

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 492

ROLLING BEARINGS
RADIAL BEARINGS
TOLERANCES

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BRIEF HISTORY

The ISO Recommendation R 492, *Rolling Bearings — Radial Bearings — Tolerances*, was drawn up by Technical Committee ISO/TC 4, *Rolling Bearings*, the Secretariat of which is held by the Sveriges Standardiseringskommission (SIS).

This ISO Recommendation cancels and replaces sections 2 and 3 of the ISO Recommendation R 15-1955, *Ball and Roller Bearings*.

Work on this question by the Technical Committee began in 1949 and led, in 1962, to the adoption of two Draft ISO Recommendations:

No. 280, *Rolling Bearings. Radial Bearings. Tolerance Classes 6, 5 and 4*,

No. 359, *Rolling Bearings. Radial Bearings. Normal Tolerances* (revision of ISO Recommendation R 15-1955, *Ball and Roller Bearings*, section 2).

In May 1962, these Draft ISO Recommendations were circulated to all the ISO Member Bodies for enquiry. They were approved by the following Member Bodies:

Australia	Germany	Spain
Austria	Hungary	Sweden
Belgium	India	Switzerland
Burma	Italy	United Kingdom
Canada	Netherlands	U.S.S.R.
Chile	New Zealand	Yugoslavia
Czechoslovakia	Poland	
France	Romania	

Moreover, the Draft ISO Recommendation No. 359 was approved by the following Member Bodies:

Brazil, Colombia, Greece, Japan.

One Member Body opposed the approval of Draft ISO Recommendation No. 280:

Japan

In order to bring all radial bearing tolerances in one document, these two Draft ISO Recommendations were combined with ISO Recommendation R 15-1955, *Ball and Roller Bearings*, section 3, and then submitted by correspondence to the ISO Council which decided, in July 1966, to accept them as an ISO RECOMMENDATION.

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**ROLLING BEARINGS
RADIAL BEARINGS
TOLERANCES**

1. APPLICABILITY OF THE TOLERANCES

- 1.1** This ISO Recommendation applies to radial rolling bearings, metric series, particularly those made in accordance with the General Plan for Boundary Dimensions of Radial Bearings.*

It does not apply to tapered roller bearings.

Attention is called to the fact that different or modified tolerances are or may be recommended for radial bearings of particular types or for particular fields of application.

- 1.2** Cylindrical bore diameter and outside diameter "not go side" tolerance limits do not necessarily apply within a distance of twice the nominal ring chamfer dimension from the ring face.
- 1.3** The diameter deviations given in Tables 1 to 8 inclusive apply at the time of the final manufacturing inspection. Subsequent changes in the diameter deviations may occur due to ageing effects. It is, however, expected that the deviations in tolerance classes 6, 5 and 4 will remain within the values given in Tables 9 and 10. The permissible values of d_m and D_m deviations remain unchanged.
- 1.4** Attention is called to the fact that it is difficult (or sometimes impossible) to make bearings with shields or seals in the tolerance classes 6, 5 and 4, because the shields and seals influence the size and shape of the outer ring. For bearings with shields or seals, a widening of the outside diameter D deviations is recommended.

2. SYMBOLS

d = bearing bore diameter.

d_m = arithmetical mean of the largest and the smallest single diameter of the bore.

D = bearing outside diameter.

D_m = arithmetical mean of the largest and the smallest single diameter of the outside surface.

B = bearing width (individual inner and outer rings).

* The General Plan is the subject of ISO Recommendation R , *Rolling Bearings — Radial Bearings — Boundary Dimensions — General Plan*, at present Draft ISO Recommendation No. 358.

