भारतीय मानक

Indian Standard

IS 5692 : 2024
ISO 492 : 2023

रोलिंग बियरिंग्स — रेडियल बियरिंग्स — ज्यामितीय उत्पाद विनिर्देश (जीपीएस) और अनुमत छूट मूल्य

(तीसरा पुनरीक्षण)

Rolling Bearings — Radial Bearings — Geometrical Product Specifications (GPS) and Tolerance Values

(Third Revision)

ICS 21.100.20

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March 2024 **Price Group 14**

Bearing Sectional Committee, PGD 13

NATIONAL FOREWORD

This Indian Standard (Third Revision) which is identical to ISO 492 : 2023 'Rolling bearings — Radial bearings — Geometrical product specifications (GPS) and tolerance values' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Bearing Sectional Committee and approval of the Production and General Engineering Division Council.

This standard was first published in 1970 and subsequently revised in 1988 and 2019. First revision was identical to ISO 492 : 1986. Second revision of this standard was identical to ISO 492 : 2014 'Rolling bearings — Radial bearings — Tolerances', issued by the International Organization for Standardization (ISO) and superseded IS 7460 : 1988 incorporating all its content. In this revision of this standard has been undertaken to align it with the latest version of ISO 492.

The major changes incorporated in this revision are as follows:

a) Symbols and the symbols list have been amended, such as symbols for width of asymmetric rings and assembled bearing;
b) Changes have been made to the geometrical product specifications (GPS) system, such as the indication of K_{ia} and K_{ea};
c) Deviation limits and tolerance values towards larger bore diameter and outside bearing diameters in Tables 4 to 26 have been extended;
d) Annexes A, B, C and D have been deleted; and
e) The stiffness series of tapered roller bearings and background information regarding affected tolerance values have been added in new Annexes A and B.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'; and

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are given below along with their degree of equivalence for the editions indicated.

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 15 : 2017 Rolling bearings — Radial bearings — Boundary dimensions, general plan	IS 5669 : 2019/ISO 15 : 2017 Rolling bearings — Radial bearings — Boundary dimensions, general plan (*second revision*)	Identical
ISO 1101 Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out	IS 8000 (Part 1) : 2019/ISO 1101 : 2017 Geometrical product specifications (GPS) — Geometrical tolerancing : Part 1 Tolerances of form, orientation, location and run-out (*second revision*)	Identical

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Introduction

This document is a machine element geometry standard as defined in the geometrical product specifications (GPS) system presented in matrix model of ISO 14638[7].

The fundamental rules of ISO GPS given in ISO 8015 apply to this document and the default decision rules given in ISO 14253-1[5] apply to specifications made in accordance with this document, unless otherwise indicated.

The connection between functional requirements, measuring technique, and measuring uncertainty should always be considered. For measurement uncertainty, ISO 14253-2[6] should be considered.

This document uses most of the existing symbols associated with rolling bearings because they are well established in the market. In some cases, new terms are derived from the full GPS definition. The definitions of the established terms and symbols are necessarily changed according to the GPS rules. These changes of terms, definitions and symbols for geometrical product specifications (GPS) to define characteristics and tolerances of rolling bearing components and assemblies are given in ISO 22872 and incorporated in this document.

The representation of symbols, tolerance values, limits of size, deviation limits and limit values derived from GPS indications according to, for example, ISO 1101 and ISO 14405-1, including indications in tables and graphical descriptions, have been revised and implemented in accordance with the principles of ISO 22872.

Indian Standard

ROLLING BEARINGS — RADIAL BEARINGS — GEOMETRICAL PRODUCT SPECIFICATIONS (GPS) AND TOLERANCE VALUES

(Third Revision)

1 Scope

This document specifies dimensional and geometrical characteristics, deviation limits from nominal sizes, and tolerance values to define the interface (except chamfers) of radial rolling bearings. Nominal boundary dimensions are defined in ISO 15, ISO 355[2] and ISO 8443[4].

This document does not apply to certain radial bearings of particular types (e.g. needle roller bearings) or for particular fields of application (e.g. airframe bearings). Tolerances for such bearings are given in the relevant International Standards.

Chamfer dimension limits are given in ISO 582[3].

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirement of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15:2017, *Rolling bearings — Radial bearings — Boundary dimensions, general plan*

ISO 1101:2017, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 5593, *Rolling bearings — Vocabulary*

ISO 8015, *Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules*

ISO 14405-1:2016, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 1: Linear sizes*

ISO/TS 17863:2013, *Geometrical product specification (GPS) — Tolerancing of moveable assemblies*

ISO 22872, *Rolling bearings — Geometrical product specifications (GPS) — Vocabulary and representation of symbols*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15, ISO 1101, ISO 5593, ISO 14405-1, ISO/TS 17863 and ISO 22872 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Symbols

4.1 Symbols for physical quantities

Symbols in Table 1 represent physical quantities in the GPS environment and may sometimes be applied to more than one physical quantity.

In this document, the symbols for tolerance values, deviation limits and limit values are preceded by letter "t" in figures and tables.

EXAMPLE 1 $t_{\Delta Bs}$, t_{Vdmp}.

In this document, the symbols for nominal dimensions and values of upper/lower limit of size are not preceded by the letter "t" because those values are usually interpreted as nominal dimensions.

EXAMPLE 2 C, D.

Table 1 — Symbols for dimensions and tolerance values

Symbol	Description	Figure
a	Distance from face to define the restricted area for S_D or S_{D1}	3, 8, 13
B	Nominal inner ring width	1, 2, 7, 12
C	Nominal outer ring width	1, 2, 7, 12
C_1	Nominal outer ring flange width	12
D	Nominal outside diameter	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
D_1	Nominal outside diameter of outer ring flange	12
d	Nominal bore diameter <cylindrical bore>	1, 2, 3, 4, 5, 6, 12, 13, 14, 15, 16
d	Nominal bore diameter <tapered bore>	7
d_1	Nominal bore diameter at the theoretical large end of a tapered bore	7
S_L	Nominal tapered slope	7
T	Nominal assembled bearing width <tapered roller bearing>	17
T_1	Nominal effective width of inner subunit assembled with a master outer ring <tapered roller bearing>	17
T_2	Nominal effective width of outer ring assembled with a master inner subunit	17
T_F	Nominal width of an assembled flanged bearing	17
T_{F2}	Nominal effective width between an outer ring flange with a master inner subunit	17
t_{Kea}	Tolerance value for range of section height at outer ring of assembled bearing	4, 5, 6, 9, 10, 11, 14, 15, 16
t_{Kia}	Tolerance value for range of section height at inner ring of assembled bearing	4, 5, 6, 9, 10, 11, 14, 15, 16
t_{SD}	Tolerance value for perpendicularity of outer ring outside surface to the face	3, 8
t_{SD1}	Tolerance value for perpendicularity of outer ring outside surface to the flange back face	13
t_{Sd}	Tolerance value for run-out of inner ring face to the bore	3, 8, 13
t_{Sea}	Tolerance value for axial run-out of outer ring of assembled bearing	5, 6, 10, 11
t_{Sea1}	Tolerance value for axial run-out of outer ring flange back face of assembled bearing	15, 16
t_{Sia}	Tolerance value for axial run-out of inner ring of assembled bearing	5, 6, 10, 11, 15, 16

Table 1 *(continued)*

Symbol	Description	Figure
t_{VBgp}	Tolerance value for range of inner ring width with faces offset or narrow	2, 7
t_{VBs}	Tolerance value for range of inner ring width with faces directly opposite	1, 12
t_{VCgp}	Tolerance value for range of outer ring width with faces offset or narrow	2, 12
t_{VCs}	Tolerance value for range outer ring width with faces directly opposite	1, 7
t_{VC1s}	Tolerance value for range of outer ring flange width	12
t_{VDmp}	Tolerance value for range of mid-range outside diameter	1, 2, 7, 12
t_{VDsp}	Tolerance value for range of outside diameter	1, 2, 7, 12
t_{Vdmp}	Tolerance value for range of mid-range bore diameter	1, 2, 12
t_{Vdsp}	Tolerance value for range of bore diameter	1, 2, 7, 12
$t_{\Delta Bgp}$	Upper deviation limit of inner ring width with faces offset or narrow	2, 7
$t_{\Delta Bs}$	Upper and lower deviation limits of inner ring width with faces directly opposite	1, 12
$t_{\Delta Bs}$	Lower deviation limit of inner ring width with faces offset or narrow	2, 7
$t_{\Delta Cgp}$	Upper deviation limit of outer ring width with faces offset or narrow	2, 12
$t_{\Delta Cs}$	Upper and lower deviation limits of outer ring width with faces directly opposite	1, 7
$t_{\Delta Cs}$	Lower deviation limit of outer ring width with faces offset or narrow	2, 12
$t_{\Delta C1s}$	Upper and lower deviation limits of outer ring flange width	12
$t_{\Delta Dmp}$	Upper and lower deviation limits of mid-range outside diameter	1, 2, 7, 12
$t_{\Delta Ds}$	Upper and lower deviation limits of outside diameter	1, 2, 7, 12
$t_{\Delta D1s}$	Upper and lower deviation limits of outside diameter of outer ring flange	12
$t_{\Delta dmp}$	Upper and lower deviation limits of mid-range bore diameter <cylindrical bore>	1, 2, 12
$t_{\Delta dmp}$	Upper and lower deviation limits of mid-range bore diameter <tapered bore>	7
$t_{\Delta d1mp}$	Upper and lower deviation limits of a mid-range bore diameter at the theoretical large end of an inner ring <tapered bore>	7
$t_{\Delta ds}$	Upper and lower deviation limits of bore diameter	1, 2, 12
$t_{\Delta SL}$	Upper and lower deviation limits of tapered slope	7
$t_{\Delta Tg}$	Upper and lower deviation limits of the actual bearing width <tapered roller bearing>	17
$t_{\Delta T1g}$	Upper and lower deviation limits of the actual effective width of inner subunit <tapered roller bearing>	17
$t_{\Delta T2g}$	Upper and lower deviation limits of the actual effective width of outer ring	17
$t_{\Delta TFg}$	Upper and lower deviation limits of the actual bearing width of flanged bearing	17
$t_{\Delta TF2g}$	Upper and lower deviation limits of the actual effective width of flanged outer ring	17
α	Angel of tapered inner ring bore	7, 8, 9, 10, 11

4.2 Additional symbols

Symbols defined in standards other than ISO 22872 and used in this document are presented in Table 2 for information.

These includes symbols for specification modifiers, complementary specification modifiers and geometrical characteristics.

Table 2 — Additional symbols defined in other standards

Symbol	Description	Figure	Reference
ACS	Any cross-section	1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16	ISO 14405-1:2016, 7.4
ALS	Any longitudinal section	2, 7, 12	ISO 14405-1:2016, 7.4
(GN)	Minimum circumscribed size	2, 7, 12, 17	ISO 14405-1:2016, 3.7.1.3
(LP)	Two-point size	2, 7, 12	ISO 14405-1:2016, 3.6.1
(SD)	Mid-range size	1, 2, 7, 12	ISO 14405-1:2016, 3.7.2.2.5
(SR)	Range of sizes	1, 2, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16	ISO 14405-1:2016, 3.7.2.2.6
//	Parallelism	2, 7, 12	ISO 1101:2017, 17.10
⊥	Perpendicularity	3, 4, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16	ISO 1101:2017, 17.11
⌯	Symmetry	2, 7, 12	ISO 1101:2017, 17.15
↗	Circular run-out	3, 5, 6, 8, 10, 11, 13, 15, 16	ISO 1101:2017, 17.16
⌯ | M [a]	Intersection plane indicator	2, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 16,	ISO 1101:2017, 13
// | M [a]	Direction feature indicator	2, 7, 12	ISO 1101:2017, 15
FP	Fixed part	4, 5, 6, 9, 10, 11, 14, 15, 16	ISO/TS 17863:2013, 6.10.1.1
MP	Moveable part	4, 5, 6, 9, 10, 11, 14, 15, 16	ISO/TS 17863:2013, 6.10.1.1
G	Gravity	4, 5, 6, 9, 10, 11, 14, 15, 16, 17	ISO/TS 17863:2013, 6.3
1 [a]	Flag	4, 5, 6, 9, 10, 11, 14, 15, 16, 17	ISO/TS 17863:2013, 6.8 and 6.9

[a] Letters and characteristic symbols are examples.

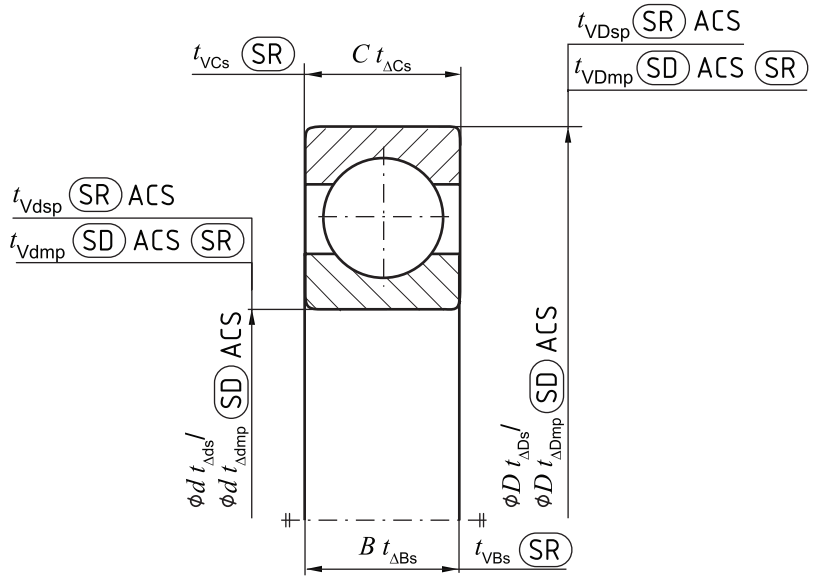
5 Graphical description

To express that the ISO GPS system in ISO 8015 is applied, the dimensional and geometrical characteristics shall be included in the technical product documentation (e.g. on the drawing). The dimensional and geometrical specifications associated to these characteristics are described in Figures 1 to 17.

According to ISO 8015, specifications shall be completed with specification operators, e.g. filtration. These may be agreed between manufacturer and customer case by case.

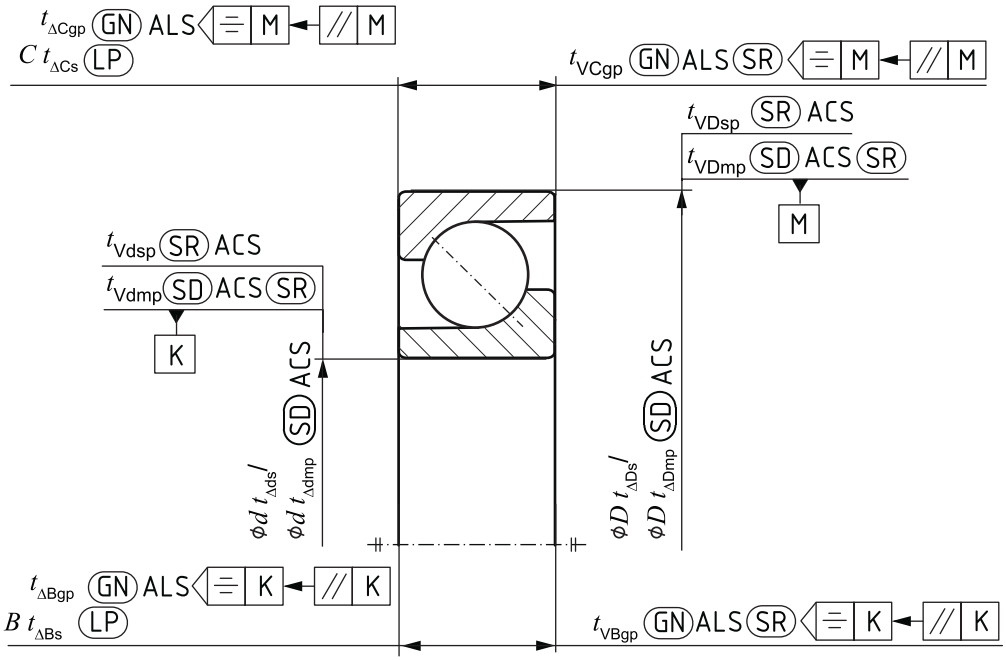
The indications in Figures 1 to 17 illustrate the correlation of interface dimensions and corresponding dimensional and geometrical tolerance symbols. The specifications for single components are illustrated in Figures 1, 2, 3, 7, 8, 12 and 13. The specifications for assembled bearings are illustrated in Figures 4, 5, 6, 9, 10, 11, 14, 15, 16 and 17. The examples are not intended to cover all possible assemblies.

