INTERNATIONAL STANDARD

ISO 492

Third edition
1994-12-01

Rolling bearings — Radial bearings — Tolerances

Roulements — Roulements radiaux — Tolérances

Reference number
ISO 492:1994(E)

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 492 was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 4, *Tolerances*.

This third edition cancels and replaces the second edition (ISO 492:1986). The definitions have been deleted and a new symbol, ΔD_{1s}, has been added. Changes and additions have been made to tables 1 to 10, 12, 16 and 18. A new table 19 specifies flange outside diameter tolerances. Tolerances for tapered bores, taper 1:12, have been changed (table 20), and those for taper 1:30 have been added (table 21).

Annex A of this International Standard is for information only.

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Rolling bearings — Radial bearings — Tolerances

1 Scope

This International Standard specifies tolerances for boundary dimensions (except chamfer dimensions) and the running accuracy of radial rolling bearings specified in ISO 15 and ISO 355.

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 International Standards.

Chamfer dimension limits are given in ISO 582.

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 15:1981, *Rolling bearings — Radial bearings — Boundary dimensions — General plan.*

ISO 355:1977, *Rolling bearings — Metric tapered roller bearings — Boundary dimensions and series designations.*

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

ISO 5593:1984, *Rolling bearings — Vocabulary.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 1132 and ISO 5593 apply.

4 Symbols

The symbols (except those for tolerances) shown in the figures and the values given in the tables denote nominal dimensions unless otherwise specified.

4.1 Symbols for boundary dimensions and running accuracy

See figure 1 for symbols for the dimensions.

d	bore diameter
d_1	diameter at the theoretical large end of a basically tapered bore
Δd_s	deviation of a single bore diameter
Δd_{mp}	deviation of mean bore diameter in a single plane (for a basically tapered bore, Δd_{mp} refers to the theoretical small end of the bore)
Δd_{1mp}	deviation of mean bore diameter in a single plane at the theoretical large end of a basically tapered bore
V_{dp}	variation of bore diameter in a single radial plane
V_{dmp}	variation of mean bore diameter (this applies only to a basically cylindrical bore)
D	outside diameter
D_1	outside diameter of outer ring flange
ΔD_s	deviation of a single outside diameter
ΔD_{mp}	deviation of mean outside diameter in a single plane
ΔD_{1s}	deviation of a single outside diameter of outer ring flange
V_{Dp}	variation of outside diameter in a single radial plane
V_{Dmp}	variation of mean outside diameter
B	inner ring width
ΔB_s	deviation of a single inner ring width
V_{Bs}	variation of inner ring width
C	outer ring width
C_1	outer ring flange width
ΔC_s	deviation of a single outer ring width
ΔC_{1s}	deviation of a single outer ring flange width
V_{Cs}	variation of outer ring width
V_{C1s}	variation of outer ring flange width
K_{ia}	radial runout of inner ring of assembled bearing
K_{ea}	radial runout of outer ring of assembled bearing
S_d	runout of inner ring reference face (back face, where applicable) with respect to the bore

S_D variation of outer ring outside surface generatrix inclination with respect to the outer ring reference face (back face)

S_{D1} variation of outer ring outside surface generatrix inclination with respect to the outer ring flange back face

S_{ia} runout of inner ring face (back face) with respect to the raceway of assembled bearing

S_{ea} runout of outer ring face (back face) with respect to the raceway of assembled bearing

S_{ea1} runout of outer ring flange back face with respect to the raceway of assembled bearing

