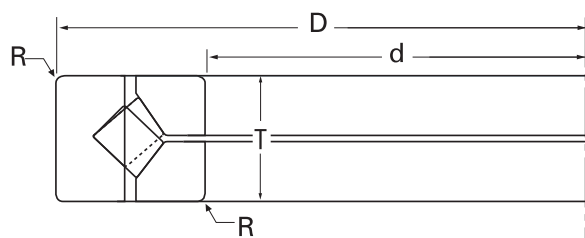
Bearing Number	Bore d	O.D. D	Height C	Aligning Washer radius R _t	Washers		Shoulder Diameter		Fillet ⁽¹⁾ Radius r (Max.)	Wt.	Load Rating	
					Small Diameter O.D. D ₁	Large Bore I.D. d ₁	Shaft H (Min.)	Housing E (Max.)			Static Load Rating C _{0a}	Dynamic Load Rating C _t
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.
70TPS132	177.800 7.0000	374.650 14.7500	101.600 4.0000	390.53 15.375	353.22 13.906	180.98 7.125	335.0 13.19	228.6 9.00	6.4 0.25	52.6 115.9	4490 1010000	1750 394000
80TPS134	203.200 8.0000	323.850 12.7500	101.600 4.0000	215.90 8.500	302.42 11.906	207.96 8.188	292.1 11.50	238.1 9.38	6.4 0.25	29.8 65.8	2660 599000	1150 258000
80TPS135	203.200 8.0000	374.650 14.7500	101.600 4.0000	304.80 12.000	353.22 13.906	207.96 8.188	336.6 13.25	263.5 10.38	6.4 0.25	47.7 105.2	4230 950000	1730 389000
80TPS136	203.200 8.0000	428.625 16.8750	101.600 4.0000	495.30 19.500	404.02 15.906	209.55 8.250	382.6 15.06	266.7 10.50	6.4 0.25	68.2 150.4	5740 1290000	2310 520000
90TPS139	228.600 9.0000	374.650 14.7500	101.600 4.0000	304.80 12.000	353.22 13.906	234.95 9.250	339.7 13.38	263.5 10.38	6.4 0.25	42.2 93.1	3910 879000	1460 328000
90TPS140	228.600 9.0000	428.625 16.8750	101.600 4.0000	495.30 19.500	404.02 15.906	234.95 9.250	385.8 15.19	266.7 10.50	6.4 0.25	63.3 139.5	5560 1250000	2140 482000
100TPS143	254.000 10.0000	428.625 16.8750	101.600 4.0000	425.45 16.750	404.02 15.906	260.36 10.250	387.4 15.25	292.1 11.50	6.4 0.25	56.2 124.0	5160 1160000	1750 394000
100TPS144	254.000 10.0000	479.425 18.8750	127.000 5.0000	508.00 20.000	454.82 17.906	260.36 10.250	435.0 17.12	304.8 12.00	6.4 0.25	99.5 219.5	7210 1620000	2690 604000
100TPS145	254.000 10.0000	530.225 20.8750	127.000 5.0000	609.6 24.000	505.62 19.906	260.36 10.250	481.0 18.94	336.6 13.25	6.4 0.25	131.8 290.6	9560 2150000	3670 825000
120TPS151	304.800 12.0000	479.425 18.8750	127.000 5.0000	390.53 15.375	454.82 17.906	311.15 12.250	438.2 17.25	346.1 13.62	6.4 0.25	82.1 181.0	6340 1420000	2300 518000
120TPS152	304.800 12.0000	530.225 20.8750	152.400 6.0000	619.13 24.375	505.62 19.906	311.15 12.250	484.2 19.06	352.4 13.88	6.4 0.25	139.4 307.4	7900 1780000	3300 743000
120TPS153	304.800 12.0000	631.825 24.8750	152.400 6.0000	723.90 28.500	607.22 23.906	311.15 12.250	584.2 23.00	406.4 16.00	6.4 0.25	236.9 522.4	12900 2900000	4680 1050000
140TPS158	355.600 14.0000	530.225 20.8750	123.825 4.8750	495.30 19.500	504.82 19.875	361.95 14.250	489.0 19.25	393.7 15.50	6.4 0.25	89.2 196.6	7200 1620000	2610 588000
140TPS159	355.600 14.0000	581.025 22.8750	123.825 4.8750	723.90 28.500	555.62 21.875	361.95 14.250	535.0 21.06	393.7 15.50	6.4 0.25	125.0 275.6	10000 2250000	3570 802000
140TPS160	355.600 14.0000	631.825 24.8750	123.825 4.8750	917.58 36.125	606.62 23.875	361.95 14.250	581.0 22.88	415.9 16.38	6.4 0.25	170.9 376.9	12600 2840000	4040 908000
160TPS164	406.400 16.0000	581.025 22.8750	152.400 6.0000	444.50 17.500	555.62 21.875	412.75 16.250	539.8 21.25	444.5 17.50	6.4 0.25	123.9 273.2	7860 1770000	3090 695000
160TPS165	406.400 16.0000	635.000 25.0000	152.400 6.0000	596.90 23.500	606.42 23.875	412.75 16.250	585.8 23.06	457.2 18.00	6.4 0.25	174.4 384.6	11200 2510000	4170 937000
160TPS166	406.400 16.0000	685.800 27.0000	152.400 6.0000	752.48 29.625	657.22 25.875	412.75 16.250	633.4 24.94	469.9 18.50	6.4 0.25	229.8 506.7	13800 3090000	4710 1060000

⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.

CROSSED ROLLER THRUST BEARINGS

TYPE XR AND JXR

- Withstands high overturning moments.
- Applications include machine tool table bearing for vertical boring and grinding machines. Other applications include various pivot and pedestal applications.
- Dimensions given in the following table relate to bearing type TXRDO, which is the most common form of crossed roller bearing.
- TXRDO bearing has a double outer race and two inner races with rollers spaced by separators.
- Other mounting configurations and sizes of crossed roller bearing can be supplied to meet particular assembly or setting requirements.
- Contact your Timken representative for more information.



DIMENSIONS – LOAD RATINGS

Bearing Number	Dimensions				Load Ratings		Factor k ⁽²⁾
	Bore d	O.D. D	Height T	Radius ⁽¹⁾ R	Two-Row radial	Thrust	
	mm in.	mm in.	mm in.	mm in.	kN lbs.	kN lbs.	
XR496051	203.200 8.0000	279.400 11.0000	31.750 1.2500	1.5 0.06	51300 11500	61600 13800	0.48
JXR637050	300.000 11.8110	400.000 15.7480	37.000 1.4567	1.5 0.06	63000 14200	80100 18000	0.45
JXR652050	310.000 12.2047	425.000 16.7323	45.000 1.7717	2.5 0.10	82200 18500	102000 23000	0.46
XR678052	330.200 13.0000	457.200 18.0000	63.500 2.50000	3.3 0.13	100000 22500	123000 27600	0.47
JXR699050	370.000 14.5669	495.000 19.4882	50.000 1.9685	3.0 0.12	93600 21000	119000 26700	0.45
XR766051	457.200 18.0000	609.600 24.0000	63.500 2.5000	3.3 0.13	141000 31600	178000 40100	0.45
XR820060	580.000 22.8346	760.000 29.9213	80.000 3.1496	6.4 0.25	240000 53900	299000 67200	0.46
XR855053	685.800 27.0000	914.400 36.0000	79.375 3.1250	3.3 0.13	270000 60700	344000 77200	0.45
XR882055	901.700 35.50000	1117.600 44.0000	82.550 3.2500	3.3 0.13	300000 67400	396000 88900	0.44
XR889058	1028.700 40.5000	1327.150 52.2500	114.300 4.5000	3.3 0.13	405000 91000	534000 120000	0.44
XR897051	1549.400 61.0000	1828.800 72.0000	101.600 4.0000	3.3 0.13	518000 116000	699000 157000	0.43

⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.

⁽²⁾ Centrifugal force constant. See engineering section for calculations using this factor.

