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# International Standard



# 104

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Rolling bearings — Thrust bearings with flat back faces — Boundary dimensions

*Roulements — Butées à rondelles plates — Dimensions d'encombrement*

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## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 104 was developed by Technical Committee ISO/TC 4, *Rolling bearings*, and was circulated to the member bodies in October 1978.

It has been approved by the member bodies of the following countries :

Australia	Germany, F.R.	Romania:1979
Austria	Hungary	South Africa, Rep. of
Belgium	India	Sweden
Brazil	Italy	Switzerland
Bulgaria	Japan	United Kingdom
Canada	Korea, Dem. P. Rep. of	USA
Chile	Korea, Rep. of	USSR
China	Mexico	Yugoslavia
Czechoslovakia	Netherlands	
France	Poland	

No member body expressed disapproval of the document.

This International Standard cancels and replaces ISO Recommendation R 104-1966, of which it constitutes a technical revision.

# Rolling bearings — Thrust bearings with flat back faces — Boundary dimensions

## 0 INTRODUCTION

This International Standard contains the same boundary dimensions as the general plan of ISO/R 104 with the exception that the nominal chamfer dimensions have been replaced by minimum chamfer dimensions.

In addition, values for the maximum outside diameters of shaft washers and the minimum bore diameters of housing washers are given for several of the dimension series. Also, dimension series 92, 93, 94, 22, 23 and 24 have been extended.

Guide rules for the extension of this International Standard for single direction thrust bearings are given as an annex, but do not constitute an integral part of the body of this International Standard.

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard lays down the major boundary dimensions of single direction and double direction thrust bearings with flat back faces.

In addition, it gives the minimum bore diameters of housing washers and maximum outside diameters of shaft washers of bearings in dimension series 11, 12, 13, 14, 22, 23 and 24. Guide rules are given in an annex for further extension of this International Standard for single direction thrust bearings.

Chamfer dimensions  $r$  and  $r_1$  apply only at the corners indicated in figures 1 and 2. No dimensions are given for other corners; however, they should not be sharp.

## 2 SYMBOLS

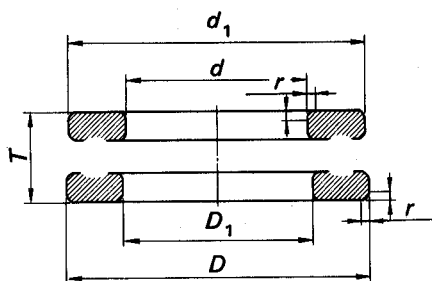


FIGURE 1 — Single direction thrust bearing

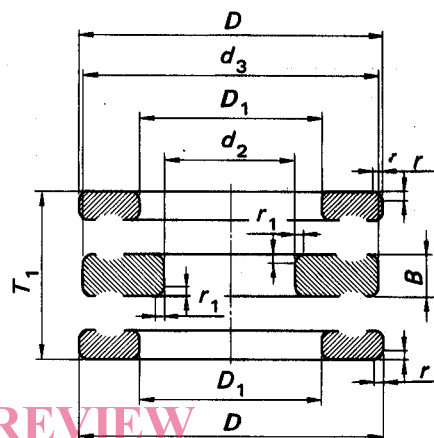


FIGURE 2 — Double direction thrust bearing

$d$	= bore diameter of shaft washer, single direction bearing, nominal
$d_1$	= outside diameter of shaft washer, single direction bearing, nominal
$d_{1 \text{ s max}}$	= largest single outside diameter of shaft washer
$d_2$	= bore diameter of central shaft washer, double direction bearing, nominal
$d_3$	= outside diameter of central shaft washer, nominal
$d_{3 \text{ s max}}$	= largest single outside diameter of central shaft washer
$D$	= outside diameter of housing washer, nominal
$D_1$	= bore diameter of housing washer, nominal
$D_{1 \text{ s min}}$	= smallest single bore diameter of housing washer
$T$	= bearing height, single direction bearing, nominal
$T_1$	= bearing height, double direction bearing, nominal
$B$	= height of central shaft washer, nominal
$r$	= back face chamfer dimension of shaft washer (single direction bearing) and housing washer
$r_{\text{ s min}}$	= smallest single dimension of $r$
$r_1$	= face chamfer dimension of central shaft washer
$r_{1 \text{ s min}}$	= smallest single dimension of $r_1$