α taper angle (half the cone angle) of inner ring bore

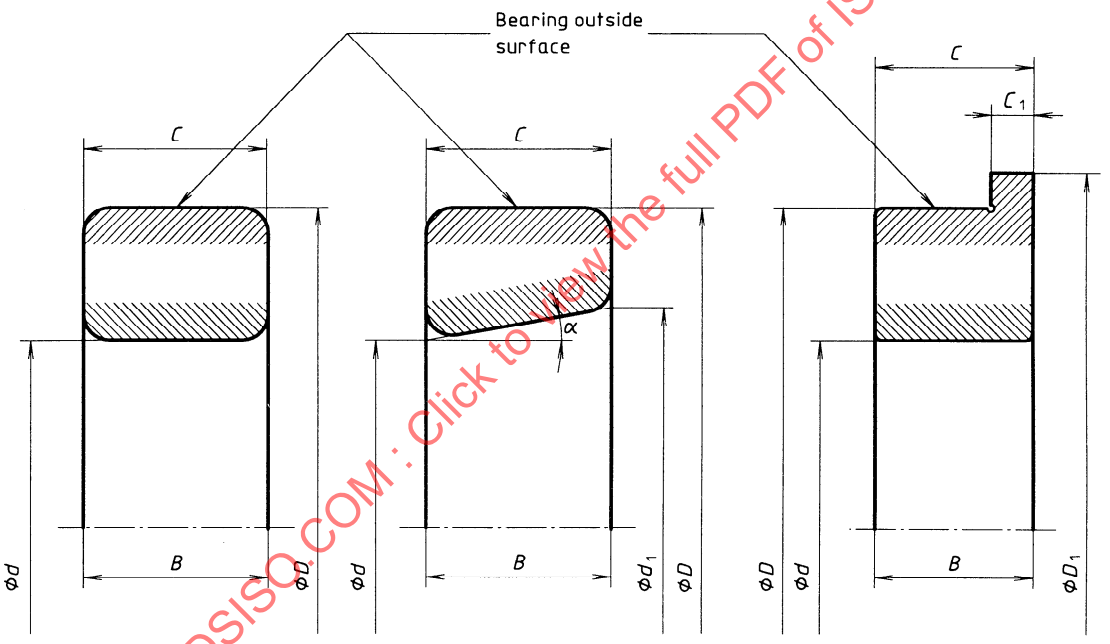

Figure 1 — Symbols for boundary dimensions

4.2 Additional symbols for tapered roller bearings

See figure 2.

T bearing width

ΔT_s deviation of the actual bearing width

T_1 effective inner subunit width

ΔT_{1s} deviation of the actual effective inner subunit width

T_2 effective outer subunit width

ΔT_{2s} deviation of the actual effective outer subunit width

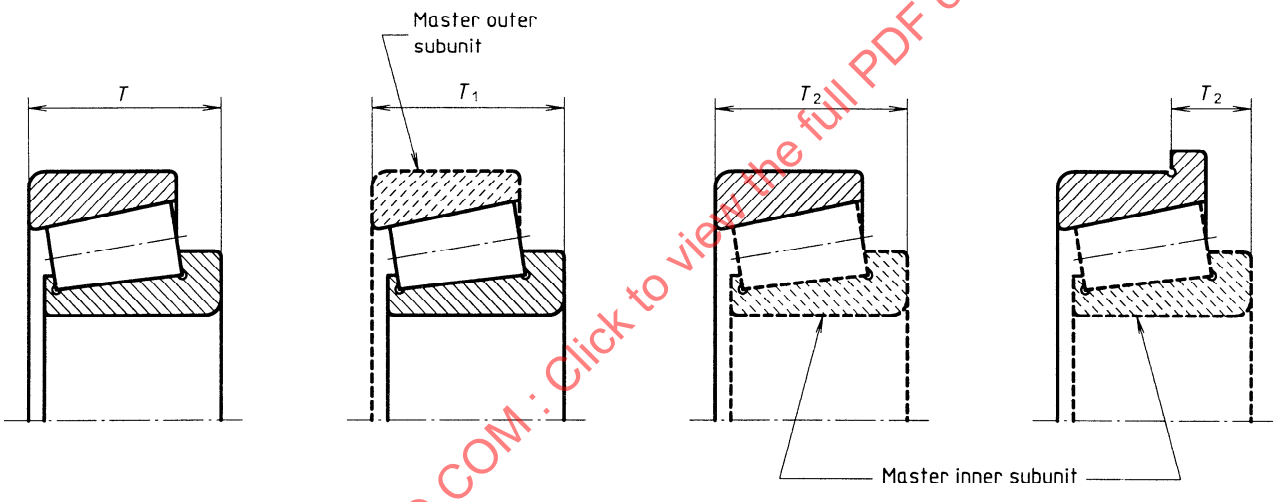

Figure 2 — Additional symbols for tapered roller bearings

5 Tolerances

5.1 Radial bearings except tapered roller bearings

The bore diameter tolerances given in this subclause apply to basically cylindrical bores. Tolerances for tapered bores are given in 5.4.

The diameter series referred to in tables 1 to 8 are those defined in ISO 15.

