INTERNATIONAL STANDARD

ISO 14660-2

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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

Spécification géométrique des produits (GPS) — Éléments géométriques —

Partie 2: Ligne médiane extraite d'un cylindre et d'un cône, surface médiane extraite, taille locale d'un élément extrait

Reference number
ISO 14660-2:1999(E)

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 3.

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.

International Standard ISO 14660-2 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

ISO 14660 consists of the following parts, under the general title *Geometrical product specifications (GPS) — Geometrical features*:

— *Part 1: General terms and definitions*

— *Part 2: Extracted median line of a cylinder and a cone, extracted median surface, local size of an extracted feature*

Annex A of this part of ISO 14660 is for information only.

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Introduction

This part of ISO 14660 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 3 of the Size, Form of line — Derived feature, Form of surface — Derived feature, Orientation — Derived feature and Location — Derived feature chains of standards in the general GPS matrix.

For more detailed information on the relation of this part of ISO 14660 to other standards and the GPS matrix model, see annex A.

Geometrical features exist in three “worlds”:

— the world of specification, where several representations of the future workpiece are imagined by the designer;

— the world of the workpiece, the physical world;

— the world of inspection, where a representation of a given workpiece is used through sampling of the workpiece by measuring instruments.

It is important to understand the relationship between these three worlds. ISO 14660 defines standardized terminology for geometrical features in each world as well as standardized terminology for the relationship and communication between each world.

This part of ISO 14660 is part 2 of a series of standards under preparation dealing with geometrical feature definitions.

Extracted features are not geometrical perfect and need further detailed definitions compared to the corresponding nominal features to be unambiguous defined and correctly understood.

It is the intention that the same detailed definition of an extracted feature is valid in all chains of standards where the feature or characteristic is used. Therefore the definitions given in this part of ISO 14660 are in force wherever they apply in the general GPS matrix.

For the purposes of this part of ISO 14660, the following line types have been used in the illustrations:

Feature type	Line type
• extracted surface • extracted line (integral features)	wide dotted line
• extracted median surface • extracted median line (derived features)	narrow dotted line
• associated plane of a extracted (integral) surface • associated line in a extracted (integral) surface	wide dashed dotted line
• associated median plane, associated axis (derived features)	narrow dashed dotted line
• real surface (outline)	continuous wide line
• nominal features (technical drawings in illustrations)	in accordance with ISO 128-24

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

1 Scope

This part of ISO 14660 defines a number of extracted features of workpieces. It specifies conditions for default definitions, i.e. when no other definitions are specified on the drawing by an extended feature indication. This part of ISO 14660 does not give further definitions, for the extracted feature in question, which would require extended drawing indications.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 14660. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 14660 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 14660-1:1999, *Geometrical product specifications (GPS) — Geometrical features — Part 1: General terms and definitions*.

3 Terms and definitions

For the purposes of this part of ISO 14660, the terms and definitions given in ISO 14660-1 and the following apply.

3.1
default definition (of an extracted feature)
detailed supplementary definition, selected by convention, of the extracted feature concerned, which is applicable only by using the basic ISO tolerance indication on the drawing or in other technical documents

NOTE 1 The basic ISO tolerance indications are those given in, for example, ISO 286-1, ISO 1101 and ISO 1302.

NOTE 2 The default definition (of an extracted feature) can be changed to a special definition by adding an extension to the basic ISO tolerance indication. Such extensions are under development.

3.2
extracted median line of a cylinder
locus of centres of cross-sections, where

— the centres of cross-sections are centres of associated circles; and

— the cross-sections are perpendicular to the axis of the associated cylinder obtained from the extracted surface (i.e. the radius could be different from the nominal radius)

3.3
extracted median line of a cone
locus of centres of cross-sections, where

— the centres of cross-sections are centres of associated circles; and

— the cross-sections are perpendicular to the axis of the associated cone obtained from the extracted surface (i.e. the angle could be different from the nominal angle)

3.4
extracted median surface
locus of centrepoints between sets of opposite points of the opposite extracted surfaces, where

— the connecting lines of sets of opposite points are perpendicular to the associated median plane; and

— the associated median plane is the median plane of two associated parallel planes obtained from the extracted surfaces (i.e. the distance between the two associated parallel planes could be different from the nominal distance)

3.5
local size of an extracted cylinder
local diameter of an extracted cylinder
distance between two opposite points on the feature, where

— the connection line between the points includes the associated circle centre; and

— the cross-sections are perpendicular to the axis of the associated cylinder obtained from the extracted surface

3.6
local size of two parallel extracted surfaces
distance between two points on opposite extracted surfaces, where

— the connecting lines of sets of opposite points are perpendicular to the associated median plane; and

— the associated median plane is the median plane of two associated parallel planes obtained from the extracted surfaces (i.e. the distance between the two associated parallel planes could be different from the nominal distance)

4 Default definition conditions

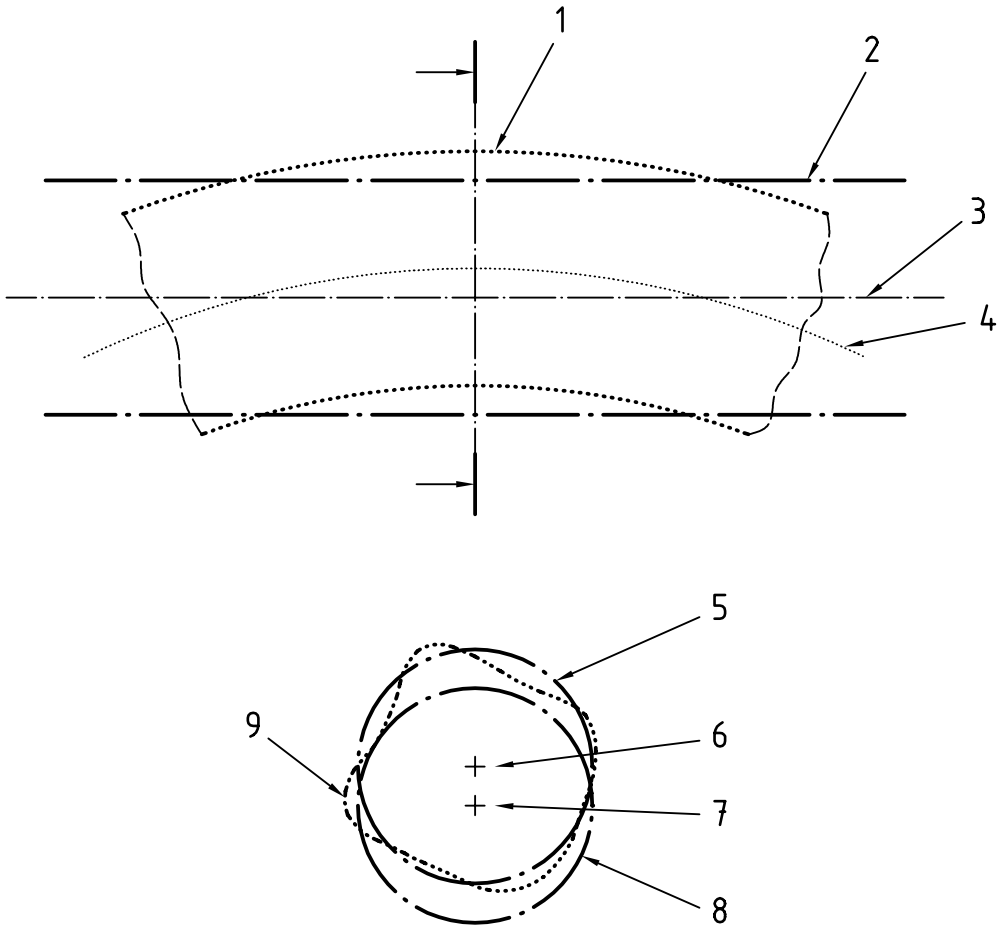
4.1 Extracted derived features

4.1.1 Extracted median line of a cylinder

For the default definition (unless otherwise specified) of the extracted median line of a cylinder, the following conditions apply:

— the associated circles are the total least squares circles (see Figure 1);

— the associated cylinder is the total least squares cylinder (see Figure 1).



Key

1 Extracted surface
2 Associated cylinder
3 Associated cylinder axis
4 Extracted median line
5 Associated circle
6 Associated circle centre
7 Associated cylinder axis
8 Associated cylinder
9 Extracted line