3 SINGLE DIRECTION THRUST BEARINGS

3.1 Diameter series 0

TABLE 1 — Single direction bearings — Diameter series 0

Dimensions in millimetres

d	D	r <sub>s</sub> min	Dimension series			d	D	r <sub>s</sub> min	Dimension series		
			70	90	10				70	90	10
			T						T		
4	12	0,3	4	—	6	360	400	1	18	24	30
6	16	0,3	5	—	7	380	420	1	18	24	30
8	18	0,3	5	—	7	400	440	1	18	24	30
10	20	0,3	5	—	7	420	460	1	18	24	30
12	22	0,3	5	—	7	440	480	1	18	24	30
15	26	0,3	5	—	7	460	500	1	18	24	30
17	28	0,3	5	—	7	480	520	1	18	24	30
20	32	0,3	6	—	8	500	540	1	18	24	30
25	37	0,3	6	—	8	530	580	1,1	23	30	38
30	42	0,3	6	—	8	560	610	1,1	23	30	38
35	47	0,3	6	—	8	600	650	1,1	23	30	38
40	52	0,3	6	—	9	630	680	1,1	23	30	38
45	60	0,3	7	—	10	670	730	1,5	27	36	45
50	65	0,3	7	—	10	710	780	1,5	32	42	53
55	70	0,3	7	—	10	750	820	1,5	32	42	53
60	75	0,3	7	—	10	800	870	1,5	32	42	53
65	80	0,3	7	—	10	850	920	1,5	32	42	53
70	85	0,3	7	—	10	900	980	2	36	48	63
75	90	0,3	7	—	10	950	1 030	2	36	48	63
80	95	0,3	7	—	10	1 000	1 090	2,1	41	54	70
85	100	0,3	7	—	10	1 060	1 150	2,1	41	54	70
90	105	0,3	7	—	10	1 120	1 220	2,1	45	60	80
100	120	0,6	9	—	14	1 180	1 280	2,1	45	60	80
110	130	0,6	9	—	14	1 250	1 360	3	50	67	85
120	140	0,6	9	—	14	1 320	1 440	3	—	—	95
130	150	0,6	9	—	14	1 400	1 520	3	—	—	95
140	160	0,6	9	—	14	1 500	1 630	4	—	—	105
150	170	0,6	9	—	14	1 600	1 730	4	—	—	105
160	180	0,6	9	—	14	1 700	1 840	4	—	—	112
170	190	0,6	9	—	14	1 800	1 950	4	—	—	120
180	200	0,6	9	—	14	1 900	2 060	5	—	—	130
190	215	1	11	—	17	2 000	2 160	5	—	—	130
200	225	1	11	—	17	2 120	2 300	5	—	—	140
220	250	1	14	—	22	2 240	2 430	5	—	—	150
240	270	1	14	—	22	2 360	2 550	5	—	—	150
260	290	1	14	—	22	2 500	2 700	5	—	—	160
280	310	1	14	—	22						
300	340	1	18	24	30						
320	360	1	18	24	30						
340	380	1	18	24	30						

