BRITISH STANDARD

BS EN ISO
8785:1999

Geometrical Product Specification (GPS) — Surface imperfections — Terms, definitions and parameters

The European Standard EN ISO 8785:1999 has the status of a British Standard

ICS 01.040.17; 17.040.20

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BSI British Standards

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee TDE/4, Engineering drawing, Metrology, Precision measurement and other related documentation, which has the responsibility to:

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— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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NOTE This is a special English language version of BS EN ISO 8785:1999 produced specifically for this CD ROM.

The hard copy form of BS EN ISO 8785:1999 consists of both English and French text and can be purchased from Customer Services.

This British Standard, having been prepared under the direction of the Consumer Products and Services Sector Committee, was published under the authority of the Standards Committee and comes into effect on
15 October 1999

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Summary of pages

This document comprises a front cover, an inside front cover, the EN ISO title page, the EN ISO foreword page, the ISO title page, pages ii to iv, pages 1 to 18, an inside back cover and a back cover.

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Descriptors: geometrical product specifications, surfaces, surface condition, surface defects, imperfections, definitions, vocabulary.

English version

Geometrical product specification (GPS) — Surface imperfections — Terms, definitions and parameters (ISO 8785:1998)

Spécification géométrique des produits (GPS) — Imperfections de surface — Termes, définitions et paramètres (ISO 8785:1998)

Geometrische Produktspezifikation (GPS) — Oberflächenunvollkommenheiten — Begriffe, Definitionen und Kenngrößen (ISO 8785:1998)

This European Standard was approved by CEN on 26 May 1999.

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Foreword

The text of the International Standard from Technical Committee ISO/TC 213 "Dimensional and geometrical product specifications and verification" of the International Organization for Standardization (ISO) has been taken over as a European Standard by Technical Committee CEN/TC 290 "Dimensional and geometrical product specification and verification", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2000, and conflicting national standards shall be withdrawn at the latest by January 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 8785:1998 has been approved by CEN as a European Standard without any modification.

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

ISO 8785

First edition
Première édition
1998-07-15

Geometrical Product Specification (GPS) — Surface imperfections — Terms, definitions and parameters

Spécification géométrique des produits (GPS) — Imperfections de surface — Termes, définitions et paramètres

Reference number
Numéro de référence
ISO 8785:1998(E/F)

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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.

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 8785 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

Annex A and Annex B of this International Standard are for information only.

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Introduction

This International Standard is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO/TR 14638). It influences the chain links 1 and 2 of the chain of standards for surface imperfections.

For more detailed information of the relation of this standard to other standards and the GPS matrix mode, see Annex A.

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1 Scope

This International Standard defines terms relating to surface imperfections in order to establish a common vocabulary to be used in technical documents, technical drawings, scientific publications, etc. to specify to what extent surface imperfections are allowed and to aid in the specification of methods of measuring surface imperfections.

The surface imperfections defined in this International Standard are not related to surface roughness[1)] or surface waviness.

It does not specify the desirability or undesirability of surface imperfections, which depend on the application or function of the surface.

For specific applications and manufacturing processes, additional terms and definitions may be necessary. Such terms and definitions will be specified in relevant International Standards.

Some types of specific surface imperfections are defined in other International Standards as well.

2 General

2.1

reference surface

surface, having the form of a geometrical surface, from which the parameters of surface imperfections are assessed

NOTE 1 The reference surface passes through the highest peak of the real surface excluding the imperfections, and is equidistant from the mean surface determined by the least-squares method.

NOTE 2 The reference surface is determined over a specified surface area, or over a limited part of the surface area related to the size (dimensions) of a single imperfection, the size of the area being sufficient to assess the imperfection while suppressing the influence of form deviation on the assessment.

NOTE 3 The reference surface coincides in practice with the surface of the area adjacent to the imperfection.

2.2

surface imperfection evaluation area

A

portion of the real surface or the whole real surface of a workpiece on which surface imperfections are specified and inspected

2.3

surface texture

repetitive or random deviations from the geometrical surface which form the three-dimensional topography of the surface

NOTE Surface texture includes roughness, waviness, lay, imperfections and form deviations over a limited surface area.

2.4

surface imperfection

SIM

element, irregularity or group of elements and irregularities of the real surface unintentionally or accidentally caused during manufacture, storage or use of the surface

NOTE 1 It is recommended not to use the term “surface defect” for the meaning defined here (see definition of “defect” in ISO 8402)

NOTE 2 Such types of elements or irregularities differ considerably from those constituting a rough surface.

