SLOVENSKI STANDARD

oSIST prEN ISO 5459:2016

01-junij-2016

Specifikacija geometrijskih veličin izdelka - Geometrijsko toleriranje - Reference in sistemi referenc (ISO/DIS 5459:2016)

Geometrical product specifications (GPS) - Geometrical tolerancing - Datums and datum systems (ISO/DIS 5459:2016)

Geometrische Produktspezifikation (GPS) - Geometrische Tolerierung - Bezüge und Bezugssysteme (ISO/DIS 5459:2016)

Spécification géométrique des produits (GPS) - Tolérancement géométrique - Références spécifiées et systèmes de références spécifiées (ISO/DIS 5459:2016)

Ta slovenski standard je istoveten z: prEN ISO 5459

ICS:

17.040.10	Tolerance in ujemi	Limits and fits
17.040.40	Specifikacija geometrijskih veličin izdelka (GPS)	Geometrical Product Specification (GPS)

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DRAFT INTERNATIONAL STANDARD

ISO/DIS 5459

ISO/TC **213** Secretariat: **DS**

Voting begins on: **2016-03-24** Voting terminates on: **2016-06-23**

Geometrical product specifications (GPS) — Geometrical tolerancing — Datums and datum systems

Spécification géométrique des produits (GPS) — Tolérancement géométrique — Références spécifiées et systèmes de références spécifiées

ICS: 17.040.10; 01.100.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel three month enquiry.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Reference number
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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 5459 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This third edition cancels and replaces the second edition (ISO 5459:2011), which has been technically revised.

Introduction

ISO 5459 is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO 14638). It influences the chain links A, B and C of the chain of standards on size, orientation, location, run-out, profile surface texture and areal surface texture.

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

For more detailed information of the relation of this International Standard to the GPS matrix model, see Annex J.

For the definitive presentation (proportions and dimensions) of symbols for geometrical tolerancing, see ISO 7083.

This International Standard provides tools to express location or orientation constraints, or both, for a tolerance zone. It does not provide information about the relationship between datums or datum systems and functional requirements or applications.

Former practice of datums is given in Annex I.

Geometrical product specification (GPS) — Geometrical tolerances — Datum and datum systems

1 Scope

This International Standard specifies terminology, rules and methodology for the indication and understanding of datums and datum systems in technical product documentation. This International Standard also provides explanations to assist the user in understanding the concepts involved.

This International Standard defines the specification operator (see ISO 17450-2) used to establish a datum or datum system. The verification operator (see ISO 17450-2) can take different forms (physically or mathematically) and is not the subject of this International Standard.

NOTE The detailed rules for maximum and least material requirements for datums are given in ISO 2692.

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 128-24:2014, *Technical drawings — General principles of presentation — Part 24: Lines on mechanical engineering drawings*

ISO/FDIS 1101:2015[1)], *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 2692, *Geometrical product specifications (GPS) — Geometrical tolerancing — Maximum material requirement (MMR), least material requirement (LMR) and reciprocity requirement (RPR)*

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/FDIS 1101:2015[1)], ISO 2692, ISO 17450-1, ISO 17450-2 and the following apply.

3.1
situation feature
point, straight line, plane or helix from which the location and/or orientation of a geometrical feature, can be defined

1) Under finalisation.

3.2
datum feature
real (non-ideal) integral feature used for establishing a single datum

Note 1 to entry: A datum feature can be a complete surface, a set of one or more portions of a complete surface, or a feature of size.

Note 2 to entry: An illustration showing the relations between datum feature, associated feature and datum is given in Figure 2.

3.3
datum target
specific portion, which is nominally a point, a line segment or an area, taken of complete real (non-ideal) integral feature used for establishing a datum

Note 1 to entry: Where the datum target is a point, a line or an area, it is indicated as a datum target point, a datum target line or a datum target area, respectively.

3.4
moveable datum target
datum target moving along a defined path

3.5
associated feature
ideal feature which is fitted to the datum feature with a specific association criterion

Note 1 to entry: The type of the associated feature is by default the same as the type of the nominal integral feature used to establish the datum (for an exception see 7.4.2.6.2).

Note 2 to entry: The associated feature for establishing a datum simulates the contact between the real surface of the workpiece and other components.

Note 3 to entry: An illustration showing the relations between datum feature, associated feature and datum is given in Figure 2.

