

SLOVENSKI STANDARD

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Specifikacije geometrijskih veličin izdelka (GPS) - Specifikacija definiranih prehodov med geometrijskimi elementi (ISO/DIS 21204:2017)

Geometrical product specifications (GPS) - Specification of defined transitions between features (ISO/DIS 21204:2017)

Geometrische Produktspezifikation (GPS) - Spezifikation von definierten Übergängen zwischen Geometrieelementen (ISO/DIS 21204:2017)

Spécification géométrique des produits (GPS) - Spécification de transitions définies entre des éléments (ISO/DIS 21204:2017)

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Foreword

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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).

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The committee responsible for this document is Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

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Introduction

This document 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 A, B and C of the chains of standards on form, orientation and location.

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. The default decision rules given in ISO 14253-1 apply to specifications made in accordance with this document, unless otherwise stated.

In technical drawings, the ideal geometric shape is represented without any deviation and, in general, without consideration of the states of the transitions. Nevertheless, for many purposes (the functioning of a part, or out of safety considerations, for example) particular states of transitions need to be indicated. ISO 13715 provides the tools for indicating requirements to edges of undefined shape. These tools are insufficient when the shape of the transition is important for functional reasons. Therefore, this document provides a set of tools for indicating requirements to defined transitions.

IMPORTANT – All the specification illustrations in this document show edges drawn as sharp corners. They could equally have been drawn showing the nominal geometry of the transition, without change in the meaning of the indications. In a CAD system, the transition geometry can be modelled or not without changing the meaning of the indications.

All the specification illustrations in this document show a 90° angle between the two adjacent features. Specifications according to this document have the same meaning, taking the nominal angle into account, regardless of the angle between the two adjacent features.

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Geometrical product specifications (GPS) — Specification of defined transitions between features

1 Scope

This document defines a number of specification operators for the specification of defined transitions between features. A transition is an areal feature connecting two adjacent features, for which the intersection is a line. The transition includes portions of the adjacent features. These specifications all apply to any line in a defined direction in the transition feature. It also defines the specification modifiers and the drawing indications for such transition specifications.

The proportions and dimensions of the graphical symbols to be used are also specified.

NOTE 1 Corners (the transition between three or more features) are not considered transitions and are consequently not covered by this document.

NOTE 2 A transition exists between two single features. A defined transition has a defined nominal shape and is not sharp ($r = 0$).

This document provides a set of tools to express several defined transition specifications. It does not present any information on the relationship between a function or a use and a defined transition specification.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

transition

areal feature connecting two adjacent features, for which the nominal intersection is a line

NOTE 1 to entry: The transition includes portions of the adjacent features, see Annex A.

NOTE 2 to entry: The specifications for transitions defined in this document apply to any line in a defined direction in the areal feature.

3.2

separation point

point separating the search areas for finding the ends of the adjacent features

3.3

specification origin

origin point for the distances defining the tolerated feature and the adjacent reference sections

3.4

specification direction

direction in which the distances defining the tolerated feature and the adjacent reference sections apply

4 Basic concepts

A transition is an areal feature connecting two adjacent features.

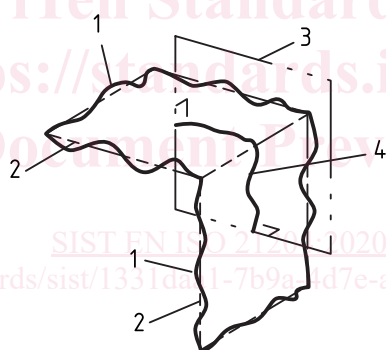
In this document "transition" without qualifier means "defined transition".

The specifications defined in this document are suitable for relatively simple transition functions, e.g. ensuring assembly without interference. For more complex functions, geometrical tolerancing offers more precise tools.

Specifications for defined transitions specify either line profiles defined in intersection planes, where the specification for each line profile is independent of the other line profiles, or collections of such line profiles, e.g. a requirement that the radius shall be consistent along the transition.

The intersection planes that defines the tolerated features are in theoretically exact relationships with the total least squares (Gaussian) derived features of the features adjacent to the transition. Figure 1 shows the case where the two adjacent features are planes. The intersection planes are perpendicular to the intersection line between the two adjacent features.

The length of the tolerated feature is limited as defined in A.3.



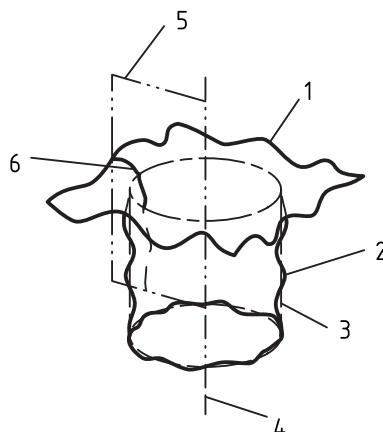
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Key

- 1 nominally flat real features adjacent to the transition
- 2 total least squares (Gaussian) planes associated to 1
- 3 one of the infinite set of intersection planes perpendicular to 2
- 4 one of the infinite set of line profiles containing a tolerated feature

Figure 1 — Intersection planes defining the tolerated features for an transition between two planar features

Figure 2 shows the case where one adjacent feature is a plane and the other is a cylinder. In this case the intersection plane contains the axis of the derived cylinder.



