

BS EN 13523-12:2017



BSI Standards Publication

Coil coated metals — Test methods

Part 12: Resistance to scratching

National foreword

This British Standard is the UK implementation of EN 13523-12:2017. It supersedes BS EN 13523-12:2004 which is withdrawn.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 secretary.

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English Version

Coil coated metals - Test methods - Part 12: Resistance to scratching

Tôles prélaquées - Méthodes d'essai - Partie 12 :
Résistance à la rayure

Bandbeschichtete Metalle - Prüfverfahren - Teil 12:
Widerstand gegen Ritzen

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European foreword

This document (EN 13523-12:2017) 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of an identical text or by endorsement, at the latest by September 2017, and conflicting national standards shall be withdrawn at the latest by September 2017.

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 13523-12:2004.

The main changes are:

- a) a reference to EN 13523-0 concerning conditioning of the test panels was added;
- 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 — 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 15: Metamerism*

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

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1 Scope

This part of the EN 13523 series describes the procedure for determining the resistance of an organic coating on a metallic substrate to penetration by scratching with a needle.

It is possible that with some aluminium alloys and thin gauge steel substrate below 0,4 mm, that rather than scratching, the needle will deform the substrate. Under these conditions, this test method is not applicable.

Soft coatings such as poly vinyl chloride (PVC) and structured coatings will not give a precise result due to the soft nature of the coating and/or the potential for the needle to snag.

The method is not applicable to conductive coatings.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13523-0:2014, *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)*

3 Terms and definitions

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

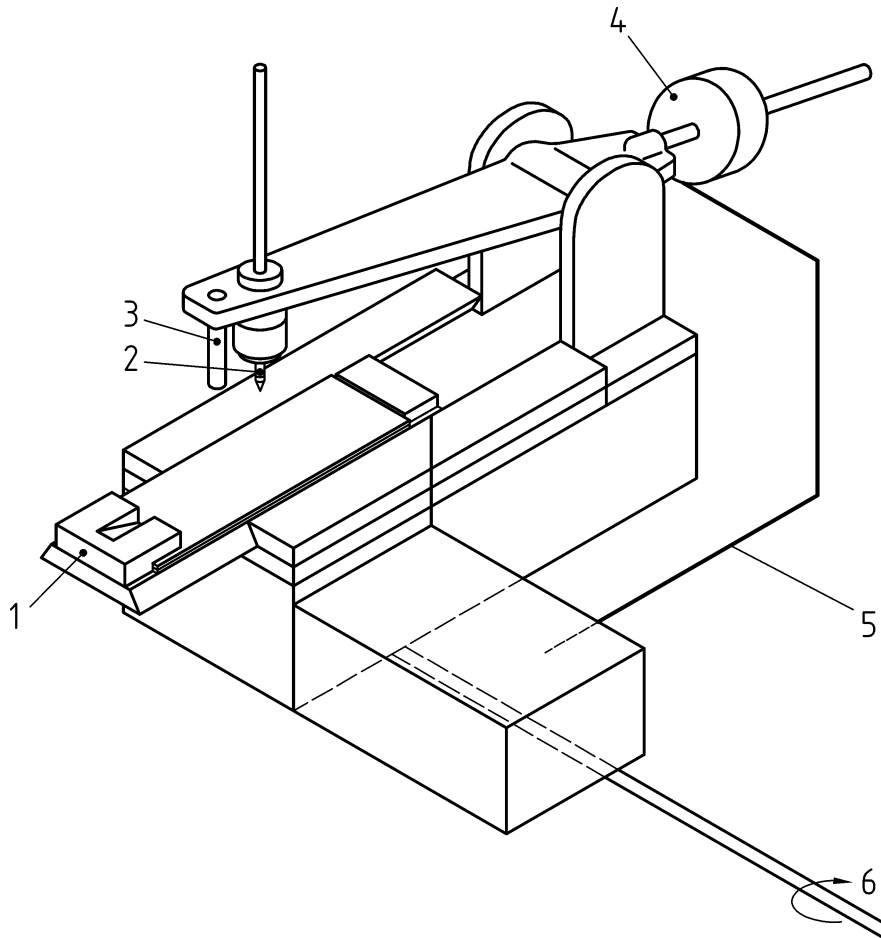
4 Principle

The organic coating is tested by mechanical means whereby a test panel is dragged beneath a needle upon which a specified load is placed.

