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Rolling bearings — Radial internal clearance

Roulements — Jeu interne radial

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

International Standard ISO 5753 was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Sub-Committee SC 4, *Tolerances*.

This second edition cancels and replaces the first edition (ISO 5753:1981), which has been technically revised.

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Rolling bearings — Radial internal clearance

1 Scope

This International Standard specifies values of radial internal clearance for

- radial contact groove ball bearings, except those for insert bearings, which are given in ISO 9628;
- double row self-aligning ball bearings;
- cylindrical roller bearings;
- needle roller bearings; and
- double row self-aligning roller bearings.

Values are given for all five types of bearing with cylindrical bore, and also for the self-aligning bearings with tapered bore.

The values given apply to non-preloaded bearings and of a design such that they can take purely radial load.

Depending on bearing design and measuring method, some scatter of the results of repeated measurements may be experienced. Manufacturers are expected to take such scatter into consideration by applying correspondingly reduced manufacturing tolerances.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard

are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1132:1980, *Rolling bearings — Tolerances — Definitions*.

ISO 6979:1982, *Needle roller bearings — Heavy series — Dimensions and tolerances*.

ISO 9628:—¹⁾, *Rolling bearings — Insert bearings and eccentric locking collars*.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 1132 apply. For the convenience of users of this International Standard, the following definition is reproduced.

3.1 radial internal clearance: G_r (bearing capable of taking purely radial load, non-preloaded): The arithmetical mean of the radial distances through which one of the rings may be displaced relative to the other, from one eccentric extreme position to the diametrically opposite extreme position, in different angular directions and without being subjected to any external load. The mean value includes displacements with the rings in different angular positions relative to each other and with the set of rolling elements in different angular positions in relation to the rings.

NOTE 1 At each limiting eccentric position of the rings in relation to each other, their relative axial position, and the position of the rolling elements relative to the raceways, are to be such that the one ring has actually assumed the extreme eccentric position in relation to the other ring.

1) To be published.

4 Radial internal clearance values

4.1 Radial contact groove ball bearings

See table 1.

Table 1 — Radial contact groove ball bearings with cylindrical bore

Clearance values in micrometres

Bore diameter <i>d</i> mm		Group 2		Group N		Group 3		Group 4		Group 5	
over	incl.	min.	max.								
2,5	6	0	7	2	13	8	23	—	—	—	—
6	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	230
200	225	2	35	25	85	75	140	125	195	175	265
225	250	2	40	30	95	85	160	145	225	205	300
250	280	2	45	35	105	90	170	155	245	225	340
280	315	2	55	40	115	100	190	175	270	245	370
315	355	3	60	45	125	110	210	195	300	275	410
355	400	3	70	55	145	130	240	225	340	315	460
400	450	3	80	60	170	150	270	250	380	350	510
450	500	3	90	70	190	170	300	280	420	390	570
500	560	10	100	80	210	190	330	310	470	440	630
560	630	10	110	90	230	210	360	340	520	490	690
630	710	20	130	110	260	240	400	380	570	540	760
710	800	20	140	120	290	270	450	430	630	600	840
800	900	20	160	140	320	300	500	480	700	670	940
900	1 000	20	170	150	350	330	550	530	770	740	1 040
1 000	1 120	20	180	160	380	360	600	580	850	820	1 150
1 120	1 250	20	190	170	410	390	650	630	920	890	1 260

NOTE — These values are not valid for insert bearings; refer to ISO 9628.

4.2 Double row self-aligning ball bearings

See tables 2 and 3.

Table 2 — Double row self-aligning ball bearings with cylindrical bore

Clearance values in micrometres

Bore diameter <i>d</i> mm		Group 2		Group N		Group 3		Group 4		Group 5	
over	incl.	min.	max.								
2,5	6	1	8	5	15	10	20	15	25	21	33
6	10	2	9	6	17	12	25	19	33	27	42
10	14	2	10	6	19	13	26	21	35	30	48
14	18	3	12	8	21	15	28	23	37	32	50
18	24	4	14	10	23	17	30	25	39	34	52
24	30	5	16	11	24	19	35	29	46	40	58
30	40	6	18	13	29	23	40	34	53	46	66
40	50	6	19	14	31	25	44	37	57	50	71
50	65	7	21	16	36	30	50	45	69	62	88
65	80	8	24	18	40	35	60	54	83	76	108
80	100	9	27	22	48	42	70	64	96	89	124
100	120	10	31	25	56	50	83	75	114	105	145
120	140	10	38	30	68	60	100	90	135	125	175
140	160	15	44	35	80	70	120	110	161	150	210

Table 3 — Double row self-aligning ball bearings with tapered bore

Clearance values in micrometres

Bore diameter <i>d</i> mm		Group 2		Group N		Group 3		Group 4		Group 5	
over	incl.	min.	max.								
18	24	7	17	13	26	20	33	28	42	37	55
24	30	9	20	15	28	23	39	33	50	44	62
30	40	12	24	19	35	29	46	40	59	52	72
40	50	14	27	22	39	33	52	45	65	58	79
50	65	18	32	27	47	41	61	56	80	73	99
65	80	23	39	35	57	50	75	69	98	91	123
80	100	29	47	42	68	62	90	84	116	109	144
100	120	35	56	50	81	75	108	100	139	130	170
120	140	40	68	60	98	90	130	120	165	155	205
140	160	45	74	65	110	100	150	140	191	180	240

4.3 Cylindrical roller bearings

See table 4.

