



SLOVENSKI STANDARD SIST EN ISO 1101:2006

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Geometrical Product Specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out (ISO 1101:2004)

Geometrische Produktspezifikation (GPS) - Geometrische Tolerierung - Tolerierung von Form, Richtung, Ort und Lauf (ISO 1101:2004)

Spécification géométrique des produits (GPS) - Tolérancement géométrique - Tolérancement de forme, orientation, position et battement (ISO 1101:2004)

Ta slovenski standard je istoveten z: EN ISO 1101:2005

ICS:

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

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 1101

November 2005

ICS 01.100.20; 17.040.10

English Version

**Geometrical Product Specifications (GPS) - Geometrical
tolerancing - Tolerances of form, orientation, location and run-
out (ISO 1101:2004)**

Spécification géométrique des produits (GPS) -
Tolérancement géométrique - Tolérancement de forme,
orientation, position et battement (ISO 1101:2004)

Geometrische Produktspezifikation (GPS) - Geometrische
Tolerierung - Tolerierung von Form, Richtung, Ort und Lauf
(ISO 1101:2004)

This European Standard was approved by CEN on 3 November 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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EN ISO 1101:2005 (E)**Foreword**

The text of ISO 1101:2004 has been prepared by Technical Committee ISO/TC 213 "Dimensional and geometrical product specifications and verification" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 1101:2005 by Technical Committee CEN/TC 290 "Dimensional and geometrical product specification and verification", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

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INTERNATIONAL STANDARD

ISO 1101

Second edition
2004-12-15

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*

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ISO 1101:2004(E)**Foreword**

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 verification*.

This second edition cancels and replaces the first edition (ISO 1101:1983), which has been technically revised.

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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 and 2 of the chain of standards on form, orientation, location and run out, and chain link 1 of the chain of standards on datums.

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

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 Table 2 for more detailed information.

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

In the interest of uniformity, all figures in this International Standard 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.

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.

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

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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.

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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 14660-1 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.

ISO 1101:2004(E)

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.

This and future editions of ISO 1101 will be revised to include improved illustrations whenever new amendments for ISO 1101 have reached the stage of publication.

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.

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

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:—¹⁾, *Geometrical Product Specification (GPS) — Geometrical tolerancing — Maximum material requirement (MMR) and least material requirement (LMR)*

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

ISO 5459:1981, *Technical drawings — Geometrical tolerancing — Datums and datum-systems for geometrical tolerances*

1) To be published. (Revision of ISO 2692:1988)

ISO 1101:2004(E)

ISO 8015:1985, *Technical drawings — Fundamental tolerancing principle*

ISO 10578:1992, *Technical drawings — Tolerancing of orientation and location — Projected tolerance zone*

ISO 10579:1993, *Technical drawings — Dimensioning and tolerancing — Non-rigid parts*

ISO/TS 12180-1:2003, *Geometrical Product Specifications (GPS) — Cylindricity — Part 1: Vocabulary and parameters of cylindrical form*

ISO/TS 12180-2:2003, *Geometrical Product Specifications (GPS) — Cylindricity — Part 2: Specification operators*

ISO/TS 12181-1:2003, *Geometrical Product Specifications (GPS) — Roundness — Part 1: Vocabulary and parameters of roundness*

ISO/TS 12181-2:2003, *Geometrical Product Specifications (GPS) — Roundness — Part 2: Specification operators*

ISO/TS 12780-1:2003, *Geometrical Product Specifications (GPS) — Straightness — Part 1: Vocabulary and parameters of straightness*

ISO/TS 12780-2:2003, *Geometrical Product Specifications (GPS) — Straightness — Part 2: Specification operators*

ISO/TS 12781-1:2003, *Geometrical Product Specifications (GPS) — Flatness — Part 1: Vocabulary and parameters of flatness*

ISO/TS 12781-2:2003, *Geometrical Product Specifications (GPS) — Flatness — Part 2: Specification operators*

ISO 14660-1:1999, *Geometrical Product Specifications (GPS) — Geometrical features — Part 1: General terms and definitions*

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*

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ISO/TS 17450-2:2002, *Geometrical product specifications (GPS) — General concepts — Part 2: Basic tenets, specifications, operators and uncertainties*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14660-1 and ISO 14660-2 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 See also 4.4.

