



**SLOVENSKI STANDARD**  
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**Prevlečene kovine, ki se navijajo - Preskusne metode - 21. del: Vrednotenje preskušancev, izpostavljenih zunanjemu okolju**

Coil coated metals - Test methods - Part 21: Evaluation of outdoor exposed panels

Bandbeschichtete Metalle - Prüfverfahren - Teil 21: Bewertung von freibewitterten Probenplatten

Tôles prélaquées - Méthodes d'essai - Partie 21 : Évaluation des panneaux exposés en extérieur

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**DRAFT**  
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English Version

## Coil coated metals - Test methods - Part 21: Evaluation of outdoor exposed panels

Tôles prélaquées - Méthodes d'essai - Partie 21 :  
Évaluation des panneaux exposés en extérieur

Bandbeschichtete Metalle - Prüfverfahren - Teil 21:  
Bewertung von freibewitterten Probenplatten

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 139.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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## European foreword

This document (prEN 13523-21:2023) has been prepared by Technical Committee CEN/TC 139 “Paints and varnishes”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13523-21:2017.

In comparison with the previous edition, the following technical modifications have been made:

- a) a definition for “undercreep” has been added
- b) visual assessment of chalking in accordance with EN ISO 4628-6 has been added to 8.3.2;
- c) the canopy and overlap areas of Type 2 (90°N) and Type 3 (5°S) panels respectively have been defined in 8.3.3 and 8.3.4;
- d) 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*
- *Part 13: Resistance to accelerated ageing by the use of heat*
- *Part 14: Chalking (Helmen method)*
- *Part 16: Resistance to abrasion*

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- *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 (Cataplasm test)*
- *Part 29: Resistance to environmental soiling (Dirt pick-up and striping)*

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## 1 Scope

This document specifies the procedure for evaluating the behaviour of an organic coating on a metallic substrate during and after outdoor exposure. Panel design, preparation and the procedure for outdoor exposure are performed in accordance with EN 13523-19.

After washing of the panel, some dirt can remain on the panel. This remaining dirt can influence the accuracy and precision of readings of gloss and colour, performed on exposed panels, although carried out in accordance with the standards. Unlike other precise measurements, the objective of this European Standard is to report on trends in the corrosion and/or paint degradation behaviour of coil coated panels.

## 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 1396, *Aluminium and aluminium alloys — Coil coated sheet and strip for general applications — Specifications*

EN 10169, *Continuously organic coated (coil coated) steel flat products — Technical delivery conditions*

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

EN 13523-2, *Coil coated metals — Test methods — Part 2: Gloss*

EN 13523-3, *Coil coated metals — Test methods — Part 3: Colour difference and metamerism — Instrumental comparison*

EN 13523-14, *Coil coated metals — Test methods — Part 14: Chalking (Helmen method)*

EN 13523-19, *Coil coated metals — Test methods — Part 19: Panel design and method of atmospheric exposure testing*

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 4628-3, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 3: Assessment of degree of rusting (ISO 4628-3)*

EN ISO 4628-4, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 4: Assessment of degree of cracking (ISO 4628-4)*

EN ISO 4628-5, *Paints and varnishes — Evaluation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 5: Assessment of degree of flaking (ISO 4628-5)*

EN ISO 4628-6, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 6: Assessment of degree of chalking by tape method (ISO 4628-6)*

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EN ISO 4628-8, *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)*

**3 Terms and definitions**

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

**3.1****holiday**

defect of a paint film

Examples: Pinholes and craters

[SOURCE: EN ISO 4618:2023, 3.138]

**3.2****artificial defect**

holiday through a coating, deliberately introduced in order to expose the underlying metal substrate prior to exposure to a corrosive environment

[SOURCE: EN ISO 4628-8:2012, 3.2]

**3.2.1****circular defect**

circular holiday through a coating, deliberately introduced in order to expose the underlying metal substrate prior to exposure in a corrosive environment

[SOURCE: EN ISO 4628-8:2012, 3.3]

**3.2.2****scribe**

linear holiday through a coating, deliberately introduced in order to expose the underlying metal substrate prior to exposure in a corrosive environment

[SOURCE: EN ISO 4618:2023, 3.224]

**3.2.3****edge**

unprotected cut edge, in order to expose the underlying metal substrate prior to exposure in a corrosive environment

