SLOVENSKI STANDARD
SIST EN 13523-1:2010

01-marec-2010

Nadomeġļa:
SIST EN 13523-1:2002

Kovine, zaġļitene po postopku coil-coating - Metode preskuġanja - 1. del: Debelina premaza

Coil coated metals - Test methods - Part 1: Film thickness

Bandbeschichtete Metalle - Prüfverfahren - Teil 1: Schichtdicke

Tôles prélaquées - Méthodes d'essai - Partie 1: Épaisseur du revêtement

Ta slovenski standard je istoveten z: EN 13523-1:2009

ICS:

17.040.20	Lastnosti površin	Properties of surfaces
25.220.60	Organske prevleke	Organic coatings

SIST EN 13523-1:2010 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13523-1

December 2009

ICS 17.040.20; 25.220.60

Supersedes EN 13523-1:2001

English Version

Coil coated metals - Test methods - Part 1: Film thickness

Tôles prélaquées - Méthodes d'essai - Partie 1: Epaisseur du revêtement

Bandbeschichtete Metalle - Prüfverfahren - Teil 1: Schichtdicke

This European Standard was approved by CEN on 7 November 2009.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 13523-1:2009: E

Contents

Page

Foreword

This document (EN 13523-1:2009) has been prepared by Technical Committee CEN/TC 139 “Paints and varnishes”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2010, and conflicting national standards shall be withdrawn at the latest by June 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13523-1:2001.

The main technical change is: the Scope of the method has been changed to include micrometer and optical determination methods.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the procedures for determining the dry film thickness of an organic coating on a metallic substrate (coil coating).

Four appropriate methods are given in this European Standard:

a) magnetic induction;

b) eddy current;

c) micrometer;

d) optical.

The methods are applicable only to products with smooth and flat substrates but the coating itself may be textured. In that case, for methods a) and b) the average of a series of readings will represent an average of the thickness of the organic coating, while method c) will give the maximum thickness and method d) can provide the minimum, maximum and average thickness.

Non-destructive continuous-web methods on measurement of dry-film thickness (see EN ISO 2808) are not dealt with.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 13523-0:2001, *Coil coated metals — Test methods — Part 0: General introduction and list of test methods*

EN 23270, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing (ISO 3270:1984)*

ISO 3611, *Micrometer callipers for external measurement*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13523-0:2001 and the following apply.

3.1
film thickness
distance between the surface of the film and the surface of the substrate

[EN ISO 2808:2007]

4 Principle

4.1 Method A: Measurement on a magnetic substrate – magnetic induction

The film thickness on a magnetic substrate is determined by means of an electrical probe placed on the coating and developing an electromagnetic field in the substrate. The potential variation of this field is a function of the distance between the probe and the substrate. This signal is measured and converted to the film thickness reading.

4.2 Method B: Measurement on a non-magnetic substrate – eddy current

The film thickness on a non-magnetic substrate is determined by means of an electrical probe placed on the coating and generating eddy currents in the substrate. The variation of the amplitude and phase is a function of the distance between the probe and the substrate. This signal is measured and converted to the film thickness reading.

4.3 Method C: Measurement on all substrates – micrometer method

The film thickness is determined by measuring the coated sample and then removing the organic coating and re-measuring the sample minus the coating, or by measuring a film of organic coating that has been removed from the sample.

4.4 Method D: Measurement on all substrates – optical method

The film thickness is determined by microscopical measurement of a section cut through the film. The defined cut may be made in the coating using a special blade (symmetrical cut), a special paint borer (conical bore) or a milling tool (sloping cut).

5 Apparatus and materials

5.1 Instruments for measuring film thickness, using the principles described in Clause 4.

5.2 Solvent, suitable for removing organic coatings, for example methyl ethyl ketone (2-butanone).

5.3 Suitable abrasive and/or **blunt knife**, or other means of removing softened organic coatings that do not damage the substrate.

5.4 Cutting tool, for Method D.

5.4.1 Blade, for making a symmetrical cut in the coating.

5.4.2 Paint borer, for making a conical bore in the coating.

5.4.3 Milling tool, for making a sloping cut in the coating.

6 Sampling

Shall be according to EN 13523-0.

7 Test panels

Shall be according to EN 13523-0.