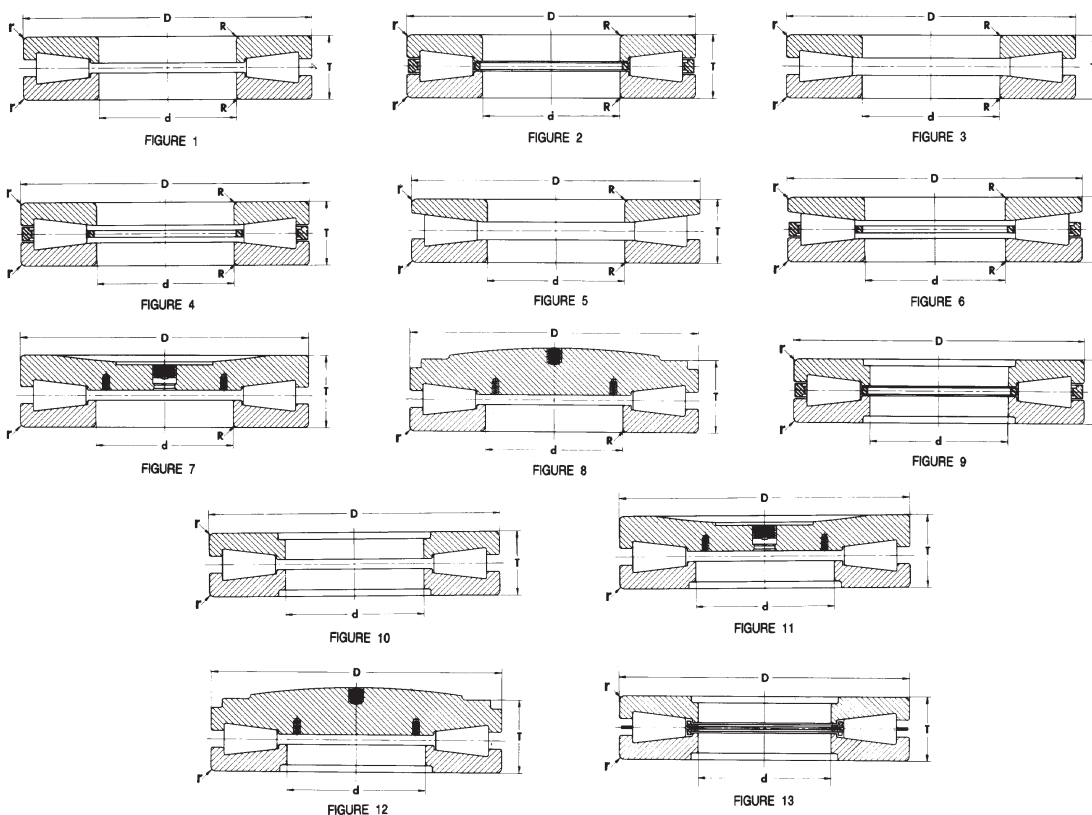




TAPERED ROLLER THRUST BEARINGS

TYPE TTHD

- Consists of two tapered thrust races, rollers and cage.
- All components are separable.
- Generally a heavy-duty bearing and can operate at a relatively high speed.
- Extensively used in numerous applications including oil well swivels, pulp refiners, extruders and piercing mill thrust blocks.



Bearing Number	Fig No.	Bore		Outside Diameter	Width	Shaft Fillet Radius	Housing Fillet Radius	Mass	Remarks
		d	D						
		mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	
T135	2	34.925	76.200	15.875	1.5	1.5	0.4	0.88	
	2	1.3750	3.0000	0.6250	0.06	0.06			
T135F	1	34.925	76.200	15.875	1.5	1.5	0.4	0.88	
	1	1.3750	3.0000	0.6250	0.06	0.06			
T200A	2	50.800	109.538	22.225	2.3	2.3	1.1	2.40	
	2	2.0000	4.3125	0.8750	0.09	0.09			
T311	2	76.200	161.925	33.338	3.3	3.3	3.6	8.02	
	2	3.0000	6.3750	1.3215	0.13	0.13			
T311F	1	76.200	161.925	33.338	3.3	3.3	3.6	8.02	
	1	3.0000	6.3750	1.3215	0.13	0.13			
*T311FS - T311S	8	76.200	161.925	49.212	3.3	3.3	-	-	T311FS - T311S, SPHERICAL RADIUS = 457.200 mm (18")
	8	3.0000	6.3750	1.9375	0.13	0.13			
T411	2	101.600	215.900	46.038	3.3	3.3	8.9	19.60	
	2	4.0000	8.5000	1.8125	0.13	0.13			

Bearing Number	Fig No.	Bore	Outside Diameter	Width	Shaft Fillet Radius	Housing Fillet Radius	Mass	Remarks
		d	D	T	R	r		
		mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	
T411F	1 1	101.600 4.0000	215.900 8.5000	46.038 1.8125	3.3 0.13	3.3 0.13	8.9 19.60	
*T411FAS - T411S	8 8	76.200 3.0000	215.900 8.5000	65.088 2.5625	3.3 0.13	3.3 0.13	– –	T411FAS - T411S, SPHERICAL RADIUS = 508.000 mm (20")
T441	2 2	111.760 4.4000	223.520 8.8000	55.880 2.2000	3.3 0.13	3.3 0.13	11.4 25.13	
T441F	1 1	111.760 4.4000	223.520 8.8000	55.880 2.2000	3.3 0.13	3.3 0.13	11.4 25.13	
T451	2 2	114.300 4.5000	250.825 9.8750	53.975 2.1250	4.0 0.16	4.0 0.16	15.0 33.07	
T511	2 2	127.000 5.0000	266.700 10.5000	58.738 2.3125	4.8 0.19	4.8 0.19	17.8 39.24	
T511A	2 2	128.588 5.0625	266.700 10.5000	58.738 2.3125	4.8 0.19	4.8 0.19	17.8 39.24	
T511F	1 1	127.000 5.0000	266.700 10.5000	58.738 2.3125	4.8 0.19	4.8 0.19	17.8 39.24	
*T511FS - T511S	8 8	127.000 5.0000	266.700 10.5000	79.375 3.1250	4.8 0.19	4.8 0.19	– –	T511FS - T511S, SPHERICAL RADIUS = 609.600 mm (24")
*T511FSA - T511S	8 8	101.600 4.0000	266.700 10.5000	79.375 3.1250	4.8 0.19	4.8 0.19	– –	T511FSA - T511S, SPHERICAL RADIUS = 609.600 mm (24")
*T511FSA - T511SA	7 7	101.600 4.0000	266.700 10.5000	79.375 3.1250	4.8 0.19	4.8 0.19	– –	T511FSA - T511SA, SPHERICAL RADIUS = 609.600 mm (24")
T520	2 2	127.000 5.0000	250.825 9.8750	55.563 2.1875	4.8 0.19	4.8 0.19	13.9 30.64	
T611	2 2	152.400 6.0000	317.500 12.5000	69.850 2.7500	6.4 0.25	6.4 0.25	29.3 64.60	
T611F	1 1	152.400 6.0000	317.500 12.5000	69.850 2.7500	6.4 0.25	6.4 0.25	29.3 64.60	
*T611FS - T611S	8 8	152.400 6.0000	317.500 12.5000	87.313 3.4375	6.4 0.25	6.4 0.25	– –	T611FS - T611S, SPHERICAL RADIUS = 711.200 mm (28")
*T611FS - T611SA	8 8	152.400 6.0000	317.500 12.5000	87.313 3.4375	6.4 0.25	6.4 0.25	– –	T611FS - T611SA, SPHERICAL RADIUS = 762.000 mm (30")
*T611FSA - T611SA	7 7	SOLID	317.500 12.5000	87.313 3.4375	N/A N/A	6.4 0.25	– –	T611FSA - T611SA, SPHERICAL RADIUS = 762.000 mm (30")
*T611FS - T611SB	8 8	152.400 6.0000	317.500 12.5000	87.313 3.4375	6.4 0.25	6.4 0.25	– –	T611FS - T611SB, SPHERICAL RADIUS = 755.700 mm (29.75")
T651	2 2	165.100 6.5000	311.150 12.2500	88.900 3.5000	6.4 0.25	6.4 0.25	38.3 84.44	
T661	2 2	168.275 6.6250	304.800 12.0000	69.850 2.7500	6.4 0.25	6.4 0.25	27.8 61.29	
T691	2 2	174.625 6.8750	358.775 14.1250	82.550 3.2500	6.4 0.25	6.4 0.25	45.3 99.87	
T709	4 4	177.800 7.0000	431.800 17.0000	101.600 4.0000	6.4 0.25	6.4 0.25	86.3 190.26	
T711	2 2	177.800 7.0000	368.300 14.5000	82.550 3.2500	8.0 0.31	8.0 0.31	48.4 106.70	
T711F	1 1	177.800 7.0000	368.300 14.5000	82.550 3.2500	8.0 0.31	8.0 0.31	48.4 106.70	
T711FS - T711S	7 7	177.800 7.0000	368.300 14.5000	104.775 4.1250	8.0 0.31	8.0 0.31	– –	
*T711FS - T711SA	8 8	177.800 7.0000	368.300 14.5000	101.600 4.0000	8.0 0.31	8.0 0.31	– –	T711FS - T711SA, SPHERICAL RADIUS = 762.000 mm (30")
*T711FSS - T711S	7 7	SOLID	368.300 14.5000	104.775 4.1250	N/A N/A	8.0 0.31	– –	T711FSS - T711S, SPHERICAL RADIUS = 622.300 mm (24.5")
T811	2 2	203.200 8.0000	419.100 16.5000	92.075 3.6250	9.7 0.38	9.7 0.38	69.3 152.78	
T811F	1 1	203.200 8.0000	419.100 16.5000	92.075 3.6250	9.7 0.38	9.7 0.38	69.3 152.78	
*T811FS - T811S	7 7	203.200 8.0000	419.100 16.5000	123.825 4.8750	9.7 0.38	9.7 0.38	– –	T811FS - T811S, SPHERICAL RADIUS = 508.000 mm (20")
*T811FS - T811SA	8 8	203.200 8.0000	422.275 16.6250	115.880 4.5625	9.7 0.38	9.7 0.38	– –	T811FS - T811SA, SPHERICAL RADIUS = 838.200 mm (33"), LOWER RACE OD = 419.100 mm (16.5000")





