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Geometrical product specifications (GPS) — Partition —

Part 3: **Methods used for specification and verification**

Spécification géométrique des produits (GPS) — Partition —

Partie 3: Méthodes utilisées pour la spécification et la vérification

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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 document 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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This document was prepared by Technical Committee ISO/TC 213, *Geometrical product specifications and verification*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 290, *Geometrical product specification and verification*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 18183 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO 14638). It influences chain links B, C and E of the chains of standards on size, distance, form, orientation, location and run-out in the GPS matrix model.

The ISO GPS matrix model given in ISO 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 and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this document, unless otherwise indicated.

For more detailed information on the relation of this document to other standards and the GPS matrix model, see Annex C.

This document develops the concepts and methods for default partitioning of skin model (specification) and sampled surface model (verification) along with ISO 18183-1[1)] and ISO 18183-2.[2)]

1) Under preparation. Stage at the time of publication: ISO/FDIS 18183-1:2023.

2) Under preparation. Stage at the time of publication: ISO/FDIS 18183-2:2023.

Geometrical product specifications (GPS) — Partition —

Part 3:
Methods used for specification and verification

1 Scope

This document specifies the procedure for the partition operation of geometrical product specification and verification.

This document does not apply to profile and areal surface texture.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 18183-1[3)], *Geometrical product specifications (GPS) — Partitioning — Part 1: Terms, definitions and basic concepts*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18183-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Default partition

4.1 General

If not otherwise indicated, the default partition shall be that which partitions the skin model (in specification), the nominal model and the samples surface model (in verification) into single features (single surfaces or single lines). See Figure 1.

For the purposes of this document, a single feature is taken to be of maximum extent. The maximum extent is derived from any combination of length, area, curvature, invariance degree and point set characteristics.

3) Under preparation. Stage at the time of publication: ISO/FDIS 18183-1:2023.

a) Default partition of nominal model

b) Default partition of skin model (specification)

c) Default partition of sampled surface model (verification)

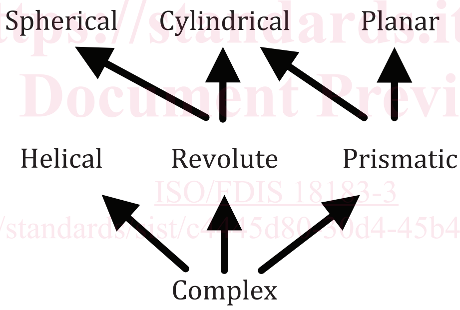
Figure 1 — Default partition

4.2 Default partition surfaces

If not otherwise indicated, the default partition for surfaces shall be that which partitions the surface into single surfaces. For the purposes of this document, a single surface is taken to be the maximum area possible.

A single surface is a connected surface (a continuous region where any two points can be connected by a path that remains entirely within the surface's boundaries) where no subset of the considered geometric entity exists with an invariance class not respecting the partial ordering of invariance classes (see Figure 2) and, in the case of a surface of revolute invariance class, where its generatrix is a single line.

A single surface is finite (limited in extent).

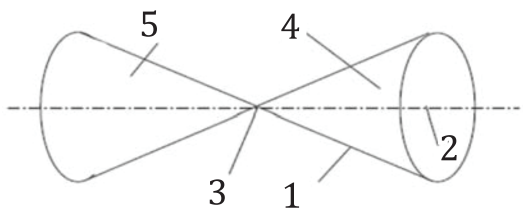


NOTE An upward arrow indicates an increasing freedom in the degree of invariance.

Figure 2 — Partial ordering of the seven invariance classes based on degree of invariance

Where the generatrix intersects the axis of revolution:

- once, each side of the generatrix intersection is considered as a separate single surface (see Figure 3);
- twice or more, the surface between adjacent intersections is considered as a single surface (see Figure 4).



Key

1 generatrix

2 axis of revolution

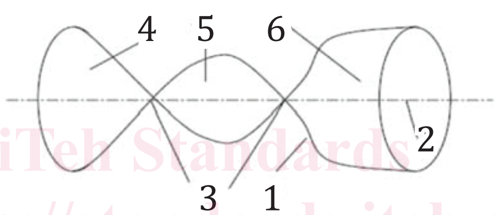
3 intersection point

4 single cone surface, right side

5 single cone surface, left side

NOTE The generatrix intersects the axis once; in this case there are two single surfaces.

