
Toplotnoizolacijski proizvodi za uporabo v gradbeništvu – Doseganje ravnotežne vlažnosti pri predpisani temperaturi in relativni vlažnosti zraka

Thermal insulating products for building applications - Conditioning to moisture equilibrium under specified temperature and humidity conditions

Wärmedämmstoffe für das Bauwesen - Einstellen der Ausgleichsfeuchte bei definierten Temperatur- und Feuchtebedingungen

Produits isolants thermiques destinés aux applications du bâtiment - Conditionnement jusqu'à l'équilibre hygroscopique dans des conditions de température et d'humidité spécifiées

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Materiali za toplotno in
zvočno izolacijo

Thermal and sound insulating
materials

SIST EN 12429:1999

en

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Thermal insulating products for building applications -
Conditioning to moisture equilibrium under specified temperature
and humidity conditions

Produits isolants thermiques destinés aux applications du
bâtiment - Conditionnement jusqu'à l'équilibre
hygroscopique dans des conditions de température et
d'humidité spécifiées

Wärmedämmstoffe für das Bauwesen - Einstellen der
Ausgleichsfeuchte bei definierten Temperatur- und
Feuchtebedingungen

This European Standard was approved by CEN on 25 June 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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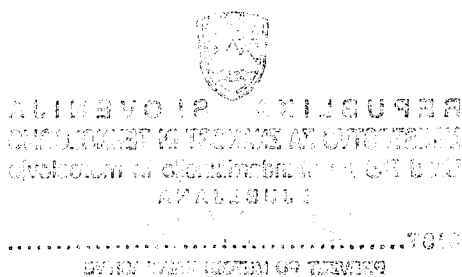
EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard 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 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 contains the following normative annex:

Annex A - Determination of limiting value of moisture content change and conditioning time factor by experiment

and two informative annexes:

Annex B - Computer calculations to determine the limiting value of moisture content change

Annex C - Calculations of conditioning time to reach equilibrium using the Fourier number

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 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 1998, and conflicting national standards shall be withdrawn at the latest by December 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies equipment and procedures to condition a thermal insulating product to equilibrium moisture content at $(23 \pm 2)^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity.

The standard is also applicable to thermal insulating products with moulded skins but is not normally relevant for faced products or for products with other surface treatments.

NOTE 1: The normally specified moisture content is the result of the equilibrium between the atmosphere and the product at $(23 \pm 2)^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity. The standard may also be used if a product has to be conditioned to other relative humidities.

NOTE 2: The moisture equilibrium may - due to hysteresis effects - differ depending on whether the equilibrium has been reached by absorption or by desorption. In addition perfect equilibrium may require a very long time to be reached. Therefore it is necessary to accept equilibrium within a certain accuracy.

NOTE 3: For products which do not absorb moisture, conditioning is not needed. It should nevertheless be ensured that there is no water on the surface before testing.

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 these publications apply to this draft European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- <https://standards.iteh.ai/catalog/standards/sist/148fc77f-ea09-4f12-96dd-e57d74652388/sist-en-12429-1999>
- EN 12085 Thermal insulating products for building applications - Determination of linear dimensions of test specimens
- prEN ISO 12571 Building materials - Determination of hygroscopic sorption curves (ISO/DIS 12571:1996)

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this standard, the following definitions apply:

3.1.1 atmosphere 23/50: A controlled atmosphere at a temperature of $(23 \pm 2)^\circ\text{C}$ and a relative humidity of $(50 \pm 5) \%$.

3.1.2 hygroscopic range: Moisture content in equilibrium with 98 % relative humidity or lower.

3.1.3 equivalent time, Δt_e : d^2 hours, where d is the numerical value of the test specimen thickness in centimetres.

3.1.4 limiting value of moisture content change, Δw_1 : The change in moisture content during a specified period of equivalent time, Δt_e , at the upper limit of the hygroscopic range.

3.1.5 conditioning time factor, γ : The factor by which the equivalent time, Δt_e , has to be multiplied to determine the required conditioning period in the hygroscopic range.

