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Specifikacija geometrijskih veličin izdelka (GPS) - Tekstura površine: ravna - 73. del: Meritve materiala - Izrazi in definicije za površinske napake (ISO/DIS 25178-73:2018)

Geometrical product specifications (GPS) - Surface texture: Areal - Part 73: Material measures - Terms and definitions for surface defects (ISO/DIS 25178-73:2018)

Geometrische Produktspezifikation (GPS) - Oberflächenbeschaffenheit: Flächenhaft - Teil 73: Maßverkörperungen - Begriffe für Oberflächenfehler (ISO/DIS 25178-73:2018)

Spécification géométrique des produits (GPS) - État de surface: surfacique - Partie 73: Défauts sur les mesures matérialisées - Termes et définitions: (ISO/DIS 25178-73:2018)

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Geometrical product specifications (GPS) — Surface texture: Areal —

Part 73:
Material measures — Terms and definitions for surface defects

Spécification géométrique des produits (GPS) — État de surface: Surfacique —

Partie 73: Défauts sur les mesures matérialisées — Termes et définitions

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Contents

Page

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.

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 documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

A list of all parts in the ISO 25178- series can be found on the ISO website.

Introduction

0.1 General

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 F of the chain of standards on Profile surface texture, Areal surface texture and Surface imperfections.

The ISO GPS Masterplan 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. The default decision rules given in ISO 14253-1 apply to specifications made in accordance with this document, unless otherwise stated.

For more detailed information on the relation of this document to the GPS matrix model, see Annex B.

This document is based on the premise that a material measure has a real geometrical surface which is a realization of an ideal or nominal surface, which in turn can in most cases be regarded as a simple mathematical concept: for example a plane, a sphere, a step function, or a sinusoidal shape. In each case there will be an associated precisely-known quantity, which is used when the material measure is measured by a surface texture-measuring instrument in one or more operations during the calibration and set-up of that instrument.

Any portion of the measuring surface of the material measure at which the real surface deviates from the ideal nominal surface is therefore more or less undesirable, and is here denoted by the term *defect*.

0.2 Relationship to ISO 8785:1999 *Surface Imperfections — Terms, Definitions and Parameters*

ISO 8785:1999 was intended to apply to all types of surface, whether functional or otherwise. Examples of functional surfaces are: brake disks, cylinder linings, optical lens and mirror surfaces, fluid pipe couplings, marine propeller blades, artificial hip joints. In each case, the surface has to perform one or more definite jobs, and consequently the choice of method of manufacture, and the type of surface geometry together with a certain range of parameter values which are specified for it, are usually a compromise between conflicting requirements which may not all be perfectly fulfilled. The functional surface can then be measured in order to find out how closely it matches the parameter values which have been specified.

However, this is not the same as determining how well the surface functions. In many cases it is not obvious exactly what the ideal profile shape from the point of view of best function, would be. Therefore, it is possible that a surface which deviates from the specified profile in some places, actually performs better than one which has no deviations. For this reason, ISO 8785:1999 used the general term *imperfections*, which does not suggest undesirability, in preference to the term *defects*, which does suggest it.

Unlike ISO 8785:1999, this document does not deal with any classes of defect other than geometrical, that may appear upon the surfaces of material measures. Examples of other classes of defect are: unwanted variations in physical properties such as surface hardness, or surface colour, or electrical properties. For the purposes of this document, no instance of such an unwanted variation in a physical property is considered to be a defect unless it coincides spatially with the area of a geometrical defect. For information on variations in surface colour, see Annex A.

0.3 Relationship to ISO 5436-1:2000 and ISO 25178-70

The material measures and calibration specimens which are described in ISO 5436-1 and ISO 25178-70, are not functional surfaces as described in 0.2. Material measures exist only in order to be measured, there are no physical jobs which they have to do. They are physical representations of a mathematically simple shape, which is therefore the ideal shape, and which can be specified precisely.

Any deviation from this ideal shape is therefore undesirable, and so the term *defect* is preferable to the term *imperfection.* It is possible for a single calibration specimen to be used in two or more different

applications, but for each application there exists a theoretically ideal shape, although certain features of the ideal may be more important in one application than the other.