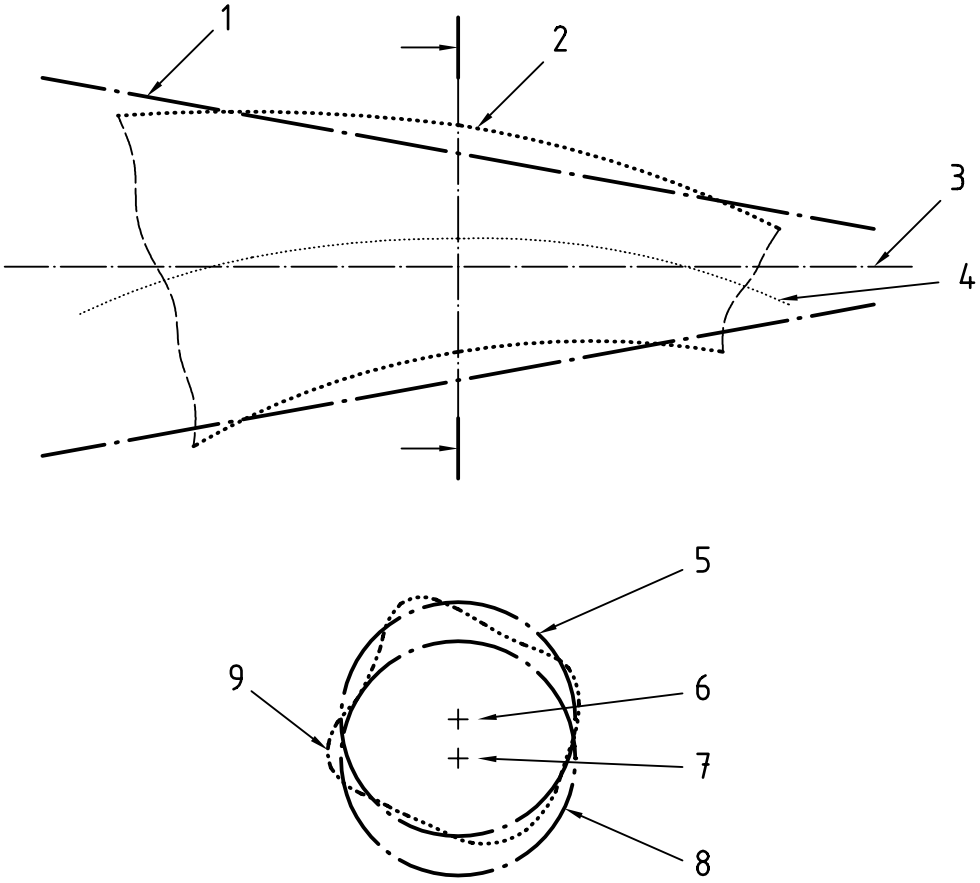
Figure 1 — Extracted median line of a cylinder

4.1.2 Extracted median line of a cone

For the default definition (unless otherwise specified) of the extracted median line of a cone, the following conditions apply:

— the associated circles are the total least squares circles (see Figure 2);

— the associated cone is the total least squares cone (see Figure 2).



Key

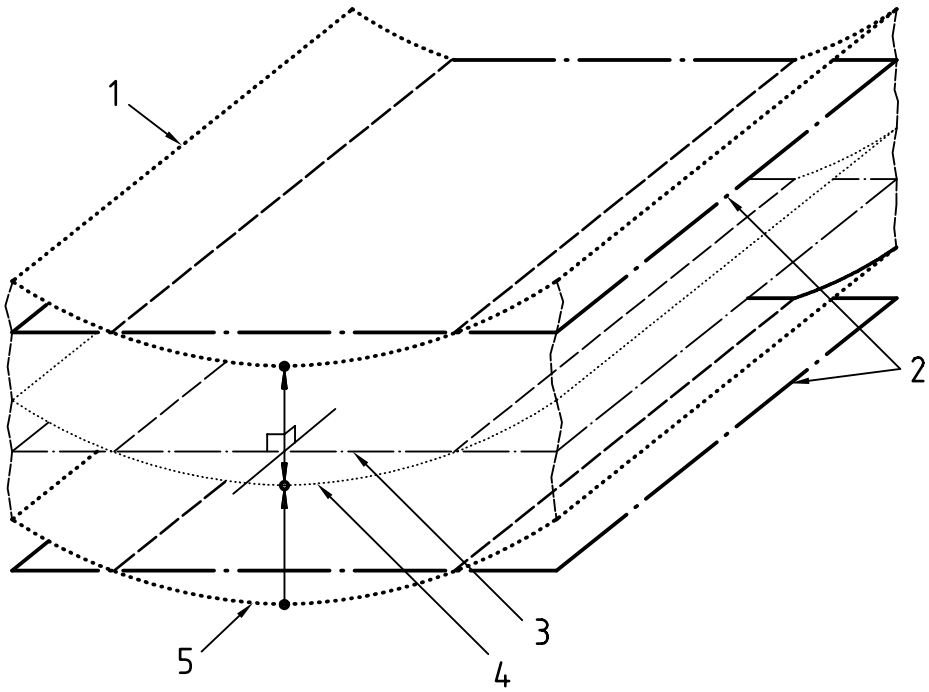
1 Associated cone
2 Extracted surface
3 Associated axis
4 Extracted median line
5 Associated circle
6 Associated circle centre
7 Associated cone axis
8 Associated cone
9 Extracted line

Figure 2 — Extracted median line of a cone

4.1.3 Extracted median surface

For the default definition (unless otherwise specified) of the extracted median surface, the following condition applies:

— the two associated parallel planes are obtained by the total least squares method (see Figure 3).



