

English version

**Flexible sheets for waterproofing - Waterproofing of concrete  
bridge decks and other concrete surfaces trafficable by vehicles  
- Determination of the resistance to compaction of an asphalt  
layer**

Feuilles souples d'étanchéité - Etanchéité de ponts et  
autres surfaces en béton circulables par les véhicules -  
Détermination de la résistance au compactage de la  
couche bitumineuse

Abdichtungsbahnen - Abdichtungen für Betonbrücken und  
andere Verkehrsflächen auf Beton - Bestimmung des  
Widerstandes gegenüber Verdichtung der Schutzschicht

This European Standard was approved by CEN on 14 April 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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## Contents

Page

Foreword .....	3
Introduction .....	4
1 Scope.....	5
2 Normative references .....	5
3 Terms and definitions .....	5
4 Test methods .....	5
4.1 Principle .....	5
4.2 Apparatus and materials .....	6
4.3 Preparation of test specimens.....	6
4.4 Procedure .....	7
4.5 Expression of results.....	7
4.6 Test report .....	8
Annex A (normative) Determination of watertightness for Method 1 .....	9

## Foreword

This document (EN 14692:2005) 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of an identical text or by endorsement, at the latest by December 2005, and conflicting national standards shall be withdrawn at the latest by December 2005.

This European Standard is one of a series of standards applicable to flexible sheets for waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## Introduction

The purpose of the test is to determine the ability of a waterproofing system to resist damage from compaction of an asphalt layer.



## 1 Scope

This European Standard specifies a test method for the evaluation of the resistance of a bitumen sheet to compaction of an asphalt layer.

## 2 Normative references

The following referenced documents are indispensable for the application 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 1928, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of watertightness*

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

EN 13416:2001, *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 document, the terms and definitions given in EN 13416:2001, EN 13375:2004 and prEN 14695:2003 apply.

## 4 Test methods

### 4.1 Principle

The test consists of compacting an asphalt layer of a determined composition on a bitumen sheet laid on a base specimen.

It may be carried out in two alternative ways:

- Method 1: The asphalt layer is laid directly on the sheet bonded to the base specimen;
- Method 2: A de-bonding interface is laid between the base specimen and the sheet and between the sheet and the asphalt layer.

After compacting of the test specimen, the bitumen sheet is recovered for observation of its condition and any perforations. Depending on the results of the observations, the watertightness of the recovered bitumen sheet should be checked.

## **4.2 Apparatus and materials**

**4.2.1** Compaction equipment, as referred to in EN 13375.

**4.2.2** Standard equipment and materials, such as, site gas torch, brush, etc.

**4.2.3** Oven, with circulating air (without fresh supply), capable of maintaining  $(100 \pm 5) ^\circ\text{C}$ .

## **4.3 Preparation of test specimens**

### **4.3.1 General**

Take samples and test pieces in accordance with EN 13416.

### **4.3.2 Test specimen with sheet bonded to the base specimen (Method 1)**

The test specimen is prepared in accordance with EN 13375.

The size of the test specimen is 600 mm x 400 mm.

### **4.3.3 Test specimen with sheet not bonded to the base specimen (Method 2)**

Place a de-bonding interface between the base specimen and the bitumen sheet, and on the upper surface of the bitumen sheet to prevent the asphalt layer adhering to it.

For the interface between the base specimen and the bitumen sheet, use one non-woven glass fibre sheet of  $(70 \pm 5) \text{ g/m}^2$ .

For the interface between the bitumen sheet and the asphalt layer mix, use two non-woven glass fibre sheets of  $(70 \pm 5) \text{ g/m}^2$ .

The size of the test specimen is 300 mm x 300 mm.

### **4.3.4 Asphalt layer, compaction and test specimens**

#### **4.3.4.1 General**

Lay and compact the asphalt layer mix in accordance with EN 13375.

#### **4.3.4.2 Test specimen with sheet bonded to the base specimen (Method 1)**

In the case of the sheet bonded to the base specimen, obtain four equal parts by wet sawing the test specimen, prepared as described in 4.3.1 and 4.3.2.

#### **4.3.4.3 Test specimen with sheet not bonded to the base specimen (Method 2)**

In the case of test specimens with de-bonding interfaces, let the asphalt layer cool and remove the sheet for visual inspection and testing.



## 4.4 Procedure

### 4.4.1 Test specimen with sheet bonded to the base specimen (Method 1)

**4.4.1.1** Inspect visually the cross-section of the parts of the test specimen to check the sheet/asphalt layer interface, and whether any binder from the sheet is bleeding into the asphalt layer.

