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**Kovinske in druge anorganske prevleke - Pregled metod za merjenje debeline  
(ISO/DIS 3882:2022)**

Metallic and other inorganic coatings - Review of methods of measurement of thickness  
(ISO/DIS 3882:2022)

Metallische und andere anorganische Überzüge - Übersicht über Verfahren zur  
Schichtdickenmessung (ISO/DIS 3882:2022)

Revêtements métalliques et autres revêtements inorganiques - Revue des méthodes de  
mesurage de l'épaisseur (ISO/DIS 3882:2022)

**Ta slovenski standard je istoveten z: prEN ISO 3882**

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## ISO/DIS 3882

ISO/TC 107

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## Metallic and other inorganic coatings — Review of methods of measurement of thickness

*Revêtements métalliques et autres revêtements inorganiques — Vue d'ensemble sur les méthodes de mesurage de l'épaisseur*

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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](http://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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*.

This fourth edition cancels and replaces the third edition (ISO 3882:2003), which has been technically revised.

The main changes compared to the previous edition are as follows:

- editorial changes;
- rearrangement of the sections;
- [Table 2](#) (Applicability of typical instrumental methods for coating thickness measurement) and [Table 3](#) (Representative thickness ranges of coating thickness measuring instruments) moved to an informative annex;
- new section for STEP method;
- review of measurement uncertainties;
- adding phase sensitive eddy current, ISO 21968 to measurement methods and in [Table 2](#) and [3](#).

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](http://www.iso.org/members.html).

## Introduction

This document summarizes the various methods used for the measurement of coating thickness and describes their working principles. Methods of measuring coating thickness are either destructive or non-destructive (see [Table 1](#)). The information given in [Table 2](#) will assist in the choice of typical instrumental methods suitable for thickness measurements. For all instrumental methods, manufacturers' instructions contain useful information on the correct handling of the instruments.

The thickness ranges covered by the different methods depend on the coating materials, thickness of the coating, substrates and instruments used (see [Table 3](#)); e.g., although X-ray spectrometry can be used to measure the thickness of a chromium coating, thicknesses of 20 µm or more cannot be measured with sufficient precision. Similarly, while magnetic methods could be used to measure the thickness of a gold coating over a magnetic steel substrate, many magnetic instruments do not have the sensitivity to measure accurately thicknesses of gold coatings less than 2 µm.

Where a referee method is required the appropriate coating specification can contain useful information on the preferred method.

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# Metallic and other inorganic coatings — Review of methods of measurement of thickness

## 1 Scope

This document reviews methods for measuring the thickness of metallic and other inorganic coatings on both metallic and non-metallic substrates (see [Tables 1, 2 and 3](#)). It is limited to tests already specified, or to be specified, in International Standards, and excludes certain tests that are used for special applications.

## 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 1463, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method*

ISO 2064, *Metallic and other inorganic coatings — Definitions and conventions concerning the measurement of thickness*

ISO 2128, *Anodizing of aluminium and its alloys — Determination of thickness of anodic oxidation coatings — Non-destructive measurement by split-beam microscope*

ISO 2177, *Metallic coatings — Measurement of coating thickness — Coulometric method by anodic dissolution*

ISO 2178, *Non-magnetic coatings on magnetic substrates — Measurement of coating thickness — Magnetic method*

ISO 2360, *Non-conductive coatings on non-magnetic electrically conductive base metals — Measurement of coating thickness — Amplitude-sensitive eddy-current method*

ISO 21968, *Non-magnetic metallic coatings on metallic and non-metallic basis materials — Measurement of coating thickness — Phase-sensitive eddy-current method*

ISO 2361, *Electrodeposited nickel coatings on magnetic and non-magnetic substrates — Measurement of coating thickness — Magnetic method*

ISO 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods*

ISO 3543, *Metallic and non-metallic coatings — Measurement of thickness — Beta backscatter method*

ISO 3868, *Metallic and other non-organic coatings — Measurement of coating thicknesses — Fizeau multiple-beam interferometry method*

ISO 4518, *Metallic coatings — Measurement of coating thickness — Profilometric method*

ISO 9220, *Metallic coatings — Measurement of coating thickness — Scanning electron microscope method*

ISO 10111, *Metallic and other inorganic coatings — Measurement of mass per unit area — Review of gravimetric and chemical analysis methods*

ISO 21968, *Non-magnetic metallic coatings on metallic and non-metallic basis materials — Measurement of coating thickness — Phase-sensitive eddy-current method*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2064 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/>

### 4 Overview

[Table 1](#) summarizes the methods of measuring coating thickness that are discussed in this document.

**Table 1 — Methods of measuring coating thickness**

Non-destructive		Destructive	
Split beam microscope (light section)	ISO 2128 <sup>a</sup>	Microscopical (optical)	ISO 1463
Magnetic	ISO 2178 and ISO 2361	Fizeau multiple-beam interferometry	ISO 3868 <sup>b</sup>
Eddy current – amplitude-sensitive	ISO 2360	Profilometric (stylus and optical)	ISO 4518 <sup>b</sup>
– phase-sensitive	ISO 21968		
X-ray spectrometric	ISO 3497	Scanning electron microscope	ISO 9220
Beta backscatter	ISO 3543	Dissolution methods:	
		Gravimetric strip and weigh method and gravimetric analytical method	ISO 10111
		Coulometric method	ISO 2177
		STEP method	ISO 16866
<sup>a</sup> Can be destructive in some applications.			
<sup>b</sup> Can be non-destructive in some applications.			

## 5 Non-destructive methods

### 5.1 Split beam microscope (light section) method, ISO 2128

This equipment, originally designed for the measurement of surface roughness, is used for measuring the thickness of transparent and translucent coatings, in particular anodic oxide coatings on aluminium. A light beam is projected on to the surface at an angle of 45°. Part of the beam is reflected from the surface of the coating and the rest penetrates the coating and is reflected from the coating/metal substrate interface. The distance that separates the two images observed in the eyepiece of the microscope is proportional to the thickness of the coating and can be measured by means of a Vernier screw that controls a calibrated graticule. The method can be used where sufficient light is reflected from the coating/metal substrate interface to give a clear image in the microscope. For transparent or translucent coatings, such as anodic oxide films, this method is non-destructive.

For measuring the thickness of opaque coatings, a small area of the coating is removed and in this application, the method is destructive. The step between the surface of the coating and the basis metal produces a deflection of the light beam that gives an absolute measure of the coating thickness.