THRUST BEARINGS

TYPE TTHD - continued

B

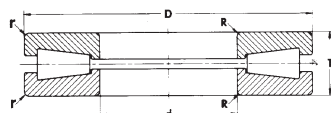


FIGURE 1

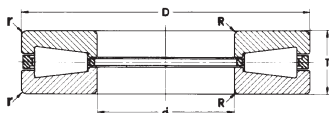


FIGURE 2

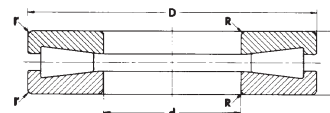


FIGURE 3

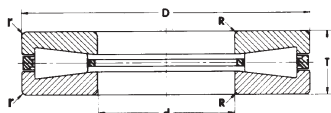


FIGURE 4



FIGURE 5

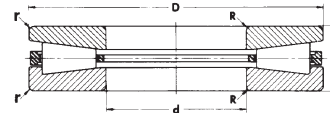


FIGURE 6

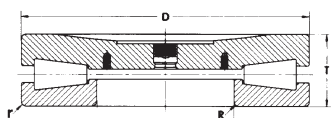


FIGURE 7

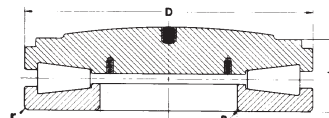


FIGURE 8

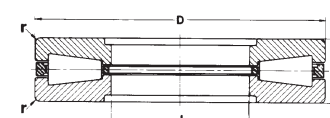


FIGURE 9

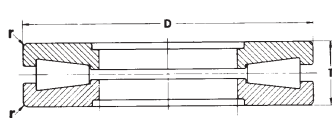


FIGURE 10

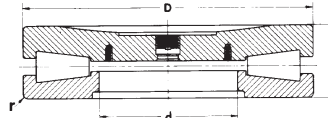


FIGURE 11

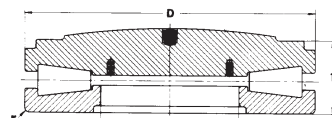


FIGURE 12

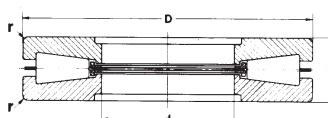


FIGURE 13

Bearing Number	Fig No.	Bore	Outside Diameter	Width	Shaft Fillet Radius	Housing Fillet Radius	Mass	Remarks
		d	D	T	R	r		
		mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	
*T811FSA - T811SB	7 7	SOLID	422.275 16.6250	120.650 4.7500	N/A N/A	9.7 0.38	- -	T811FSA - T811SB, SPHERICAL RADIUS = 506.000 mm (20"), LOWER RACE OD = 419.100 mm (16.5000")
T811X	2 2	203.200 8.0000	419.100 16.5000	120.650 4.7500	9.7 0.38	9.7 0.38	92.7 204.37	
*T811 - T811XA	2 2	203.200 8.0000	419.100 16.5000	106.363 4.1875	9.7 0.38	9.7 0.38	- -	T811 - T811XA, 2 BORES, OTHER BORE = 201.613 mm (7.9375")
T911	9 9	228.600 9.0000	482.600 19.0000	104.775 4.1250	N/A N/A	11.2 0.44	105.0 231.49	
T911A	9 9	234.950 9.2500	482.600 19.0000	104.775 4.1250	N/A N/A	11.2 0.44	103.0 227.08	
T911F	10 10	228.600 9.0000	482.600 19.0000	104.775 4.1250	N/A N/A	11.2 0.44	- -	
*T911 - T911A	9 9	228.600 9.0000	482.600 19.0000	104.775 4.1250	N/A N/A	11.2 0.44	- -	T911 - T911A, 2 BORES, OTHER BORE = 234.950 mm (9.2500")
*T911FS - T911S	11 11	228.600 9.0000	482.600 19.0000	146.050 5.7500	N/A N/A	11.2 0.44	- -	T911FS - T911S, SPHERICAL RADIUS = 635.000 mm (25")
*T911FS - T911SA	12 12	228.600 9.0000	482.600 19.0000	131.763 5.1875	N/A N/A	11.2 0.44	- -	T911FS - T911SA, SPHERICAL RADIUS = 1295.400 mm (51")
*T911FS - T911SB	12 12	228.600 9.0000	482.600 19.0000	114.300 4.5000	N/A N/A	11.2 0.44	- -	T911FS - T911SB, SPHERICAL RADIUS = 895.350 mm (35.25")
T921	9 9	234.950 9.2500	546.100 21.5000	127.000 5.0000	N/A N/A	16.0 0.63	171.0 376.99	

Bearing Number	Fig No.	Bore	Outside Diameter	Width	Shaft Fillet Radius	Housing Fillet Radius	Mass	Remarks
		d	D	T	R	r		
		mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	
T921F	10 10	234.950 9.2500	546.100 21.5000	127.000 5.0000	N/A N/A	16.0 0.63	171.0 376.99	
T1011	9 9	254.000 10.0000	539.750 21.2500	117.475 4.6250	N/A N/A	11.2 0.44	147.0 324.08	
*T1011FS - T1011S	12 12	254.000 10.0000	539.750 21.2500	149.225 5.8750	N/A N/A	11.2 0.44	– –	T1011FS - T1011S, SPHERICAL RADIUS = 1066.8 mm (42")
*T1011FS - T1011SA	11 11	254.000 10.0000	539.750 21.2500	158.750 6.2500	N/A N/A	11.2 0.44	– –	T1011FS - T1011SA, SPHERICAL RADIUS = 635.000 mm (25")
*T1011FS - T1011SC	11 11	254.000 10.0000	539.750 21.2500	158.750 6.2500	N/A N/A	11.2 0.44	– –	T1011FS - T1011SC, SPHERICAL RADIUS = 635.000 mm (25")
T1115	9 9	279.400 11.0000	495.300 19.5000	133.350 5.2500	N/A N/A	6.4 0.25	125.0 275.58	
T1120	9 9	279.400 11.0000	603.250 23.7500	136.525 5.3750	N/A N/A	11.2 0.44	212.0 467.38	
T1120F	10 10	279.400 11.0000	603.250 23.7500	136.525 5.3750	N/A N/A	11.2 0.44	212.0 467.38	
*T1120FS - T1120S	12 12	279.400 11.0000	603.250 23.7500	136.525 5.3750	N/A N/A	11.2 0.44	– –	T1120FS - T1120S, SPHERICAL RADIUS = 1308.1 mm (51.5")
T1421	9 9	355.600 14.0000	533.400 21.0000	101.600 4.0000	N/A N/A	6.4 0.25	84.1 185.41	
T1421F	10 10	355.600 14.0000	533.400 21.0000	101.600 4.0000	N/A N/A	6.4 0.25	84.1 185.41	
T1750	2 2	44.450 1.7500	84.734 3.3360	18.258 0.7188	2.3 0.09	2.3 0.09	0.5 1.08	
T2520	2 2	63.500 2.5000	117.475 4.6250	25.400 1.0000	2.3 0.09	2.3 0.09	1.3 2.95	
*T3004W	1 1	76.454 3.0100	167.081 6.5780	44.450 1.7500	3.3 0.13	N/A N/A	– –	T3004W, RETAINER ON OD
T7519	2 2	190.000 7.4803	355.600 14.0000	74.219 2.9220	6.4 0.25	6.4 0.25	35.9 79.15	
*T8920FA - T8920FB	11 11	168.275 6.6250	638.175 25.1250	152.400 6.0000	N/A N/A	11.0 0.43	– –	NO SPHERICAL RADIUS
T9020	9 9	228.600 9.0000	431.800 17.0000	88.773 3.4950	N/A N/A	9.7 0.38	65.7 144.84	
*T9030FS - T9030S	7 7	SOLID	482.600 19.0000	165.000 6.5354	N/A N/A	11.2 0.44	– –	T9030FS - T9030S, SPHERICAL RADIUS = 635.000 mm (25")
*T9030FS - T9030SA	8 8	SOLID	482.600 19.0000	150.622 5.9300	N/A N/A	11.2 0.44	– –	T9030FS - T9030SA, SPHERICAL RADIUS = 1295.400 mm (51")
*T9030FSA - T9030SA	12 12	168.275 6.6250	482.600 19.0000	131.763 5.1875	N/A N/A	11.2 0.44	– –	T9030FSA - T9030SA, SPHERICAL RADIUS = 1295.400 mm (51")
*T9030FSA - T9030SB	12 12	168.275 6.6250	482.600 19.0000	131.763 5.1875	N/A N/A	11.2 0.44	– –	T9030FSA - T9030SB, SPHERICAL RADIUS = 1066.800 mm (42")
T9250F	10 10	234.950 9.2500	546.100 21.5000	127.000 5.0000	N/A N/A	16.0 0.63	– –	
T9250FA	10 10	139.700 5.5000	546.100 21.5000	127.000 5.0000	N/A N/A	16.0 0.63	– –	
*T9250FAS - T9250SA	12 12	139.700 5.5000	549.275 21.6250	155.575 6.1250	N/A N/A	16.0 0.63	– –	T9250FAS - T9250SA, SPHERICAL RADIUS = 1295.400 mm (51")
*T9250FAS - T9250SC	12 12	139.700 5.5000	549.275 21.6250	155.575 6.1250	N/A N/A	16.0 0.63	– –	T9250FAS - T9250SC, SPHERICAL RADIUS = 1295.400 mm (51")
*T9250FS - T9250S	11 11	234.950 9.2500	546.100 21.5000	168.275 6.6250	N/A N/A	16.0 0.63	– –	T9250FS - T9250S, SPHERICAL RADIUS = 641.350 mm (25.25")
*T9250FS - T9250SA	12 12	234.950 9.2500	549.275 21.6250	155.575 6.1250	N/A N/A	16.0 0.63	– –	T9250FS - T9250SA, SPHERICAL RADIUS = 1295.400 mm (51")
*T9250FS - T9250SB	11 11	234.950 9.2500	546.100 21.5000	171.450 6.7500	N/A N/A	16.0 0.63	– –	T9250FS - T9250SB, SPHERICAL RADIUS = 558.800 mm (22")
*T12040FS - T12040S	12 12	304.800 12.0000	1146.175 45.1250	317.500 12.5000	N/A N/A	19.0 0.75	– –	T12040FS - T12040S, SPHERICAL RADIUS = 2000.250 mm (78.75"), LOWER RACE OD = 1143.000 mm (45.0000")
*T14214	13 13	355.600 14.0000	533.400 21.0000	101.600 4.0000	N/A N/A	6.4 0.25	– –	T14214, 2 BORES, OTHER BORE = 355.961 mm (14.0150")
T14520	9 9	368.300 14.5000	603.300 23.7500	120.650 4.7500	N/A N/A	9.7 0.38	144.0 317.47	