5 Apparatus

5.1 Scratch apparatus (see EN ISO 1518-1). The apparatus is shown in Figure 1. It consists of a sliding table, which holds the test panel, with an arm on which the load is placed over a chuck, which holds the needle, a constant speed motor to drive the table and a low voltage electrical meter to detect electrical contact.

Other arrangements which give a similar performance may be used.



Key

- 1 panel in test panel holder with sloping ramp
- 2 needle
- 3 rod which allows the needle to lower gently onto the tested surface
- 4 counterweight
- 5 electrical connection with indicator for detecting scratch penetration to a metallic substrate
- 6 drive from constant-speed motor

Figure 1 — Scratch apparatus

5.2 Needle that can be fixed on the apparatus. The tip of the needle is a small sphere ($1 \pm 0,05$) mm in diameter of hardened steel or tungsten carbide, the latter giving a longer serviceable life.

In the case of a needle with a tip of hardened steel, the needle should be used only once and then disposed of or re-tipped.

6 Sampling

Shall be in accordance with EN 13523-0.

7 Test panels

Shall be in accordance with EN 13523-0.

The test panel to be tested shall be flat and typically 75 mm × 150 mm, although size may vary depending on the apparatus.

8 Procedure

8.1 Ambient conditions

Measure the resistance to scratching of the organic coating at ambient conditions. For more accurate measurements, as required for instance in case of dispute, the temperature shall be (23 ± 2) °C or any other temperature agreed upon and the relative humidity shall be (50 ± 5) %, in accordance with EN 23270. Conditioning is carried out in accordance with EN 13523-0:2014, Clause 6.

8.2 Determination

Clamp the test panel onto the sliding table, using the screw clamps on the apparatus, the long edge being in the direction in which the scratch is to be made. The surface to be tested shall be facing up.

Place the needle in the chuck. It is important that the needle tip is checked for damage and that any debris is removed. This should be carried out prior to every scratch.

Adjust the position of the counterweight so that the rod is just in contact with the sample holder on top of the ramp. Place the specified load on the needle. Put the apparatus into the scratch mode and start the test.

The minimum length of the travel shall be 50 mm.

The penetration of the coating will be indicated by the detection of an electrical current when the needle makes contact with the metallic substrate.

If the test method is to be used as a pass or fail method, this procedure shall be carried out 3 times with the same load at different positions on the test panel.

This procedure can be repeated after increasing the load until penetration of the coating to the metallic substrate takes place.

It is essential that the movement is smooth with no heavy downward or lateral movement.

9 Expression of results

The result shall be expressed either by a pass or fail with a specified load or by the load just prior to penetration, in which case the result shall be the arithmetic mean of three measurements.

10 Precision

No precision data are 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 part of the EN 13523 series (EN 13523-12);
- c) the temperature at which the test was carried out;
- d) the direction of scratching (relative to rolling direction);
- e) the result of the test, as indicated in Clause 9;
- f) any deviation from the test method specified;
- g) the date of the test.

Bibliography

- [1] EN 1396, *Aluminium and aluminium alloys - Coil coated sheet and strip for general applications - Specifications*
- [2] EN 10169, *Continuously organic coated (coil coated) steel flat products — Technical delivery conditions*
- [3] EN ISO 1518-1, *Paints and varnishes - Determination of scratch resistance - Part 1: Constant-loading method (ISO 1518-1)*

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK