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Coil coated metals – Test methods

Part 20: Foam adhesion

National foreword

This British Standard is the UK implementation of EN 13523-20:2020. It supersedes BS EN 13523-20:2011, which is withdrawn.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 20:
Foam adhesion

Tôles prélaquées - Méthodes d'essai -
Partie 20 : Adhérence des mousses

Bandbeschichtete Metalle - Prüfverfahren
- Teil 20: Haftfestigkeit von Schaum

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European foreword

This document (EN 13523-20:2020) 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of an identical text or by endorsement, at the latest by December 2020, and conflicting national standards shall be withdrawn at the latest by December 2020.

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 13523-20:2011.

The main changes are:

- a) testing of non-adhesion of domestic appliance products has been added ([9.2.3](#));
- 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 (Cataplasma test)*
- *Part 29: Resistance to environmental soiling (Dirt pick-up and striping)*

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1 Scope

This document describes a laboratory method for testing foam adhesion to an organic coating on a metallic substrate under dry and wet conditions.

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*

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:

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

4 Principle

The foam adhesion is tested by pulling off the foam from the coil coated metal sheet.

Testing foam adhesion: this test has only two possible results: “pass” or “fail”.

Testing non-adhesion of foam: the result is estimated percentage of remaining coverage.

5 Material

5.1 Foam.

Organic insulation material created by mixing polyols and isocyanates to make (for example) polyurethane (PUR) or polyisocyanurate (PIR) foams.

Mixing and handling of foams shall be carried out in line with the foam manufacturer's recommendations.

NOTE In the industrial process of sandwich panel manufacture, the constituent liquids of the foam are mixed just prior to application, which then expand rapidly to fill the gap between two outward facing sheets of coated metal, usually in a continuous process or the hollow space in a profile, at least partly formed by coated metal in a discontinuous process. (e.g. production of refrigerators).

6 Apparatus

Ordinary laboratory apparatus and glassware, together with the following:

6.1 Humidity cabinet capable of being maintained at 100 % relative humidity at a temperature of (40 ± 2) °C.

7 Sampling

Shall be in accordance with EN 13523-0.

8 Test panels

Preparation and conditioning of test panels shall be in accordance with EN 13523-0.

9 Procedure

9.1 Preparation

Cut the samples of coated metal sheet into pieces of approximately 200 mm × 250 mm.

Mix the components of the foam together in a blender, according to the supplier's specification (for example 20 g polyol and 26 g isocyanate, during 10 s).

Pour a small quantity of the mixture over the surface to be tested. As the mixture reacts immediately, the application of the mixture shall be done within 20 s after mixing, unless otherwise specified by the supplier.

After the application, leave the samples under ambient conditions, for 30 min to 40 min or as otherwise specified, before testing as described below.

9.2 Adhesion testing

9.2.1 Dry adhesion

9.2.1.1 Pull off the polymerised foam (by hand) from one sample.

9.2.1.2 If at the coating/foam interface none of the original coating surface is revealed, a second sample shall be held at room temperature for 24 h. Pull off the polymerised foam (by hand) from this sample. Lightly scrape the remaining foam layer with typically a blunt knife or finger nail. If this scraping cannot reveal the original coating, dry adhesion is reported as "pass".

9.2.2 Wet adhesion

9.2.2.1 Put a sample prepared as described in 9.1 in boiling water for 1 h. After removal of excess water, pull off the foam (by hand).

9.2.2.2 If at the coating/foam interface none of the original coating surface is revealed after the boiling test, put a second sample as described in 9.1 in the humidity cabinet (100 % relative humidity at 40 °C) for 24 h. After removal of excess water, pull off the foam (by hand). If at the coating/foam interface none of the original coating surface is revealed, wet adhesion is reported as "pass".

9.2.3 Testing non-adhesion in domestic appliance products

9.2.3.1 Pull off the polymerised foam (by hand) from one sample.

9.2.3.2 If at the coating/foam interface a foam layer is revealed, try to scrape lightly the remaining foam layer with typically a blunt knife or finger nail. If this scraping removes the foam from the coating completely, non-adhesion is reported as a "pass" with 0 % foam adhesion.

10 Expression of results

The results of foam adhesion shall be expressed either as "pass" if dry and wet adhesion tests are passed or as "fail" indicating at which step the adhesion test failed.

"Pass" and "fail" criteria shall be agreed by the interested parties. The results for non-adhesion shall be expressed in estimated percentage of remaining foam coverage.

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 (EN 13523-20);
- c) the specification of the main components;
- d) the result of the test, as indicated in [Clause 10](#);
- e) any deviation from the test method specified;
- f) any unusual features (anomalies) observed during the test;
- 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*

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