# SLOVENSKI STANDARD
# oSIST prEN ISO 25178-602:2023

**01-december-2023**

---

**Specifikacija geometrijskih veličin izdelka - Tekstura površine: ploskovna - 602. del: Konstrukcije in značilnosti brezkontaktnih (fokusirna barvna sonda) instrumentov (ISO/DIS 25178-602:2023)**

Geometrical product specifications (GPS) - Surface texture: Areal - Part 602: Design and characteristics of non- contact (confocal chromatic probe) instruments (ISO/DIS 25178-602:2023)

Geometrische Produktspezifikation (GPS) - Oberflächenbeschaffenheit: Flächenhaft - Teil 602: Aufbau und Merkmale von berührungslos messenden Geräten (mit chromatisch konfokaler Sonde) (ISO/DIS 25178-602:2023)

Spécification géométrique des produits (GPS) - État de surface: Surfacique - Partie 602: Conception et caractéristiques des instruments sans contact (à capteur confocal chromatique) (ISO/DIS 25178-602:2023)



**Ta slovenski standard je istoveten z:** **prEN ISO 25178-602**

---

**ICS:**

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

**oSIST prEN ISO 25178-602:2023** **en,fr,de**

DRAFT INTERNATIONAL STANDARD

**ISO/DIS 25178-602**

ISO/TC **213**

Secretariat: **BSI**

Voting begins on:
**2023-10-05**

Voting terminates on:
**2023-12-28**

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

## Part 602:
## Design and characteristics of non-contact (confocal chromatic probe) instruments

ICS: 17.040.20



This document is circulated as received from the committee secretariat.

**ISO/CEN PARALLEL PROCESSING**



Reference number
ISO/DIS 25178-602:2023(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 25178-602:2010), 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.

The confocal chromatic optical principle can be implemented in various set-ups. The configuration described in this document comprises three basic elements: an optoelectronic controller, a linking fibre optic cable and a chromatic objective (sometimes called “optical pen”).

Several techniques are possible to create the axial chromatic aberration or to extract the height information from the reflected light. In addition to implementations as point sensors, chromatic aberration can be integrated into line sensors and field sensors. Annex A describes in detail confocal chromatic imaging and its implementation into distance measurement probes.

This type of instrument is mainly designed for areal measurements, but it is also able to perform profile measurements.

This document describes the metrological characteristics of an optical profiler using a confocal chromatic probe based on axial chromatic aberration of white light, designed for the measurement of areal surface texture.



For more detailed information on the chromatic probe instrument technique, see Annex A. Reading this annex before the main body can lead to a better understanding of this document.

NOTE Portions of this document, particularly the informative sections, may describe patented systems and methods. This information is provided only to assist users in understanding the operating principles of confocal chromatic probe. 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 602: Design and characteristics of non-contact (confocal chromatic probe) instruments

## 1 Scope

This document defines the design and metrological characteristics of a particular non-contact instrument for measuring surface texture using a confocal chromatic probe based on axial chromatic aberration of white light. Additional metrological characteristics can be found in ISO 25178-600. 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**
**chromatic aberration**
<confocal chromatic probe>
optical effect of a lens that focuses light at different lengths depending on the wavelength

Note 1 to entry: Chromatic aberration can be axial (on the optical axis) or lateral (off the optical axis). It is defined in ISO 10934:2020, 3.1.4.2.

**3.2**
**chromatic objective**
objective with axial chromatic aberration

**3.3**
**confocal chromatic probe**
device that senses surface heights using a *chromatic objective* (3.2) mounted into a confocal setup

Note 1 to entry: Various optical configurations are discussed in Annex A.

**3.4**
**confocal chromatic microscopy**
surface topography measurement method consisting of a confocal microscope with chromatic objective integrated with a spectrometer whereby the surface height at a single point is sensed by the wavelength of light reflected from the surface

[SOURCE: ISO 25178-6:2010, 3.3.7 modified — "a detection device (e.g. spectrometer)" has been replaced with "a spectrometer".]

**3.5**
**light source**
⟨chromatic probe⟩ source of light containing a continuum of wavelengths in a predefined spectral region

Note 1 to entry: The spectral region emitted by the source should be compatible with the spectral bandwidth of the optical system and the detector.

Note 2 to entry: Usually, this spectral region extends within the visible light, between wavelength values 0,4 µm to 0,8 µm.

**3.6**
**light source pinhole**
small hole placed following the *light source* (3.5), to make it a point light source

Note 1 to entry: The system contains two pinholes: the first one is the light source pinhole. It defines a small spot of light that acts as the point light source for the instrument. The second one is the discrimination pinhole. It limits the transmitted beam to the part that is in focus on the sample surface and is reflected by it along the optical axis (see Figure A.1).

Note 2 to entry: In practice, the pinholes are obtained by using a fibre optic which provides spatial discrimination and allows the optical head to be used away from the optoelectronic controller.

**3.7**
**discrimination pinhole**
small hole placed in front of the detector, providing depth discrimination on a beam reflected from the sample surface by blocking defocused light

Note 1 to entry: Notes 1 and 2 to entry in 3.6 also apply here.

**3.8**
**working distance**
⟨chromatic probe⟩ distance measured along the optical axis between the element closest to the surface and the point on the surface located in the middle of the *vertical range* (3.9)

**3.9**
**vertical range**
⟨chromatic probe⟩ distance measured between the focal point of the shortest wavelength and the focal point of the longest wavelength detected on the spectrometer

Note 1 to entry: The vertical range depends on the depth of field and on the spectral range of the spectrometer.

**3.10**
**optical pen**
part of a *confocal chromatic probe* (3.3) that contains a *chromatic objective* (3.2) and that is located close to the surface during the measurement

Note 1 to entry: The optical pen is usually connected to an opto-electronic box through a fibre optic.