**4.4.1.2** Heat two parts of the test specimen in an oven at  $(100 \pm 5) ^\circ\text{C}$  for  $(120 \pm 5)$  min.

**4.4.1.3** Separate the bitumen sheet manually from the base specimen and asphalt layer, taking care not to destroy the asphalt layer so that its interface surface can be examined.

**4.4.1.4** Check the condition of the bitumen sheet that was removed from the part of the test specimen, and hold up to the light to detect any perforations due to compacting of the asphalt layer.

**4.4.1.5** Remove the binder from the reinforcement by extraction (for example with toluene as solvent).

**4.4.1.6** Dry the reinforcement in an oven at  $(100 \pm 5) ^\circ\text{C}$  for 30 min approximately, and hold up to the light to detect any perforations.

**4.4.1.7** In case of perforations, test on the two remaining parts of the test specimen (see 4.4.1.2) the waterproofing complex (bitumen sheet and asphalt layer) for watertightness according to the test method described in normative Annex A.

### 4.4.2 Test specimen with sheet not bonded to the base specimen (Method 2)

Separate the bitumen sheet, and visually inspect its condition. If the visual inspection reveals perforations in the bitumen sheet, the watertightness test need not be performed. If the visual inspection reveals no perforations in the bitumen sheet, test the bitumen sheet for watertightness according to EN 1928, Method A with a pressure of 100 kPa for 24 h.

## 4.5 Expression of results

### 4.5.1 Visual inspection test

For Method 1: Report any perforation after the operations of 4.4.1. In case of no perforations, express the resistance to compaction of an asphalt layer as "resistant".

For Method 2: Report any perforation after the operations of 4.4.2. In case of perforations, express the resistance to compaction of an asphalt layer as "not resistant".

### 4.5.2 Watertightness test

For Method 1: In case of perforations detected according to 4.4.1, express the resistance to compaction of an asphalt layer as "resistant" if no leak is detected when tested according to annex A.

For Method 2: Express the resistance to compaction as "resistant" if the bitumen sheet does not leak when tested according to the method given in 4.4.2.

### 4.5.3 Precision of the test method

No precision data is currently available.

#### 4.6 Test report

The test report shall include at least the following information:

- a) all details necessary to identify the product tested and identification of the whole waterproofing system including asphalt layer and application temperature, type and quantity of the primer;
- b) a reference to this document and any deviation from it;
- c) information on preparation of test specimens in accordance with 4.3 and EN 13375, and prepared by and witnessed by which organization;
- d) the dates of delivery of sample and preparation of test specimens;
- e) information about the chosen procedure in accordance with 4.1 (Method 1 or Method 2);
- f) the test result and failure mode for each individual test as indicated in 4.5;
- g) the date of tests.



## **Annex A**

### **(normative)**

## **Determination of watertightness for Method 1**

### **A.1 General**

#### **A.1.1 Purpose of the test**

The purpose of the test method is to determine the watertightness of test specimen according to Method 1 (4.1).

#### **A.1.2 Principle of the method**

The test consists of subjecting a specimen of the waterproofing system in a closed cell to a specified water pressure and observing the absence of water transmission through the system.

### **A.2 Equipment**

**A.2.1** Apparatus, suitable for applying pressures up to 1 MPa in measuring cells in which the test specimens to be tested are placed (see an example of apparatus in Figure A.1).

### **A.3 Test specimens**

Obtain test specimens with a diameter of 150 mm and a maximum thickness of 70 mm by coring.

After coring, heat the test specimens under a controlled temperature (4.4.1), and separate the complex at the waterproofing/concrete interface.