3. TOLERANCE VALUES

3.1 Normal tolerance class

TABLE 1

Inner Ring

Deviations in microns

Bore diameter <i>d</i> nominal millimetres		Cylindrical bore diameter (Tolerances KB)				Radial run-out	Width <i>B</i>		
		<i>d_m</i>		<i>d</i> **			Deviations		Variation of individual ring
over	incl.	high	low	high	low	max.	high	low	max.
0.6*	2.5	0	- 8	+ 1	- 9	10	0	- 40	12
(2.5)	10	0	- 8	+ 2	-10	10	0	- 120	15
(10)	18	0	- 8	+ 3	-11	10	0	- 120	20
(18)	30	0	- 10	+ 3	-13	13	0	- 120	20
(30)	50	0	- 12	+ 3	-15	15	0	- 120	20
(50)	80	0	- 15	+ 4	-19	20	0	- 150	25
(80)	120	0	- 20	+ 5	-25	25	0	- 200	25
(120)	180	0	- 25	+ 6	-31	30	0	- 250	30
(180)	250	0	- 30	+ 8	-38	40	0	- 300	30
(250)	315	0	- 35	+ 9	-44	50	0	- 350	35
(315)	400	0	- 40	+10	-50	60	0	- 400	40
(400)	500	0	- 45	+12	-57	65	0	- 450	—
(500)	630	0	- 50	—	—	70	0	- 500	—
(630)	800	0	- 75	—	—	—	0	- 750	—
(800)	1000	0	-100	—	—	—	0	- 1000	—
(1000)	1250	0	-125	—	—	—	0	- 1250	—
(1250)	1600	0	-160	—	—	—	0	- 1600	—
(1600)	2000	0	-200	—	—	—	0	- 2000	—

* This diameter is included in the group.

** These deviations are valid for two-point measurements only. They apply only to diameter series 0, 2, 3 and 4:
in diameter series 0, up to and including $d = 40$ mm,
in diameter series 2, up to and including $d = 180$ mm.

TABLE 2

Outer Ring

Deviations in microns

Outside diameter <i>D</i> nominal millimetres		Outside diameter (Tolerances hB)				Radial run-out	Width <i>B</i> Deviations
		<i>D_m</i>		<i>D</i> **			
over	incl.	high	low	high	low	max.	
2.5*	6	0	- 8	+ 1	- 9	15	Identical to those of inner ring of same bearing
(6)	18	0	- 8	+ 2	-10	15	
(18)	30	0	- 9	+ 2	-11	15	
(30)	50	0	- 11	+ 3	-14	20	
(50)	80	0	- 13	+ 4	-17	25	
(80)	120	0	- 15	+ 5	-20	35	
(120)	150	0	- 18	+ 6	-24	40	
(150)	180	0	- 25	+ 7	-32	45	
(180)	250	0	- 30	+ 8	-38	50	
(250)	315	0	- 35	+ 9	-44	60	
(315)	400	0	- 40	+10	-50	70	
(400)	500	0	- 45	+12	-57	80	
(500)	630	0	- 50	+14	-64	100	
(630)	800	0	- 75	—	—	—	
(800)	1000	0	-100	—	—	—	
(1000)	1250	0	-125	—	—	—	
(1250)	1600	0	-160	—	—	—	
(1600)	2000	0	-200	—	—	—	
(2000)	2500	0	-250	—	—	—	

* This diameter is included in the group.

** These deviations are valid for two-point measurements only. They apply only to diameter series 0, 2, 3 and 4:
in diameter series 0, up to and including $D = 80$ mm,
in diameter series 2, up to and including $D = 315$ mm.

3.2 Tolerance class 6

TABLE 3

Inner Ring

Deviations in microns

Bore diameter <i>d</i> nominal millimetres		Cylindrical bore diameter				Radial run-out	Width <i>B</i>		
		<i>d_m</i>		<i>d</i> **			Deviations	Variation of individual ring	
		Deviations							
over	incl.	high	low	high	low	max.	high	low	max.
0.6*	2.5	0	-7	+1	-8	5	0	-40	12
(2.5)	10	0	-7	+1	-8	6	0	-120	15
(10)	18	0	-7	+1	-8	7	0	-120	20
(18)	30	0	-8	+1	-9	8	0	-120	20
(30)	50	0	-10	+1	-11	10	0	-120	20
(50)	80	0	-12	+2	-14	10	0	-150	25
(80)	120	0	-15	+3	-18	13	0	-200	25
(120)	180	0	-18	+3	-21	18	0	-250	30
(180)	250	0	-22	+4	-26	20	0	-300	30
(250)	315	0	-25	+5	-30	25	0	-350	35
(315)	400	0	-30	+5	-35	30	0	-400	40
(400)	500	0	-35	+6	-41	35	0	-450	45
(500)	630	0	-40	+8	-48	40	0	-500	50

* This diameter is included in the group.

** These deviations are valid for two-point measurements only. They apply only to diameter series 0, 1, 2, 3 and 4: in diameter series 0, up to and including $d = 60$ mm.

