International Standard

ISO 492

Rolling bearings — Radial bearings — Tolerances

Roulements — Roulements radiaux — Tolérances

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Descriptors : bearings, rolling bearings, radial bearings, symbols, dimensions, dimensional tolerances.

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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 492 was prepared by Technical Committee ISO/TC 4, *Rolling bearings.*

This second edition cancels and replaces the first edition (ISO 492-1981); tolerances for ball bearing outer ring flanges have been incorporated into this second edition. As a consequence, additions have been made to clause 4, and to tables 2, 4, 6, 8 and 10 in clause 5 with respect to the first edition.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Rolling bearings — Radial bearings — Tolerances

1 Scope and field of application

This International Standard specifies the tolerances for boundary dimensions (except chamfer dimensions) and running accuracy of radial rolling bearings, metric series.

Chamfer dimension limits are given in ISO 582.

This International Standard does not apply to certain radial bearings of particular types (for example, drawn cup needle roller bearings) or for particular fields of application (for example, airframe bearings and instrument precision bearings). Tolerances for such bearings are given in the relevant ISO International Standards.

2 References

ISO 15, *Rolling bearings — Radial bearings — Boundary dimensions — General plan.*

ISO 286, *ISO system of limits and fits.*[1]

ISO 582, *Rolling bearings — Metric series — Chamfer dimension limits.*

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

ISO 5593, *Rolling bearings — Vocabulary.*

3 Definitions

Definitions of concepts which are particular to outer ring flanges are given in 3.1 to 3.5. Definitions of other concepts to which the tolerances specified in this International Standard apply are given in ISO 1132 and ISO 5593.

3.1 single outer ring flange width, C_{1s} : Distance between the points of intersection of the two actual side faces of an outer ring flange and a straight line perpendicular to the plane tangential to the reference face of the flange.

3.2 deviation of a single outer ring flange width, Δ_{C1s} : Difference between a single outer ring flange width and the nominal flange width.

3.3 outer ring flange width variation, V_{C1s} : Difference between the largest and the smallest of the single widths of an individual outer ring flange.

3.4 variation of bearing outside surface generatrix inclination with flange back face, S_{D1} : Total variation of the relative position, in a radial direction parallel with the plane tangential to the outer ring flange back face, of points on the same generatrix of the bearing outside surface at a distance from the side face of the ring and from the back face of the flange equal to the largest permissible axial single chamfer dimension of the ring.

3.5 assembled bearing outer ring flange back face runout with raceway, S_{ea1} (groove ball bearing) : Difference between the largest and the smallest of the axial distances between the outer ring flange back face, in different relative angular positions of the outer ring, at a radial distance from the outer ring axis equal to half the flange back face mean diameter, and a point in a fixed position relative to the inner ring. The inner and outer ring raceways are to be in contact with all the balls.

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1) At present at the stage of draft. (Revision of ISO/R 286-1962.)

1

4 Symbols

4.1 Symbols for boundary dimensions

d = bearing bore diameter, nominal

d_1 = basic diameter at theoretical large end of a basically tapered bore

Δ_{ds} = deviation of a single bore diameter

Δ_{dmp} = single plane mean bore diameter deviation (for a basically tapered bore Δ_{dmp} refers only to the theoretical small end of bore)

Δ_{d1mp} = mean bore diameter deviation at theoretical large end of a basically tapered bore

V_{dp} = bore diameter variation in a single radial plane

V_{dmp} = mean bore diameter variation (this applies only to a basically cylindrical bore)