NOTE 3 The presence of imperfection on the real surface does not necessarily mean that the given surface is unsuitable for use. The acceptability of an imperfection is dependent on the application or function of the surface and is specified in appropriate terms, e.g. length, depth, width, height, number per unit area, etc.

1) See for example ISO 4287.

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3 Characteristics and parameters of surface imperfections

NOTE The maximum value of parameters and characteristics of surface imperfections allowed on a surface is that value applied for specification, i.e. the limit beyond which the component containing the imperfection is rejected.

EXAMPLES

$SIM_n = 60$

where SIM_n is the surface imperfection number as defined in **3.7**

$SIM_n/A = 60/1\ m^{-2}$

$SIM_n/A = 10/50\ mm^{-2}$

where A is the surface imperfection evaluation area as defined in **2.2**

3.1

surface imperfection length

SIM_e

greatest dimension of the surface imperfection, measured parallel to the reference surface

3.2

surface imperfection width

SIM_w

greatest dimension of the surface imperfection, measured normal to the surface imperfection length and parallel to the reference surface

3.3

single surface imperfection depth

SIM_{sd}

greatest depth of the surface imperfection, measured from and perpendicular to the reference surface

3.3.1

combined surface imperfection depth

SIM_{cd}

distance between the reference surface and the lowermost point of the surface imperfection, measured from and perpendicular to the reference surface

3.4

single surface imperfection height

SIM_{sh}

greatest height of the surface imperfection, measured from and perpendicular to the reference surface

3.4.1

combined surface imperfection height

SIM_{ch}

distance between the reference surface and the uppermost point of the surface imperfection, measured from and perpendicular to the reference surface

3.5

surface imperfection area

SIM_a

area of a single surface imperfection projected onto the reference surface

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3.6

total surface imperfection area

SIM_t

area equal to the sum of the individual surface imperfection areas, within the agreed limits of discrimination

NOTE 1 The total surface imperfections area is calculated as:

$SIM_t = SIM_{a1} + SIM_{a2} + \ldots + SIM_{an}$

NOTE 2 When specifying the agreed limits of discrimination, the dimensional criterion that should be used is the minimum dimension of surface imperfection characteristic below which the surface imperfection is neglected when determining the SIM_n and SIM_t values.

3.7

surface imperfection number

SIM_n

number of surface imperfections on the total real surface, within the agreed limits of discrimination

3.8

number of surface imperfections per unit area

SIM_n/A

number of surface imperfections on the specified surface imperfection evaluation area A

4 Specific types of surface imperfections

4.1

recession

inwardly directed surface imperfection

4.1.1

groove

surface imperfection which is a longitudinal recession with a rounded or flat bottom

See Figure 1.

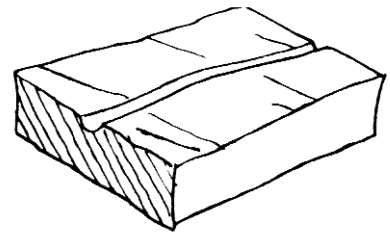

Figure 1

4.1.2

scratch

surface imperfection which is a recession of irregular shape and unspecified direction

See Figure 2.

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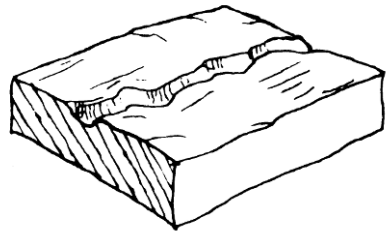

Figure 2

4.1.3

crack

linear recession with a sharp bottom resulting from a disturbance of the integrity of the surface, and of the parent material of the workpiece

See Figure 3.

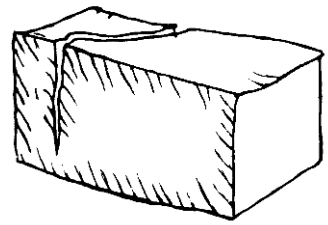

Figure 3

4.1.4

pore

cavity of very small size with steeply sloping walls and, normally, sharp edges, where the upper edges of the cavity are not higher than the tangential reference surface

See Figure 4.

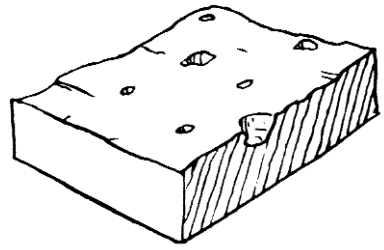

Figure 4

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4.1.5

blowhole

surface imperfection in the form of a single recession resulting from the loss of foreign particles, from etching or from the effect of gas

See Figure 5.