3.2 Diameter series 1

TABLE 2 — Single direction bearings — Diameter series 1

Dimensions in millimetres

d	D	r <sub>s</sub> min	Dimension series				
			71	91	11		
			T			d <sub>1 s</sub> max	D <sub>1 s</sub> min
10	24	0,3	6	—	9	24	11
12	26	0,3	6	—	9	26	13
15	28	0,3	6	—	9	28	16
17	30	0,3	6	—	9	30	18
20	35	0,3	7	—	10	35	21
25	42	0,6	8	—	11	42	26
30	47	0,6	8	—	11	47	32
35	52	0,6	8	—	12	52	37
40	60	0,6	9	—	13	60	42
45	65	0,6	9	—	14	65	47
50	70	0,6	9	—	14	70	52
55	78	0,6	10	—	16	78	57
60	85	1	11	—	17	85	62
65	90	1	11	—	18	90	67
70	95	1	11	—	18	95	72
75	100	1	11	—	19	100	77
80	105	1	11	—	19	105	82
85	110	1	11	—	19	110	87
90	120	1	14	—	22	120	92
100	135	1	16	21	25	135	102
110	145	1	16	21	25	145	112
120	155	1	16	21	25	155	122
130	170	1	18	24	30	170	132
140	180	1	18	24	31	178	142
150	190	1	18	24	31	188	152
160	200	1	18	24	31	198	162
170	215	1,1	20	27	34	213	172
180	225	1,1	20	27	34	222	183
190	240	1,1	23	30	37	237	193
200	250	1,1	23	30	37	247	203
220	270	1,1	23	30	37	267	223
240	300	1,5	27	36	45	297	243
260	320	1,5	27	36	45	317	263
280	350	1,5	32	42	53	347	283
300	380	2	36	48	62	376	304
320	400	2	36	48	63	396	324
340	420	2	36	48	64	416	344
360	440	2	36	48	65	436	364
380	460	2	36	48	65	456	384
400	480	2	36	48	65	476	404
420	500	2	36	48	65	495	424
440	540	2,1	45	60	80	535	444
460	560	2,1	45	60	80	555	464
480	580	2,1	45	60	80	575	484
500	600	2,1	45	60	80	595	504
530	640	3	50	67	85	635	534
560	670	3	50	67	85	665	564
600	710	3	50	67	85	705	604
630	750	3	54	73	95	745	634
670	800	4	58	78	105	795	674
710	850	4	63	85	112	845	714
750	900	4	67	90	120	895	755
800	950	4	67	90	120	945	805
850	1 000	4	67	90	120	995	855
900	1 060	5	73	95	130	1 055	905
950	1 120	5	78	103	135	1 115	955
1 000	1 180	5	82	109	140	1 175	1 005
1 060	1 250	5	85	115	150	1 245	1 065
1 120	1 320	5	90	122	160	1 315	1 125
1 180	1 400	6	100	132	175	1 395	1 185
1 250	1 460	6	—	—	175	1 455	1 255
1 320	1 540	6	—	—	175	1 535	1 325
1 400	1 630	6	—	—	180	1 620	1 410
1 500	1 750	6	—	—	195	1 740	1 510
1 600	1 850	6	—	—	195	1 840	1 610
1 700	1 970	7,5	—	—	212	1 960	1 710
1 800	2 080	7,5	—	—	220	2 070	1 810
1 900	2 180	7,5	—	—	220	2 170	1 910
2 000	2 300	7,5	—	—	236	2 290	2 010
2 120	2 430	7,5	—	—	243	2 420	2 130
2 240	2 570	9,5	—	—	258	2 560	2 250
2 360	2 700	9,5	—	—	265	2 690	2 370
2 500	2 850	9,5	—	—	272	2 840	2 510

