



SLOVENSKI STANDARD SIST EN 13523-4:2002

01-september-2002

Coil coated metals - Test methods - Part 4: Pencil hardness

Bandbeschichtete Metalle - Prüfverfahren - Teil 4: Bleistiftheärte

Tôles prélaquées - Méthodes d'essai - Partie 4: Dureté crayon

Ta slovenski standard je istoveten z: **EN 13523-4:2001**

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ICS:

17.040.20	Lastnosti površin	Properties of surfaces
25.220.60	Organske prevleke	Organic coatings

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en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13523-4

January 2001

ICS 17.040.20; 25.220.60

English version

Coil coated metals - Test methods - Part 4: Pencil hardness

Tôles prélaquées - Méthodes d'essai - Partie 4: Dureté
crayon

Bandbeschichtete Metalle - Prüfverfahren - Teil 4:
Bleistifthärte

This European Standard was approved by CEN on 30 December 2000.

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 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 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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard 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of an identical text or by endorsement, at the latest by July 2001, and conflicting national standards shall be withdrawn at the latest by July 2001.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This Part of EN 13523 describes the procedure for determining the relative hardness of an organic coating on a metallic substrate, by means of pencils of known hardness.

Smooth surfaces will give more accurate results but the method is also applicable for textured surfaces. The more pronounced the texture, the greater the unreliability of results.

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

Paint and varnishes and their raw materials – Temperatures and humidities for conditioning and testing (ISO 3270:1984)

SIST EN 13523-4:2002

ISO 15184:1998

Paints and varnishes – Determination of film hardness by pencil 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, together with the following.

3.1

pencil hardness

resistance of the surface of a paint film to marking, or other defects as a result of the action of a pencil with a specified dimension, shape and hardness of the lead, which is pushed across the surface.

NOTE: Marking by pencil leads covers a range of defects in the surface of the paint film. For further details see ISO 15184:1998.

4 Principle

The coating is intentionally damaged by pencils of increasing hardness. The hardest lead which does not remove the coating for a minimum of 3 mm length determines the degree of hardness.

5 Apparatus and materials

Ordinary laboratory apparatus, together with the following:

5.1 Set of Cretacolor or Faber Castell drawing pencils, or their equivalents in the following range:

6B, 5B, 4B, 3B, 2B, B, HB, F, H, 2H, 3H, 4H, 5H, 6H
(softer) (harder)

NOTE: Cretacolor and Faber Castell pencils have been found to be the most uniform and the most reproducible.

5.2 Mechanical sharpener.

5.3 Abrasive paper, No. 400 Emery paper is suitable.

5.4 Lead holder, as appropriate.

5.5 Mechanical device, consisting of a metal block, provided with two wheels on one side of the block. In the middle of the metal block there is a cylindrical hole at an angle of 45°. With the help of a clamp, pencils can be fixed in the device, always in the same manner. A level indicator on the top of the device ensures that testing is carried out horizontally. The device shall be designed so that in the horizontal position a load of $(7,5 \pm 0,1)$ N is exerted on the tip of the pencil. An example of a suitable device is shown in figure 1.

6 Sampling

See EN 13523-0:2001.

7 Test panels

See EN 13523-0:2001.

8 Procedure

Measure the pencil hardness of the organic coating 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.

Sharpen the pencils (5.1) so that 6 mm of lead, free from nicks and perfectly cylindrical in shape, protrudes either beyond the wood, or beyond the chuck if a holder is used. Then trim the lead on the abrasive paper (5.3) to obtain a level and perfectly circular section whose diameter is equivalent to the pencil lead and whose end is as near as possible at right angles to the axis of the pencil (see figure 2).

Hold the prepared pencil at 45° to the surface of the coating and push it forward with a force of 7,5 N downward pressure without breaking the lead.

For inspection purposes this test is usually performed manually but for better reproducibility and more accurate measurements a mechanical device (5.5) shall be used in which case a force of 7,5 N shall be applied to the lead.