Key

1 Extracted surface
2 Associated plane
3 Associated median plane
4 Extracted median surface
5 Extracted surface

Figure 3 — Extracted median surface

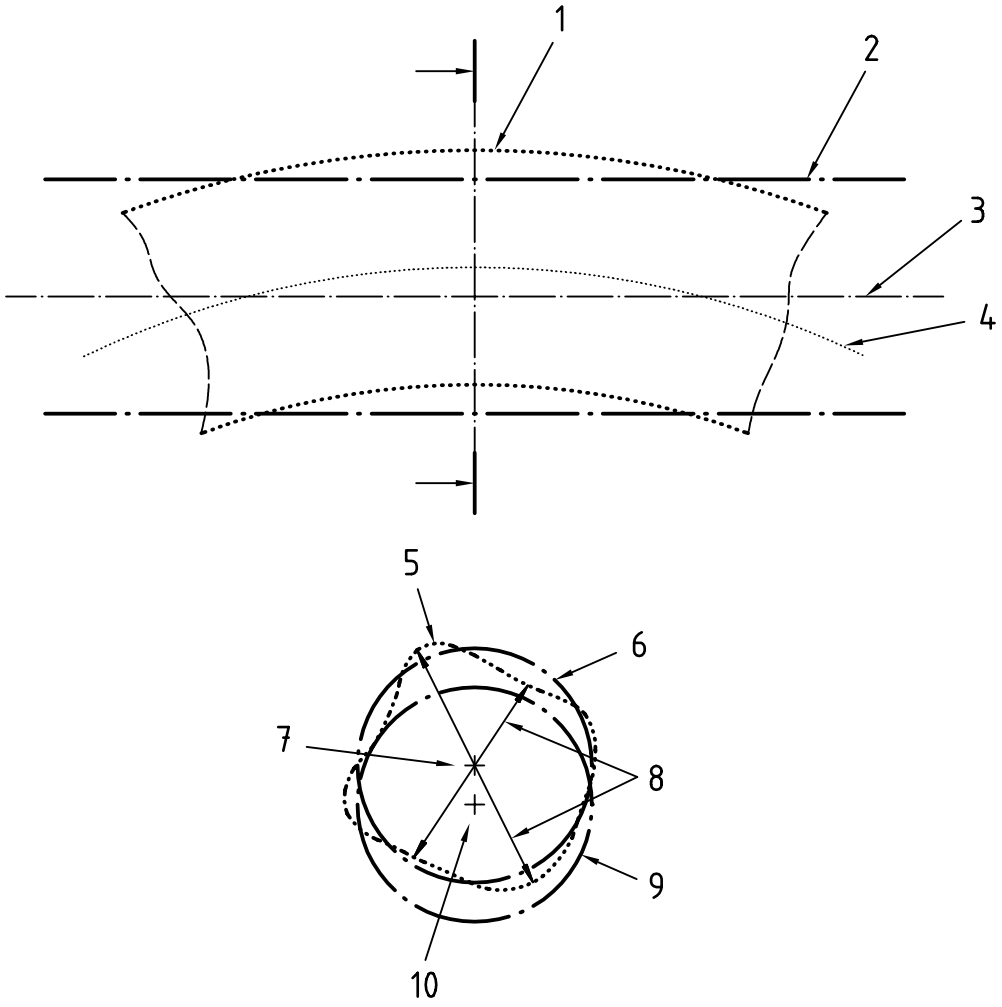
4.2 Local size of extracted features

4.2.1 Local size of an extracted cylinder (local diameter of an extracted cylinder)

For the default definition (unless otherwise specified) of the local diameter of an extracted cylinder (of a cross-section), the following conditions apply:

— the associated circle is the total least squares circle (see Figure 4);

— the associated cylinder is the total least squares cylinder (see Figure 4).