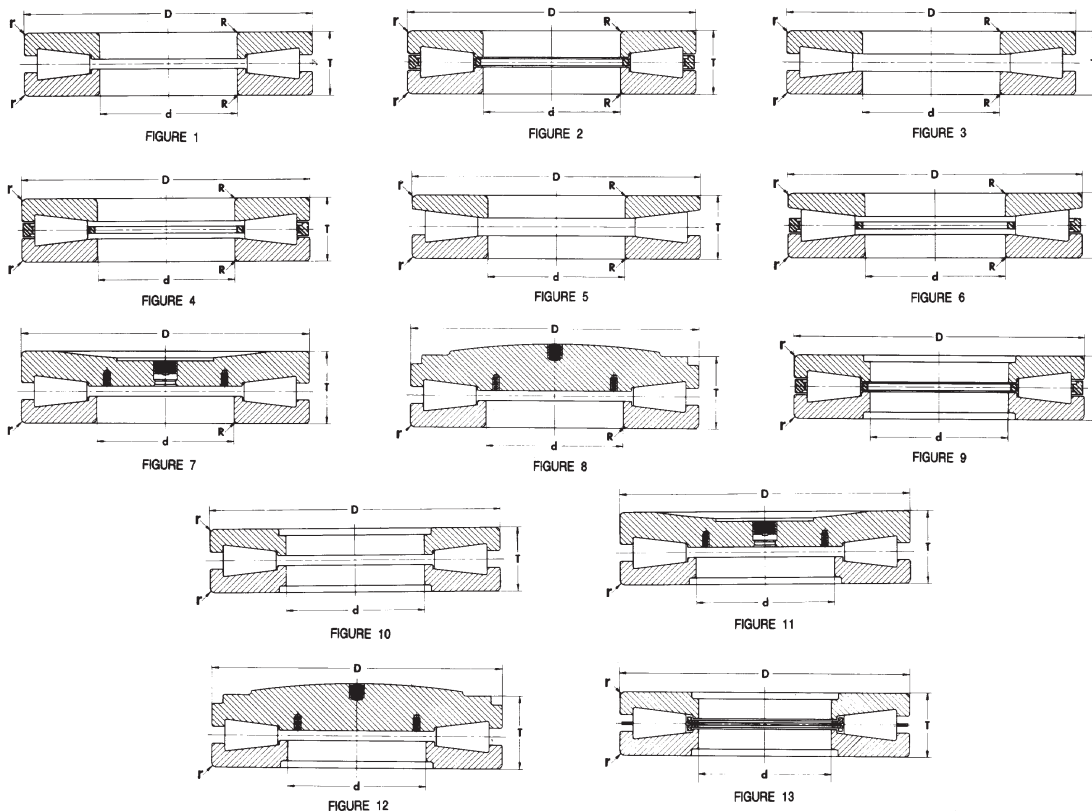




THRUST BEARINGS

TYPE TTHD - *continued*

B

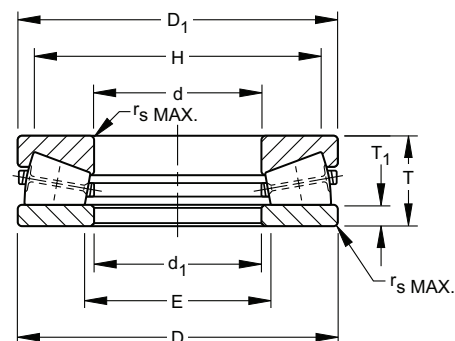


Bearing Number	Fig No.	Bore	Outside Diameter	Width	Shaft Fillet Radius	Housing Fillet Radius	Mass	Remarks
		d	D	T	R	r		
		mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	
T16021	9	406.400	711.200	146.050	N/A	9.7	264.0	
	9	16.0000	28.0000	5.7500	N/A	0.38	582.02	
T16021F	10	406.400	711.200	146.050	N/A	9.7	264.0	
	10	16.0000	28.0000	5.7500	N/A	0.38	582.02	
T16050	9	406.400	838.200	177.800	N/A	12.7	517.0	
	9	16.0000	33.0000	7.0000	N/A	0.5	1139.79	
T17010FS - T17020S	12	431.800	942.975	260.350	N/A	12.7	-	
	12	17.0000	37.1250	10.2500	N/A	0.5	-	
T48000	9	1219.200	1524.000	136.525	N/A	9.7	596.0	
	9	48.0000	60.0000	5.3750	N/A	0.38	1313.95	

TAPERED ROLLER THRUST BEARINGS

TYPE TTVF

- Combines the outstanding features of tapered thrust and cylindrical roller bearings to offer the highest possible capacity of any thrust bearing of its size.
- One washer is perfectly flat, while the second includes a tapered raceway matching the rollers.
- Originally developed for screwdown applications in metal rolling mills where thrust loads exceeding one million pounds are common.



DIMENSIONS – LOAD RATINGS

Bearing Number	Bore d	O.D. D	Height T	Washers			Shoulder Diameter		Fillet ⁽¹⁾ Radius r	Wt.	Load Rating		Approx. Limiting Speed (for Oil Bath Only)
				Thickness T ₁	Small Diameter O.D. D ₁	Large Bore I.D. d ₁	Shaft H (Min.)	Housing E (Max.)			Static Load Rating C _{0a}	Dynamic Load Rating C _t	
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.	RPM
F-3167-B	101.575 3.9990	215.875 8.4990	46.038 1.8125	9.53 0.375	215.14 8.470	102.59 4.039	193.7 7.62	108 4.25	2.5 0.10	9.3 20.5	1570.0 353000	880.0 198000	1350
W-3217-B	127.000 5.0000	266.700 10.5000	58.738 2.3125	12.70 0.500	265.94 10.470	127.51 5.020	238.1 9.38	149.2 5.88	3.6 0.14	18.6 41.0	2570.0 578000	1350.0 304000	1090
S-4055-C	149.974 5.9045	299.720 11.8000	89.692 3.5312	25.40 1.000	298.45 11.750	154 6.063	267.5 10.53	174.6 6.88	3 0.12	35.8 79.0	3350.0 754000	1850.0 416000	970
G-3304-B	168.275 6.6250	304.800 12.0000	69.850 2.7500	14.29 0.562	303.21 11.938	171.45 6.750	277.8 10.94	188.9 7.44	6.4 0.25	25.9 57.0	3730.0 839000	1910.0 429000	950
W-3218-B	177.800 7.0000	368.300 14.5000	82.550 3.2500	17.46 0.688	366.71 14.438	180.98 7.125	336.6 13.25	203.2 8.00	6.1 0.24	49.4 109.0	6270.0 1410000	2940.0 660000	790
F-3094-C	228.575 8.9990	431.749 16.9980	88.900 3.5000	15.88 0.625	430.99 16.968	231.78 9.125	396.9 15.62	257.2 10.12	5.1 0.20	71.7 158.0	7120.0 1600000	3420.0 769000	670
I-2077-C	253.975 9.9990	508.000 20.0000	95.250 3.7500	19.05 0.750	507.19 19.968	256.38 10.094	468.3 18.44	282.6 11.12	6.4 0.25	110.2 243.0	10000.0 2260000	4530.0 1020000	570
R-2927-C	254.000 10.0000	508.000 20.0000	107.950 4.2500	21.43 0.844	506.41 19.938	257.18 10.125	466.7 18.38	285.8 11.25	4.8 0.19	123.4 272.0	12100.0 2720000	5550.0 1250000	570
G-3224-C	256.540 10.1000	546.100 21.5000	165.100 6.5000	34.92 1.375	542.92 21.375	258.76 10.188	515.9 20.31	301.6 11.88	6.1 0.24	227.2 501.0	14900.0 3350000	7900.0 1780000	530
S-4077-C	259.999 10.2362	479.948 18.8956	132.080 5.2000	26.99 1.062	478.36 18.833	263.17 10.361	427 16.81	300 11.81	4.8 0.19	126.5 279.0	8980.0 2020000	4720.0 1060000	610
C-8091-C	279.400 11.0000	603.250 23.7500	136.525 5.3750	30.16 1.188	601.66 23.688	282.58 11.125	552.4 21.75	317.5 12.50	4.8 0.19	230.4 508.0	1770.0 3980000	7890.0 1770000	480
G-3272-C	304.775 11.9990	609.600 24.0000	114.300 4.5000	28.58 1.125	606.81 23.890	307.18 12.094	565.2 22.25	342.9 13.50	6.4 0.25	190.9 421.0	17800.0 3990000	7380.0 1660000	480
E-1994-C	304.800 12.0000	673.100 26.5000	171.450 6.7500	37.31 1.469	671.51 26.438	307.98 12.125	608 23.94	352.4 13.88	7.6 0.30	347.8 767.0	22700.0 5100000	11000.0 2470000	430
F-3090-A	304.800 12.0000	736.600 29.0000	279.400 11.0000	44.45 1.750	735.01 28.938	307.98 12.125	614.4 24.19	385.8 15.19	9.1 0.36	732 1614.0	28000.0 6300000	17100.0 3850000	400
I-2060-C	368.541 14.5095	609.156 23.9825	120.650 4.7500	25.40 1.000	604.84 23.812	371.48 14.625	565.2 22.25	401.6 15.81	9.7 0.38	176 388.0	11800.0 2640000	5840.0 1310000	480
B-8350-C	406.400 16.0000	711.200 28.0000	167.084 6.5781	36.91 1.453	709.61 27.938	409.58 16.125	654 25.75	450.8 17.75	9.1 0.36	356.5 786.0	19900.0 4480000	10300.0 2310000	410
F-3163-C	406.400 16.0000	712.394 28.0470	146.050 5.7500	30.96 1.219	711.28 28.003	409.58 16.125	650.9 25.62	455.6 17.94	7.6 0.30	303.4 669.0	19300.0 4350000	9190.0 2070000	410
F-3131-G	431.800 17.0000	863.600 34.0000	228.600 9.0000	44.45 1.750	862.01 33.938	434.98 17.125	787.4 31.00	489 19.25	10.2 0.40	774.6 1708.0	37700.0 8480000	18800.0 4230000	340
A-6096-C	508.000 20.0000	990.600 39.0000	196.850 7.7500	67.47 2.656	990.60 39.000	508.58 20.062	927.1 36.50	563.6 22.19	12.7 0.50	882.5 1946.0	41500.0 9320000	16700.0 3760000	290
F-3093-A	558.800 22.0000	1066.800 42.0000	285.750 11.2500	57.15 2.250	1065.21 41.938	561.98 22.125	952.5 37.50	639.8 25.19	10.2 0.40	1401.4 3090.0	49400.0 11100000	28000.0 6300000	270
F-3172-C	711.200 28.0000	965.200 38.0000	127.000 5.0000	30.16 1.188	963.61 37.938	714.38 28.125	917.6 36.12	762 30.00	4.8 0.19	354.2 781.0	19600.0 4400000	8670.0 1950000	300
H-2054-G	711.200 28.0000	990.600 39.0000	190.500 7.5000	44.45 1.750	989.01 38.938	712.79 28.062	936.6 36.88	755.6 29.75	10.2 0.40	572.3 1262.0	28000.0 6300000	14200.0 3200000	290
D-2864-C	825.424 32.4970	1168.400 46.0000	127.000 5.0000	31.75 1.250	1168.40 46.000	825.50 32.500	1130.3 44.50	860.4 33.88	14.2 0.56	549.7 1212.0	44100.0 9920000	15600.0 3500000	250
F-3067-C	1219.998 48.0314	1574.869 62.0027	177.800 7.0000	44.45 1.750	1575 62.008	1219.99 48.031	1498.6 59.00	1266.8 49.88	6.4 0.25	1173.2 2587.0	49900.0 11200000	21900.0 4930000	180

