

# Flexible sheets for waterproofing — Determination of tensile properties —

## Part 1: Bitumen sheets for roof waterproofing

The European Standard EN 12311-1:1999 has the status of a  
British Standard

ICS 91.100.50

## National foreword

This British Standard is the official English language version of EN 12311-1:1999.

The UK participation in its preparation was entrusted by Technical Committee B/546, Flexible sheets for waterproofing, to Subcommittee B/546/1, Bitumen sheets, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

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### Summary of pages

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English version

## Flexible sheets for waterproofing - Determination of tensile properties - Part 1: Bitumen sheets for roof waterproofing

Feuilles souples d'étanchéité - Détermination des propriétés en traction - Partie 1: Feuilles d'étanchéité de toiture bitumineuses

Abdichtungsbahnen - Bestimmung des Zug-Dehnungsverhaltens - Teil 1: Bitumenbahnen für Dachabdichtungen

This European Standard was approved by CEN on 21 August 1999.

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Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This European Standard 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of an identical text or by endorsement, at the latest by March 2000, and conflicting national standards shall be withdrawn at the latest by September 2001.

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## Introduction

This European Standard is intended for the characterization of bitumen sheets as manufactured or supplied before use. The 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 on product characteristics on reinforced and unreinforced bitumen sheets for roof waterproofing.

## 1 Scope

This European Standard specifies a method for the determination of the tensile properties of bitumen sheets for roofing.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN10002-2, Metallic materials - Tensile testing - Part 2: Verification of the force of measuring system of the tensile testing machines.

## 3 Definitions

For the purposes of this standard the definitions indicated in 3.1 to 3.3 and in the corresponding European Standard on product specifications apply.

**3.1 maximum tensile force** the largest value of tensile force occurring during testing

**3.2 elongation at maximum tensile force** elongation of the test specimen occurring at the maximum tensile force

**3.3 gauge length** the initial test length, i.e. the distance between the grips or extensometer measuring points

## 4 Principle

A test specimen is stretched at a constant rate of extension until it ruptures. The tensile force and the corresponding change in length of the specimen is continuously recorded throughout the test.

## 5 Apparatus

**Tensile testing machine** equipped with a continuous recording of force and corresponding distance, capable of maintaining a uniform rate of grip separation as specified below. The tensile testing machine shall have a sufficient loading capacity (at least 2 000 N) and a grip separation speed of  $(100 \pm 10)$  mm per min. The width of grips shall not be less than 50 mm.

The tensile testing machine shall be provided with a type of grip which maintains or increases the gripping pressure as a function of the increase of the force applied to the specimen and capable of holding the test specimen in such a manner that slip relative to the grips is limited to a maximum of 1 mm for products up to 3 mm thick, and 2 mm for thicker products. The method of gripping shall not induce premature failure at or in the grips.

To prevent the slippage from the grips exceeding the stated limits, it will be permitted to use cooled grips. Alternatively the actual elongation of the test specimen can be measured with an extensometer.

The force measuring system shall meet at least class 2 in accordance with EN10002-2 (i.e.  $\pm 2$  %).

## 6 Sampling

Test samples shall be taken in accordance with the corresponding European Standard.

## 7 Preparation of test specimens

For a complete tensile test, two sets of test specimens are to be prepared: a set of five for the longitudinal direction and a set of five for the transverse direction.

Test specimens are to be cut at random from a test piece not closer than 100 mm from the edge of the sheet, with the aid of a template, or die cutter, to provide the rectangular test specimens measuring  $(50 \pm 0,5)$  mm wide by a length of at least  $(200 \text{ mm} + 2 \times \text{gripping length})$ , the longer direction being the test direction.

Any non-permanent surface layer should be removed.

The test specimens are to be conditioned for at least 20 h at  $(23 \pm 2)$  °C and relative humidity in the range 30 % to 70 % before testing.

## 8 Procedure

The test specimen is to be tightly clamped in the tensile test machine grips, taking care that the longitudinal axis of the test specimen and the axis of the testing machine and grips are correctly aligned. The clear distance between grips shall be  $(200 \pm 2)$  mm. Mark the test specimens in such a way that any slippage from the grips can be identified. Where an extensometer is used, this shall be set at a gauge length of  $(180 \pm 2)$  mm before the test. A preload of maximum 5 N before the start of the test is recommended to take out any slack in the test specimen.

The test shall be carried out at  $(23 \pm 2)$  °C with a constant speed of grip separation of  $(100 \pm 10)$  mm per minute.

The tensile force and the corresponding distance of separation of the grips (or extensometer) shall be recorded.

## 9 Expression of results, evaluation and precision of test method

### 9.1 Evaluation

Determine from the force and distance recorder, or from the data registered, the maximum force and the corresponding elongation calculated from the separation of the tensile testing machine grips (or extensometer) and expressed as a percentage of the original gauge length.

Disregard any test result where the test specimen breaks within 10 mm from the grips or when it slips by more than the permitted limit within the grips of the tensile testing machine, and retest with a replacement test specimen.

The maximum tensile force, expressed in N/50mm, and corresponding elongation in percent are noted, together with direction of the test specimen.

List the individual values of tensile force in and elongation in percent for the five test specimens, in each direction. Calculate the mean value.

The mean values of tensile force shall be rounded to the nearest 5 N and mean values of elongation shall be rounded to the nearest 1 %.

In the case of sheets with composite reinforcements which give rise to two or more distinct peaks on the force/elongation curve, the force and elongation of the two greatest peaks shall be recorded.

### 9.2 Precision of the test method

The precision of the test method is not specified

## 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 (EN 12311-1) and any deviation from it;
- c) information of sampling in accordance with clause 6;
- d) details of preparation of the test specimens in accordance with clause 7;
- e) the test results in accordance with 9.1;
- f) the date of the test.

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