Key

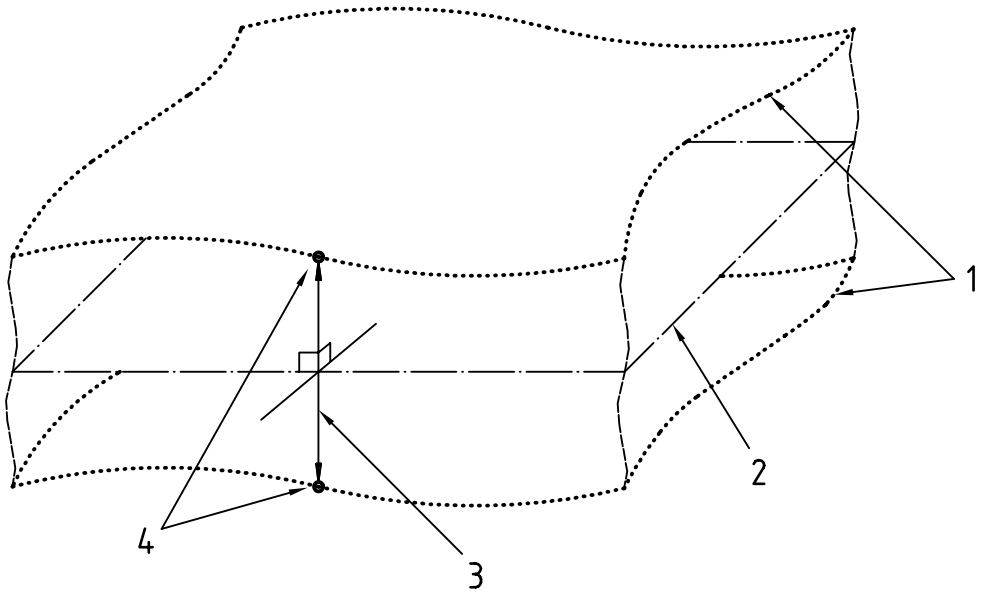
1	Extracted surface
2	Associated cylinder
3	Associated cylinder axis
4	Extracted median line
5	Extracted line
6	Associated circle
7	Associated centre
8	Local diameter of the extracted feature
9	Associated cylinder
10	Associated axis

Figure 4 — Local size of an extracted cylinder (local diameter of a cylinder)

4.2.2 Local size of two parallel extracted surfaces

For the default definition (unless otherwise specified) of the local size of two parallel extracted surfaces (see Figure 5), the following condition applies:

— the two associated parallel planes are obtained by the total least squares method.



Key

1 Extracted surfaces
2 Associated median plane
3 Local size of two extracted surfaces
4 Opposite points

Figure 5 — Local size of two parallel extracted surfaces

Annex A
(informative)

Relation to the GPS matrix model

For full details about the GPS matrix model, see ISO/TR 14638.

A.1 Information about the standard and its use

This part of ISO 14660 gives the general definitions of five extracted features mentioned in detail in clause 4. These definitions are the basis of the default definitions for the five extracted features concerned and of further definitions of extended feature definitions which are not covered in this part of ISO 14660.

The given definitions are to be used by the designer to understand the function of the chosen drawing indication, and to be used as to produce and assess parts with the indicated requirement.

A.2 Position in the GPS matrix model

This part of ISO 14660 is a general GPS standard, which influences chain link number 3 of the Size, Form of line — Derived feature, Form of surface — Derived feature, Orientation — Derived feature and Location — Derived feature chains of standards in the general GPS matrix, as illustrated in Figure A.1.

	Global GPS standards					
	General GPS standards					
	Chain link number	**1**	**2**	**3**	**4**	**5**	**6**
Fundamental GPS standards	Size						
	Distance						
	Radius						
	Angle						
	Form of line independent of datum						
	Form of line dependent of datum						
	Form of surface independent of datum						
	Form of surface dependent of datum						
	Orientation						
	Location						
	Circular run-out						
	Total run-out						
	Datums						
	Roughness profile						
	Waviness profile						
	Primary profile						
	Surface imperfections						
	Edges						

Figure A.1

A.3 Related standards

The related International Standards are those of the chains of standards indicated in Figure A.1.

Bibliography

[1] ISO 128-24:1999, *Technical drawings — General principles of presentation — Part 24: Lines on mechanical engineering drawings*.

[2] ISO 286-1:1988, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits*.

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

[4] ISO 1302:1992, *Technical drawings — Method of indicating surface texture*.

[5] ISO/TR 14638:1995, *Geometrical Product Specifications (GPS) — Masterplan*.

[6] *International vocabulary of basic and general terms in metrology (VIM)*, BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 2nd edition, 1993.

1) To be published. (Revision of ISO 1101:1983)

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