α = taper angle, nominal

D = bearing outside diameter, nominal

D_1 = outer ring flange outside diameter, nominal

Δ_{Ds} = deviation of a single outside diameter

Δ_{Dmp} = single plane mean outside diameter deviation

V_{Dp} = outside diameter variation in a single radial plane

V_{Dmp} = mean outside diameter variation

B = inner ring width, nominal

Δ_{Bs} = deviation of a single inner ring width

V_{Bs} = inner ring width variation

C = outer ring width, nominal

C_1 = outer ring flange width, nominal

Δ_{Cs} = deviation of a single outer ring width

Δ_{C1s} = deviation of a single outer ring flange width

V_{Cs} = outer ring width variation

V_{C1s} = outer ring flange width variation

K_{ia} = radial runout of assembled bearing inner ring

K_{ea} = radial runout of assembled bearing outer ring

S_d = inner ring reference face (backface, where applicable) runout with bore

S_D = variation of bearing outside surface generatrix inclination with outer ring reference face (backface)

S_{D1} = variation of bearing outside surface generaterix inclination with flange back face

S_{ia} = assembled bearing inner ring face (backface) runout with raceway

S_{ea} = assembled bearing outer ring face (backface) runout with raceway

S_{ea1} = assembled bearing outer ring flange back face runout with raceway
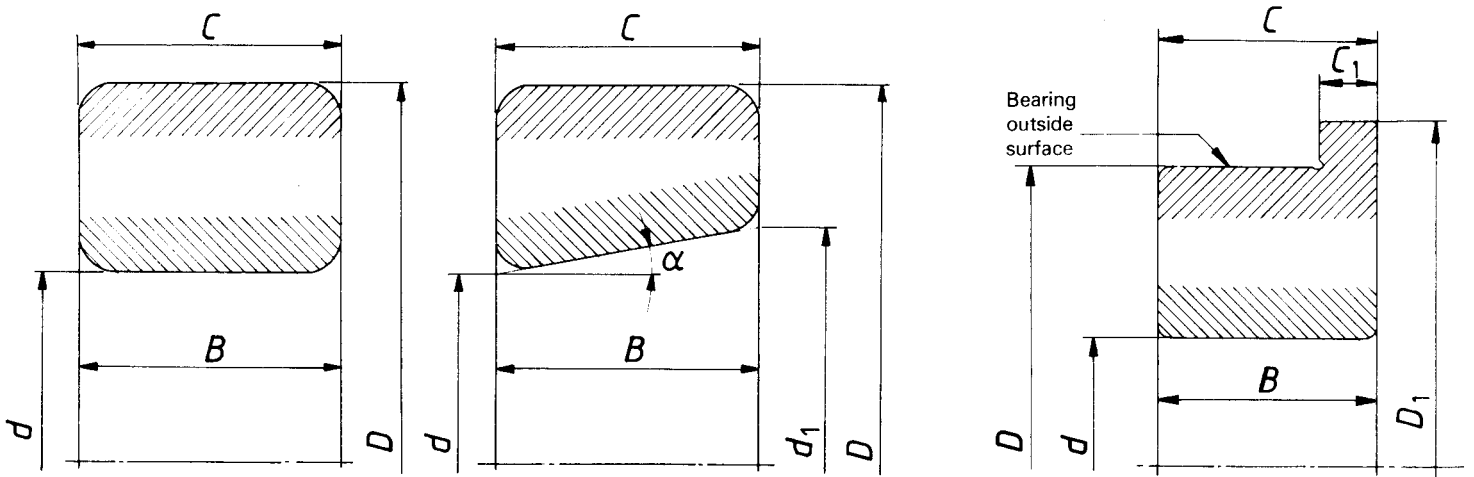
Figure 1 — Symbols for boundary dimensions

