



# SLOVENSKI STANDARD SIST EN ISO 22432:2012

01-januar-2012

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## Specifikacija geometrijskih veličin izdelka - Značilnosti, potrebne za geometrijsko specifikacijo in preverjanje (ISO 22432:2011)

Geometrical product specifications (GPS) - Features utilized in specification and verification (ISO 22432:2011)

Geometrische Produktspezifikation (GPS) - Zur Spezifikation und Prüfung benutzte Geometrielemente (ISO 22432:2011)

Spécification géométrique des produits - Éléments utilisés en spécification et vérification (ISO 22432:2011)

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### ICS:

17.040.40	Specifikacija geometrijskih veličin izdelka (GPS)	Geometrical Product Specification (GPS)
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EN ISO 22432

NORME EUROPÉENNE

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## Geometrical product specifications (GPS) - Features utilized in specification and verification (ISO 22432:2011)

Spécification géométrique des produits (GPS) - Éléments utilisés en spécification et vérification (ISO 22432:2011)

Geometrische Produktspezifikation (GPS) - Zur Spezifikation und Prüfung benutzte Geometrielemente (ISO 22432:2011)

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## Foreword

This document (EN ISO 22432:2011) has been prepared by Technical Committee ISO/TC 213 "Dimensional and geometrical product specifications and verification" in collaboration with 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of an identical text or by endorsement, at the latest by May 2012, and conflicting national standards shall be withdrawn at the latest by May 2012.

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.

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# INTERNATIONAL STANDARD

**ISO**  
**22432**

First edition  
2011-11-15

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## **Geometrical product specifications (GPS) — Features utilized in specification and verification**

*Spécification géométrique des produits (GPS) — Éléments utilisés en  
spécification et vérification*

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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 22432 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

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## Introduction

This International Standard is a Geometrical Product Specifications (GPS) standard and is to be regarded as a global GPS standard (see ISO/TR 14638). It influences all chain links in all chains of standards in the general GPS matrix.

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 and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this document, unless otherwise indicated.

Geometrical features exist in three “worlds”:

- the world of nominal definition, where an ideal representation of the workpiece is defined by the designer;
- the world of specification, where the designer has in mind several representations of the workpiece;
- the world of verification, where one (or more) representation(s) of a given workpiece is (are) identified in the application of measuring procedure(s).

In the world of verification, mathematical operations can be distinguished from physical operations. The physical operations are the operations based on physical procedures; they are generally mechanical, optical or electromagnetic. The mathematical operations are mathematical treatments of the sampling of the workpiece. This treatment is generally achieved by computing or electronic treatment.

It is important to understand the relationship between these three worlds. This International Standard defines standardized terminology for geometrical features principally in the world of specification and the world of verification, to be used in communication between each world.

The features defined in this International Standard are well suited for the specification of rigid parts and assemblies, and may also be applied to non-rigid parts and assemblies by specifying allowable variation according to rigid solids.

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# Geometrical product specifications (GPS) — Features utilized in specification and verification

## 1 Scope

This International Standard defines general terms and types of features for geometrical features of specifications for workpieces. These definitions are based on concepts developed in ISO/TS 17450-1.

This International Standard aims to serve as the “road map” mapping out the interrelationship between geometrical features, thus enabling future standardization for industry and software makers in a consistent manner.

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

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ISO/TS 17450-1:2005, *Geometrical product specifications (GPS) — General concepts — Part 1: Model for geometrical specification and verification*

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, ISO/TS 17450-1 and ISO/TS 17450-2 and the following apply.

### 3.1

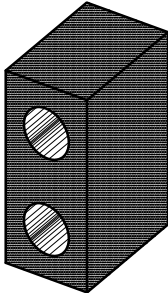
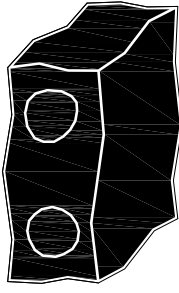
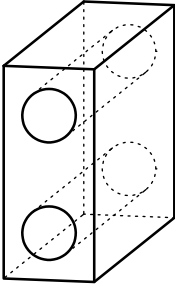
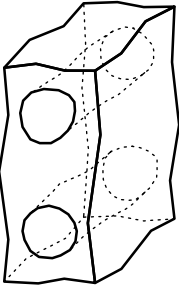
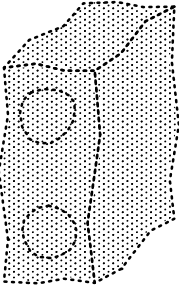
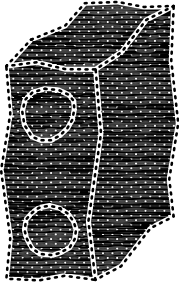
#### surface model

model representing the set of features limiting the virtual or the real workpiece

NOTE 1 All closed surfaces (see Figures 1 and A.1) are included.

NOTE 2 The surface model allows the definition of single features, sets of features, and/or portions of features. The total product is modelled by a set of surface models corresponding to each workpiece.

EXAMPLE Case of a hollow surface.

Representation of a real surface of the workpiece		Representation of the real workpiece <sup>a</sup>	
			
Representation of nominal surface model	Representation of skin model	Representation of discrete surface model	Representation of sampled surface model
			
<sup>a</sup> For the purpose of this International Standard.			

NOTE It is impossible to predict the total geometry of the real workpiece due to its geometrical imperfections. In this International Standard, a real surface of the workpiece is illustrated in solid black.

Figure 1 — Example of real surface of the workpiece and its models

### 3.1.1

#### nominal surface model

surface model of ideal geometry defined by the technical product documentation

NOTE 1 A nominal surface model is an ideal feature (See Figure 1 and Table 1).

NOTE 2 A nominal surface model is a continuous surface composed of an infinite number of points.

NOTE 3 Any feature on the nominal surface model (skin model) contains a continuous infinite number of points.

### 3.1.2

#### skin model

surface model of non-ideal geometry

NOTE 1 The skin model is a virtual model used to express the specification operator and the verification operator considering a continuous surface (see Table 1 and ISO/TS 17450-1).

NOTE 2 A skin model is a non-ideal feature (see Figure 1).

NOTE 3 A skin model is a continuous surface consisting of an infinite number of points.

NOTE 4 Any feature on the skin model contains a continuous infinite number of points.

**3.1.3****discrete surface model**

surface model obtained from the skin model by an extraction

NOTE 1 In addition to the required points, the extraction implies an interpolation.

NOTE 2 The discrete surface model is used to express the specification operator and the verification operator considering a finite number of points (see Table 1).

NOTE 3 A discrete surface model is a non-ideal feature (see Figure 1).

**3.1.4****sampled surface model**

surface model obtained from the real workpiece model by a physical extraction

NOTE 1 In addition to the sampled points, the verification may imply an interpolation.

NOTE 2 The sampled surface model is used in verification by coordinate metrology, not, for example, in verification by a gauge because gauging makes no measurement of points. In verification by a gauge, the real surface of the workpiece is directly considered (see Table 1).

NOTE 3 A sampled surface model is a non-ideal feature (see Figure 1).

**3.2****geometrical feature**

point, line, surface, volume or a set of these previous items

NOTE 1 The non-ideal surface model is a particular geometrical feature, corresponding to the infinite set of points defining the interface between the workpiece and the surrounding.

NOTE 2 A geometrical feature can be an ideal feature or a non-ideal feature, and can be considered as a single feature or a compound feature.

**3.2.1****nominal feature**

geometrical feature of ideal geometry defined in the technical product documentation by the product designer

NOTE 1 See Figure B.1.

NOTE 2 A nominal feature is defined by the technical product documentation. See Table 1.

NOTE 3 A nominal feature can be finite or infinite; by default it is infinite.

EXAMPLE A perfect cylinder, defined in a drawing, is a nominal feature obeying a specific mathematical formula, which is defined in a coordinate system related to the situation feature, and for which dimensional parameters are associated. The situation feature of a cylinder is a line which is commonly called "its axis". Taking this line as an axis of a Cartesian coordinate system leads to writing  $x^2 + y^2 = D/2$ ,  $D$  being a dimensional parameter. A cylinder is a feature of size, of which the size is its diameter  $D$ .

**3.2.2****real feature**

geometrical feature corresponding to a part of the workpiece real surface

**3.2.3****discrete feature**

geometrical feature corresponding to a part of the discrete surface model

**3.2.4****sampled feature**

geometrical feature corresponding to a part of the sampled surface model