
**Geometrical Product Specifications
(GPS) — Straightness —**

**Part 1:
Vocabulary and parameters of
straightness**

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*Spécification géométrique des produits (GPS) — Rectitude —
Partie 1: Vocabulaire et paramètres de rectitude*

ISO/TS 12780-1:2003

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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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/TS 12780-1 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

ISO/TS 12780 consists of the following parts, under the general title *Geometrical Product Specifications (GPS) — Straightness*:

- *Part 1: Vocabulary and parameters of straightness*
- *Part 2: Specification operators*

Introduction

This part of ISO/TS 12780 is a geometrical product specification (GPS) Technical Specification and is to be regarded as a general GPS document (see ISO/TR 14638). It influences chain link 2 of the chain of standards on form of line independent of datum.

For more detailed information of the relation of this part of ISO/TS 12780 to other standards and the GPS matrix model, see Annex C.

This part of ISO/TS 12780 defines terms and concepts necessary for defining the specification operators according to ISO/TS 17450-2 for straightness of integral features.

Extracting data will always involve applying a certain filtering process. An additional filtering of the extracted data may or may not be applied. This additional filter can be a mean line filter (Gaussian, spline, wavelet, etc.) or a non-linear filter (e.g. morphological filter). The type of filtering will influence the definition of straightness and the specification operators and, therefore, needs to be stated unambiguously.

This part of ISO/TS 12780 is not intended to disallow any means of measuring straightness.

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Geometrical Product Specifications (GPS) — Straightness —

Part 1: Vocabulary and parameters of straightness

1 Scope

This part of ISO/TS 12780 defines the terms and concepts related to straightness of individual integral features and covers complete straightness profiles only.

NOTE Straightness of an extracted derived axis of a cylinder is defined in ISO/TS 12180-1 and ISO/TS 12180-2.

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/TS 12780-2:2003, *Geometrical Product Specifications (GPS) — Straightness — Part 2: Specification operators*

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ISO 14660-1:1999, *Geometrical Product Specifications (GPS) — Geometrical features — Part 1: General terms and definitions*

ISO 14660-2:1999, *Geometrical Product Specifications (GPS) — Geometrical features — Part 2: Extracted median line of a cylinder and a cone, extracted median surface, local size of an extracted feature*

ISO/TS 17450-1:—¹⁾, *Geometrical Product Specifications (GPS) — General concepts — Part 1: Model for geometrical specification and verification*

3 Terms and definitions

For the purposes of this part of ISO/TS 12780, the terms and definitions given in ISO 14660-1, ISO 14660-2, ISO/TS 17450-1 and the following apply.

3.1 General terms

3.1.1

straightness

property of a straight line

1) To be published.

3.1.2 normal of the surface

normal of a feature associated to an integral feature

3.1.3 straightness plane

plane established by the normal of the surface and the direction in which the feature is nominally straight

See Figure 1.

3.2 Terms relating to profiles

3.2.1 real surface of a workpiece

integral feature, part of a real surface of a workpiece limited by the adjacent real (integral) features

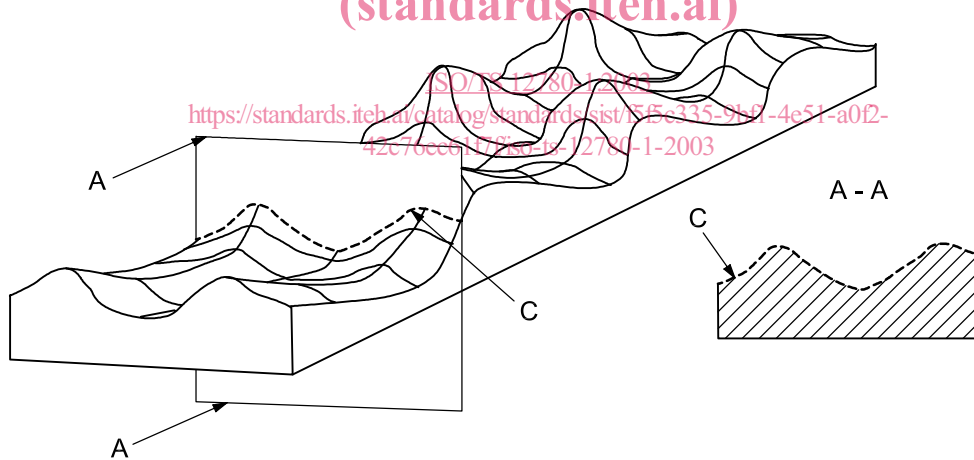
[ISO 14660-1:1999, definition 2.4].