For example, a sinusoidal roughness specimen can be used to check Ra or RSm parameter values. In the first application it is more important that the sinusoidal specimen exhibits uniformity of amplitude (peak height) than uniformity of wavelength (peak spacing), but in the second application it is the other way around. The fact that the calibration specimen can be used in two different applications does not make it a functional surface, it is still a measurement standard which exists only in order to be measured.

0.4 Defining defects by reference to *geometrical shape*, rather than to *cause*

ISO 8785:1999, Clause 4 contains several descriptions of surface imperfections in terms which make reference to the *cause* of the imperfection, instead of just their geometrical shape. This can create the following kinds of difficulties when applying these descriptions in practice:

a) the possibility of confusion, in cases where a feature has the shape of one type of imperfection, but has the cause of a different one;

b) in many cases, particularly with very small features at the limits of visibility, the cause may be unknown and hard to discover;

c) it makes it more difficult to translate the terms into other languages.

In this document the emphasis is on geometrical shape, and three terms will be defined corresponding to the cases in which the deviation is upwards from the surface (outward defect, 3.2.6), or downwards into the surface (inward defect, 3.2.7), or neither upward nor downward (neutral defect, 3.2.8). However, there is one exception: it is necessary to define one special type of defect (negative defect, 3.2.9) which sometimes appears on material measures that have been manufactured by one of the widely-used methods of replication and which appear on such a replicated material measure as the result of a corresponding defect on the surface of the mother mould (often called a *negative*), which produced the replica.

0.5 Terms for ways of responding to defects

Consistent with the general idea that defects are undesirable, this document contains a section which defines terms for all possible responses to the presence of defects. It does not specify which of these responses should be applied in any particular situation, it simply defines terms and names for them, and thus enables users, manufacturers, calibration metrologists, and writers of other standards documents, to state their own policies and procedures clearly and unambiguously.

0.6 A defect is a portion of the surface rather than a property of the whole surface

In the language of ISO 8015:2011, 5.4, and ISO 22432:2011, 3.2, a defect is a *geometrical feature* limited by natural boundaries, that is *non-ideal,* and *real* (ISO 22432:2011, 3.2.2). In this document a defect is considered to be a *portion* of the physical surface of a geometrical measurement standard, rather than a *property* of the whole surface. This is necessary in order to distinguish between three common responses to the presence of defects on a measurement standard, responses which are easily confused with each other if they are not precisely defined. They are:

— first, to *remove* the defect (by either physically cutting it off the measuring area or else discarding data points in the software);

— secondly, to *avoid* the defect (by redefining the limits of the measuring area);

— thirdly, to *repair* the defect (by either reworking or cleaning the specimen, or else retouching data in the software).

In the absence of strict definitions for the terms *remove, avoid,* and *repair,* the widely-used term *remove* is ambiguous. However, it is important to distinguish between repairing and removing defects as defined in this document, because many users of specimens and writers of procedures and policies will want to forbid one of these whilst allowing or requiring the other to be done.

0.7 Inapplicability of the definitions presented in this document, to the case of functional surfaces

The statements in 0.6 make it difficult to extend the application of the new definitions to the case of functional surfaces. In most instances it is not possible to *remove* defects from functional surfaces, or to *avoid* them: instead, the only option is to *repair* them or *modify* them. For example, the scratched part of a lens cannot be removed from the lens, or the corroded part of a ship propeller from the propeller. *Removing* or *avoiding* defects (as here defined) is only possible in the case of geometrical measurement standards, where the extent of the measuring area can be redefined or have parts cut away from it.

0.8 Normative and non-normative aspects of this document

All of the definitions presented in Clause 3.2 of this document are normative insofar as the standard specifies the vocabulary which is to be used whenever reference is made to geometrical defects on the surfaces of material measures.

In addition, Clause 3.3 is normative. Of the six ways defined for responding to defects, at least one has to be selected. (At least one, because although 3.3.1 to 3.3.4 are mutually exclusive, 3.3.5 and 3.3.6 are not: it is possible to decide to ignore defects, and then to go on to measure them by chance.)

However, nothing in this standard prevents any customer making additional specifications concerning the physical properties of the surface of any physical measurement standard. Customers may specify the hardness, or the colour, for example, in addition to specifying the geometrical properties; and if the specimen supplied does not conform to those additional specifications then the customer can refuse to buy it even if its geometrical product specifications are completely fulfilled.