BS EN 12039:2016

BSI Standards Publication

Flexible sheets for waterproofing — Bitumen sheets for roof waterproofing — Determination of adhesion of granules

bsi.

National foreword

This British Standard is the UK implementation of EN 12039:2016. It supersedes BS EN 12039:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/546, Flexible sheets for waterproofing and water vapour control.

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

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Published by BSI Standards Limited 2016

ISBN 978 0 580 91904 6

ICS 91.100.50

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2016.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12039

June 2016

ICS 91.100.50

Supersedes EN 12039:1999

English Version

Flexible sheets for waterproofing - Bitumen sheets for roof waterproofing - Determination of adhesion of granules

Feuilles souples d'étanchéité - Feuilles d'étanchéité de toiture bitumineuses - Détermination de l'adhérence des granulats

Abdichtungsbahnen - Bitumenbahnen für Dachabdichtungen - Bestimmung der Bestreuungshaftung

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Ref. No. EN 12039:2016 E

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European foreword

This document (EN 12039:2016) has been prepared by Technical Committee CEN/TC 254 “Flexible sheets for waterproofing”, the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by December 2016, and conflicting national standards shall be withdrawn at the latest by December 2016.

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 12039:1999.

List of main changes since this new edition:

a) editorial changes;

b) replacement of ISO 565 in B.1.2.

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1 Scope

This European Standard applies to the apparatus and the test procedure used for the determination of the adhesion of granules to factory made bituminous sheets for roofing. It can also be used in other areas where it is relevant.

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 13416:2001, *Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Rules for sampling*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
surface
upper side of the sheet, as used in situ; which is usually the inside of the roll

3.2
granule
particle which does not pass a sieve as defined in B.1.2

4 Principle

The method determines the adhesion of granules during a brushing test under specified conditions. The mass of brushed-off granules is compared to the original mass of granules on a test specimen cut off from the same roll.

5 Apparatus

5.1 Brushing machine, working automatically to perform outward and return cyclic linear movements between a replaceable brush applied with a force of (21,5 ± 0,5) N on the surface of the test specimen, and the test specimen itself. The constant amplitude A of the relative movement of the axis of the replaceable brush is (200 ± 20) mm, and the average displacement speed is such that 50 cycles are achieved within (55 ± 5) s. The brushing machine shall include suitable clamps, at least 50 mm wide, to restrain the ends of the specimen.

5.2 Replaceable brush, consisting of a block of a suitable material in which 22 holes are drilled as indicated in Figure A.1, with a 4 mm diameter. From each hole, 22 polyamide 66 yarns, diameter 0,80 mm project (16 ± 2) mm.

The effective area of the replaceable brush, when loaded, is 80 mm × 25 mm. The effective brushed area B, as shown in Figure A.2, is $[(A + 80) \times 25]$ mm^2.

A single replaceable brush shall be used for a maximum of 100 tests of fewer if yarns are projecting less than 13 mm from a hole.

5.3 Balance, accurate to the nearest 0,01 g.

5.4 Machine, to cut or die-cut test specimens with a width of (50 ± 1) mm in the desired length.

5.5 Room for conditioning, temperature (23 ± 2) °C and (50 ± 20) % relative humidity.

5.6 Household vacuum cleaner, 500 W, sucking air through an accessory 50 mm wide.

6 Preparation of test samples and test specimens

6.1 Sampling

Sampling in accordance with EN 13416:2001.

6.2 Sampling and preparation of test specimens

Test specimens shall be cut or die-cut in the dimension (50 ± 1) mm wide, length minimum 285 mm, from the samples in the length direction of the sheet.

Condition five test specimens for (24 ± 0,5) h in the climate room at (23 ± 2) °C. Suck the loose granules from the test specimens carefully moving the vacuum cleaner accessory over their surfaces. Determine the mass M_{1i} of each test specimen to the nearest 0,01 g.

7 Procedure

The mass of brushed-off granules is compared to the initial mass of granules of the test specimens cut from the same roll and in the same position on the sheet with respect either to its axis or right side or left side.

Determine the initial mass of granules in accordance with Annex B.

Secure the test specimen onto the brushing machine using the clamps, and place the loaded replaceable brush on the test specimen, the length of the replaceable brush being in the length direction of the specimen (see Figure A.2).

Perform 50 cycles and remove the test specimen from the brushing machine.

Repeat the procedure for each test specimen.

Suck the loose granules from the test specimens moving the vacuum cleaner accessory over their surfaces. Determine the mass M_{2i} of each test specimen to within 0,01 g.

8 Expression of results

Determine the adhesion of granules (M_i), expressed as percentage of relative difference between the two masses of each test specimen using Formula (1):

$$M_i = \frac{M_{1i} - M_{2i}}{B \times G_o} \times 100 \quad (1)$$

where

G_o is the initial mass of granules per 1 m^2 in the same third of the sample where the specimens were cut in accordance with EN 13416:2001, in gram/square metre (g/m^2), as determined in Annex B;

M_{1i} is the mass of the test specimen before brushing, in gram (g);

M_{2i} is the mass of the test specimen after brushing, in gram (g);

B is the area effectively brushed, in square metre (m^2).

9 Accuracy

The precision of the method is not specified.

NOTE No report on interlaboratory tests on repeatability, r, or on reproducibility, R, is available. The accuracy will be specified when sufficient interlaboratory data are available.