**3.3****corroded area**

area around a defect where the substrate has been attacked by corrosion

[SOURCE: EN ISO 4628-8:2012, 3.4]



### 3.4

#### **delaminated area**

area around a defect where loss of adhesion of a coating from a substrate or an underlying coating has occurred

[SOURCE: EN ISO 4628-8:2012, 3.5]

### 3.5

#### **undercreep**

corrosion progressing underneath the coating parallel to the surface or delamination emanating from an unprotected cut-edge or an artificial defect

## 4 Principle

The behaviour of the test panels exposed in accordance with EN 13523-19 is evaluated. Any degradation in the relevant area is reported, using the relevant parts of the EN 13523 series and appropriate EN ISO Standards.

In cases where the inspection area is limited (e.g. at screws and bends), the evaluation method (see the EN ISO 4628 series) is replaced by an easier and more suitable measurement of the degradation in millimetres.

Where possible, the results of symmetrical areas, e.g. left and right edges, are combined and the average value is reported.

The inspection of the 45° panel (panel 1) will focus on paint degradation, whereas the 90° panel (panel 2) and the 5° panel (panel 3) are mainly evaluated for corrosion.

NOTE 1 Panel designations (1, 2, 3) are as defined in EN 13523-19.

NOTE 2 Due to restrictions in the available flat area, the number of recommended readings might vary from other parts of the EN 13523 series and relevant EN ISO Standards.

It is strongly recommended to take a photograph of each exposed panel at each inspection.

## 5 Apparatus and materials

5.1 **Gloss meter**, in accordance with EN 13523-2.

5.2 **Apparatus for colour measurement**, in accordance with EN 13523-3.

5.3 **Apparatus for measurement of chalking**, in accordance with EN 13523-14.

5.4 **Washing solution**, containing 0,5 % (mass fraction) of a mild non-reactive detergent (pH 6 to 7) in water.

5.5 **Cloth or sponge**, non-abrasive and smooth.

## 6 Sampling

Sampling shall be in accordance with EN 13523-0.

## 7 Test panels

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

## 8 Procedure

### 8.1 General

Evaluate the coating properties at ambient temperature.

The panels shall be inspected yearly and for a minimum duration as specified in EN 1396 or EN 10169. Colour measurements on metallics as well as gloss and colour measurements on textured and embossed surfaces are only indicative.

### 8.2 Preparation

**8.2.1** Ensure that results of the measurements of gloss in accordance with EN 13523-2 and colour in accordance with EN 13523-3 are available before exposure of the test panels.

When using reference panels, these panels shall be kept in an envelope and not exposed to any light source.

**8.2.2** Some measurements require a washed area prior to inspection. Washing shall be performed as follows:

Wash the upper 1/3 part of the 45° panel with washing solution (5.4) at ambient temperature. Use the cloth or sponge (5.5) to gently clean the surface. Rinse with water at ambient temperature and air dry at ambient temperature.

Washing should be carried out in such a way that the other 2/3 of the panel is not affected.

### 8.3 Evaluation

#### 8.3.1 General

The following procedure specifies the sets of different readings that are taken. For each panel the procedure is accompanied by a table summarizing the different measurements and the relevant standard test methods.

#### 8.3.2 Panel 1 (45° panel)

A summary of the different measurements and evaluations on panel 1 is given in Table 1.

For gloss and colour change, measurements shall be performed on the washed area of the panel. Chalking and the evaluation of the overall surface shall be performed on the unwashed area of the panel. Cracking on the bend shall be evaluated on both the washed and unwashed area of the panel.

Inspect the panels as indicated in a) to e) below.

##### a) Change in gloss

Measure the gloss in accordance with EN 13523-2. Perform the reading parallel with the bend and report the average value of not less than three measurements. Use the same measurement angle as has been used for the initial measurement prior to exposure and report this angle. Report both initial gloss and gloss after exposure from which the change in gloss and the gloss retention can be calculated.

##### b) Colour change

Carry out the measurement in accordance with EN 13523-3. The colour change is the difference between the initial  $L^*$ ,  $a^*$ ,  $b^*$  values and the  $L^*$ ,  $a^*$ ,  $b^*$  values after exposure. Report initial and inspection measurements  $L^*$ ,  $a^*$ ,  $b^*$  and changes  $\Delta L^*$ ,  $\Delta a^*$ ,  $\Delta b^*$  and  $\Delta E$ .