NOTE Figures 1 to 17 are drawn schematically and do not necessarily show all design details.



NOTE The symbol "/" (forward slash) shows alternative specification indications depending on tolerance class and diameter series.

Figure 1 — Size specification for single components of bearing with cylindrical bore and symmetrical rings



NOTE The symbol "/" (forward slash) shows alternative specification indications depending on tolerance class and diameter series.

Figure 2 — Size specification for single components of bearing with cylindrical bore and asymmetrical rings

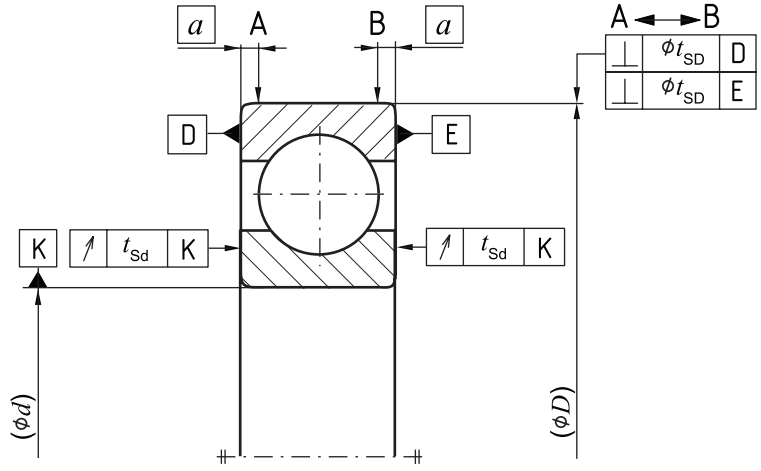
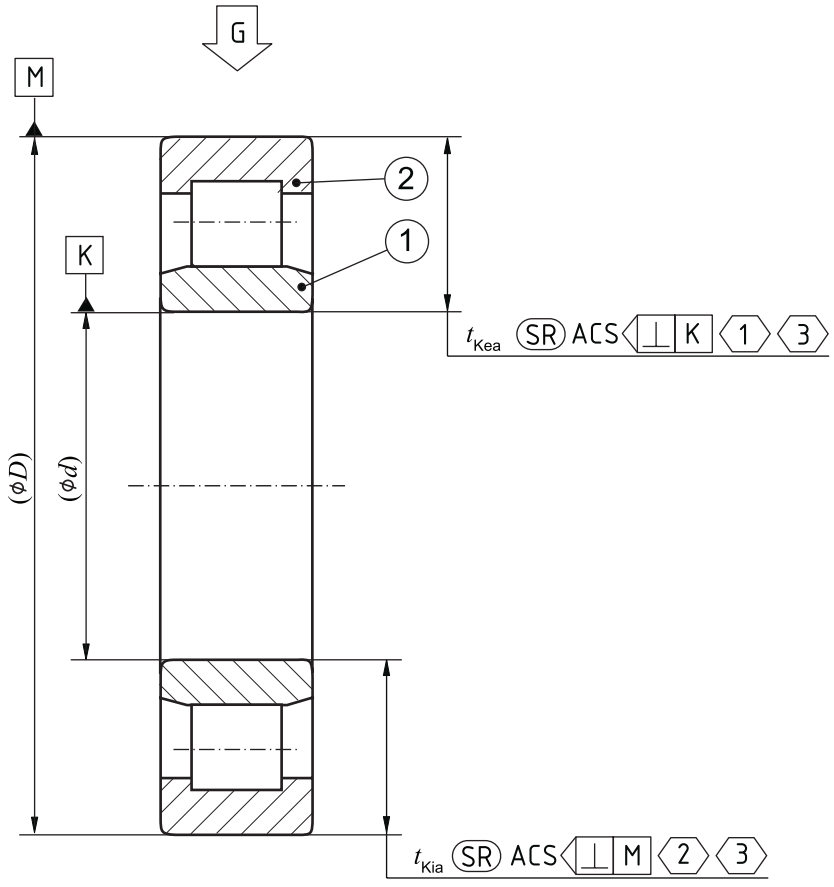


Figure 3 — Geometrical tolerances for single components of bearing with cylindrical bore



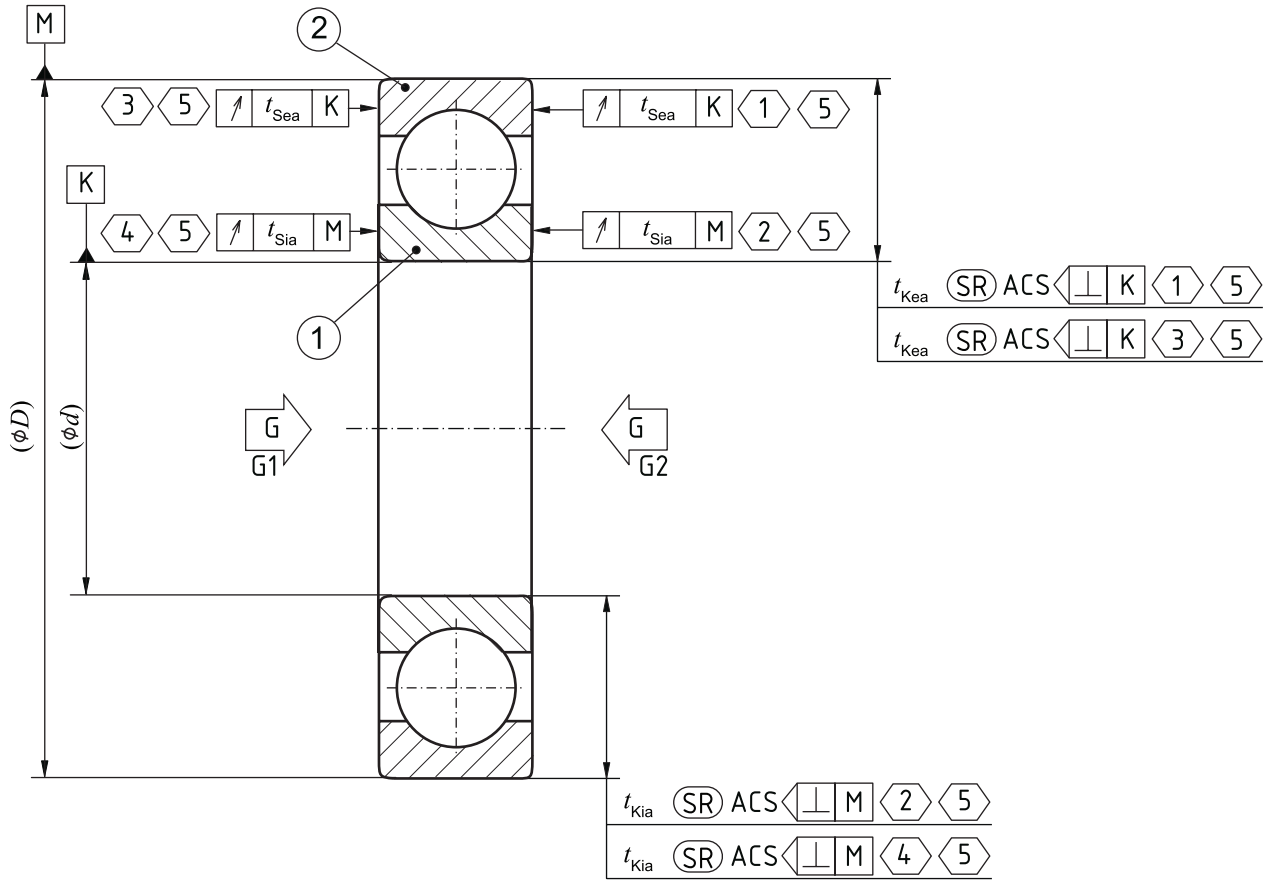
Key

1 = FP 1 - MP 2, G

2 = FP 2 - MP 1, G

3 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 4 — Geometrical tolerances for assembled bearing with cylindrical bore — Cylindrical roller bearing, spherical roller bearing, toroidal roller bearing and self-aligning ball bearing



Key

1 = FP 1 - MP 2, G2

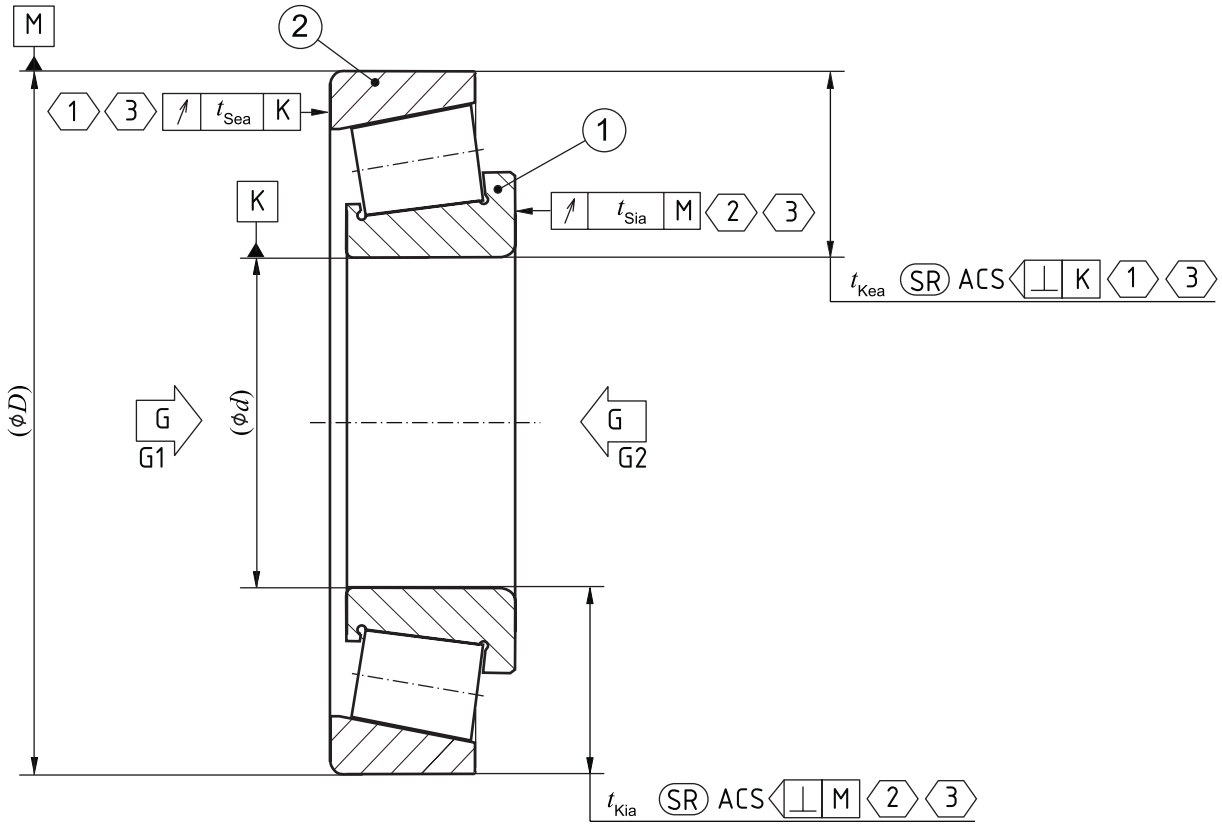
2 = FP 2 - MP 1, G2

3 = FP 1 - MP 2, G1

4 = FP 2 - MP 1, G1

5 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 5 — Geometrical tolerances for assembled bearing with cylindrical bore — Deep groove ball bearing, double-row deep groove ball bearing, double-row angular contact ball bearing and four-point-contact ball bearing



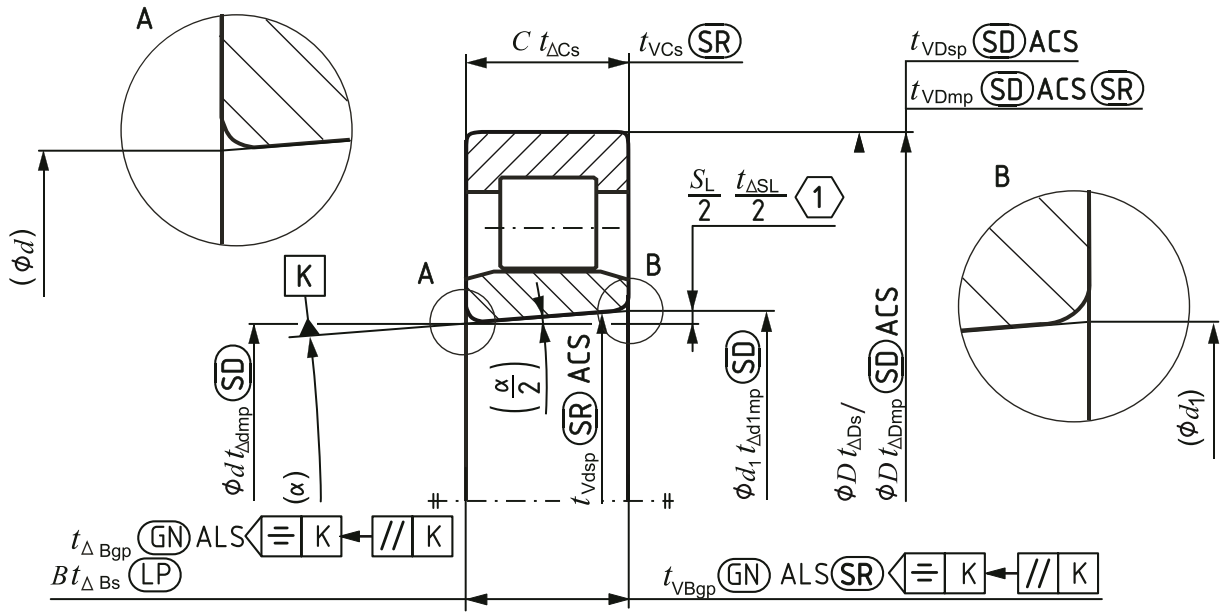
Key

1 = FP (1) - MP (2), G1

2 = FP (2) - MP (1), G2

3 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 6 — Geometrical tolerances for assembled bearing with cylindrical bore — Single-row angular contact ball bearing and tapered roller bearing



Key

1 = S_L is a calculated nominal size according to Formula (1)
$t_{\Delta SL}$ is a calculated characteristic according to Formula (2)

$$S_L = (d_1 - d) = 2B \tan(\alpha/2) \quad (1)$$

$$t_{\Delta SL} = t_{\Delta d1mp} - t_{\Delta dmp} \quad (2)$$

NOTE 1 See Figure 2 for indications on asymmetrical outer ring.

