



SLOVENSKI STANDARD

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Prevlčene kovine, ki se navijajo - Preskusne metode - 9. del: Odpornost proti vodi pri potapljanju

Coil coated metals - Test methods - Part 9: Resistance to water immersion

Bandbeschichtete Metalle - Prüfverfahren - Teil 9: Beständigkeit gegen Eintauchen in Wasser

Tôles prélaquées - Méthodes d'essai - Partie 9: Résistance à l'immersion dans l'eau

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ICS:

17.040.20	Lastnosti površin	Properties of surfaces
25.220.60	Organske prevleke	Organic coatings

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EUROPEAN STANDARD
NORME EUROPÉENNE
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ICS 25.220.60

Supersedes EN 13523-9:2014

English Version

**Coil coated metals - Test methods - Part 9: Resistance to
water immersion**

Tôles prélaquées - Méthodes d'essai - Partie 9 :
Résistance à l'immersion dans l'eau

Bandbeschichtete Metalle - Prüfverfahren - Teil 9:
Beständigkeit gegen Eintauchen in Wasser

This European Standard was approved by CEN on 19 December 2021.

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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 CEN-CENELEC 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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European foreword

This document (EN 13523-9:2022) 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of an identical text or by endorsement, at the latest by August 2022, and conflicting national standards shall be withdrawn at the latest by August 2022.

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

This document supersedes EN 13523-9:2014.

The main changes are:

- a) EN ISO 3696 has been added to 6.1 as reference for the deionised water;
- b) a remark concerning the assessment of organic coated steel substrates having multiple metallic phases in zinc based coating has been added to Clause 10;
- c) “test specimen” has been harmonized to “test panel” in the entire text;
- d) the list of the existing parts of EN 13523 has been updated;
- e) the text has been editorially revised and the normative references have been updated.

The EN 13523 series, *Coil coated metals — Test methods*, consists of the following parts:

- *Part 0: General introduction*
- *Part 1: Film thickness*
- *Part 2: Gloss*
- *Part 3: Colour difference and metamerism — Instrumental comparison*
- *Part 4: Pencil hardness*
- *Part 5: Resistance to rapid deformation (impact test)*
- *Part 6: Adhesion after indentation (cupping test)*
- *Part 7: Resistance to cracking on bending (T-bend test)*
- *Part 8: Resistance to salt spray (fog)*
- *Part 9: Resistance to water immersion*
- *Part 10: Resistance to fluorescent UV radiation and water condensation*
- *Part 11: Resistance to solvents (rubbing test)*
- *Part 12: Resistance to scratching*

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- *Part 13: Resistance to accelerated ageing by the use of heat*
- *Part 14: Chalking (Helmen method)*
- *Part 16: Resistance to abrasion*
- *Part 17: Adhesion of strippable films*
- *Part 18: Resistance to staining*
- *Part 19: Panel design and method of atmospheric exposure testing*
- *Part 20: Foam adhesion*
- *Part 21: Evaluation of outdoor exposed panels*
- *Part 22: Colour difference — Visual comparison*
- *Part 23: Resistance to humid atmospheres containing sulfur dioxide*
- *Part 24: Resistance to blocking and pressure marking*
- *Part 25: Resistance to humidity*
- *Part 26: Resistance to condensation of water*
- *Part 27: Resistance to humid poultice (Cataplasma test)*
- *Part 29: Resistance to environmental soiling (Dirt pick-up and striping)*

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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

1 Scope

This document specifies the procedure for determining the resistance to water immersion of an organic coating on a metallic substrate.

The test is applicable to all kinds of organic coatings, including metallics and embossed, textured, pearlescent and printed coatings. The results of the test give an indication of the resistance of the coil coated metal to water.

The method is not intended to reproduce any particular condition of condensation.

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.

EN 13523-0, *Coil coated metals — Test methods — Part 0: General introduction*

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

EN 60454-2, *Pressure-sensitive adhesive tapes for electrical purposes — Part 2: Methods of test (IEC 60454-2)*

EN ISO 3696:1995, *Water for analytical laboratory use — Specification and test methods (ISO 3696:1987)*

EN ISO 4628-2, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering (ISO 4628-2)*

EN ISO 4628-8:2012, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 8: Assessment of degree of delamination and corrosion around a scribe or other artificial defect (ISO 4628-8:2012)*

EN ISO 17872, *Paints and varnishes — Guidelines for the introduction of scribe marks through coatings on metallic panels for corrosion testing (ISO 17872)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13523-0 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 Principle

A test panel is immersed in water at about 40 °C for a defined period of time. The degree of blistering on the general surface and the corrosion at the cut edges and scribes are then evaluated.

