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Rolling bearings — Cylindrical rollers —

Part 1: Boundary dimensions, geometrical product specifications (GPS) and tolerance values for steel rollers

Roulements — Rouleaux cylindriques —
Partie 1: Dimensions d'encombrement, spécification géométrique des produits (GPS) et valeurs de tolérance pour rouleaux en acier

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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 documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 5, *Needle, cylindrical and spherical roller bearings*.

This first edition of ISO 12297-1 cancels and replaces ISO 12297:2012, which has been technically revised.

The main changes are as follows:

— the geometrical product specification (GPS) system has been introduced into the document;

— the document was revised editorially.

A list of all parts in the ISO 12297 series can be found on the ISO website.

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 specification system (GPS system) as described in the framework document of ISO 14638[10].

The fundamental rules of ISO GPS given in ISO 8015[5] apply to this document and the default decision rules given in ISO 14253-1[8] apply to specifications made in accordance with this document, unless otherwise indicated.

The connection between functional requirements, measuring technique and measuring uncertainty are always intended to be considered. For measurement uncertainty, ISO 14253-2[9] is considered.

Rolling bearings — Cylindrical rollers —

Part 1: Boundary dimensions, geometrical product specifications (GPS) and tolerance values for steel rollers

1 Scope

This document specifies nominal boundary dimensions, geometrical product specifications (GPS) and tolerance values for finished steel cylindrical rollers for rolling bearings. The maximum roller diameter is 40 mm.

Annexes A and B give the sorting principles for roller diameter and roller length tolerances and gauges, respectively.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

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

ISO 15241, *Rolling bearings — Symbols for physical quantities*

ISO 21204, *Geometrical product specifications (GPS) — Transition specification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1101, ISO 4288, ISO 14405-1, ISO 15241, ISO 21204 and the following 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/

3.1
roller diameter gauge
amount by which the *mean diameter of the roller diameter gauge lot* (3.5) can differ from the nominal roller diameter, this amount being one of an established series

Note 1 to entry: Each roller diameter gauge is a whole multiple of the *interval of roller diameter gauge* (3.3) established for the roller grade in question.

Note 2 to entry: A roller diameter gauge, in combination with the roller grade and nominal roller diameter, should be considered as the most exact roller size specification to be used by the customer for ordering purposes.

3.2
roller diameter gauge lot
quantity of rollers of the same roller grade and nominal dimensions, all having the mean roller diameter in a single plane within the same *roller diameter gauge* (3.1)

3.3
interval of roller diameter gauge
$\boldsymbol{I_{GDw}}$
amount by which the permitted mean diameter of the *roller diameter gauge lot* (3.2) is divided

Note 1 to entry: The interval of roller diameter gauge and diameter gauge is defined subject to agreement between the customer and the supplier.

3.4
variation of roller diameter
$\boldsymbol{V_{Dwsp}}$
difference between the largest and the smallest of the single roller diameters in a single radial plane

3.5
mean diameter of the roller diameter gauge lot
$\boldsymbol{D_{wmL}}$
average of D_{wmpx} observed on the *roller diameter gauge lot* (3.2)

3.6
roller length gauge
amount by which the *mean length of the roller length gauge lot* (3.9) should differ from the nominal roller length, this amount being one of an established series

Note 1 to entry: Each roller length gauge is a whole multiple of the *interval of roller length gauge* (3.8) established for a certain nominal roller length.

3.7
roller length gauge lot
quantity of rollers having the mean roller length within the same *roller length gauge* (3.6)

3.8
interval of roller length gauge
$\boldsymbol{I_{GLw}}$
amount by which the permitted *mean length of the roller length gauge lot* (3.9) is divided

3.9
mean length of the roller length gauge lot
$\boldsymbol{L_{wmL}}$
arithmetical mean of the mean length of the longest roller and the shortest roller length in a *roller length gauge lot* (3.7)

3.10
variation of the roller length gauge lot
$\boldsymbol{V_{LwL}}$
difference between the mean length of the roller having the largest such length and that of the roller having the smallest such length in a *roller length gauge lot* (3.7)

3.11
$\boldsymbol{G}$
specific combination of geometrical product specifications (GPS) and sorting range for rollers identified by symbol *G* with a modifying alphanumerical symbol according to Table 2

3.12
$\boldsymbol{D_w}$
nominal roller diameter

3.13
$\boldsymbol{D_{wmpx}}$
maximum of mid-range diameter (out of two-point diameter) in any cross-section of the cylindrical part of the roller (only to calculate V_{DwL})

Note 1 to entry: The term "two-point size" is defined in ISO 14405-1:2016, 3.6.1, the term "maximum size" is defined in ISO 14405-1:2016, 3.7.2.2.1, the term "mid-range size" is defined in ISO 14405-1:2016, 3.7.2.2.5, the term "any cross section" is defined in ISO 14405-1:2016, 7.4.