8 Procedure

8.1 Calibration

8.1.1 General

For the measurement the instructions of the manufacturer of the instrument shall be taken into account, in particular regarding the calibration and/or setting up procedure.

Before use, calibrate each instrument in accordance with the manufacturer's instructions using calibration standards. For instruments that cannot be calibrated, determine the deviation from the nominal value by comparison with calibration standards and take this into consideration for all measurements.

During use, check the calibration of the instrument as specified by the instrument's manufacturer.

8.1.2 Calibration standards

Calibration standards of known and uniform thickness are available either as foils or shims, or as coated standards with assigned values traceable to nationally recognized standards.

Calibration foils are generally made of plastics materials. They are subject to indentation and shall, therefore, be replaced frequently.

For methods A and B the surface and magnetic properties of the metallic substrate of the coated calibration standards shall be similar to those of the test specimen.

For methods C and D the substrate of the test specimen and of the calibration standards shall be the same, provided the critical thickness (see Note below) is not exceeded.

NOTE For each instrument, there is a critical thickness of metallic substrate above which instruments will not be affected by an increase in thickness.

8.2 Scale rating

For methods A and B, and if necessary, select the scale with a maximum above the estimated thickness of the coating and adjust the instrument to the thickness of a known non-metallic standard measured on the reference plate. The readings at several positions shall not vary by more than ± 5 %. The thickness of the standard shall be greater than half the measuring scale used.

8.3 Measurement

8.3.1 Ambient conditions

Measure the film thickness at ambient temperature. For more accurate measurements, as required for instance in case of dispute, the temperature shall be (23 ± 2) °C and the relative humidity (50 ± 5) %, in accordance with EN 23270.

8.3.2 Method A: Magnetic induction

The samples shall be measured on a non-metallic and non-conductive table.

Place the probe perpendicular to and in contact with the coated panel and read the film thickness on the standard scale. Take at least five measurements on smooth surfaces, and at least ten measurements on textured coatings.

In the case of metallic coated steel (e.g. galvanized steel), the electric probe cannot measure simultaneously the metallic and the organic coating. Therefore, determine first the total thickness of the metallic coating and organic coating and, after having removed the organic coating, measure the thickness of the metallic coating on the same place. The difference gives the thickness of the organic coating.

Remove the organic coating with a solvent (5.2). After an adequate period of contact with the solvent, remove the softened organic coating by abrasive action using an abrasive and/or blunt knife (5.3). This stripping process shall not remove any metallic coating.

8.3.3 Method B: Eddy current

The samples shall be measured on a non-metallic and non-conductive table.

Place the probe perpendicular to and in contact with the coated panel and read the film thickness on the standard scale. Take at least five measurements on smooth surfaces, and at least ten measurements on textured coatings.

8.3.4 Method C: Micrometer method

Operate all instruments so that the coated specimen side is facing the spindle. With the hand-held type, press the specimen against the fixed measuring tip. Carry out each measurement such that the spindle of the micrometer is pressed against the surface to be tested. Turn the spindle until the ratchet is activated.

Remove the organic coating with a solvent (5.2). After an adequate period of contact with the solvent, remove the softened organic coating by abrasive action using an abrasive and/or blunt knife (5.3). This stripping process shall not remove any metallic coating.

Repeat the second measurement after removing the film. Calculate the film thickness from the difference in the readings for the total thickness and the substrate thickness.

For measuring free films, remove a filmstrip and measure the thickness according to above.

The external micrometer gauge design shall conform to the requirements of ISO 3611. An example is shown in Figure 1. Both jaws shall be in the same plane.

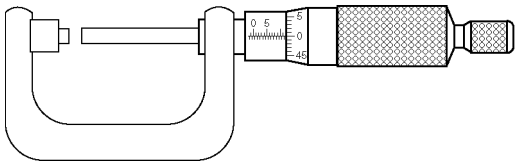

Figure 1 — Micrometer screw gauge

8.3.5 Method D: Optical method

Use the instrument (5.4) to make a cut in the organic coating down to the substrate, according to Figure 2. Examine using a microscope.

The cut is made with a specified angle in the coating. The film thickness t, is calculated either manually or by the device using the equation

$$t = b \times \tan\alpha$$

where

b is the projected width determined using a microscope;