Note 4 to entry: An associated feature may have the same shape as the nominal integral datum feature or it may be another shape defined as a contacting feature.

Note 5 to entry: See Figure 1.

3.6
datum
one or more situation features (point, line, plane, helix) derived from one or more associated integral features

Note 1 to entry: a datum can be used to locate or orientate an ideal feature (eg. a tolerance zone, an intersection plane, an orientation plane, a reference feature, or an ideal feature representing for instance a virtual condition)

Note 2 to entry: A datum is a theoretically exact reference; it is defined by a plane, a straight line or a point, or a combination thereof, i.e one of the following possibilities:

— [plane; straight line; point] or

— [plane; straight line] or

— [straight line; point] or

— [plane] or

— [point] or

— [straight line] or

— [helix].

Note 3 to entry: The concept of datums is inherently reliant upon the invariance class concept (see Annex A and Annex B).

Note 4 to entry: Datums with maximum material condition or least material condition (see ISO 2692) are not covered in this International Standard .

Note 5 to entry: When a datum is established, for example, on a complex surface, the datum consists of a plane, a straight line or a point, or a combination thereof. The modifier [SL], [PL] or [PT], or a combination thereof, can be attached to the datum identifier to limit the situation feature(s) taken into account relative to the surface.

Note 6 to entry: An illustration showing the relation between datum feature, associated feature and datum is given in Figure 2.

3.7
single datum
datum established from one datum feature taken from one single surface or from one feature of size

Note 1 to entry: The invariance class of a single surface can be complex, prismatic, helical, cylindrical, revolute, planar or spherical. A set of situation features defining the datum (see Table B.1) corresponds to each type of single surface.

Note 2 to entry: See rule 5 in 7.4.2.5.

3.8
common datum

datum established simultaneously (considering the collection of associated feature together with constraint between them), without specific order, from two or more datum features

Note 1 to entry: To define a common datum, it is necessary to consider the collection surface created by the considered datum features. The invariance class of a collection surface can be complex, prismatic, helical, cylindrical, revolute, planar or spherical (see Table B.1).

Note 2 to entry: See rule 5 in 7.4.2.5.

3.9
datum system
set of one or more datums established in a specific ordered sequence from one or more datum features

Note 1 to entry: To define a datum system, it is necessary to consider the collection surface created by the considered datum features to identify its invariance class (see Table B.1).

Note 2 to entry: A datum system can consist only in a common datum or a single datum.

Note 3 to entry: the role of datum system is described in Clause 5

3.10
datum section
specification element containing one, two or three datum indicators

Note 1 to entry: A datum section can be used as a part of a tolerance indicator, an intersection plane indicator, an orientation plane indicator, collection plane indicator or a direction feature indicator (see ISO/FDIS 1101:2015[1)]).

3.11
datum indicator
specification element containing only one single datum or common datum

3.12
primary datum
single datum or common datum, which is indicated in the first datum indicator of the datum section and that is not influenced by constraints from other datums

Note 1 to entry: The primary datum is indicated in the first datum indicator of the datum section (see 7.3).

3.13
secondary datum
single datum or common datum which is indicated in the second datum indicator of the datum section and that is constrained at least in orientation from the primary datum

Note 1 to entry: The secondary datum is indicated in the second datum indicator of the datum section (see 7.3).

3.14
tertiary datum
single datum or common datum which is indicated in the third datum indicator of the datum section and that is constrained at least in orientation from the primary datum and the secondary datum

Note 1 to entry: The tertiary datum is indicated in the third datum indicator of the datum section (see 7.3).

3.15
collection surface
two or more surfaces considered simultaneously as a surface

Note 1 to entry: Table B.1 is used to determine the invariance class of a datum or datum systems when using a collection of surfaces.

Note 2 to entry: Two intersecting planes may be considered simultaneously or sequentially (one after the other). When the two intersecting planes are considered simultaneously as a single surface, that surface is a collection surface.

3.16
objective function
objective function for association
formula that describes the quality of association

Note 1 to entry: In this International Standard, the term “objective function” refers to “objective function for association”.

Note 2 to entry: The objective functions are usually named and mathematically described: maximum inscribed, minimum zone, etc.

3.17
association
operation used to fit ideal feature(s) to non-ideal feature(s) according to an association criterion

[ISO 17450-1:2011, 3.4.1.4]

3.18
(association) constraint
requirement on the associated feature

Note 1 to entry:

EXAMPLE Orientation constraint, location constraint, material constraint or intrinsic characteristic constraint.

