SLOVENSKI STANDARD
SIST EN 13523-6:2003

01-januar-2003

Kovine, zaģļ itene po postopku coil-coating - Metode preskuģanja - 6. del: Oprijem po globljenju (preskus elastiļ nosti)

Coil coated metals - Test methods - Part 6: Adhesion after indentation (cupping test)

Bandbeschichtete Metalle - Prüfverfahren - Teil 6: Haftfestigkeit nach Eindrücken (Tiefungsprüfung)

Tôles prélaquées - Méthodes d'essai - Partie 6 : Adhérence apres indentation (essai d'emboutissage)

Ta slovenski standard je istoveten z: **EN 13523-6:2002**

ICS:

17.040.20	Lastnosti površin	Properties of surfaces
25.220.60	Organske prevleke	Organic coatings

SIST EN 13523-6:2003 **en**

EUROPEAN STANDARD

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ICS 17.040.20; 25.220.60

English version

Coil coated metals - Test methods - Part 6: Adhesion after indentation (cupping test)

Tôles prélaquées - Méthodes d'essai - Partie 6: Adhérence après indentation (essai d'emboutissage)

Bandbeschichtete Metalle - Prüfverfahren - Teil 6: Haftfestigkeit nach Eindrücken (Tiefungsprüfung)

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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 Management Centre has the same status as the official versions.

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

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Ref. No. EN 13523-6:2002 E

Foreword

This document EN 13523-6:2002 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of an identical text or by endorsement, at the latest by January 2003, and conflicting national standards shall be withdrawn at the latest by January 2003.

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

1 Scope

This Part of EN 13523 defines terms of the procedure for determining the adhesion of an organic coating to a metallic substrate after indentation after slow deformation.

The resistance to cracking can also be evaluated.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

EN 23270:1991, *Paints and varnishes and their raw materials - Temperatures and humidities for conditioning and testing (ISO 3270:1984).*

EN ISO 1520:2001, *Paints and varnishes - Cupping test (ISO 1520:1999).*

IEC 60454-2:1994, *Specification for pressure-sensitive adhesive tapes for electrical purposes - Part 2: Methods of test.*

3 Terms and definitions

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

4 Principle

The test specimen is cross-hatched with a cutting tool and is then deformed by pressing under specified conditions. After pressing, the test specimen can be artificially aged by immersion in boiling water.

5 Apparatus and materials

5.1 Cross-hatching device

A single-bladed knife, very sharp to avoid any burrs. For coatings less than 60 µm in thickness, it is also possible to use a purpose-made cutting tool, capable of making a minimum of 6 parallel cuts.

5.2 Pressing device

Apparatus in accordance with EN ISO 1520:2001, consisting essentially of:

a) a steel die, of inside diameter (27 ± 0,05) mm, its contact surface with the test specimen being flat and polished;

b) a retainer ring, having its flat and polished surface in contact with the test specimen;

c) a striker consisting of a polished steel sphere, of diameter (20 ± 0,05) mm with a maximum of 0,1 mm displacement from the axis of the die;

d) a system, preferably hydraulic, allowing movement of the striker at a speed of (12 ± 6) mm/min.

5.3 Ageing device

The ageing device shall consist of:

a) a vessel, to contain boiling water, whose dimensions allow the complete immersion of the test specimen;

b) a heating system.

5.4 Pincers, the jaws of which shall be flat, blunt and having a width of at least 5 mm.

5.5 Magnifying glass ×10.

5.6 Transparent pressure-sensitive adhesive tape, 25 mm wide, with an adhesion strength of (10 ± 1) N per 25 mm width when tested in accordance with IEC 60454-2:1994.

6 Sampling

See EN 13523-0:2001.

7 Test panels

See EN 13523-0:2001.

8 Procedure

8.1 Ambient conditions

Measure the coating adhesion 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 23270:1991.

8.2 Cross-hatching (not used for evaluation of resistance to cracking)

8.2.1 For coatings greater than or equal to 60 µm thickness (see Figure 1)

Make two parallel cuts 5 mm apart, together with two additional similar cuts at right angles to form a central 5 mm × 5 mm square.

Each cut shall just reach the metallic substrate, and each cut shall measure at least 50 mm in length.

Each cut shall be at a distance of not less than 20 mm from the edge of the test panel.

8.2.2 For coatings less than 60 µm thickness (see Figure 2)

Make at least six parallel cuts 1 mm apart, together with at least six additional similar cuts at right angles.

Each cut shall just reach the metallic substrate, and each cut shall measure at least 50 mm in length.

Each cut shall be at a distance of not less than 20 mm from the edge of the test panel.

NOTE At this stage none of the squares formed exhibit adhesion failure from the metallic substrate.

8.3 Pressing

Choose an indentation depth in millimetres, for example 80 % of the depth which ruptures the metallic substrate.

Clamp the test panel between the retainer ring and the die, the coating facing the die and the end of the striker being in contact with the test panel. The measuring device shall be in position 0. Ensure that the cross-hatching shall be centred on the dome.

Move the spherical end of the striker at constant speed of (12 ± 6) mm/min to reach the chosen depth of indentation.

8.4 Ageing (optional and only for coatings greater than or equal to 60 µm thickness)

Immerse the test panel in boiling water for at least 1 h.

If required, the test can be run for longer periods of time.

Generally, ageing shall be carried out after the deformation but in some cases it may be performed before.

8.5 Assessment of adhesion

8.5.1 For coatings greater than or equal to 60 µm thickness

Make an attempt to pull the strips of the organic coating away from the metallic substrate in each of the four directions, starting from the central square. Lift the end of the strips with the knife (5.1), then pull with the pincers (5.4) until the rupture of the strip.

