BRITISH STANDARD

BS EN
14693:2006

Flexible sheets for waterproofing — Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles — Determination of the behaviour of bitumen sheets during application of mastic asphalt

The European Standard EN 14693:2006 has the status of a British Standard

ICS 91.100.50

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 14693:2006.

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A list of organizations represented on B/546/9 can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

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English Version

Flexible sheets for waterproofing - Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles - Determination of the behaviour of bitumen sheets during application of mastic asphalt

Feuilles souples d'étanchéité - Etanchéité des ponts et autres surfaces en béton circulables par les véhicules - Détermination du comportement des feuilles en bitume lors de l'application de l'asphalte coulé

Abdichtungsbahnen - Abdichtungen für Betonbrücken und andere Verkehrsflächen auf Beton - Bestimmung des Verhaltens von Bitumenbahnen bei Anwendung von Gussasphalt

This European Standard was approved by CEN on 14 November 2005.

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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 Central Secretariat has the same status as the official versions.

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

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Ref. No. EN 14693:2006: E

Contents

Foreword

This European Standard (EN 14693:2006) has been prepared by Technical Committee CEN/TC 254 “Flexible sheets for waterproofing”, the secretariat of which is held by BSI.

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 March 2007, and conflicting national standards shall be withdrawn at the latest by March 2007.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

The purpose of the test is to determine the behaviour of the bitumen sheet which is in contact with the mastic asphalt during application.

1 Scope

This European Standard is applicable to bitumen sheets intended for use with a layer of mastic asphalt.

This European Standard specifies a test method for the evaluation of the resistance of bitumen sheets to the rising of the bitumen compound at the application of mastic asphalt in a non-floating manner.

Note This European Standard could also be used for bitumen sheets intended for use with other asphalt types as a protection layer.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1849-1, *Flexible sheets for waterproofing — Determination of thickness and mass per unit area — Part 1: Bitumen sheets for roof waterproofing*

EN 13375:2004, *Flexible sheets for waterproofing — Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles — Specimen preparation*

EN 13416, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Rules for sampling*

prEN 14695:2003, *Flexible sheets for waterproofing — Reinforced bitumen sheets for waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles — Definitions and characteristics*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 13375:2004 and prEN 14695:2003 apply.

4 Test methods

4.1 Principle

Mastic asphalt, with a temperature of 250 ºC, is poured on bitumen sheet and the following points are determined:

— quantity of sheet-compound specks on the surface of the mastic asphalt;

— quantity of sheet-compound inclusions within the mastic asphalt;

— changes in thickness of the bitumen sheet.

4.2 Apparatus and materials

4.2.1 *Mastic asphalt*, in accordance with EN 13375, with an addition of 4 % to 5 % by mass iron oxide powder (Fe_2O_3).

4.2.2 *Mastic asphalt boiler*, with motor-driven stirring device and oil-fired jacket heating.

4.2.3 *Stereo optical measuring instrument*, with tenfold magnification and a reading accuracy of 0,1 mm.

4.2.4 *UV-C lighting equipment.*

4.2.5 *Concrete slab*, in accordance with EN 13375 (400 ± 10) mm × (400 ± 10) mm, thickness (45 ± 5) mm.

4.2.6 *Frame*, internal dimensions (350 ± 10) mm × (350 ± 10) mm, height of frame (40 ± 2) mm.

4.2.7 *Equipment for measuring the temperature,* with an accuracy of 1 °C.

4.2.8 *Layer of dry sand*, with a depth of 80 mm to 100 mm natural sand.

4.2.9 *Spirit level.*

4.2.10 *Saw.*

4.2.11 *Float for mastic asphalt.*

4.2.12 *Screw clamps.*

4.2.13 *Transparent foil*.

4.3 Preparation of test specimens

Take samples and test specimens in accordance with EN 13416, the dimensions of the test specimens are (400 ± 10) mm × (400 ± 10) mm. Ensure that the test specimens are without any mechanical damage.

