SLOVENSKI STANDARD
oSIST prEN ISO 1101:2014

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Specifikacija geometrijskih veličin izdelka - Toleriranje geometrijskih veličin - Tolerance oblike, orientacije, položaja in opleta (ISO/DIS 1101:2014)

Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out (ISO/DIS 1101:2014)

Geometrische Produktspezifikation (GPS) - Geometrische Tolerierung - Tolerierung von Form, Richtung, Ort und Lauf (ISO/DIS 1101:2014)

Spécification géométrique des produits (GPS) - Tolérancement géométrique - Tolérancement de forme, orientation, position et battement (ISO/DIS 1101:2014)

Ta slovenski standard je istoveten z: **prEN ISO 1101**

ICS:

01.100.20	Konstrukcijske risbe	Mechanical engineering drawings
17.040.10	Tolerance in ujemi	Limits and fits

oSIST prEN ISO 1101:2014 **en**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 1101.2

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Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out

Spécification géométrique des produits (GPS) — Tolérancement géométrique — Tolérancement de forme, orientation, position et battement

ICS: 01.100.20;17.040.10

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1101 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verifications*.

This fourth edition cancels and replaces the third edition (ISO 1101:2012), its Corrigendum ISO 1101:2012/Cor.1:2013 and its draft amendment ISO 1101:2012/DAmd.1, which have been technically revised.

Annex B, C, E, F and G are normative.

Annex A, D and H are for information only.

Introduction

This International Standard is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences chain links 1, 2 and 3 of the chain of standards on form, orientation, location and run out, and chain link 1 of the chain of standards on datums.

The ISO GPS Masterplan given in ISO/TR 14638 gives an overview of the ISO GPS system of which this document is a part. The fundamental rules of ISO GPS given in ISO 8015 apply to this document. The default decision rules given in ISO 14253-1 apply to specifications made in accordance with this document, unless otherwise stated.

For more detailed information on the relation of this International Standard to the GPS matrix model, see Annex D.

This International Standard represents the initial basis and describes the required fundamentals for geometrical tolerancing. Nevertheless, it is advisable to consult the separate standards referenced in Clause 2 and in Tables 2 and 3 for more detailed information.

For the presentation of lettering (proportions and dimensions), see ISO 3098-2.

All figures in this International Standard for the 2D drawing indications have been drawn in first-angle projection with dimensions and tolerances in millimetres. It should be understood that third-angle projection and other units of measurement could have been used equally well without prejudice to the principles established. For all figures giving tolerancing examples in 3D, the dimensions and tolerances are the same as for the similar figures shown in 2D.

The illustrations in this International Standard represent either 2D drawing views or 3D axonometric views on 2D drawings and are intended to illustrate how a specification can be fully indicated with visible annotation. For possibilities of illustrating a specification where elements of the specification may be available through a query function or other interrogation of information on the 3D CAD model and rules for attaching specifications to 3D CAD models, see ISO 16792.

The figures in this International Standard illustrate the text and are not intended to reflect an actual application. Consequently, the figures are not fully dimensioned and toleranced, showing only the relevant general principles. Neither are the figures intended to imply a particular display requirement in terms of whether hidden detail, tangent lines or other annotations are shown or not shown. Many figures have lines or details removed for clarity, or added or extended to assist with the illustration of the text.

For a definitive presentation (proportions and dimensions) of the symbolization for geometrical tolerancing, see ISO 7083.

Annex A of this International Standard has been provided for information only. It presents previous drawing indications that have been omitted here and are no longer used.

It needs to be noted that the former use of the term “circularity” has been changed to the term “roundness” for reasons of consistency with other standards.

Definitions of features are taken from ISO 17450-1 and ISO 14660-2, which provide new terms different from those used in previous edition of this International Standard. The former terms are indicated in the text following the new terms, between parentheses.

For the purposes of this International Standard, the terms “axis” and “median plane” are used for derived features of perfect form, and the terms “median line” and “median surface” for derived features of imperfect form. Furthermore, the following line types have been used in the explanatory illustrations, i.e. those representing non-technical drawings for which the rules of ISO 128 (all parts) apply.

Feature level	Feature type	Details	Line type	
			Visible	Behind plane/surface
Nominal feature (ideal feature)	integral feature	point line/axis surface/plane	wide continuous	narrow dashed
	derived feature	point line/axis face/plane	narrow long dashed dotted	narrow dashed dotted
Real feature	integral feature	surface	wide freehand continuous	narrow freehand dashed
Extracted feature	integral surface	point line surface	wide short dashed	narrow short dashed
	derived feature	point line face	wide dotted	narrow dotted
Associated feature	integral feature	point straight line ideal feature	wide doubled-dashed double-dotted	narrow double-dashed double-dotted
	derived feature	point straight line plane	narrow long dashed double-dotted	wide dashed double-dotted
	datum	point line surface/plane	wide long dashed double-short dashed	narrow long dashed double-short dashed
Tolerance zone limits, tolerances planes		line surface	continuous narrow	narrow dashed
Section, illustration plane, drawing plane, aid plane		line surface	narrow long dashed short dashed	narrow dashed short dashed
Extension, dimension, leader and reference lines		line	continuous narrow	narrow dashed

Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out

IMPORTANT — The illustrations included in this International Standard are intended to illustrate the text and/or to provide examples of the related technical drawing specification; these illustrations are not fully dimensioned and toleranced, showing only the relevant general principles.

As a consequence, the illustrations are not a representation of a complete workpiece, and are not of a quality that is required for use in industry (in terms of full conformity with the standards prepared by ISO/TC 10 and ISO/TC 213), and as such are not suitable for projection for teaching purposes.

1 Scope

This International Standard contains basic information and gives requirements for the geometrical tolerancing of workpieces.

It represents the initial basis and defines the fundamentals for geometrical tolerancing.

The illustrations in this International Standard are intended to illustrate how a specification can be fully indicated with visible annotation.

NOTE 1 Other International Standards referenced in Clause 2 and in Tables 2 and 3 provide more detailed information on geometrical tolerancing.

NOTE 2 As an alternative to this International Standard, ISO 16792 gives possibilities of attaching specifications to 3D CAD models, where elements of the specification may be available through a query function or other interrogation of information on the model instead of being indicated using visible annotation.

2 Normative references

The following referenced documents are indispensable for the application 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 128-24:1999, *Technical drawings — General principles of presentation — Part 24: Lines on mechanical engineering drawings*

ISO 1660:1987, *Technical drawings — Dimensioning and tolerancing of profiles*

ISO 2692:2006, *Geometrical product specifications (GPS) — Geometrical tolerancing — Maximum material requirement (MMR), least material requirement (LMR) and reciprocity requirement (RPR)*

ISO 5458:1998, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Positional tolerancing*

ISO 5459:2011, *Geometrical product specifications (GPS) — Geometrical tolerancing — Datums and datum systems*

ISO 7083:1983, *Technical drawings — Symbols for geometrical tolerancing — Proportions and dimensions*.

ISO 8015:2011, *Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules*

ISO 10579:2010, *Geometrical product specifications (GPS) — Dimensioning and tolerancing — Non-rigid parts*

ISO 12180-1:2011, *Geometrical product specifications (GPS) — Cylindricity — Part 1: Vocabulary and parameters of cylindrical form*

ISO 12180-2:2011, *Geometrical product specifications (GPS) — Cylindricity — Part 2: Specification operators*

ISO 12181-1:2011, *Geometrical product specifications (GPS) — Roundness — Part 1: Vocabulary and parameters of roundness*

ISO 12181-2:2011, *Geometrical product specifications (GPS) — Roundness — Part 2: Specification operators*

ISO 12780-1:2011, *Geometrical product specifications (GPS) — Straightness — Part 1: Vocabulary and parameters of straightness*

ISO 12780-2:2011, *Geometrical product specifications (GPS) — Straightness — Part 2: Specification operators*

ISO 12781-1:2011, *Geometrical product specifications (GPS) — Flatness — Part 1: Vocabulary and parameters of flatness*

ISO 12781-2:2011, *Geometrical product specifications (GPS) — Flatness — Part 2: Specification operators*

ISO 13715:2000, *Technical drawings — Edges of undefined shape — Vocabulary and indications*

ISO 14660-2:1999, *Geometrical Product Specifications (GPS) — Geometrical features — Part 2: Extracted median line of a cylinder and a cone, extracted median surface, local size of an extracted feature*

ISO/TS 16610-1:2006, *Geometrical Product Specifications (GPS) — Filtration — Part 1: Overview and basic concepts*

ISO/TS 16610-20:2006, *Geometrical Product Specifications (GPS) — Filtration — Part 20: Linear profile filters: Basic concepts*

ISO 16610-21:2011, *Geometrical Product Specifications (GPS) — Filtration — Part 21: Linear profile filters: Gaussian filters*

ISO/TS 16610-22:2006, *Geometrical Product Specifications (GPS) — Filtration — Part 22: Linear profile filters: Spline filters*

ISO/TS 16610-28:2010, *Geometrical Product Specifications (GPS) — Filtration — Part 28: Profile filters: End effects*

ISO/TS 16610-29:2006, *Geometrical Product Specifications (GPS) — Filtration — Part 29: Linear profile filters: Spline wavelets*

ISO/TS 16610-30:2009, *Geometrical Product Specifications (GPS) — Filtration — Part 30: Robust profile filters: Basic concepts*

ISO/TS 16610-31:2010, *Geometrical Product Specifications (GPS) — Filtration — Part 31: Robust profile filters: Gaussian regression filters*