4.2 Additional symbols for tapered roller bearings

T = bearing width, nominal

Δ_{Ts} = deviation of the actual bearing width

T_1 = effective width of inner sub-unit, nominal

Δ_{T1s} = deviation of the actual effective width of inner sub-unit

T_2 = effective width of outer sub-unit, nominal

Δ_{T2s} = deviation of the actual effective width of outer sub-unit
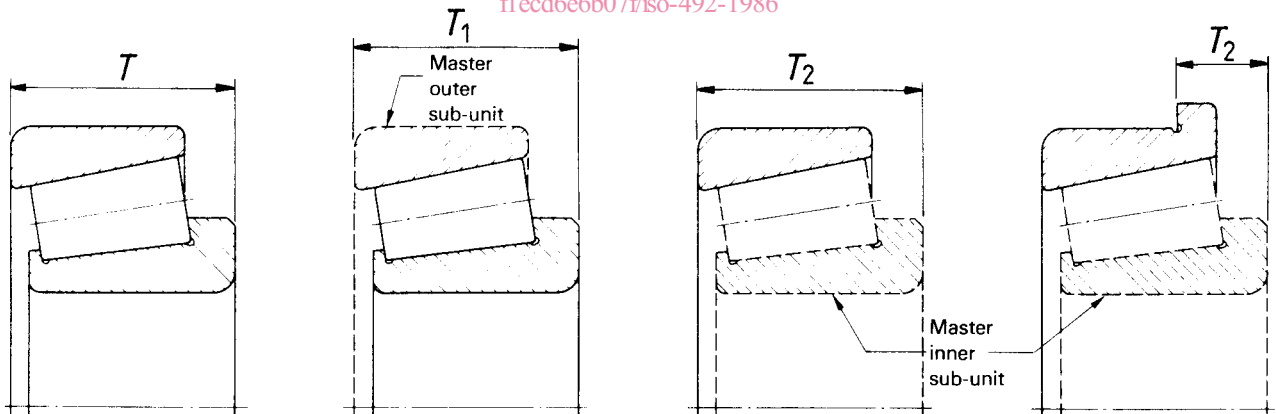
Figure 2 — Additional symbols for tapered roller bearings

5 Tolerance values

5.1 Radial bearings except tapered roller bearings

Bore diameter tolerances given in this sub-clause apply to basically cylindrical bores. Tolerances for tapered bores are given in 5.3.

The diameter series referred to in the tables of this clause are those defined in ISO 15.

5.1.1 Normal tolerance class

Table 1 — Inner ring

Tolerance values in micrometres

| d mm		Δ_{dmp}		V_{dp} diameter series			V_{dmp}	K_{ia}	Δ_{Bs}			V_{Bs}
				7,8,9	0,1	2,3,4			all	normal	modified[2]	
over	incl.	high	low		max.		max.	max.	high	low		max.
0,6[1]	2,5	0	−8	10	8	6	6	10	0	−40	—	12
2,5	10	0	−8	10	8	6	6	10	0	−120	−250	15
10	18	0	−8	10	8	6	6	10	0	−120	−250	20
18	30	0	−10	13	10	8	8	13	0	−120	−250	20
30	50	0	−12	15	12	9	9	15	0	−120	−250	20
50	80	0	−15	19	19	11	11	20	0	−150	−380	25
80	120	0	−20	25	25	15	15	25	0	−200	−380	25
120	180	0	−25	31	31	19	19	30	0	−250	−500	30
180	250	0	−30	38	38	23	23	40	0	−300	−500	30
250	315	0	−35	44	44	26	26	50	0	−350	−500	35
315	400	0	−40	50	50	30	30	60	0	−400	−630	40
400	500	0	−45	56	56	34	34	65	0	−450	—	50
500	630	0	−50	63	63	38	38	70	0	−500	—	60
630	800	0	−75	—	—	—	—	80	0	−750	—	70
800	1 000	0	−100	—	—	—	—	90	0	−1 000	—	80
1 000	1 250	0	−125	—	—	—	—	100	0	−1 250	—	100
1 250	1 600	0	−160	—	—	—	—	120	0	−1 600	—	120
1 600	2 000	0	−200	—	—	—	—	140	0	−2 000	—	140

1) This diameter is included in the group.

2) This refers to the rings of single bearings made for paired or stack mounting.

