Thrust ball bearings

Definition and capabilities

Definition

Thrust ball bearings have a contact angle of 90° and are designed to withstand axial loads only. They must therefore often be associated with a radial bearing.

Single-direction ball thrust bearings withstand the axial load of a shaft in only one direction.

Thrust bearings are made of detachable elements: shaft-ring, housing-ring, ball-cage assembly.

Cages

Thrust bearings are equipped with a pressed steel cage.

Capabilities

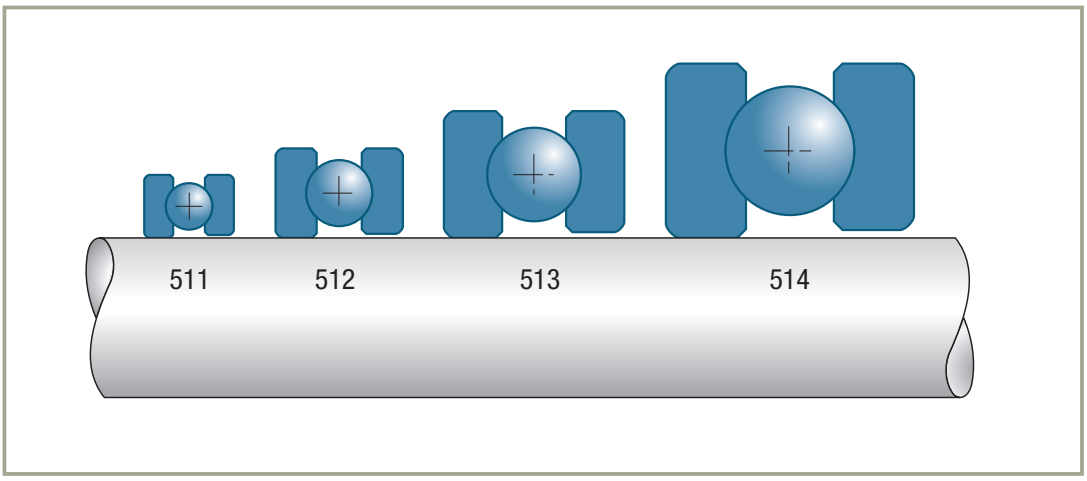
Loads and speeds

Can withstand axial loads only in one direction, and low speeds.

Misalignment

As the performance of a thrust bearing is related to the distribution of the load over the entire circumference, it is important to have virtually no misalignment between the shaft-ring and the housing-ring (misalignment angle less than 0.03°).

Series



Tolerances

In accordance with ISO 199 Standard, normal tolerance class.

Design criteria

Bearing life

Minimum dynamic axial load

To compensate for the effects of the centrifugal force being exerted on the balls, it is necessary to permanently exert on the thrusts an axial loading F_a whose minimal value F_{am} (in NR) is determined by the formula:

$$F_{am} = 10^{-14} (N \cdot C_0)^2$$

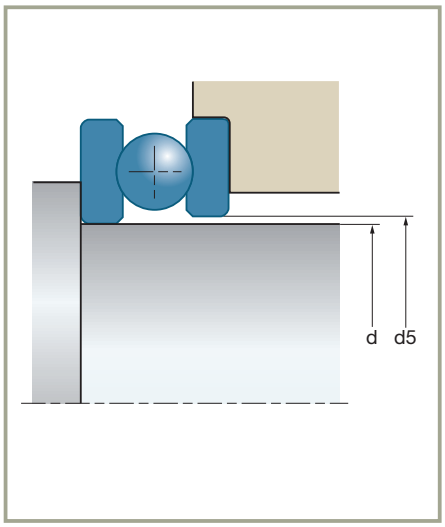
Maximum static axial capacity

This is defined by the basic static capacity C_0.

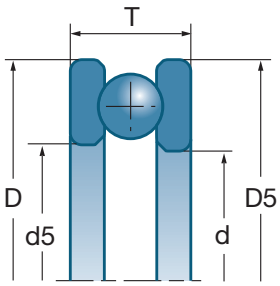
Installation/Assembly criteria

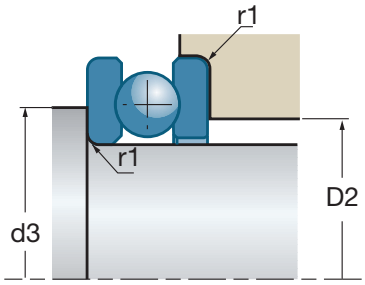
Fitting and adjustment

As the elements are detachable they are interchangeable. The shaftring is mounted on its seat with an interference fit. The housing-ring must be free to centre itself. To ease the correct position of the thrust bearing when fitting, the housing-ring has a bore diameter (d5) greater than that of the shaft-ring (d). If the axial load of the non-loaded thrust bearing is insufficient, a pre-load must be applied using springs to reach the minimum dynamic axial load defined above.