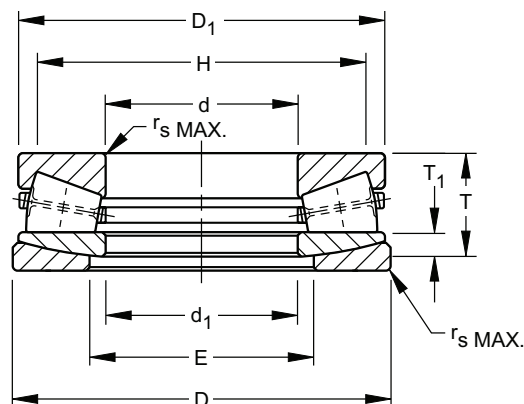
⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.



TAPERED ROLLER THRUST BEARINGS

TYPE TTVS

- Same basic roller and raceway design as the TTVF except that the lower washer is two pieces to permit self-alignment under conditions of initial misalignment.



DIMENSIONS – LOAD RATINGS

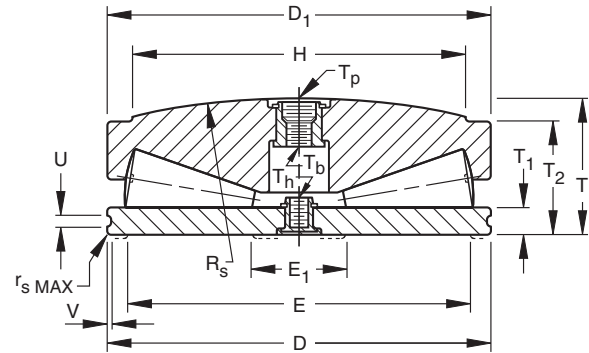
Bearing Number	Bore d	O.D. D	Height T	Washers			Shoulder Diameter		Fillet ⁽¹⁾ Radius r _s (Max.)	Wt.	Load Rating		Approx. Limiting Speed (for Oil Bath Only) RPM
				Thickness T ₁	Small Diameter O.D. D ₁	Large Bore I.D. d ₁	Shaft H (Min.)	Housing E (Max.)			Static Load Rating C _{0a}	Dynamic Load Rating C _t	
	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	mm in.	kg lbs.	kN lbs.	kN lbs.	
B-7976-C	184.15 7.2500	406.4 16.0000	203.2 8.0000	66.68 2.625	404.81 15.938	187.32 7.375	346.1 13.62	228.6 9.00	6.1 0.24	157.4 347.0	7650.0 1720000	4540.0 1020000	720
B-8824-C	199.374 7.8730	399.948 15.7460	121.841 4.7969	36.4 1.433	396.88 15.625	203.2 8.000	358.8 14.12	240.5 9.47	4.1 0.16	86.2 190.0	7020.0 1580000	3590.0 807000	730
E-2004-C	228.6 9.0000	482.549 18.9980	158.75 6.2500	44.91 1.768	479.55 18.880	231.78 9.125	419.1 16.50	282.6 11.12	4.8 0.19	170.1 375.0	10900.0 2440000	5870.0 1320000	600
H-1685-C	241.3 9.5000	488.899 19.2480	152.4 6.0000	57.15 2.250	482.6 19.000	242.09 9.531	431.8 17.00	279.4 11.00	6.1 0.24	162.8 359.0	9940.0 2240000	4980.0 1120000	600
W-3120-C	253.975 9.9990	508 20.0000	215.9 8.5000	61.91 2.437	504.82 19.875	285.75 11.250	425.4 16.75	317.5 12.50	10.2 0.40	250.8 553.0	9770.0 2200000	6020.0 1350000	580
P-1739-C	304.8 12.0000	609.6 24.0000	215.9 8.5000	61.91 2.437	608.01 23.938	307.98 12.125	536.6 21.12	349.2 13.75	7.6 0.30	359.6 793.0	17800.0 4010000	10000.0 2260000	480
N-2827-G	355.6 14.0000	660.4 26.0000	254 10.0000	76.2 3.000	657.22 25.875	358.78 14.125	577.8 22.75	412.8 16.25	10.2 0.40	483 1065.0	18600.0 4180000	11100.0 2490000	440
B-8424-C	406.4 16.0000	869.95 34.2500	241.3 9.5000	82.55 3.250	887.41 34.938	438.15 17.250	803.3 31.62	463.6 18.25	16.5 0.65	858 1892.0	39000.0 8770000	17700.0 3980000	330

⁽¹⁾ Maximum shaft or housing fillet radius that bearing corners will clear.

TAPERED ROLLER THRUST BEARINGS

TYPE TTSX

- A full roller complement design without a conventional bore.
- Supplied with center inserts for attachment purposes as well as for lifting.
- Offers the highest capacity but at a somewhat reduced speed capability, as compared with other V-Flat types.