3.3 Diameter series 2

TABLE 3 — Single direction bearings — Diameter series 2

Dimensions in millimetres

d	D	r <sub>s</sub> min	Dimension series				
			72	92	12		
			T		d <sub>1 s</sub> max	D <sub>1 s</sub> min	
4	16	0,3	6	—	8	16	4
6	20	0,3	6	—	9	20	6
8	22	0,3	6	—	9	22	8
10	26	0,6	7	—	11	26	12
12	28	0,6	7	—	11	28	14
15	32	0,6	8	—	12	32	17
17	35	0,6	8	—	12	35	19
20	40	0,6	9	—	14	40	22
25	47	0,6	10	—	15	47	27
30	52	0,6	10	—	16	52	32
35	62	1	12	—	18	62	37
40	68	1	13	—	19	68	42
45	73	1	13	—	20	73	47
50	78	1	13	—	22	78	52
55	90	1	16	21	25	90	57
60	95	1	16	21	26	95	62
65	100	1	16	21	27	100	67
70	105	1	16	21	27	105	72
75	110	1	16	21	27	110	77
80	115	1	16	21	28	115	82
85	125	1	18	24	31	125	88
90	135	1,1	20	27	35	135	93
100	150	1,1	23	30	38	150	103
110	160	1,1	23	30	38	160	113
120	170	1,1	23	30	39	170	123
130	190	1,5	27	36	45	187	133
140	200	1,5	27	36	46	197	143
150	215	1,5	29	39	50	212	153
160	225	1,5	29	39	51	222	163
170	240	1,5	32	42	55	237	173
180	250	1,5	32	42	56	247	183
190	270	2	36	48	62	267	194
200	280	2	36	48	62	277	204
220	300	2	36	48	63	297	224
240	340	2,1	45	60	78	335	244
260	360	2,1	45	60	79	355	264
280	380	2,1	45	60	80	375	284
300	420	3	54	73	95	415	304
320	440	3	54	73	95	435	325
340	460	3	54	73	96	455	345
360	500	4	63	85	110	495	365
380	520	4	63	85	112	515	385
400	540	4	63	85	112	535	405
420	580	5	73	95	130	575	425
440	600	5	73	95	130	595	445
460	620	5	73	95	130	615	465
480	650	5	78	103	135	645	485
500	670	5	78	103	135	665	505
530	710	5	82	109	140	705	535
560	750	5	85	115	150	745	565
600	800	5	90	122	160	795	605
630	850	6	100	132	175	845	635
670	900	6	103	140	180	895	675
710	950	6	109	145	190	945	715
750	1 000	6	112	150	195	995	755
800	1 060	7,5	118	155	205	1 055	805
850	1 120	7,5	122	160	212	1 115	855
900	1 180	7,5	125	170	220	1 175	905
950	1 250	7,5	136	180	236	1 245	955
1 000	1 320	9,5	145	190	250	1 315	1 005
1 060	1 400	9,5	155	206	265	1 395	1 065
1 120	1 460	9,5		206			
1 180	1 520	9,5		206			
1 250	1 610	9,5		216			
1 320	1 700	9,5		228			

3.4 Diameter series 3

TABLE 4. — Single direction bearings — Diameter series 3

Dimensions in millimetres

d	D	r <sub>s</sub> min	Dimension series				
			73	93	13		
			T		d <sub>1 s</sub> max	D <sub>1 s</sub> min	
4	20	0,6	7	—	11	20	4
6	24	0,6	8	—	12	24	6
8	26	0,6	8	—	12	26	8
10	30	0,6	9	—	14	30	10
12	32	0,6	9	—	14	32	12
15	37	0,6	10	—	15	37	15
17	40	0,6	10	—	16	40	19
20	47	1	12	—	18	47	22
25	52	1	12	—	18	52	27
30	60	1	14	—	21	60	32
35	68	1	15	—	24	68	37
40	78	1	17	22	26	78	42
45	85	1	18	24	28	85	47
50	95	1,1	20	27	31	95	52
55	105	1,1	23	30	35	105	57
60	110	1,1	23	30	35	110	62
65	115	1,1	23	30	36	115	67
70	125	1,1	25	34	40	125	72
75	135	1,5	27	36	44	135	77
80	140	1,5	27	36	44	140	82
85	150	1,5	29	39	49	150	88
90	155	1,5	29	39	50	155	93
100	170	1,5	32	42	55	170	103
110	190	2	36	48	63	187	113
120	210	2,1	41	54	70	205	123
130	225	2,1	42	58	75	220	134
140	240	2,1	45	60	80	235	144
150	250	2,1	45	60	80	245	154
160	270	3	50	67	87	265	164
170	280	3	50	67	87	275	174
180	300	3	54	73	95	295	184
190	320	4	58	78	105	315	195
200	340	4	63	85	110	335	205
220	360	4	63	85	112	355	225
240	380	4	63	85	112	375	245
260	420	5	73	95	130	415	265
280	440	5	73	95	130	435	285
300	480	5	82	109	140	475	305
320	500	5	82	109	140	495	325
340	540	5	90	122	160	535	345
360	560	5	90	122	160	555	365
380	600	6	100	132	175	595	385
400	620	6	100	132	175	615	405
420	650	6	103	140	180	645	425
440	680	6	109	145	190	675	445
460	710	6	112	150	195	705	465
480	730	6	112	150	195	725	485
500	750	6	112	150	195	745	505
530	800	7,5	122	160	212	795	535
560	850	7,5	132	175	224	845	565
600	900	7,5	136	180	236	895	605
630	950	9,5	145	190	250	945	635
670	1 000	9,5	150	200	258	995	675
710	1 060	9,5	160	212	272	1 055	715
750	1 120	9,5	165	224	290	1 115	755
800	1 180	9,5	170	230	300	1 175	805
850	1 250	12	180	243	315	1 245	855
900	1 320	12	190	250	335	1 315	905
950	1 400	12	200	272	355	1 395	955
1 000	1 460	12	276				

