BS EN 12316-2:2013

BSI Standards Publication

Flexible sheets for waterproofing — Determination of peel resistance of joints

Part 2: Plastic and rubber sheets for roof waterproofing

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National foreword

This British Standard is the UK implementation of EN 12316-2:2013. It supersedes BS EN 12316-2:2000 which is withdrawn.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.

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

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

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Flexible sheets for waterproofing - Determination of peel resistance of joints - Part 2: Plastic and rubber sheets for roof waterproofing

Feuilles souples d'étanchéité - Détermination de la résistance au pelage des joints - Partie 2 : Feuilles d'étanchéité de toiture plastiques et élastomères

Abdichtungsbahnen - Bestimmung des Schälwiderstandes der Fügenähte - Teil 2: Kunststoff- und Elastomerbahnen für Dachabdichtungen

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 12316-2:2013) 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of an identical text or by endorsement, at the latest by December 2013, and conflicting national standards shall be withdrawn at the latest by December 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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

This document supersedes EN 12316-2:2000.

This document has been technically and editorially revised to include the following:

— introduction of failure modes and how to handle results with different modes;

— estimation of precision.

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

Introduction

This European Standard is intended for characterisation of plastic and rubber sheets as manufactured or supplied before use. This test method relates 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 for plastic and rubber sheets for waterproofing.

1 Scope

This European Standard specifies a method for determining the resistance to peeling of joints between two adjacent sheets of the same plastic or rubber sheets for waterproofing.

This test method will be used mainly for testing the joints in mechanically fastened plastic or rubber sheets for waterproofing.

The peel strength characterises the optimum joint strength which can be reached for a membrane and a joint technique under laboratory conditions. On roofs the joint strength could be clearly reduced due to the non-optimal conditions (e.g. pressure, temperature, humidity, pollution, workmanship). The requirement for the joint technique at the site is to ensure a permanently tight joint.

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 ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/ compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1)*

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

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1
peel resistance
tensile force required to completely separate a prepared joint test specimen by peeling

4 Principle

The principle of the test is to pull a test specimen to peel a joint at a constant speed until it breaks. The tensile force is continuously recorded throughout the test.

5 Apparatus

Tensile testing machine equipped with a continuous recording of force and corresponding extension and capable of maintaining uniform speed of grip separation as specified below.

Tensile testing machine shall have a sufficient loading capacity and a grip separation speed of (100 ± 10) mm/min. The width of grips shall not be less than 50 mm.

The tensile testing machine shall be equipped with grips of a type which maintain or increase the clamping pressure as a function of the increase of the force applied to the test specimen. The test specimen shall be held so that it does not slip in the grips more than 2 mm.

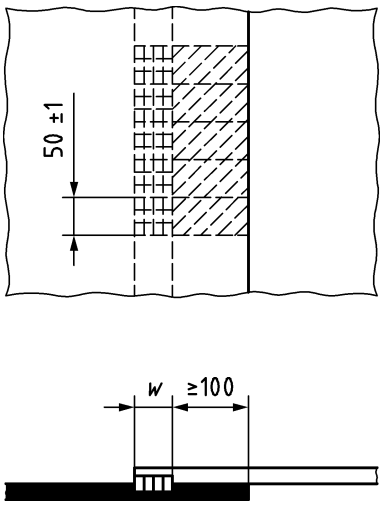
The method of gripping shall not induce premature rupture close to the grips.

The force measuring system shall meet at least Class 2 of EN ISO 7500-1 (i.e. ± 2%).

6 Sampling

Samples shall be taken in accordance with EN 13416.

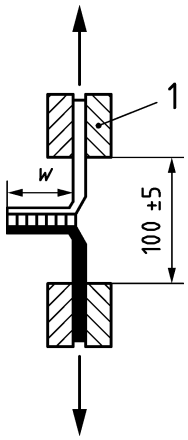
Dimensions in millimetres



Key
w width of joint

Figure 1 - Preparation of specimen from specially made side and end laps

Dimensions in millimetres



Key
1 grip
w width of joint

Figure 2 - Peel strength testing of side and end laps

7 Preparation of test pieces and test specimens

Test pieces of the sheet are joined by the method(s) to be used for installation as recommended by the manufacturer. After jointing, the test piece shall be conditioned for a minimum of 16 h at (23 ± 2) °C before testing unless the manufacturer recommends differently.

From each of these joint test pieces, five rectangular test specimens (50 ± 1) mm wide shall be cut, perpendicular to the joint (see Figure 1). They shall have such a length, that the ends of the specimen fill the grips and that the complete overlap can be tested perpendicular to joint (see Figure 2).

Rectangular joint test specimens shall be prepared representing all possibilities of jointing according to the way(s) to be used for installation.

The number of specimens tested is five per set.

8 Procedure

The test specimen shall be firmly held in the grips of the tensile testing machine, taking care that the longitudinal axis of the test specimen, the axis of the tensile testing machine and the grips are correctly aligned.

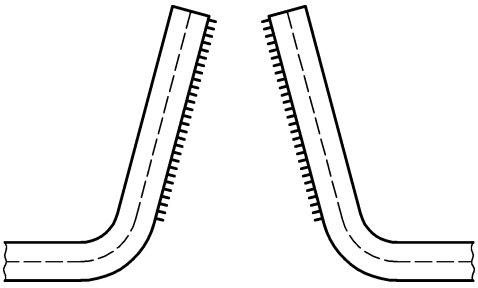
The clear distance between the grips shall be (100 ± 5) mm (see Figure 2). No preload will be applied.

The test is carried out on a test specimen at a temperature of (23 ± 2) °C and at a constant separating speed for the grips of (100 ± 10) mm/min.

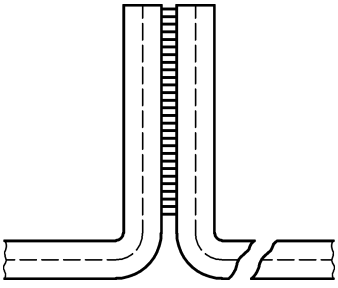
The applied force and extension shall be recorded continuously until the test specimen separates.

The mode of failure of the joint shall be recorded.

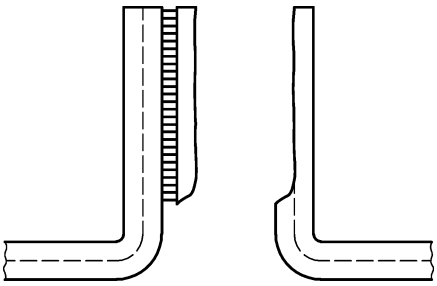
The modes of failure are classified in three classes A, B, C or combinations of them (see Figure 3).



A - Peeling of the joint



B - Break outside of the joint



C - Delamination of sheet. In this case the area of delamination has to be more than 5 % of the joint area.

Figure 3 – Mode of failure

9 Expression of results

9.1 Jointing information

State all relevant information on the formation and the conditioning of the joint.

9.2 Evaluation

9.2.1 General

A force extension graph shall be drawn up.

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

The mode of failure of each specimen has to be reported in accordance to Clause 8.

An average of all specimens can only be calculated if the failure mode is identical for all specimens. If different failure modes occur, only evaluation in accordance to the main failure mode has to be reported.

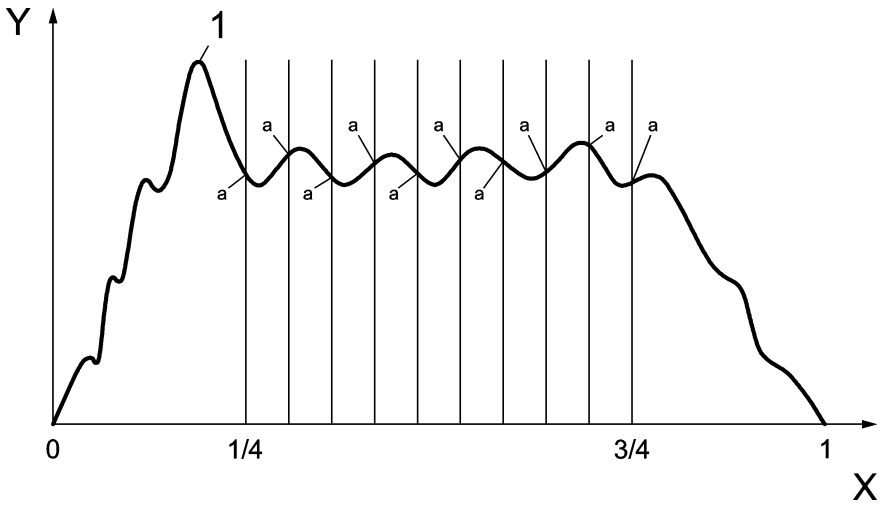
9.2.2 Maximum peel resistance

If a majority of the specimens do not show failure mode A (i.e. a majority of the specimens show either failure mode B or C or combination of both) and the maximum force detected is more than 100 N/50 mm, then the maximum peel resistance has to be evaluated. In this case, no value for the resistance should be reported. Only the classification “no failure of the joint” has to be reported. This is the best possible joint.

This evaluation applies if, for a majority of the specimens, “no failure of the joint” occurs.

9.2.3 Average peel resistance (relevant only if peel fully occurs)

If a majority of the specimens show failure mode A, then the average peel resistance has to be evaluated. At least the first and last quarter of the graph shall not be included when calculating the average peel resistance of the test specimen. An average value of the force is calculated on the remaining section by determination of ten equidistant values and is expressed as N/50 mm (see Figure 4).



Key
1 maximum peel force
a points to be evaluated
Y force axis
X extension axis

Figure 4 - Graph for calculating the peel resistance (example)

The purpose of the evaluation method specified here is to calculate an average peel resistance value, which corresponds to the mean value of the forces acting on the test specimen at certain specified times during testing. This method also permits an evaluation to be carried out if the graphs do not feature any distinctive peaks. This can occur when testing some bonded materials. It should be noted that the results could vary, depending on the direction in which the test specimens are taken.

9.3 Calculations

If a majority of the specimens show failure mode A then calculate the results for specimens with failure mode A, the peel resistance as the mean (using the maximum or average peel force as occurs for each specimen) expressed in N/50 mm. State the peel resistance to the nearest Newton with the corresponding standard deviation.

If the maximum peel resistance is evaluated, no calculation is needed.

9.4 Precision of the test method

As estimated by accredited laboratories the scattering due to the uncertainty in measurement based on a single value evaluation (force, width…) is about 10 %.

10 Test report

The test report shall include the following information:

a) reference to this European Standard (EN 12316-2) and any deviation from it;

b) all details necessary to identify the product tested;

c) information on sampling in accordance with Clause 6;

d) details of preparation of the test specimen in accordance with Clause 7;

e) test results in accordance with Clause 9 including the mode of failure for each specimen and either the average peel resistance or for maximum peel resistance the classification “no failure of the joint” has to be reported;

f) any peculiarities in the method employed or encountered during the test;

g) date of the test(s).

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