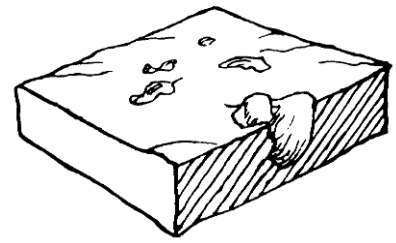

Figure 5

4.1.6

shrinkage hole

recession caused by shrinkage during solidification of a casting, a weld, etc.

See Figure 6.

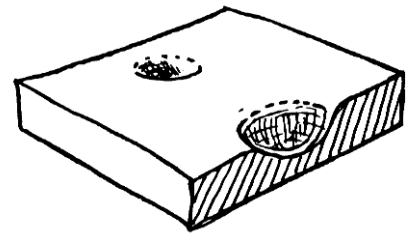

Figure 6

4.1.7

fissure

chink

crevice

sharp, cleft-like, irregular opening of small depth

See Figure 7.

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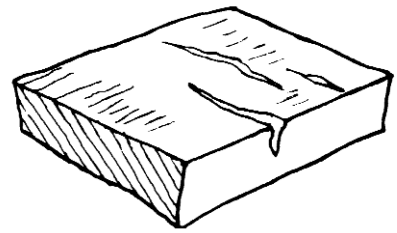

Figure 7

4.1.8

wane

imperfection in the form of a rounded-off part at the intersection of two workpiece surfaces

See Figure 8.

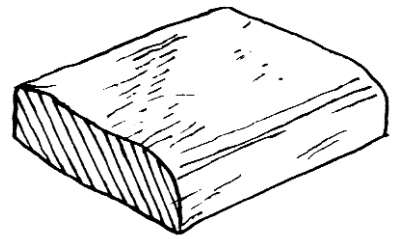

Figure 8

4.1.9

(concave) buckle

recession on the surface of sheet material caused by local bending

See Figure 9.

Figure 9

4.1.10

dent

hollow with no raised portion, often caused by plastic deformation resulting from an impression or blow

See Figure 10.

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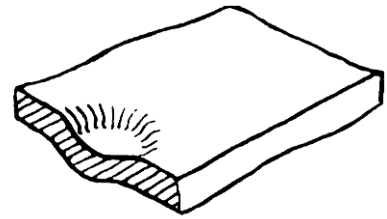

Figure 10

4.2

raising

outwardly directed surface imperfection

4.2.1

wart

ridge-like or hill-like elevation of small size and limited height

See Figure 11.

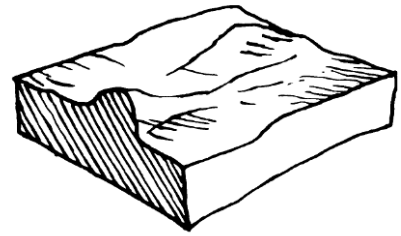

Figure 11

4.2.2

blister

local convexity caused by a subsurface inclusion of gas or liquid

See Figure 12.

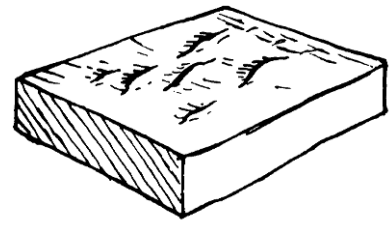

Figure 12

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4.2.3

(convex) buckle

raising on the surface of sheet material caused by local bending

See Figure 13.

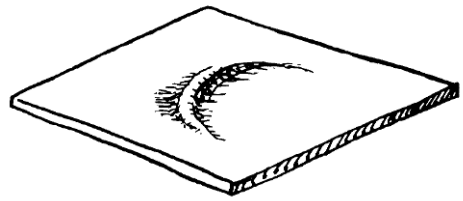

Figure 13

4.2.4

scale

flake-like, partially, detached raising of small thickness, resulting from flaking of the surface layer, which is of a different composition than the parent material

See Figure 14.

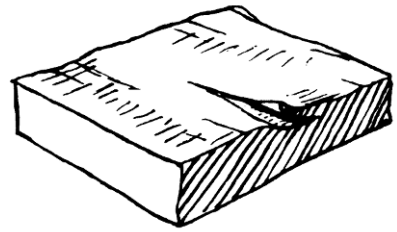

Figure 14

4.2.5

inclusion

particle of foreign material embedded in the workpiece material

See Figure 15.

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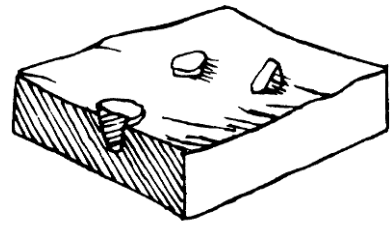

Figure 15

4.2.6

burr

raised sharp edge, frequently with a wane on the opposite side

See Figure 16.