TABLE 4

Outer Ring

Deviations in microns

Outside diameter <i>D</i> nominal millimetres		Outside diameter				Radial run-out	Width <i>B</i>
		<i>D_m</i>		<i>D</i> **			Deviations
		Deviations					
over	incl.	high	low	high	low	max.	
2.5*	6	0	-7	+1	-8	8	Identical to those of inner ring of same bearing
(6)	18	0	-7	+1	-8	8	
(18)	30	0	-8	+1	-9	9	
(30)	50	0	-9	+2	-11	10	
(50)	80	0	-11	+2	-13	13	
(80)	120	0	-13	+2	-15	18	
(120)	150	0	-15	+3	-18	20	
(150)	180	0	-18	+3	-21	23	
(180)	250	0	-20	+4	-24	25	
(250)	315	0	-25	+4	-29	30	
(315)	400	0	-28	+5	-33	35	
(400)	500	0	-33	+5	-38	40	
(500)	630	0	-38	+7	-45	50	
(630)	800	0	-45	+10	-55	60	
(800)	1 000	0	-60	+10	-70	75	

* This diameter is included in the group.

** These deviations are valid for two-point measurements only. They apply only to diameter series 0, 1, 2, 3 and 4: in diameter series 0, up to and including $D = 95$ mm.

3.3 Tolerance class 5

TABLE 5

Inner Ring

Deviations in microns

Bore diameter <i>d</i> nominal millimetres		Cylindrical bore diameter				Radial run-out	Refer- ence side run-out with bore	Groove run-out with refer- ence side***	width <i>B</i>		
		<i>d_m</i>		<i>d</i> **					Deviations	Vari- ation of individu- al ring	
		Deviations									
over	incl.	high	low	high	low	max.	max.	max.	high	low	max.
0.6*	2.5	0	- 5	0	- 5	3.5	7	7	0	- 40	5
(2.5)	10	0	- 5	0	- 5	3.5	7	7	0	- 40	5
(10)	18	0	- 5	0	- 5	3.5	7	7	0	- 80	5
(18)	30	0	- 6	0	- 6	4	8	8	0	-120	5
(30)	50	0	- 8	0	- 8	5	8	8	0	-120	5
(50)	80	0	- 9	0	- 9	5	8	8	0	-150	6
(80)	120	0	-10	0	-10	6	9	9	0	-200	7
(120)	180	0	-13	0	-13	8	10	10	0	-250	8
(180)	250	0	-15	0	-15	10	11	13	0	-300	10
(250)	315	0	-18	0	-18	13	13	15	0	-350	13
(315)	400	0	-23	0	-23	15	15	20	0	-400	15

* This diameter is included in the group.

** These deviations are valid for two-point measurements only. They apply only to diameter series 0, 1, 2, 3 and 4.

*** Applies to groove type ball bearings only.

TABLE 6

Outer Ring

Deviations in microns

Outside diameter <i>D</i> nominal millimetres		Outside diameter				Radial run-out	Outside surface run-out with refer- ence side	Groove run-out with refer- ence side***	Width <i>B</i>		
		<i>D_m</i>		<i>D</i> **					Deviations	Vari- ation of individu- al ring	
		Deviations									
over	incl.	high	low	high	low	max.	max.	max.	high	low	max.
2.5*	6	0	- 5	0	- 5	5	8	8	Identical to those of inner ring of same bearing		5
(6)	18	0	- 5	0	- 5	5	8	8			5
(18)	30	0	- 6	0	- 6	6	8	8			5
(30)	50	0	- 7	0	- 7	7	8	8			5
(50)	80	0	- 9	0	- 9	8	8	10			6
(80)	120	0	-10	0	-10	10	9	11			8
(120)	150	0	-11	0	-11	11	10	13			8
(150)	180	0	-13	0	-13	13	10	14			8
(180)	250	0	-15	0	-15	15	11	15			10
(250)	315	0	-18	0	-18	18	13	18			11
(315)	400	0	-20	0	-20	20	13	20			13
(400)	500	0	-23	0	-23	23	15	23			15
(500)	630	0	-28	0	-28	25	18	25			18
(630)	800	0	-35	0	-35	30	20	30		20	

* This diameter is included in the group.