10 Test report

The test report shall include at least the following information:

a) all details necessary to identify the product tested;

b) a reference to this European Standard and any deviation from it;

c) information on sampling and details on preparation of test specimens in accordance with Clause 6;

d) information on the test procedure in accordance with Clause 7;

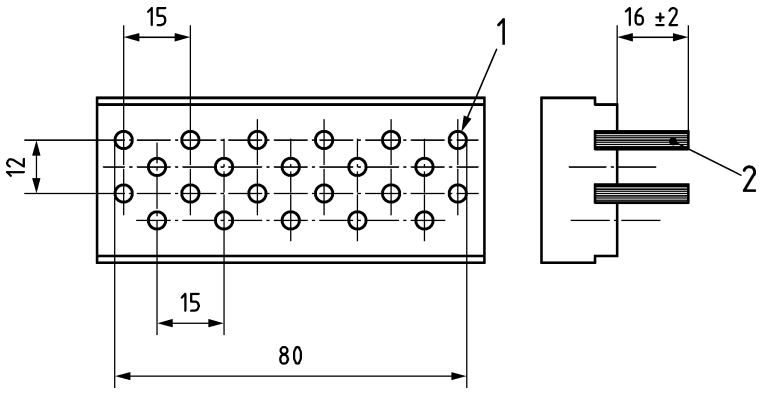
e) the test results in accordance with Clause 8;

f) date of the test.

Annex A
(normative)

Brush model and area brushed

Dimensions in millimetres



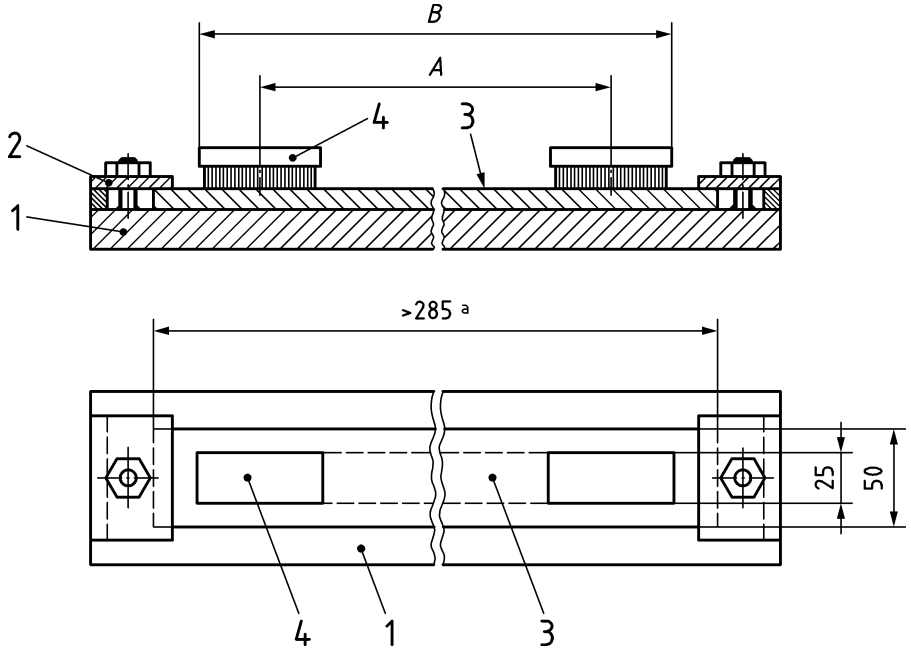
Key

1 22 holes Ø 4

2 22 wires Ø 0,8

Figure A.1 — Brush model

Dimensions in millimetres



Key

1 support

2 fixing clamp for specimen (example)

3 test specimen

4 replaceable brush

Figure A.2 — Area brushed

Annex B
(normative)

Determination of the initial mass of granules

B.1 Apparatus and materials

B.1.1 Hot extraction apparatus, usually of a SOXHLET type.

B.1.2 315 µm sieve in accordance with ISO 3310-1.

B.1.3 Solvent, e.g. toluene, trichloroethylene or dichloromethane, according to national safety regulations.

B.1.4 Balance — see 5.3.

B.2 Specimens

Cut the specimens from the roll(s) which was (were) sampled in preparation for the granule adhesion test. Exclude the first and the last metre in the length direction of the roll, and 100 mm nearest to the edge in the width direction of the roll. Divide the roll equally into three parts in the length direction. From each third, cut two specimens of (100 ± 1) mm × (100 ± 1) mm to the nearest 1 mm (total area of each specimen 0,01 m^2) or alternatively 70 mm × 50 mm (total area of each specimen 0,0035 m^2). Each pair of specimens will be representative of the initial mass of granules found in the thirds of roll used for the adhesion test.

B.3 Procedure

B.3.1 The area S_i of the specimen shall be calculated in m^2.

B.3.2 The specimen shall be placed in the extractor with the solvent adjusted as necessary.

B.3.3 Soluble components shall be separated by hot extraction, until the solvent in the hot extraction apparatus becomes colourless (usually 1 h to 2 h).

B.3.4 The specimen shall be taken out of the extractor, dried at (105 ± 2) °C for at least 2 h.

B.3.5 The granules shall be separated from other components using sieve (B.1.2).

B.3.6 The mass of the granules N_i shall be determined to the nearest 0,01 g. The procedure shall be repeated on each specimen.

B.4 Calculation and expression of results

B.4.1 Calculate the mass per unit area of granules (G_i), expressed in g/m^2, of each specimen using Formula (B.1):

$$G_i = \frac{N_i}{S_i} \qquad \text{(B.1)}$$

where

N_i is the mass of the granules relative to one specimen, in gram (g);

S_i is the area of the specimen, in square metre (m^2).

B.4.2 Calculate the mean (G_o), expressed in g/m^2, of the individual values G_i of the specimens cut from the same third of the roll.

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