



BSI Standards Publication

Thermal insulating products for building applications — Determination of short term water absorption by partial immersion

National foreword

This British Standard is the UK implementation of EN 1609:2013. It supersedes BS EN 1609:1997 which is withdrawn.

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

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English Version

Thermal insulating products for building applications - Determination of short term water absorption by partial immersion

Produits isolants thermiques destinés aux applications du
bâtiment - Détermination de l'absorption d'eau à court
terme: essai par immersion partielle

Wärmedämmstoffe für das Bauwesen - Bestimmung der
Wasseraufnahme bei kurzzeitigem teilweisem Eintauchen

This European Standard was approved by CEN on 15 December 2012.

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Foreword

This document (EN 1609:2013) has been prepared by Technical Committee CEN/TC 88 “Thermal insulating materials and products”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.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 supersedes EN 1609:1996.

The revision of this standard contains no major changes, only minor corrections and clarifications of an editorial nature.

This European Standard is one of a series of standards which specify test methods for determining dimensions and properties of thermal insulating materials and products. It supports a series of product standards for thermal insulating materials and products which derive from the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products (Directive 89/106/EEC) through the consideration of the essential requirements.

This European Standard has been drafted for applications in building, but it may also be used in other areas where it is relevant.

This European test standard is one of the following group of interrelated standards on test methods for determining dimensions and properties of thermal insulation materials and products, all of which fall within the scope of CEN/TC 88:

- EN 822, *Thermal insulating products for building applications — Determination of length and width*
- EN 823, *Thermal insulating products for building applications — Determination of thickness*
- EN 824, *Thermal insulating products for building applications — Determination of squareness*
- EN 825, *Thermal insulating products for building applications — Determination of flatness*
- EN 826, *Thermal insulating products for building applications — Determination of compression behaviour*
- EN 1602, *Thermal insulating products for building applications — Determination of the apparent density*
- EN 1603, *Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity)*
- EN 1604, *Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions*
- EN 1605, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions*
- EN 1606, *Thermal insulating products for building applications — Determination of compressive creep*

- EN 1607, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*
- EN 1608, *Thermal insulating products for building applications — Determination of tensile strength parallel to faces*
- EN 1609, *Thermal insulating products for building applications — Determination of short-term water absorption by partial immersion*
- EN 12085, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*
- EN 12086, *Thermal insulating products for building applications — Determination of water vapour transmission properties*
- EN 12087, *Thermal insulating products for building applications — Determination of long-term water absorption by immersion*
- EN 12088, *Thermal insulating products for building applications — Determination of long-term water absorption by diffusion*
- EN 12089, *Thermal insulating products for building applications — Determination of bending behaviour*
- EN 12090, *Thermal insulating products for building applications — Determination of shear behaviour*
- EN 12091, *Thermal insulating products for building applications — Determination of freeze-thaw resistance*
- EN 12429, *Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions*
- EN 12430, *Thermal insulating products for building applications — Determination of behaviour under point load*
- EN 12431, *Thermal insulating products for building applications — Determination of thickness for floating floor insulating products*
- EN 13793, *Thermal insulating products for building applications — Determination of behaviour under cyclic loading*
- EN 13820, *Thermal insulating materials for building applications — Determination of organic content*

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.

1 Scope

This European Standard specifies the equipment and procedures for determining the short-term water absorption of test specimens by partial immersion. It is applicable to thermal insulating products.

NOTE It is intended to simulate the water absorption caused by a 24 h raining period during construction work.

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 12085, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

3 Terms and definitions

This European Standard contains no terms and definitions.

4 Principle

A test specimen is placed with its lower part in water, for a period of 24 h, and its change in mass is measured.

The excess water adhering to the surface but not absorbed by the test specimen is removed by drainage (method A) or taken into account by deduction of the initial water uptake (method B).

5 Apparatus

5.1 Balance, capable of determining the mass of a specimen to an accuracy of 0,1 g.

5.2 Water tank, with a device for keeping the water level constant to within ± 2 mm, and a device to keep the test specimen in position.

The device to keep the test specimen in position shall not cover more than 15 % of the cross-sectional area of the test specimen, which is exposed to water. An example is shown in Figure 1.

5.3 Tap water, adjusted to a temperature of (23 ± 5) °C. In case of dispute, deionised water shall be used.

5.4 Equipment for drainage. Examples are shown in Figures 2a) and 2b).

6 Test specimens

6.1 Dimensions of test specimens

The thickness of test specimens shall be the original product thickness.

The test specimens shall be prisms of square cross section having a side length of (200 ± 1) mm.

6.2 Number of test specimens

The number of test specimens shall be as specified in the relevant product standard. If the number is not specified, then at least four test specimens shall be used.

In the absence of a product standard or any other European Technical Specification, the number of test specimens may be agreed between parties.

6.3 Preparation of test specimens

The test specimens shall be cut so that they do not include product edges.

The test specimens shall be prepared by methods that do not change the original structure of the product. Any skins, facings and/or coatings shall be retained.

Special methods of preparation, when needed, are given in the relevant product standard or any other European Technical Specification.

6.4 Conditioning of test specimens

The test specimens shall be conditioned for at least 6 h at (23 ± 5) °C. In case of dispute, they shall be conditioned at (23 ± 2) °C and (50 ± 5) % relative humidity for the time stated in the relevant product standard.

7 Procedure

7.1 Test conditions

Testing shall be carried out at (23 ± 5) °C. In case of dispute, it shall be carried out at (23 ± 2) °C and (50 ± 5) % relative humidity.

7.2 Test procedure

7.2.1 General

The choice of the method (A or B) shall be as specified in the relevant product standard.

In the absence of a product standard or any other European Technical Specification, the method may be agreed between parties.

The dimensions of the test specimens shall be measured in accordance with EN 12085.

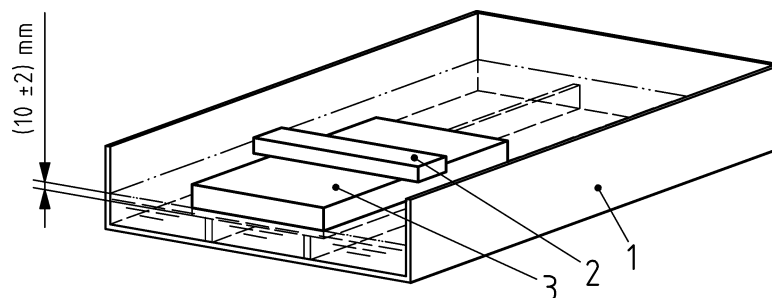
7.2.2 Method A (drainage)

Weigh the test specimen to the nearest 0,1 g to determine its initial mass, m_0 .

Testing shall be carried out with half the number of specimens with one larger face up and the other half with the same larger face down.

Place the test specimen in the empty water tank and apply a sufficient load to keep it partially immersed when water is added. Carefully add the water to the tank until the bottom face of the test specimen is (10 ± 2) mm below the surface of the water (see example in Figure 1). Ensure that the water level remains constant during the test.

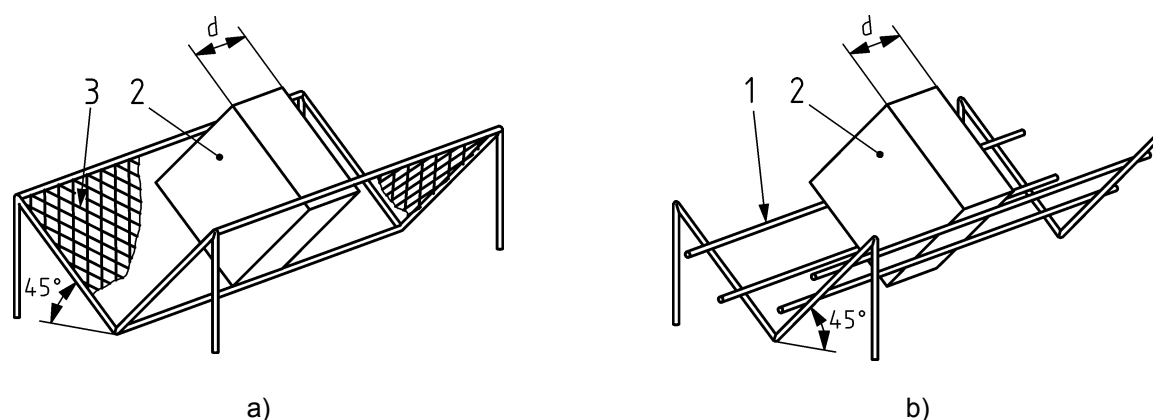
After $24 \text{ h} \pm 30 \text{ min}$, remove the test specimen; drain it for $(10 \pm 0,5) \text{ min}$ by placing it vertically on a mesh, inclined at 45° as shown in Figure 2a) or 2b). Then weigh the test specimen to determine its mass, m_{24} .



