International
Standard

ISO 25178-604

Second edition
2025-02

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

Part 604:

Design and characteristics of non-contact (coherence scanning interferometry) instruments

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

Partie 604: Conception et caractéristiques des instruments sans contact (à interférométrie par balayage à cohérence)

Reference number
ISO 25178-604:2025(en)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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).

This second edition cancels and replaces the first edition (ISO 25178-604:2013), which has been technically revised.

The main changes are as follows:

- removal of the terms and definitions now specified in ISO 25178-600;
- revision of all terms and definitions for clarity and consistency with other ISO standards documents;
- addition of Clause 4 for instrument requirements, which summarizes normative features and characteristics;
- addition of Clause 5 on metrological characteristics;
- addition of Clause 6 on design features, which clarifies types of instruments relevant to this document;
- addition of an information flow concept diagram in Clause 4;
- revision of Annex A describing the principles of instruments addressed by this document;
- addition of Annex B on metrological characteristics and influence quantities; replacement of the normative table of influence quantities with an informative description of common error sources and how these relate the metrological characteristics in ISO 25178-600.

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 link F of the chains of standards on profile 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 on the relation of this document to other standards and the GPS matrix model, see Annex C.

This document includes terms and definitions relevant to the coherence scanning interferometry (CSI) instrument for the measurement of areal surface topography. Annex A briefly summarizes CSI instruments and methods to clarify the definitions and to provide a foundation for Annex B, which describes common sources of uncertainty and their relation to the metrological characteristics of CSI.

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 CSI instruments. This document is not intended to establish priority for any intellectual property, nor does it imply a license to proprietary technologies described herein.

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

Part 604:

Design and characteristics of non-contact (coherence scanning interferometry) instruments

1 Scope

This document specifies the design and metrological characteristics of coherence scanning interferometry (CSI) instruments for the areal measurement of surface topography. Because surface profiles can be extracted from surface topography data, the methods described in this document are also applicable to profiling measurements.

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 terms and definitions given in ISO 25178-600 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
coherence scanning interferometry
CSI
surface topography measurement method wherein the localization of *interference fringes* (3.7) during a scan of optical path length provides a means to determine a surface topography map

Note 1 to entry: The optical path length difference is the difference in optical path length, including the effect of geometry and refractive index, between the measurement and reference paths of an interferometer (see ISO 10934:2020, 3.3.1).

Note 2 to entry: CSI uses a broad illumination spectral bandwidth or the illumination geometry, or both, to localize the interference fringes.

Note 3 to entry: CSI uses either fringe localization alone or in combination with *interference phase* (3.8) evaluation, depending on the surface type, desired surface topography repeatability and software capabilities.

Note 4 to entry: Table 1 provides a list of alternative terms for CSI that are within the scope of this document.