

BS EN 12088:2013



BSI Standards Publication

Thermal insulating products for building applications — Determination of long term water absorption by diffusion

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee B/540, Energy performance of materials components and buildings.

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

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Published by BSI Standards Limited 2013

ISBN 978 0 580 78047 9

ICS 91.100.60

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 April 2013.

Amendments issued since publication

Amd. No.	Date	Text affected
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EUROPEAN STANDARD

EN 12088

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2013

ICS 91.100.60

Supersedes EN 12088:1997

English Version

Thermal insulating products for building applications - Determination of long term water absorption by diffusion

Produits isolants thermiques destinés aux applications du
bâtiment - Détermination de l'absorption d'eau à long terme
- Essai par diffusion

Wärmedämmstoffe für das Bauwesen - Bestimmung der
Wasseraufnahme durch Diffusion

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

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Foreword

This document (EN 12088:2013) 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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.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 12088:1997.

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 buildings but it may also be used in other areas where it is relevant.

This European test standard is one of the following group of inter-related 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, 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 long-term water absorption of test specimens by diffusion. It is applicable to thermal insulating products. It is intended to simulate the water absorption of products subjected to high relative humidities, approximating to 100 %, on both sides and subjected to a water vapour pressure gradient for a long period of time e.g. inverted roof or unprotected ground insulation.

The test is not applicable for all types of thermal insulating products. The product standard should state for which of its products, if any, this test is applicable.

NOTE For unprotected ground insulation, the temperature of 50 °C might be replaced by a lower temperature, when more data is available.

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*

3 Terms and definitions

This European Standard contains no terms and definitions.

4 Principle

The long-term water absorption by diffusion is determined by measuring the increase in the mass of a test specimen subjected to a water vapour pressure difference and temperature gradient for a period of 28 days.

5 Apparatus

5.1 Balance, which allows the determination of the mass of a test specimen to 0,1 g.

5.2 Corrosion resistant container, with a frame supporting the test specimens.

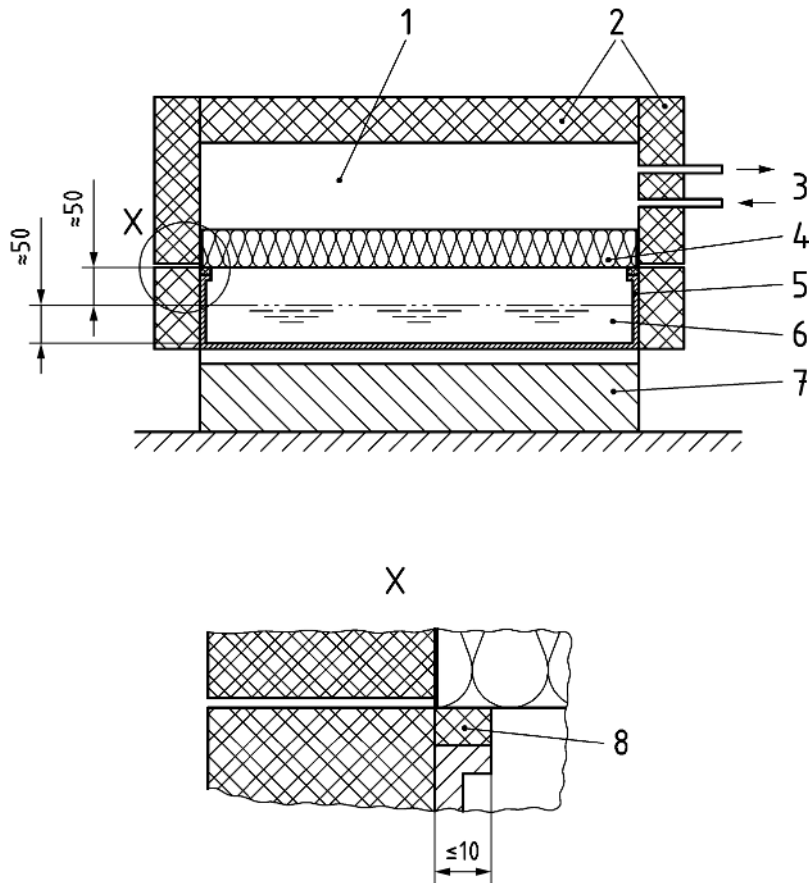
5.3 Heating device, with a thermostat, which provides water temperature control to (50 ± 1) °C.

