
Specifikacija geometrijskih veličin izdelka (GPS) - Tekstura površine: ploskovna - 70. del: Meritve materiala (ISO/DIS 25178-70:2026)

Geometrical product specification (GPS) - Surface texture: Areal - Part 70: Material measures (ISO/DIS 25178-70:2026)

Geometrische Produktspezifikation (GPS) - Oberflächenbeschaffenheit: Flächenhaft - Teil 70: Maßverkörperungen (ISO/DIS 25178-70:2026)

Spécification géométrique des produits (GPS) - État de surface: surfacique - Partie 70: Mesures matérialisées (ISO/DIS 25178-70:2026)

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DRAFT International Standard

ISO/DIS 25178-70

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

Part 70: Material measures

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

Partie 70: Mesures matérialisées

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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).

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

This second edition cancels and replaces the first editions (ISO 25178-70:2014), which have been technically revised and cancels and replaces ISO 5436-1:2000, whose contents have been revised and incorporated into this document.

The main changes are as follows:

- revision of Clause 7, which now include most of the contents of ISO 5436-1:2000;
- revision of Clause 8 on Areal material measure;
- revision of Clause 9 on material measure certificate;
- addition of Annex B on the calibration method of sensitive and insensitive material measures to check the stylus tip condition, which was addressed in ISO 5436-1:2000;
- addition of Annex C describing changes to the previous documents (ISO 25178:2014 and ISO 5436-1:2000);
- revision of Annex D on equivalence table for material measure names; the corresponding material measure with PGC has been added;
- revision of Annex E on evaluation of a spacing measurand on an areal instrument.

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.

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Introduction

This document is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO 14638 [1]). It influences chain link G of the chain of standards on profile and areal surface texture.

The ISO GPS matrix model given in ISO 14638 [1] 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 [2] apply to this document and the default decision rules given in ISO 14253-1 [3] apply to the specifications made in accordance with this document, unless otherwise indicated.

For more detailed information on the relation of this document to other standards and the GPS matrix model, see [Annex G](#).

The material measures for profile surface texture instruments were previously defined in ISO 5436-1. Based on this, this document for areal surface texture instruments was published in 2014. Since this is the more modern international standard and more inclusive material measures for the profile method and the areal method differ only in the presence of a Y-axis, this edition of this document replaces not only the previous version of ISO 25178-70 but also ISO 5436-1:2000.

This document introduces material measures that can be used for calibration, verification and adjustment of profile and areal surface texture measurement instruments.

NOTE Portions of this document, particularly the informative sections, describe patented systems and methods. This information is provided only to assist users in understanding the operating principles of contact stylus instruments. This document is not intended to establish priority for any intellectual property, nor does it imply a license to proprietary technologies described herein.

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

Part 70: Material measures

1 Scope

This document specifies the characteristics of material measures used for the calibration, adjustment and verification of profile and areal surface texture measurement instruments.

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 10012, *Quality management — Requirements for measurement management systems*

ISO 14660-1:1999, *Geometrical Product Specifications (GPS) — Geometrical features — Part 1: General terms and definitions*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

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 terms and definitions given in ISO 12780-1, ISO 12781-1, ISO 21920-2, ISO 25178-2, ISO 25178-600, ISO 25178-601, ISO 25178-701 and ISO/IEC Guide 99 and the following 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 material measure

<surface texture> dedicated manufactured workpiece intended to reproduce or supply, in a permanent manner during its use quantities of one or more given kinds, each with an assigned quantity value

Note 1 to entry: The indication of a material measure is its assigned quantity value.

Note 2 to entry: A material measure can be a measurement standard.

Note 3 to entry: A material measure is sometimes called calibration sample, calibration specimen, calibration standard, standard artefact, physical measurement standard or physical standard.

[SOURCE: ISO/IEC Guide 99:2007, 3.6, modified — A domain has been added and the definition modified. The examples are not reproduced.]

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4 General

A material measure can be used for three different purposes:

- calibration of the metrological characteristics, followed by assessment of the measurement uncertainty;
- user adjustment of the instrument, which establishes corrections of the measured quantities;
- verification of the measurement instrument to test the validity of calibration and adjustment.

These purposes depend on the metrological characteristics of the material measures (see the ISO 25178-700 series).

The material measures presented in this document are suitable for all three purposes; nevertheless, they have been especially designed for the assessment and correction of systematic errors. This is due to the fact that the characteristics of those material measures permit the calibration of coordinates such as x , y and z through the assessment and verification of adjustment coefficients C_x , C_y and C_z (see the ISO 25178-600 series).

These material measures are generally not useful for separating the errors introduced by the instrument from those due to the filtering and computation algorithms. The algorithms can be tested using software measurement standards (see ISO 5436-2 [4], ISO 25178-71 [5] and ISO 25178-72 [6]).

Most of the material measures presented below permit the verification and the correction of the squareness between X- and Y- drive units on areal instruments.

The measurement method, the instrument settings, especially concerning the filter settings and/or the required topographic spatial resolution W_R (see Clause 9, and also ISO 25178-600:2019, 3.1.20). This information is usually specified by the manufacturer of the material measure, the calibration certificate or calibration instructions.

In ISO 21920-2 and ISO 25178-2, each term is followed by its parameter (abbreviated term), then its symbol. Throughout this document, parameters are written as abbreviated terms with lower-case suffixes (as in Rq) when used in a sentence, and are written as symbols with subscripts (as in Rq) when used in formulae, to avoid misinterpretations of compound letters as an indication of multiplication between quantities in formulae. The parameters with lower-case suffixes are used in product documentations, drawing and data sheets.

5 Requirements for the material measures

The design characteristics of material measures shall be compatible with the considered application. See also [Annex A](#).

The material characteristics of the material measure shall not significantly influence the measurement carried out on it.

The lateral scale-limits of the integral real surface (defined in ISO 14660-1:1999, 2.4.1) of the material measure shall be specified. Features, or components of features, with length scales entirely outside the bandwidth of these scale-limits, shall be considered not to affect the measurement. Similarly, features or parts of features located outside the area involved in the analysis shall be considered not to affect the measurement.

Examples of such features are:

- flatness deviation of the real integral surface of the standard;
- form deviation of the groove(s) (i.e. for PGR, PGC, PDG, AGP, AGC, etc.);
- groove bottom radius (i.e. for PGC, PCS, PDG, AGP, AGC, etc.);

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- form deviation of the flanks of the triangles (i.e. for PPT, PCS, PDG, AGP, etc.);
- parallelism errors between grooves (i.e. for PDG, AGP, etc.);
- squareness between grooves (i.e. for AGP, etc.);
- local slope at any point (when using an optical instrument);
- bisector of the groove(s) or the triangles (line, plane or cylinder), which shall be nominally perpendicular to the reference plane of the standard;
- reflectivity of the surface (when using an optical instrument);
- hardness of the material (when using a stylus instrument);
- refractive index of the material;
- colour of the material.

The measurement standards should be uniquely identified. Serial number, type and nominal values of the measurands are recommended to be engraved on the standard and/or standard's casing.

6 Types of material measures

The different types of material measures covered by this document are given in [Table 1](#) and [Table 2](#).

NOTE 1 The prefix P is used for the profile material measures type.

NOTE 2 The prefix A is used for the areal material measures type.

[Annex D](#) gives the equivalence between names defined in other standards (e.g. ISO 5436-1 and ISO 25178-701).

Table 1 — Types of profile material measures

Type	Name
PPS	Periodic sinusoidal shape
PPT	Periodic triangular shape
PPR	Periodic rectangular shape
PPA	Periodic arcuate shape
PGR	Groove, rectangular
PGC	Groove, circular
PRO	Irregular profile
PCR	Circular irregular profile
PRI	Prism
PRB	Razor blade
PAS	Approximated sinusoidal shape
PCS	Contour standard
PDG	Double groove

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Table 2 — Types of areal material measures

Type	Name
AGP	Grooves, perpendicular
AGC	Groove, circular
ASP	Hemisphere
APS	Plane – sphere
ACG	Cross grating
ACS	Cross sinusoidal
ARS	Radial sinusoidal
ASG	Star-shape grooves
AIR	Irregular
AFL	Flat plane
APC	Photochromic pattern

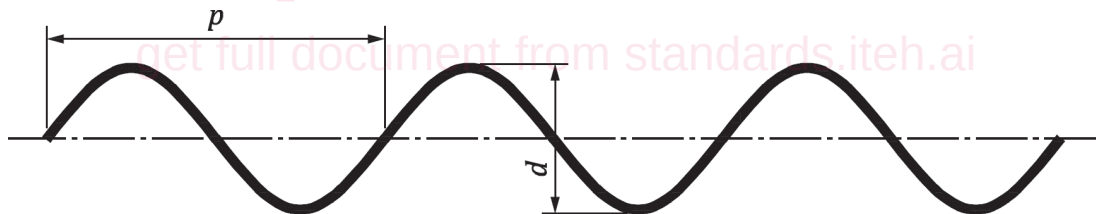
7 Profile material measures

7.1 Type PPS: Periodic sinusoidal shape

7.1.1 Design characteristics

This material measure reproduces a sinusoidal shape along one direction. The shape is defined by the period p and the depth d (see [Figure 1](#)).

NOTE Particular cases of PPS material measures, commonly called chirps, have increasing or decreasing periods. They enable the assessment of instrument bandwidth or lateral resolution.



Key

d	depth
p	period

Figure 1 — Sinusoidal shape

7.1.2 Measurands

See [Table 3](#).

Table 3 — Measurand of material measures — Type PPS

	Profile	Areal
Z-axis	Ra, Rq, Rt and/or Rz	Sa, Sq and/or Sz
X-axis (and Y-axis)	Rsm	averaged Psm

This material measure can be primarily used for calibrating vertical profile component for contact stylus instruments, and can also be used for calibrating horizontal profile components, if the period p is held within limits acceptable for this purpose. The material measure is chosen, so that the values of Ra, Rq and Rsm are not affected by attenuation due to the stylus tip or S-filter with a nesting index N_{is} (cut-off λ_s).