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I.S. EN ISO 14405-1:2010

# Geometrical product specifications (GPS) - Dimensional tolerancing - Part 1: Linear sizes (ISO 14405-1:2010)

## I.S. EN ISO 14405-1:2010

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<b>NSAI</b> 1 Swift Square, Northwood, Santry Dublin 9	T +353 1 807 3800 F +353 1 807 3838 E standards@nsai.ie W NSAI.ie	<b>Sales:</b> T +353 1 857 6730 F +353 1 857 6729 W standards.ie
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English Version

## Geometrical product specifications (GPS) - Dimensional tolerancing - Part 1: Linear sizes (ISO 14405-1:2010)

Spécification géométrique des produits (GPS) -  
Tolérancement dimensionnel - Partie 1: Tailles linéaires  
(ISO 14405-1:2010)

Geometrische Produktspezifikation (GPS) - Dimensionelle  
Tolerierung - Teil 1: Längenmaße (ISO 14405-1:2010)

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## **Foreword**

This document (EN ISO 14405-1:2010) has been prepared by Technical Committee ISO/TC 213 “Dimensional and geometrical product specifications and verification” in collaboration with the 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of an identical text or by endorsement, at the latest by June 2011, and conflicting national standards shall be withdrawn at the latest by June 2011.

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**Geometrical product specifications  
(GPS) — Dimensional tolerancing —**

Part 1:  
**Linear sizes**

*Spécification géométrique des produits (GPS) — Tolérancement  
dimensionnel —*

*Partie 1: Tailles linéaires*



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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 14405-1 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

ISO 14405 consists of the following parts, under the general title *Geometrical product specification (GPS) — Dimensional tolerancing*:

- *Part 1: Linear sizes*
- *Part 2: Dimensions other than linear sizes*

## **Introduction**

This part of ISO 14405 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 to 3 of the chain of standards on size.

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.

For more detailed information of the relation of this part of ISO 14405 to other standards and the GPS matrix model, see Annex D.

Produced workpieces exhibit deviations from the ideal geometric form. The real value of the dimension of a feature of size is dependent on the form deviations and on the specific type of size applied.

The type of size to be applied to a feature of size depends on the function of the workpiece.

The type of size can be indicated on the drawing by a specification modifier for controlling the feature definition and evaluation method to be used.



# Geometrical product specifications (GPS) — Dimensional tolerancing —

## Part 1: Linear sizes

### 1 Scope

This part of ISO 14405 establishes the default specification operator for linear size and defines a number of special specification operators for linear size for feature of size types “cylinder” and “two parallel opposite planes”. It also defines the specification modifiers and the drawing indications for these linear sizes. This part of ISO 14405 covers the following linear sizes:

- local size;
  - two-point size;
  - spherical size;
  - section size;
  - portion size;
- global size;
  - direct global linear size;
    - least-squares size;
    - maximum inscribed size;
    - minimum circumscribed size;
  - indirect global linear size;
- calculated size;
  - circumference diameter;
  - area diameter;
  - volume diameter;
- rank-order size;
  - maximum size;
  - minimum size;
  - average size;
  - median size;

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- mid-range size;
- range size.

This part of ISO 14405 defines tolerances of linear sizes when there is:

- a + and/or – limit deviation (e.g. 0/–0,019) (see Figure 9);
- an upper limit of size (ULS) and/or lower limit of size (LLS) (e.g. 15,2 max., 12 min. or 30,2/30,181) (see Figure 11);
- an ISO tolerance class code in accordance with ISO 286-1 (e.g. 10 h6) (see Figure 10)

with or without modifiers (see Tables 1 and 2).

This part of ISO 14405 provides a set of tools to express several types of size characteristic. It does not present any information on the relationship between a function or a use and a size characteristic.

## 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 286-1:2010, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

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

ISO 8015:—<sup>1)</sup>, *Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules*

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 17450-1:—<sup>2)</sup>, *Geometrical product specifications (GPS) — General concepts — Part 1: Model for geometrical specification and verification*

ISO 17450-2:—<sup>3)</sup>, *Geometrical product specifications (GPS) — General concepts — Part 2: Basic tenets, specifications, operators and uncertainties*

ISO 81714-1:—<sup>4)</sup>, *Design of graphical symbols for use in the technical documentation of products — Part 1: Basic rules*

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