BRITISH STANDARD

BS EN
12691:2006

Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to impact

The European Standard EN 12691:2006 has the status of a British Standard

ICS 91.100.50

BSI
British Standards

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 12691:2006. It supersedes BS EN 12691:2001 which is withdrawn.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 B/546 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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Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of resistance to impact

Feuilles souples d'étanchéité - Feuilles d'étanchéité de toitures bitumineuses, plastiques et élastomères - Détermination de la résistance au choc

Abdichtungsbahnen - Bitumen-, Kunststoff- und Elastomerbahnen für Dachabdichtungen - Bestimmung des Widerstandes gegen stoßartige Belastung

This European Standard was approved by CEN on 12 January 2006.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard (EN 12691:2006) 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 September 2006, and conflicting national standards shall be withdrawn at the latest by September 2006.

This European Standard supersedes EN 12691:2001.

In order to receive more precise test results a revision of the test procedure was necessary.

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

This European Standard is intended for characterisation and classification of bitumen, plastic and rubber sheets as manufactured or supplied before use. This test method relates exclusively to products or to their components where appropriate, and not to waterproofing membrane systems composed of such products and installed in the works.

This test is intended to be used in conjunction with European Standards “Definitions and characteristics” for bitumen sheets and for plastic and rubber sheets for roof waterproofing.

1 Scope

This European Standard specifies a test for puncture by impact on sheets for roof waterproofing. Mechanical stress on waterproofing sheets ranges from static long-term loads to dynamic short-term loads. This method represents the dynamic category of load where puncture may be caused by impact.

This European Standard may also be applied for other purposes of waterproofing.

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 13163:2001, *Thermal insulation products for buildings — Factory made products of expanded polystyrene (EPS) — Specification*

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

3 Terms and definitions

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

3.1
top surface
upper side of the sheet as used in-situ. It is usually the inside of the roll.

4 Principle

The test specimen is struck on the top surface of the sheet by a free falling drop mass with a puncturing tool.

The test specimen is lying on a hard support (method A) and if required additionally on a soft support (method B). After the impact the test specimen is tested for leakage.

5 Apparatus

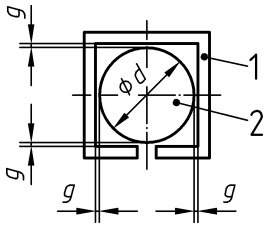
The testing is performed using a test apparatus, which enables vertically falling of the drop mass and consists of the parts indicated in 5.1 to 5.7 and can be used with a hard support (method A) or a soft support (method B).

5.1 Stand

The stand can be constructed for free falling of the drop mass or optionally for rail guided falling and should be at least as long (high) as the maximum drop height to be tested (for most practical purposes 2 m will be sufficient).

An example for a guide rail for the falling drop mass is given in Figure 1.

Dimensions in millimetres



Key

1 Guide rail (slitted square tube e.g.)
2 Drop mass
d Diameter between 25 mm to 30 mm
g Gap between 0,5 mm to 1 mm

Figure 1 — Guide rail and drop mass / cross section (example)

5.2 Drop mass and puncturing tool

Cylindrical steel drop mass with a fixed puncturing tool. The weight of the drop mass including the puncturing tool shall be (500 ± 5) g; the diameter should be preferable between 25 mm to 30 mm.

The puncturing tool shall be made according to the following specifications:

— formed in steel material and firmly fixed to the drop mass;

— hardened to 50 HRC;

— spherical formed with a diameter of (12,7 ± 0,1) mm;

— shaft diameter of (10 ± 0,1) mm; shaft length about 40 mm.

See example in Figure 2.

5.3 Release mechanism

Release mechanism (trigger) with a setting device for variable drop height from 200 mm to at least 2 000 mm in increments of:

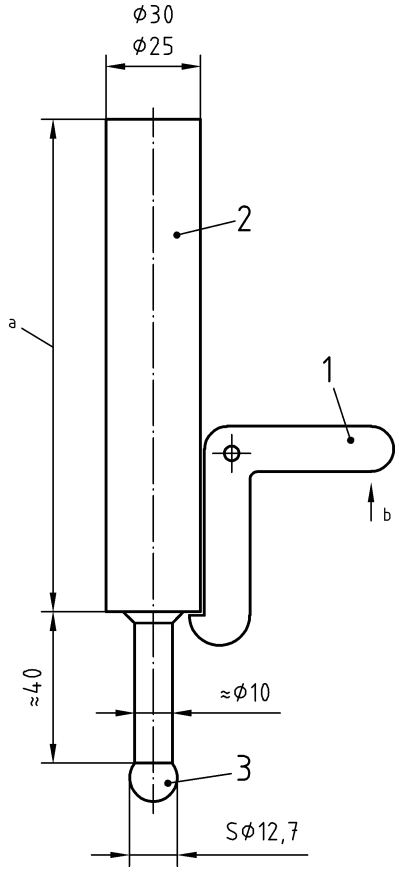
— 50 mm between 200 mm and 500 mm;

— 100 mm between 500 mm and 1 000 mm;

— 250 mm for drop heights above 1 000 mm.

