

RATIFICACIÓN DE DOCUMENTOS EUROPEOS ABRIL 2013

HOJA DE ANUNCIO

En cumplimiento del punto 11.2.6.4 de las Reglas Internas de CEN/CENELEC Parte 2, se ha otorgado el rango de norma española al Documento Europeo siguiente:

Documento Europeo	Título	Fecha de Disponibilidad
EN ISO 1101:2013	Especificación geométrica de productos (GPS). Tolerancia geométrica. Tolerancias de forma, orientación, localización y alabeo (ISO 1101:2012, incluido Cor 1:2013). (Ratificada por AENOR en abril de 2013.)	2013-02-20

Este anuncio causará efecto a partir del primer día del mes siguiente al de su publicación en la revista UNE. La correspondiente versión oficial de este documento se encuentra disponible en la sede de AENOR, Calle Génova 6, 28004 MADRID.

©..2013.. Derechos de reproducción reservados a los Miembros de CEN.

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.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents	Page
Foreword.....	3

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.

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

This document supersedes EN ISO 1101:2005.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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.

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Basic concepts	4
5 Symbols	5
6 Tolerance frame	7
7 Toleranced features	8
8 Tolerance zones	10
9 Datums	16
10 Supplementary indications	19
11 Theoretically exact dimensions (TED)	25
12 Restrictive specifications	25
13 Projected tolerance zone	27
14 Free state condition	30
15 Interrelationship of geometrical tolerances	30
16 Intersection planes	30
17 Orientation planes	33
18 Definitions of geometrical tolerances	35
Annex A (informative) Former practices	92
Annex B (normative) Assessment of geometrical deviations	95
Annex C (normative) Relations and dimensions of graphical symbols	99
Annex D (informative) Relation to the GPS matrix model	101
Bibliography	103

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 third edition cancels and replaces the second edition (ISO 1101:2004) and ISO 10578:1992. Representations of specifications in the form of a 3D model have been added.

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

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:—¹, *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.

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

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 The direction feature can be a plane, a cylinder or a cone.

NOTE 2 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 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 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 tolerated feature.

3.5**compound contiguous feature**

feature composed of several single features joined together without gaps

NOTE 1 A compound contiguous feature can be closed or not.

NOTE 2 A non-closed compound contiguous feature can be defined by the way of using the “between” symbol (see 10.1.4).

NOTE 3 A closed compound contiguous feature can be defined by the way of using the “all around” symbol (see 10.1.2). 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 contiguous feature

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

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

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

NOTE 4 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, or
- the nominal shape of a feature.

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