



SLOVENSKI STANDARD

SIST EN 12086:1999

01-september-1999

Toplotnoizolacijski proizvodi za uporabo v gradbeništvu – Določanje lastnosti pri prehodu zračne pare

Thermal insulating products for building applications - Determination of water vapour transmission properties

Wärmedämmstoffe für das Bauwesen - Bestimmung der Wasserdampfdurchlässigkeit

Produits isolants thermiques destinés aux applications du bâtiment - Détermination des propriétés de transmission de la vapeur d'eau

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ICS:

91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials
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EUROPEAN STANDARD

EN 12086

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 1997

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Descriptors: buildings, thermal insulation, thermal insulating materials, tests, determination, vapour transmission, water vapour, permeability, test conditions, procedure, computation

English version

**Thermal insulating products for building
applications - Determination of water vapour
transmission properties**

Produits isolants thermiques destinés aux
applications du bâtiment - Détermination des
propriétés de transmission de la vapeur d'eau

Wärmedämmstoffe für das Bauwesen - Bestimmung
der Wasserdampfdurchlässigkeit

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This European Standard was approved by CEN on 1997-04-26. 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.

The European Standards exist 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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword	3
1 Scope	5
2 Normative references	5
3 Definitions	5
4 Principle	6
5 Apparatus	6
6 Test specimens	7
7 Procedure	8
8 Calculation and expression of results	9
9 Accuracy of measurement	12
10 Test report	12
Annex A (informative) Conversion table for water vapour transmission units	13
Annex B (informative) Examples of test assemblies	14
Annex C (informative) Information about correction procedures	15

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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 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.

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 informative Annexes:

Annex A - Conversion table for water vapour transmission units

Annex B - Examples of test assemblies

Annex C - Information about correction procedures

This European Standard has been drafted for applications in buildings but it may also be used in other areas where it is relevant. **(standards.iteh.ai)**

In pursuance of Resolution BT 20/1993 Revised, CEN/TC 88 have proposed defining the standards listed below as a European "package" of standards, setting December 31, 1997 as the date of withdrawal (dow) of national standards which conflict with the European Standards of this package.

The "package" of standards comprises the following group of inter-related standards on test methods for determining dimensions and properties of thermal insulation materials and products, all of which come 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

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 the equipment and procedures for determining the water vapour transmission rate, water vapour permeance and water vapour permeability of test specimens in the steady state under different sets of specified test conditions. It is applicable to thermal insulating products.

It is intended to be used for homogeneous materials (see note 1) and for products which may contain integral skins or facings of different material(s).

NOTE 1: A material is considered to be homogeneous, with regard to mass distribution, if its density is approximately the same throughout, i.e. if the measured density values are close to its mean density.

NOTE 2: This test method is not normally used for determining the water vapour transmission properties of single, separate vapour barriers (of high diffusion resistance), such as prefabricated films, foils, membranes or sheets, due to the long duration of the test.

For products with a vapour retarder or barrier with a water vapour diffusion equivalent air layer thickness $s_d \geq 1000$ m (see 3.6) other test methods e.g. IR-detection can be used for measuring the single separate vapour retarder or barrier, provided that the results obtained are in the same range as the values measured in accordance with this standard.

The water vapour transmission rate and permeance values are specific to the test specimen (i.e. the product) thickness tested. For homogeneous products, the water vapour permeability is a property of the material.

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

EN 12085 Thermal insulating products for building applications - Determination of linear dimensions of test specimens

3 Definitions

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

3.1 water vapour transmission rate, g : The quantity of water vapour transmitted through unit area in unit time under specified conditions of temperature, humidity and thickness.

3.2 water vapour permeance, W : The quotient of the water vapour transmission rate of the test specimen and the water vapour pressure difference between the two specimen faces during the test.

3.3 water vapour resistance, Z : The inverse of water vapour permeance.

3.4 water vapour permeability, δ : The product of the permeance and the thickness of the test specimen. The water vapour permeability of a homogeneous product is a property of the material. It is the quantity of water vapour transmitted per unit of time through a unit area of the product per unit of vapour pressure difference between its faces for a unit thickness.