5.1.1 Normal tolerance class

See tables 1 and 2.

Table 1 — Inner ring

Tolerance values in micrometres

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

1) This refers to the rings of single bearings made for paired or stack assemblies.

Table 2 — Outer ring

Tolerance values in micrometres

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

NOTE — The tolerances for the outside diameter of an outer ring flange D_1 are given in table 19.

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

2) Applies to groove ball bearings only.

5.1.2 Tolerance class 6

See tables 3 and 4.

Table 3 — Inner ring

Tolerance values in micrometres

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

1) This refers to the rings of single bearings made for paired or stack assemblies.

Table 4 — Outer ring

Tolerance values in micrometres

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

NOTE — The tolerances for the outside diameter of an outer ring flange D_1 are given in table 19.

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

2) Applies to groove ball bearings only.

5.1.3 Tolerance class 5

See tables 5 and 6.

Table 5 — Inner ring

Tolerance values in micrometres

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

1) Applies to groove ball bearings only.

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

Table 6 — Outer ring

Tolerance values in micrometres

D mm	ΔD_{mp}		V_{Dp} Diameter series 9	V_{Dp} Diameter series 0,1,2,3,4	V_{Dmp}	K_{ea}	S_D [1] S_{D1} [2]	S_{ea} [1] [2]	S_{ea1} [2]	ΔC_s ΔC_{1s} [2]		V_{Cs} V_{C1s} [2]
	high	low	max.		max.	max.	max.	max.	max.	high	low	max.
$2{,}5 \leqslant D \leqslant 6$	0	− 5	5	4	3	5	8	8	11			5
$6 < D \leqslant 18$	0	− 5	5	4	3	5	8	8	11			5
$18 < D \leqslant 30$	0	− 6	6	5	3	6	8	8	11			5
$30 < D \leqslant 50$	0	− 7	7	5	4	7	8	8	11			5
$50 < D \leqslant 80$	0	− 9	9	7	5	8	8	10	14			6
$80 < D \leqslant 120$	0	− 10	10	8	5	10	9	11	16	Identical to ΔB_s of inner ring of same bearing		8
$120 < D \leqslant 150$	0	− 11	11	8	6	11	10	13	18			8
$150 < D \leqslant 180$	0	− 13	13	10	7	13	10	14	20			8
$180 < D \leqslant 250$	0	− 15	15	11	8	15	11	15	21			10
$250 < D \leqslant 315$	0	− 18	18	14	9	18	13	18	25			11
$315 < D \leqslant 400$	0	− 20	20	15	10	20	13	20	28			13
$400 < D \leqslant 500$	0	− 23	23	17	12	23	15	23	33			15
$500 < D \leqslant 630$	0	− 28	28	21	14	25	18	25	35			18
$630 < D \leqslant 800$	0	− 35	35	26	18	30	20	30	42			20

NOTE — The tolerances for the outside diameter of an outer ring flange D_1 are given in table 19.

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

2) Applies to groove ball bearings only.

5.1.4 Tolerance class 4

See tables 7 and 8.

Table 7 — Inner ring

Tolerance values in micrometres

d mm	Δd_{mp}		Δd_s [1]		V_{dp} Diameter series 9	V_{dp} Diameter series 0,1,2,3,4	V_{dmp}	K_{ia}	S_d	S_{ia} [2]	ΔB_s all	ΔB_s normal	ΔB_s modified [3]	V_{Bs}
	high	low	high	low	max.		max.	max.	max.	max.	high	low		max.
0,6 ⩽ d ⩽ 2,5	0	− 4	0	− 4	4	3	2	2,5	3	3	0	− 40	− 250	2,5
2,5 < d ⩽ 10	0	− 4	0	− 4	4	3	2	2,5	3	3	0	− 40	− 250	2,5
10 < d ⩽ 18	0	− 4	0	− 4	4	3	2	2,5	3	3	0	− 80	− 250	2,5
18 < d ⩽ 30	0	− 5	0	− 5	5	4	2,5	3	4	4	0	− 120	− 250	2,5
30 < d ⩽ 50	0	− 6	0	− 6	6	5	3	4	4	4	0	− 120	− 250	3
50 < d ⩽ 80	0	− 7	0	− 7	7	5	3,5	4	5	5	0	− 150	− 250	4
80 < d ⩽ 120	0	− 8	0	− 8	8	6	4	5	5	5	0	− 200	− 380	4
120 < d ⩽ 180	0	− 10	0	− 10	10	8	5	6	6	7	0	− 250	− 380	5
180 < d ⩽ 250	0	− 12	0	− 12	12	9	6	8	7	8	0	− 300	− 500	6

1) These deviations apply to diameter series 0, 1, 2, 3 and 4 only.