3.5 Diameter series 4

TABLE 5 – Single direction bearings – Diameter series 4

Dimensions in millimetres

d	D	r <sub>s</sub> min	Dimension series				
			74	94	14		
			T		d <sub>1 s</sub> max	D <sub>1 s</sub> min	
25	60	1	16	21	24	60	27
30	70	1	18	24	28	70	32
35	80	1,1	20	27	32	80	37
40	90	1,1	23	30	36	90	42
45	100	1,1	25	34	39	100	47
50	110	1,5	27	36	43	110	52
55	120	1,5	29	39	48	120	57
60	130	1,5	32	42	51	130	62
65	140	2	34	45	56	140	68
70	150	2	36	48	60	150	73
75	160	2	38	51	65	160	78
80	170	2,1	41	54	68	170	83
85	180	2,1	42	58	72	177	88
90	190	2,1	45	60	77	187	93
100	210	3	50	67	85	205	103
110	230	3	54	73	95	225	113
120	250	4	58	78	102	245	123
130	270	4	63	85	110	265	134
140	280	4	63	85	112	275	144
150	300	4	67	90	120	295	154
160	320	5	73	95	130	315	164
170	340	5	78	103	135	335	174
180	360	5	82	109	140	355	184
190	380	5	85	115	150	375	195
200	400	5	90	122	155	395	205
220	420	6	90	122	160	415	225
240	440	6	90	122	160	435	245
260	480	6	100	132	175	475	265
280	520	6	109	145	190	515	285
300	540	6	109	145	190	535	305
320	580	7,5	118	155	205	575	325
340	620	7,5	125	170	220	615	345
360	640	7,5	125	170	220	635	365
380	670	7,5	132	175	224	665	385
400	710	7,5	140	185	243	705	405
420	730	7,5	140	185	243	725	425
440	780	9,5	155	206	265	775	445
460	800	9,5	155	206	265	795	465
480	850	9,5	165	224	290	845	485
500	870	9,5	165	224	290	865	505
530	920	9,5	175	236	308	915	535
560	980	12	190	250	335	975	565
600	1 030	12	195	258	335	1 025	605
630	1 090	12	206	280	365	1 085	635
670	1 150	15	218	290	375	1 145	675
710	1 220	15	230	308	400	1 215	715
750	1 280	15	236	315	412	1 275	755
800	1 360	15	250	335	438	1 355	805
850	1 440	15		354			
900	1 520	15		372			
950	1 600	15		390			
1 000	1 670	15		402			
1 060	1 770	15		426			
1 120	1 860	15		444			
1 180	1 950	19		462			



## 3.6 Diameter series 5

TABLE 6 – Single direction bearings – Diameter series 5

Dimensions in millimetres

$d$	$D$	$r_s$ min	Dimensions series		$d$	$D$	$r_s$ min	Dimensions series	
			95					95	
			$T$					$T$	
17	52	1	21		180	420	6	145	
20	60	1	24		190	440	6	150	
25	73	1,1	29		200	460	7,5	155	
30	85	1,1	34		220	500	7,5	170	
35	100	1,1	39		240	540	7,5	180	
40	110	1,5	42		260	580	9,5	190	
45	120	2	45		280	620	9,5	206	
50	135	2	51		300	670	9,5	224	
55	150	2,1	58		320	710	9,5	236	
60	160	2,1	60		340	750	12	243	
65	170	2,1	63		360	780	12	250	
70	180	3	67		380	820	12	265	
75	190	3	69		400	850	12	272	
80	200	3	73		420	900	15	290	
85	215	4	78		440	950	15	308	
90	225	4	82		460	980	15	315	
100	250	4	90		480	1 000	15	315	
110	270	5	95		500	1 060	15	335	
120	300	5	109		530	1 090	15	335	
130	320	5	115		560	1 150	15	355	
140	340	5	122		600	1 220	15	375	
150	360	6	125		630	1 280	15	388	
160	380	6	132		670	1 320	15	388	
170	400	6	140		710	1 400	15	412	