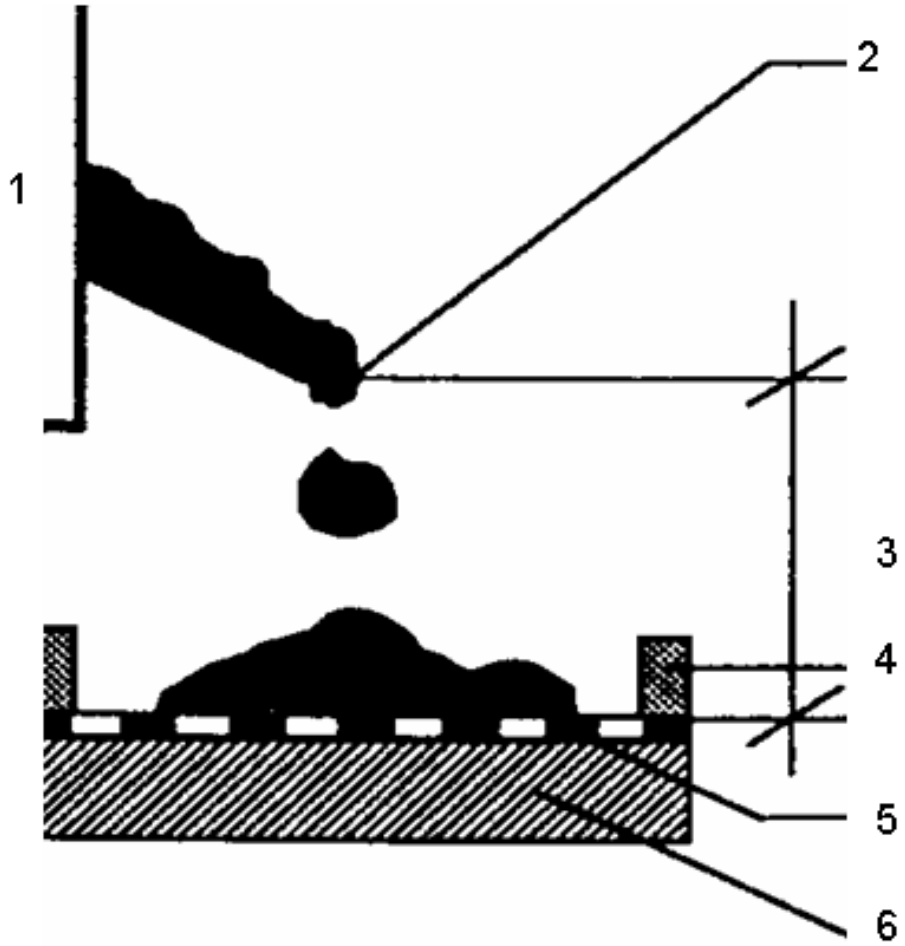
The thickness of the sheet, determined in accordance with EN 1849-1, shall be known (reference thickness).

Two concrete slabs are required.

4.4 Procedure

4.4.1 Condition the sand layer, the concrete slab and the test specimen for at least 24 h at (23 ± 2) ºC.

4.4.2 Place the test specimen onto the concrete slab. Position the frame on top of the test specimen and concrete slab, and fix it with screw clamps.



Key

1 mastic asphalt boiler
2 mastic asphalt
3 pouring height
4 frame
5 test specimen
6 concrete slab

Figure 1 — Illustration of pouring

4.4.3 Lay the concrete slab with test specimen on the sand layer, and level it by means of the spirit level.

4.4.4 Pour the mastic asphalt and distribute it softly using the float to fill the frame.

4.4.5 Ensure that the temperature of the mastic asphalt on leaving the boiler is (250 ± 3) °C before pouring, and also that the pouring height of the mastic asphalt from the upper surface of the test specimen is between 100 mm and 150 mm. Complete the pouring of the mastic asphalt within two minutes, and leave to cool for at least eight hours after pouring. After cooling, remove the frame.