2) Applies to groove ball bearings only.

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

Table 8 — Outer ring

Tolerance values in micrometres

D mm	ΔD_{mp}		ΔD_s [1]		V_{Dp} Diameter series 9	V_{Dp} Diameter series 0,1,2,3,4	V_{Dmp}	K_{ea}	S_D [2] S_{D1} [3]	S_{ea} [2] [3]	S_{ea1} [3]	ΔC_s ΔC_{1s} [3]		V_{Cs} V_{C1s} [3]
	high	low	high	low	max.		max.	max.	max.	max.	max.	high	low	max.
2,5 ⩽ D ⩽ 6	0	− 4	0	− 4	4	3	2	3	4	5	7			2,5
6 < D ⩽ 18	0	− 4	0	− 4	4	3	2	3	4	5	7			2,5
18 < D ⩽ 30	0	− 5	0	− 5	5	4	2,5	4	4	5	7			2,5
30 < D ⩽ 50	0	− 6	0	− 6	6	5	3	5	4	5	7			2,5
50 < D ⩽ 80	0	− 7	0	− 7	7	5	3,5	5	4	5	7	Identical to		3
80 < D ⩽ 120	0	− 8	0	− 8	8	6	4	6	5	6	8	ΔB_s of inner		4
120 < D ⩽ 150	0	− 9	0	− 9	9	7	5	7	5	7	10	ring of		5
150 < D ⩽ 180	0	− 10	0	− 10	10	8	5	8	5	8	11	same bearing		5
180 < D ⩽ 250	0	− 11	0	− 11	11	8	6	10	7	10	14			7
250 < D ⩽ 315	0	− 13	0	− 13	13	10	7	11	8	10	14			7
315 < D ⩽ 400	0	− 15	0	− 15	15	11	8	13	10	13	18			8

NOTE — The tolerances for the outside diameter of an outer ring flange D_1 are given in table 19.

1) These deviations apply to diameter series 0, 1, 2, 3 and 4 only.

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

3) Applies to groove ball bearings only.

5.1.5 Tolerance class 2

See tables 9 and 10.

Table 9 — Inner ring

Tolerance values in micrometres

d	Δd_{mp}		Δd_s		V_{dp} [1]	V_{dmp}	K_{ia}	S_d	S_{ia} [2]	ΔB_s			V_{Bs}
										all	normal	modified [3]	
mm	high	low	high	low	max.	max.	max.	max.	max.	high	low	low	max.
$0,6 \leqslant d \leqslant 2,5$	0	− 2,5	0	− 2,5	2,5	1,5	1,5	1,5	1,5	0	− 40	− 250	1,5
$2,5 < d \leqslant 10$	0	− 2,5	0	− 2,5	2,5	1,5	1,5	1,5	1,5	0	− 40	− 250	1,5
$10 < d \leqslant 18$	0	− 2,5	0	− 2,5	2,5	1,5	1,5	1,5	1,5	0	− 80	− 250	1,5
$18 < d \leqslant 30$	0	− 2,5	0	− 2,5	2,5	1,5	2,5	1,5	2,5	0	− 120	− 250	1,5
$30 < d \leqslant 50$	0	− 2,5	0	− 2,5	2,5	1,5	2,5	1,5	2,5	0	− 120	− 250	1,5
$50 < d \leqslant 80$	0	− 4	0	− 4	4	2	2,5	1,5	2,5	0	− 150	− 250	1,5
$80 < d \leqslant 120$	0	− 5	0	− 5	5	2,5	2,5	2,5	2,5	0	− 200	− 380	2,5
$120 < d \leqslant 150$	0	− 7	0	− 7	7	3,5	2,5	2,5	2,5	0	− 250	− 380	2,5
$150 < d \leqslant 180$	0	− 7	0	− 7	7	3,5	5	4	5	0	− 250	− 380	4
$180 < d \leqslant 250$	0	− 8	0	− 8	8	4	5	5	5	0	− 300	− 500	5

1) These deviations apply to diameter series 0, 1, 2, 3 and 4 only.