Thrust ball bearings *(continued)*

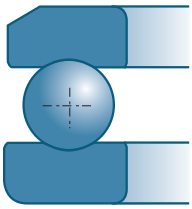


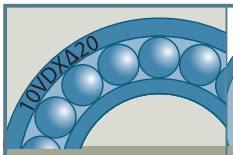
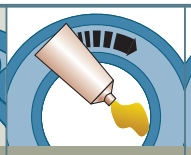
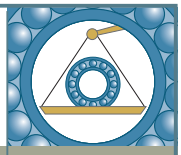


d	10VDX20	d5	D	D5	T	C	C_0
mm	References	mm	mm	mm	mm	10^3N	10^3N
10	51100	11	24	24	9	10.00	14.00
12	51101	13	26	26	9	10.30	15.40
15	51102 51202	16 17	28 32	28 32	9 12	10.50 15.70	16.80 24.40
17	51103 51203	18 19	30 35	30 35	9 12	11.30 16.20	19.60 26.60
20	51104 51204	21 22	35 40	35 40	10 14	15.00 22.30	26.60 37.70
25	51105 51205 51305 51405	26 27 27 27	42 47 52 60	42 47 52 60	11 15 18 24	18.10 27.80 35.70 55.50	35.50 50.50 61.50 89.40
30	51106 51206 51306 51406	32 32 32 32	47 52 60 70	47 52 60 70	11 16 21 28	18.80 29.40 42.70 72.70	39.90 58.20 78.70 126.00
35	51107 51207 51307 51407	37 37 37 37	52 62 68 80	52 62 68 80	12 18 24 32	20.10 39.10 55.50 86.90	46.60 78.20 105.00 155.00
40	51108 51208 51308	42 42 42	60 68 78	60 68 78	13 19 26	26.90 44.00 69.30	62.90 92.40 135.00
45	51109 51209 51309 51409	47 47 47 47	65 73 85 100	65 73 85 100	14 20 28 39	27.90 46.50 80.00 130.00	69.20 105.00 164.00 243.00
50	51110 51210	52 52	70 78	70 78	14 22	28.80 47.20	75.50 111.00
55	51111 51211 51311	57 57 57	78 90 105	78 90 105	16 25 35	34.80 69.40 119.00	93.20 159.00 246.00

Characteristics

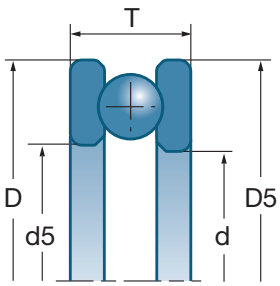
■ Thrust ball bearings with simple effect

