### INTERNATIONAL STANDARD

ISO 492

Sixth edition 2023-08

# Rolling bearings — Radial bearings — Geometrical product specifications (GPS) and tolerance values

Roulements — Roulements radiaux — Spécification géométrique des produits (GPS) et valeurs de tolérance

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Con	Contents				
Forew	ord		iv		
Intro	ductio	on	<b>v</b>		
1	Scon	e	1		
2	•	native references			
_					
3	Terms and definitions				
4	Symbols				
	4.1	Symbols for physical quantities			
	4.2	Additional symbols	3		
5	Grap	phical description	4		
6	Deviation limits and tolerance values		17		
	6.1	General			
	6.2	Radial bearings except tapered roller bearings	18		
		6.2.1 Tolerance class Normal	18		
		6.2.2 Tolerance class 6			
		6.2.3 Tolerance class 5			
		6.2.4 Tolerance class 4			
	( )	6.2.5 Tolerance class 2			
	6.3	Radial tapered roller bearings			
		6.3.1 Tolerance class Normal 6.3.2 Tolerance class 6X			
		6.3.3 Tolerance class 5	32 34		
		6.3.5 Tolerance class 2			
	6.4	Radial bearings, outer ring flanges 2023			
	6.5	Basically tapered bores, tapers 1:12 and 1:30			
Anne	A (in bear	formative) Background information on $t_{ m VDsp}$ and $t_{ m Vdsp}$ for radial tapered roller ings	40		
Anne		nformative) Stiffness series for radial tapered roller bearings with boundary ensions according to ISO 355	41		
Biblio	grapl	1y	48		

### 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see <a href="www.iso.org/directives">www.iso.org/directives</a>).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see <a href="https://www.iso.org/iso/foreword.html">www.iso.org/iso/foreword.html</a>.

This document was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 4, *Rolling bearings - Vocabulary, boundary dimensions and geometrical product specifications*.

This sixth edition cancels and replaces the fifth edition (ISO 492:2014), which has been technically revised.

The main changes are as follows:

- symbols have been revised and the symbol list amended;
- some revisions have been made to the geometrical product specifications (GPS) system, such as the indication of  $K_{ia}$  and  $K_{ea}$ ;
- revisions have been made to the symbol for width of asymmetric rings and assembled bearing;
- an extension of deviation limits and tolerance values towards larger bore diameter and outside bearing diameters in Tables 4 to 26 has been made;
- the tables for the radial bearings and the tapered roller bearings, such as the headings, notes of tables and some other values, have been aligned;
- Annexes A, B, C and D (in ISO 492:2014) have been deleted;
- the stiffness series of tapered roller bearings and background information regarding affected tolerance values have been added in new <u>Annexes A</u> and <u>B</u>.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

### 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<sup>[5]</sup> 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<sup>[6]</sup> 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.

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## Rolling bearings — Radial bearings — Geometrical product specifications (GPS) and tolerance values

### 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 rds/sist/3b2271c1-1395-4fe7-af7a-76f8cc64e104/iso-

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 <a href="https://www.iso.org/obp">https://www.iso.org/obp</a>
- IEC Electropedia: available at <a href="https://www.electropedia.org/">https://www.electropedia.org/</a>

### 4 Symbols

### 4.1 Symbols for physical quantities

Symbols in <u>Table 1</u> 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
а	Distance from face to define the restricted area for $S_{\rm D}$ or $S_{\rm D1}$	<u>3, 8, 13</u>
В	Nominal inner ring width	<u>1, 2, 7, 12</u>
С	Nominal outer ring width	<u>1, 2, 7, 12</u>
$C_1$	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	<u>12</u>
d	Nominal bore diameter <cylindrical bore=""></cylindrical>	1, 2, 3, 4, 5, 6, 12, 13, 14, 15, 16
d https://si	Nominal bore diameter <tapered bore=""> /36227161-1395-4fe7-af</tapered>	<b>Z</b> -76f8cc64e104/iso-
$d_1$	Nominal bore diameter at the theoretical large end of a tapered bore	7
$S_{\rm L}$	Nominal tapered slope	7
T	Nominal assembled bearing width <tapered bearing="" roller=""></tapered>	<u>17</u>
$T_1$	Nominal effective width of inner subunit assembled with a master outer ring <tapered bearing="" roller=""></tapered>	<u>17</u>
$T_2$	Nominal effective width of outer ring assembled with a master inner subunit	<u>17</u>
$T_{ m F}$	Nominal width of an assembled flanged bearing	<u>17</u>
$T_{\rm F2}$	Nominal effective width between an outer ring flange with a master inner subunit	<u>17</u>
$t_{ m Kea}$	Tolerance value for range of section height at outer ring of assembled bearing	4, 5, 6, 9, 10, 11, 14, 15, 16
$t_{ m Kia}$	Tolerance value for range of section height at inner ring of assembled bearing	4, 5, 6, 9, 10, 11, 14, 15, 16
$t_{ m SD}$	Tolerance value for perpendicularity of outer ring outside surface to the face	<u>3, 8</u>
$t_{\mathrm{SD1}}$	Tolerance value for perpendicularity of outer ring outside surface to the flange back face	13
$t_{ m Sd}$	Tolerance value for run-out of inner ring face to the bore	3, <u>8</u> , <u>13</u>
$t_{Sea}$	Tolerance value for axial run-out of outer ring of assembled bearing	<u>5, 6</u> , <u>10</u> , <u>11</u>
$t_{Sea1}$	Tolerance value for axial run-out of outer ring flange back face of assembled bearing	<u>15</u> , <u>16</u>
$t_{ m Sia}$	Tolerance value for axial run-out of inner ring of assembled bearing	<u>5, 6, 10, 11, 15, 16</u>