NOTE 2 The symbol "/" (forward slash) shows alternative specification indications depending on tolerance class and diameter series.

Figure 7 — Size specification for single components of bearing with tapered bore

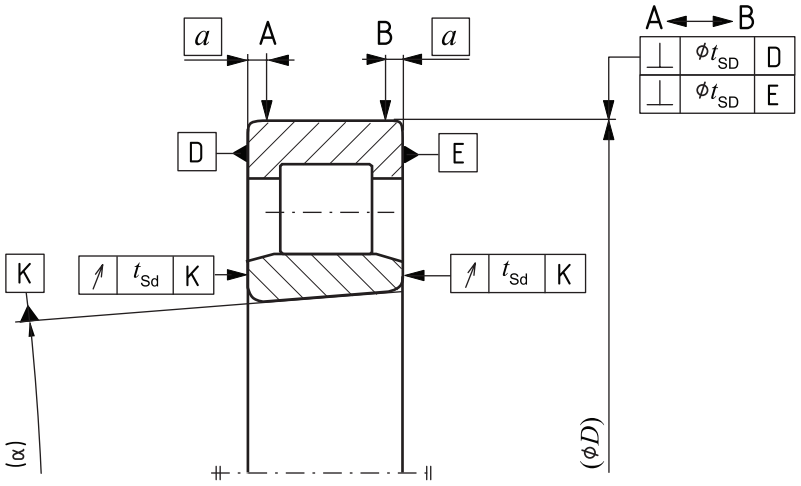
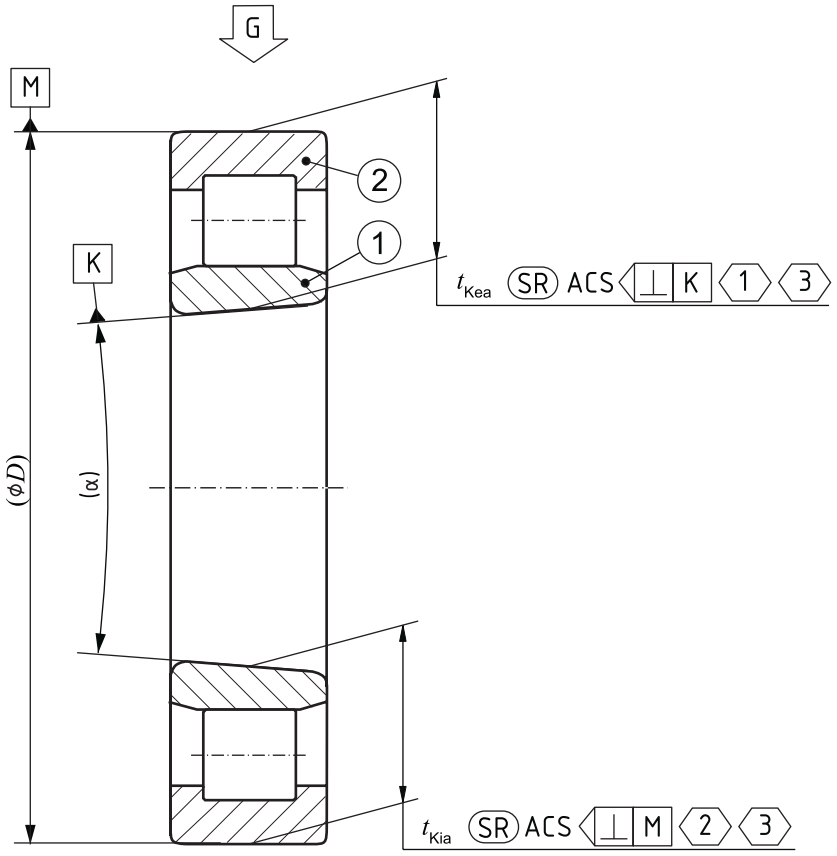


Figure 8 — Geometrical tolerances for single components of bearing with tapered bore



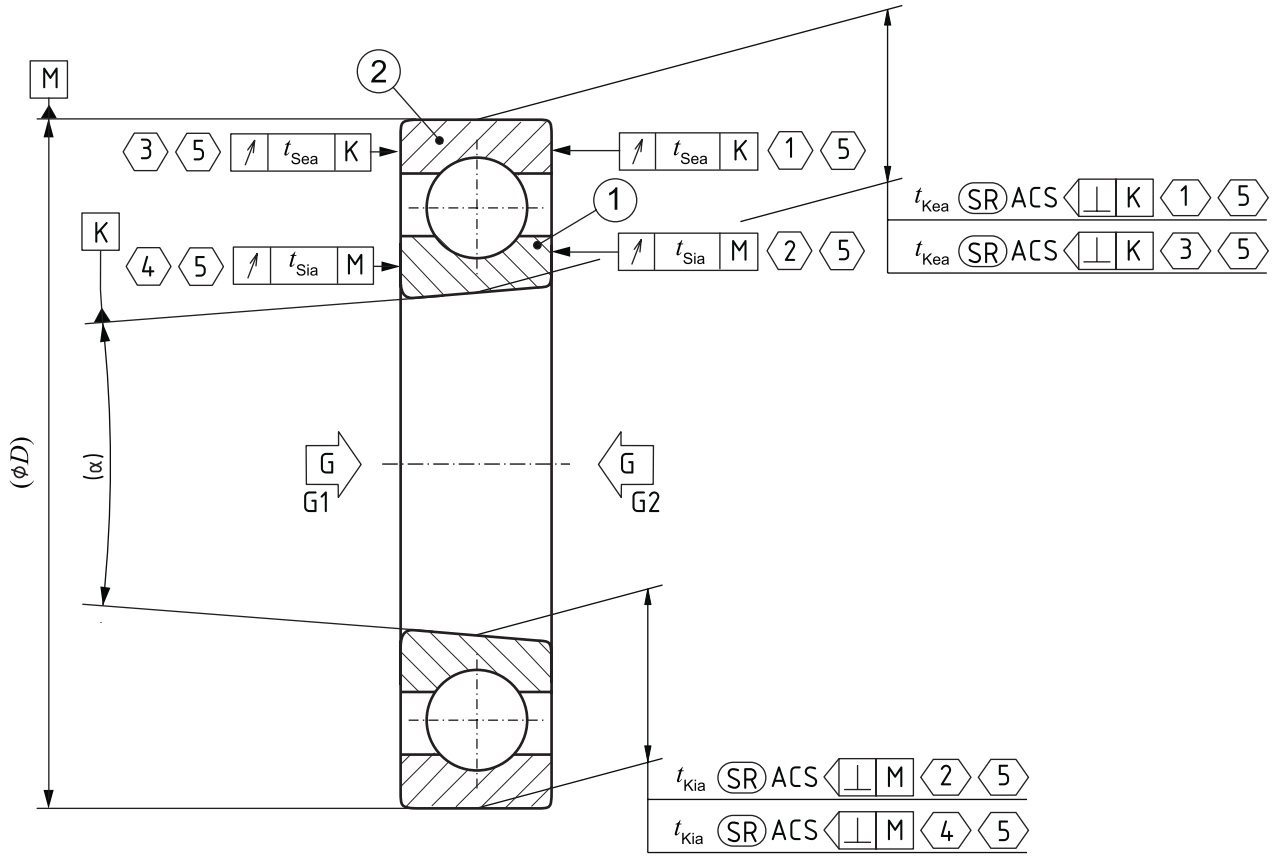
Key

1 = FP ① - MP ②, G

2 = FP ② - MP ①, G

3 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 9 — Geometrical tolerances for assembled bearing with tapered bore — Cylindrical roller bearing, spherical roller bearing, toroidal roller bearing and self-aligning ball bearing



Key

1 = FP 1 - MP 2, G2

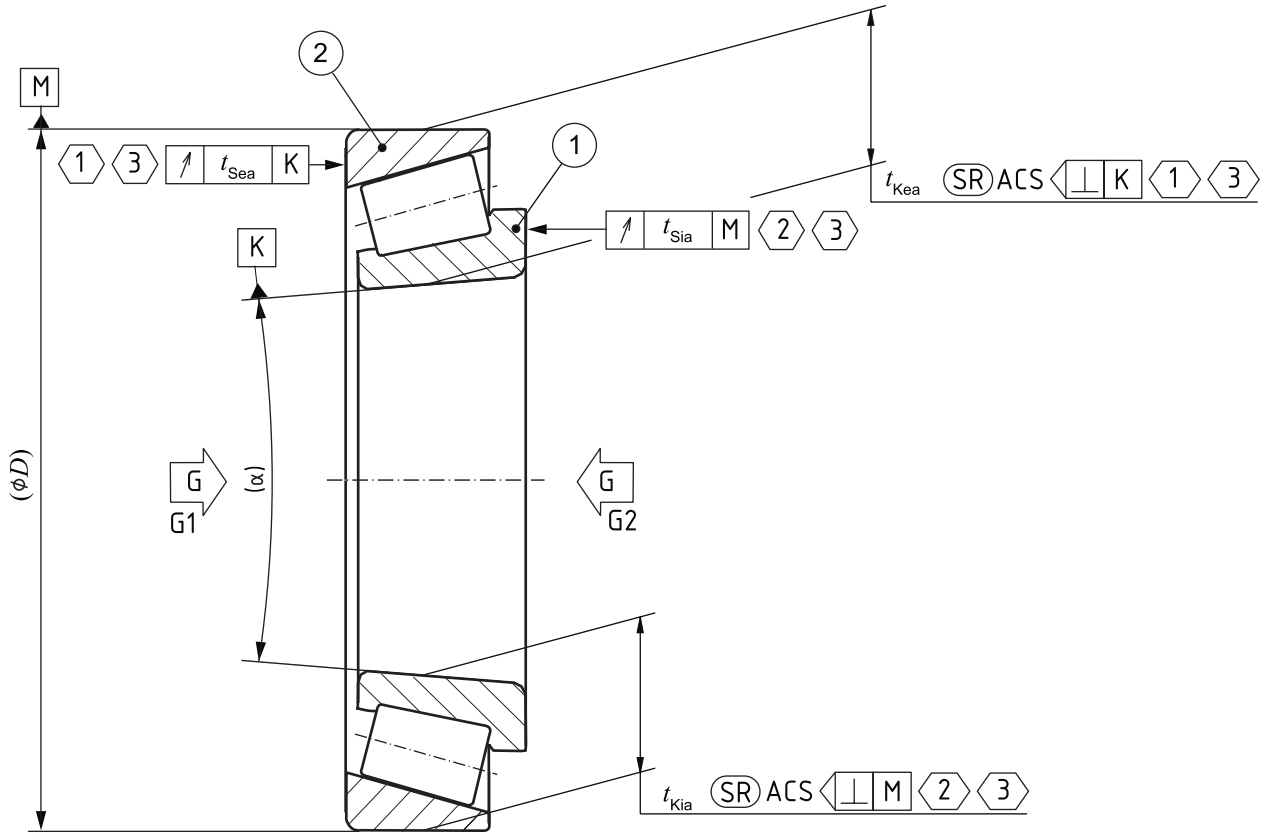
2 = FP 2 - MP 1, G2

3 = FP 1 - MP 2, G1

4 = FP 2 - MP 1, G1

5 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 10 — Geometrical tolerances for assembled bearing with tapered bore — Deep groove ball bearing, double-row deep groove ball bearing, double-row angular contact ball bearing and four-point-contact ball bearing



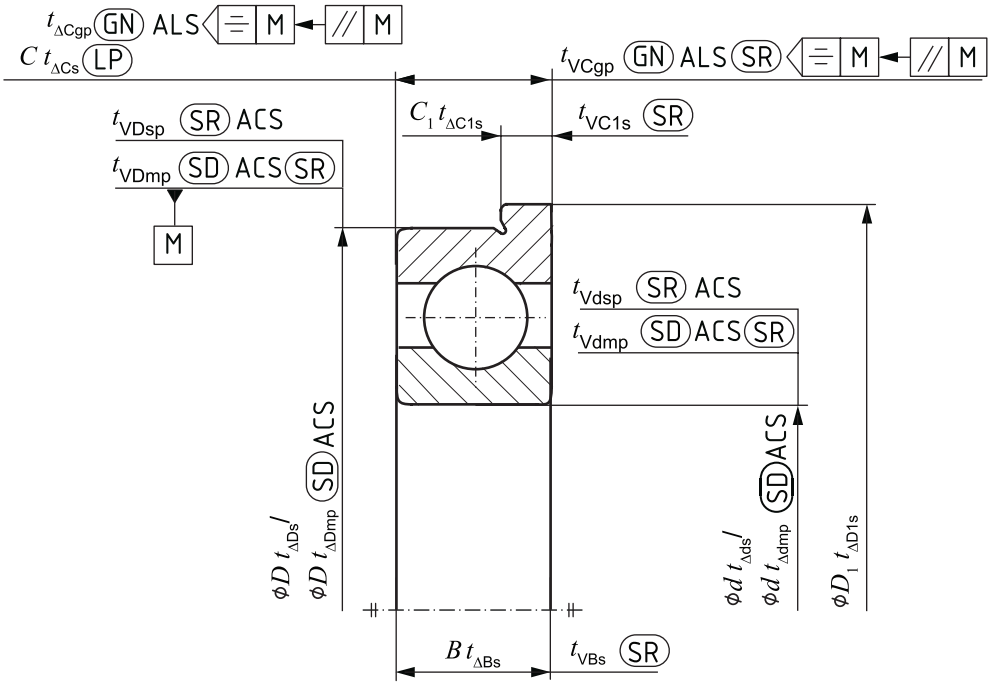
Key

1 = FP (1) - MP (2), G1

2 = FP (2) - MP (1), G2

3 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 11 — Geometrical tolerances for assembled bearing with tapered bore — Single-row angular contact ball bearing and tapered roller bearing



NOTE 1 See Figure 2 for indications on asymmetrical inner ring.

NOTE 2 The symbol "/" (forward slash) shows alternative specification indications depending on tolerance class and diameter series.

