BS EN 13653:2017

BSI Standards Publication

Flexible sheets for waterproofing — Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles — Determination of shear strength

bsi.

National foreword

This British Standard is the UK implementation of EN 13653:2017. It supersedes BS EN 13653:2004 which is withdrawn.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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English Version

Flexible sheets for waterproofing - Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles - Determination of shear strength

Feuilles souples d'étanchéité - Étanchéité des tabliers de ponts en béton et autres surfaces en béton circulables par les véhicules - Détermination de la résistance au cisaillement

Abdichtungsbahnen - Abdichtung von Betonbrücken und anderen Verkehrsflächen aus Beton - Bestimmung der Schubfestigkeit

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European foreword

This document (EN 13653:2017) 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of an identical text or by endorsement, at the latest by September 2017, and conflicting national standards shall be withdrawn at the latest by September 2017.

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 13653:2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The significant technical changes are the new reference to prEN 17048 in Clause 2, Normative references, and the substitution of the term “bitumen sheet” with the generic wording “waterproofing sheet” in every clause where needed.

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Introduction

The purpose of the test is to determine the shear strength properties of the waterproofing system. This test simulates action of dynamic forces (e.g. braking).

1 Scope

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

This document specifies a test method for the evaluation of the shear strength properties of the waterproofing sheet system applied to a concrete surface and with an asphalt layer.

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 13375, *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*

EN 14695, *Flexible sheets for waterproofing - Reinforced bitumen sheets for waterproofing of concrete bridge decks and other trafficked areas of concrete - Definitions and characteristics*

prEN 17048, *Flexible sheets for waterproofing - Plastic and rubber sheets for waterproofing of concrete bridge decks and other trafficked areas of concrete - Definitions and characteristics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13375, EN 14695, prEN 17048 and the following apply.

3.1
shear strength
shear stress at maximum force, when testing the shear resistance in a waterproofing system

4 Test methods

4.1 Principle

A force is induced in the waterproofing system laid between base specimen and asphalt layer to determine the shear strength of the waterproofing. Testing is carried out in compression at constant displacement rate. The force is applied at an angle of 15° to the plane of shearing.

4.2 Apparatus and materials

a) A loading device capable of producing a load of 10 kN with an accuracy of 1 % at a displacement rate relative to the supports of (10 ± 1) mm/min (Figure 1). The loading shall be applied through the centre of the waterproofing. The recording device shall be capable of measuring the force to an accuracy of 1 % and displacement to 0,1 mm. The device on which the test specimen is supported shall be at an angle of inclination of (15 ± 1) ° with regard to the direction of load at the start of the test.

b) Load application without any resulting momentum shall be ensured by the chosen manner of support (for example by a gimbal mounting).

c) Conditioning device, giving a temperature of (23 ± 2) °C.

d) Device for measuring test temperature with an accuracy of at least ± 0,5 °C.

4.3 Preparation of test specimens

Samples and test pieces shall be taken in accordance with EN 13416.

Specimen preparation is described and asphalt layer mixes are given in EN 13375. The size of the test specimens shall be 220 mm × 110 mm (see Figure 1).

Four test specimens shall be used for the test.

4.4 Procedure

Prior to testing the test specimens shall be conditioned at a test temperature of (23 ± 2) °C for at least 24 h.

NOTE 1 Additionally other temperatures can be used if required.

The dimensions of the shear area A shall be measured and recorded.

The test specimen shall be placed in the test equipment at an angle of (15 ± 1) ° to the shear plane.

A constant displacement shall be applied at a rate of (10 ± 1) mm/min. The force and displacement shall be recorded during the test. The test temperature shall be measured and recorded.

NOTE 2 The results of the test depend significantly on the test temperature.

The failure location shall be visually inspected and details of the failure shall be recorded such as:

— Adhesion failure: displacement between waterproofing system and underlay, or between bitumen sheet and asphalt layer;

— Cohesion failure: displacement in the waterproofing system.

NOTE 3 In shear testing, sliding may occur at the base specimen surface (primer) or between the sheets or at the asphalt layer interface with the sheet.

