SLOVENSKI STANDARD
oSIST prEN ISO 25178-603:2023

01-december-2023

Specifikacija geometrijskih veličin izdelka (GPS) - Tekstura površine: ravna - 603. del: Konstrukcije in značilnosti nekontaktnih instrumentov (interferometrija s faznim zamikom) (ISO/DIS 25178-603:2023)

Geometrical product specifications (GPS) - Surface texture: Areal - Part 603: Design and characteristics of non-contact (phase shifting interferometry) instruments (ISO/DIS 25178 -603:2023)

Geometrische Produktspezifikation (GPS) - Oberflächenbeschaffenheit: Flächenhaft - Teil 603: Aufbau und Merkmale von berührungslos messenden Geräten (phasenschiebende Interferometrie) (ISO/DIS 25178-603:2023)

Spécification géométrique des produits (GPS) - État de surface: Surfacique - Partie 603: Conception et caractéristiques des instruments sans contact (à interférométrie à glissement de franges) (ISO/DIS 25178-603:2023)

Ta slovenski standard je istoveten z: **prEN ISO 25178-603**

ICS:

17.040.20	Lastnosti površin	Properties of surfaces
17.040.40	Specifikacija geometrijskih veličin izdelka (GPS)	Geometrical Product Specification (GPS)

oSIST prEN ISO 25178-603:2023 **en,fr,de**

DRAFT INTERNATIONAL STANDARD

ISO/DIS 25178-603

ISO/TC **213**

Secretariat: **BSI**

Voting begins on:
2023-10-23

Voting terminates on:
2024-01-15

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

Part 603:
Design and characteristics of non-contact (phase shifting interferometry) instruments

ICS: 17.040.20

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING

Reference number
ISO/DIS 25178-603:2023(E)

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

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*.

This second edition cancels and replaces the first edition (ISO 25178-603:2013), which has been technically revised.

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

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 of the relation of this document to other standards and the GPS matrix model, see Annex C.

This document includes normative terms and definitions relevant to the phase shifting interferometry (PSI) method for the measurement of areal surface topography. The informative Annex A briefly summarizes PSI instruments and methods to clarify the normative definitions and to provide a foundation for informative Annex B, which describes common sources of uncertainty and their relation to the metrological characteristics of PSI.

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 phase shifting interferometry. 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 603: Design and characteristics of non-contact (phase shifting interferometry) instruments

1 Scope

This document describes the design and metrological characteristics of phase shifting interferometry instruments for areal measurement of surface topography. Because surface profiles can be extracted from areal surface topography data, the methods described in this document can be applied to profiling measurements as well.

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 terminological 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
phase shifting interferometry
PSI
method for measuring areal surface topography from the surface height dependence of an interferometric signal, whereby the interference phase is estimated from two or more digitized interference images acquired over a sequence of controlled phase shifts

Note 1 to entry: In this document, PSI refers specifically to methods that employ time-dependent phase shifting mechanisms. Other methods of acquiring and analysing interference patterns, including parallel or instantaneous methods using polarization or carrier fringes, are outside the scope of this document.

Note 2 to entry: ISO/TR 14999-2:2019, 6.4.4 provides further information on synchronous detection and phase shifting interferometry.

Note 3 to entry: PSI instruments are most often employed for measurements of optically smooth surfaces, as defined in ISO 25178-600:2019, 3.4.4.

3.2
interference objective
microscope objective adapted with a reference path and reference surface for the generation of interference patterns superimposed on the image of a sample surface

Note 1 to entry: Interference objectives are used in PSI instruments that are configured as microscopes. Other configurations of PSI instruments, particularly for fields of view larger than about 10 mm, can have interferometer designs that are not based on microscope objectives.

Note 2 to entry: Annex A provides example types of interference objective in common usage.

3.3
linear phase shifting interferometry
linear PSI
PSI method that relies on sampling an interference signal over a sequence of evenly spaced interference phase shifts

3.4
sinusoidal phase shifting interferometry
sinusoidal PSI
PSI method that relies on sampling an interference signal over a sequence of sinusoidally-varying interference phase shifts

3.5
axial scan
mechanical or optical displacement between the sample under inspection and the imaging optics

Note 1 to entry: The imaging optics is nominally parallel to the axial scan axis of the microscope.

[SOURCE: ISO 25178-607:2019, 3.5]

3.6
phase shifting interferometry algorithm
PSI algorithm
algorithm for the data processing procedure, including the mathematical equations, used to calculate the topography from two or more digitized interference images acquired over a sequence of controlled phase shifts

3.7
equivalent wavelength
constant value equal to twice the change in surface topography height that produces one full cycle of interference phase change (equivalent to one interference fringe)

Note 1 to entry: The equivalent wavelength is a definition in the context of PSI for the measurement optical wavelength, defined in ISO 25178-600:2019, 3.3.3 as the "…effective value of the wavelength of the light used to measure a surface".

Note 2 to entry: This definition corresponds to the measurement configuration described in Annex A, and can have different definitions for other measurement configurations.

Note 3 to entry: The equivalent wavelength can be calculated from contributions such as the light source wavelength together with other factors related to the instrument design, or can be calibrated using a procedure corresponding to the definition of the equivalent wavelength.

3.8
phase change on reflection
PCOR
change in interference phase attributable to the optical properties of a sample surface independent of surface height

Note 1 to entry: The PCOR is most relevant to non-dielectric materials such as metals and surfaces that have thin layers of differing materials producing thin-film effects.