4 Basic concepts

4.1 Geometrical tolerances shall be specified in accordance with functional requirements. Manufacturing and inspection requirements can also influence geometrical tolerancing.

NOTE Indicating geometrical tolerances on a drawing does not necessarily imply the use of any particular method of production, measurement or gauging.

4.2 A geometrical tolerance applied to a feature defines the tolerance zone within which that feature shall be contained.

4.3 A feature is a specific portion of the workpiece, such as a point, a line or a surface; these features can be integral features (e.g. the external surface of a cylinder) or derived (e.g. a median line or median surface). See ISO 14660-1.

4.4 According to the characteristic to be tolerated and the manner in which it is dimensioned, the tolerance zone is one of the following:

- the space within a circle;
- the space between two concentric circles;
- the space between two equidistant lines or two parallel straight lines;
- the space within a cylinder;
- the space between two coaxial cylinders
- the space between two equidistant surfaces or two parallel planes;
- the space within a sphere.

4.5 Unless a more restrictive indication is required, for example by an explanatory note (see Figure 8), the tolerated feature may be of any form or orientation within this tolerance zone.

4.6 The tolerance applies to the whole extent of the considered feature unless otherwise specified as in Clauses 12 and 13.

4.7 Geometrical tolerances which are assigned to features related to a datum do not limit the form deviations of the datum feature itself. It may be necessary to specify tolerances of form for the datum feature(s).

ISO 1101:2004(E)

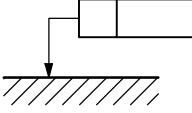
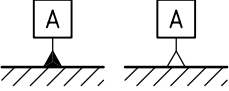






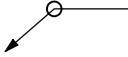

5 Symbols

See Tables 1 and 2.

Table 1 — Symbols for geometrical characteristics

Tolerances	Characteristics	Symbol	Datum needed	Subclause
Form	Straightness	—	no	18.1
	Flatness	▭	no	18.2
	Roundness	○	no	18.3
	Cylindricity	∕	no	18.4
	Profile any line	∩	no	18.5
	Profile any surface	∪	no	18.7
Orientation	Parallelism	//	yes	18.9
	Perpendicularity	⊥	yes	18.10
	Angularity	∠	yes	18.11
	Profile any line	∩	yes	18.6
	Profile any surface	∪	yes	18.8
Location	Position	⊕	yes or no	18.12
	Concentricity (for centre points)	◎	yes	18.13
	Coaxiality (for axes)	◎	yes	18.13
	Symmetry	≡	yes	18.14
	Profile any line	∩	yes	18.6
	Profile any surface	∪	yes	18.8
Run-out	Circular run-out	↗	yes	18.15
	Total run-out	↗↗	yes	18.16

Table 2 — Additional symbols

Description	Symbol	Reference
Toleranced feature indication		Clause 7
Datum feature indication		Clause 9 and ISO 5459
Datum target indication		ISO 5459
Theoretically exact dimension		Clause 11
Projected tolerance zone		Clause 13 and ISO 10578
Maximum material requirement		Clause 14 and ISO 2692
Least material requirement		Clause 15 and ISO 2692
Free state condition (non-rigid parts)		Clause 16 and ISO 10579
All around (profile)		Subclause 10.1
Envelope requirement		ISO 8015
Common zone	CZ	Subclause 8.5
Minor diameter	LD	Subclause 10.2
Major diameter	MD	Subclause 10.2
Pitch diameter	PD	Subclause 10.2
Line element	LE	Subclause 18.9.4
Not convex	NC	Subclause 6.3
Any cross-section	ACS	Subclause 18.13.1