The drop height is measured from the bottom of the puncturing tool to the surface of the test specimen.

Dimensions in millimetres



Key

1 Release mechanism
2 Drop mass
3 Puncturing tool
a Length according to total weight of (500 ± 5) g
b Action: push to release

Figure 2 — Drop mass with puncturing tool and release (for guide rail) (example)

5.4 Ballast ring

Ballast ring in steel with mass of at least 2 000 g with inner diameter of approximately 100 mm (see Figure 3).

5.5 Support

5.5.1 Methods A and B

a) For all products: substrate *AI* (see 5.5.2);

b) For different products (only if required): substrate *EPS* (see 5.5.3).
Type of substrate has to be indicated with the test results.

5.5.2 Aluminium plate (method A)

Aluminium plate of the quality *AlMgSiF32* with the size of about 300 mm x 300 mm x 3 mm.

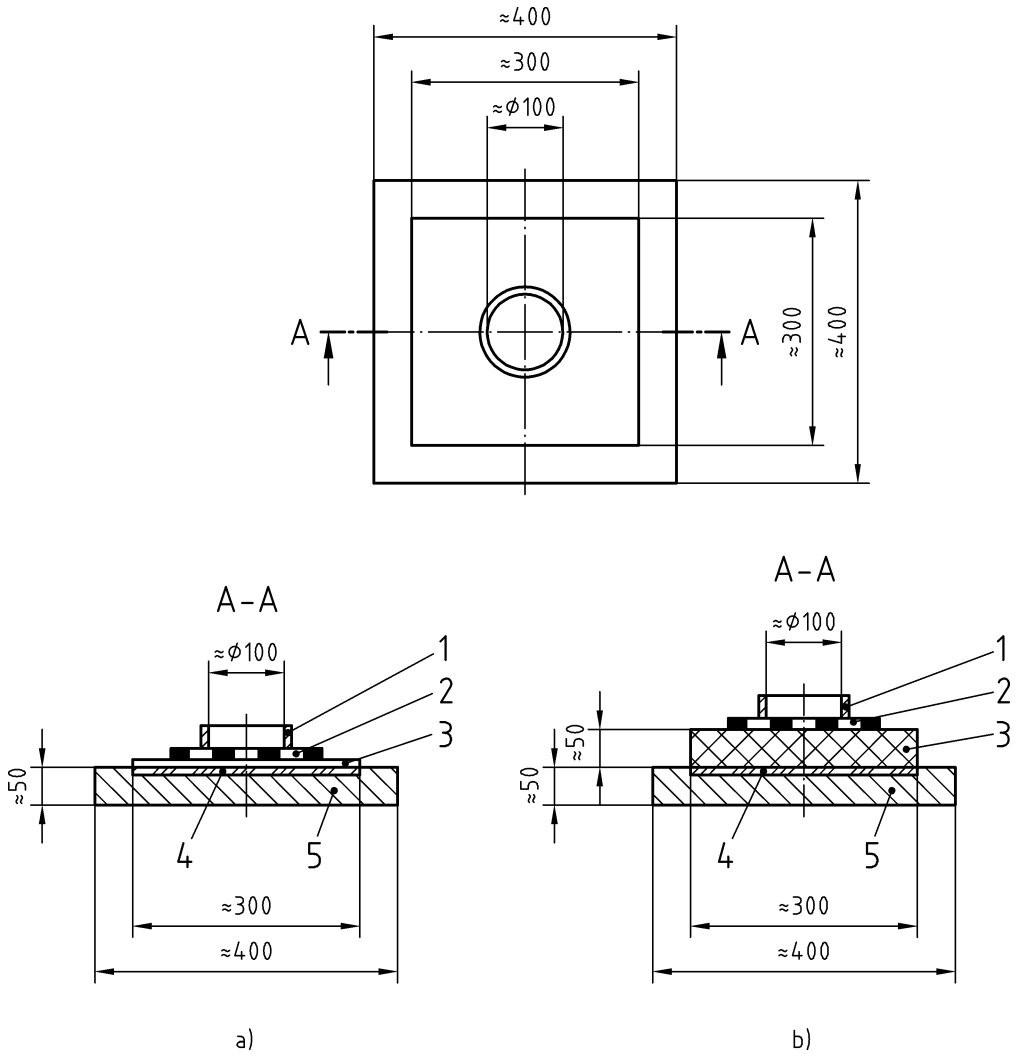
5.5.3 Standard expanded polystyrene panel (method B)

Standard expanded polystyrene panel with a cut surface and size of about 300 mm x 300 mm x 50 mm; (EPS-Quality CS(10)150, see EN 13163).