Make successive tests until the hardest lead which does not remove the coating for a minimum of 3 mm length is determined, the pencil or holder being rotated to present a fresh edge before each trial.

Before examination remove the lead residue from the test specimen.

9 Expression of results

Indicate as the pencil hardness the reference number of the hardest lead which does not remove the coating for a minimum of 3 mm length.

10 Precision

Smooth surfaces will give more accurate results but the method is also applicable for textured surfaces. The more pronounced the texture, the greater the unreliability of results.

10.1 Repeatability

This method demands a measure of practical experience in conducting the test in order to obtain repeatable results.

10.2 Reproducibility

The absolute results can vary widely when carried out with different devices, by different persons, or with pencils of different batches or from different manufacturers.

However, the results obtained give qualitative information only.

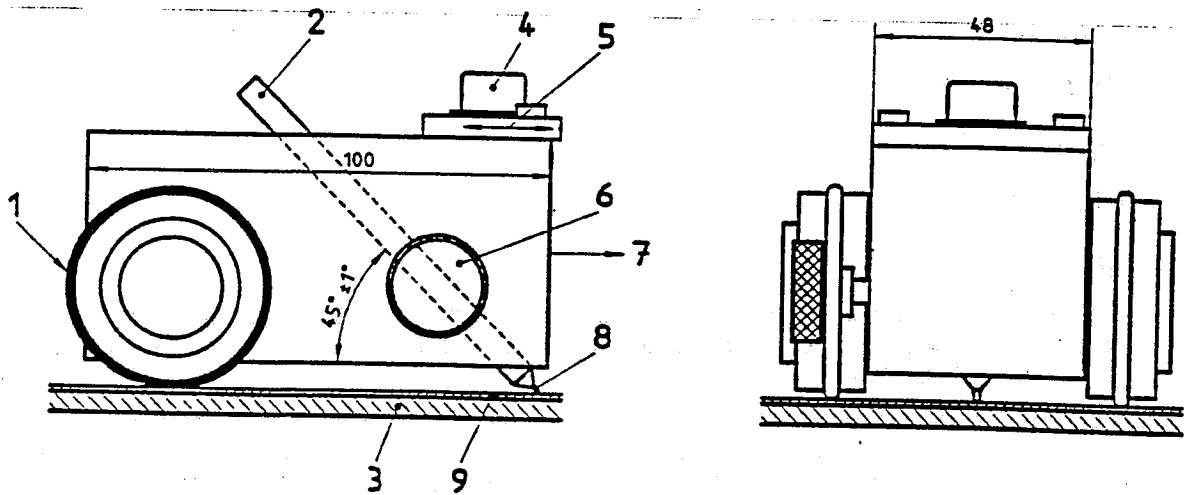
11 Test report

The test report shall contain at least the following information:

- all details necessary to identify the product tested;
- a reference to this part of EN 13523 (EN 13523-4);
- identification of the pencils used;

- d) whether a mechanical device has been used;
- 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



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Key

- 1 Rubber O-ring
- 2 Pencil
- 3 Substrate
- 4 Level
- 5 Small, movable weight

- 6 Clamp
- 7 Direction of motion of instrument
- 8 Pencil lead
- 9 Paint film

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Figure 1 - Schematic diagram of test instrument

Dimensions in millimetres



Figure 2 - Schematic view of pencil after sharpening

Bibliography

EN 1396:1996	Aluminium and aluminium alloys – Coil coated sheet and strip for general applications – Specifications
EN 10169-1:1996	Continuously organic coated (coil coated) steel flat products – Part 1: General information (definitions, materials, tolerances, test methods)
ENV 10169-2:1999	Continuously organic coated (coil coated) steel flat products – Part 2: Products for building exterior applications
ASTM D 3363-92a	Standard Test Method for Film Hardness by Pencil Test (Gouge hardness only)

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