Figure 12 — Size specification for single components of bearing with flanged outer ring

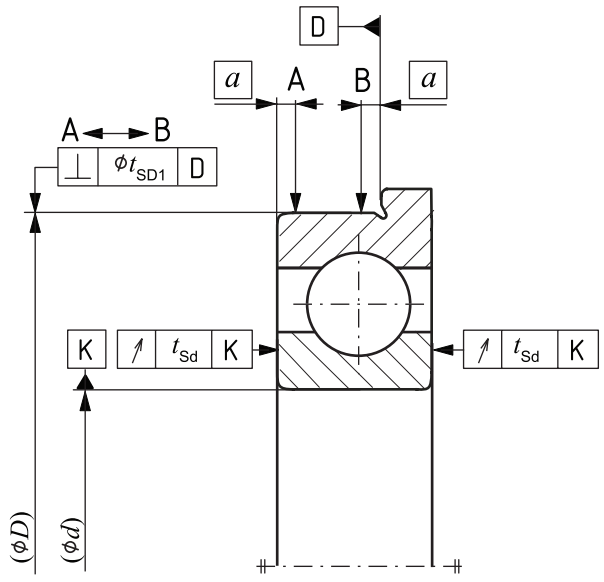
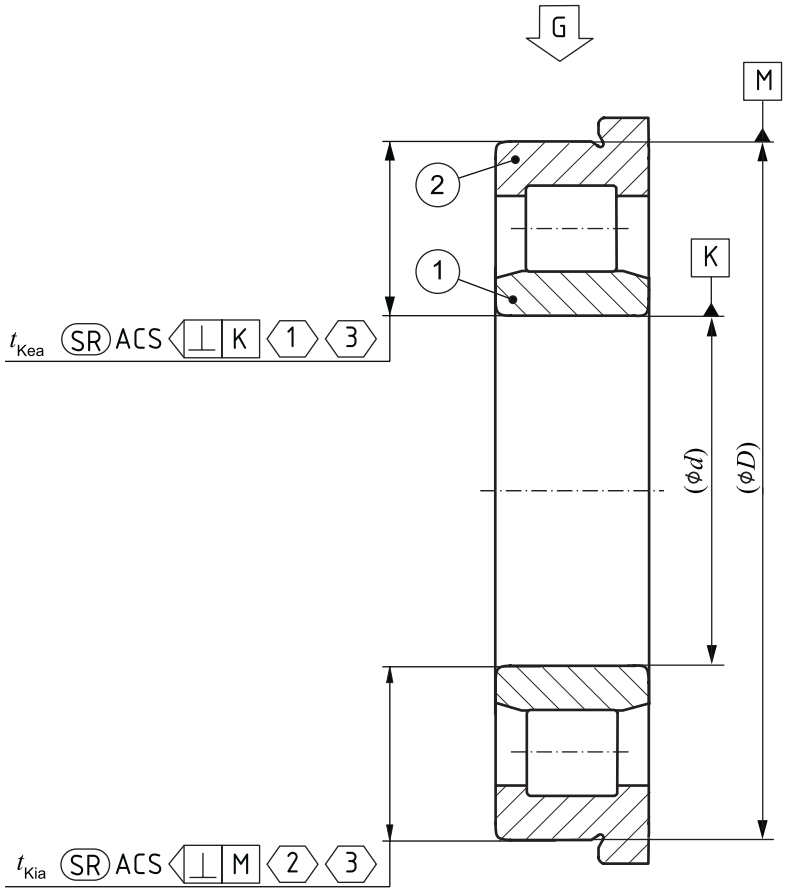


Figure 13 — Geometrical tolerances for single components of bearing with flanged outer ring



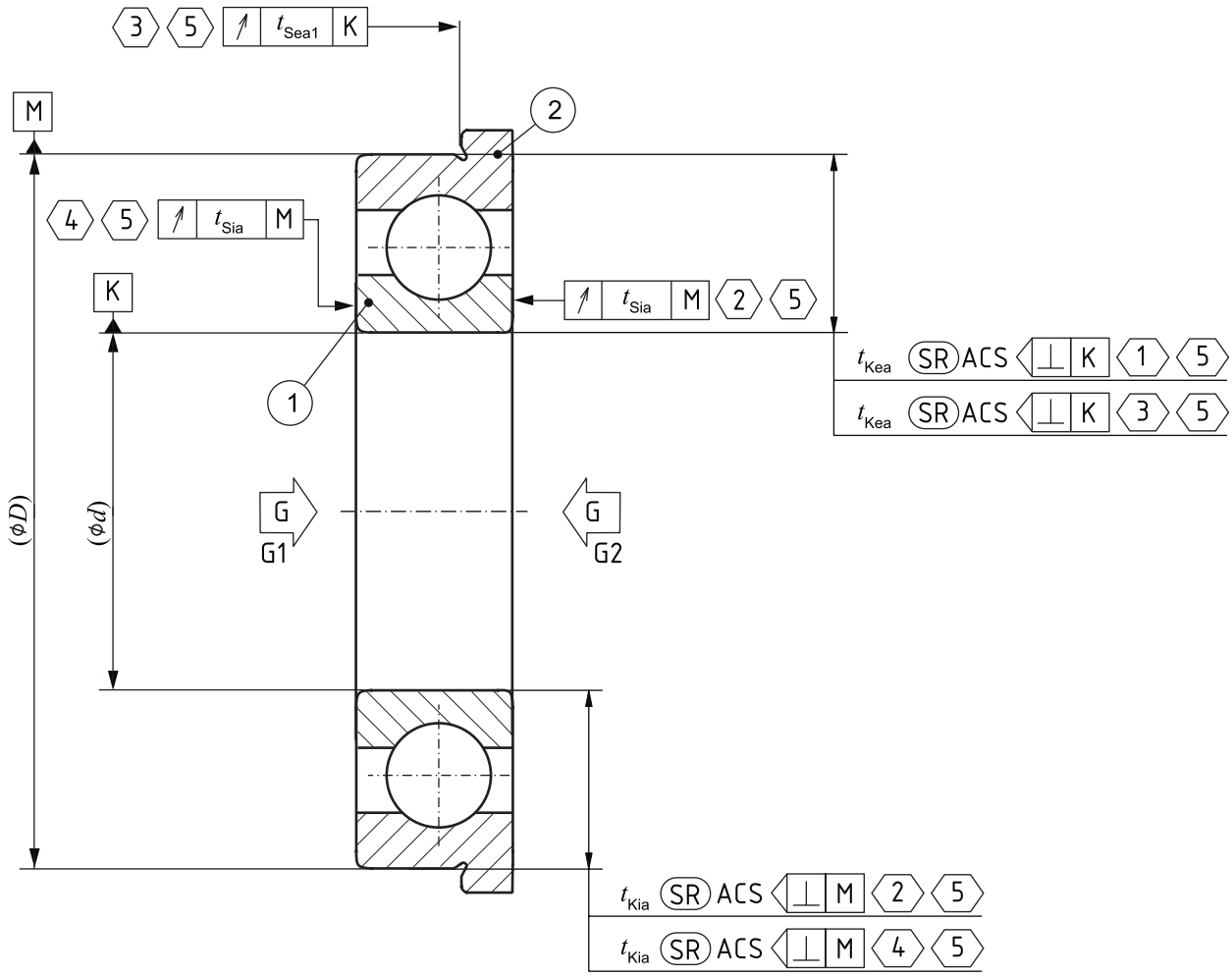
Key

1 = FP (1) - MP (2), G

2 = FP (2) - MP (1), G

3 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 14 — Geometrical tolerances for assembled bearing with flanged outer ring — Cylindrical roller bearing, spherical roller bearing, toroidal roller bearing and self-aligning ball bearing



Key

1 = FP 1 - MP 2, G2

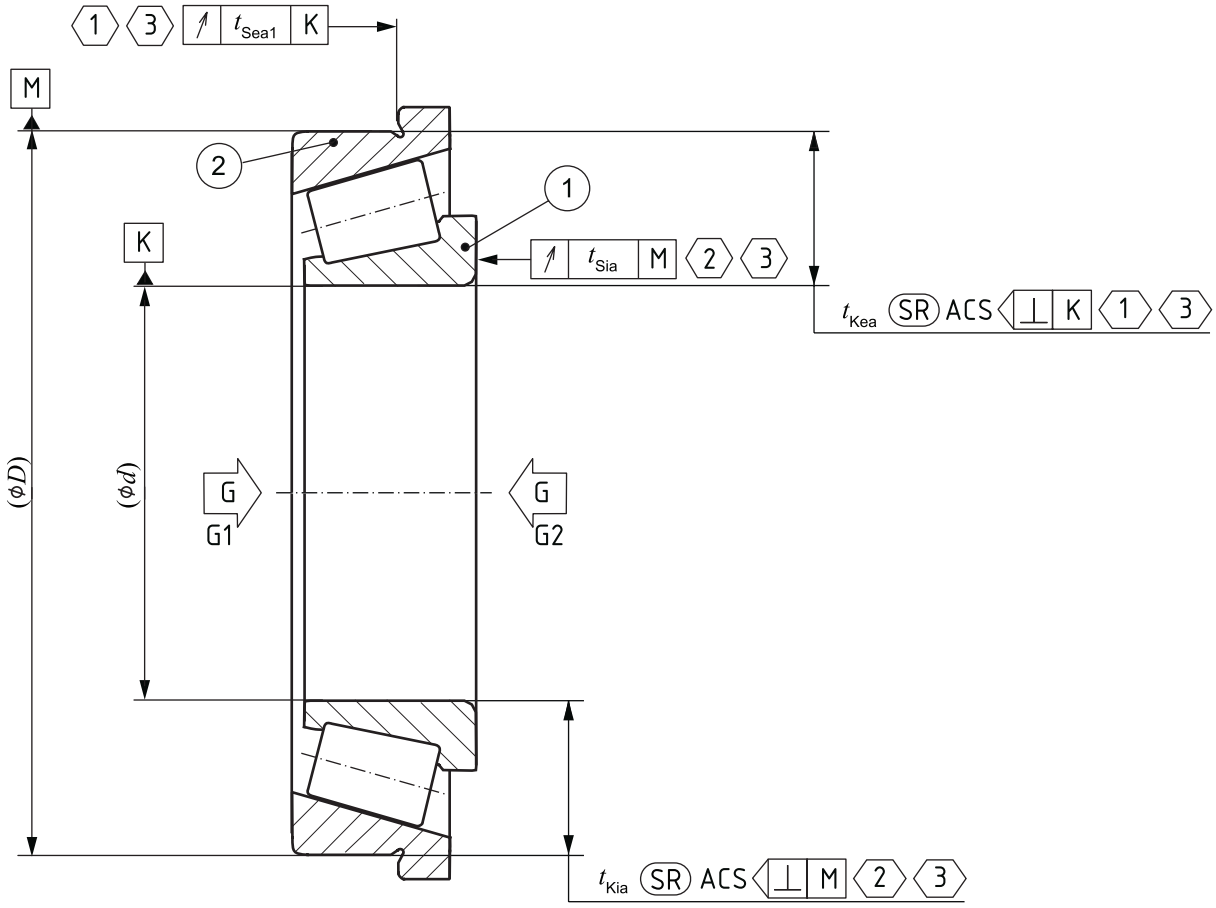
2 = FP 2 - MP 1, G2

3 = FP 1 - MP 2, G1

4 = FP 2 - MP 1, G1

5 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 15 — Geometrical tolerances for assembled bearing with flanged outer ring — Deep groove ball bearing, double-row deep groove ball bearing, double-row angular contact ball bearing and four-point-contact ball bearing



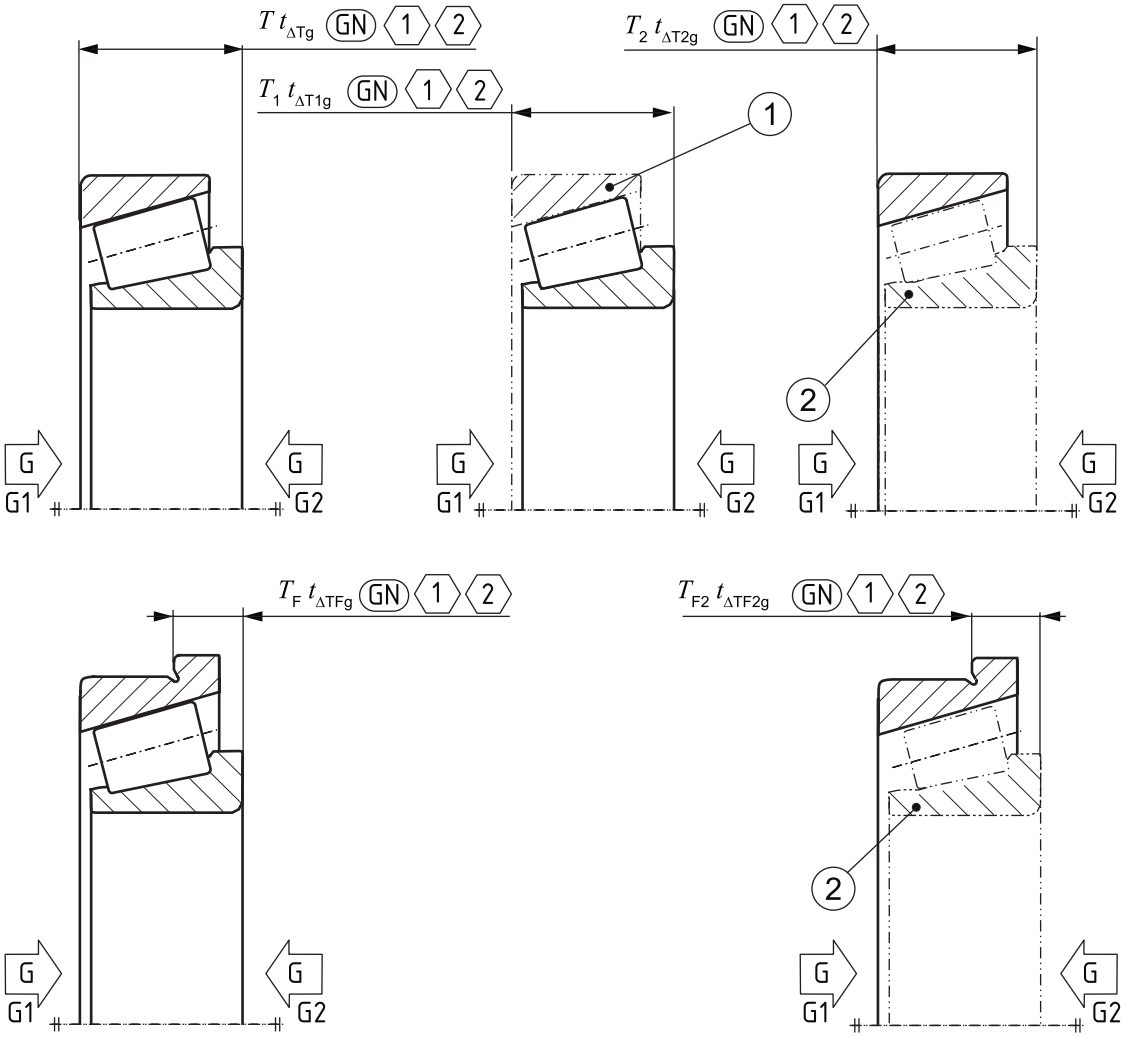
Key

1 = FP 1 - MP 2, G1

2 = FP 2 - MP 1, G2

3 = the rolling elements shall be in correct functional contact with both the inner and outer rings

Figure 16 — Geometrical tolerances for assembled bearing with flanged outer ring — Single-row angular contact ball bearing and tapered roller bearing



Key

1 = G1 or G2

2 = the rolling elements shall be in correct functional contact with both the inner and outer rings

1 master outer ring

2 master inner subunit

Figure 17 — Additional symbols for assembled tapered roller bearings

6 Deviation limits and tolerance values

6.1 General

The deviation limits and tolerance values for cylindrical bores are given in 6.2 and 6.3 and for flanges in 6.4. The deviation limits and tolerance values for tapered bore are given in 6.5.

The diameter series referred to in Tables 4 to 13 are those defined in ISO 15. In Tables 4 to 29, the symbols U and L are used as follows:

— U = upper deviation limit;

— L = lower deviation limit.

The symbol "—" in Tables 4 to 29 is used when no values have been established.

The stiffness series referred to in Tables 14, 15, 18, 19, 21 and 22 are categorized according to Table 3.

Stiffness equivalent factor f_S is calculated from Formula (3):

$$f_S = (D\text{-}d)/d^{0,9} \quad (3)$$

NOTE 1 Formula (3) is similar in concept to ISO 15:2017, A.3.

NOTE 2 Annex A provides background information on t_{VDsp} and t_{Vdsp} for radial tapered roller bearings.

Table 3 — Tapered roller bearings — Stiffness series

f_S		Stiffness series	Abbreviation for stiffness series
>	≤		
—	0,535	extra light	A
0,535	0,73	light	B
0,73	1,3	medium	C
1,3	—	standard	S

EXAMPLE 1

Tapered roller bearing 3EC 080 according to ISO 355[2] with the boundary dimensions:

d = 80 mm

D = 140 mm

$f_S = (140\text{-}80)/80^{0,9} = 1,16$

⇨ Values for V_{dsp} and V_{Dsp} according to stiffness series C “medium”

EXAMPLE 2

Tapered roller bearing 3EC 260 according to ISO 355[2] with the boundary dimensions:

d = 260 mm

D = 360 mm

$f_S = (360\text{-}260)/260^{0,9} = 0,67$

⇨ Values for V_{dsp} and V_{Dsp} according to stiffness series B “light”

NOTE 3 Refer to Annex B for stiffness series for radial tapered roller bearings with boundary dimensions according to ISO 355.

6.2 Radial bearings except tapered roller bearings

6.2.1 Tolerance class Normal

See Tables 4 and 5.

Table 4 — Radial bearings except tapered roller bearings — Inner ring — Tolerance class Normal

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$		t_{Vdsp} [b]			t_{Vdmp}	t_{Kia}	$t_{\Delta Bs}$ $t_{\Delta Bgp}$ [c d]			t_{VBs} t_{VBgp} [c]
				Diameter series					All	Normal	Modified[a]	
>	≤	U	L	9	0, 1	2, 3, 4			U	L		
—	0,6	0	−8	10	8	6	6	10	0	−40	—	12
0,6	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
2 000	2 500	0	−250	—	—	—	—	170	0	−2 200	—	160
2 500	3 150	0	−310	—	—	—	—	210	0	−2 350	—	180
3 150	4 000	0	−385	—	—	—	—	260	0	−2 500	—	200

[a] Applies to inner rings and outer rings of single bearings made for paired and stacked assemblies. Also applies to inner rings with tapered bore with $d \geq 50$ mm.

[b] No values have been established for diameter series 7 and 8.

[c] Applies only to asymmetrical rings.

[d] Applies only to upper deviation limit.

Table 5 — Radial bearings except tapered roller bearings — Outer ring — Tolerance class Normal

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta Dmp}$		t_{VDsp} [a] [c]				t_{VDmp} [a]	t_{Kea}	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [b] $t_{\Delta Cgp}$ [d] [e]		t_{VCs} t_{VC1s} [b] t_{VCgp} [d]
				Open bearings			Capped bearings					
				Diameter series								
>	≤	U	L	9	0, 1	2, 3, 4	2, 3, 4			U	L	
—	2,5	0	−8	10	8	6	10	6	15	For symmetrical rings, identical to $t_{\Delta Bs}$ and t_{VBs} of an inner ring of the same bearing as the outer ring. For asymmetrical rings, identical to $t_{\Delta Bgp}$ and t_{VBgp} of an inner ring of the same bearing as the outer ring.		
2,5	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			
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			
2 500	3 150	0	−300	—	—	—	—	—	300			
3 150	4 000	0	−350	—	—	—	—	—	350			
4 000	5 000	0	−400	—	—	—	—	—	400			

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] Applies before mounting and after removal of internal or external snap ring.

[b] Applies to groove ball bearings only.

[c] No values have been established for diameter series 7 and 8.

[d] Applies only to asymmetrical rings.

[e] Applies only to upper deviation limit.

6.2.2 Tolerance class 6

See Tables 6 and 7.

Table 6 — Radial bearings except tapered roller bearings — Inner ring — Tolerance class 6

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$		t_{Vdsp} [b]			t_{Vdmp}	t_{Kia}	$t_{\Delta Bs}$ / $t_{\Delta Bgp}$ [c d]			t_{VBs} / t_{VBgp} [c]
				Diameter series					All	Normal	Modified[a]	
>	≤	U	L	9	0, 1	2, 3, 4			U	L		
—	0,6	0	−7	9	7	5	5	5	0	−40	—	12
0,6	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
630	800	0	−50	—	—	—	—	50	0	−750	—	60
800	1 000	0	−60	—	—	—	—	60	0	−1 000	—	70
1 000	1 250	0	−75	—	—	—	—	75	0	−1 250	—	80
1 250	1 600	0	−95	—	—	—	—	95	0	−1 600	—	95
1 600	2 000	0	−120	—	—	—	—	115	0	−2 000	—	110
2 000	2 500	0	−145	—	—	—	—	145	0	−2 200	—	130
2 500	3 150	0	−180	—	—	—	—	180	0	−2 350	—	150

[a] Applies to inner rings and outer rings of single bearings made for paired and stacked assemblies. Also applies to inner rings with tapered bore with $d \geq 50$ mm.

[b] No values have been established for diameter series 7 and 8.

[c] Applies only to asymmetrical rings.

[d] Applies only to upper deviation limit.

Table 7 — Radial bearings except tapered roller bearings — Outer ring — Tolerance class 6

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta Dmp}$		t_{VDsp} [a] [c]				t_{VDmp} [a]	t_{Kea}	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [b] $t_{\Delta Cgp}$ [d] [e]		t_{VCs} t_{VC1s} [b] t_{VCgp} [d]
				Open bearings			Capped bearings					
				Diameter series								
>	≤	U	L	9	0, 1	2, 3, 4	0, 1, 2, 3, 4			U	L	
—	2,5	0	−7	9	7	5	9	5	8	For symmetrical rings, identical to $t_{\Delta Bs}$ and t_{VBs} of an inner ring of the same bearing as the outer ring. For asymmetrical rings, identical to $t_{\Delta Bgp}$ and t_{VBgp} of an inner ring of the same bearing as the outer ring.		
2,5	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			
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			
1 000	1 250	0	−75	—	—	—	—	—	90			
1 250	1 600	0	−95	—	—	—	—	—	110			
1 600	2 000	0	−120	—	—	—	—	—	135			
2 000	2 500	0	−145	—	—	—	—	—	165			
2 500	3 150	0	−180	—	—	—	—	—	205			
3 150	4 000	0	−225	—	—	—	—	—	260			

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] Applies before mounting and after removal of internal or external snap ring.

[b] Applies to groove ball bearings only.

[c] No values have been established for diameter series 7 and 8.

[d] Applies only to asymmetrical rings.

[e] Applies only to upper deviation limit.

6.2.3 Tolerance class 5

See Tables 8 and 9.

Table 8 — Radial bearings except tapered roller bearings — Inner ring — Tolerance class 5

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$		t_{Vdsp}[c]			t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia}[a]	$t_{\Delta Bs}$ $t_{\Delta Bgp}$[d e]			t_{VBs} t_{VBgp}[d]
				Diameter series							All	Normal	Modified[b]	
>	≤	U	L	9	0, 1	2, 3, 4					U	L		
—	0,6	0	−5	5	4	4	3	4	7	7	0	−40	−250	5
0,6	2,5	0	−5	5	4	4	3	4	7	7	0	−40	−250	5
2,5	10	0	−5	5	4	4	3	4	7	7	0	−40	−250	5
10	18	0	−5	5	4	4	3	4	7	7	0	−80	−250	5
18	30	0	−6	6	5	5	3	4	8	8	0	−120	−250	5
30	50	0	−8	8	6	6	4	5	8	8	0	−120	−250	5
50	80	0	−9	9	7	7	5	5	8	8	0	−150	−250	6
80	120	0	−10	10	8	8	5	6	9	9	0	−200	−380	7
120	180	0	−13	13	10	10	7	8	10	10	0	−250	−380	8
180	250	0	−15	15	12	12	8	10	11	13	0	−300	−500	10
250	315	0	−18	18	14	14	9	13	13	15	0	−350	−500	13
315	400	0	−23	23	18	18	12	15	15	20	0	−400	−630	15
400	500	0	−28	—	—	—	—	18	19	25	0	−450	—	18
500	630	0	−35	—	—	—	—	21	22	30	0	−500	—	21
630	800	0	−45	—	—	—	—	26	27	35	0	−750	—	26
800	1 000	0	−60	—	—	—	—	32	32	40	0	−1 000	—	32
1 000	1 250	0	−75	—	—	—	—	40	38	50	0	−1 250	—	40
1 250	1 600	0	−90	—	—	—	—	50	46	60	0	−1 600	—	50

[a] Applies to groove ball bearings only.

[b] Applies to inner rings and outer rings of single bearings made for paired and stacked assemblies. Also applies to inner rings with tapered bore with $d \geq 50$ mm.

[c] No values have been established for diameter series 7 and 8.

[d] Applies only to asymmetrical rings.

[e] Applies only to upper deviation limit.

Table 9 — Radial bearings except tapered roller bearings — Outer ring — Tolerance class 5

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta Dmp}$		t_{VDsp} [a b e] Diameter series			t_{VDmp} [b]	t_{Kea}	t_{SD} [c] t_{SD1} [d]	t_{Sea} [c d]	t_{Sea1} [d]	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [d] $t_{\Delta Cgp}$ [f g]		t_{VCs} t_{VC1s} [d] t_{VCgp} [f]
>	≤	U	L	9	0, 1	2, 3, 4						U	L	
—	2,5	0	−5	5	4	4	3	5	4	8	11	For symmetrical rings, identical to $t_{\Delta Bs}$ of an inner ring of the same bearing as the outer ring. For asymmetrical rings, identical to $t_{\Delta Bgp}$ and t_{VBgp} of an inner ring of the same bearing as the outer ring.		5
2,5	6	0	−5	5	4	4	3	5	4	8	11			5
6	18	0	−5	5	4	4	3	5	4	8	11			5
18	30	0	−6	6	5	5	3	6	4	8	11			5
30	50	0	−7	7	5	5	4	7	4	8	11			5
50	80	0	−9	9	7	7	5	8	4	10	14			6
80	120	0	−10	10	8	8	5	10	4,5	11	16			8
120	150	0	−11	11	8	8	6	11	5	13	18			8
150	180	0	−13	13	10	10	7	13	5	14	20			8
180	250	0	−15	15	11	11	8	15	5,5	15	21			10
250	315	0	−18	18	14	14	9	18	6,5	18	25			11
315	400	0	−20	20	15	15	10	20	6,5	20	28			13
400	500	0	−23	23	17	17	12	23	7,5	23	33			15
500	630	0	−28	28	21	21	14	25	9	25	35			18
630	800	0	−35	35	26	26	18	30	10	30	42			20
800	1 000	0	−50	—	—	—	—	37	12	37	51			25
1 000	1 250	0	−63	—	—	—	—	45	14	45	62			30
1 250	1 600	0	−80	—	—	—	—	55	17	55	75			36
1 600	2 000	0	−100	—	—	—	—	66	21	66	90			44

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] No values have been established for capped bearings.

[b] Applies before mounting and after removal of internal or external snap ring.

[c] Does not apply to bearings with flanged outer ring.

[d] Applies to groove ball bearings only.

[e] No values have been established for diameter series 7 and 8.

[f] Applies only to asymmetrical rings.

[g] Applies only to upper deviation limit.

6.2.4 Tolerance class 4

See Tables 10 and 11.

Table 10 — Radial bearings except tapered roller bearings — Inner ring — Tolerance class 4

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$[a] $t_{\Delta ds}$[b]		t_{Vdsp}[e]			t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia}[c]	$t_{\Delta Bs}$ $t_{\Delta Bgp}$[f g]			t_{VBs} t_{VBgp}[f]
				Diameter series							All	Normal	Modified[d]	
>	≤	U	L	9	0, 1	2, 3, 4					U	L		
—	0,6	0	−4	4	3	3	2	2,5	3	3	0	−40	−250	2,5
0,6	2,5	0	−4	4	3	3	2	2,5	3	3	0	−40	−250	2,5
2,5	10	0	−4	4	3	3	2	2,5	3	3	0	−40	−250	2,5
10	18	0	−4	4	3	3	2	2,5	3	3	0	−80	−250	2,5
18	30	0	−5	5	4	4	2,5	3	4	4	0	−120	−250	2,5
30	50	0	−6	6	5	5	3	4	4	4	0	−120	−250	3
50	80	0	−7	7	5	5	3,5	4	5	5	0	−150	−250	4
80	120	0	−8	8	6	6	4	5	5	5	0	−200	−380	4
120	180	0	−10	10	8	8	5	6	6	7	0	−250	−380	5
180	250	0	−12	12	9	9	6	8	7	8	0	−300	−500	6
250	315	0	−15	—	—	—	—	9	8	9	0	−350	—	8
315	400	0	−19	—	—	—	—	11	10	12	0	−400	—	10
400	500	0	−23	—	—	—	—	13	12	15	0	−450	—	12
500	630	0	−28	—	—	—	—	16	14	18	0	−500	—	14

[a] These deviation limits apply to diameter series 7, 8 and 9 only.

[b] These deviation limits apply to diameter series 0, 1, 2, 3 and 4 only.

[c] Applies to groove ball bearings only.

[d] Applies to inner rings and outer rings of single bearings made for paired or stacked assemblies.

[e] No values have been established for diameter series 7 and 8.

[f] Applies only to asymmetrical rings.

[g] Applies only to upper deviation limit.

Table 11 — Radial bearings except tapered roller bearings — Outer ring — Tolerance class 4

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta Dmp}$ [a] $t_{\Delta Ds}$ [b]		t_{VDsp} [c d g] Diameter series			t_{VDmp} [d]	t_{Kea}	t_{SD} [e] t_{SD1} [f]	t_{Sea} [e f]	t_{Sea1} [f]	$t_{\Delta Cs}$ $t_{\Delta C1s}$ [f] $t_{\Delta Cgp}$ [h i]		t_{VCs} t_{VC1s} [f] t_{VCgp} [h]
>	≤	U	L	9	0, 1	2, 3, 4						U	L	
—	2,5	0	−4	4	3	3	2	3	2	5	7	For symmetrical rings, identical to $t_{\Delta Bs}$ and t_{VBs} of an inner ring of the same bearing as the outer ring. For asymmetrical rings, identical to $t_{\Delta Bgp}$ and t_{VBgp} of an inner ring of the same bearing as the outer ring.		2,5
2,5	6	0	−4	4	3	3	2	3	2	5	7			2,5
6	18	0	−4	4	3	3	2	3	2	5	7			2,5
18	30	0	−5	5	4	4	2,5	4	2	5	7			2,5
30	50	0	−6	6	5	5	3	5	2	5	7			2,5
50	80	0	−7	7	5	5	3,5	5	2	5	7			3
80	120	0	−8	8	6	6	4	6	2,5	6	8			4
120	150	0	−9	9	7	7	5	7	2,5	7	10			5
150	180	0	−10	10	8	8	5	8	2,5	8	11			5
180	250	0	−11	11	8	8	6	10	3,5	10	14			7
250	315	0	−13	13	10	10	7	11	4	10	14			7
315	400	0	−15	15	11	11	8	13	5	13	18			8
400	500	0	−19	—	—	—	—	15	6	15	22			10
500	630	0	−24	—	—	—	—	18	7	18	27			12
630	800	0	−29	—	—	—	—	22	8,5	22	33			15

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] These deviation limits apply to diameter series 7, 8 and 9 only.

[b] These deviation limits apply to diameter series 0, 1, 2, 3 and 4 only.

[c] No values have been established for capped bearings.

[d] Applies before mounting and after removal of internal or external snap ring.

[e] Does not apply to bearings with flanged outer ring.

[f] Applies to groove ball bearings only.

[g] No values have been established for diameter series 7 and 8.

[h] Applies only to asymmetrical rings.

[i] Applies only to upper deviation limit.

6.2.5 Tolerance class 2

See Tables 12 and 13.

Table 12 — Radial bearings except tapered roller bearings — Inner ring — Tolerance class 2

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$[a] $t_{\Delta ds}$[b]		t_{Vdsp}	t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia}[c]	$t_{\Delta BS}$ $t_{\Delta Bgp}$[e f]			t_{VBs} t_{VBgp}[e]
									All	**Normal**	**Modified**[d]	
>	≤	U	L						U	L		
—	0,6	0	−2,5	2,5	1,5	1,5	1,5	1,5	0	−40	−250	1,5
0,6	2,5	0	−2,5	2,5	1,5	1,5	1,5	1,5	0	−40	−250	1,5
2,5	10	0	−2,5	2,5	1,5	1,5	1,5	1,5	0	−40	−250	1,5
10	18	0	−2,5	2,5	1,5	1,5	1,5	1,5	0	−80	−250	1,5
18	30	0	−2,5	2,5	1,5	2,5	1,5	2,5	0	−120	−250	1,5
30	50	0	−2,5	2,5	1,5	2,5	1,5	2,5	0	−120	−250	1,5
50	80	0	−4	4	2	2,5	1,5	2,5	0	−150	−250	1,5
80	120	0	−5	5	2,5	2,5	2,5	2,5	0	−200	−380	2,5
120	150	0	−7	7	3,5	2,5	2,5	2,5	0	−250	−380	2,5
150	180	0	−7	7	3,5	5	4	5	0	−250	−380	4
180	250	0	−8	8	4	5	5	5	0	−300	−500	5
250	315	0	−10	—	—	6	5,5	6	0	−350	—	6
315	400	0	−12	—	—	7	7	9	0	−400	—	7
400	500	0	−15	—	—	8,5	8,5	11	0	−450	—	8,5

[a] These deviation limits apply to diameter series 7, 8 and 9 only.

[b] These deviation limits apply to diameter series 0, 1, 2, 3 and 4 only.

[c] Applies to groove ball bearings only.

[d] Applies to inner rings and outer rings of single bearings made for paired or stacked assemblies.

[e] Applies only to asymmetrical rings.

[f] Applies only to upper deviation limit.

Table 13 — Radial bearings except tapered roller bearings — Outer ring — Tolerance class 2

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta Dmp}$[a] $t_{\Delta Ds}$[b]		t_{VDsp}[c d]	t_{VDmp}[d]	t_{Kea}	t_{SD}[e] t_{SD1}[f]	t_{Sea}[e f]	t_{Sea1}[f]	$t_{\Delta Cs}$ $t_{\Delta C1s}$[f] $t_{\Delta Cgp}$[g h]		t_{VCs} t_{VC1s}[f] t_{VCgp}[g]
>	≤	U	L							U	L	
—	2,5	0	−2,5	2,5	1,5	1,5	0,75	1,5	3	For symmetrical rings, identical to $t_{\Delta Bs}$ and t_{VBs} of an inner ring of the same bearing as the outer ring. For asymmetrical rings, identical to $t_{\Delta Bgp}$ and t_{VBgp} of an inner ring of the same bearing as the outer ring.		1,5
2,5	6	0	−2,5	2,5	1,5	1,5	0,75	1,5	3			1,5
6	18	0	−2,5	2,5	1,5	1,5	0,75	1,5	3			1,5
18	30	0	−4	4	2	2,5	0,75	2,5	4			1,5
30	50	0	−4	4	2	2,5	0,75	2,5	4			1,5
50	80	0	−4	4	2	4	0,75	4	6			1,5
80	120	0	−5	5	2,5	5	1,25	5	7			2,5
120	150	0	−5	5	2,5	5	1,25	5	7			2,5
150	180	0	−7	7	3,5	5	1,25	5	7			2,5
180	250	0	−8	8	4	7	2	7	10			4
250	315	0	−8	8	4	7	2,5	7	10			5
315	400	0	−10	10	5	8	3,5	8	11			7
400	500	0	−12	—	—	10	4,5	10	14			8
500	630	0	−15	—	—	12	5,5	12	17			10

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] These deviation limits apply to diameter series 7, 8 and 9 only.

[b] These deviation limits apply to diameter series 0, 1, 2, 3 and 4 only.

[c] No values have been established for capped bearings.

[d] Applies before mounting and after removal of internal or external snap ring.

[e] Does not apply to bearings with flanged outer ring.

[f] Applies to groove ball bearings only.

[g] Applies only to asymmetrical rings.

[h] Applies only to upper deviation limit.

6.3 Radial tapered roller bearings

6.3.1 Tolerance class Normal

See Tables 14 to 16.

Table 14 — Radial tapered roller bearings — Inner ring — Tolerance class Normal

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$		t_{Vdsp} [a] [b] Stiffness series			t_{Vdmp}	t_{Kia}
>	≤	U	L	B	C	S		
—	10	0	−12	12	12	12	9	15
10	18	0	−12	12	12	12	9	15
18	30	0	−12	12	12	12	9	18
30	50	0	−12	15	15	12	9	20
50	80	0	−15	22	18	15	11	25
80	120	0	−20	30	25	20	15	30
120	180	0	−25	38	30	25	19	35
180	250	0	−30	45	38	30	23	50
250	315	0	−35	52	44	35	26	60
315	400	0	−40	60	50	40	30	70
400	500	0	−45	68	56	45	34	80
500	630	0	−60	90	75	60	40	90
630	800	0	−75	—	—	—	—	100
800	1 000	0	−100	—	—	—	—	115
1 000	1 250	0	−125	—	—	—	—	130
1 250	1 600	0	−160	—	—	—	—	150
1 600	2 000	0	−200	—	—	—	—	170
2 000	2 500	0	−250	—	—	—	—	200
2 500	3 150	0	−310	—	—	—	—	240
3 150	4 000	0	−385	—	—	—	—	300

[a] No values have been established for stiffness series A.

[b] Tolerances for stiffness series B and C are newly introduced in this edition of this document and can be subject to agreement between customer and manufacturer.

Table 15 — Radial tapered roller bearings — Outer ring — Tolerance class Normal

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta DmP}$		t_{VDsp} [a] [b] Stiffness series			t_{VDmp}	t_{Kea}
>	≤	U	L	B	C	S		
—	18	0	−12	12	12	12	9	18
18	30	0	−12	12	12	12	9	18
30	50	0	−14	15	14	14	11	20
50	80	0	−16	20	20	16	12	25
80	120	0	−18	27	22	18	14	35

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] No values have been established for stiffness series A.

[b] Tolerances for stiffness series B and C are newly introduced in this edition of this document and can be subject to agreement between customer and manufacturer.

Table 15 *(continued)*

D mm		$t_{\Delta Dmp}$		t_{VDsp} [a] [b] Stiffness series			t_{VDmp}	t_{Kea}
>	≤	U	L	B	C	S		
120	150	0	−20	30	25	20	15	40
150	180	0	−25	38	30	25	19	45
180	250	0	−30	45	38	30	23	50
250	315	0	−35	52	44	35	26	60
315	400	0	−40	60	50	40	30	70
400	500	0	−45	68	56	45	34	80
500	630	0	−50	90	75	60	38	100
630	800	0	−75	120	100	80	55	120
800	1 000	0	−100	150	125	100	75	140
1 000	1 250	0	−125	—	—	—	—	160
1 250	1 600	0	−160	—	—	—	—	180
1 600	2 000	0	−200	—	—	—	—	200
2 000	2 500	0	−250	—	—	—	—	220
2 500	3 150	0	−300	—	—	—	—	270
3 150	4 000	0	−350	—	—	—	—	330
4 000	5 000	0	−400	—	—	—	—	400

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] No values have been established for stiffness series A.

[b] Tolerances for stiffness series B and C are newly introduced in this edition of this document and can be subject to agreement between customer and manufacturer.

Table 16 — Radial tapered roller bearings — Width of inner rings, outer rings, single-row bearings and single-row subunits — Tolerance class Normal

Deviation limits in micrometres

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$ [a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$ [a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
—	10	0	−120	0	−120	+200	0	+100	0	+100	0
10	18	0	−120	0	−120	+200	0	+100	0	+100	0
18	30	0	−120	0	−120	+200	0	+100	0	+100	0
30	50	0	−120	0	−120	+200	0	+100	0	+100	0
50	80	0	−150	0	−150	+200	0	+100	0	+100	0
80	120	0	−200	0	−200	+200	−200	+100	−100	+100	−100
120	180	0	−250	0	−250	+350	−250	+150	−150	+200	−100
180	250	0	−300	0	−300	+350	−250	+150	−150	+200	−100
250	315	0	−350	0	−350	+350	−250	+150	−150	+200	−100

[a] Applies only to upper deviation limit of asymmetrical rings.

Table 16 *(continued)*

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$[a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$[a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
315	400	0	−400	0	−400	+400	−400	+200	−200	+200	−200
400	500	0	−450	0	−450	+450	−450	+225	−225	+225	−225
500	630	0	−500	0	−500	+500	−500	—	—	—	—
630	800	0	−750	0	−750	+600	−600	—	—	—	—
800	1 000	0	−1 000	0	−1 000	+750	−750	—	—	—	—
1 000	1 250	0	−1 250	0	−1 250	+900	−900	—	—	—	—
1 250	1 600	0	−1 600	0	−1 600	+1 050	−1 050	—	—	—	—
1 600	2 000	0	−2 000	0	−2 000	+1 200	−1 200	—	—	—	—
2 000	2 500	0	−2 500	0	−2 500	+1 600	−1 600	—	—	—	—
2 500	3 150	0	−3 150	0	−3 150	+2 000	−2 000	—	—	—	—
3 150	4 000	0	−4 000	0	−4 000	+2 500	−2 500	—	—	—	—

[a] Applies only to upper deviation limit of asymmetrical rings.

6.3.2 Tolerance class 6X

See Table 17.

The diameter tolerances, t_{Kia} and t_{Kea} for inner and outer rings of this tolerance class are the same as those given in Tables 14 and 15 for the tolerance class Normal.

Table 17 — Radial tapered roller bearings — Width of inner rings, outer rings, single-row bearings and single-row subunits — Tolerance class 6X

Deviation limits in micrometres

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$[a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$[a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
—	10	0	−50	0	−100	+100	0	+50	0	+50	0
10	18	0	−50	0	−100	+100	0	+50	0	+50	0
18	30	0	−50	0	−100	+100	0	+50	0	+50	0
30	50	0	−50	0	−100	+100	0	+50	0	+50	0
50	80	0	−50	0	−100	+100	0	+50	0	+50	0
80	120	0	−50	0	−100	+100	0	+50	0	+50	0
120	180	0	−50	0	−100	+150	0	+50	0	+100	0
180	250	0	−50	0	−100	+150	0	+50	0	+100	0
250	315	0	−50	0	−100	+200	0	+100	0	+100	0
315	400	0	−50	0	−100	+200	0	+100	0	+100	0
400	500	0	−50	0	−100	+200	0	+100	0	+100	0
500	630	0	−100	0	−150	+250	0	—	—	—	—

[a] Applies only to upper deviation limit of asymmetrical rings.

Table 17 *(continued)*

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$[a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$[a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
630	800	0	−120	0	−170	+300	0	—	—	—	—
800	1 000	0	−140	0	−185	+400	0	—	—	—	—
1 000	1 250	0	−165	0	−210	+500	0	—	—	—	—
1 250	1 600	0	−200	0	−250	+600	0	—	—	—	—
1 600	2 000	0	−240	0	−290	+750	0	—	—	—	—
2 000	2 500	0	−300	0	−350	+900	0	—	—	—	—

[a] Applies only to upper deviation limit of asymmetrical rings.

6.3.3 Tolerance class 5

See Tables 18 to 20.

Table 18 — Radial tapered roller bearings — Inner ring — Tolerance class 5

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$		t_{Vdsp}[a b] Stiffness series			t_{Vdmp}	t_{Kia}	t_{Sd}
>	≤	U	L	B	C	S			
—	10	0	−7	5	5	5	5	5	7
10	18	0	−7	5	5	5	5	5	7
18	30	0	−8	6	6	6	5	5	8
30	50	0	−10	10	10	8	5	6	8
50	80	0	−12	14	11	9	6	7	8
80	120	0	−15	17	14	11	8	8	9
120	180	0	−18	21	18	14	9	11	10
180	250	0	−22	26	21	17	11	13	11
250	315	0	−25	29	24	19	13	13	13
315	400	0	−30	35	29	23	15	15	15
400	500	0	−35	—	—	—	—	20	17
500	630	0	−40	—	—	—	—	25	20
630	800	0	−50	—	—	—	—	30	25
800	1 000	0	−60	—	—	—	—	37	30
1 000	1 250	0	−75	—	—	—	—	45	40
1 250	1 600	0	−90	—	—	—	—	55	50

[a] No values have been established for stiffness series A.

[b] Tolerances for stiffness series B and C are newly introduced in this edition of this document and can be subject to agreement between customer and manufacturer.

Table 19 — Radial tapered roller bearings — Outer ring — Tolerance class 5

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta Dmp}$		t_{VDsp} [a] [b] Stiffness series			t_{VDmp}	t_{Kea}	t_{SD} [c] t_{SD1}
>	≤	U	L	B	C	S			
—	18	0	−8	6	6	6	5	6	4
18	30	0	−8	6	6	6	5	6	4
30	50	0	−9	11	9	7	5	7	4
50	80	0	−11	13	10	8	6	8	4
80	120	0	−13	15	13	10	7	10	4,5
120	150	0	−15	17	14	11	8	11	5
150	180	0	−18	21	18	14	9	13	5
180	250	0	−20	23	19	15	10	15	5,5
250	315	0	−25	29	24	19	13	18	6,5
315	400	0	−28	33	28	22	14	20	6,5
400	500	0	−33	39	33	26	17	24	8,5
500	630	0	−38	45	38	30	20	30	10
630	800	0	−45	57	48	38	25	36	12,5
800	1 000	0	−60	—	—	—	—	43	15
1 000	1 250	0	−80	—	—	—	—	52	19
1 250	1 600	0	−100	—	—	—	—	62	25
1 600	2 000	0	−125	—	—	—	—	73	32,5

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] No values have been established for stiffness series A.

[b] Tolerances for stiffness series B and C are newly introduced in this edition of this document and can be subject to agreement between customer and manufacturer.

[c] Does not apply to bearings with flanged outer ring.

Table 20 — Radial tapered roller bearings — Width of inner rings, outer rings, single-row bearings and single-row subunits — Tolerance class 5

Deviation limits in micrometres

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$ [a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$ [a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
—	10	0	−200	0	−200	+200	−200	+100	−100	+100	−100
10	18	0	−200	0	−200	+200	−200	+100	−100	+100	−100
18	30	0	−200	0	−200	+200	−200	+100	−100	+100	−100
30	50	0	−240	0	−240	+200	−200	+100	−100	+100	−100
50	80	0	−300	0	−300	+200	−200	+100	−100	+100	−100
80	120	0	−400	0	−400	+200	−200	+100	−100	+100	−100
120	180	0	−500	0	−500	+350	−250	+150	−150	+200	−100

[a] Applies only to the upper deviation limit of asymmetrical rings.

Table 20 *(continued)*

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$[a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$[a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
180	250	0	−600	0	−600	+350	−250	+150	−150	+200	−100
250	315	0	−700	0	−700	+350	−250	+150	−150	+200	−100
315	400	0	−800	0	−800	+400	−400	+200	−200	+200	−200
400	500	0	−900	0	−900	+450	−450	+225	−225	+225	−225
500	630	0	−1 100	0	−1 100	+500	−500	—	—	—	—
630	800	0	−1 600	0	−1 600	+600	−600	—	—	—	—
800	1 000	0	−2 000	0	−2 000	+750	−750	—	—	—	—
1 000	1 250	0	−2 000	0	−2 000	+750	−750	—	—	—	—
1 250	1 600	0	−2 000	0	−2 000	+900	−900	—	—	—	—

[a] Applies only to the upper deviation limit of asymmetrical rings.

6.3.4 Tolerance class 4

See Tables 21 to 23.

Table 21 — Radial tapered roller bearings — Inner ring — Tolerance class 4

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$[a] $t_{\Delta ds}$[b]		t_{Vdsp}[cd] Stiffness series			t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia}
>	≤	U	L	B	C	S				
—	10	0	−5	4	4	4	4	3	3	3
10	18	0	−5	4	4	4	4	3	3	3
18	30	0	−6	5	5	5	4	3	4	4
30	50	0	−8	8	6	6	5	4	4	4
50	80	0	−9	9	7	7	5	4	5	4
80	120	0	−10	10	8	8	5	5	5	5
120	180	0	−13	13	10	10	7	6	6	7
180	250	0	−15	14	11	11	8	8	7	8
250	315	0	−18	—	—	—	—	9	8	9
315	400	0	−21	—	—	—	—	11	10	12
400	500	0	−25	—	—	—	—	13	12	15
500	630	0	−29	—	—	—	—	16	14	18

[a] These deviation limits apply to stiffness series A and B.

[b] These deviation limits apply to stiffness series C and S.

[c] No values have been established for stiffness series A.

[d] Tolerances for stiffness series B and C are newly introduced in this edition of this document and can be subject to agreement between customer and manufacturer.

Table 22 — Radial tapered roller bearings — Outer ring — Tolerance class 4

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta Dmp}$ [a] $t_{\Delta Ds}$ [b]		t_{VDsp} [c d] Stiffness series			t_{VDmp}	t_{Kea}	t_{SD} [e] t_{SD1}	t_{Sea} [e]	t_{Sea1}
>	≤	U	L	B	C	S					
—	18	0	−6	5	5	5	4	4	2	5	7
18	30	0	−6	5	5	5	4	4	2	5	7
30	50	0	−7	5	5	5	5	5	2	5	7
50	80	0	−9	9	7	7	5	5	2	5	7
80	120	0	−10	10	8	8	5	6	2,5	6	8
120	150	0	−11	10	8	8	6	7	2,5	7	10
150	180	0	−13	13	10	10	7	8	2,5	8	11
180	250	0	−15	14	11	11	8	10	3,5	10	14
250	315	0	−18	18	14	14	9	11	4	10	14
315	400	0	−20	19	15	15	10	13	5	13	18
400	500	0	−25	—	—	—	—	15	6	15	22
500	630	0	−29	—	—	—	—	18	7	18	27
630	800	0	−35	—	—	—	—	22	8,5	22	33

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] These deviation limits apply to stiffness series A and B.

[b] These deviation limits apply to stiffness series C and S.

[c] No values have been established for stiffness series A.

[d] Tolerances for stiffness series B and C are newly introduced in this edition of this document and can be subject to agreement between customer and manufacturer.

[e] Does not apply to bearings with flanged outer ring.

Table 23 — Radial tapered roller bearings — Width of inner rings, outer rings, single-row bearings and single-row subunits — Tolerance class 4

Deviation limits in micrometres

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$ [a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$ [a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
—	10	0	−200	0	−200	+200	−200	+100	−100	+100	−100
10	18	0	−200	0	−200	+200	−200	+100	−100	+100	−100
18	30	0	−200	0	−200	+200	−200	+100	−100	+100	−100
30	50	0	−240	0	−240	+200	−200	+100	−100	+100	−100
50	80	0	−300	0	−300	+200	−200	+100	−100	+100	−100
80	120	0	−400	0	−400	+200	−200	+100	−100	+100	−100
120	180	0	−500	0	−500	+350	−250	+150	−150	+200	−100
180	250	0	−600	0	−600	+350	−250	+150	−150	+200	−100
250	315	0	−700	0	−700	+350	−250	+150	−150	+200	−100
315	400	0	−800	0	−800	+400	−400	+200	−200	+200	−200

[a] Applies only to upper deviation limit of asymmetrical rings.

Table 23 *(continued)*

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$[a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$[a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
400	500	0	−900	0	−900	+450	−450	+225	−225	+225	−225
500	630	0	−1 100	0	−1 100	+500	−500	—	—	—	—

[a] Applies only to upper deviation limit of asymmetrical rings.

6.3.5 Tolerance class 2

See Tables 24 to 26.

Table 24 — Radial tapered roller bearings — Inner ring — Tolerance class 2

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$[a] $t_{\Delta ds}$[b]		t_{Vdsp}	t_{Vdmp}	t_{Kia}	t_{Sd}	t_{Sia}
>	≤	U	L					
—	10	0	−4	2,5	1,5	2	1,5	2
10	18	0	−4	2,5	1,5	2	1,5	2
18	30	0	−4	2,5	1,5	2,5	1,5	2,5
30	50	0	−5	3	2	2,5	2	2,5
50	80	0	−5	4	2	3	2	3
80	120	0	−6	5	2,5	3	2,5	3
120	180	0	−7	7	3,5	4	3,5	4
180	250	0	−8	7	4	5	5	5
250	315	0	−8	—	—	6	5,5	6
315	400	0	−12	—	—	7	7	9
400	500	0	−15	—	—	8,5	8,5	11

[a] These deviation limits apply to stiffness series A and B.

[b] These deviation limits apply to stiffness series C and S.

Table 25 — Radial tapered roller bearings — Outer ring — Tolerance class 2

Deviation limits and tolerance values in micrometres

D mm		$t_{\Delta Dmp}$[a] $t_{\Delta Ds}$[b]		t_{VDsp}	t_{VDmp}	t_{Kea}	t_{SD}[c] t_{SD1}	t_{Sea}[c]	t_{Sea1}
>	≤	U	L						
—	18	0	−5	4	2,5	2,5	0,75	2,5	4
18	30	0	−5	4	2,5	2,5	0,75	2,5	4
30	50	0	−5	4	2,5	2,5	1	2,5	4
50	80	0	−6	4	2,5	4	1,25	4	6

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] These deviations limits apply to stiffness series A and B.

[b] These deviations limits apply to stiffness series C and S.

[c] Does not apply to bearings with flanged outer ring.

Table 25 *(continued)*

D mm		$t_{\Delta Dmp}$[a] $t_{\Delta Ds}$[b]		t_{VDsp}	t_{VDmp}	t_{Kea}	t_{SD}[c] t_{SD1}	t_{Sea}[c]	t_{Sea1}
>	≤	U	L						
80	120	0	−6	5	3	5	1,5	5	7
120	150	0	−7	5	3,5	5	1,75	5	7
150	180	0	−7	7	4	5	2	5	7
180	250	0	−8	8	5	7	2,5	7	10
250	315	0	−9	8	5	7	3	7	10
315	400	0	−10	10	6	8	3,5	8	11
400	500	0	−12	—	—	10	4,5	10	14
500	630	0	−15	—	—	12	5,5	12	17

NOTE The deviation limits for the outside diameter, D_1, of an outer ring flange are given in Table 27.

[a] These deviations limits apply to stiffness series A and B.

[b] These deviations limits apply to stiffness series C and S.

[c] Does not apply to bearings with flanged outer ring.

Table 26 — Radial tapered roller bearings — Width of inner rings, outer rings, single-row bearings and single-row subunits — Tolerance class 2

Deviation limits in micrometres

d mm		$t_{\Delta Bs}$ $t_{\Delta Bgp}$[a]		$t_{\Delta Cs}$ $t_{\Delta Cgp}$[a]		$t_{\Delta Tg}$ $t_{\Delta TFg}$		$t_{\Delta T1g}$		$t_{\Delta T2g}$ $t_{\Delta TF2g}$	
>	≤	U	L	U	L	U	L	U	L	U	L
—	10	0	−200	0	−200	+200	−200	+100	−100	+100	−100
10	18	0	−200	0	−200	+200	−200	+100	−100	+100	−100
18	30	0	−200	0	−200	+200	−200	+100	−100	+100	−100
30	50	0	−240	0	−240	+200	−200	+100	−100	+100	−100
50	80	0	−300	0	−300	+200	−200	+100	−100	+100	−100
80	120	0	−400	0	−400	+200	−200	+100	−100	+100	−100
120	180	0	−500	0	−500	+200	−250	+100	−100	+100	−150
180	250	0	−600	0	−600	+200	−300	+100	−150	+100	−150
250	315	0	−700	0	−700	+200	−300	+100	−150	+100	−150
315	400	0	−800	0	−800	+300	−300	+150	−150	+150	−150
400	500	0	−900	0	−900	+350	−350	+175	−175	+175	−175

[a] Applies only to upper deviation limit of asymmetrical rings.

6.4 Radial bearings, outer ring flanges

See Table 27.

Table 27 — Flange outside diameter deviation limits

Deviation limits in micrometres

D_1 mm		$t_{\Delta D1s}$			
		Locating flange		**Non-locating flange**	
>	≤	U	L	U	L
—	6	0	−36	+220	−36
6	10	0	−36	+220	−36
10	18	0	−43	+270	−43
18	30	0	−52	+330	−52
30	50	0	−62	+390	−62
50	80	0	−74	+460	−74
80	120	0	−87	+540	−87
120	180	0	−100	+630	−100
180	250	0	−115	+720	−115
250	315	0	−130	+810	−130
315	400	0	−140	+890	−140
400	500	0	−155	+970	−155
500	630	0	−175	+1 100	−175
630	800	0	−200	+1 250	−200
800	1 000	0	−230	+1 400	−230
1 000	1 250	0	−260	+1 650	−260
1 250	1 600	0	−310	+1 950	−310
1 600	2 000	0	−370	+2 300	−370
2 000	2 500	0	−440	+2 800	−440

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

Tolerances for tapered bores for tolerance class Normal are given in Tables 28 and 29.

The tolerances for a tapered bore comprise

— $t_{\Delta dmp}$;

— a taper tolerance, given by deviation limits for tapered slope, $t_{\Delta SL}$;

— t_{Vdsp}.

NOTE See Figure 7.

Table 28 — Tapered bore, taper 1:12

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$		$t_{\Delta SL}$		t_{Vdsp} [a] [b]
>	≤	U	L	U	L	
—	10	+22	0	+15	0	9
10	18	+27	0	+18	0	11
18	30	+33	0	+21	0	13
30	50	+39	0	+25	0	16
50	80	+46	0	+30	0	19
80	120	+54	0	+35	0	22
120	180	+63	0	+40	0	40
180	250	+72	0	+46	0	46
250	315	+81	0	+52	0	52
315	400	+89	0	+57	0	57
400	500	+97	0	+63	0	63
500	630	+110	0	+70	0	70
630	800	+125	0	+80	0	—
800	1 000	+140	0	+90	0	—
1 000	1 250	+165	0	+105	0	—
1 250	1 600	+195	0	+125	0	—

[a] Applies in any cross-section of the bore.

[b] Does not apply to diameter series 7 and 8 or stiffness series A.

Table 29 — Tapered bore, taper 1:30

Deviation limits and tolerance values in micrometres

d mm		$t_{\Delta dmp}$		$t_{\Delta SL}$		t_{Vdsp} [a] [b]
>	≤	U	L	U	L	
—	50	+15	0	+30	0	19
50	80	+15	0	+30	0	19
80	120	+20	0	+35	0	22
120	180	+25	0	+40	0	40
180	250	+30	0	+46	0	46
250	315	+35	0	+52	0	52
315	400	+40	0	+57	0	57
400	500	+45	0	+63	0	63
500	630	+50	0	+70	0	70

[a] Applies in any cross-section of the bore.

[b] Does not apply to diameter series 7 and 8 or stiffness series A.

Annex A
(informative)

Background information on t_{VDsp} and t_{Vdsp} for radial tapered roller bearings

Previously published standards have no differentiation between the diameter series, for the tolerances t_{VDsp} and t_{Vdsp} for tapered roller bearings, in contrast to other bearing types where the t_{VDsp} and t_{Vdsp} tolerance values differed according to radial cross-section profiles.

For tapered roller bearings, the same values of t_{VDsp} and t_{Vdsp} were previously applied over the whole range of cross-sections referenced only to the bore or outside diameter.

Figure A.1 shows that there is a large range of radial cross-sections between different bearing series with the same outside diameter. In addition, due to the tapered design, the wall thickness of the inner and outer rings varies in the axial direction.

These differences in cross-section, volume and shape can lead to different deformations during the manufacturing process and in the finished bearing ring. For “thin-section" (low stiffness) bearings the t_{VDsp} and t_{Vdsp} tolerances have only a reduced influence on customer applications, because in the mounted condition the rings partly take the shape of the surrounding parts depending on the relative stiffnesses between them.

It is also necessary to consider the deformation of the bearing due to its own weight especially for large size bearings.

For these reasons, the current edition of this document shows t_{VDsp} and t_{Vdsp} tolerance values for tapered roller bearings which vary according to a stiffness series based on the rules in ISO 15. This more closely aligns with the structure already used for other bearing types.

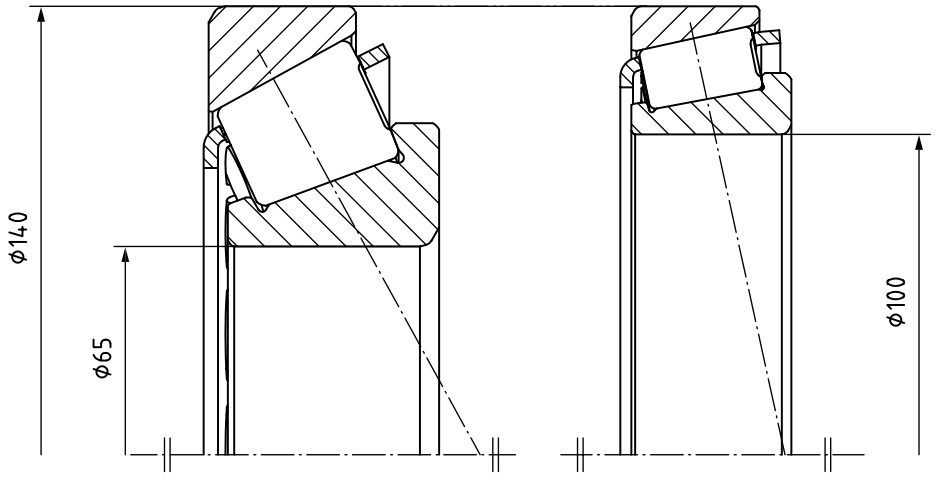


Figure A.1 — Example cross-section of radial tapered roller bearings with the same outside diameter

Annex B
(informative)

Stiffness series for radial tapered roller bearings with boundary dimensions according to ISO 355

See Tables B.1 to B.5.