Table 2 — Outer ring

Tolerance values in micrometres

D mm		Δ_{Dmp}		V_{Dp}[3]				V_{Dmp}[3]	K_{ea}	Δ_{Cs} Δ_{C1s}[4]		V_{Cs} V_{C1s}[4]
				Open bearings			Capped bearings[2]					
				diameter series								
over	incl.	high	low	7,8,9	0,1	2,3,4	2,3,4			high	low	
				max.			max.	max.	max.			max.
2,5[1]	6	0	−8	10	8	6	10	6	15			
6	18	0	−8	10	8	6	10	6	15			
18	30	0	−9	12	9	7	12	7	15			
30	50	0	−11	14	11	8	16	8	20			
50	80	0	−13	16	13	10	20	10	25			
80	120	0	−15	19	19	11	26	11	35			
120	150	0	−18	23	23	14	30	14	40			
150	180	0	−25	31	31	19	38	19	45			
180	250	0	−30	38	38	23	—	23	50	Identical to Δ_{Bs} and V_{Bs} of inner ring of same bearing		
250	315	0	−35	44	44	26	—	26	60			
315	400	0	−40	50	50	30	—	30	70			
400	500	0	−45	56	56	34	—	34	80			
500	630	0	−50	63	63	38	—	38	100			
630	800	0	−75	94	94	55	—	55	120			
800	1 000	0	−100	125	125	75	—	75	140			
1 000	1 250	0	−125	—	—	—	—	—	160			
1 250	1 600	0	−160	—	—	—	—	—	190			
1 600	2 000	0	−200	—	—	—	—	—	220			
2 000	2 500	0	−250	—	—	—	—	—	250			

1) This diameter is included in the group.

2) No values have been established for diameter series 7, 8, 9, 0 and 1.

3) Applies before mounting and after removal of internal or external snap ring.

4) Applies to groove ball bearings only.

NOTE — The tolerance for the outside diameter of an outer ring flange, D_1, of a groove ball bearing is js12 (see ISO 286).

5.1.2 Tolerance class 6

Table 3 — Inner ring

Tolerance values in micrometres

d mm		Δ_{dmp}		V_{dp} diameter series			V_{dmp}	K_{ia}	Δ_{Bs}			V_{Bs}
				7,8,9	0,1	2,3,4			all	normal	modified[2]	
over	incl.	high	low		max.		max.	max.	high	low		max.
0,6[1]	2,5	0	−7	9	7	5	5	5	0	−40	—	12
2,5	10	0	−7	9	7	5	5	6	0	−120	−250	15
10	18	0	−7	9	7	5	5	7	0	−120	−250	20
18	30	0	−8	10	8	6	6	8	0	−120	−250	20
30	50	0	−10	13	10	8	8	10	0	−120	−250	20
50	80	0	−12	15	15	9	9	10	0	−150	−380	25
80	120	0	−15	19	19	11	11	13	0	−200	−380	25
120	180	0	−18	23	23	14	14	18	0	−250	−500	30
180	250	0	−22	28	28	17	17	20	0	−300	−500	30
250	315	0	−25	31	31	19	19	25	0	−350	−500	35
315	400	0	−30	38	38	23	23	30	0	−400	−630	40
400	500	0	−35	44	44	26	26	35	0	−450	—	45
500	630	0	−40	50	50	30	30	40	0	−500	—	50

1) This diameter is included in the group.

2) This refers to the rings of single bearings made for paired or stack mounting.

Table 4 — Outer ring

Tolerance values in micrometres

D mm		Δ_{Dmp}		V_{Dp}[3] Open bearings			Capped bearings[2]	V_{Dmp}[3]	K_{ea}	Δ_{Cs} Δ_{C1s}[4]		V_{Cs} V_{C1s}[4]
				diameter series								
				7,8,9	0,1	2,3,4	0,1,2,3,4			high	low	max.
over	incl.	high	low		max.			max.	max.			max.
2,5[1]	6	0	−7	9	7	5	9	5	8			
6	18	0	−7	9	7	5	9	5	8			
18	30	0	−8	10	8	6	10	6	9			
30	50	0	−9	11	9	7	13	7	10			
50	80	0	−11	14	11	8	16	8	13			
80	120	0	−13	16	16	10	20	10	18	Identical to Δ_{Bs} and V_{Bs} of inner ring of same bearing		
120	150	0	−15	19	19	11	25	11	20			
150	180	0	−18	23	23	14	30	14	23			
180	250	0	−20	25	25	15	—	15	25			
250	315	0	−25	31	31	19	—	19	30			
315	400	0	−28	35	35	21	—	21	35			
400	500	0	−33	41	41	25	—	25	40			
500	630	0	−38	48	48	29	—	29	50			
630	800	0	−45	56	56	34	—	34	60			
800	1 000	0	−60	75	75	45	—	45	75			

1) This diameter is included in the group.