2) Applies to groove ball bearings only.

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

Table 10 — Outer ring

Tolerance values in micrometres

D	ΔD_{mp}		ΔD_s [1]		V_{Dp} [1]	V_{Dmp}	K_{ea}	S_D [2] S_{D1} [3]	S_{ea} [2] [3]	S_{ea1} [3]	ΔC_s ΔC_{1s} [3]		V_{Cs} V_{C1s} [3]
mm	high	low	high	low	max.	max.	max.	max.	max.	max.	high	low	max.
$2,5 \leqslant D \leqslant 6$	0	− 2,5	0	− 2,5	2,5	1,5	1,5	1,5	1,5	3			1,5
$6 < D \leqslant 18$	0	− 2,5	0	− 2,5	2,5	1,5	1,5	1,5	1,5	3			1,5
$18 < D \leqslant 30$	0	− 4	0	− 4	4	2	2,5	1,5	2,5	4			1,5
$30 < D \leqslant 50$	0	− 4	0	− 4	4	2	2,5	1,5	2,5	4			1,5
$50 < D \leqslant 80$	0	− 4	0	− 4	4	2	4	1,5	4	6	Identical to ΔB_s of inner ring of same bearing		1,5
$80 < D \leqslant 120$	0	− 5	0	− 5	5	2,5	5	2,5	5	7			2,5
$120 < D \leqslant 150$	0	− 5	0	− 5	5	2,5	5	2,5	5	7			2,5
$150 < D \leqslant 180$	0	− 7	0	− 7	7	3,5	5	2,5	5	7			2,5
$180 < D \leqslant 250$	0	− 8	0	− 8	8	4	7	4	7	10			4
$250 < D \leqslant 315$	0	− 8	0	− 8	8	4	7	5	7	10			5
$315 < D \leqslant 400$	0	− 10	0	− 10	10	5	8	7	8	11			7

NOTE — The tolerances for the outside diameter of an outer ring flange D_1 are given in table 19.

1) These deviations apply to open and capped bearings of diameter series 0, 1, 2, 3 and 4 only.

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

3) Applies to groove ball bearings only.

5.2 Tapered roller bearings

Bore diameter tolerances given in this subclause apply to basically cylindrical bores. Tolerances for tapered bores are given in 5.4.

5.2.1 Normal tolerance class

See tables 11 to 13.

Table 11 — Diameter and radial runout — Inner ring

Tolerance values in micrometres

d mm	Δd_{mp}		V_{dp}	V_{dmp}	K_{ia}
	high	low	max.	max.	max.
$10 \leqslant d \leqslant 18$	0	− 12	12	9	15
$18 < d \leqslant 30$	0	− 12	12	9	18
$30 < d \leqslant 50$	0	− 12	12	9	20
$50 < d \leqslant 80$	0	− 15	15	11	25
$80 < d \leqslant 120$	0	− 20	20	15	30
$120 < d \leqslant 180$	0	− 25	25	19	35
$180 < d \leqslant 250$	0	− 30	30	23	50
$250 < d \leqslant 315$	0	− 35	35	26	60
$315 < d \leqslant 400$	0	− 40	40	30	70

Table 12 — Diameter and radial runout — Outer ring

Tolerance values in micrometres

D mm	ΔD_{mp}		V_{Dp}	V_{Dmp}	K_{ea}
	high	low	max.	max.	max.
$18 \leqslant D \leqslant 30$	0	− 12	12	9	18
$30 < D \leqslant 50$	0	− 14	14	11	20
$50 < D \leqslant 80$	0	− 16	16	12	25
$80 < D \leqslant 120$	0	− 18	18	14	35
$120 < D \leqslant 150$	0	− 20	20	15	40
$150 < D \leqslant 180$	0	− 25	25	19	45
$180 < d \leqslant 250$	0	− 30	30	23	50
$250 < d \leqslant 315$	0	− 35	35	26	60
$315 < d \leqslant 400$	0	− 40	40	30	70
$400 < d \leqslant 500$	0	− 45	45	34	80
$500 < d \leqslant 630$	0	− 50	50	38	100

NOTE — The tolerances for the outside diameter of an outer ring flange D_1 are given in table 19.