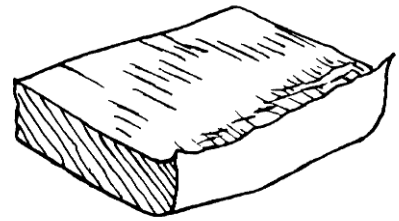

Figure 16

4.2.7

flash

ridge of workpiece material either expelled from the gap between mould parts or die parts when forming (die casting, forging, etc.) or formed perpendicular to the direction of pressure when resistance welding two surfaces (upset welding, flash welding, etc.)

See Figure 17.

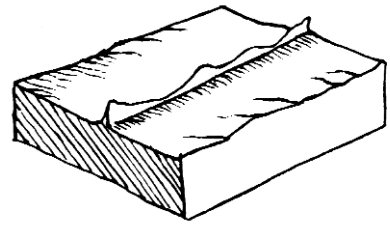

Figure 17

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4.2.8

deposits

build-up on a workpiece either of foreign material or of material from another workpiece

See Figure 18.

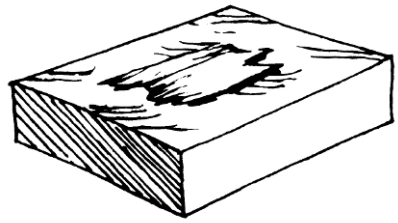

Figure 18

4.3

combined surface imperfection

partially inwardly and partially outwardly directed surface imperfection

4.3.1

crater

hollow with a circular contour and raised edges resembling the mouth of a volcano; the edges are higher than the reference surface cf. **dent** (**4.1.10**)

See Figure 19.

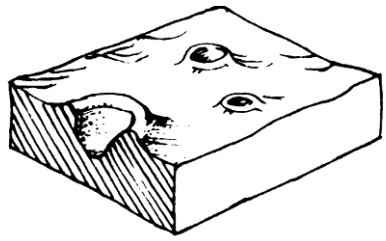

Figure 19

4.3.2

lap

tongue-like raising of small thickness, often in the form of a seam, caused by folding over of material and forcing it into the surface when rolling, forging, etc.

See Figure 20.

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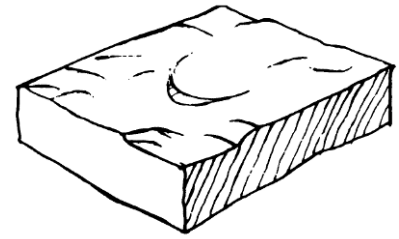

Figure 20

4.3.3

scoring

imperfection in the form of successive recessions and raisings caused by the expulsion of workpiece material owing to the movement of a foreign body

See Figure 21.

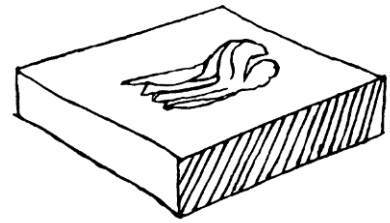

Figure 21

4.3.4

chip rest

band-like raisings resulting from poor chip removal

See Figure 22.

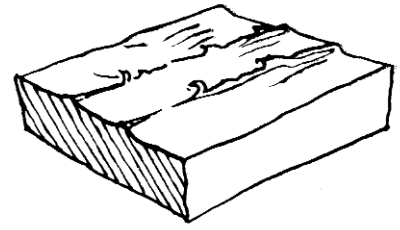

Figure 22

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4.4

area imperfections

appearance imperfections

scattered imperfections in the outermost surface layer, often without sharp contours and often without practicably measurable depth or height

4.4.1

skidding

surface damage of, for example, ball bearings, rollers and races of bearings, of silvery frosted appearance, which occurs on discrete areas of the surface and is caused by intermittent overloading

See Figure 23.

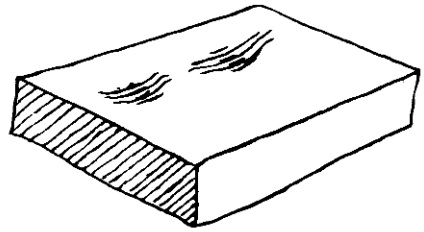

Figure 23

4.4.2

erosion

surface damage due to the physical destruction or wear of the surface

See Figure 24.

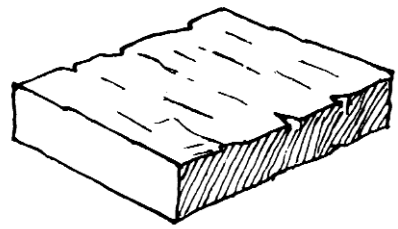

Figure 24

4.4.3

corrosion

surface damage due to the chemical destruction of the surface

See Figure 25.