**Table 1** (continued)

$t_{\Delta \text{dmp}} \qquad \text{Upper and lower deviation limits of mid-range bore diameter}$	Symbol	Description	Figure
$ \begin{array}{c} t_{VRS} & \text{Tolerance value for range of inner ring width with faces offset or narrow } 2,12 \\ t_{VCS} & \text{Tolerance value for range of outer ring width with faces offset or narrow } 2,12 \\ t_{VCS} & \text{Tolerance value for range of outer ring flange width } \\ t_{VCIs} & \text{Tolerance value for range of outer ring flange width } \\ t_{VDmp} & \text{Tolerance value for range of outside diameter } \\ t_{VDSp} & \text{Tolerance value for range of outside diameter } \\ t_{VDSp} & \text{Tolerance value for range of outside diameter } \\ t_{VDmp} & \text{Tolerance value for range of mid-range bore diameter } \\ t_{VDmp} & \text{Tolerance value for range of mid-range bore diameter } \\ t_{VDmp} & \text{Tolerance value for range of bore diameter } \\ t_{VDmp} & \text{Tolerance value for range of bore diameter } \\ t_{VDmp} & \text{Tolerance value for range of bore diameter } \\ t_{VDmp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of diameter } \\ t_{VDMp} & \text{Tolerance value for range of bore diameter } \\ t_{VDMp} & \text{Tolerance value for range of diameter } \\ t_{VDMp} & \text{Tolerance value for range of diameter } \\ t_{VDMp} & \text{Tolerance value for value finitis of outer ring flange vidth } \\ t_{VDMp} & \text{Tolerance value for value ring width of mid-range bore diameter } \\ t_{VDMp} & \text{Tolerance value for value ring width of mid-range bore diameter } \\ t_{VDMp} & Tolerance value for value ring width of mid-range bore diamete$	$t_{ m VBgp}$	Tolerance value for range of inner ring width with faces offset or narrow	<u>2,7</u>
		Tolerance value for range of inner ring width with faces directly opposite	<u>1, 12</u>
t <sub>VCS</sub> Tolerance value for range outer ring width with faces directly opposite         1. Z           t <sub>VDmp</sub> Tolerance value for range of outer ring flange width         12           t <sub>VDmp</sub> Tolerance value for range of mid-range outside diameter         1. 2. 7. 12           t <sub>VDsp</sub> Tolerance value for range of mid-range bore diameter         1. 2. 7. 12           t <sub>Vdsp</sub> Tolerance value for range of bore diameter         1. 2. 7. 12           t <sub>ABB</sub> Upper deviation limit of inner ring width with faces offset or narrow value for range of bore diameter         2. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7. 7.		Tolerance value for range of outer ring width with faces offset or narrow	<u>2, 12</u>
V <sub>VDDDP</sub> Tolerance value for range of mid-range outside diameter         1, 2, 7, 12           t <sub>VDSP</sub> Tolerance value for range of outside diameter         1, 2, 7, 12           t <sub>VdMp</sub> Tolerance value for range of outside diameter         1, 2, 7, 12           t <sub>VdMp</sub> Tolerance value for range of bore diameter         1, 2, 7, 12           t <sub>ABBP</sub> Upper deviation limit of inner ring width with faces offset or narrow 2, 7           t <sub>ABB</sub> Upper and lower deviation limits of inner ring width with faces offset or narrow 2, 1           t <sub>ABB</sub> Lower deviation limit of outer ring width with faces offset or narrow 2, 1           t <sub>ACRP</sub> Upper and lower deviation limits of outer ring width with faces offset or narrow 2, 12           t <sub>ACS</sub> Lower deviation limit of outer ring width with faces offset or narrow 2, 12           t <sub>ACS</sub> Lower deviation limits of outer ring width with faces offset or narrow 2, 12           t <sub>ACS</sub> Lower deviation limits of outer ring width with faces offset or narrow 2, 12           t <sub>ACS</sub> Lower deviation limits of outer ring flange width 12           t <sub>ADDDP</sub> Upper and lower deviation limits of outside diameter 1, 2, 7, 12           t <sub>ADDD</sub> Upper and lower deviation limits of outside diameter 2, 7, 12           t <sub>ADDD</sub> Upper and lower deviation limits of mid-range bore diameter <1, 2, 12		Tolerance value for range outer ring width with faces directly opposite	<u>1, 7</u>
$t_{\text{VDmp}} \qquad \text{Tolerance value for range of mid-range outside diameter} \qquad 1, 2, 7, 12$ $t_{\text{Vdmp}} \qquad \text{Tolerance value for range of outside diameter} \qquad 1, 2, 7, 12$ $t_{\text{Vdmp}} \qquad \text{Tolerance value for range of mid-range bore diameter} \qquad 1, 2, 12$ $t_{\text{Vdsp}} \qquad \text{Tolerance value for range of bore diameter} \qquad 1, 2, 12$ $t_{\text{Vdsp}} \qquad \text{Tolerance value for range of bore diameter} \qquad 1, 2, 12$ $t_{\text{ABB}} \qquad \text{Upper deviation limit of inner ring width with faces offset or narrow} \qquad 2, 7$ $t_{\text{ABB}} \qquad \text{Upper and lower deviation limits of inner ring width with faces offset or narrow} \qquad 2, 12$ $t_{\text{ACSp}} \qquad \text{Upper deviation limit of outer ring width with faces offset or narrow} \qquad 2, 12$ $t_{\text{ACSp}} \qquad \text{Upper and lower deviation limits of outer ring width with faces offset or narrow} \qquad 2, 12$ $t_{\text{ACS}} \qquad \text{Lower deviation limit of outer ring width with faces offset or narrow} \qquad 2, 12$ $t_{\text{ACIs}} \qquad \text{Upper and lower deviation limits of outer ring flange width} \qquad 12$ $t_{\text{ACIs}} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12$ $t_{\text{ADD}} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12$ $t_{\text{ADIs}} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12$ $t_{\text{ADIs}} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 1, 2, 12$ $t_{\text{ADIn}} \qquad \text{Upper and lower deviation limits of mid-range bore diameter < cv-lindrical bore>$ $t_{\text{Admp}} \qquad \text{Upper and lower deviation limits of mid-range bore diameter} < 1, 2, 12, 12$ $t_{\text{ADI}} \qquad \text{Upper and lower deviation limits of a mid-range bore diameter} < 1, 2, 12, 12$ $t_{\text{ATI}} \qquad \text{Upper and lower deviation limits of the actual bearing width  t_{\text{ATR}} \qquad \text{Upper and lower deviation limits of the actual bearing width  t_{\text{ATI}} \qquad \text{Upper and lower deviation limits of the actual effective width of flanged bearing} t_{\text{ATI}} \qquad \text{Upper and lower deviation limits of the actual bearing width of flanged outer ring} t_{\text{ATI}} \qquad Upper and lower deviation limits o$	$t_{ m VC1s}$	Tolerance value for range of outer ring flange width	12
$ \begin{array}{c} t_{VDSp} \\ t_{Vdmp} \\ \hline \\ Tolerance value for range of mid-range bore diameter \\ \hline \\ t_{Vdsp} \\ \hline \\ Tolerance value for range of bore diameter \\ \hline \\ t_{ABg} \\ \hline \\ Upper deviation limit of inner ring width with faces offset or narrow etabs \\ t_{ABs} \\ \hline \\ Upper and lower deviation limits of inner ring width with faces offset or narrow etabs \\ t_{ABs} \\ \hline \\ Upper and lower deviation limits of inner ring width with faces offset or narrow etabs \\ t_{ABs} \\ \hline \\ Lower deviation limit of inner ring width with faces offset or narrow etabs \\ t_{ACs} \\ \hline \\ Upper and lower deviation limits of outer ring width with faces offset or narrow etabs \\ t_{ACs} \\ \hline \\ Upper and lower deviation limits of outer ring width with faces offset or narrow etabs \\ t_{ACs} \\ \hline \\ Lower deviation limit of outer ring width with faces offset or narrow etabs \\ t_{ACs} \\ \hline \\ Lower deviation limits of outer ring flange width etabors \\ t_{ACls} \\ \hline \\ Upper and lower deviation limits of outer ring flange width etabors \\ t_{ADmp} \\ \hline \\ Upper and lower deviation limits of outside diameter etabs \\ t_{ADmp} \\ \hline \\ Upper and lower deviation limits of outside diameter etabors \\ t_{Admp} \\ \hline \\ Upper and lower deviation limits of outside diameter etabors \\ t_{Admp} \\ \hline \\ Upper and lower deviation limits of mid-range bore diameter etabore etabore \\ t_{Adlimp} \\ \hline \\ Upper and lower deviation limits of mid-range bore diameter etabore etabore \\ t_{Adlimp} \\ \hline \\ Upper and lower deviation limits of a mid-range bore diameter etabore etabore \\ t_{Ads} \\ \hline \\ Upper and lower deviation limits of the actual bearing width etabors etabors \\ t_{Adlimp} \\ \hline \\ Upper and lower deviation limits of the actual bearing width etabors et$		Tolerance value for range of mid-range outside diameter	<u>1, 2, 7, 12</u>
$ \begin{array}{c} t_{\rm Vdmp} & {\rm Tolerance\ value\ for\ range\ of\ mid-range\ bore\ diameter} & 1,2,12 \\ t_{\rm ABgp} & {\rm Tolerance\ value\ for\ range\ of\ bore\ diameter} & 1,2,7,12 \\ t_{\rm ABgp} & {\rm Upper\ deviation\ limit\ of\ inner\ ring\ width\ with\ faces\ offset\ or\ narrow} & 2,7 \\ t_{\rm ABg} & {\rm Upper\ and\ lower\ deviation\ limits\ of\ inner\ ring\ width\ with\ faces\ offset\ or\ narrow} & 2,7 \\ t_{\rm ACB} & {\rm Lower\ deviation\ limit\ of\ inner\ ring\ width\ with\ faces\ offset\ or\ narrow} & 2,12 \\ t_{\rm ACG} & {\rm Upper\ deviation\ limit\ of\ outer\ ring\ width\ with\ faces\ offset\ or\ narrow} & 2,12 \\ t_{\rm ACS} & {\rm Upper\ and\ lower\ deviation\ limit\ of\ outer\ ring\ width\ with\ faces\ offset\ or\ narrow} & 2,12 \\ t_{\rm ACS} & {\rm Lower\ deviation\ limit\ of\ outer\ ring\ width\ with\ faces\ offset\ or\ narrow} & 2,12 \\ t_{\rm ACS} & {\rm Lower\ deviation\ limit\ of\ outer\ ring\ width\ with\ faces\ offset\ or\ narrow} & 2,12 \\ t_{\rm ACS} & {\rm Lower\ deviation\ limit\ of\ outer\ ring\ flange\ width} & 1,2 \\ t_{\rm ACIs} & {\rm Upper\ and\ lower\ deviation\ limit\ of\ outside\ diameter} & 1,2,7,12 \\ t_{\rm ADD} & {\rm Upper\ and\ lower\ deviation\ limit\ of\ outside\ diameter} & 1,2,7,12 \\ t_{\rm ADIS} & {\rm Upper\ and\ lower\ deviation\ limit\ of\ outside\ diameter} & 1,2,7,12 \\ t_{\rm Admp} & {\rm Upper\ and\ lower\ deviation\ limit\ of\ mid-range\ bore\ diameter\ $		Tolerance value for range of outside diameter	<u>1</u> , <u>2</u> , <u>7</u> , <u>12</u>
$ \begin{array}{c} t_{\text{Vdsp}} \\ t_{\text{ABgp}} \\ \\ t_{\text{ABgp}} \\ \\ t_{\text{ABgp}} \\ \\ t_{\text{ABg}} \\ \\ t_{\text{ABs}} \\ \\ t_{\text{Opper deviation limit of inner ring width with faces offset or narrow 2.7} \\ t_{\text{ABs}} \\ \\ t_{\text{ABs}} \\ \\ t_{\text{Duper and lower deviation limits of inner ring width with faces offset or narrow 2.7} \\ t_{\text{ACgp}} \\ t_{\text{ACgp}} \\ \\ t_{\text{Duper deviation limit of outer ring width with faces offset or narrow 2.12} \\ t_{\text{ACG}} \\ \\ t_{\text{Duper and lower deviation limits of outer ring width with faces offset or narrow 2.12} \\ t_{\text{ACG}} \\ \\ t_{\text{Duper and lower deviation limits of outer ring width with faces offset or narrow 2.12} \\ t_{\text{ACIs}} \\ \\ t_{\text{Duper and lower deviation limits of outer ring flange width 3.2.7.12} \\ t_{\text{ACIs}} \\ \\ t_{\text{Duper and lower deviation limits of outer ring flange width 3.2.7.12} \\ t_{\text{ADIs}} \\ \\ t_{\text{Duper and lower deviation limits of outside diameter 3.2.7.12} \\ t_{\text{ADIs}} \\ \\ t_{\text{Duper and lower deviation limits of outside diameter of outer ring flange 3.2.7.12} \\ t_{\text{Admp}} \\ \\ t_{\text{Duper and lower deviation limits of mid-range bore diameter  3.2.12} \\ t_{\text{Admp}} \\ \\ t_{\text{Duper and lower deviation limits of mid-range bore diameter  3.2.12} \\ t_{\text{Admp}} \\ \\ t_{\text{Duper and lower deviation limits of a mid-range bore diameter 4.2.12} \\ \\ t_{\text{Adlimp}} \\ \\ t_{\text{Duper and lower deviation limits of a mid-range bore diameter at the theoretical large end of an inner ring  4.2.12} \\ t_{\text{Ads}} \\ \\ t_{Duper and lower deviation limits of the actual bearing width $		Tolerance value for range of mid-range bore diameter	<u>1, 2, 12</u>