ISO/TS 16610-32:2009, *Geometrical Product Specifications (GPS) — Filtration — Part 32: Robust profile filters: Spline filters*

ISO/TS 16610-40:2006, *Geometrical Product Specifications (GPS) — Filtration — Part 40: Morphological profile filters: Basic concepts*

ISO/TS 16610-41:2006, *Geometrical Product Specifications (GPS) — Filtration — Part 41: Morphological profile filters: Disk and horizontal line-segment filters*

ISO 17450-1:2011, *Geometrical Product Specifications (GPS) — General concepts — Part 1: Model for geometrical specification and verification*

ISO 17450-2:2012, *Geometrical product specifications (GPS) — General concepts — Part 2: Basic tenets, specifications, operators, uncertainties and ambiguities*

ISO 25378:2011, *Geometrical product specifications (GPS) — Characteristics and conditions — Definitions*

3 Terms and definitions

For the purpose of this International Standard, the terms and definitions given in ISO 8015, ISO 12180-1, ISO 12181-1, ISO 12780-1, ISO 12781-1, ISO 14660-2, ISO 16610-series, ISO 17450-1, ISO 17450-2, ISO 22432 and the following apply.

3.1
tolerance zone
space limited by one or several geometrically perfect lines or surfaces, and characterized by a linear dimension, called a tolerance

NOTE to entry See also 4.4.

3.2
intersection plane
plane, established from an extracted feature of the workpiece, identifying a line on an extracted surface (integral or median) or a point on an extracted line

NOTE to entry The use of intersection planes makes it possible to define toleranced features independent of the view.

3.3
orientation plane
plane, established from an extracted feature of the workpiece, identifying the orientation of the tolerance zone

NOTE 1 to entry The use of an orientation plane makes it possible to define the direction of the width of the tolerance zone independent of the TEDs (for location) or of the datum (for orientation).

NOTE 2 to entry The orientation plane is only used when the toleranced feature is a median feature (centre point, median straight line) and the tolerance zone is defined by two parallel straight lines or two parallel planes.

3.4
direction feature
feature, established from an extracted feature of the workpiece, identifying the direction of the width of the tolerance zone

NOTE 1 to entry The direction feature can be a plane, a cylinder or a cone.

NOTE 2 to entry For a line in a surface, the use of a direction feature makes it possible to change the direction of the width of the tolerance zone.

NOTE 3 to entry The direction feature is used on a complex surface or a complex profile when the direction of the tolerance value is not normal to the specified geometry.

NOTE 4 to entry By default, the direction feature is a cone, a cylinder or a plane constructed from the datum or datum system indicated in the second compartment of the direction feature indicator. The geometry of the direction feature depends on the geometry of the toleranced feature.

3.5
compound continuous feature
feature composed of several single features joined together without gaps

NOTE 1 to entry A compound continuous feature can be closed or not.

NOTE 2 to entry A non-closed compound continuous feature can be defined using the “between” symbol (see 9.1.4).

NOTE 3 to entry A closed compound continuous feature can be defined using the “all around” symbol (see 9.1.2). In this case, it is a set of single features whose intersection with any plane parallel to a collection plane is a line or a point.

3.6
collection plane
plane, established from a nominal feature on the workpiece, defining a closed compound continuous feature

NOTE to entry The collection plane may be required when the “all around” symbol is applied.

3.7
theoretically exact dimension
TED
dimension indicated on technical product documentation, which is not affected by an individual or general tolerance

NOTE 1 to entry For the purpose of this International Standard, the term “theoretically exact dimension” has been abbreviated TED.

NOTE 2 to entry A theoretically exact dimension is a dimension used in operations (e.g. association, partition, collection, …).

NOTE 3 to entry A theoretically exact dimension can be a linear dimension or an angular dimension.

NOTE 4 to entry A TED can define

— the extension or the relative location of a portion of one feature,

— the length of the projection of a feature,

— the theoretical orientation or location from one or more features,

— the nominal shape of a feature,

— the theoretical location of datum targets and movable datum targets

NOTE 5 to entry A TED is indicated by a rectangular frame including a value.

3.8
theoretically exact feature
TEF
nominal feature with perfect form and in theoretically exact location and orientation, if applicable

NOTE 1 to entry While a theoretically exact feature (TEF) can be any nominal feature, the term is usually used for complex features and compound features that are defined by theoretically exact dimensions (TEDs) or CAD data.

NOTE 2 to entry The theoretically exact location and orientation, if applicable, is relative to the indicated datum system for the tolerances to the corresponding actual feature.

EXAMPLE 1 The spherical surface shown in figure 108 is a theoretically exact feature, with a defined spherical radius and a defined location and orientation relative to datum A.

EXAMPLE 2 A virtual condition, e.g. a maximum material virtual condition (MMVC) according to ISO 2692 is a theoretically exact feature.

3.9
united feature
single compound feature defined from more than one single feature, which may or may not be continuous