2) No values have been established for diameter series 7, 8 and 9.

3) Applies before mounting and after removal of internal or external snap ring.

4) Applies to groove ball bearings only.

NOTE — The tolerance for the outside diameter of an outer ring flange, D_1, of a groove ball bearing is js12 (see ISO 286).

5.1.3 Tolerance class 5

Table 5 — Inner ring

Tolerance values in micrometres

d mm		Δ_{dmp}		V_{dp} diameter series		V_{dmp}	K_{ia}	S_d	S_{ia} [2]	Δ_{Bs}			V_{Bs}
				7,8,9	0,1,2,3,4					all	normal	modified [3]	
over	incl.	high	low	max.		max.	max.	max.	max.	high	low		max.
0,6 [1]	2,5	0	−5	5	4	3	4	7	7	0	−40	−250	5
2,5	10	0	−5	5	4	3	4	7	7	0	−40	−250	5
10	18	0	−5	5	4	3	4	7	7	0	−80	−250	5
18	30	0	−6	6	5	3	4	8	8	0	−120	−250	5
30	50	0	−8	8	6	4	5	8	8	0	−120	−250	5
50	80	0	−9	9	7	5	5	8	8	0	−150	−250	6
80	120	0	−10	10	8	5	6	9	9	0	−200	−380	7
120	180	0	−13	13	10	7	8	10	10	0	−250	−380	8
180	250	0	−15	15	12	8	10	11	13	0	−300	−500	10
250	315	0	−18	18	14	9	13	13	15	0	−350	−500	13
315	400	0	−23	23	18	12	15	15	20	0	−400	−630	15

1) This diameter is included in the group.

2) Applies to groove ball bearings only.

3) This refers to the rings of single bearings made for paired or stack mounting.

Table 6 — Outer ring

Tolerance values in micrometres

D mm		Δ_{Dmp}		V_{Dp} [2] diameter series		V_{Dmp}	K_{ea}	S_D [3] S_{D1} [4]	S_{ea} [3],[4] S_{ea1} [4]	Δ_{Cs} Δ_{C1s} [4]		V_{Cs} V_{C1s} [4]
				7,8,9	0,1,2,3,4					high	low	
over	incl.	high	low	max.		max.	max.	max.	max.			max.
2,5 [1]	6	0	−5	5	4	3	5	8	8			5
6	18	0	−5	5	4	3	5	8	8			5
18	30	0	−6	6	5	3	6	8	8			5
30	50	0	−7	7	5	4	7	8	8			5
50	80	0	−9	9	7	5	8	8	10			6
80	120	0	−10	10	8	5	10	9	11	Identical to Δ_{Bs} of inner ring of same bearing		8
120	150	0	−11	11	8	6	11	10	13			8
150	180	0	−13	13	10	7	13	10	14			8
180	250	0	−15	15	11	8	15	11	15			10
250	315	0	−18	18	14	9	18	13	18			11
315	400	0	−20	20	15	10	20	13	20			13
400	500	0	−23	23	17	12	23	15	23			15
500	630	0	−28	28	21	14	25	18	25			18
630	800	0	−35	35	26	18	30	20	30			20

1) This diameter is included in the group.

2) No values have been established for capped bearings.

3) Does not apply to bearings with flanged outer ring.

4) Applies to groove ball bearings only.

NOTE — The tolerance for the outside diameter of an outer ring flange, D_1, of a groove ball bearing is js12 (see ISO 286).