Key

- 1 water tank
- 2 load to keep the test specimen in position
- 3 test specimen

Figure 1 — Examples of partial immersion test device



Key

- 1 stainless steel mesh
- 2 test specimen
- 3 perforated stainless steel

Figure 2 — Examples of suitable equipment for drainage

7.2.3 Method B (deduction of initial water uptake)

Weigh the test specimen to an accuracy of 0,1 g to determine its initial mass, m_0 .

Testing shall be carried out with half the number of specimens with one larger face up and the other half with the same larger face down.

Place the test specimen in the water tank in such position that it is partially immersed in water with its bottom face $(10 \pm 2) \text{ mm}$ below the water level. Remove the test specimen after 10 s holding it horizontally and place it, within 5 s, in a plastic tray of known mass. Weigh this tray with the test specimen to determine the test specimen mass including the initial water uptake, m_1 .

Replace the test specimen in the water tank and apply a sufficient load to keep the test specimen partially immersed in water with its bottom face (10 ± 2) mm below the water level (see example in Figure 1). Ensure that the water level remains constant during the test.

After $24 \text{ h} \pm 30 \text{ min}$ remove the test specimen, holding it horizontally, and place it, within 5 s, in the plastic tray of known mass to determine its mass, m_{24} .

Method B is only applicable if the initial water uptake is less than or equal to $0,5 \text{ kg/m}^2$, where this is calculated using the following formula:

$$\frac{m_1 - m_0}{A_p} \quad (1)$$

where

m_1 is the mass of the test specimen including the initial water uptake (method B), in kilograms;

m_0 is the initial mass of the test specimen as determined by method A, in kilograms;

A_p is the bottom surface area of the test specimen, in square metres.

8 Calculation and expression of results

The test result shall be the mean value of the individual values. For products having dissimilar faces, two mean values shall be calculated.

Results should not be extrapolated to other thicknesses.

Calculate the short-term water absorption by partial immersion, W_p , in kilograms per square metre, using the following formulae:

Method A

$$W_p = \frac{m_{24} - m_0}{A_p} \quad (2)$$

Method B

$$W_p = \frac{m_{24} - m_1}{A_p} \quad (3)$$

where

m_0 is the initial mass of the test specimen as determined in method A, in kilograms;

m_1 is the mass of the test specimen including the initial water uptake in method B, in kilograms;

m_{24} is the mass of the test specimen after partial immersion for 24 h (method A and B), in kilograms;

A_p is the bottom surface area of the test specimen, in square metres.

W_p shall be given to the nearest $0,01 \text{ kg/m}^2$.

9 Accuracy of measurement

An interlaboratory test was performed with six to ten laboratories and three products were tested regarding test method A.

For the method B, six laboratories performed the test on one product.

The results were analysed according to ISO 5725-2.

The results from the test are given in Table 1:

Table 1 — Short term partial immersion

Test conditions	Water uptake (in kg/m ²)		
	Range of measured W_p	Estimate of reproducibility variance S_R	95 % reproducibility limit
Method A (drainage)	0,02 to 0,50	0,03	0,10
Method B (deduction of initial water uptake)	0,04 to 0,20	0,05	0,15

The above mentioned terms are applied as described in ISO 5725-2.

Repeatability has not been determined.

Bias cannot be determined in this test method as there is not any accepted reference material for it.

NOTE The choice of products was selected to get a wide range of water uptake.

10 Test report

The test report shall include the following information:

- a) reference to this European Standard;
- b) product identification:
 - 1) product name, factory, manufacturer, or supplier;
 - 2) production code number;
 - 3) type of product;
 - 4) packaging;
 - 5) the form in which the product arrived at the laboratory;
 - 6) other information as appropriate (e.g. nominal dimensions, nominal density);
- c) test procedure:
 - 1) pre-test history and sampling (e.g. who sampled and, place of sampling);

- 2) conditioning;
 - 3) dimensions of the test specimens;
 - 4) deviations from Clauses 6 and 7, if any;
 - 5) date of testing;
 - 6) general information relating to the test including a reference to the method used (A or B) and, if relevant, the initial water uptake;
 - 7) any events which may have affected the results. Information about the apparatus and identity of the person responsible for the test should be available in the laboratory, but it need not be recorded in the report;
- d) results: all individual values and the mean value.

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