$t_{\Delta Bgp} \qquad \text{Upper and lower deviation limits of inner ring width with faces offset or narrow 2.7 } \\ t_{\Delta Bs} \qquad \text{Upper and lower deviation limits of inner ring width with faces directly opposite} \\ t_{\Delta Lower} \qquad \text{Upper deviation limit of inner ring width with faces offset or narrow 2.7 } \\ t_{\Delta Cgp} \qquad \text{Upper deviation limit of outer ring width with faces offset or narrow 2.12 } \\ t_{\Delta Cs} \qquad \text{Upper and lower deviation limits of outer ring width with faces offset or narrow 2.12 } \\ t_{\Delta Cs} \qquad \text{Upper and lower deviation limits of outer ring width with faces offset or narrow 2.12 } \\ t_{\Delta Cls} \qquad \text{Upper and lower deviation limits of outer ring flange width 1.2 } \\ t_{\Delta Cls} \qquad \text{Upper and lower deviation limits of outer ring flange width 1.2 } \\ t_{\Delta Dmp} \qquad \text{Upper and lower deviation limits of outside diameter 1.2.7.12 } \\ t_{\Delta Dmp} \qquad \text{Upper and lower deviation limits of outside diameter 1.2.7.12 } \\ t_{\Delta Dms} \qquad \text{Upper and lower deviation limits of outside diameter of outer ring flange 1.2 } \\ t_{\Delta dmp} \qquad \text{Upper and lower deviation limits of mid-range bore diameter $		Tolerance value for range of bore diameter	<u>1, 2, 7, 12</u>
$t_{\rm ABS} \qquad \text{Upper and lower deviation limits of inner ring width with faces directly opposite} \\ t_{\rm ABS} \qquad \text{Lower deviation limit of inner ring width with faces offset or narrow} & 2, 7 \\ t_{\rm ACGp} \qquad \text{Upper deviation limit of outer ring width with faces offset or narrow} & 2, 12 \\ t_{\rm ACG} \qquad \text{Upper and lower deviation limits of outer ring width with faces directly opposite} \\ t_{\rm ACG} \qquad \text{Lower deviation limit of outer ring width with faces offset or narrow} & 2, 12 \\ t_{\rm ACG} \qquad \text{Lower deviation limit of outer ring width with faces offset or narrow} & 2, 12 \\ t_{\rm ACIs} \qquad \text{Upper and lower deviation limits of outer ring flange width} \qquad 12 \\ t_{\rm ADImp} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12 \\ t_{\rm ADS} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12 \\ t_{\rm ADIs} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12 \\ t_{\rm Admp} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 12 \\ \text{Upper and lower deviation limits of mid-range bore diameter < cv-} \qquad 1, 2, 12 \\ \text{Upper and lower deviation limits of mid-range bore diameter} < 1, 2, 12 \\ \text{Upper and lower deviation limits of a mid-range bore diameter} < 1, 2, 12 \\ \text{Upper and lower deviation limits of a mid-range bore diameter} < 1, 2, 12 \\ \text{Upper and lower deviation limits of the actual bearing width} < 1, 2, 12 \\ \text{Upper and lower deviation limits of the actual bearing width} < 1, 2, 12 \\ \text{Upper and lower deviation limits of the actual effective width of inner} \\ \text{Upper and lower deviation limits of the actual bearing width} < 1, 2, 12 \\ \text{Upper and lower deviation limits of the actual bearing width} < 1, 2, 12 \\ \text{Upper and lower deviation limits of the actual bearing width} < 1, 2, 12 \\ \text{Upper and lower deviation limits of the actual bearing width} < 1, 2, 12 \\ \text{Upper and lower deviation limits of the actual bearing width} < 1, 2, 12 \\ \text{Upper and lower deviation limits of the actual bearing width} < 1, 2, 12 \\ \text{Upper and lower deviation limits} < 1$		Upper deviation limit of inner ring width with faces offset or narrow	<u>2, 7</u>
$t_{\Delta Cgp}$ Upper deviation limit of outer ring width with faces offset or narrow $t_{\Delta Cs}$ Upper and lower deviation limits of outer ring width with faces directly opposite1, 7 $t_{\Delta Cs}$ Lower deviation limit of outer ring width with faces offset or narrow $t_{\Delta C1s}$ 1, 2 $t_{\Delta C1s}$ Upper and lower deviation limits of outer ring flange width $t_{\Delta Dmp}$ 12 $t_{\Delta Dmp}$ Upper and lower deviation limits of outside diameter $t_{\Delta Ds}$ 1, 2, 7, 12 $t_{\Delta Ds}$ Upper and lower deviation limits of outside diameter $t_{\Delta C1s}$ 1, 2, 7, 12 $t_{\Delta Dls}$ Upper and lower deviation limits of outside diameter of outer ring flange $t_{\Delta C1s}$ 12 $t_{\Delta Dls}$ Upper and lower deviation limits of mid-range bore diameter < cy-lindrical bore>1, 2, 12 $t_{\Delta dmp}$ Upper and lower deviation limits of mid-range bore diameter < cy-lindrical bore>7 $t_{\Delta dlmp}$ Upper and lower deviation limits of a mid-range bore diameter < cy-lindrical large end of an inner ring < tapered bore>7 $t_{\Delta dlmp}$ Upper and lower deviation limits of bore diameter $t_{\Delta C1s}$ 1, 2, 12 $t_{\Delta T2s}$ Upper and lower deviation limits of the actual bearing width < tapered 17 $t_{\Delta T1g}$ Upper and lower deviation limits of the actual effective width of outer ring17 $t_{\Delta T2g}$ Upper and lower deviation limits of the actual bearing width of flanged bearing17 $t_{\Delta TF2g}$ Upper and lower deviation limits of the actual bearing width of flanged outer ring17			1, 12
$t_{\Delta CS} \qquad \text{Upper and lower deviation limits of outer ring width with faces directly opposite} \\ t_{\Delta CS} \qquad \text{Lower deviation limit of outer ring width with faces offset or narrow}  2, 12 \\ t_{\Delta C1S} \qquad \text{Upper and lower deviation limits of outer ring flange width} \qquad 12 \\ t_{\Delta Dmp} \qquad \text{Upper and lower deviation limits of mid-range outside diameter} \qquad 1, 2, 7, 12 \\ t_{\Delta DS} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12 \\ t_{\Delta DIS} \qquad \text{Upper and lower deviation limits of outside diameter of outer ring flange} \qquad 12 \\ t_{\Delta IDIS} \qquad \text{Upper and lower deviation limits of mid-range bore diameter } \\ t_{\Delta dmp} \qquad \text{Upper and lower deviation limits of mid-range bore diameter } \\ t_{\Delta dmp} \qquad \text{Upper and lower deviation limits of a mid-range bore diameter } \\ t_{\Delta dlmp} \qquad \text{Upper and lower deviation limits of a mid-range bore diameter at the theoretical large end of an inner ring } \\ t_{\Delta dlmp} \qquad \text{Upper and lower deviation limits of bore diameter} \qquad 1, 2, 12 \\ t_{\Delta SL} \qquad \text{Upper and lower deviation limits of the actual bearing width } \\ t_{\Delta Tlg} \qquad \text{Upper and lower deviation limits of the actual effective width of outer ring} \\ Upper and lower deviation limits of the actual bearing width of flanged bearing} \qquad 17 \\ t_{\Delta TFg} \qquad \text{Upper and lower deviation limits of the actual bearing width of flanged bearing} \\ Upper and lower deviation limits of the actual bearing width of flanged outer ring} \qquad 17 \\ Upper and lower deviation limits of the actual bearing width of flanged outer ring} \qquad 17 \\ Upper and lower deviation limits of the actual bearing width of flanged outer ring} \qquad 17 \\ Upper and lower deviation limits of the actual effective width of flanged outer ring} \qquad 17 \\ Upper and lower deviation limits of the actual effective width of flanged outer ring} \qquad 17 \\ Upper and lower deviation limits of the$	$t_{\Delta  m Bs}$	Lower deviation limit of inner ring width with faces offset or narrow	<u>2, 7</u>
$t_{\Delta CS} \qquad \text{Upper and lower deviation limits of outer ring width with faces directly opposite} \\ t_{\Delta CIS} \qquad \text{Lower deviation limit of outer ring width with faces offset or narrow}  2, 12 \\ t_{\Delta CIS} \qquad \text{Upper and lower deviation limits of outer ring flange width} \qquad 12 \\ t_{\Delta DDmp} \qquad \text{Upper and lower deviation limits of mid-range outside diameter} \qquad 1, 2, 7, 12 \\ t_{\Delta DS} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12 \\ t_{\Delta DIS} \qquad \text{Upper and lower deviation limits of outside diameter of outer ring flange} \qquad 12 \\ t_{\Delta DIS} \qquad \text{Upper and lower deviation limits of mid-range bore diameter} \qquad 1, 2, 12 \\ \text{lindrical bore} \qquad 1, 2, 12 \\ \text{lindrical bore} \qquad 1, 2, 12 \\ \text{lindrical bore} \qquad 1, 2, 12 \\ \text{lindrical lone} \qquad 1, 2, 12 \\ \text{long and lower deviation limits of mid-range bore diameter} \qquad 1, 2, 12 \\ t_{\Delta damp} \qquad \text{Upper and lower deviation limits of a mid-range bore diameter} \qquad 1, 2, 12 \\ t_{\Delta damp} \qquad \text{Upper and lower deviation limits of bore diameter} \qquad 1, 2, 12 \\ t_{\Delta dSL} \qquad \text{Upper and lower deviation limits of the adameter}} \qquad 1, 2, 12 \\ t_{\Delta TSL} \qquad \text{Upper and lower deviation limits of the actual bearing width < tapered}} \qquad 17 \\ t_{\Delta TIg} \qquad \text{Upper and lower deviation limits of the actual effective width of inner}} \qquad 17 \\ t_{\Delta TIg} \qquad \text{Upper and lower deviation limits of the actual effective width of outer ring}} \qquad 17 \\ t_{\Delta TIg} \qquad \text{Upper and lower deviation limits of the actual effective width of outer ring}} \qquad 17 \\ t_{\Delta TIg} \qquad \text{Upper and lower deviation limits of the actual bearing width of flanged bearing}} \qquad 17 \\ t_{\Delta TIF2g} \qquad \text{Upper and lower deviation limits of the actual bearing width of flanged bearing}} \qquad 17 \\ t_{\Delta TIF2g} \qquad \text{Upper and lower deviation limits of the actual bearing width of flanged outer ring}} \qquad 17 \\ t_{\Delta TIF2g} \qquad \text{Upper and lower deviation limits of the actual bearing width of flanged outer ring}} \qquad 17 \\ t_{\Delta TIF2g} \qquad \text{Upper and lower deviation limits of the actual effective width of flanged outer ring}} \qquad 17 \\ t_{\Delta TIF2g} \qquad Upper and lower devia$	$t_{\Delta  m Cgp}$	Upper deviation limit of outer ring width with faces offset or narrow	<u>2, 12</u>
$\begin{array}{lll} t_{\Delta C1s} & \text{Upper and lower deviation limits of outer ring flange width} & 12 \\ t_{\Delta Dmp} & \text{Upper and lower deviation limits of mid-range outside diameter} & 1, 2, 7, 12 \\ t_{\Delta Ds} & \text{Upper and lower deviation limits of outside diameter} & 1, 2, 7, 12 \\ t_{\Delta D1s} & \text{Upper and lower deviation limits of outside diameter} & 1, 2, 7, 12 \\ t_{\Delta dmp} & \text{Upper and lower deviation limits of mid-range bore diameter} & 2, 1, 2, 12 \\ lindrical bore> & t_{\Delta dmp} & \text{Upper and lower deviation limits of mid-range bore diameter} & 7 \\ t_{\Delta dmp} & \text{Upper and lower deviation limits of mid-range bore diameter} & 7 \\ t_{\Delta d1mp} & \text{Upper and lower deviation limits of a mid-range bore diameter} & 7 \\ t_{\Delta d3} & \text{Upper and lower deviation limits of bore diameter} & 1, 2, 12 \\ t_{\Delta SL} & \text{Upper and lower deviation limits of the actual bearing width} & 17 \\ t_{\Delta T1g} & \text{Upper and lower deviation limits of the actual bearing width} & 17 \\ t_{\Delta T1g} & \text{Upper and lower deviation limits of the actual effective width of inner subunit} & 17 \\ t_{\Delta T2g} & \text{Upper and lower deviation limits of the actual effective width of outer ring} \\ t_{\Delta TFg} & \text{Upper and lower deviation limits of the actual bearing width} & 17 \\ t_{\Delta TFg} & \text{Upper and lower deviation limits of the actual bearing width} & 17 \\ t_{\Delta TFg} & \text{Upper and lower deviation limits of the actual bearing width} & 17 \\ t_{\Delta TFg} & \text{Upper and lower deviation limits} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation limits} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation limits} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & 17 \\ t_{\Delta TF2g} & \text{Upper and lower deviation} & $			1, 7