3.18.1
orientation constraint
requirement on one or more rotational degrees of freedom used to establish the associated feature

3.18.2
location constraint
requirement on one or more translational degrees of freedom used to establish the associated feature

3.18.3
material constraint
additional condition to the location of the associated feature, relative to the material of the feature, while optimizing an objective function

Note 1 to entry: For example, an association constraint can be that all distances between the associated feature and the datum feature are positive or equal to zero, i.e. the associated feature is outside the material.

3.18.4
intrinsic characteristic constraint
additional requirement applied to the intrinsic characteristic of an associated feature whether it is considered fixed or variable

3.19
association criterion
objective function with or without constraints, defined for an association

Note 1 to entry: Several constraints may be defined for an association.

Note 2 to entry: Association results (associated features) may differ, depending upon the choice of association criterion.

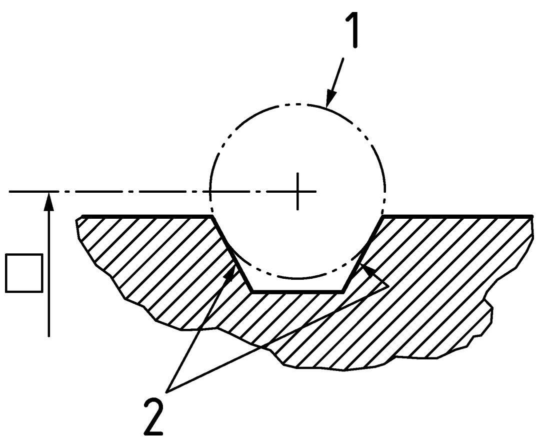
Note 3 to entry: Default association criteria are defined in Annex A.

3.20
contacting feature
ideal feature, which can have a nominal shape different from the shape of the integral geometrical feature, with which it is in contact

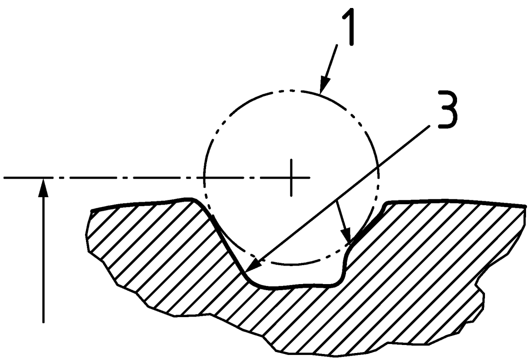
Note 1 to entry: A contacting feature can be used to define a set of one or more datum features, and/or to establish a datum.

Note 2 to entry: See rule 6.a in 7.4.2.6.2.

Note 3 to entry: See Figure 1.



a) Contacting feature on nominal model



b) Contacting feature on real workpiece

Key

1 contacting feature: ideal sphere in contact with the datum feature or the feature under consideration

2 features under consideration: nominal trapezoidal slot (collection of two non-parallel surfaces)

3 datum feature: real feature corresponding to the trapezoidal slot (collection of two non-parallel surfaces)

Figure 1 — Example of a contacting feature

3.21
invariance class
group of ideal features for which the nominal surface is invariant for the same degrees of freedom

Note 1 to entry: There are seven invariance classes (see Annex B).

3.22
theoretically exact dimension
TED
linear or angular dimension used in GPS operations to define theoretically exact geometry, extents, locations and orientations of features

Note 1 to entry: For the purpose of this International Standard, the term “theoretically exact dimension” has been abbreviated TED.

Note 2 to entry: A TED can be used to define

— the extension or the relative location of a portion of one feature,
— the length of the projection of a feature,
— the theoretically exact orientation or location of one feature relative to one or more other features, or
— the nominal shape of a feature,
— the theoretical location of datum targets and movable datum targets,
— the connection of two or more tolerance zones,
— the connection of one or more tolerance zones to a datum or datum system,
— the definition of a theoretical exact feature (TEF),
— the connection and orientation of datum targets,
— the location and dimensions of a restricted toleranced feature,
— the direction of the width of the tolerance zone.

Note 3 to entry: A TED can be explicit or implicit. When indicated, an explicit TED is indicated by a rectangular frame including a value and sometimes an associated symbol, e.g. ø or R. On 3D models, explicit TEDs may be available by queries.