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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 par immersion partielle

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 29767 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*.

Introduction

This International Standard comprises the original EN 1609:1996, EN 1609:1996/AC:1997 and its Amendment 1:2006 prepared by Technical Committee CEN/TC 88, *Thermal insulating materials and products*, which have been amended by ISO/TC 163/SC 1 with reference to conditioning and testing conditions in tropical countries.

This International Standard is one of a series of documents specifying test methods, based on existing European Standards, that are being adopted by ISO. This "package" of standards includes the following group of interrelated documents.

International Standard	Respective EN standard
ISO 29465, *Thermal insulating products for building applications — Determination of length and width*	EN 822
ISO 29466, *Thermal insulating products for building applications — Determination of thickness*	EN 823
ISO 29467, *Thermal insulating products for building applications — Determination of squareness*	EN 824
ISO 29468, *Thermal insulating products for building applications — Determination of flatness*	EN 825
ISO 29469, *Thermal insulating products for building applications — Determination of compression behaviour*	EN 826
ISO 29470, *Thermal insulating products for building applications — Determination of the apparent density*	EN 1602
ISO 29471, *Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity)*	EN 1603
ISO 29472, *Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions*	EN 1604
ISO 29764, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions*	EN 1605
ISO 29765, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*	EN 1607
ISO 29766, *Thermal insulating products for building applications — Determination of tensile strength parallel to faces*	EN 1608
ISO 29767, *Thermal insulating products for building applications — Determination of short-term water absorption by partial immersion*	EN 1609

ISO 29768, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*	EN 12085
ISO 29769, *Thermal insulating products for building applications — Determination of behaviour under point load*	EN 12430
ISO 29770, *Thermal insulating products for building applications — Determination of thickness for floating-floor insulating products*	EN 12431
ISO 29771, *Thermal insulating materials for building applications — Determination of organic content*	EN 13820
ISO 29803, *Thermal insulation products for building applications — Determination of the resistance to impact of external thermal insulation composite systems (ETICS)*	EN 13497
ISO 29804, *Thermal insulation products for building applications — Determination of the tensile bond strength of the adhesive and of the base coat to the thermal insulation material*	EN 13494
ISO 29805, *Thermal insulation products for building applications — Determination of the mechanical properties of glass fibre meshes*	EN 13496

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

1 Scope

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

NOTE The procedure specified by this International Standard is intended to simulate the water absorption caused by a 24 h raining period during construction work.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 29768, *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 Principle

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

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

4 Apparatus

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

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

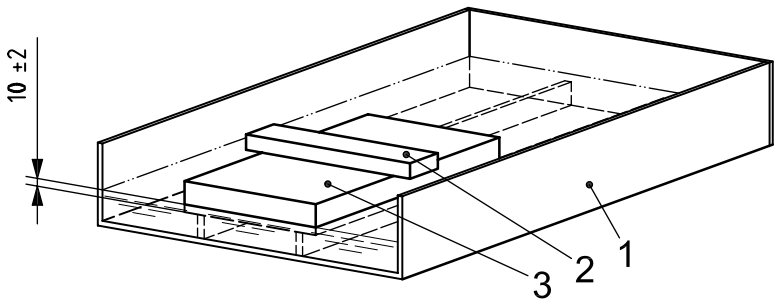
The device to keep the specimen in position shall not cover more than 15 % of the cross-sectional area of the specimen that is exposed to water. An example is shown in Figure 1.

4.3 **Tap water**, adjusted to a temperature of (23 ± 5) °C.

4.4 Equipment for drainage.

See examples shown in Figure 2.