$\begin{array}{c} t_{\Delta \mathrm{Dmp}} & \text{Upper and lower deviation limits of mid-range outside diameter} & 1, 2, 7, 12 \\ t_{\Delta \mathrm{DS}} & \text{Upper and lower deviation limits of outside diameter} & 1, 2, 7, 12 \\ t_{\Delta \mathrm{D1S}} & \text{Upper and lower deviation limits of outside diameter of outer ring flange} & 12 \\ t_{\Delta \mathrm{dmp}} & \text{Upper and lower deviation limits of mid-range bore diameter} & < cy-lindrical bore> & 1, 2, 12 \\ lindrical bore> & 1, 2, 12 \\ lindrical bore> & 1, 2, 12 \\ lindrical bore> & 2 \\ t_{\Delta \mathrm{dmp}} & \text{Upper and lower deviation limits of mid-range bore diameter} & 2 \\ t_{\Delta \mathrm{d1mp}} & \text{Upper and lower deviation limits of a mid-range bore diameter} & 3 \\ t_{\Delta \mathrm{d1mp}} & \text{Upper and lower deviation limits of bore diameter} & 4 \\ t_{\Delta \mathrm{d2s}} & \text{Upper and lower deviation limits of tapered slope} & 7 \\ t_{\Delta \mathrm{TS}} & \text{Upper and lower deviation limits of the actual bearing width} &$	$t_{\Delta  ext{Cs}}$	Lower deviation limit of outer ring width with faces offset or narrow	<u>2, 12</u>
$t_{\Delta D m p} \qquad \text{Upper and lower deviation limits of mid-range outside diameter} \qquad 1, 2, 7, 12$ $t_{\Delta D 1 S} \qquad \text{Upper and lower deviation limits of outside diameter} \qquad 1, 2, 7, 12$ $t_{\Delta D 1 S} \qquad \text{Upper and lower deviation limits of outside diameter of outer ring flange} \qquad 12$ $t_{\Delta d m p} \qquad \text{Upper and lower deviation limits of mid-range bore diameter} < cv-lindrical bore> \qquad 1, 2, 12$ $t_{\Delta d m p} \qquad \text{Upper and lower deviation limits of mid-range bore diameter}$		Upper and lower deviation limits of outer ring flange width	<u>12</u>
$\begin{array}{c} t_{\Delta \mathrm{DS}} & \text{Upper and lower deviation limits of outside diameter} & 1, 2, 7, 12 \\ \hline t_{\Delta \mathrm{D1S}} & \text{Upper and lower deviation limits of outside diameter of outer ring flange} & 12 \\ \hline t_{\Delta \mathrm{dmp}} & \text{Upper and lower deviation limits of mid-range bore diameter} < cv-lindrical bore> & 1, 2, 12 \\ \hline t_{\Delta \mathrm{dmp}} & \text{Upper and lower deviation limits of mid-range bore diameter} < cv-lindrical bore> & 7 \\ \hline t_{\Delta \mathrm{d1mp}} & \text{Upper and lower deviation limits of a mid-range bore diameter} & 7 \\ \hline t_{\Delta \mathrm{d1mp}} & \text{Upper and lower deviation limits of a mid-range bore diameter} & 7 \\ \hline t_{\Delta \mathrm{d3}} & \text{Upper and lower deviation limits of bore diameter} & 1, 2, 12 \\ \hline t_{\Delta \mathrm{d3}} & \text{Upper and lower deviation limits of tapered slope} & 7 \\ \hline t_{\Delta \mathrm{TSL}} & \text{Upper and lower deviation limits of the actual bearing width} < \text{tapered} & 17 \\ \hline t_{\Delta \mathrm{T1g}} & \text{Upper and lower deviation limits of the actual effective width of inner} & 17 \\ \hline t_{\Delta \mathrm{T2g}} & \text{Upper and lower deviation limits of the actual effective width of} & 17 \\ \hline t_{\Delta \mathrm{TF2g}} & \text{Upper and lower deviation limits of the actual bearing width} & 17 \\ \hline t_{\Delta \mathrm{TF2g}} & \text{Upper and lower deviation limits of the actual bearing width} & 17 \\ \hline t_{\mathrm{d1nged bearing}} & \text{Upper and lower deviation limits} & 17 \\ \hline t_{\mathrm{d1nged bearing}} & \text{Upper and lower deviation limits} & 17 \\ \hline t_{\mathrm{d1nged outer ring}} & \text{Upper and lower deviation limits} & 17 \\ \hline \end{array}$		Upper and lower deviation limits of mid-range outside diameter	<u>1, 2, 7, 12</u>
$t_{\Delta D1S}$ Upper and lower deviation limits of outside diameter of outer ring flange12 $t_{\Delta dmp}$ 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 diameter1, 2, 12 $t_{\Delta SL}$ Upper and lower deviation limits of tapered slope7 $t_{\Delta Tg}$ 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 ring17 $t_{\Delta TF2g}$ Upper and lower deviation limits of the actual bearing width of flanged bearing17 $t_{\Delta TF2g}$ Upper and lower deviation limits of the actual effective width of flanged outer ring17		Upper and lower deviation limits of outside diameter	<u>1, 2, 7, 12</u>
$t_{\Delta dmp}$ Upper and lower deviation limits of mid-range bore diameter <cylindrical bore="">1, 2, 12<math>t_{\Delta dmp}</math>Upper and lower deviation limits of mid-range bore diameter <ta-pered bore="">7<math>t_{\Delta d1mp}</math>Upper and lower deviation limits of a mid-range bore diameter at the theoretical large end of an inner ring <tapered bore="">7<math>t_{\Delta ds}</math>Upper and lower deviation limits of bore diameter1, 2, 12<math>t_{\Delta SL}</math>Upper and lower deviation limits of tapered slope7<math>t_{\Delta Tg}</math>Upper and lower deviation limits of the actual bearing width <tapered 17<="" th=""><math>t_{\Delta T1g}</math>Upper and lower deviation limits of the actual effective width of inner subunit <tapered bearing="" roller="">17<math>t_{\Delta T2g}</math>Upper and lower deviation limits of the actual effective width of outer ring17<math>t_{\Delta TF2g}</math>Upper and lower deviation limits of the actual bearing width of flanged bearing17<math>t_{\Delta TF2g}</math>Upper and lower deviation limits of the actual effective width of flanged outer ring17</tapered></tapered></tapered></ta-pered></cylindrical>		Upper and lower deviation limits of outside diameter of outer ring flange	12
$t_{\Delta d1mp} \qquad \text{pered bore} > \\ t_{\Delta d1mp} \qquad \text{Upper and lower deviation limits of a mid-range bore diameter at the theoretical large end of an inner ring < tapered bore > \\ t_{\Delta ds} \qquad \text{Upper and lower deviation limits of bore diameter} \qquad 1, 2, 12 \\ t_{\Delta SL} \qquad \text{Upper and lower deviation limits of tapered slope} \qquad 7 \\ t_{\Delta Tg} \qquad \text{Upper and lower deviation limits of the actual bearing width < tapered 17 \\ roller bearing > \\ t_{\Delta T1g} \qquad \text{Upper and lower deviation limits of the actual effective width of inner subunit < tapered roller bearing > \\ t_{\Delta T2g} \qquad \text{Upper and lower deviation limits of the actual effective width of outer ring} \\ t_{\Delta TF2g} \qquad \text{Upper and lower deviation limits of the actual bearing width of flanged bearing} \\ t_{\Delta TF2g} \qquad \text{Upper and lower deviation limits of the actual bearing width of flanged outer ring} \\ 17 \qquad 17 \qquad 18 \qquad 19 \qquad 19 \qquad 19 \qquad 19 \qquad 19 \qquad 19 \qquad 19$	$t_{\Delta  m dmp}$		<u>1, 2, 12</u>
theoretical large end of an inner ring <tapered bore=""> <math>t_{\Delta ds}</math> Upper and lower deviation limits of bore diameter 1, 2, 12  <math>t_{\Delta SL}</math> Upper and lower deviation limits of tapered slope 7  <math>t_{\Delta Tg}</math> Upper and lower deviation limits of the actual bearing width <tapered 17="" <math="">t_{\Delta T1g} Upper and lower deviation limits of the actual effective width of inner subunit <tapered bearing="" roller=""> <math>t_{\Delta T1g}</math> Upper and lower deviation limits of the actual effective width of outer ring 17  <math>t_{\Delta T2g}</math> Upper and lower deviation limits of the actual effective width of flanged bearing 17  <math>t_{\Delta TF2g}</math> Upper and lower deviation limits of the actual bearing width of flanged bearing 17  <math>t_{\Delta TF2g}</math> Upper and lower deviation limits of the actual effective width of flanged outer ring 17</tapered></tapered></tapered>	$t_{\Delta  m dmp}$		<u>7</u>
$t_{\Delta SL}$ Upper and lower deviation limits of tapered slope 7 $t_{\Delta Tg}$ Upper and lower deviation limits of the actual bearing width <tapered 17="" <math="">t_{\Delta T1g} Upper and lower deviation limits of the actual effective width of inner 17  subunit <tapered bearing="" roller=""> <math>t_{\Delta T2g}</math> Upper and lower deviation limits of the actual effective width of 17  outer ring  <math>t_{\Delta TFg}</math> Upper and lower deviation limits of the actual bearing width of 17  <math>t_{\Delta TF2g}</math> Upper and lower deviation limits of the actual bearing width of 17  <math>t_{\Delta TF2g}</math> Upper and lower deviation limits of the actual effective width of 17  flanged outer ring</tapered></tapered>	$t_{\Delta  ext{d1mp}}$		7
$t_{\Delta SL}$ Upper and lower deviation limits of tapered slope7 $t_{\Delta Tg}$ Upper and lower deviation limits of the actual bearing width <tapered bearing="" roller="">17<math>t_{\Delta T1g}</math>Upper and lower deviation limits of the actual effective width of inner subunit <tapered bearing="" roller="">17<math>t_{\Delta T2g}</math>Upper and lower deviation limits of the actual effective width of outer ring17<math>t_{\Delta TFg}</math>Upper and lower deviation limits of the actual bearing width of flanged bearing17<math>t_{\Delta TF2g}</math>Upper and lower deviation limits of the actual effective width of flanged outer ring17</tapered></tapered>	$t_{ m \Delta ds}$	Upper and lower deviation limits of bore diameter	<u>1, 2, 12</u>
$t_{\Delta { m Tg}}$ Upper and lower deviation limits of the actual bearing width <tapered 17="" bearing="" roller=""> <math>t_{\Delta { m T1g}}</math> Upper and lower deviation limits of the actual effective width of inner subunit <tapered bearing="" roller=""> <math>t_{\Delta { m T2g}}</math> Upper and lower deviation limits of the actual effective width of outer ring upper and lower deviation limits of the actual bearing width of flanged bearing upper and lower deviation limits of the actual bearing width of flanged outer ring upper and lower deviation limits of the actual effective width of flanged outer ring upper and lower deviation limits of the actual effective width of flanged outer ring upper and lower deviation limits of the actual effective width of flanged outer ring upper actual effective width of langed upper actual effective width of langed outer ring upper actual effective width of langed upper actual effec</tapered></tapered>		Upper and lower deviation limits of tapered slope	7
$t_{\Delta T2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of outer ring} \\ t_{\Delta TFg} \hspace{1cm} \text{Upper and lower deviation limits of the actual bearing width of flanged bearing} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF2g} \hspace{1cm} \text{Upper and lower deviation limits of the actual effective width of flanged outer ring} \\ t_{\Delta TF$	$t_{\Delta  m Tg}$		17
outer ring $t_{\Delta TFg}$ Upper and lower deviation limits of the actual bearing width of flanged bearing $t_{\Delta TF2g}$ Upper and lower deviation limits of the actual effective width of flanged outer ring	$t_{\Delta  m T1g}$		<u>17</u>
flanged bearing $t_{\Delta TF2g}$ Upper and lower deviation limits of the actual effective width of flanged outer ring	$t_{\Delta  m T2g}$		<u>17</u>
flanged outer ring	$t_{\Delta \mathrm{TFg}}$		17
$\alpha$ Angel of tapered inner ring bore $7, 8, 9, 10, 11$	$t_{\Delta  m TF2g}$		<u>17</u>
	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  $\underline{\text{Table 2}}$  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, <u>7</u> , <u>12</u>	ISO 1101:2017, 17.15
1	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
<b>→</b> /// M <sup>a</sup>	Direction feature indicator	2, 7, 12	ISO 1101:2017, 15
FP	Fixed part CII SI AND A	4, 5, 6, 9, 10, 11, 14, 15, 16	ISO/TS 17863:2013, 6.10.1.1
MP	Moveable part (SUAMOLA)	4, 5, 6, 9, 10, 11, 14, 15, 16	ISO/TS 17863:2013, 6.10.1.1
G	Gravity ISO	4, 5, 6, 9, 10, 11, 14, 15, 16, 17	ISO/TS 17863:2013, 6.3
1 a	Flag 4	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.		

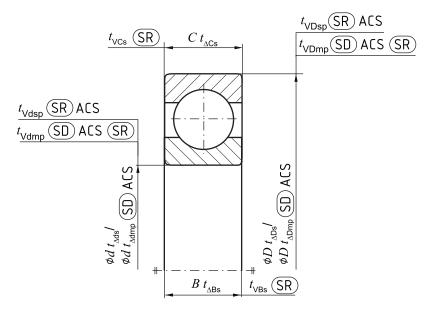
### 5 Graphical description

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.

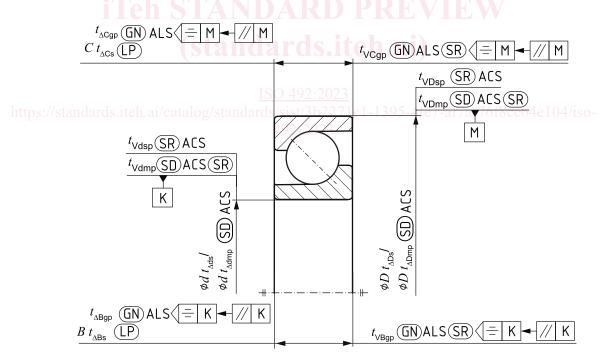
The indications in <u>Figures 1</u> to <u>17</u> illustrate the correlation of interface dimensions and corresponding dimensional and geometrical tolerance symbols. The specifications for single components are illustrated in <u>Figures 1</u>, <u>2</u>, <u>3</u>, <u>7</u>, <u>8</u>, <u>12</u> and <u>13</u>. The specifications for assembled bearings are illustrated in <u>Figures 4</u>, <u>5</u>, <u>6</u>, <u>9</u>, <u>10</u>, <u>11</u>, <u>14</u>, <u>15</u>, <u>16</u> and <u>17</u>. 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

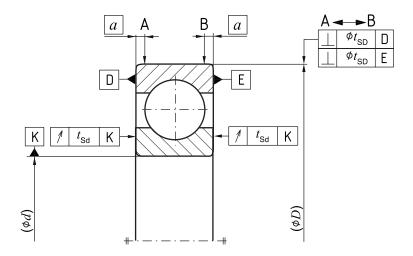
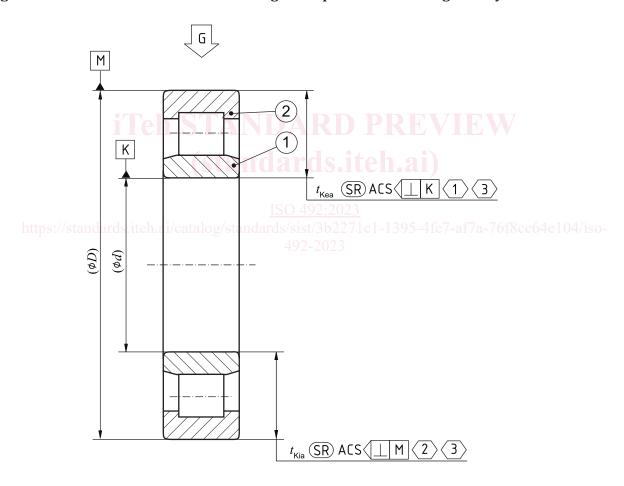


Figure 3 — Geometrical tolerances for single components of bearing with cylindrical bore



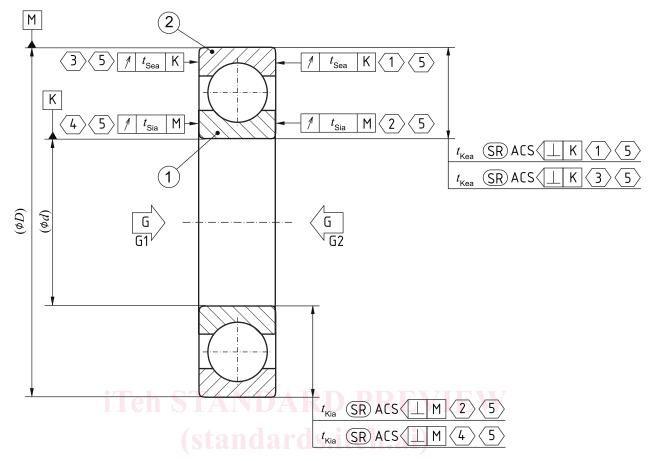
Key

$$\boxed{1}$$
 = FP  $\boxed{1}$  - MP  $\boxed{2}$ , G

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

 $\overline{3}$  = 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

$$= FP \bigcirc -MP \bigcirc , G2$$

$$\overline{3}$$
 = FP  $\overline{1}$  - MP  $\overline{2}$ , G1

$$\langle 4 \rangle$$
 = FP  $\langle 2 \rangle$  - MP  $\langle 1 \rangle$ , G1

 $\boxed{5}$  = 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

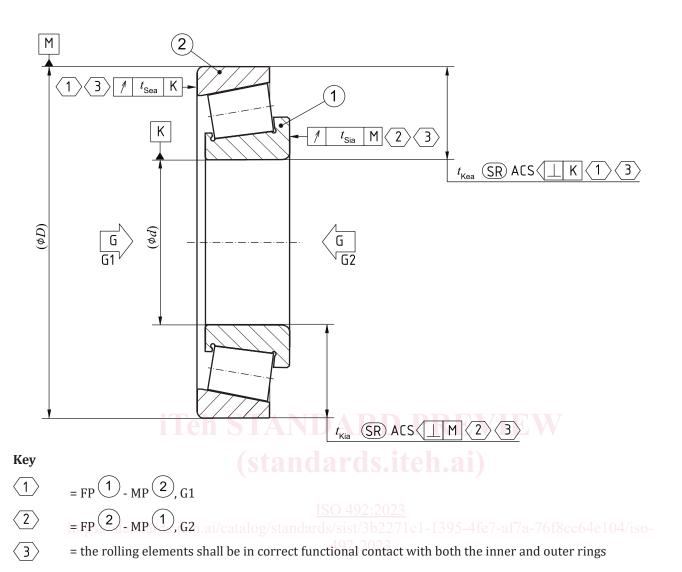
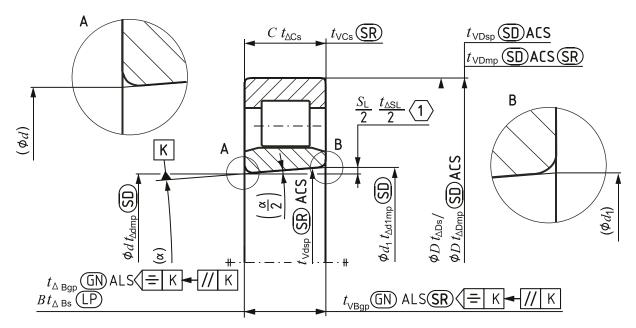


Figure 6 — Geometrical tolerances for assembled bearing with cylindrical bore — Single-row angular contact ball bearing and tapered roller bearing



Key

 $\begin{array}{l}
\boxed{1} = S_{L} \text{ is a calculated nominal size according to Formula (1)} \\
t_{\Delta SL} \text{ is a calculated characteristic according to Formula (2)} \\
S_{L} = (d_{1} - d) = 2B \tan(\alpha/2) \\
t_{\Delta SL} = t_{\Delta d1mp} - t_{\Delta dmp}
\end{array} \tag{1}$ 

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.

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

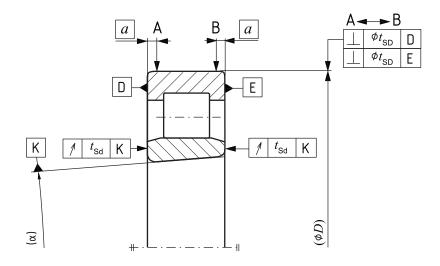


Figure 8 — Geometrical tolerances for single components of bearing with tapered bore