Geometrical product specifications (GPS) - Characteristics and conditions - Definitions (ISO 25378:2011)

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NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 25378:2011 sisaldab Euroopa standardi EN ISO 25378:2011 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 25378:2011 consists of the English text of the European standard EN ISO 25378:2011.
Standard on kinnitatud Eesti Standardikeskuse 30.04.2011 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.	This standard is ratified with the order of Estonian Centre for Standardisation dated 30.04.2011 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.
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Geometrical product specifications (GPS) - Characteristics and conditions - Definitions (ISO 25378:2011)

Spécification géométrique des produits - Caractéristiques et conditions - Définitions (ISO 25378:2011)

Geometrische Produktspezifikation (GPS) - Merkmale und Bedingungen - Begriffe (ISO 25378:2011)

This European Standard was approved by CEN on 7 August 2010.

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Foreword

This document (EN ISO 25378:2011) 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of an identical text or by endorsement, at the latest by October 2011, and conflicting national standards shall be withdrawn at the latest by October 2011.

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Endorsement notice

The text of ISO 25378:2011 has been approved by CEN as a EN ISO 25378:2011 without any modification.

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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 of all chains of standards in the general GPS matrix.

To facilitate the reading and the understanding of this International Standard, it is essential to refer to ISO 17450-1 and ISO/TS 17450-2.

Geometrical characteristics exist in three “worlds”:

— the world of nominal geometrical definition, where an ideal representation of the future workpiece is defined by the designer;

— the world of specification, where several representations of the future workpiece are imagined by the designer;

— the world of verification, where one or several representations of a given workpiece are identified in the application of measuring procedure(s).

A GPS specification defines requirements through a geometrical characteristic and condition.

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.

These specifications, characteristics and conditions, generically defined in this International Standard, are well suited to define requirements of rigid parts and assemblies and can also be applied to non-rigid parts and assemblies.

Geometrical product specifications (GPS) — Characteristics and conditions — Definitions

1 Scope

This International Standard defines general terms for geometrical specifications, characteristics and conditions. These definitions are based on concepts developed in ISO 17450-1 and ISO 22432 and they are given by using a mathematical description based on Annex B of ISO 17450-1:2011.

This International Standard is not intended for industrial use as such among designers, but is aimed to serve as the “road map” mapping out the requirements based on geometrical features, thus enabling future standardization for industry and software makers in a consistent manner.

This International Standard defines general types of geometrical characteristics and conditions which can be used in GPS. These descriptions are applicable to

— a workpiece,

— an assembly,

— a population of workpieces, and

— a population of assemblies.

These definitions are based on concepts of operators and the duality principle contained in ISO 17450-1 and ISO/TS 17450-2 and on the description of types of geometrical features defined in ISO 22432.

Conceptually, these specification operators can be used as specification operators or as verification operators (duality principle).

This International Standard is not intended to define GPS specifications, symbology or other types of expression.

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 3534-1:2006, *Statistics — Vocabulary and symbols — Part 1: General statistical terms and terms used in probability*

ISO 3534-2, *Statistics — Vocabulary and symbols — Part 2: Applied statistics*

ISO 17450-1:2011, *Geometrical product specifications (GPS) — General concepts — Part 1: Model for geometrical specification and verification*

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

ISO 22432[1)], *Geometrical product specifications (GPS) — Features utilized in specification and verification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3534-1, ISO 3534-2 and ISO 17450-1 and the following apply.

3.1
geometrical specification
expression of a set of one or more conditions on one or more geometrical characteristics

NOTE 1 A specification can express a combination of individual conditions on an individual characteristic or a population condition on a population characteristic.

NOTE 2 A specification consists of one or more single specifications. These single specifications can be individual specifications, population specifications or any combination.

3.2
condition
combination of a limit value and a binary relational mathematical operator

EXAMPLE 1 "be less than or equal to 6,3", the expression of this condition can be, for instance: 6,3 max or U 6,3. Mathematically: let X be the considered value of the characteristic, the condition is $X \leqslant 6{,}3$.

EXAMPLE 2 "be greater than or equal to 0,8", the expression of this condition can be, for instance: 0,8 min or L 0,8. Mathematically: let X be the considered value of the characteristic, the condition is $0{,}8 \leqslant X$.

EXAMPLE 3 a set of two complementary conditions (lower and upper limits) can be expressed through, for instance: 10,2 – 9,8, $9{,}8\ ^{+0{,}4}_{0}$, 10 ± 0,2, or $9{,}9\ ^{+0{,}3}_{-0{,}1}$. Mathematically: let X be the considered value of the characteristic, the condition is $9{,}8 \leqslant X \leqslant 10{,}2$.

EXAMPLE 4 "be less than or equal to R, R being given by a function, $R = (X^2 + Y^2) \times 0{,}85$, X and Y being the ordinates of the coordinate system.

NOTE 1 A binary relational mathematical operator is a mathematical concept which generalizes the notion as "greater than or equal to" in arithmetic, or "is item of the set" in set theory.

NOTE 2 The limit value can be defined for any individual workpiece or for populations of workpieces.

NOTE 3 The limit value can be independent of a coordinate system or dependent upon it. In the latter case, the limit value depends on the function of the ordinates of the coordinate system or graphical ordinate system.

NOTE 4 The limit value can be determined by a statistical tolerancing approach, by an arithmetical tolerancing (worst case) approach or by other means. The manner of determining the limit value and the choice of condition is not the subject of this International Standard.

NOTE 5 Two possible inequality relations exist:

— the characteristic value can be less than or equal to the limit value (upper limit);

— the characteristic value can be greater than or equal to the limit value (lower limit).

1) In preparation.