4.5 Measurements

4.5.1 Determination of surface proportion of any sheet compound specks on the surface of the mastic asphalt

4.5.1.1 Determine the mass of the square partial surface of the transparent foil with an area of (50 ± 1) mm × (50 ± 1) mm, m_1.

4.5.1.2 Visually determine a square partial surface of (50 ± 1) mm × (50 ± 1) mm of the mastic asphalt surface, on which the total area taken up by the sheet compound specks holds the biggest share. In case of doubt, the use of UV-C illumination is recommended.

4.5.1.3 Mark the sheet compound specks of this partial surface on transparent foil and cut out the specks.

4.5.1.4 Determine the mass of the cut-out segments of the foil, m_2.

4.5.2 Determination of the thickness of the sheet after pouring the mastic asphalt

4.5.2.1 Saw the test specimen (made up of the concrete slab, sheet and mastic asphalt) parallel to the lateral face into three equal parts. Use the middle part as a test specimen for further testing.

4.5.2.2 Make fine pencil marks at each 25 mm on both cut surfaces of the test specimen. The first mark shall be made 10 mm from the edge of the mastic asphalt. Apply the marks vertically to the upper concrete surface on both sides of the sheet.

4.5.2.3 Determine the thickness of the sheet at each pencil mark to an accuracy of 0,1 mm in the stereo optical measuring instrument. In cases of doubt, determine the borderline between the sheet, the mastic asphalt and the concrete slab respectively with a pointed object. Any mineral particles distributed from the sheet surface protection shall be considered as part of the sheet.

4.5.2.4 Substitute any determined individual value that is bigger than the reference thickness of the sheet by the reference thickness.

4.5.2.5 Calculate the arithmetic mean of the thickness of each test specimen to an accuracy of 0,1 mm.

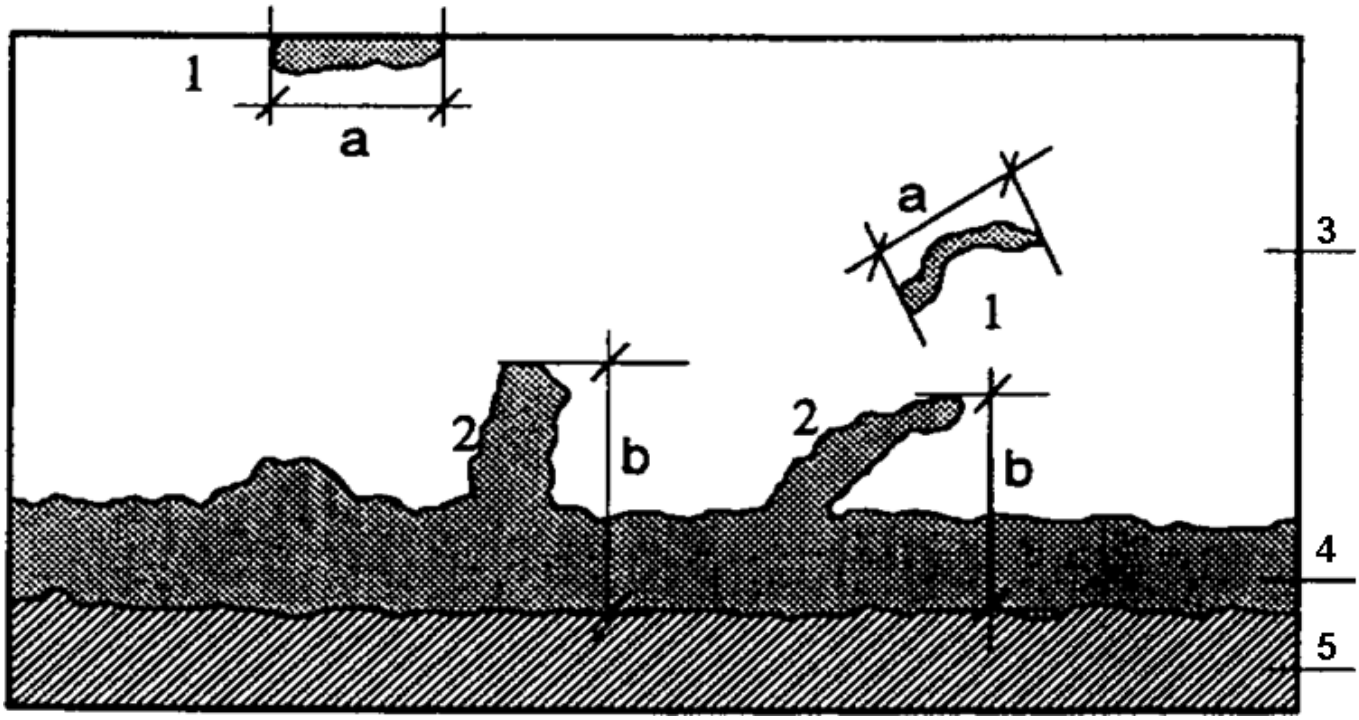
4.5.3 Determination of sheet compound inclusions in the mastic asphalt