** These deviations are valid for two-point measurements only. They apply only to diameter series 0, 1, 2, 3 and 4.

*** Applies to groove type ball bearings only.

3.4 Tolerance class 4

TABLE 7

Inner Ring

Deviations in microns

Bore diameter <i>d</i> nominal millimetres		Cylindrical bore diameter				Radial run-out	Refer- ence side run-out with bore	Groove run-out with refer- ence side***	Width <i>B</i>		
		<i>d_m</i>		<i>d</i> **					Deviations		Variation of individual ring
		over	incl.	high	low				high	low	
0.6*	2.5	0	- 4	0	- 4	2.5	3	3	0	- 40	2.5
(2.5)	10	0	- 4	0	- 4	2.5	3	3	0	- 40	2.5
(10)	18	0	- 4	0	- 4	2.5	3	3	0	- 80	2.5
(18)	30	0	- 5	0	- 5	3	4	4	0	-120	2.5
(30)	50	0	- 6	0	- 6	4	4	4	0	-120	3
(50)	80	0	- 7	0	- 7	4	5	4	0	-150	4
(80)	120	0	- 8	0	- 8	5	5	5	0	-200	4
(120)	180	0	-10	0	-10	6	6	7	0	-250	5
(180)	250	0	-12	0	-12	8	7	8	0	-300	6

* This diameter is included in the group.

** These deviations are valid for two-point measurements only. They apply only to diameter series 0, 1, 2, 3 and 4.

*** Applies to groove type ball bearings only.

TABLE 8

Outer Ring

Deviations in microns

Outside diameter <i>D</i> nominal millimetres		Outside diameter				Radial run-out	Outside surface run-out with re- ference side	Groove run-out with refer- ence side***	Width <i>B</i>		
		<i>D_m</i>		<i>D</i> **					Deviations		Variation of individual ring
		over	incl.	high	low				high	low	
2.5*	6	0	- 4	0	- 4	3	4	5	Identical to those of inner ring of same bearing		2.5
(6)	18	0	- 4	0	- 4	3	4	5		2.5	
(18)	30	0	- 5	0	- 5	4	4	5		2.5	
(30)	50	0	- 6	0	- 6	5	4	5		2.5	
(50)	80	0	- 7	0	- 7	5	4	5		3	
(80)	120	0	- 8	0	- 8	6	5	6		4	
(120)	150	0	- 9	0	- 9	7	5	7		5	
(150)	180	0	-10	0	-10	8	5	8		5	
(180)	250	0	-11	0	-11	10	7	10		7	
(250)	315	0	-13	0	-13	11	8	10		7	
(315)	400	0	-15	0	-15	13	10	13	8		

* This diameter is included in the group.

** These deviations are valid for two-point measurements only. They apply only to diameter series 0, 1, 2, 3 and 4.

*** Applies to groove type ball bearings only.

3.5 Diameter tolerances acceptable after ageing
(see clause 1.3)

TABLE 9

Bore diameter
(for d_m deviations, see Tables 3, 5 and 7)
Deviations in microns

Bore diameter d nominal millimetres		Cylindrical bore diameter d^{**}					
		Deviations					
		Class 6 ***		Class 5 ****		Class 4 ****	
over	incl.	high	low	high	low	high	low
0.6*	2.5	+ 1	- 8	0	- 5	0	- 4
(2.5)	10	+ 2	- 9	+1	- 6	+1	- 5
(10)	18	+ 3	-10	+2	- 7	+2	- 6
(18)	30	+ 3	-11	+2	- 8	+2	- 7
(30)	50	+ 3	-13	+2	-10	+2	- 8
(50)	80	+ 4	-16	+2	-11	+2	- 9
(80)	120	+ 5	-20	+2	-12	+2	-10
(120)	180	+ 6	-24	+3	-16	+3	-13
(180)	250	+ 8	-30	+4	-19	+4	-16
(250)	315	+ 9	-34	+4	-22	—	—
(315)	400	+10	-40	+5	-28	—	—
(400)	500	+12	-47	—	—	—	—
(500)	630	+15	-55	—	—	—	—

* This diameter is included in the group.

** These deviations are valid for two-point measurements only.

*** Applies to diameter series 0, 1, 2, 3 and 4 only: in diameter series 0, up to and including $d = 60$ mm.

**** Applies to diameter series 0, 1, 2, 3 and 4 only.