Table 13 — Width — Inner and outer rings, single-row bearings and single-row subunits

Tolerance values in micrometres

d mm	ΔB_s		ΔC_s		ΔT_s		ΔT_{1s}		ΔT_{2s}	
	high	low	high	low	high	low	high	low	high	low
$10 \leqslant d \leqslant 18$	0	− 120	0	− 120	+ 200	0	+ 100	0	+ 100	0
$18 < d \leqslant 30$	0	− 120	0	− 120	+ 200	0	+ 100	0	+ 100	0
$30 < d \leqslant 50$	0	− 120	0	− 120	+ 200	0	+ 100	0	+ 100	0
$50 < d \leqslant 80$	0	− 150	0	− 150	+ 200	0	+ 100	0	+ 100	0
$80 < d \leqslant 120$	0	− 200	0	− 200	+ 200	− 200	+ 100	− 100	+ 100	− 100
$120 < d \leqslant 180$	0	− 250	0	− 250	+ 350	− 250	+ 150	− 150	+ 200	− 100
$180 < d \leqslant 250$	0	− 300	0	− 300	+ 350	− 250	+ 150	− 150	+ 200	− 100
$250 < d \leqslant 315$	0	− 350	0	− 350	+ 350	− 250	+ 150	− 150	+ 200	− 100
$315 < d \leqslant 400$	0	− 400	0	− 400	+ 400	− 400	+ 200	− 200	+ 200	− 200

5.2.2 Tolerance class 6 X

The diameter tolerances and radial runout for inner and outer rings of this tolerance class are the same as those given in tables 11 and 12 for the normal class.

Width tolerances are given in table 14.

Table 14 — Width — Inner and outer rings, single-row bearings and single-row subunits

Tolerance values in micrometres

d mm	ΔB_s		ΔC_s		ΔT_s		ΔT_{1s}		ΔT_{2s}	
	high	low	high	low	high	low	high	low	high	low
$10 \leqslant d \leqslant 18$	0	− 50	0	− 100	+ 100	0	+ 50	0	+ 50	0
$18 < d \leqslant 30$	0	− 50	0	− 100	+ 100	0	+ 50	0	+ 50	0
$30 < d \leqslant 50$	0	− 50	0	− 100	+ 100	0	+ 50	0	+ 50	0
$50 < d \leqslant 80$	0	− 50	0	− 100	+ 100	0	+ 50	0	+ 50	0
$80 < d \leqslant 120$	0	− 50	0	− 100	+ 100	0	+ 50	0	+ 50	0
$120 < d \leqslant 180$	0	− 50	0	− 100	+ 150	0	+ 50	0	+ 100	0
$180 < d \leqslant 250$	0	− 50	0	− 100	+ 150	0	+ 50	0	+ 100	0
$250 < d \leqslant 315$	0	− 50	0	− 100	+ 200	0	+ 100	0	+ 100	0
$315 < d \leqslant 400$	0	− 50	0	− 100	+ 200	0	+ 100	0	+ 100	0

5.2.3 Tolerance class 5

See tables 15 and 16.

Table 15 — Inner ring and single-row bearing width

Tolerance values in micrometres

d mm	Δd_{mp}		V_{dp}	V_{dmp}	K_{ia}	S_d	ΔB_s		ΔT_s	
	high	low	max.	max.	max.	max.	high	low	high	low
$10 \leqslant d \leqslant 18$	0	− 7	5	5	5	7	0	− 200	+ 200	− 200
$18 < d \leqslant 30$	0	− 8	6	5	5	8	0	− 200	+ 200	− 200
$30 < d \leqslant 50$	0	− 10	8	5	6	8	0	− 240	+ 200	− 200
$50 < d \leqslant 80$	0	− 12	9	6	7	8	0	− 300	+ 200	− 200
$80 < d \leqslant 120$	0	− 15	11	8	8	9	0	− 400	+ 200	− 200
$120 < d \leqslant 180$	0	− 18	14	9	11	10	0	− 500	+ 350	− 250
$180 < d \leqslant 250$	0	− 22	17	11	13	11	0	− 600	+ 350	− 250

