

**Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out (ISO 1101:2012, including Cor 1:2013)**

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# EESTI STANDARDI EESSÕNA

# NATIONAL FOREWORD

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English Version

## Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out (ISO 1101:2012, including Cor 1:2013)

Spécification géométrique des produits (GPS) - Tolérancement géométrique - Tolérancement de forme, orientation, position et battement (ISO 1101:2012, y compris Cor 1:2013)

Geometrische Produktspezifikation (GPS) - Geometrische Tolerierung - Tolerierung von Form, Richtung, Ort und Lauf (ISO 1101:2012, einschließlich Cor 1:2013)

This European Standard was approved by CEN on 5 February 2013.

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## Foreword

The text of ISO 1101:2012, including Cor 1:2013 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 1101:2013 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of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

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### Endorsement notice

The text of ISO 1101:2012, including Cor 1:2013 has been approved by CEN as EN ISO 1101:2013 without any modification.

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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, 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 Table 2 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 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 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.

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

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# 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.

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 2692:2006, *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 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 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*

ISO 17450-2:—<sup>1</sup>, *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.

**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 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 For a derived feature, the use of an orientation plane makes it possible to define the direction of the width of the tolerance zone independent of the TEDs (case of location) or of the datum (case of orientation).

NOTE 2 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.

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<sup>1</sup> To be published. (Revision of ISO/TS 17450-2:2002)