Table 4 — Cylindrical roller bearings with cylindrical bore

Clearance values in micrometres

Bore diameter <i>d</i> mm		Group 2		Group N		Group 3		Group 4		Group 5	
over	incl.	min.	max.								
	10	0	25	20	45	35	60	50	75	—	—
10	24	0	25	20	45	35	60	50	75	65	90
24	30	0	25	20	45	35	60	50	75	70	95
	30	5	30	25	50	45	70	60	85	80	105
30	50	5	35	30	60	50	80	70	100	95	125
50	65	10	40	40	70	60	90	80	110	110	140
	65	10	45	40	75	65	100	90	125	130	165
65	80	15	50	50	85	75	110	105	140	155	190
80	100	15	55	50	90	85	125	125	165	180	220
100	120	15	60	60	105	100	145	145	190	200	245
120	140	20	70	70	120	115	165	165	215	225	275
140	160	25	75	75	125	120	170	170	220	250	300
160	180	35	90	90	145	140	195	195	250	275	330
180	200	45	105	105	165	160	220	220	280	305	365
200	225	45	110	110	175	170	235	235	300	330	395
225	250	55	125	125	195	190	260	260	330	370	440
250	280	55	130	130	205	200	275	275	350	410	485
280	315	65	145	145	225	225	305	305	385	455	535
315	355	100	190	190	280	280	370	370	460	510	600
355	400	110	210	210	310	310	410	410	510	565	665
400	450	110	220	220	330	330	440	440	550	625	735
450	500										

4.4 Needle roller bearings

For complete needle roller bearings, except drawn cup bearings and heavy series given in ISO 6979, the same radial internal clearance values apply as given for cylindrical roller bearings in table 4.

For complete bearings of the heavy series (see ISO 6979), and for needle roller bearings comprising

an inner ring delivered as a separate item, the radial clearance is given by the inner ring raceway and the needle roller complement bore diameters. Tolerances for these diameters are given in the International Standards covering needle roller bearing inner rings and needle roller bearings without inner ring.

4.5 Double row self-aligning roller bearings

See tables 5 and 6.

Table 5 — Double row self-aligning roller bearings with cylindrical bore

Clearance values in micrometres

Bore diameter <i>d</i> mm		Group 2		Group N		Group 3		Group 4		Group 5	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
14	18	10	20	20	35	35	45	45	60	60	75
18	24	10	20	20	35	35	45	45	60	60	75
24	30	15	25	25	40	40	55	55	75	75	95
30	40	15	30	30	45	45	60	60	80	80	100
40	50	20	35	35	55	55	75	75	100	100	125
50	65	20	40	40	65	65	90	90	120	120	150
65	80	30	50	50	80	80	110	110	145	145	180
80	100	35	60	60	100	100	135	135	180	180	225
100	120	40	75	75	120	120	160	160	210	210	260
120	140	50	95	95	145	145	190	190	240	240	300
140	160	60	110	110	170	170	220	220	280	280	350
160	180	65	120	120	180	180	240	240	310	310	390
180	200	70	130	130	200	200	260	260	340	340	430
200	225	80	140	140	220	220	290	290	380	380	470
225	250	90	150	150	240	240	320	320	420	420	520
250	280	100	170	170	260	260	350	350	460	460	570
280	315	110	190	190	280	280	370	370	500	500	630
315	355	120	200	200	310	310	410	410	550	550	690
355	400	130	220	220	340	340	450	450	600	600	750
400	450	140	240	240	370	370	500	500	660	660	820
450	500	140	260	260	410	410	550	550	720	720	900
500	560	150	280	280	440	440	600	600	780	780	1 000
560	630	170	310	310	480	480	650	650	850	850	1 100
630	710	190	350	350	530	530	700	700	920	925	1 190
710	800	210	390	390	580	580	770	770	1 010	1 010	1 300
800	900	230	430	430	650	650	860	860	1 120	1 120	1 440
900	1 000	260	480	480	710	710	930	930	1 220	1 220	1 570

Table 6 — Double row self-aligning roller bearings with tapered bore

Clearance values in micrometres

Bore diameter <i>d</i> mm		Group 2		Group N		Group 3		Group 4		Group 5	
over	incl.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
18	24	15	25	25	35	35	45	45	60	60	75
24	30	20	30	30	40	40	55	55	75	75	95
30	40	25	35	35	50	50	65	65	85	85	105
40	50	30	45	45	60	60	80	80	100	100	130
50	65	40	55	55	75	75	95	95	120	120	160
65	80	50	70	70	95	95	120	120	150	150	200
80	100	55	80	80	110	110	140	140	180	180	230
100	120	65	100	100	135	135	170	170	220	220	280
120	140	80	120	120	160	160	200	200	260	260	330
140	160	90	130	130	180	180	230	230	300	300	380
160	180	100	140	140	200	200	260	260	340	340	430
180	200	110	160	160	220	220	290	290	370	370	470
200	225	120	180	180	250	250	320	320	410	410	520
225	250	140	200	200	270	270	350	350	450	450	570
250	280	150	220	220	300	300	390	390	490	490	620
280	315	170	240	240	330	330	430	430	540	540	680
315	355	190	270	270	360	360	470	470	590	590	740
355	400	210	300	300	400	400	520	520	650	650	820
400	450	230	330	330	440	440	570	570	720	720	910
450	500	260	370	370	490	490	630	630	790	790	1 000
500	560	290	410	410	540	540	680	680	870	870	1 100
560	630	320	460	460	600	600	760	760	980	980	1 230
630	710	350	510	510	670	670	850	850	1 090	1 090	1 360
710	800	390	570	570	750	750	960	960	1 220	1 220	1 500
800	900	440	640	640	840	840	1 070	1 070	1 370	1 370	1 690
900	1 000	490	710	710	930	930	1 190	1 190	1 520	1 520	1 860

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