4.5.3.1 Visually determine at both cutting edges of the test specimen any inclusions of sheet compounds, either bonded or not bonded to the sheet. In case of doubt, the use of UV-C illumination is recommended.

4.5.3.2 Such inclusions of a size ≥ 7 mm (distance between the extreme points of the inclusions) that are not bonded to the sheet shall be marked and counted accordingly.

4.5.3.3 Sheet compound inclusions of a maximum height ≥ 12 mm from the underside of the sheet that are bonded to the sheet, shall be marked and counted accordingly.

4.5.3.4 The total number of both types of inclusions on each test specimen is calculated.



Key

1 with sheet non bonded inclusions
2 with sheet bonded inclusions
3 mastic asphalt
4 sheet
5 concrete slab
a size of non bonded inclusions
b height of bonded inclusions

Figure 2 — Illustration of inclusions

4.6 Evaluation and expression of results

4.6.1 Sheet compound specks on the surface of the mastic asphalt

Calculate for each test specimen the relative surface proportion of the specks on the surface, stating it as a percentage of the partial surface.

$$s = \frac{m_2}{m_1} \times 100\ \% \qquad (1)$$

where

s is the relative surface proportion of the sheet compound specks [%];

m_1 is the mass of transparent foil 50 mm × 50 mm in grams [g];

m_2 is the mass of the cut-out transparent foil, in grams [g].

The result is the arithmetic mean of the two measurements, rounded to 5 %.

4.6.2 Changes in thickness of the sheet after pouring of the mastic asphalt

Calculate the changes in thickness and round to an accuracy of 0,1 mm.

$$\Delta t = t_0 - \frac{t_1 + t_2}{2} \quad (2)$$

where

Δt are the changes in thickness [mm];

t_0 is the reference thickness of the sheet, determined in accordance with EN 1849-1 [mm];

t_1 is the arithmetic mean of the thickness of the sheet in test specimen 1, in millimetres [mm];

t_2 is the arithmetic mean of the sheet in test specimen 2, in millimetres [mm].

4.6.3 Sheet compound inclusions in the mastic asphalt

The arithmetic mean of the number of inclusions in the two test specimens shall be calculated and rounded to the nearest whole number.

$$i = \frac{i_1 + i_2}{2} \quad (3)$$

where

i is the arithmetic mean of the number of inclusions [-];

i_1 is the number of inclusions on test specimen 1 [-];

i_2 is the number of inclusions on test specimen 2 [-].

4.7 Precision of the test method

No precision data is currently available.

4.8 Test report

The test report shall include at least the following:

a) all details necessary to identify the product tested;

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

c) information about preparation of test specimens in accordance with 4.3;

d) information about the procedure in accordance with 4.5;

e) test results according to 4.6:

- Relative surface proportion of sheet compound specks;
- Changes in thickness of the sheet;
- arithmetic mean of the number of sheet compound inclusions in the mastic asphalt;

f) dates of delivery and preparation of test specimens;

g) date of tests.

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