3.5 water vapour diffusion resistance factor, μ : The quotient of the water vapour permeability of air and the water vapour permeability of the material or the homogeneous product concerned. It indicates the relative magnitude of the water vapour resistance of the product and that of an equally thick layer of stationary air at the same temperature.

3.6 water vapour diffusion equivalent air layer thickness, s_d : The thickness of a motionless air layer which has the same water vapour resistance as the test specimen with the thickness d .

NOTE: A conversion table and units for the above definitions are given in annex A.

4 Principle

The test specimen is sealed to the open side of a test dish containing a desiccant or an aqueous saturated salt solution. The assembly is then placed in a test atmosphere whose temperature and humidity are controlled. Because of the difference between the partial water vapour pressures in the test assembly and in the test atmosphere water vapour flows through the test specimen. Periodic weighings of the assembly are made to determine the rate of water vapour transmission when the steady state is reached.

5 Apparatus

5.1 Test dishes, preferably of circular shape and which are (corrosion) resistant to any desiccant or to the salt solution which they may be required to contain and impermeable to water or water vapour. These dishes are typically made of glass or metal. The size of the dishes depends on the size of the test specimen to be tested. The difference in size between the upper exposed area (A_1) and the lower exposed area (A_2) of the test specimen shall be less than 3 % (see examples in annex B).

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NOTE: Some types of test dish are unsuitable for use with certain materials. This should be stated in the relevant product standard or any other European technical specification.

5.2 Measuring instruments, capable of determining linear dimensions in accordance with EN 12085.

5.3 Template (with edge tapered to facilitate removal after use) with a shape and size corresponding to that of the test dish to duplicate the exposed area of the specimen. The template shall have an area that is at least 90 % of the test specimen's surface in order to limit the edge effect due to non-linear vapour flow (see annex C).

5.4 Analytical balance, capable of weighing the test assembly to an accuracy of ± 1 mg or better. If larger test assemblies are used, the weighing accuracy may be determined with respect to the total weight and the required accuracy of the test results.

5.5 Chamber, capable of being maintained within ± 3 % of the required relative humidity and within ± 1 °C of the required temperature.

NOTE: In order to maintain the required conditions throughout the chamber it may be necessary to use air circulation with an air speed of between 0,02 to 0,3 m/s.

If a non-injection type humidity chamber is used, saturated salt solutions may then be used.

5.6 Sealant, unaffected by test conditions. The following are examples of suitable sealants:

5.6.1 A mixture of 90 % micro crystalline wax and 10 % of plasticizer (e.g. low molecular weight polyisobutylene)

5.6.2 60 % micro crystalline wax with 40 % refined crystalline paraffin.

6 Test specimens

6.1 Dimensions of test specimens

6.1.1 Shape and fit

The test specimens shall be representative of the product and shall include any natural surface skins or facings of different material(s).

If it is intended to measure the permeability of the core material, all skins and facings shall be removed and the test specimens shall have a thickness of at least 20 mm.

NOTE: For faced and/or coated products with a water vapour diffusion resistance index $\mu \leq 3$, for the core material, the permeability may be determined from measurements made on the facing/coating itself, after separation from the product.

The test specimens shall be cut to correspond to the dimensions of the chosen test assembly (see examples in annex B).

6.1.2 Thickness of test specimens

The thickness of the test specimen shall be the thickness of the product. If this exceeds 100 mm, the specimen thickness may be reduced by cutting.

6.1.3 Exposed area

The exposed area A of the test specimen (arithmetic mean of the upper and lower exposed areas) shall be at least 50 cm². The diameter of circular test specimens or the equivalent diameter of rectangular test specimens (calculated from the area) shall be at least twice the test specimen thickness.

6.2 Number of test specimens

A minimum of five test specimens shall be tested. If the test specimen area is > 500 cm², a minimum of three test specimens shall be tested.

If the test specimens have been cut, all pieces shall be tested.

If the product to be tested is suspected of being anisotropic, the test specimens shall be cut such that the parallel faces are normal to the direction of vapour flow of the product in its application.

If the product is faced with natural skins or adhered facing which are different for the two sides, the test specimens shall be tested with the vapour flow in the same direction as that in the intended use. If the direction of intended use relative to the facings is not known, a duplicate set of test specimens shall be prepared so that tests can be made and reported for each direction of vapour flow.

6.3 Conditioning of test specimens

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