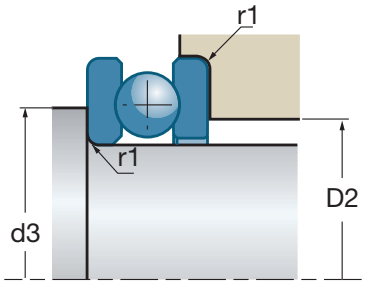


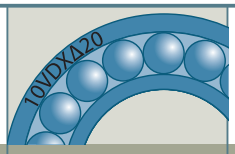
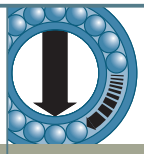
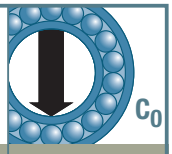
			d3 min	D2 max	r1 max	
References	rpm*	rpm*	mm	mm	mm	kg
51100	7900	10600	18	16	0.30	0.021
51101	7500	10000	20	18	0.30	0.023
51102 51202	7100 6000	9400 7900	23 25	20 22	0.30 0.60	0.025 0.042
51103 51203	7100 5600	9400 7500	25 28	22 24	0.30 0.60	0.025 0.050
51104 51204	6300 5000	8400 6700	29 32	26 28	0.30 0.60	0.038 0.078
51105 51205 51305 51405	5300 4500 3800 3200	7100 6000 5000 4200	35 38 41 46	32 34 36 39	0.60 0.60 1.00 1.00	0.058 0.110 0.167 0.340
51106 51206 51306 51406	5000 4000 3300 2700	6700 5300 4500 3500	40 43 48 54	37 39 42 46	0.60 0.60 1.00 1.00	0.065 0.133 0.270 0.530
51107 51207 51307 51407	4700 3500 2800 2200	6300 4700 3800 3000	45 51 55 62	42 46 48 53	0.60 1.00 1.00 1.10	0.081 0.203 0.377 0.790
51108 51208 51308	4200 3200 2700	5600 4200 3500	52 57 63	48 51 55	0.60 1.00 1.00	0.110 0.260 0.540
51109 51209 51309 51409	4000 3000 2400 1900	5300 4000 3200 2500	57 62 69 78	53 56 61 67	0.60 1.00 1.00 1.10	0.128 0.283 0.662 1.450
51110 51210	3800 2800	5000 3800	62 67	58 61	0.60 1.00	0.139 0.380
51111 51211 51311	3300 2500 1900	4500 3300 2500	69 76 85	64 69 75	0.60 1.00 1.10	0.220 0.590 1.350

* These are the speed limits according to the SNR concept (see pages 85 to 87).

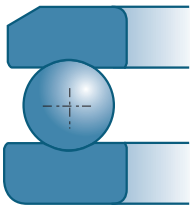
Thrust ball bearings *(continued)*

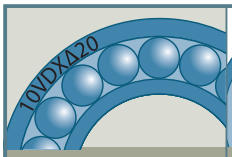
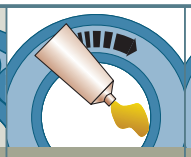
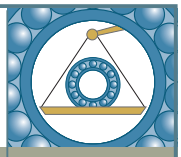




d		d5	D	D5	T	 C	 C_0
mm	References	mm	mm	mm	mm	10^3N	10^3N
60	51112 51312	62 62	85 110	85 110	17 35	41.40 124.00	113.00 270.00
65	51213 51313	67 67	100 115	100 115	27 36	74.90 128.00	189.00 287.00
70	51114 51214	72 72	95 105	95 105	18 27	43.10 76.10	127.00 199.00
75	51115 51215	77 77	100 110	100 110	19 27	44.50 77.30	136.00 209.00
80	51116 51216 51416	82 82 83	105 115 170	105 115 170	19 28 68	44.60 78.50 317.00	141.00 219.00 751.00
85	51117 51217	87 88	110 125	110 125	19 31	46.00 95.40	150.00 264.00
90	51118	92	120	120	22	59.70	190.00
100	51120	102	135	135	25	85.10	268.00
110	51122	112	145	145	25	87.30	288.00
120	51124	122	155	155	25	88.90	308.00
130	51126	132	170	170	30	119.00	406.00
150	51130	152	190	188	31	123.00	448.00
160	51132	162	200	198	31	125.00	476.00

Thrust ball bearings with simple effect *(continued)*



			d3 min	D2 max	r1 max	
References	rpm*	rpm*	mm	mm	mm	kg
51112 51312	3200 1900	4200 2500	75 90	70 80	1.00 1.10	0.257 1.450
51213 51313	2400 1800	3200 2400	86 95	79 85	1.00 1.10	0.729 1.550
51114 51214	2800 2200	3800 3000	85 91	80 84	1.00 1.00	0.354 0.783
51115 51215	2700 2200	3500 3000	90 96	85 89	1.00 1.00	0.398 0.827
51116 51216 51416	2700 2000 890	3500 2700 1200	95 101 133	90 94 116	1.00 1.00 2.10	0.430 0.908 7.300
51117 51217	2700 2000	3500 2700	100 109	95 101	1.00 1.00	0.442 1.300
51118	2000	2700	108	102	1.00	0.598
51120	2000	2700	121	114	1.00	0.974
51122	1900	2500	131	124	1.00	1.060
51124	1600	2100	141	134	1.00	1.140
51126	1400	1900	154	146	1.00	1.740
51130	1300	1800	174	166	1.00	2.000
51132	1300	1800	184	176	1.00	2.100

* These are the speed limits according to the SNR concept (see pages 85 to 87).