Bearing Number	Screw Extension Dia. min. H	O.D. D	Overall Height T	Height T ₂	Spherical Radius R _s	Washer Thickness T ₁	max. r _s	Top Washer O.D. D ₁	Hsg. Shldr. Dia. E	Hsg. Shldr. Dia. E ₁	Groove		Eyebolt Threads		T _p Taper Pipe Plug Thread	Basic Static Thrust Capacity BSTC
											Width U	Depth V	T _b	T _h		
58 TTSX 908	5.000	5.875	2.164	1.875	18.000	0.500	1/16	5.782	5 3/8	2	0.187	0.046	1/2-13	3/8-16	3/8	299000
68 TTSX 910	6.000	6.875	2.417	2.062	18.000	0.500	1/16	6.782	6 3/8	2 7/8	0.187	0.046	1/2-13	3/8-16	3/8	400000
80 TTSX 914	7.000	8.000	2.977	2.562	20.000	0.625	1/16	7.907	7 3/8	2 7/8	0.250	0.046	1/2-13	3/8-16	3/8	565000
105 TTSX 918	9.000	10.500	3.717	3.187	24.000	0.750	1/16	10.407	9 3/8	3 1/8	0.312	0.078	3/4-10	1/2-13	3/4	985000
126 TTSX 922	11.000	12.625	4.369	3.750	30.000	0.875	1/16	12.532	11 1/2	3 5/8	0.406	0.094	3/4-10	1/2-13	3/4	1515000
148 TTSX 926	13.000	14.875	5.079	4.375	36.000	1.000	1/16	14.782	13 5/8	4 5/8	0.406	0.094	1 1/4-7	1/2-13	1 1/4	2050000
172 TTSX 934 0G778	13.500	17.252	6.495	5.500	33.000	1.250	5/32	17.152	15 9/8	4 9/16	0.531	0.125	1 1/4-7	1 - 8	1 1/4	2815000
161 TTSX 930	14.000	16.125	5.542	4.812	40.000	1.125	1/8	16.032	14 5/8	4 9/16	0.406	0.094	1 1/4-7	1/2-13	1 1/4	2430000
161 TTSX 930 AA678	14.000	16.125	6.730	5.616	54.000	1.750	1/16	16.032	14 9/8	4 9/16	—	—	1 1/4-7	1 - 8	1 1/4	2430000
172 TTSX 934	15.000	17.250	5.932	5.125	40.000	1.250	1/8	17.157	15 5/8	4 9/16	0.531	0.125	1 1/4-7	1 - 8	1 1/4	2800000
202 TTSX 942 EE2000	15.875	20.250	7.430	6.125	25.000	1.375	1/16	20.532	19	5	—	—	1 1/4-7	1 - 8	1 1/4	4190000
190 TTSX 940	16.500	19.000	5.730	5.125	75.000	1.500	1/16	18.906	18 1/4	7 3/16	0.531	0.125	1 1/4-7	1 - 8	1 1/4	3460000
190 TTSX 940 OA617	16.500	19.000	6.015	5.125	42.000	1.500	1/16	18.905	18 1/4	5 3/16	0.531	0.125	1 1/4-7	1 - 8	1 1/4	3620000
190 TTSX 938 B0563	17.000	19.250	6.717	5.750	42.000	1.375	1/8	19.407	17 5/8	4 5/8	—	—	1 1/4-7	1 - 8	1 1/4	3680000
195 TTSX 938 OD452	17.000	19.500	6.635	5.750	46.500	1.375	1/8	12.407	17 5/8	4 5/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	3680000
195 TTSX 938	17.000	19.500	6.717	5.750	42.000	1.375	1/8	19.407	17 5/8	4 5/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	3680000
195 TTSX 938 D0574	17.000	19.560	6.717	5.750	42.000	1.375	1/8	19.407	17 5/8	4 5/8	—	—	1 1/4-7	1 - 8	1 1/4	3680000
206TTSX 942	18.000	20.625	6.920	6.000	50.000	1.375	1/8	20.532	19	5 1/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	4190000
206 TTSX 942 AB551	18.000	20.625	7.937	6.878	42.000	2.238	1/8	20.532	19	5	0.531	0.125	1 1/4-7	1 - 8	1 1/4	4190000
210 TTSX 944 A0574	18.000	21.000	7.000	6.375	78.000	1.250	—	20.906	19 1/2	5	—	—	1 1/4-7	1 - 8	1 1/4	4232000
210 TTSX 944	18.000	21.000	7.000	6.375	78.000	1.250	1/16	20.906	19 1/2	5	0.375	0.375	1 1/4-7	1 - 8	1 1/4	4232000
210 TTSX 944 BA1479	18.000	21.000	7.023	—	78.000	1.250	—	21.000	19 1/2	5	—	—	1 1/4-7	1 - 8	1 1/4	4232000
218 TTSX 946	19.000	21.875	7.514	6.500	50.000	1.500	1/8	21.782	19 7/8	6	0.531	0.125	1 1/4-7	1 - 8	1 1/4	4550000
228 TTSX 950	20.000	22.875	7.629	6.625	56.000	1.500	1/8	22.782	20 3/4	5 1/4	0.531	0.125	1 1/4-7	1 - 8	1 1/4	5130000
228 TTSX 950 A02017	20.000	22.875	7.629	6.625	56.000	1.500	1/8	22.782	20 3/4	5 1/4	0.531	0.125	1 1/4-7	1 - 8	1 1/4	5130000
228 TTSX 950 OA452	20.000	22.875	7.708	6.625	51.500	1.500	1/8	22.782	20 3/4	5 1/4	0.531	0.125	1 1/4-7	1 - 8	1 1/4	5130000
240 TTSX 954 0C1185	21.000	24.000	8.032	7.000	60.000	1.500	1/8	23.907	22	4 5/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	5700000
240 TTSX 954	21.000	24.000	8.032	7.000	60.000	1.500	1/8	23.907	22	5 5/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	5700000
252 TTSX 958 00149	22.000	25.250	8.373	7.250	60.000	1.500	1/8	25.157	23 1/8	5 3/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	6290000
252 TTSX 958	22.000	25.250	8.373	7.250	60.000	1.500	1/8	25.157	23 1/8	5 3/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	6290000

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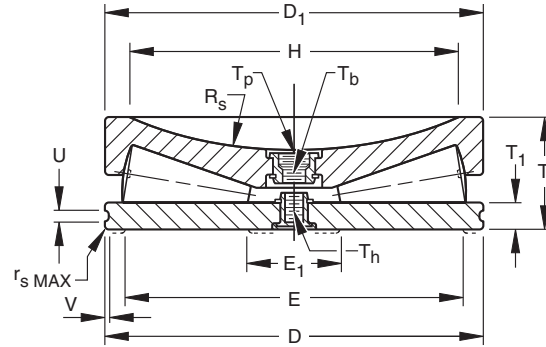




TAPERED ROLLER THRUST BEARINGS

TYPE TTSV

- Designed with a full complement of controlled contour rollers without a conventional bore.
- Supplied with center inserts for attachment purposes as well as for lifting.
- Offers the highest capacity but at a somewhat reduced speed capability, as compared with other V-Flat types.



Bearing Number	Screw Extension Dia. min. H	O.D. D	Height T	Spherical Radius Rs	Washer Thickness T1	max. rs	Top Washer O.D. D1	Hsg. Shldr. Dia. E	Hsg. Shldr. Dia. E1	Groove		Eyebolt Threads		Tp Taper Pipe Plug Thread	Basic Static Thrust Capacity BSTC lbs.
										Width U	Depth V	Tb	Th		
58 TTSV 908	5.000	5.875	1.875	9.000	0.500	1/16	5.782	5 3/8	2	0.187	0.046	5/8-11	3/8-16	—	299000
80 TTSV 914 AA508	5.500	8.000	2.563	24.000	0.625	—	7.907	7 3/8	2 7/8	—	—	5/8-11	3/8-16	—	565000
68 TTSV 910	6.000	6.875	2.062	9.000	0.500	1/16	6.782	6 3/8	2 7/8	0.187	0.046	5/8-11	3/8-16	—	400000
80 TTSV 914	7.000	8.000	2.562	10.000	0.625	1/16	7.907	7 3/8	2 7/8	0.250	0.046	5/8-11	3/8-16	—	565000
105 TTSV 918	9.000	10.500	3.187	12.000	0.750	1/16	10.407	9 3/8	3 3/8	0.312	0.078	3/4-10	1/2-13	—	985000
105 TTSV 918 OC1150	9.000	10.500	3.187	14.000	0.750	1/16	10.407	9 3/8	3 1/8	0.312	0.078	3/4-10	1/2-13	—	985000
126 TTSV 922	11.000	12.625	3.750	15.000	0.875	1/16	12.532	11 1/2	3 5/8	0.406	0.094	3/4-10	1/2-13	—	1515000
148 TTSV 926	13.000	14.875	4.375	18.000	1.000	1/16	14.782	13 5/8	4 5/8	0.406	0.094	3/4-10	1/2-13	3/4	2050000
148 TTSV 926 AO529	13.000	14.875	4.375	18.000	1.000	1/16	14.782	13 5/8	4 5/8	0.406	0.094	3/4-10	1/2-13	—	2050000
161 TTSV 930 OA534	13.000	16.125	5.500	20.000	1.125	1/8	16.032	14 5/8	4 9/16	0.406	0.094	3/4-10	1/2-13	3/4	2430000
161 TTSV 930	14.000	16.125	4.812	20.000	1.125	1/8	16.032	14 5/8	4 9/16	0.406	0.094	3/4-10	1/2-13	3/4	2430000
172 TTSV 934	15.000	17.250	5.125	20.000	1.250	1/8	17.157	15 5/8	4 9/16	0.531	0.125	1 1/4-7	1 - 8	1 1/4	2800000
172 TTSV 934 BA528	15.000	17.250	5.875	50.000	2.000	—	17.157	15 5/8	4 9/16	—	—	1 1/4-7	1 - 8	1 1/4	2800000
195 TTSV 938 OA452	17.000	19.500	5.750	25.000	1.375	1/8	19.407	17 5/8	4 5/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	3680000
195 TTSV 938	17.000	19.500	5.750	22.000	1.375	1/8	19.407	17 5/8	4 5/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	3680000
195 TTSV 938 OC902	17.000	19.500	5.750	25.000	1.375	1/8	19.250	17 5/8	4 5/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	3610000
195 TTSV 938 LE1722	17.000	19.500	5.750	36.000	1.375	1/4	19.407	17 5/8	4 5/8	0.953	0.130	1 1/4-7	1 - 8	1 1/4	3680000
195 TTSV 938 DB508	17.000	19.500	5.750	50.000	1.383	—	19.407	17 5/8	4 5/8	—	—	1 1/4-7	1 - 8	1 1/4	3680000
206 TTSV 942	18.000	20.625	6.000	25.000	1.375	1/8	20.532	19	5 1/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	4190000
210 TTSV 944 CA1481	18.000	21.000	7.000	50.000	1.125	—	21.000	19 1/2	5	—	—	1 1/4-7	1 - 8	1 1/4	4232000
210 TTSV 944 DA 1708	18.000	21.000	7.500	50.000	1.750	—	21.000	19 1/2	5	—	—	1 1/4-7	1 - 8	1 1/4	4232000
212 TTSV 942 EA1740	18.000	21.250	6.250	25.000	1.625	7/16	21.250	19	5	0.531	0.125	1 1/4-7	1 - 8	1 1/4	4190000
218 TTSV 946	19.000	21.875	6.500	25.000	1.500	1/8	21.782	19 7/8	6	0.531	0.125	1 1/4-7	1 - 8	1 1/4	4550000
228 TTSV 950	20.000	22.875	6.625	28.000	1.500	1/8	22.782	20 3/4	5 1/4	0.531	0.125	1 1/4-7	1 - 8	1 1/4	5130000
240 TTSV 954	21.000	24.000	7.000	30.000	1.500	1/8	23.907	22	5 3/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	5700000
252 TTSV 958	22.000	25.250	7.250	30.000	1.500	1/8	25.157	23 1/8	5 3/8	0.531	0.125	1 1/4-7	1 - 8	1 1/4	6290000

TAPERED ROLLER THRUST BEARINGS

TYPE TTSP

- The types TTSP and TTSPS (not shown) thrust bearings are made up of two tapered thrust races, rollers, cage and outside retainer which holds the components together during shipping and installation.
- These bearings are employed extensively in the steering pivot positions of automotive and industrial applications.

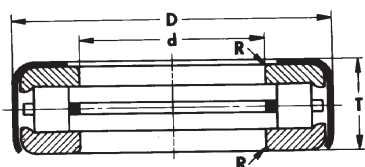


FIGURE 1

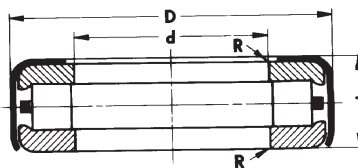


FIGURE 2

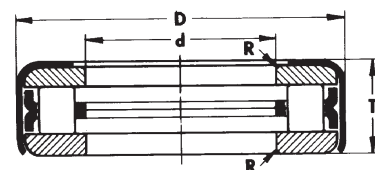


FIGURE 3

Bearing Number		Fig No.	Bore d	Outside Diameter D	Width T	Shaft Fillet Radius R	Mass	Remarks
No Oil Holes In Retainer	Oil Holes In Retainer							
			mm in.	mm in.	mm in.	mm in.	kg lbs.	
T63	T63W	1 1	16.129 0.6350	41.275 1.6250	12.700 0.5000	0.8 0.03	0.08 0.18	
T76	T76W	1 1	19.304 0.7600	41.275 1.6250	13.487 0.5310	0.8 0.03	0.08 0.18	
T77	T77W	1 1	19.304 0.7600	41.275 1.6250	12.700 0.5000	0.8 0.03	0.07 0.15	
T82	T82W	1 1	20.879 0.8220	41.275 1.6250	13.487 0.5310	0.8 0.03	0.07 0.15	
T86		1 1	20.257 0.7975	39.688 1.5625	14.288 0.5625	1.3 0.05	0.07 0.15	
T88	T88W	1 1	22.479 0.8850	48.021 1.8906	15.088 0.5940	0.8 0.03	0.11 0.24	
T89		1 1	22.479 0.8850	48.021 1.8906	15.875 0.6250	0.8 0.03	0.12 0.26	
*T92		2 2	23.825 0.9380	44.958 1.7700	13.487 0.5310	0.8 0.03	– –	T92 HAS 2 BORES, OTHER BORE =24.054 mm (.9470"), R = .08 mm (.03").
T93		2 2	24.054 0.9470	44.958 1.7700	13.487 0.5310	0.8 0.03	0.09 0.20	
T94	T94W	1 1	24.054 0.9470	48.021 1.8906	15.088 0.5940	0.8 0.03	0.11 0.24	
T95	T95W	1 1	24.130 0.9500	50.800 2.0000	15.875 0.6250	0.8 0.03	0.13 0.29	
T101	T101W	1 1	25.654 1.0100	50.800 2.0000	15.875 0.6250	0.8 0.03	0.13 0.29	
*T101X		1 1	25.146 0.9900	50.800 2.0000	15.875 0.6250	0.8 0.03	– –	T101X HAS 2 BORES, OTHER BORE =24.654 mm (1.0100").
*T102		1 1	25.654 1.0100	50.800 2.0000	16.916 0.6660	0.8 0.03	– –	T102 HAS EXTENDED RETAINER, RETAINER "C" DIMENSION - 20.384 mm (.8025"). EXTENSION INSIDE DIAMETER = 35.052 mm (1.3800")
T104	T104W	1 1	26.289 1.0350	50.800 2.0000	15.875 0.6250	0.8 0.03	0.13 0.29	
*T105		1 1	25.654 1.0100	50.800 2.0000	15.875 0.6250	0.8 0.03	– –	T105 HAS 2 BORES, OTHER BORE = 27.299 mm (1.0720").
T107	T107W	1 1	27.299 1.0720	50.800 2.0000	15.875 0.6250	0.8 0.03	0.12 0.26	
T110	T110W	1 1	28.829 1.1350	53.188 2.0940	15.875 0.6250	0.8 0.03	0.14 0.31	
T113	T113W	1 1	28.829 1.1350	55.562 2.1875	15.875 0.6250	0.8 0.03	0.15 0.33	

* See remarks column.





TAPERED ROLLER THRUST BEARINGS

TYPE TTSP – continued

B

Bearing Number		Fig No.	Bore d	Outside Diameter D	Width T	Shaft Fillet Radius R	Mass	Remarks
No Oil Holes In Retainer	Oil Holes In Retainer							
mm in.	mm in.							
*T114	*T114W	1 1	25.654 1.0100	55.562 2.1875	15.875 0.6250	0.8 0.03	– –	T114 AND T114W HAVE 2 BORES, OTHER BORE = 28.829 mm (1.1350").
*T114X		2 2	28.829 1.1350	50.800 2.0000	15.875 0.6250	0.8 0.03	– –	T114X HAS 2 CAGES AND 2 BORES, OTHER BORE = 29.261 mm (1.1520").
T119	T119W	1 1	30.416 1.1975	55.562 2.1875	15.875 0.6250	0.8 0.03	0.15 0.33	
T120		2 2	30.416 1.1975	54.745 2.1553	11.430 0.4500	0.8 0.03	0.11 0.24	
T121		1 1	30.716 1.2093	55.562 2.1875	15.875 0.6250	0.8 0.03	0.16 0.35	
T126	T126W	1 1	32.004 1.2600	55.562 2.1875	15.875 0.6250	0.8 0.03	0.14 0.31	
*T126A	T126AW	1 1	32.004 1.2600	55.562 2.1875	15.875 0.6250	0.8 0.03	0.14 0.31	T126A - 2 CAGES
T139	T139W	1 1	35.179 1.3850	58.738 2.3125	15.875 0.6250	0.8 0.03	0.15 0.33	
*T139KP		1 1	35.179 1.3850	58.738 2.3125	15.875 0.6250	0.8 0.03	0.15 0.33	RACES ARE CADMIUM PLATED.
T142	T142W	1 1	35.179 1.3850	62.708 2.4688	19.431 0.7650	0.8 0.03	0.23 0.51	
T149	T149W	1 1	38.303 1.5080	65.883 2.5938	19.431 0.7650	0.8 0.03	0.24 0.53	
T158		1 1	40.234 1.5840	65.883 2.5938	19.431 0.7650	0.8 0.03	0.23 0.51	
T199	T199W	1 1	51.054 2.0100	74.612 2.9375	15.875 0.6250	0.8 0.03	0.20 0.44	
T309	T309W	1 1	78.583 3.0938	102.395 4.0313	15.875 0.6250	0.8 0.03	0.29 0.64	
T387	T387W	1 1	96.425 3.8750	127.000 5.0000	17.463 0.7650	0.8 0.03	0.50 1.10	
T484		1 1	123.012 4.8430	152.400 6.0000	17.463 0.6875	0.8 0.03	0.63 1.39	
T581		1 1	147.638 5.8125	177.800 7.0000	17.463 0.6875	0.8 0.03	0.89 1.96	
T1760		3 3	44.623 1.7568	76.200 3.0000	10.922 0.4300	0.8 0.03	0.18 0.4	

* See remarks column.

TAPERED ROLLER THRUST BEARINGS

TYPE TTC-TTCS

- The types TTC, TTCS and TTCL (not shown) thrust bearings consist of two tapered thrust races, rollers and an outside retainer and are cageless.
- The outside retainer holds the assembly together for shipping and installation.
- These thrust bearings are specifically designed for oscillating applications.
- These types are identical with the exception of the retainer construction.