3.2 Abbreviations

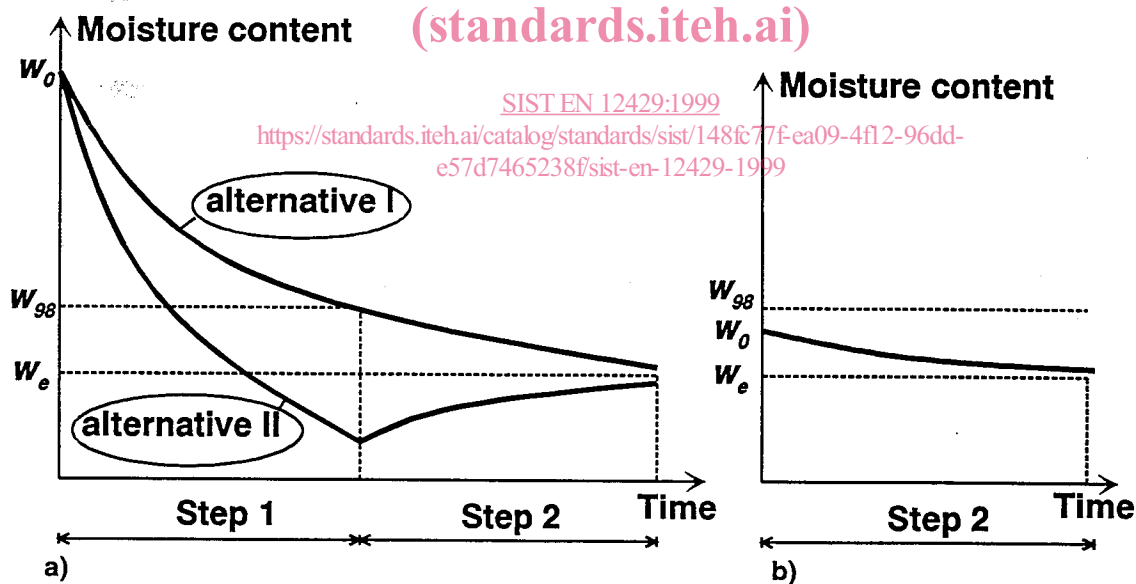
EPS expanded polystyrene
ICB insulation cork board
MW mineral wool
PUR polyurethane foam
XPS extruded polystyrene foam

4 Principle

The conditioning is carried out using one or two steps, see figure 1:

Step 1 is conditioning the test specimen to a moisture content within the hygroscopic range. This conditioning may take place in an atmosphere 23/50 or in a ventilated oven. The choice of condition depends on the type of material. Alternative I shows drying in atmosphere 23/50 and alternative II drying in a heated oven.

Step 2 is conditioning the test specimen to equilibrium with an atmosphere 23/50, after the moisture content has reached the hygroscopic range.



w_0 is the initial moisture content

w_{98} is the moisture content at upper limit of hygroscopic range

w_e is the moisture content in equilibrium with atmosphere 23/50

Figure 1: Moisture content versus time during step 1 and step 2

5 Apparatus

5.1 Temperature and humidity controlled chamber, capable of maintaining the atmosphere 23/50.

5.2 Temperature controlled ventilated oven, that takes the air from an environment of 23/50. The oven shall be capable of maintaining a temperature of $(40 \pm 5)^\circ\text{C}$ or $(70 \pm 5)^\circ\text{C}$ or $(105 \pm 5)^\circ\text{C}$ as specified in the relevant product standard or any other European technical specification.

5.3 Measuring instruments, capable of measuring the linear dimensions of test specimens in accordance with EN 12085, with an accuracy of 1 %.

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 squarely cut and square having sides 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 three test specimens shall be conditioned.

NOTE: 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 are representative of the full size product. Any surface skins, facings and/or coatings shall be retained.

6.4 Preconditioning of test specimens

If the procedure shown in figure 1a is used ensure that the test specimens have a moisture content well above the hygroscopic range. If in this case the hygroscopic sorption curve for the product is not known, it shall be determined in accordance with prEN ISO 12571.

NOTE: To increase the moisture content to above the hygroscopic range it may be necessary to immerse the test specimens in water, expose them to the exterior climate or expose them to water vapour in accordance with EN 12088 Thermal insulating products for building applications - Determination of long term water absorption by diffusion.

7 Procedure

7.1 General

Determine the linear dimensions in accordance with EN 12085 with an accuracy of 1 %. Calculate the volume, V , of each test specimen.

The conditioning is carried out using either of the alternative procedures shown in figure 1a (steps 1 and 2) or the procedure shown in figure 1b (step 2 alone).

The test specimens shall be installed in the chamber or ventilated oven such that substantially free air circulation occurs around them.

In some cases, the moisture content will be within the hygroscopic range before the conditioning starts. In this case step 1 shall be omitted and only step 2 in accordance with figure 1b shall be followed.

7.2 Conditioning step 1

Place the test specimens in an atmosphere 23/50, or in a ventilated oven at an elevated temperature. The temperature shall be as specified in the relevant product.

NOTE 1: In the absence of a product standard or any other European technical specification the temperature may be agreed between parties.

At preselected intervals of time, depending on the product tested and the atmosphere used, remove and weigh the test specimens to determine any mass changes. Continue until the change in moisture content is less than the limiting value, i.e.

$$\Delta w < \Delta w_1$$

where:

Δw is the change in moisture content during a period of d^2 hours (d being the numerical value of the test specimen thickness in centimetres), in kilogrammes per cubic metre;

Δw_1 is the appropriate limiting value of moisture content change, determined in accordance with annex A, in kilogrammes per cubic metre.

NOTE 2: the limiting value of moisture content change may be determined following the procedures in annex B.

A suitable time interval is normally 24 h. Constant mass is considered to have been established when the change in the mass of the test specimen over a 24 h period is less than 0,05 % of the total mass.

NOTE 3: For products with a thickness greater than 10 cm, extra drying out time may be required. The acceptable rate of drying is inversely proportional to the square of the thickness, i.e. a 20 cm product would require a change in mass less than 0,013 % per 24 h.

NOTE 4: A temperature as high as possible is desirable because this will minimize the conditioning period, but the temperature should not be so high as to cause changes in the material properties.