

**Metallkatted. Katte paksuse mõõtmine.
Skaneeriva elektronmikroskoobi
meetod**

Metallic coatings - Measurement of coating
thickness - Scanning electron microscope method

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 9220:1999 sisaldab Euroopa standardi EN ISO 9220:1994 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 12.12.1999 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 9220:1999 consists of the English text of the European standard EN ISO 9220:1994.</p> <p>This document is endorsed on 12.12.1999 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>Standard määrab kindlaks meetodi metallkatte kohtpaksuse määramiseks läbilõike uurimise teel skaneeriva elektronmikroskoobiga.</p>	<p>Scope:</p>
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ICS 17.040.20

Võtmesõnad: katsed, katted, metallkatted, määramine, paksus, paksuse mõõtmine

ICS 25.220.40

Descriptors: Metal coatings, coating thickness, measurement, scanning electron microscopy.

English version

Metallic coatings

**Measurement of coating thickness
Scanning electron microscope method
(ISO 9220:1988)**

Revêtements métalliques; mesurage de
l'épaisseur de revêtement; méthode au
microscope électronique à balayage
(ISO 9220:1988)

Metallische Überzüge; Messung der
Schichtdicke; Verfahren mit Raster-
elektronenmikroskop (ISO 9220:1988)

This European Standard was approved by CEN on 1994-10-26 and is identical to the ISO Standard as referred to.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

International Standard

ISO 9220:1988 Metallic coatings; measurement of coating thickness; scanning electron microscope method which was prepared by ISO/TC 107 'Metallic and other inorganic coatings' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 262 'Protection of metallic materials against corrosion' as a European Standard.

CEN/TC 262 had decided to submit ISO 9220:1988 for Formal Vote. The result was positive.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by April 1995 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of the International Standard ISO 9220:1988 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

1 Scope

This International Standard specifies a method for the measurement of the local thickness of metallic coatings by examination of cross-sections with a scanning electron microscope (SEM). It is destructive and has an uncertainty of less than 10 % or 0,1 μm , whichever is greater. It can be used for thicknesses up to several millimetres, but it is usually more practical to use a light microscope (ISO 1463) when applicable.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1463 : 1982, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method*.

ISO 2064 : 1980, *Metallic and other non-organic coatings — Definitions and conventions concerning the measurement of thickness*.

3 Definition

For the purposes of this International Standard, the following definition applies.

local thickness: The mean of the thickness measurements, of which a specified number is made within a reference area. (See ISO 2064.)

4 Principle

A test specimen is cut, ground, and polished from a cross-section of the coating for metallographic examination by a scanning electron microscope. The measurement is made on a conventional micrograph or on a photograph of the video waveform signal for a single scan across the coating.

5 Instrumentation

5.1 Scanning electron microscope (SEM)

The SEM shall have a resolution capability of 50 nm or better. Suitable instruments are available commercially.

5.2 SEM stage micrometer

A stage micrometer or graticule is required for calibration of the magnification of the SEM. The stage micrometer or graticule shall have an uncertainty of less than 5 % for the magnification employed. Suitable stage micrometers or graticules are available commercially.

6 Factors influencing the measurement results

The following factors may affect the accuracy of a measurement of coating thickness.

6.1 Surface roughness

If the coating or its substrate is rough relative to the coating thickness, one or both of the interfaces bounding the coating cross-section may be too irregular to permit accurate measurement of the average thickness in the field of view.

6.2 Taper of cross-section

If the plane of the cross-section is not perpendicular to the plane of the coating, the measured thickness will be greater than the true thickness. For example, an inclination of 10° to the perpendicular will contribute a 1,5 % error.

6.3 Specimen tilt

Any tilt of the specimen (plane of cross-section) with respect to the SEM beam may result in an inaccurate measurement.

NOTE — If the tilt of the test specimen is different from that used for calibration, inaccuracies may result.

6.4 Coating deformation

Detrimental deformation of the coating can be caused by excessive temperature or pressure during the mounting and preparation of cross-sections of soft coatings or coatings that melt at low temperatures, and by excessive abrasion of brittle materials during preparation of cross-sections.