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

Part 700: Calibration, adjustment and verification of areal topography measuring instruments

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

Partie 700: Étalonnage, ajustage et vérification d'instruments de mesure de la topographie des surfaces

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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.

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 of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 290, *Dimensional and geometrical product specification and verification*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

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 E, F and G of the chains of standards on profile surface texture and areal surface texture.

The ISO/GPS matrix model 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 and the default decision rules given in ISO 14253-1 apply to the specifications made in accordance with this document, unless otherwise indicated.

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

In the GPS concept, the design values of geometric parameters on workpieces and their tolerances are compared with the measurement of those parameters on the corresponding manufactured workpieces and their associated measurement uncertainties. For a reliable result it is therefore necessary to calibrate the measurement instrument involved in this process.

This document specifies default procedures for the calibration, adjustment and verification of surface topography measuring instruments, using material measures traceable to the meter through a national metrology institute or qualified laboratory, see ISO/IEC Guide 99:2007, 2.41. Default methods are recommended when no other calibration procedures have been clearly defined.

This document describes the calibration (see ISO/IEC Guide 99:2007, 2.39), adjustment (see ISO/IEC Guide 99:2007, 3.11) and verification (see ISO/IEC Guide 99:2007, 2.44) in general for topography measuring instruments.

The calibration of an instrument's metrological characteristics enables the verification of the instrument's specifications when the specifications are based on these metrological characteristics. This also enables the comparison of systems of different manufacturers that may be based on different measurement principles.

The metrological characteristics capture all of the factors that can influence a measurement result (influence quantities) and can be propagated appropriately through a specific measurement model to estimate measurement uncertainty.

Calibration is a part of the determination of the overall uncertainty of measurement. The complete evaluation of measurement uncertainty may include other factors such as operator variability, changing environmental influences, the effects of thermal and mechanical stresses on the sample part and other factors that are not accounted for in the instrument calibrations.

Alternative calibration techniques to the defaults given here are equally acceptable, depending on the capabilities of the instrumentation and provided those alternatives have clear traceability paths. Example techniques include those based on an independent realization of the meter using a natural emission wavelength, the value for which has been established with a known uncertainty.

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

Part 700: Calibration, adjustment and verification of areal topography measuring instruments

1 Scope

This document specifies generic procedures for the calibration, adjustment and verification of metrological characteristics that areal topography measuring instruments have in common, as stated in ISO 25178-600.

Because surface profiles can be extracted from surface topography images, most of the methods described in this document can be adapted to profiling instruments.

Instrument-specific issues are not covered by this document. For example, for instruments based on mechanical probing where the probe follows an additional arcuate motion, additional measures are specified in ISO 25178-701.

This document does not include procedures for area-integrating methods, although those are also stated in ISO 25178-6. For example, light scattering belongs to a class of techniques known as area-integrating methods for measuring surface topography.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 25178-600:2019, *Geometrical product specifications (GPS) — Surface texture: Areal — Part 600: Metrological characteristics for areal topography measuring methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
non-measured points
surface locations for which no valid measured values exist

Note 1 to entry: The handling of non-measured points is specified in 6.3.

Note 2 to entry: Non-measured points may be caused by a feature of the measuring instrument or by a defect on the surface of the measurement standard which is outside the range of the instrument.