Figure 3 — Example of a surface of type cone



Key

1 generatrix

2 axis of revolution

3 intersection point

4 single revolute surface, left side

5 single revolute surface, middle

6 single revolute surface, right side

NOTE The generatrix intersects the axis twice or more; in this case there are three single surfaces.

Figure 4 — Example of a surface of type revolute

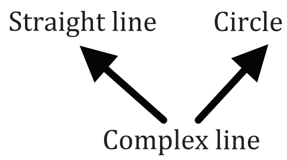
For real surfaces, curvature and slippable motion should be used to determine single surfaces. References to this and other methods can be found in Annex A and Annex B.

4.3 Default partition lines

If not otherwise indicated, the default partition for lines shall be that which partitions the line into single lines. For the purposes of this document, a single line is taken to be the longest line possible.

A single line is a connected line where no subset of the considered geometric entity exists with an invariance class not respecting the partial ordering of invariance classes (see Figure 5).

A single line is finite (limited in extent).



NOTE An upwards arrow indicates an increasing freedom in the degree of invariance.

Figure 5 — Partial ordering based on degree of invariance

For real lines, the concept of curvature and slippable motion should be used to determine invariant lines and, hence, single lines. In practice, the straight line is a special case of a circle with zero curvature. Figures 6 to 9 illustrate partitioning of a line into single lines through curvature calculation.

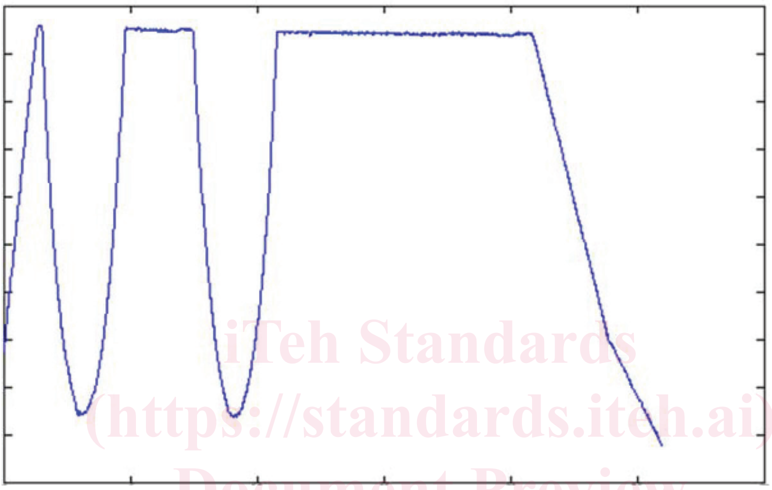


Figure 6 — Original line

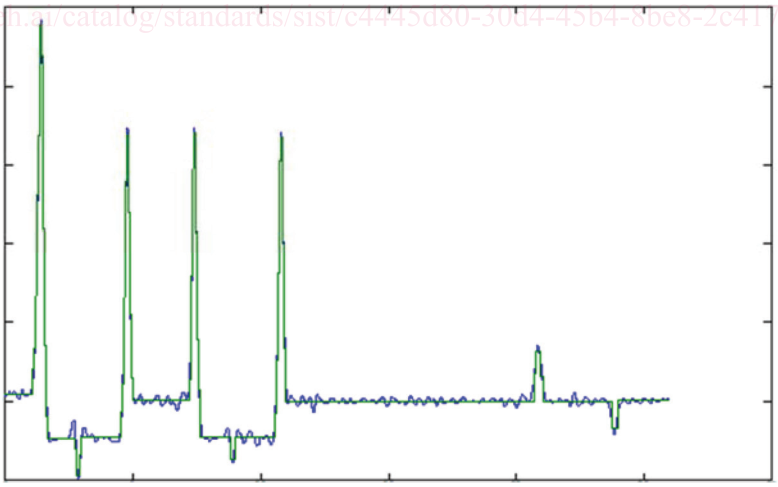


Figure 7 — Calculated curvature from Figure 6 partitioned into single lines