

Geometrical product specifications (GPS) - Dimensional tolerancing - Part 3: Angular sizes (ISO 14405-3:2016)

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## Geometrical product specifications (GPS) - Dimensional tolerancing - Part 3: Angular sizes (ISO 14405-3:2016)

Spécification géométrique des produits (GPS) -  
Tolérancement dimensionnel - Partie 3: Tailles  
angulaires (ISO 14405-3:2016)

Geometrische Produktspezifikationen (GPS) -  
Dimensionelle Tolerierung - Teil 3:  
Winkelgrößenmaße (ISO 14405-3:2016)

This European Standard was approved by CEN on 2 October 2016.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## European foreword

This document (EN ISO 14405-3:2017) 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of an identical text or by endorsement, at the latest by July 2017, and conflicting national standards shall be withdrawn at the latest by July 2017.

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### Endorsement notice

The text of ISO 14405-3:2016 has been approved by CEN as EN ISO 14405-3:2017 without any modification.

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

The committee responsible for this document is 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*
- *Part 3: Angular 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 14638). In the general GPS matrix, it influences chain links “Symbols and indications”, “Feature requirements” and “Feature properties” of the size chain of standards.

The ISO/GPS Masterplan given in ISO 14638 gives an overview of the ISO/GPS system of which this part of ISO 14405 is a part. The fundamental rules of ISO/GPS given in ISO 8015 apply to this part of ISO 14405 and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this part of ISO 14405, unless otherwise indicated.

For more detailed information on the relation of this part of ISO 14405 to other standards and to the GPS matrix model, see [Annex D](#).

# Geometrical product specifications (GPS) — Dimensional tolerancing —

## Part 3: Angular sizes

### 1 Scope

This part of ISO 14405 establishes the default specification operator for angular size and defines a number of special specification operators for features of angular size: cone (truncated, i.e. frustum, or not), wedge (truncated or not), two opposite straight lines (intersection of a wedge/truncated wedge and a plane perpendicular to the intersection straight line of the two planes of the wedge/truncated wedge, intersection of a cone/frustum and a plane containing the axis of revolution of the cone/frustum). See [Figure 1](#) and [Figure 2](#).

This part of ISO 14405 also defines the specification modifiers and the drawing indications for these angular sizes.

This part of ISO 14405 covers the following angular sizes:

- local angular size:
  - angular size between two lines;
  - portion angular size;
- global angular size:
  - direct global angular size:
    - least squares angular size;
    - minimax angular size;
  - rank order angular size/indirect global angular size:
    - maximum angular size;
    - minimum angular size;
    - average angular size;
    - range of angular sizes;
    - mid-range angular size;
    - median angular size;
    - standard deviation of angular size.

This part of ISO 14405 defines the meaning of tolerances of angular sizes indicated as

- + and/or - limit deviations, e.g.  $0^\circ/-0,5^\circ$ , or
- indicated with upper limit of size (ULS) and/or lower limit of size (LLS), e.g.  $35^\circ$  max. or  $15^\circ$  min.,  $34^\circ/36^\circ$ ,



— with or without modifiers.

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

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8015, *Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules*

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

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

ISO 17450-3, *Geometrical product specification (GPS) — General concepts — Part 3: Toleranced Features*

ISO 14405-1:2016, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 1: Linear sizes*

ISO 14405-2, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 2: Dimensions other than linear sizes*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8015, ISO 17450-1, ISO 17450-2, ISO 17450-3, ISO 14405-1, ISO 14405-2 and the following apply.

For association criteria, it is assumed that the terms “least squares” and “Gaussian” are equivalent, as well as “minimax” and “Chebyshev”. In this document, the terms “least squares” and “minimax” are retained. The least squares criterion is understood without material constraint throughout this part of ISO 14405.

### 3.1

#### **angular size**

angular dimension of a cone or between two coplanar opposite straight lines or between two opposite non parallel planes

Note 1 to entry: The angular size is defined from nominal features or from associated features which are angular features of size.

Note 2 to entry: See example of angular size on [Figure 1](#) and [Figure 2](#).

Note 3 to entry: Definition of “angular feature of size (feature of angular size)” is given in ISO 17450-1, the angle dimension cannot be 0° or 180°.

Note 4 to entry: Angular features of size are of two types.

- Revolute angular feature of size: a cone or a frustum. Two opposite straight lines are established from a longitudinal section of a cone/frustum with a plane containing the associated axis of revolution of the cone/frustum.
- Prismatic angular feature of size: a wedge (truncated or not). Two opposite straight lines are established from a cross section of a wedge/truncated wedge with a plane perpendicular to the intersection straight line of the two associated planes of the wedge/truncated wedge.