3.14
$\boldsymbol{R_w}$
roundness of roller

Note 1 to entry: The position specification of a median plane is specified in ISO 1101:2017, 17.13.4.

3.15
$\boldsymbol{S_{Dw}}$
circular axial run-out of roller face with respect to datum, i.e. axis, established from the cylindrical part of the roller

Note 1 to entry: The circular run-out specification of circular run-out - axial is specified in ISO 1101:2017, 17.16.3.

3.16
$\boldsymbol{V_{DwL}}$
difference between D_{wmpx} of the largest and the smallest roller in a lot

3.17
$\boldsymbol{V_{Dwmp}}$
range of mid-range diameter (out of two-point diameter) obtained from any cross-section of the cylindrical part of the roller

Note 1 to entry: The term "two-point size" is defined in ISO 14405-1:2016, 3.6.1, the term "mid-range size" is defined in ISO 14405-1:2016, 3.7.2.2.5, the term "range of size" is defined in ISO 14405-1:2016, 3.7.2.2.6, the term "any cross section" is defined in ISO 14405-1:2016, 7.4.

3.18
$\boldsymbol{L_w}$
nominal roller length

3.19
$\boldsymbol{r_{s\,max}}$
largest permissible radial or axial single chamfer dimensions of a roller

3.20
$\boldsymbol{r_{s\,min}}$
smallest permissible radius dimensions of a roller

4 Abbreviated terms

pd minimum profile drop

PS position tolerance of profile drop (the position specification of a median line is specified in ISO 1101:2017, 17.13.3)

5 Graphical description

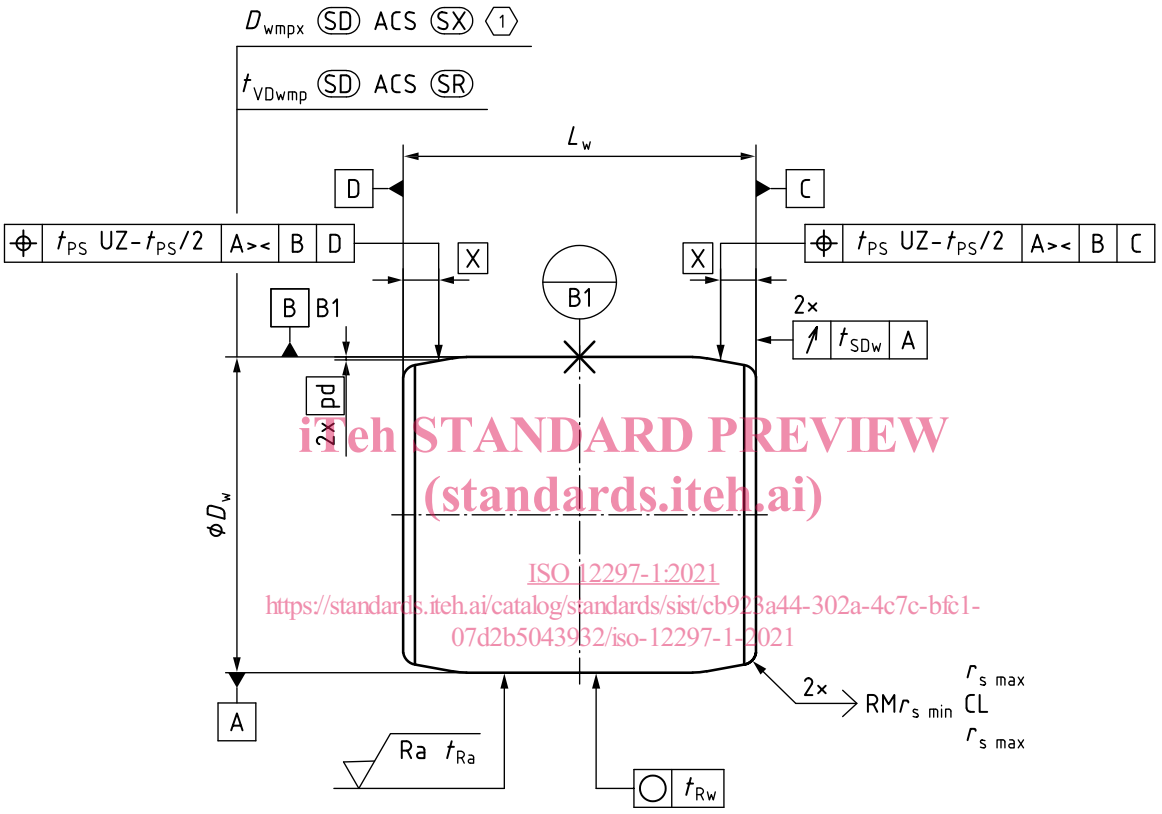
The ISO GPS system in ISO 8015[5] shall apply, the dimensional and geometrical characteristics shall be included in the technical product documentation (for example, on the drawing). The dimensional and geometrical specifications associated to these characteristics are described in Clause 3 and Figure 1.

In this document, the symbols in context with tolerance values, deviation limits and limit values shall be preceded by letter "*t*" in figures and tables. The letter "*t*" is written in italic font. The symbol group shall be subscripted to "*t*" with all symbols in upright font.

EXAMPLE t_{SDw}

For values of upper/lower limit of size the letter "*t*" shall not be indicated because in this document, those values are usually interpreted as nominal dimensions.

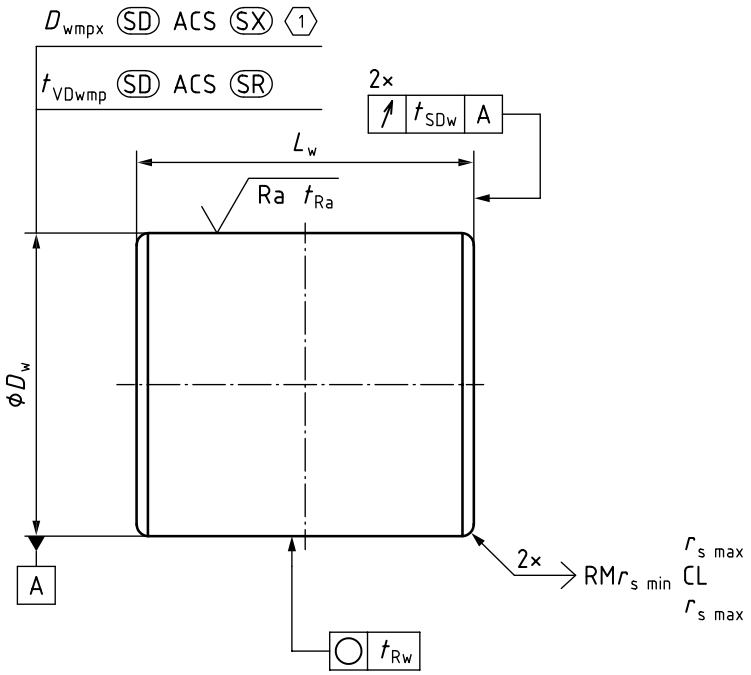
According to ISO 8015[5], specifications shall be completed with Specification Operators, e.g. filtration. These may be agreed between manufacturer and customer case by case.



Key

⟨1⟩ characteristic used only to calculate V_{DwL} for a roller lot

a) Crowned profile



1 characteristic used only to calculate V_{DwL} for a roller lot

b) Straight profile

NOTE 1 The middle part of the crowned roller is assumed to be cylindrical, which is essential to establish an axis.

NOTE 2 The TED X and pd and the tolerance t_{PS} are subject to agreement between customer and supplier.

NOTE 3 The function of crowned profile is to avoid edge stress.

NOTE 4 The tolerance zone offset UZ is used to avoid a symmetrical tolerance zone around pd. Regarding UZ, refer to ISO 1101:2017, 8.2.2.1.3.

Figure 1 — Cylindrical rollers

6 Dimensions

The nominal size of the cylindrical rollers as well as the chamfer dimensions are given in Table 1.

Table 1 — Dimensions

D_w mm	L_w mm	$r_{s\ min}$ mm	$r_{s\ max}$ mm
3	3	0,1	0,7
3	4	0,1	0,7
3	5	0,1	0,7
3,5	5	0,1	0,7
4	4	0,2	0,7
4	6	0,2	0,7
4	8	0,2	0,7
4,5	4,5	0,2	0,7
4,5	6	0,2	0,7