TTC



TTCS



FIGURE 1



FIGURE 2

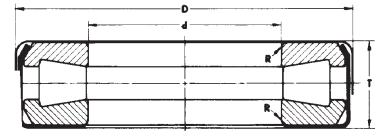


FIGURE 3

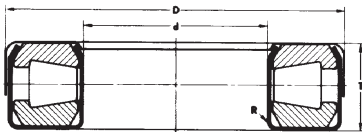


FIGURE 4

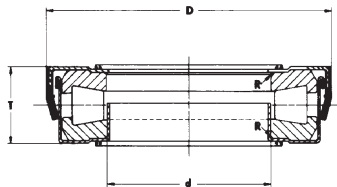


FIGURE 5

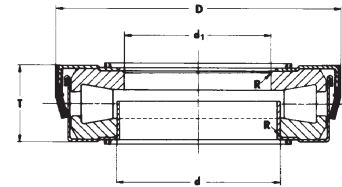


FIGURE 6

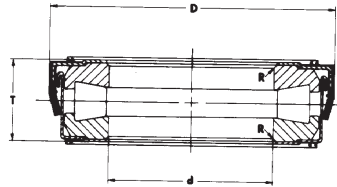


FIGURE 7

Bearing Number		Fig No.	Bore d	Outside Diameter D	Width T	Shaft Fillet Radius R	Mass	Remarks
No Oil Holes In Retainer	Oil Holes In Retainer							
			mm in.	mm in.	mm in.	mm in.	kg lbs.	
T127	T127W	1 1	32.004 1.2600	66.675 2.6250	19.446 0.7656	0.8 0.03	0.31 0.68	
T128		2 2	32.004 1.2600	66.675 2.6250	18.654 0.7344	0.8 0.03	0.29 0.64	
T130		1 1	27.102 1.0670	66.675 2.6250	19.446 0.7656	0.8 0.03	0.34 0.75	
T136		2 2	35.179 1.3850	66.675 2.6250	18.654 0.7344	0.8 0.03	0.28 0.62	
T138	T138W	1 1	35.179 1.3850	66.675 2.6250	19.446 0.7656	0.8 0.03	0.30 0.66	
*T138XS		SPCL	35.179 1.3850	66.675 2.6250	19.446 0.7656	0.8 0.03	– –	T138XS HAS 2 BORES, OTHER BORE = 35.387 mm (1.3972")
T144	T144W	1 1	36.754 1.4470	66.675 2.6250	19.446 0.7656	1.5 0.06	0.29 0.64	
*T144XA		SPCL	36.754 1.4470	66.675 2.6250	19.446 0.7656	1.5 0.06	– –	T144XA HAS 2 BORES, OTHER BORE = 37.137 mm (1.4621")
T151	T151W	1 1	38.354 1.5100	72.619 2.8590	21.433 0.8438	0.8 0.03	0.37 0.82	
T151X		1 1	38.354 1.5100	69.444 2.7340	20.726 0.8160	0.8 0.03	0.37 0.82	

* See remarks column.





TAPERED ROLLER THRUST BEARINGS

TYPE TTC-TTCS – *continued*

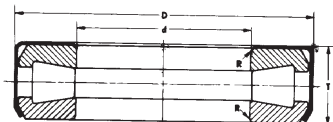


FIGURE 1

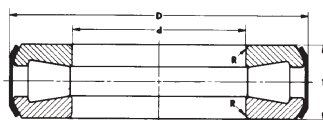


FIGURE 2

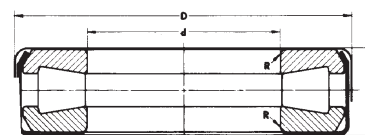


FIGURE 3

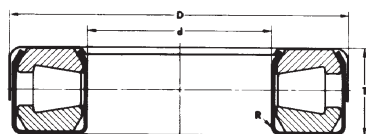


FIGURE 4

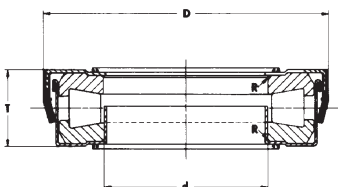


FIGURE 5

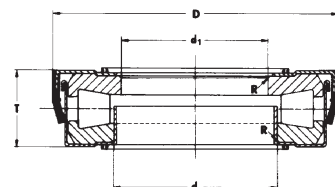


FIGURE 6

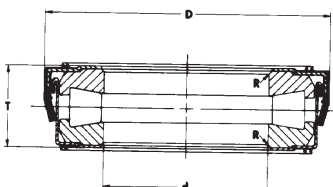


FIGURE 7

Bearing Number		Fig No.	Bore d	Outside Diameter D	Width T	Shaft Fillet Radius R	Mass	Remarks
No Oil Holes In Retainer	Oil Holes In Retainer							
			mm in.	mm in.	mm in.	mm in.	kg lbs.	
T152		2 2	38.354 1.5100	72.619 2.8590	20.638 0.8125	0.8 0.03	0.35 0.77	
T157	T157W	1 1	39.954 1.5730	72.619 2.8590	21.433 0.8438	0.8 0.03	0.37 0.82	
T163	T163W	1 1	41.529 1.6350	72.619 2.8590	21.433 0.8438	0.8 0.03	0.35 0.77	
T163X	T163XW	1 1	41.529 1.6350	72.619 2.8590	21.433 0.8438	2.0 0.80	0.35 0.77	
T169	T169W	1 1	43.104 1.6970	82.956 3.2660	23.812 0.9375	0.8 0.03	0.55 1.21	
T176	T176W	1 1	44.704 1.7600	82.956 3.2660	23.812 0.9375	0.8 0.03	0.54 1.19	
T177		1 1	45.000 1.7717	73.000 2.8740	20.000 0.7874	0.8 0.03	0.32 0.71	
T177A		1 1	45.484 1.7907	73.000 2.8740	20.000 0.7874	0.8 0.03	0.33 0.73	
*T177XA		SPCL	45.000 1.7717	73.127 2.8790	20.000 0.7874	0.8 0.03	– –	T177XA HAS 2 BORES, OTHER BORE = 45.484mm (1.7907")
T177S		5 5	45.000 1.7717	74.500 2.9331	20.221 0.7961	0.8 0.03	0.35 0.77	
T178		1 1	40.401 1.5906	73.000 2.8740	19.000 0.7480	0.8 0.03	– –	
T182	T182W	1 1	46.279 1.8220	82.956 3.2660	23.812 0.9375	0.8 0.03	0.52 1.15	
T188	T188W	1 1	47.879 1.8850	82.956 3.2660	23.812 0.9375	0.8 0.03	0.52 1.15	
T188X		4 4	47.879 1.8850	83.774 3.2970	24.130 0.9500	2.3 0.09	– –	
T189	T189W	2 2	47.879 1.8850	82.956 3.2660	23.020 0.9063	0.8 0.03	0.50 1.10	

* See remarks column.

Bearing Number		Fig No.	Bore d	Outside Diameter D	Width T	Shaft Fillet Radius R	Mass	Remarks
No Oil Holes In Retainer	Oil Holes In Retainer							
			mm in.	mm in.	mm in.	mm in.	kg lbs.	
T193	T193W	2 2	49.454 1.9470	93.269 3.6720	26.187 1.0310	0.8 0.03	0.80 1.76	
T194	T194W	1 1	49.454 1.9470	93.269 3.6720	26.975 1.0620	0.8 0.03	0.81 1.79	
T201	T201W	2 2	51.054 2.0100	93.269 3.6720	26.187 1.0310	3.3 0.13	0.77 1.70	
T202	T202W	1 1	51.054 2.0100	93.269 3.6720	26.975 1.0620	3.3 0.13	0.80 1.76	
T208	T208W	1 1	52.629 2.0720	93.269 3.6720	26.975 1.0620	0.8 0.03	0.79 1.74	
T209	T209W	2 2	52.629 2.0720	93.269 3.6720	26.187 1.0310	0.8 0.03	0.75 1.65	
T251	T251W	1 1	63.754 2.5100	111.125 4.3750	26.988 1.0625	0.8 0.03	1.07 2.36	
T252	T252W	2 2	63.754 2.5100	111.125 4.3750	25.796 1.0156	0.8 0.03	1.07 2.23	
T301	T301W	2 2	76.454 3.0100	133.350 5.2500	33.338 1.3125	2.3 0.09	1.87 4.12	
	T301X	2 2	76.454 3.0100	133.350 5.2500	33.338 1.3125	2.3 0.09	– –	
T302	T302W	1 1	76.454 3.0100	133.350 5.2500	34.925 1.3750	2.3 0.09	1.99 4.39	
T350		2 2	88.900 3.5000	133.350 5.2500	33.335 1.3124	2.8 0.11	1.41 3.11	
T402	T402W	2 2	102.108 4.0200	179.619 7.0716	44.450 1.7500	1.5 0.06	4.84 10.67	
T600	T600W	1 1	152.400 8.0000	241.300 9.5000	76.200 3.0000	3.3 0.13	14.10 31.09	
T1260	T1260W	1 1	32.004 1.2600	55.562 2.1875	15.875 0.6250	0.8 0.03	0.17 0.37	
*T1380		SPCL SPCL	35.179 1.3850	59.400 2.3386	15.875 0.6250	0.8 0.03	0.35 0.77	2 PIECE SEAL
T1921		1 1	46.279 1.8220	80.010 3.1500	15.977 0.6290	0.8 0.03	0.34 0.75	
T4020		2 2	102.108 4.0200	179.619 7.0716	31.750 1.2500	1.5 0.06	3.7 8.16	

* See remarks column.