3.2.2 extracted line

⟨straightness⟩ digital representation of the intersection of the real surface and the straightness plane

See Figure 1.

NOTE The extraction conventions for straightness are given in ISO/TS 12780-2. This extracted line is an extracted integral feature as defined in ISO 14660-1.



Key

- A straightness plane
- C extracted line

Figure 1 — Straightness plane and extracted line

3.2.3 straightness profile

extracted line intentionally modified by a filter

NOTE This is the profile to which the concepts and parameters of this part of ISO/TS 12780 can be applied.

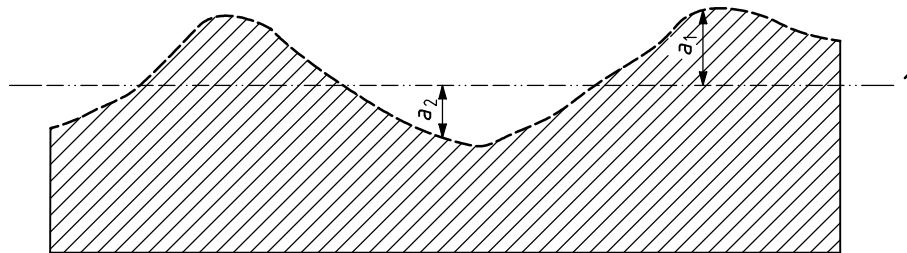
3.2.4**local straightness deviation****LSD**

deviation of a point on a straightness profile from the reference line, the deviation being normal to the reference line

See Figure 2.

NOTE 1 The deviation is negative if from the reference line the point lies in the direction of the material.

NOTE 2 See 3.3.1 for reference line.

**Key**

a_1 positive local straightness deviation

a_2 negative local straightness deviation

1 reference line

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Figure 2 — Local straightness deviation
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3.3 Terms relating to the reference line

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3.3.1

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reference line

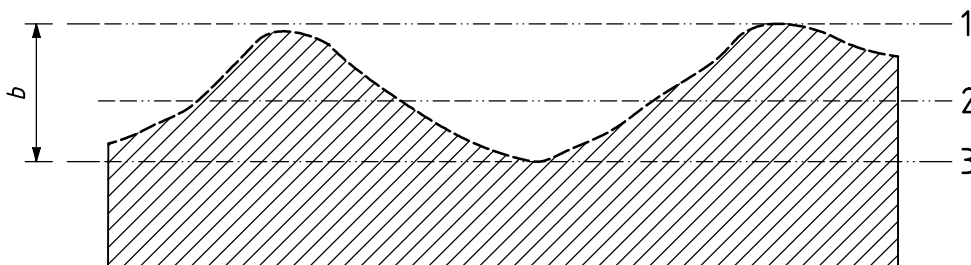
[42c76ec61f7f/iso-ts-12780-1-2003](https://standards.iteh.ai/catalog/standards/sist/f5f5c335-9bfl-4e51-a0f2-42c76ec61f7f/iso-ts-12780-1-2003)

associated line fitting the straightness profile in accordance with specified conventions, to which the deviations from straightness and the straightness parameters are referred

3.3.1.1**minimum zone reference lines****MZLI**

two parallel lines in the straightness plane enclosing the straightness profile and having the least separation

See Figure 3.

**Key**

b least separation

1 outer minimum zone reference line

2 mean minimum zone reference line

3 inner minimum zone reference line

Figure 3 — Minimum zone reference lines