Table 16 — Outer ring

Tolerance values in micrometres

D mm	ΔD_{mp}		V_{Dp}	V_{Dmp}	K_{ea}	S_D [1], S_{D1}	ΔC_s	
	high	low	max.	max.	max.	max.	high	low
$18 \leqslant D \leqslant 30$	0	− 8	6	5	6	8		
$30 < D \leqslant 50$	0	− 9	7	5	7	8		
$50 < D \leqslant 80$	0	− 11	8	6	8	8		
$80 < D \leqslant 120$	0	− 13	10	7	10	9	Identical to ΔB_s of inner ring of same bearing	
$120 < D \leqslant 150$	0	− 15	11	8	11	10		
$150 < D \leqslant 180$	0	− 18	14	9	13	10		
$180 < D \leqslant 250$	0	− 20	15	10	15	11		
$250 < D \leqslant 315$	0	− 25	19	13	18	13		
$315 < D \leqslant 400$	0	− 28	22	14	20	13		

NOTE — The tolerances for the outside diameter of an outer ring flange D_1 are given in table 19.

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

5.2.4 Tolerance class 4

See tables 17 and 18.

Table 17 — Inner ring and single-row bearing width

Tolerance values in micrometres

d mm	Δd_{mp}		Δd_s		V_{dp}	V_{dmp}	K_{ia}	S_d	S_{ia}	ΔB_s		ΔT_s	
	high	low	high	low	max.	max.	max.	max.	max.	high	low	high	low
$10 \leqslant d \leqslant 18$	0	− 5	0	− 5	4	4	3	3	3	0	− 200	+ 200	− 200
$18 < d \leqslant 30$	0	− 6	0	− 6	5	4	3	4	4	0	− 200	+ 200	− 200
$30 < d \leqslant 50$	0	− 8	0	− 8	6	5	4	4	4	0	− 240	+ 200	− 200
$50 < d \leqslant 80$	0	− 9	0	− 9	7	5	4	5	4	0	− 300	+ 200	− 200
$80 < d \leqslant 120$	0	− 10	0	− 10	8	5	5	5	5	0	− 400	+ 200	− 200
$120 < d \leqslant 180$	0	− 13	0	− 13	10	7	6	6	7	0	− 500	+ 350	− 250
$180 < d \leqslant 250$	0	− 15	0	− 15	11	8	8	7	8	0	− 600	+ 350	− 250

Table 18 — Outer ring

Tolerance values in micrometres

D mm	ΔD_{mp}		ΔD_s		V_{Dp}	V_{Dmp}	K_{ea}	S_D [1], S_{D1}	S_{ea} [1]	S_{ea1}	ΔC_s	
	high	low	high	low	max.	max.	max.	max.	max.	max.	high	low
$18 \leqslant D \leqslant 30$	0	− 6	0	− 6	5	4	4	4	5	7		
$30 < D \leqslant 50$	0	− 7	0	− 7	5	5	5	4	5	7		
$50 < D \leqslant 80$	0	− 9	0	− 9	7	5	5	4	5	7		
$80 < D \leqslant 120$	0	− 10	0	− 10	8	5	6	5	6	8	Identical to ΔB_s of inner ring of same bearing	
$120 < D \leqslant 150$	0	− 11	0	− 11	8	6	7	5	7	10		
$150 < D \leqslant 180$	0	− 13	0	− 13	10	7	8	5	8	11		
$180 < D \leqslant 250$	0	− 15	0	− 15	11	8	10	7	10	14		
$250 < D \leqslant 315$	0	− 18	0	− 18	14	9	11	8	10	14		
$315 < D \leqslant 400$	0	− 20	0	− 20	15	10	13	10	13	18		

NOTE — The tolerances for the outside diameter of an outer ring flange D_1 are given in table 19.

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

5.3 Radial bearings, outer ring flanges

Flange outside diameter tolerances given in table 19 apply to radial ball bearings and tapered roller bearings.