NOTE The procedure described in this document is similar to the test method specified in EN ISO 2812-2. A major difference is that the water is not aerated.

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5 Apparatus

Ordinary laboratory apparatus and glassware, together with the following:

5.1 Tank, of suitable size (a convenient size is 700 mm × 400 mm × 400 mm), fitted with a cover, a heater and capable of being maintained at (40 ± 1) °C.

5.2 System for circulation or stirring of the water.

5.3 Support for the test panels made from non-conductive material and arranged so that the test panels are maintained at a nominal angle of 15° to 20° to the vertical.

5.4 Cutting tool, with a hard metal tip having a radius or width capable of exposing at least 0,2 mm of metal substrate in accordance with EN ISO 17872.

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

6 Materials

6.1 Deionised water, having a conductivity not greater than 5 µS/cm at 25 °C (0,5 mS/m at 25 °C), as specified in EN ISO 3696:1995, Grade 3.

7 Sampling

Sampling shall be in accordance with EN 13523-0.

8 Test panels

Test panels shall be in accordance with EN 13523-0.

The test panels shall be of 150 mm × 100 mm, the 150 mm in rolling direction.

The reverse face shall always be protected to prevent any corrosive influence from that face to the front face. The bottom drip edge and one side edge shall remain unprotected, one or both of the other two edges may be protected or unprotected as specified or agreed.

9 Procedure

9.1 Scribing of test panels and immersion

9.1.1 Scribe the front face of the test panels by means of the cutting tool (5.4). The scribe shall extend down just through the organic coating.

If the substrate is zinc- or zinc-alloy coated steel, the intention is that the scratch should penetrate as far as the zinc coating and not further, to the steel.

The scribed indentation shall expose at least 0,2 mm of the substrate. The use of any other cutting tool other than described in 5.4 is not permitted.

9.1.2 Carry out two diagonal scribes crossing each other in the middle of the panel and extending to about 20 mm from the edges (see Annex A).

9.1.3 Fill the tank (5.1) with deionised water (6.1) and bring the temperature of the water to (40 ± 1) °C.

9.1.4 Place the panels in the tank filled with deionised water so that they are immersed for approximately three-quarters of their length. The water shall not be renewed during the duration of the test, nor shall air be injected in the water or be introduced by the action of too vigorous stirring.

9.1.5 When the panels are placed in the tank, allow the temperature of the water to stabilize at (40 ± 1) °C again and maintain this temperature throughout the duration of the test.

9.1.6 Expose the panels to the water for the specified period of time.

9.2 Assessment

9.2.1 General

Immediately after removal of the test panel from the tank carefully wipe off surface moisture with a soft tissue. Within 1 h, examine for blistering and corrosion creep.

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

9.2.2 Blistering

Examine the whole of the front face of each test panel, including the scribe and edges, for blistering as described in EN ISO 4628-2.

9.2.3 Corrosion creep

Examine corrosion creep as follows: completely remove all the loosened coating (if any) adjacent to the scribe marks using a blunt knife as described in EN ISO 4628-8. Optionally loose coating may be removed using compressed air or adhesive tape (5.5).

Corrosion creep shall be measured at a minimum of six points perpendicularly from the scribe mark to the edge of the undetached coating and expressed as an average distance for the whole length of the scribe and expressed as specified in EN ISO 4628-8.

10 Expression of results

Express the results as follows:

- on the front face excluding the scribe:
 - degree of blistering, assessed in accordance with EN ISO 4628-2;
- at the unprotected edges:
 - degree of blistering, assessed in accordance with EN ISO 4628-2;
 - delamination or corrosion creep (mm), assessed in accordance with EN ISO 4628-8:2012, Formula (1) or Formula (5);
- at the scribe:
 - degree of blistering, assessed in accordance with EN ISO 4628-2;
 - delamination or corrosion creep (mm), assessed in accordance with EN ISO 4628-8.

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For organic coated steel substrates having multiple metallic phases in zinc based coating, a different corrosion pattern (filiform type corrosion) may be observed. The assessment in this case shall be agreed between the interested parties.

11 Precision

No precision data are currently available.

12 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 document, i.e. EN 13523-9:2022;
- c) whether the top edge and/or one side edge have been protected;
- d) the duration of the test;
- e) the method used for removal of loosened coating, if any;
- f) the results of the test, as indicated in Clause 10;
- g) any deviation from the test method specified;
- h) any unusual features (anomalies) observed during the test;
- i) the date of the test.

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