INTERNATIONAL STANDARD

**ISO 12780-1**

First edition
2011-04-01

# Geometrical product specifications (GPS) — Straightness —

## Part 1: Vocabulary and parameters of straightness

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



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



This first edition of ISO 12780-1 cancels and replaces ISO/TS 12780-1:2003, which has been technically revised.



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

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 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 of the relationship of this part of ISO 12780 to other standards and the GPS matrix model, see Annex C.

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

Extracting data always involves applying a certain filtering process. An additional filtering of the extracted data might or might 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 influences the definition of straightness and the specification operators and, therefore, needs to be stated unambiguously.



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

# Geometrical product specifications (GPS) — Straightness —

# Part 1:
# Vocabulary and parameters of straightness

## 1 Scope

This part of ISO 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 12180-1 and ISO 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 11562:1996, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Metrological characterization of phase correct filters*



ISO 12780-2:2011, *Geometrical product specifications (GPS) — Straightness — Part 2: Specification operators*

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 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 document, the terms and definitions given in ISO 14660-1, ISO 14660-2 and ISO 17450-1 and the following apply.

### 3.1 General terms

**3.1.1**
**straightness**
property of a straight line

1) To be published. (Revision of ISO/TS 17450-1:2005)

**3.1.2**
**normal of the surface**
normal of a feature associated with an integral feature

**3.1.3**
**straightness plane**
plane for which the intersection with the associated integral feature is a straight line

See Figure 1.

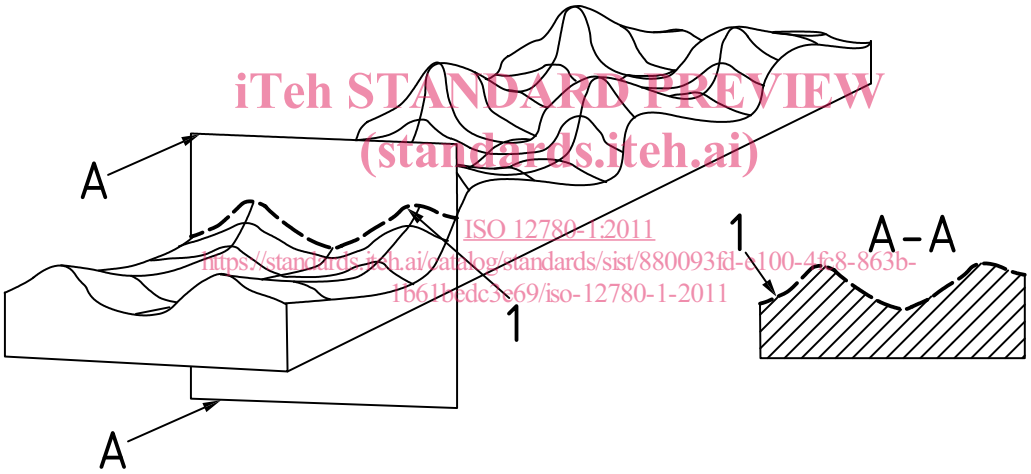
NOTE By default, the straightness plane includes the normal of the surface

## 3.2 Terms relating to profiles

**3.2.1**
**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 12780-2. This extracted line is an extracted integral feature as defined in ISO 14660-1.






**Key**
A-A straightness plane
1 extracted line

**Figure 1 — Straightness plane and extracted line**

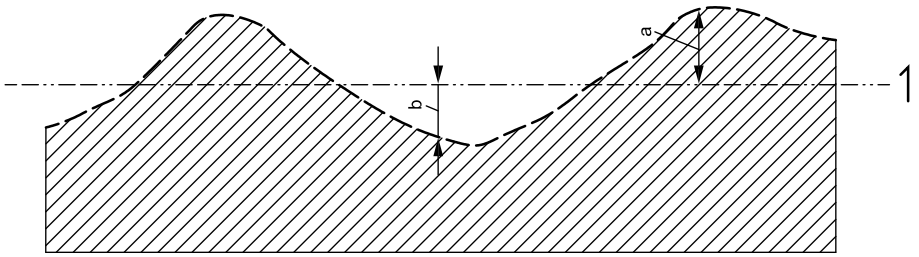
**3.2.2**
**straightness profile**
extracted line intentionally modified by a filter

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

**3.2.3**
**local straightness deviation**
$\Delta S_l$
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 For reference line, see 3.3.1.




**Key**

1 reference line

[a] Positive local straightness deviation.

[b] Negative local straightness deviation.

**Figure 2 — Local straightness deviation**

## 3.3 Terms relating to the reference line

**3.3.1**
**reference line**
associated line fitting the straightness profile in accordance with specified conventions, to which the deviations from straightness and the straightness parameters are referred

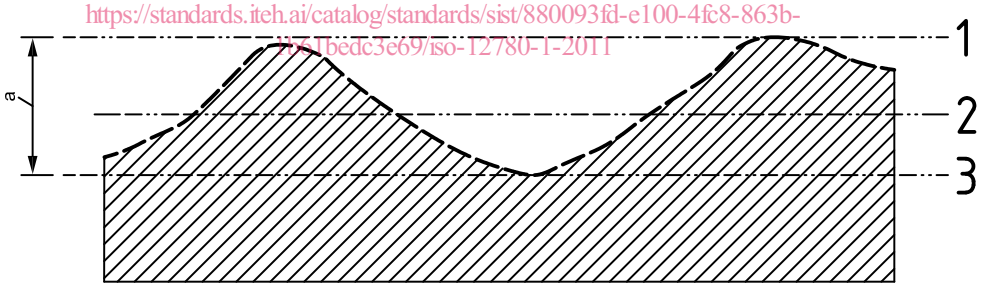
**3.3.1.1**
**minimum zone reference lines**
two parallel lines in the straightness plane enclosing the straightness profile and having the least separation

See Figure 3.



NOTE The symbol MZ is used to refer to minimum zone reference elements.






**Key**

1 outer minimum zone reference line

2 mean minimum zone reference line

3 inner minimum zone reference line

[a] Least separation.

**Figure 3 — Minimum zone reference lines**

**3.3.1.1.1**
**outer minimum zone reference line**
minimum zone reference line outside the material

See Figure 3.

**3.3.1.1.2**
**inner minimum zone reference line**
minimum zone reference line inside the material

See Figure 3.