Table B.1 — Contact angle series 2 — Stiffness series

Dimensions in millimetres

d	*D*	ISO 355 Dimension series	Stiffness series
15	42	2FB	S
17	40	2DB	S
17	40	2DD	S
17	47	2FB	S
17	47	2FD	S
20	37	2BD	C
20	45	2DC	S
20	47	2DB	S
20	47	2DD	S
20	50	2ED	S
20	52	2FB	S
20	52	2FD	S
22	40	2BC	C
22	47	2CC	S
22	52	2ED	S
25	42	2BD	C
25	47	2CE	C
25	50	2CC	S
25	52	2CD	S
25	52	2DE	S
25	58	2EE	S
25	62	2FB	S
25	62	2FD	S
28	45	2BD	C
28	55	2CD	S
28	58	2DE	S
28	65	2ED	S
30	47	2BD	C
30	55	2CE	C
30	58	2CD	S

d	*D*	ISO 355 Dimension series	Stiffness series
30	62	2DE	S
30	68	2EE	S
30	72	2FB	S
30	72	2FD	S
32	52	2BD	C
32	62	2CD	S
32	65	2DE	S
32	72	2ED	S
35	55	2BD	C
35	62	2CE	C
35	68	2DD	S
35	72	2DE	S
35	78	2EE	S
35	80	2FB	S
35	80	2FE	S
40	62	2BC	C
40	68	2BE	C
40	75	2CD	C
40	75	2CE	C
40	80	2DE	S
40	85	2EE	S
40	90	2FB	S
40	90	2FD	S
45	68	2BC	C
45	75	2CE	C
45	80	2CD	C
45	95	2ED	S
45	100	2FB	S
45	100	2FD	S
50	72	2BC	B
50	80	2CE	C

d	*D*	ISO 355 Dimension series	Stiffness series
50	82	2CC	C
50	85	2CD	C
50	90	2DD	C
50	100	2ED	S
50	110	2FB	S
50	110	2FD	S
55	80	2BC	B
55	85	2CC	C
55	90	2CE	C
55	95	2CD	C
55	95	2DD	C
55	110	2ED	S
55	120	2FB	S
55	120	2FD	S
60	85	2BC	B
60	90	2CC	C
60	95	2CE	C
60	100	2CD	C
60	115	2EE	S
60	130	2FB	S
60	130	2FD	S
65	90	2BC	B
65	100	2CC	C
65	100	2CE	C
65	110	2DD	C
65	120	2ED	C
65	125	2FD	S
65	140	2GB	S
65	140	2GD	S
70	100	2BC	B
70	105	2CC	C
70	110	2CE	C

d	*D*	ISO 355 Dimension series	Stiffness series
70	120	2DD	C
70	130	2ED	S
70	150	2GB	S
70	150	2GD	S
75	105	2BC	B
75	115	2CC	C
75	115	2CE	C
75	125	2DD	C
75	135	2ED	C
75	145	2FE	S
75	160	2GB	S
75	160	2GD	S
80	110	2BC	B
80	120	2CC	C
80	125	2CE	C
80	130	2DD	C
80	145	2ED	C
80	170	2GB	S
80	170	2GD	S
85	120	2BC	B
85	125	2CC	C
85	130	2CE	C
85	135	2DD	C
85	150	2ED	C
85	180	2GB	S
85	180	2GD	S
90	125	2BC	B
90	135	2CC	C
90	140	2CD	C
90	140	2CE	C
90	155	2EC	C
90	155	2ED	C
90	165	2FC	S
90	190	2GB	S
90	190	2GC	S
90	190	2GD	S
95	130	2BC	B
95	140	2CC	C
95	145	2CD	C
95	145	2CE	C
95	160	2ED	C

d	*D*	ISO 355 Dimension series	Stiffness series
95	200	2GB	S
95	200	2GD	S
100	140	2CC	B
100	145	2DC	B
100	150	2CD	C
100	150	2CE	C
100	165	2EE	C
100	215	2GB	S
100	215	2GC	S
100	215	2GD	S
105	145	2CC	B
105	155	2CD	C
105	160	2DD	C
105	160	2DE	C
105	170	2EE	C
105	225	2GB	S
105	225	2GD	S
110	150	2CC	B
110	160	2CD	B
110	165	2DD	C
110	170	2DE	C
110	175	2EE	C
110	240	2GB	S
110	240	2GD	S
120	165	2CC	B
120	175	2DC	C
120	180	2DD	C
120	180	2DE	C
120	190	2EE	C
120	260	2GB	S
120	260	2GD	S
130	180	2CC	B
130	185	2DC	B
130	190	2DD	C
130	200	2DE	C
130	200	2EE	C
130	280	2GB	S
140	190	2CC	B
140	200	2DC	B

d	*D*	ISO 355 Dimension series	Stiffness series
140	205	2DD	C
140	210	2DE	C
140	215	2ED	C
140	300	2GB	S
150	210	2DC	B
150	215	2DD	B
150	225	2ED	C
150	225	2EE	C
150	320	2GB	S
160	220	2DC	B
160	225	2DD	B
160	235	2ED	C
160	340	2GB	S
170	235	2DD	B
170	245	2ED	C
170	360	2GB	S
180	240	2DC	B
180	245	2DD	B
180	255	2ED	B
190	255	2DC	B
190	260	2DD	B
190	270	2ED	B
200	265	2DC	B
200	270	2DD	B
200	280	2ED	B
220	285	2DC	A
220	290	2DD	B
220	300	2ED	B
240	305	2DC	A
240	310	2DD	A
240	320	2EE	B
260	325	2DC	A
260	330	2DD	A
260	340	2DE	B
280	360	2DE	A

Table B.2 — Contact angle series 3 — Stiffness series

Dimensions in millimetres

d	*D*	ISO 355 Dimension series	Stiffness series
20	42	3CC	S
22	44	3CC	S
25	52	3CC	S
30	62	3DB	S
30	62	3DC	S
32	65	3DB	S
35	72	3DB	S
35	72	3DC	S
40	68	3CD	C
40	80	3DB	S
40	80	3DC	S
45	75	3CC	C
45	80	3CE	C
45	85	3DB	S
45	85	3DC	S
45	85	3DE	S
50	80	3CC	C
50	85	3CE	C
50	90	3DB	C
50	90	3DC	C
50	90	3DE	C
55	90	3CB	C
55	90	3CC	C
55	95	3CE	C
55	100	3DB	C
55	100	3DC	C
55	100	3DE	C
60	95	3CD	C
60	100	3CE	C
60	110	3EB	C
60	110	3EC	C
60	110	3EE	C

d	*D*	ISO 355 Dimension series	Stiffness series
65	110	3DC	C
65	110	3DE	C
65	120	3EB	C
65	120	3EC	C
65	120	3EE	C
65	135	3FE	S
70	120	3DE	C
70	125	3EB	C
70	125	3EC	C
70	125	3EE	C
75	125	3DE	C
75	130	3EE	C
75	145	3FE	S
80	125	3CC	C
80	130	3DD	C
80	130	3DE	C
80	140	3EB	C
80	140	3EC	C
80	140	3EE	C
85	140	3DD	C
85	140	3DE	C
85	150	3EB	C
85	150	3EC	C
85	150	3EE	C
85	160	3FE	S
90	140	3CC	C
90	150	3DE	C
90	160	3FB	C
90	160	3FC	C
90	160	3FE	C
95	160	3EE	C
95	170	3FB	C
95	170	3FC	C
95	170	3FE	C

d	*D*	ISO 355 Dimension series	Stiffness series
100	165	3EE	C
100	180	3FB	C
100	180	3FC	C
100	180	3FE	C
105	175	3EE	C
105	190	3FB	C
105	190	3FC	C
105	190	3FE	C
110	180	3EE	C
110	190	3FE	C
110	200	3FB	S
110	200	3FC	S
120	200	3FE	C
130	210	3EE	C
150	235	3EE	C
170	230	3DC	B
170	230	3DD	B
170	255	3EE	C
180	280	3FD	C
190	280	3EE	C
200	280	3EC	B
200	360	3GD	S
220	300	3EC	B
260	360	3EC	B
300	420	3FD	B
320	440	3FD	B

Table B.3 — Contact angle series 4 — Stiffness series

Dimensions in millimetres

d	*D*	ISO 355 Dimension series	Stiffness series
20	45	4DB	S
22	47	4CB	S
25	47	4CC	C
25	50	4CB	S
28	52	4CC	C
28	55	4CB	S
30	55	4CC	C
30	60	4CB	S
32	58	4CC	C
32	65	4DB	S
35	62	4CC	C
35	70	4DB	S
40	75	4CB	C
45	85	4DB	S
50	84	4CC	C
50	90	4DB	C
50	105	4FD	S
50	105	4FE	S
55	95	4CB	C
55	115	4FE	S
60	95	4CC	C
60	100	4CB	C
60	125	4FE	S
65	100	4CC	C
65	105	4CB	C
65	105	4CD	C
70	110	4CB	C
70	110	4CC	C

d	*D*	ISO 355 Dimension series	Stiffness series
70	110	4CD	C
70	115	4DC	C
70	140	4FE	S
75	115	4CB	C
75	115	4CC	C
75	120	4CD	C
75	130	4DB	C
75	130	4DC	C
80	125	4CB	C
80	150	4FE	S
85	130	4CB	C
85	130	4CC	C
85	130	4CD	C
90	135	4CB	C
90	145	4DC	C
90	165	4FE	S
95	140	4CB	C
95	145	4CC	C
95	150	4DC	C
95	170	4FE	C
100	145	4CB	B
100	150	4CC	C
100	155	4DC	C
100	160	4DD	C
100	175	4FE	C
105	150	4CB	B
105	160	4DC	C
105	180	4EE	C
110	160	4CB	B
110	170	4DC	C
115	165	4CC	B

d	*D*	ISO 355 Dimension series	Stiffness series
120	170	4CB	B
120	180	4DC	C
120	200	4FE	C
120	215	4FB	C
120	215	4FD	C
130	185	4CB	B
130	200	4EC	C
130	230	4FB	C
130	230	4FD	C
140	195	4CB	B
140	210	4DC	C
140	220	4EE	C
140	250	4FB	C
140	250	4FD	C
150	210	4DB	B
150	225	4EC	C
150	270	4GB	S
150	270	4GD	S
160	220	4DB	B
160	240	4EB	C
160	240	4EC	C
160	245	4EE	C
160	290	4GB	S
160	290	4GD	S
170	230	4DB	B
170	240	4DD	B
170	260	4EC	C
170	310	4GB	S
170	310	4GD	S
180	240	4DB	B
180	250	4DC	B
180	250	4DD	B
180	265	4EE	C
180	320	4GB	S
180	320	4GD	S

d	*D*	ISO 355 Dimension series	Stiffness series
190	260	4DB	B
190	260	4DC	B
190	260	4DD	B
190	290	4FD	C
190	340	4GB	S
190	340	4GD	S
200	270	4DB	B
200	290	4EE	C
200	310	4FD	C
200	360	4GB	S

d	*D*	ISO 355 Dimension series	Stiffness series
220	290	4DB	B
220	340	4FD	C
240	320	4EB	B
240	320	4EC	B
240	360	4FD	C
260	340	4DB	B
260	400	4FC	C
280	370	4EB	B
280	380	4EC	B

d	*D*	ISO 355 Dimension series	Stiffness series
280	420	4FC	C
300	400	4EB	B
300	460	4GD	C
320	420	4EB	B
320	480	4GD	C
340	460	4FD	B
360	480	4FD	B

Table B.4 — Contact angle series 5 — Stiffness series

Dimensions in millimetres

d	*D*	ISO 355 Dimension series	Stiffness series
20	47	5DD	S
25	52	5CD	S
28	58	5DD	S
30	62	5DC	S
30	72	5FD	S
32	65	5DC	S
32	75	5FD	S
35	72	5DC	S
35	80	5FE	S
40	80	5DC	S
40	80	5DD	S
40	90	5FD	S
45	85	5DC	S
45	90	5ED	S
45	100	5FD	S

d	*D*	ISO 355 Dimension series	Stiffness series
50	90	5DC	C
50	100	5ED	S
50	110	5FD	S
55	100	5DD	C
55	105	5ED	S
55	120	5FD	S
60	110	5DD	C
60	115	5ED	S
60	130	5FD	S
65	115	5DD	C
65	120	5ED	C
65	140	5GD	S
70	125	5DD	C
70	130	5ED	S
70	150	5GD	S
75	130	5DD	C
75	135	5ED	C
75	160	5GD	S

d	*D*	ISO 355 Dimension series	Stiffness series
80	135	5DD	C
80	140	5ED	C
80	170	5GD	S
85	140	5DD	C
85	145	5ED	C
85	180	5GD	S
90	145	5DD	C
90	150	5ED	C
95	150	5DD	C
95	155	5ED	C
100	155	5DD	C
100	160	5ED	C
105	160	5DD	C

Table B.5 — Contact angle series 7 — Stiffness series

Dimensions in millimetres

d	*D*	ISO 355 Dimension series	Stiffness series
25	62	7FB	S
30	72	7FB	S
35	80	7FB	S
40	90	7FB	S
45	95	7FC	S
45	100	7FB	S
50	105	7FC	S
50	110	7FB	S
55	115	7FC	S
55	120	7FB	S
60	125	7FC	S
60	130	7FB	S

d	*D*	ISO 355 Dimension series	Stiffness series
65	130	7FC	S
65	140	7GB	S
70	140	7FC	S
70	150	7GB	S
75	150	7FC	S
75	160	7GB	S
80	160	7FC	S
80	170	7GB	S
85	170	7FC	S
85	180	7GB	S
90	175	7FC	S
90	190	7GB	S
95	180	7FC	S
95	200	7GB	S

d	*D*	ISO 355 Dimension series	Stiffness series
100	190	7FC	S
100	215	7GB	S
105	200	7FC	S
105	225	7GB	S
110	210	7GC	S
110	240	7GB	S
120	220	7FC	S
120	260	7GB	S
130	230	7FC	C
130	280	7GB	S
140	240	7FC	C
140	300	7GB	S
150	250	7FC	C
150	320	7GB	S

Bibliography

[1] ISO 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

[2] ISO 355, *Rolling bearings — Tapered roller bearings — Boundary dimensions and series designations*

[3] ISO 582, *Rolling bearings — Chamfer dimensions — Maximum values*

[4] ISO 8443, *Rolling bearings — Radial ball bearings with flanged outer ring — Flange dimensions*

[5] ISO 14253-1, *Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 1: Decision rules for verifying conformity or nonconformity with specifications*

[6] ISO 14253-2, *Geometrical product specifications (GPS) — Inspection by measurement of workpieces and measuring equipment — Part 2: Guidance for the estimation of uncertainty in GPS measurement, in calibration of measuring equipment and in product verification*

[7] ISO 14638, *Geometrical product specifications (GPS) — Matrix model*

[8] ISO 15241, *Rolling bearings — Symbols for physical quantities*

[9] ISO 17450-3, *Geometrical product specifications (GPS) — General concepts — Part 3: Toleranced features*

(*Continued from second cover*)

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 5593 Rolling bearings — Vocabulary	IS 2399 : 2024/ISO 5593 : 2023 Rolling bearings — Vocabulary (*third revision*)	Identical
ISO 8015 Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules	IS 12160 : 2015/ISO 8015 : 2011 Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules (*first revision*)	Identical
ISO 14405-1 Geometrical product specifications (GPS) — Dimensional tolerancing — Part 1: Linear sizes	IS 18229 (Part 1) : 2023/ISO 14405-1 : 2016 Geometrical product specifications (GPS) — Dimensional tolerancing: Part 1 Linear sizes	Identical
ISO/TS 17863 Geometrical product specification (GPS) — Tolerancing of moveable assemblies	IS 18231 : 2023/ISO/TS 17863 : 2013 Geometrical product specifications (GPS) — Tolerancing of moveable assemblies	Identical

The Committee has reviewed the provisions of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 22872	Rolling bearings — Geometrical product specifications (GPS) — Vocabulary and representation of symbols

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*).’ The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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This Indian Standard has been developed from Doc No.: PGD 13 (23229).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi