SLOVENSKI STANDARD
SIST EN ISO 25378:2011

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Specifikacija geometrijskih veličin izdelka - Značilnosti in razmere - Definicije (ISO 25378:2011)

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

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

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

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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)

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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of an identical text or by endorsement, at the latest by October 2011, and conflicting national standards shall be withdrawn at the latest by October 2011.

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INTERNATIONAL STANDARD

ISO 25378

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

Spécification géométrique des produits — Caractéristiques et conditions — Définitions

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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.

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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.

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ISO 25378 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

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: $10{,}2 - 9{,}8$, $9{,}8\ ^{+0{,}4}_{0}$, $10 \pm 0{,}2$, 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.

3.2.1
individual condition
condition where the limit value applies to any value of an individual characteristic coming from any workpiece

EXAMPLE An individual condition used in an individual specification: the individual characteristic value shall be less than or equal to 10,2. Mathematically: let X be the considered value of the individual characteristic, the condition is $X \leqslant 10{,}2$.

NOTE An individual condition can be used alone or in combination with a population condition on the corresponding population characteristic.

3.2.2
population condition
condition where the limits apply to the value of the population characteristic

EXAMPLE A population condition used in a population specification: the value of a population characteristic shall be less than or equal to 10,1. Mathematically: let $\overline{X}$ be the considered value of the population characteristic (mean value of the population of global individual characteristic values), the condition is $\overline{X} \leqslant 10{,}1$.

NOTE The population condition can be used for statistical process control (SPC).

3.3
geometrical characteristic
individual characteristic or population characteristic related to the geometry

NOTE 1 This International Standard applies to the field of geometry and therefore, throughout this standard, only "geometrical characteristics" are used. The term "characteristic" is defined in ISO 9000:2005, 3.5.1.

NOTE 2 The geometrical characteristic permits the evaluation of a quantity which could be associated to, for instance, an angular dimension, a linear dimension, an area, a volume, etc.

3.3.1
individual characteristic
individual geometrical characteristic
single geometrical property of one or more geometrical features belonging to a workpiece

EXAMPLE The two-point diameter is an individual characteristic and the result is mathematically varying along the cylindrical feature: it is a local individual characteristic. The minimum circumscribed cylinder diameter is an individual characteristic and the result is mathematically unique: it is a global individual characteristic.

NOTE 1 A local characteristic can be single or calculated.

NOTE 2 The evaluation of an individual characteristic does not necessarily give a unique result (it can be characterized as a local individual characteristic or a global individual characteristic).

3.3.1.1
local individual characteristic
individual characteristic of which the result of evaluation is not unique

EXAMPLE 1 The two-point diameter is an individual characteristic and the result varies mathematically along the cylindrical feature: it is a local individual characteristic.

EXAMPLE 2 See 5.3.

NOTE 1 A local individual characteristic is evaluated on portion feature(s) and can be a direct characteristic or a calculated characteristic. The local diameter measured between two points is a direct local characteristic. The mean of local diameters measured between two points for a given section is a calculated local characteristic.

NOTE 2 The result of an evaluation is related to an entire feature; a single two-point diameter is in itself unique.