5.4 Cooling plate, thermally insulated on the outside, operating at a temperature of $(1 \pm 0,5)$ °C.

5.5 Tap water, adjusted to a temperature of (50 ± 1) °C.

The principle of the apparatus assembly is illustrated in Figure 1.

Dimensions in millimetres



Key

- 1 cooling plate
- 2 thermal insulation of the cooling plate and the container
- 3 cooling medium inlet and outlet
- 4 test specimen
- 5 corrosion resistant container with a frame supporting the test specimen
- 6 tap water
- 7 heating device with a thermostat
- 8 sealing

Figure 1 — Example of test device for water absorption by diffusion

6 Test specimens

6.1 Dimensions of test specimens

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

The test specimens shall be squares with squarely cut edges having sides of (500 ± 1) mm. If the product is not large enough to permit this size of test specimen, the test specimen size shall be reduced accordingly. Test specimens shall contain no joints.

6.2 Number of test specimens

The number of test specimens shall be at least two.

6.3 Preparation of test specimens

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

Test specimens shall be prepared by methods that do not substantially change the original structure of the product. Any facings, skins 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 stored for at least 6 h at $(23 \pm 5) ^\circ\text{C}$. In case of dispute, they shall be stored at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity for the time stated in the relevant product standard with a minimum of 6 h.

7 Procedure - Test procedure

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

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

Place the test specimen on the frame of the container. If the product is faced on one side, begin the test with the facing upwards. Seal the bottom edge of the test specimen to the container. The width of the sealing shall be ≤ 10 mm (see Figure 1). Place the insulated cooling plate on the top of the test specimen.

Subject the test specimen to a temperature and a water vapour pressure difference for 28 days by maintaining the water at a temperature of $(50 \pm 1) ^\circ\text{C}$ and the cooling on the other side at a temperature of $(1 \pm 0,5) ^\circ\text{C}$.

Turn the test specimen over every 7 days.

After 28 days remove the test specimen and wipe off any surface water. Weigh the test specimen again to determine its mass, m_D .

8 Calculation and expression of results

The test result, W_{dp} or W_{dv} , shall be the mean value of the individual values.

Results shall not be extrapolated to other thicknesses.

Calculate the long term water absorption by diffusion for each test specimen, W_{dp} or W_{dv} , in kilograms per square metre or volume percent using Formula (1) or (2):

$$W_{dp} = \frac{m_D - m_0}{A_p} \quad (1)$$

$$W_{dv} = \frac{m_D - m_0}{A_p \times d} \times \frac{100}{\rho_W} \quad (2)$$

where

m_0 is the initial mass of the test specimen, in kilograms;

m_D is the mass of the test specimen after submission to water absorption by diffusion for 28 days, in kilograms;

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

d is the thickness of the test specimen, in metres;

ρ_W is the density of water, assumed to be 1 000 kg/m³.

W_{dp} shall be rounded to the nearest 0,01 kg/m².

W_{dv} shall be rounded to the nearest 0,1 volume percent.

9 Accuracy of measurement

NOTE It has not been possible to include a statement on the accuracy of measurement in this edition of the standard, but it is intended to include such a statement when the standard is next revised.

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 thickness, nominal density;
- c) test procedure:
 - 1) pre-test history and sampling (e.g. who sampled and place of sampling);
 - 2) conditioning;
 - 3) deviation from Clauses 6 and 7, if any;
 - 4) date of testing;
 - 5) general information relating to the test;
 - 6) events which may have affected the results. Information about the apparatus and identity of the technician 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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