4.5 Expression of results

4.5.1 Method of calculation

The shear strength in N/mm² shall be calculated using the Formula (1) below:

$$\tau_{\max} = \left(F_{\max} / A\right) \times \cos 15\,° \quad (1)$$

If shear strength at a certain, or specific, displacement (s_ε) is required, the value of the corresponding shear stress shall be calculated using the Formula (2).

$$\tau\left(s_\varepsilon\right) = \left(F / A\right) \times \cos 15\,° \quad (2)$$

where

τ_{max} is the shear strength, in N/mm^2, rounded to 0,01 N/mm^2

τ is the shear stress at a certain displacement (s_ε), in N/mm^2, rounded to 0,01 N/mm^2

F_{max} is the recorded maximum force, in N

F is the recorded force, in N

A is the test area of the test specimen, in mm^2

s_ε is the displacement, in mm

The arithmetic mean value(s) of shear strength and shear stress at a certain displacement, if required, shall be calculated (both rounded to 0,01 N/mm^2).

4.5.2 Precision of the test method

The precision of the test method is not specified.

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 (EN 13653) and any deviation from it;

c) information on preparation of test specimens in accordance with EN 13375, specimens prepared by and witnessed by which organisation;

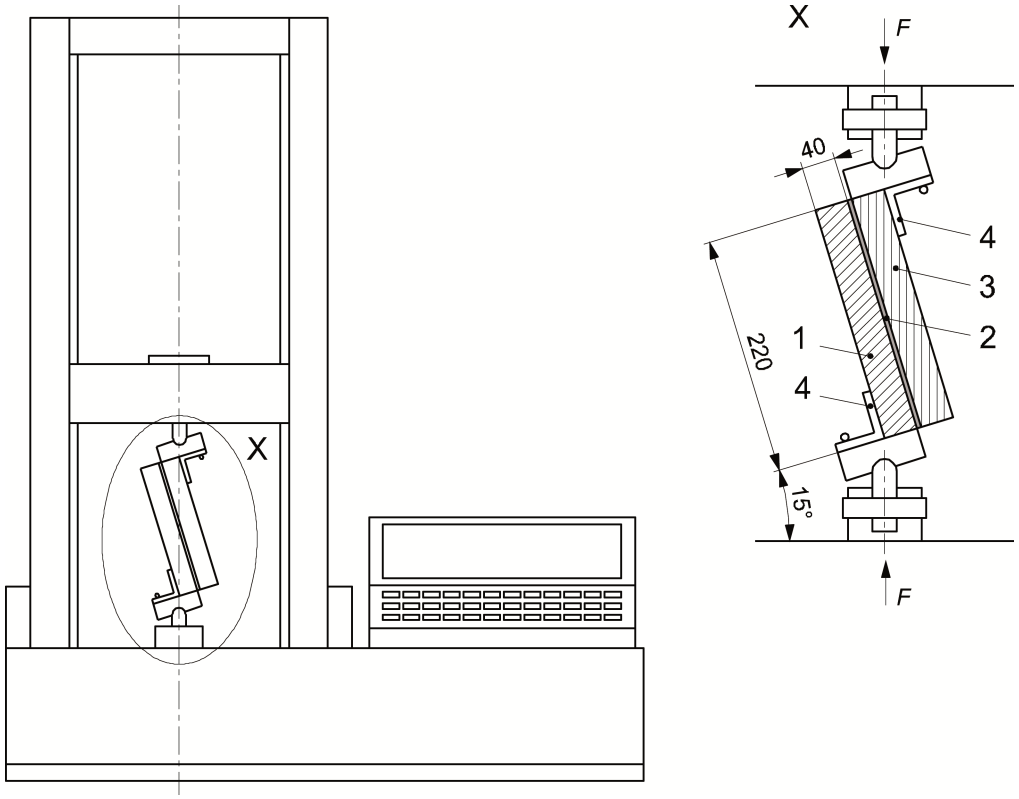
d) information about the test procedure in accordance with 4.4, test temperature, exact temperature during the test and test area;

e) the test results and failure mode according to 4.5 for each individual test, mean value if relevant and the force/displacement graph;

f) the dates of delivery preparation of specimens;

g) the date of tests.

Dimensions in millimetres



Key

1 base specimen
2 waterproofing sheet(s)
3 asphalt layer
4 adjustable support

Figure 1 — Example of loading device

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