Table 19 — Flange outside diameter tolerances

Tolerance values in micrometres

D_1 mm	ΔD_{1s}			
	Locating flange		Non-locating flange	
	high	low	high	low
$6 \leqslant D_1 \leqslant 10$	0	− 36	+ 220	− 36
$10 < D_1 \leqslant 18$	0	− 43	+ 270	− 43
$18 < D_1 \leqslant 30$	0	− 52	+ 330	− 52
$30 < D_1 \leqslant 50$	0	− 62	+ 390	− 62
$50 < D_1 \leqslant 80$	0	− 74	+ 460	− 74
$80 < D_1 \leqslant 120$	0	− 87	+ 540	− 87
$120 < D_1 \leqslant 180$	0	− 100	+ 630	− 100
$180 < D_1 \leqslant 250$	0	− 115	+ 720	− 115
$250 < D_1 \leqslant 315$	0	− 130	+ 810	− 130
$315 < D_1 \leqslant 400$	0	− 140	+ 890	− 140
$400 < D_1 \leqslant 500$	0	− 155	+ 970	− 155
$500 < D_1 \leqslant 630$	0	− 175	+ 1 100	− 175
$630 < D_1 \leqslant 800$	0	− 200	+ 1 250	− 200
$800 < D_1 \leqslant 1\,000$	0	− 230	+ 1 400	− 230
$1\,000 < D_1 \leqslant 1\,250$	0	− 260	+ 1 650	− 260
$1\,250 < D_1 \leqslant 1\,600$	0	− 310	+ 1 950	− 310
$1\,600 < D_1 \leqslant 2\,000$	0	− 370	+ 2 300	− 370
$2\,000 < D_1 \leqslant 2\,500$	0	− 440	+ 2 800	− 440

5.4 Basically tapered bores, tapers 1:12 and 1:30

See figures 3 and 4.

a) **For taper 1:12**

The taper angle (half the cone angle) is

$\alpha = 2° 23' 9{,}4'' = 2{,}385\,94° = 0{,}041\,643$ rad

The diameter at the theoretical large end of the bore is

$$d_1 = d + \frac{1}{12} B$$

b) **For taper 1:30**

The taper angle (half the cone angle) is

$\alpha = 0° 57' 17{,}4'' = 0{,}954\,84° = 0{,}016\,665$ rad

The diameter at the theoretical large end of the bore is

$$d_1 = d + \frac{1}{30} B$$

The tolerances for a tapered bore comprise:

— a mean diameter tolerance, given by limits for the mean diameter deviation at the theoretical small end of the bore, Δd_{mp};

— a taper tolerance, given by limits for the difference between the mean diameter deviations at the two ends of the bore, $\Delta d_{1mp} - \Delta d_{mp}$;

— a tolerance for the diameter variation, V_{dp}, given by a maximum value applying in any radial plane of the bore.

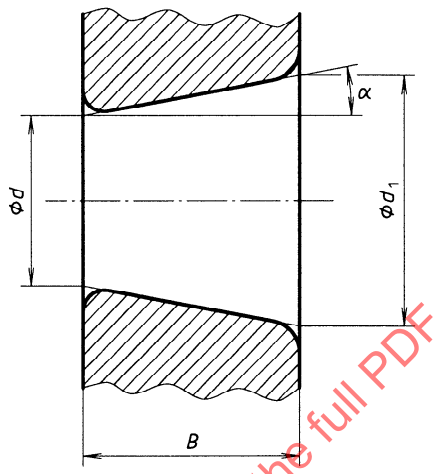

Figure 3 — Nominal tapered bore

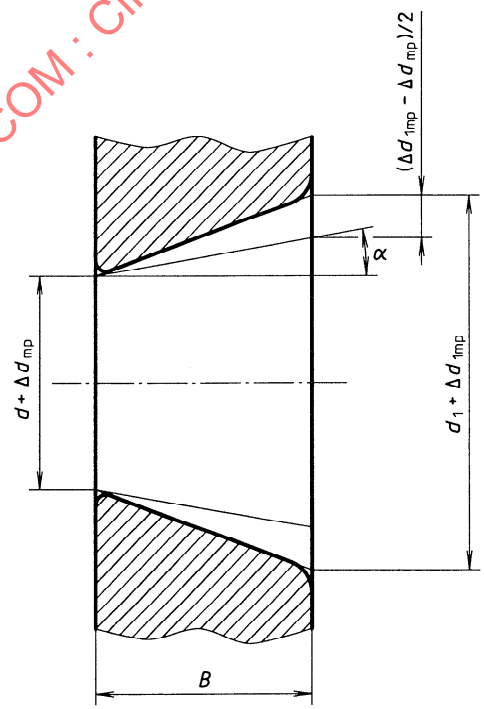

Figure 4 — Tapered bore with mean diameters and their deviations