



**SLOVENSKI STANDARD**  
**SIST EN 13523-21:2004**  
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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 : Evaluation des panneaux exposés en extérieur

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**Ta slovenski standard je istoveten z: EN 13523-21:2003**

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**ICS:**

17.040.20	Lastnosti površin	Properties of surfaces
25.220.60	Organske prevleke	Organic coatings

**SIST EN 13523-21:2004** en

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 13523-21**

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ICS 17.040.20; 25.220.60

English version

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

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

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

This European Standard was approved by CEN on 10 July 2003.

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.

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

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

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**EN 13523-21:2003 (E)****Foreword**

This document (EN 13523-21:2003) 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 February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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## 1 Scope

This Part of this European Standard 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 to be performed in accordance with prEN 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 Part of this European Standard is to report on trends in the corrosion and/or paint degradation behaviour of coil coated panels.

## 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 13523-2, *Coil coated metals — Test methods — Part 2: Specular gloss*.

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

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

prEN 13523-19, *Coil coated metals — Test methods — Part 19: Panel design and method for atmospheric exposure testing*.  
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prEN 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/FDIS 4628-2:2003)*.

prEN 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/FDIS 4628-3:2003)*.

prEN 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/FDIS 4628-4:2003)*.

prEN ISO 4628-5, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 5: Assessment of the degree of flaking (ISO/FDIS 4628-5:2003)*.

## 3 Terms and definitions

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

## EN 13523-21:2003 (E)

### 4 Principle

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

In cases where the inspection area is limited (e.g. at screws and bends), the evaluation method described in the prEN 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 mean 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 prEN 13523-19.

NOTE 2 Due to restrictions in the available flat area, the number of recommended readings may vary from the Parts of EN 13523 and relevant International Standards.

NOTE 3 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 a mass fraction of 0,5 % of a mild non-reactive detergent (pH value of 6 to 7) in water.

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

### 6 Sampling

See EN 13523-0.

### 7 Test panels

See EN 13523-0.

### 8 Procedure

#### 8.1 General

Evaluate the coating properties at ambient temperature.

It is recommended that the panels are inspected not less than every six months in the first year and yearly afterwards. 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.

In case of use of 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 is then performed as follows:

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

NOTE 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 describes the sets of different readings which have to be taken. For each panel the method is accompanied with a table summarising the different measurements and their corresponding European Standard or International Standard.

### 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 mean 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  $\Delta E$ .

#### c) Chalking

Perform the measurement and report the results in accordance with EN 13523-14.

#### d) Cracking on the bend

Inspect the bend visually for cracking. Report the presence of cracks as the distance, in millimetres, from the 1T side to the last sign of cracking.

#### e) Overall surface evaluation

The overall surface is defined as the flat surface of panel 1 excluding edges and bends.

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Inspect the overall surface of the panel for blisters in accordance with prEN ISO 4628-2, for cracking in accordance with prEN ISO 4628-4, for flaking in accordance with prEN ISO 4628-5 and for corrosion in accordance with prEN ISO 4628-3.

Report all other observations, e.g. dirt, mildew, etc., as remarks.

**8.3.3 Panel 2 (90° panel)**

A summary of the different measurements and evaluations on panel 2 is given in table 2.

NOTE The inspection is limited to the evaluation of corrosion. Evaluation of the degree of paint degradation can be performed but this panel orientation is not recommended for it. The 45° panel (panel 1) is more appropriate.

The inspection is to be performed on unwashed panels. Any deviations from the specified inspection shall be reported.

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

**a) Edges**

Describe the type of degradation, e.g. filiform corrosion, delamination, blistering, rusting (white or red rust).

Measure the size of the degradation, e.g. mean and maximum length in millimetres, percentage of edge affected, or number of individual degradations.

Take the mean of results on left and right edges and report as side edge results. Report both top and bottom edges separately as well as results on the overlap area.

**b) Overall surface evaluation**

The overall surface is defined as the flat surface of panel 2 excluding edges, bend, scribes and areas around screws or rivets.

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Inspect the overall surface of the panel for blisters in accordance with prEN ISO 4628-2, for cracking in accordance with prEN ISO 4628-4, for flaking in accordance with prEN ISO 4628-5 and for corrosion in accordance with prEN ISO 4628-3.

**c) Bends**

Inspect the bends visually for cracks. Report the presence of cracks as the distance in mm from the 1T side to the last sign of cracking. Take the mean of the results of the two bends. Also inspect for blisters in accordance with prEN ISO 4628-2, for corrosion in accordance with prEN ISO 4628-3 and for flaking in accordance with prEN ISO 4628-5.

Report any defects occurring only on the flat sides of the bends under other observations.

**d) Areas around the screws**

Report the type of degradation, together with its size as the length, in millimetres, in a radial direction.

**e) Areas around rivets**

As for d) above.

**f) Scribe**

For the horizontal and vertical scribes, report the mean and maximum values of delamination in millimetres perpendicular from the scribes, as the mean of the two scribes. If required, report the affected area of the scribes as a percentage. Also report the presence of blisters, filiform corrosion and/or rust.



**g) Reverse side**

If required, report relevant degradation.

Report all other observations as remarks.

**8.3.4 Panel 3 (5° panel)**

A summary of the different measurements and evaluations on the panel 3 is given in table 3.

NOTE For this panel, the recommended inspection is limited to the evaluation of corrosion. However, evaluation of the degree of paint degradation may be carried out.

The inspection is to be performed on unwashed panels. Any deviations from the specified inspection shall be reported.

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

**a) Edges**

Describe the type of degradation, e.g. filiform corrosion, delamination, blistering, rusting (white or red rust).

Measure the size of the degradation, e.g. mean and maximum length in millimetres, percentage of edge affected, or number of individual degradations.

Take the mean of results on left and right edges and report as side edge results. Report both top and bottom edges separately as well as results on the overlap area.

**b) Overall surface evaluation**

The overall surface is defined as the flat surface of panel 3, excluding edges, bend, scribes and area around screws or rivets.

Inspect the overall surface of the panel for blisters.

**c) Bend**

Inspect the bend of the upper panel visually for cracks. Report the presence of cracks as the distance in mm from the 1T side to the last sign of cracking. Also inspect for blisters in accordance with prEN ISO 4628-2, for corrosion in accordance with prEN ISO 4628-3 and for flaking in accordance with prEN ISO 4628-5.

Report any defects occurring only on the flat sides of the bends under other observations.

**d) Lower exposed surface in the immediate vicinity of the overlap**

As for b) above.

**e) Areas around screws**

Report the type of degradation around screws, together with its size as the length in millimetres in a radial direction.

**f) Area around rivets**

As for e) above.

**g) Reverse side**

If required, report relevant degradation.

Report all other observations as remarks.