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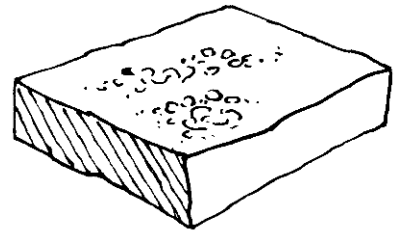

Figure 25

4.4.4

pitting

imperfection in the form of pits and small holes, often of large depth, dispersed over a large area of the surface

See Figure 26.

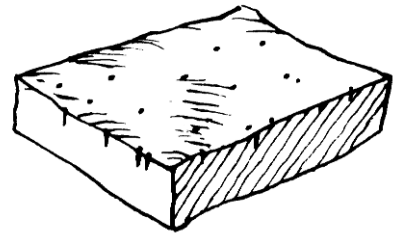

Figure 26

4.4.5

crazing

imperfections in the form of a network of cracks on a surface

See Figure 27.

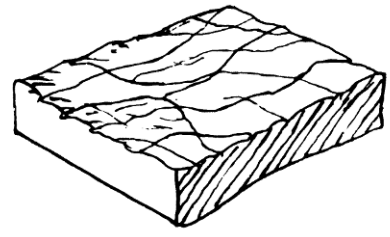

Figure 27

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4.4.6

spot

patch

area which differs visually from the adjacent surface

See Figure 28.

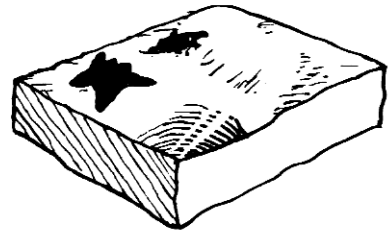

Figure 28

4.4.7

discoloration

discoloured area on a surface

See Figure 29.

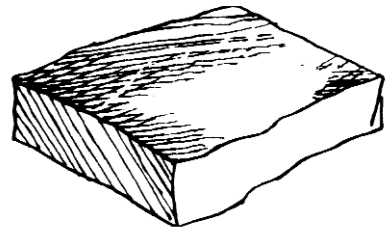

Figure 29

4.4.8

streak

band-like recessed area generally of small depth, or area having a different surface texture

See Figure 30.

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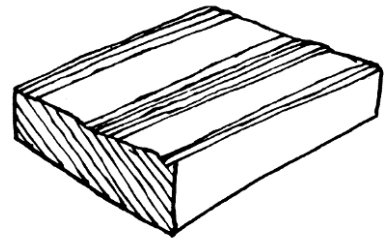

Figure 30

4.4.9

cleavage

flaking

imperfection resulting from partial separation of a portion of the workpiece surface layer

See Figure 31.

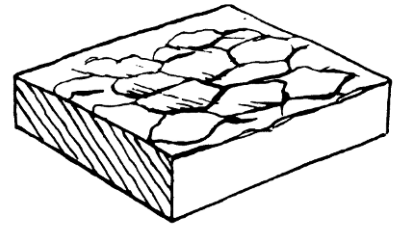

Figure 31

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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 International Standard on surface imperfections covers definitions of parameters and definitions of specific types of surface imperfections. It should be completed by standards covering chain links 3 to 6 in order to allow an unambigous understanding.

A.2 Position in the GPS matrix model

This International Standard is a general GPS standard, which influences chain link number 1 and 2 of the chain of standards on surface imperfections in the general GPS matrix, as graphically illustrated in Figure A.1.

A.3 Related standards

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

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

Figure A.1

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Annex B (informative)

Bibliography

[1] ISO 4287:1997, *Geometrical product specifications (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.*

[2] ISO 6157-1:1988, *Fasteners — Surface discontinuities — Part 1: Bolts, screws, and studs for general requirements.*

[3] ISO 6157-3:1988, *Fasteners — Surface discontinuities — Part 3: Bolts, screws, and studs for special requirements.*

[4] ISO 6520-1:-[2)], *Welding and allied processes — Part 1: Classification of imperfections in metallic fusion welds.*

[5] ISO 6601:1987, *Plastics — Friction and wear by sliding — Identification of test parameters.*

[6] ISO 8402:1994, *Quality management and quality assurance — Vocabulary.*

[7] ISO 10110-7:1996, *Optics and optical instruments — Preparation of drawings for optical elements and systems — Part 7: Surface imperfection tolerances.*

[8] ISO/TR 14638:1995, *Geometrical product specifications (GPS) — Masterplan.*

[2)] To be published. (Revision of ISO 6520:1982)

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