Key

- 1 nominally flat real feature adjacent to the transition
- 2 nominally cylindrical real feature adjacent to the transition
- 3 total least squares (Gaussian) cylinder associated to 2
- 4 axis of 3
- 5 one of the infinite set of intersection half planes including 4
- 6 one of the infinite set of line profiles containing a tolerated feature

Figure 2 — Intersection planes defining the tolerated features for a transition between a planar feature and a cylindrical feature

A plane can be considered a feature with an infinite radius of curvature. As described above, when the two adjacent features are planes, they both participate equally in defining the orientation of the intersection plane. When the adjacent features are a cylinder, which has a finite radius of curvature, and a plane, which has an infinite radius, the cylinder defines the orientation of the intersection plane. This principle is generalized, so in all cases the feature with the smallest radius of curvature defines the orientation of the intersection plane. If the two adjacent features have the same radius of curvature, they participate equally in defining the orientation of the intersection plane.

NOTE The purpose of this rule is to prioritize the alignment with the feature with the smallest radius of curvature, because a given misalignment with a feature results in a larger deviation from the nominal geometry when the radius is smaller.

The adjacent features can be any shape, but the cases of two planes and a plane and a cylinder are the only ones that are currently elaborated in detail in this document.

The extent of the adjacent reference sections is limited as defined in A.3. This means that the real surface of the workpiece beyond this extent does not influence the location and orientation for the adjacent reference sections and that material constraints only apply within the defined extent, see e.g. Figure 12 b) where the material constraint does not apply beyond the extent of the adjacent reference section.

If the intersection between the intersection plane and the adjacent feature is not nominally straight, a suitable shape, e.g. a circle, shall be associated instead with the relevant shape and size parameters being variable in the association.

5 General indication rules

5.1 Symbols

The basic transition symbol is shown in Figure 3. The reference line of the symbol shall always be indicated horizontally on the drawing.

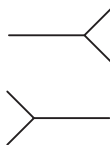


Figure 3 — Basic transition specification indicator

A leader line shall be used to connect the basic symbol to the tolerated feature, see Figure 4. The rules for terminating the leader line (using an arrow or a dot) are given in ISO 1101.

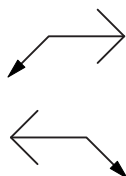


Figure 4 — Transition specification indicator with leader line

The dimensions of the transition specification indicator are given in Annex C.

Table 1 — Letter symbols for transition specification indications and their meaning

| | |
|----|---|
| C | Chamfer |
| CF | Chamfer of consistent (fixed) dimensions |
| CL | Chamfer least material boundary |
| CM | Chamfer maximum material boundary |
| D | Length of the tolerated feature from the specification origin |
| E | Ellipse |
| EF | Ellipse of consistent (fixed) dimensions |
| EL | Ellipse least material boundary |
| EM | Ellipse maximum material boundary |
| P | Profile defined by CAD |
| PF | Profile defined by CAD of consistent (fixed) dimensions |
| PL | Profile defined by CAD least material boundary |
| PM | Profile defined by CAD maximum material boundary |
| R | Radius |
| RF | Radius of consistent (fixed) value |
| RL | Radius least material boundary |
| RM | Radius maximum material boundary |
| T | (profile) tolerance value |
| UZ | (profile) tolerance offset |

5.2 Indications using the transition symbol

5.2.1 General

A transition specification may be indicated in a side view directly on an edge, if the transition is not modelled, see Figures 5 a) and 5 b), or on the transition itself, see Figures 5 c) and 5 d).

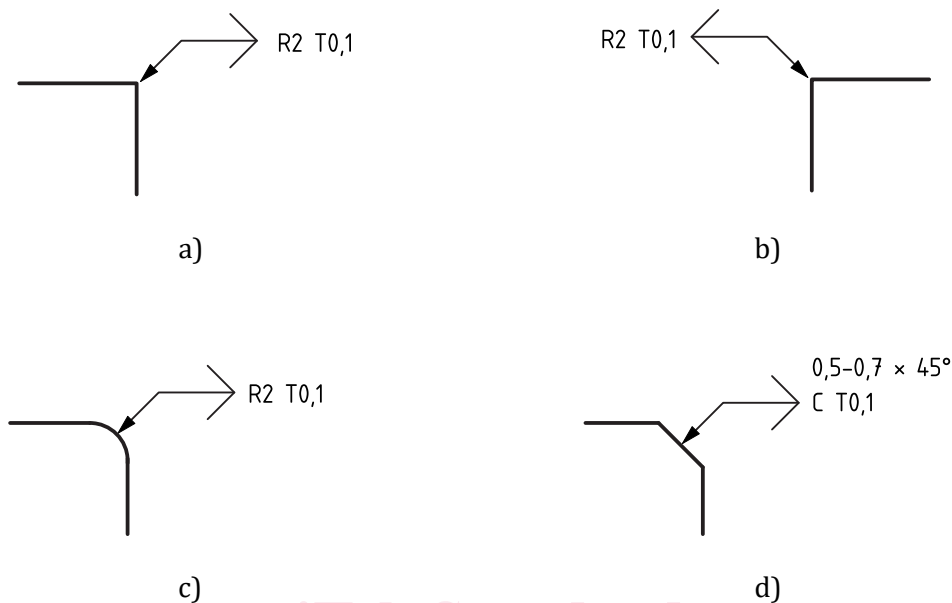


Figure 5 — Side view indications using the transition symbol

5.2.2 Indications in face view

A transition specification may be indicated in a face view directly on an edge, if the transition is not modelled, see Figure 6 a), or on the transition itself, see Figure 6 b).



Figure 6 — Face view indications using the transition symbol