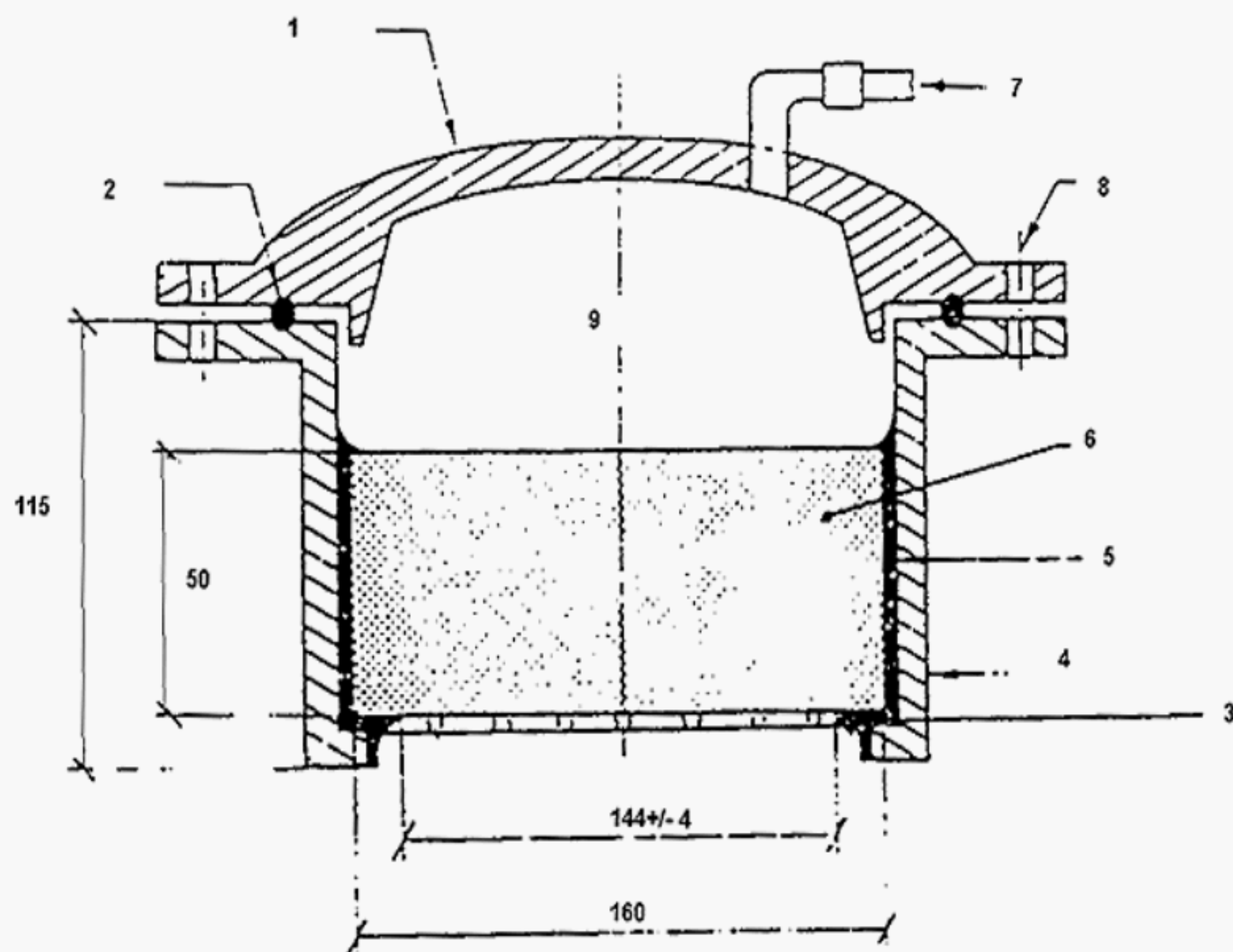
### **A.4 Test procedure**

#### **A.4.1 Installation of test specimens**

Place the lower shells of the measuring cells and tins of hard bitumen (20/30 pen) in an oven at 140 °C for at least 2 h.

Remove the lower shells from the oven and place the test specimens in them. Pour the hot bitumen into the gap between the test specimen and the side of the test cell in order to ensure a perfect seal.

After cooling, fit the cells with the top shell and connect to the apparatus (see Figure A.1).



### Key

- 1 Upper shell
- 2 Waterproofing joint
- 3 Grid (thickness: 6 mm)
- 4 Lower shell
- 5 Sealing bitumen (20/30 pen)
- 6 Test specimen ( $\varnothing$  150 mm)
- 7 Bitumen sheet
- 8 Water inlet
- 9 6 bolts  $\varnothing$  10 mm
- 10 Chamber, filled with water (Volume < 3 dm<sup>3</sup>)
- 11 Air bleeding

**Figure A.1 — Example of apparatus used for watertightness evaluation**

#### A.4.2 Testing

Perform the test at room temperature with the following steps:

- 24 h in contact with water at each of the following pressures:
  - a) room pressure;
  - b)  $(0,1 \pm 0,01)$  MPa;
  - c)  $(0,5 \pm 0,01)$  MPa;
  - d)  $(0,7 \pm 0,01)$  MPa.
- 3 h at  $(1,0 \pm 0,01)$  MPa.

Check after each pressure increment that there is no water beneath the measuring cell.

#### A.5 Expression of results

Keep a record of the pressure at which any water is observed to pass through the specimen, or of the fact that no water passed through during the test.