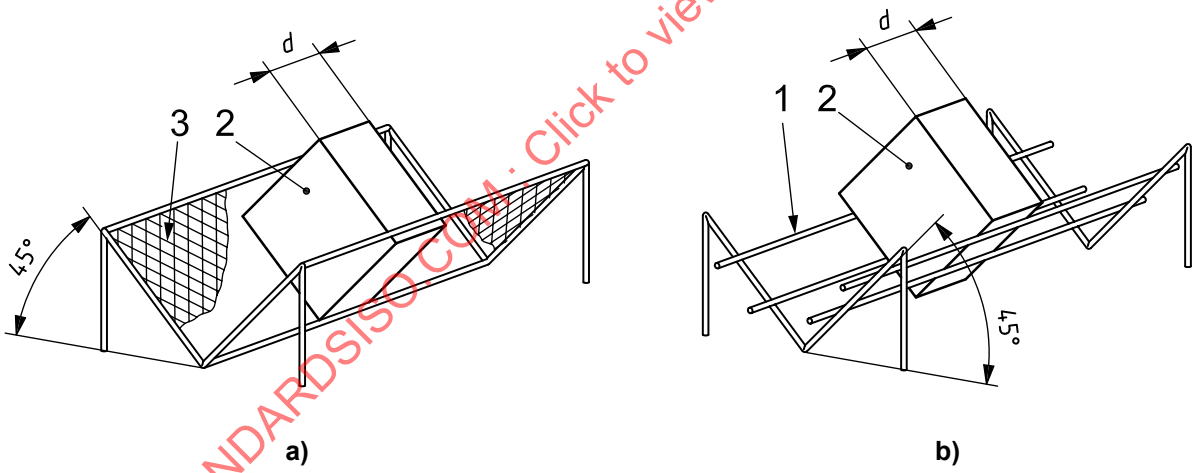
Dimensions in millimetres



Key

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

Figure 1 — Example of a partial-immersion test device



Key

1 stainless steel mesh
2 test specimen
3 perforated stainless steel

Figure 2 — Examples of equipment suitable for drainage

5 Test specimens

5.1 Dimensions of test specimens

The thickness of specimens shall be equal to the original product thickness.

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

5.2 Number of test specimens

The number of specimens shall be as specified in the relevant product standard. If the number is not specified, then at least four specimens shall be used. In the absence of a product standard or any other international or European technical specification, the number of specimens may be agreed between parties.

5.3 Preparation of test specimens

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

The 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.

NOTE Special methods of preparation, when needed, are given in the relevant product standard or any other international or European technical specification.

5.4 Conditioning of test specimens

The 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.

In tropical countries, different conditioning and testing conditions can be relevant. In this case, the conditions shall be 27 °C and 65 % RH and be stated clearly in the test report.

6 Procedure

6.1 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.

In tropical countries, different conditioning and testing conditions can be relevant. In this case, the conditions shall be 27 °C and 65 % RH and be stated clearly in the test report.

6.2 Test procedure

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 international or European technical specification, the method may be agreed between parties.

The dimensions of the specimens shall be measured in accordance with ISO 29768.

6.2.1 Method A — Drainage

Weigh the 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 one larger face down.

Place the 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 specimen is (10 ± 2) mm below the surface of the water (see Figure 1). Ensure that the water level remains constant during the test.

After 24 h, remove the specimen and drain it for (10 ± 0,5) min by placing it vertically on a mesh, inclined at 45° as shown in Figure 2. Then weigh the specimen to determine its mass and record as m_{24}.

6.2.2 Method B — Deduction of initial water uptake

Weigh the 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 one larger face down.

Place the specimen in the water tank so that it is partially immersed in water with its bottom face (10 ± 2) mm below the water level. Remove the specimen after 10 s holding it horizontally and then place it, within 5 s, in a plastic tray of known mass. Weigh this tray with the specimen to determine the specimen mass including the initial water uptake and record as m_1.

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

After 24 h, remove the specimen, holding it horizontally, and place it, within 5 s, in a plastic tray of known mass to determine its mass; record as m_{24}.

Method B is applicable only if the initial water uptake, W_u, calculated from Equation (1), is less than or equal to 0,5 kg/m^2:

$$W_u = \frac{m_1 - m_0}{A_p} \tag{1}$$

where

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

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

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

7 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, expressed in kilograms per square metre to the nearest 0,01 kg/m^2, using Equation (2) for method A and Equation (3) for method B:

$$W_p = \frac{m_{24} - m_0}{A_p} \tag{2}$$

$$W_p = \frac{m_{24} - m_1}{A_p} \tag{3}$$

where

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

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

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

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

8 Accuracy of measurement

An inter-laboratory test was conducted with 6 to 10 laboratories testing three products by method A. Six laboratories tested one product by method B.

The results were analysed and the terms applied in accordance with ISO 5725-2. The reproducibility results are given in Table 1; repeatability was not determined.

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

Table 1 — Reproducibility for short-term partial immersion water-uptake measurements

Test conditions	Water uptake 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