Observe the extent of the peeling and express in percentage of the distance between the top and the base of the dome.

If ageing is carried out, express the adhesion as a percentage of peeling for the ageing period.

8.5.2 For coatings less than 60 µm thickness

Remove two complete laps from a reel of the adhesive tape (5.6) and discard. Remove an additional length at a steady rate and cut a piece, approximately 75 mm long.

Place the centre of the tape over the lattice in a direction parallel to one set of the cuts and smooth the tape into place over the area of the lattice and for a distance of at least 20 mm beyond.

To ensure good contact with the coating, rub the tape firmly with a fingertip. The colour of the coating seen through the tape is a useful indication of overall contact.

Within 1 min of applying the tape, remove the tape by holding the free end and pulling it off steadily in 0,5 s to 1 s at an angle that is as close as possible to 60° to the panel. Assess the degree of adhesion after removal of the adhesive tape.

Retain the tape for reference purposes, for example by attaching it to a sheet of transparent film.

8.6 Assessment of cracking (optional)

Assess the degree of cracking on the dome of deformation with the × 10 magnifying glass (5.5).

If cracking is observed, the indentation depth shall be reduced and the test repeated until no cracking is observed.

9 Expression of results

9.1 For coatings greater than or equal to 60 µm thickness

Express the results as the percentage of the distance between the top and the base of the dome for peeling.

9.2 For coatings less than 60 µm thickness

Express the results as the percentage of cross-hatched squares removed after taping.

9.3 Cracking

Express the results in mm at which no cracking is observed.

10 Precision

NOTE No precision data are currently available.

11 Test report

The test report shall contain at least the following information:

a) all details necessary to identify the product tested;

b) a reference to this Part of EN 13523 (EN 13523-6);

c) the indentation depth;

d) for coatings greater than or equal to 60 µm thickness whether or not ageing has been carried out and whether the ageing has been carried out before or after deformation;

e) the results of the test, as indicated in clause 9;

f) any deviation from the test method specified;

g) the date of the test.

Dimensions in millimetres

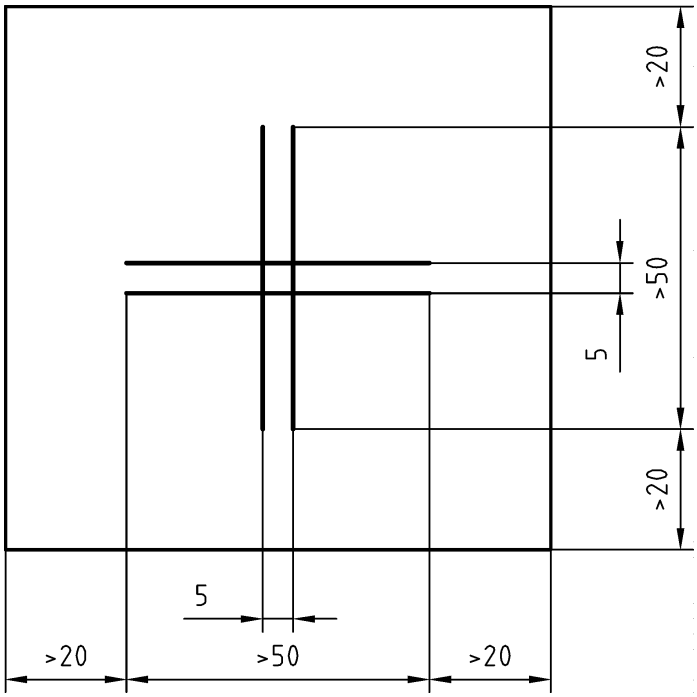

Figure 1 - Cutting of coatings ≥ 60 µm thickness
(2 cuts in each direction, 5 mm apart)

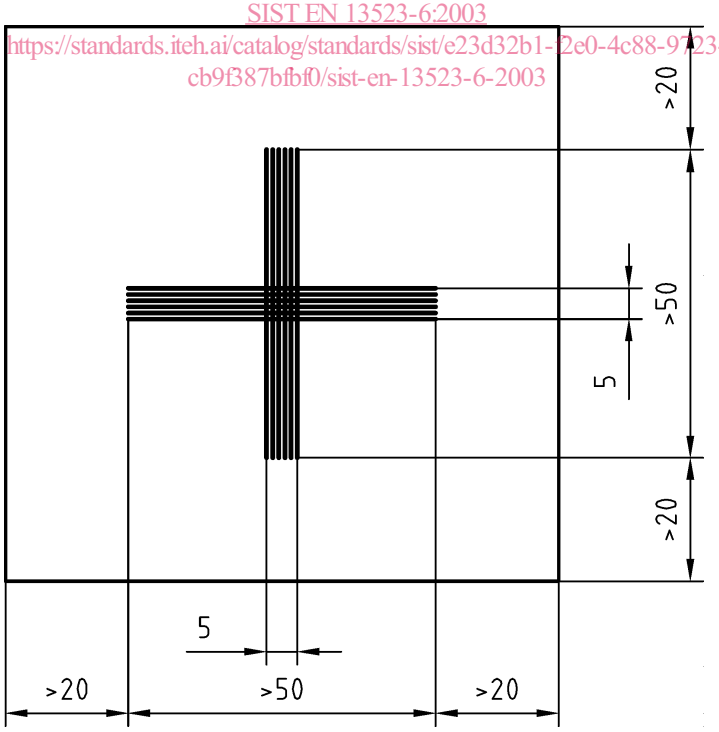

Figure 2 - Cutting of coatings < 60 µm thickness
(minimum of 6 cuts in each direction, 1 mm apart)