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Coil coated metals — Test methods

Part 14: Chalking (Helmen method)

National foreword

This British Standard is the UK implementation of EN 13523-14:2023. It supersedes BS EN 13523-14:2014, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee STI/21, Paint systems and surface preparation for metallic substrates.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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March 2023

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English Version

**Coil coated metals - Test methods - Part 14: Chalking
(Helmen Method)**Tôles prélaquées - Méthodes d'essai - Partie 14:
Farinage (méthode Helmen)Bandbeschichtete Metalle - Prüfverfahren - Teil 14:
Kreiden (Verfahren nach Helmen)

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European foreword

This document (EN 13523-14:2023) 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of an identical text or by endorsement, at the latest by September 2023, and conflicting national standards shall be withdrawn at the latest by September 2023.

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 13523-14:2014.

The main changes compared to the previous edition are listed below:

- a) the description of the test apparatus has been changed so that the glossmeter is preferred to the portable chalking apparatus, which is no longer manufactured;
- b) 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*

- *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)*

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.

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1 Scope

This document describes the procedure for determining objectively the chalking resulting from natural or artificial weathering of an organic coating on a metallic substrate.

The advantage of this procedure for measuring chalking of an organic coating is that the result can be read off immediately on an instrument. Subjective judgement by visual comparison of test specimens with reference specimens is not necessary.

Reproducible results can only be obtained by careful execution of the test. Special attention is paid to the adhesive tape and its application to the test surface.

The test method is not applicable to embossed coatings. In the case of textured coatings, the degree of texture will influence readings. Also, dirt accumulation can influence readings on outdoor weathered specimens.

NOTE Different methods for assessing chalking are in use. The results of these different methods are not comparable.

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 13523-10, *Coil coated metals - Test methods - Part 10: Resistance to fluorescent UV radiation and water condensation*

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

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*

EN ISO 2813, *Paints and varnishes - Determination of gloss value at 20°, 60° and 85° (ISO 2813)*

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:

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

3.1

chalking

appearance of a loosely adherent powder on the surface of a film or coat arising from the degradation of one or more of its constituents

[SOURCE: EN ISO 4618:2014, 2.41]

4 Principle

Following the Helmen method, a piece of transparent adhesive tape is placed on the test surface and rubbed with a plastic spatula or a finger until there is optimum adhesion. Then the rubbed adhesive tape is removed and its transparency measured. Two types of apparatus can be used, one giving a direct reading for chalking, the other one measures transmission which is converted to chalking as follows: x % transmission is equivalent to $(100 - x)$ % chalking.

5 Apparatus

5.1 60° glossmeter or multi-angle glossmeter with 60° adjustment, in accordance with EN ISO 2813 or **portable chalking apparatus**, giving a direct reading for chalking, such as the Helmen chalking tester.

The type of light detector can influence the readings. A silicon photocell is therefore recommended.

NOTE Differences in the light path between the light source and the photocell can influence readings.

5.2 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 EN 60454-2, and checked as described in 8.2.

5.3 Plastic spatula, typically of 25 mm width, with a smooth surface.

6 Sampling

The sampling shall be in accordance with EN 13523-0.

7 Test specimens

The test specimens shall be in accordance with EN 13523-0, EN 13523-10 and EN 13523-19.

8 Procedure

8.1 General

Measure the chalking of the organic coating at ambient temperature. For more accurate tests, 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.

As dirt collection can influence readings, outdoor weathered test specimens shall be measured after gentle cleaning of the area to be measured. The cleaning procedure shall be agreed between the interested parties but shall not remove any degradation products.

8.2 Checking the adhesive tape

Measure the transmission of the adhesive tape (5.2) on an appropriate support. If the transmission is less than 90 %, that roll of adhesive tape shall not be used.

8.3 Calibration

Calibrate the apparatus by applying a new piece of adhesive tape (5.2) onto the appropriate support and adjust the reading to be equivalent to 100 % transmission. Then remove the adhesive tape.

8.4 Measurement

8.4.1 Do not wipe or touch the test surface unless otherwise specified or agreed for the cleaning, as in the case of outdoor weathered specimens.

8.4.2 Apply a new piece of adhesive tape (5.2) of length about 30 mm to the flat test surface and rub with the plastic spatula (5.3) or a finger until there is optimum adhesion between the tape and the coating (as seen by the glossy, transparent appearance of the applied tape).

8.4.3 Remove the piece of tape carefully and uniformly from the test surface in a single movement and apply it to the support of the measuring instrument (5.1). Then take the reading.

9 Expression of results

Express the result as a percentage of chalking.

Values below 10 % chalking shall be expressed as "no chalking".

10 Precision

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 document, i.e. EN 13523-14:2023;
- c) the history of the test specimen (e.g. whether natural or artificial weathering);
- d) in the case of outdoor exposed test specimens: the cleaning procedure and whether dirt is present;
- e) the description of the measuring instrument used;
- f) the results of the test, as indicated in Clause 9;
- g) any deviation from the test method specified;
- h) any unusual features (anomalies) observed during the test;
- i) the date of the test.

Bibliography

- [1] EN 1396, *Aluminium and aluminium alloys - Coil coated sheet and strip for general application - Specifications*
- [2] EN 10169, *Continuously organic coated (coil coated) steel flat products - Technical delivery conditions*
- [3] 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)*
- [4] EN ISO 4618:2014, *Paints and varnishes - Terms and definitions (ISO 4618:2014)*
- [5] ASTM D4214, *Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films*
- [6] T. Helmen: *Kreidungsmessung und Kreidungsbeurteilung (Measurement and judgement of chalking)*, farbe + lack 84 (1978), 5, p. 315–322 (This article also reports results of comparative testing by means of DIN 53159 and ASTM D659.)

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