5.6 Counter mass

Counter mass of minimum 400 mm x 400 mm x 50 mm concrete slab with an even and unmarked steel support plate of about 300 mm x 300 mm x 10 mm fixed to the surface of the concrete slab (see Figure 3).

Dimensions in millimetres



a) Method A b) Method B

Key

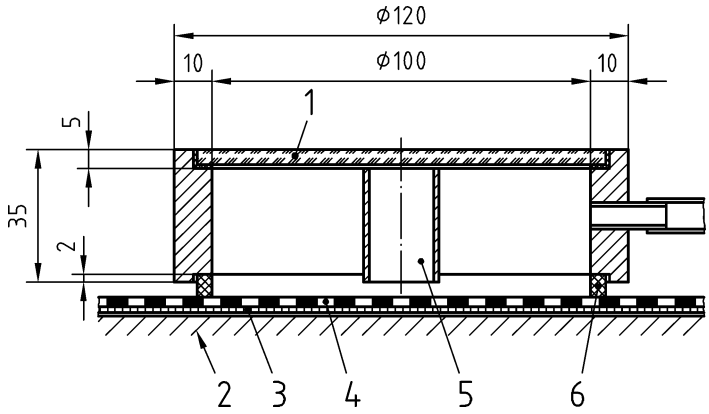
1 Ballast ring
2 Test specimen
3 Support (aluminium plate for method A or polystyrene for method B)
4 Steel plate (h = 10 mm) with even and unmarked surface
5 Concrete counter mass

Figure 3 — Counter mass and ballast ring

5.7 Puncture testing device

Vacuum or pressure device for the verification of a possible puncture (see example in Figure 4).

Dimensions in millimetres



Key

1 Glass plate
2 Support
3 Air permeable layer
4 Test specimen
5 Transparent plastic tube (perforated)
6 Gasket

Figure 4 — Vacuum device (example)

6 Sampling

Samples shall be taken in accordance with EN 13416.

7 Preparation of test specimen

A minimum of five test specimens of at least 150 mm x 150 mm should be taken from different positions across the width and the length of the roll excluding 100 mm at the edges.

The test specimen shall be cleaned on both sides with filter paper to remove adhered solid remnants and surface dirt.

The test specimens shall be conditioned for at least 24 h at the specified test condition.

8 Procedure

Testing is carried out at a temperature of (23 ± 2) °C.

For testing, the test specimens shall be placed on the support with the top surface upwards and pressed down by the ballast ring.

The test is performed by releasing the drop mass from the drop height to be tested. The puncturing tool shall hit the centre of the test specimen in the middle of the ballast ring.

Preliminary tests can be made to indicate a drop height around which perforation could be expected by increasing/reducing the drop height until perforation is noticed/avoided (increments of drop height see 5.3).

For every test a new test specimen shall be used and the support shall not be exposed to impact at the same point more than once.

That requires for each impact for:

— method A: to move the aluminium plate for about 25 mm;

— method B: to move the polystyrene panel for about 50 mm.

The main test with one impact on five different test specimens shall not result in more than one puncture. If more than one puncture occurs, the drop height shall be reduced until further impact on five different test specimens does not result in more than one puncture (increments of drop height see 5.3).

The test specimens are examined for possible puncture within 5 min after the impact test by coating the surface of the impact area with a soap solution and applying a pressure difference of 15 kPa (0,15 bar) to the zone of impact by means of a vacuum or pressure device with the positive pressure at the side subjected to impact. If after 60 s no air bubbles are visible, the test specimen is considered to have no leakage and is not punctured.

9 Expression of results

The resistance to impact is expressed as the drop height of the puncturing tool in millimetres, which has not caused leakage of the flexible sheet for roof waterproofing in four out of five test specimens.

Additionally the type of the test method (A or B) is to indicate.

10 Test report

The test report shall include at least the following information:

— all details necessary to identify the product tested;

— reference to this European Standard, i.e. EN 12691 and any deviation from it;

— information on sampling in accordance with Clause 6;

— information on the preparation of the test specimens in accordance with Clause 7;

— information on the procedure in accordance with Clause 8 and indicating the method used (A or B);

— the test results in accordance with Clause 9;

— date of the test.

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British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

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W4 4AL