SLOVENSKI STANDARD
SIST EN 14706:2006

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Toplotnoizolacijski proizvodi za opremo stavb in industrijske inštalacije – Ugotavljanje najvišje temperature servisiranja

Thermal insulating products for building equipment and industrial installations - Determination of maximum service temperature

Wärmedämmstoffe für die Haustechnik und für betriebstechnische Anlagen - Bestimmung der oberen Anwendungsgrenztemperatur

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Détermination de la température maximale de service

Ta slovenski standard je istoveten z: **EN 14706:2005**

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Thermal insulation products for building equipment and industrial installations - Determination of maximum service temperature

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles - Détermination de la température maximale de service

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This European Standard was approved by CEN on 27 October 2005.

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.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Foreword

This European Standard (EN 14706:2005) 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 June 2006, and conflicting national standards shall be withdrawn at the latest by June 2006.

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 standard contains the following 4 normative annexes:

— Annex A — Modifications of and additions to the general test method for mineral wool products

— Annex B — Modifications of and additions to the general test method for cellular glass products

— Annex C — Modifications of and additions to the general test method for phenolic foam products

— Annex D — Modifications of and additions to the general test method for polyethylene foam and flexible elastomeric foam products

This European Standard has been prepared for products used to insulate building equipment and industrial installations, but it may also be applied to products used in other areas.

A similar standard is available for testing of preformed pipe insulation EN 14707 *Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature for preformed pipe insulation.*

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

1 Scope

This European Standard specifies the equipment and procedures for determining the maximum service temperature of flat insulation products. It is applicable to thermal insulating products.

2 Normative references

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

EN 823, *Thermal insulating products for building applications — Determination of thickness*.

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

EN 12429, Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions.

ISO 7884-1, *Glass — Viscosity and viscometric fixed points — Part 1: Principles for determining viscosity and viscometric fixed points*.

ISO 7884-7, *Glass — Viscosity and viscometric fixed points — Part 7: Determination of annealing point and strain by beam bending*.

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1
Maximum service temperature
highest temperature to which a thermal insulation product may be exposed at a given thickness and at which it will continue to function within specified limits of performance

[prEN ISO 9229]

NOTE 1 The required performance may be in the areas of dimensional stability, thermal properties, and mechanical properties as well as changes in appearance and resistance against creation of hazards such as internal self heating (see Annexes A and C and possible requirements in the relevant product standard).

NOTE 2 In the present test procedure, which is used as a reference, the test specimen is exposed to a temperature difference going from ambient to the maximum service temperature. This may not reflect the actual application conditions when products are exposed to different temperatures on the two main faces, e.g. in multilayer systems or for faced products where the facing may limit the maximum service temperature.

4 Principle

Measure thickness, length, and width after one sided heat treatment for a specified time period, at the maximum service temperature, achieved using a specified rate of temperature increase. The thickness of the test specimen is measured during heat treatment, and the length and width only after cooling to ambient temperature.

NOTE The procedure may be an iterative process.

Additional requirements for assessing the maximum service temperature of specific materials are described in normative annexes to this European Standard or the relevant product standard or any other European Technical Specification.

5 Apparatus

A general arrangement of the apparatus is indicated in figure 1 and comprises:

5.1 Flat square or circular hot plate, with a uniform temperature distribution in the measuring zone on the hot face and a heat flux perpendicular to the face of the hot plate. The deviation from flatness of the hot plate shall not exceed 1 mm in the measuring zone at ambient temperature.

The hot plate shall be capable of being controlled to within ± 2 % of a predetermined temperature or ± 10 °C whichever is smaller.

The hot plate shall be capable of being heated at 50 °C/h and/or 300 °C/h.

5.2 Edge insulation, with a gap as small as possible (e.g. ≤ 1 mm/100 mm test specimen size) which will permit free movement during the test of the test specimen and of the pressure plate.

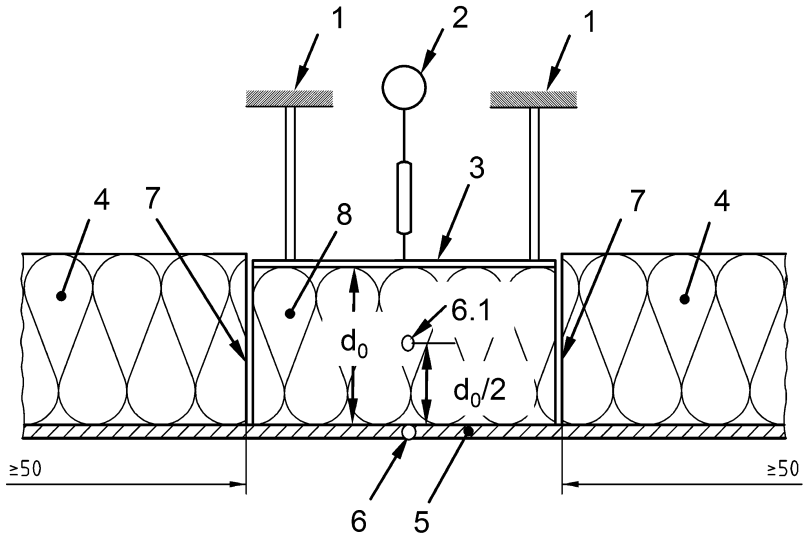
5.3 Square or circular pressure plate, with the same dimensions as the test specimen exerting the required load on the test specimen.

5.4 Device, e.g. electromechanical for measuring the thickness of the test specimen during the test to the nearest 0,1 mm.

When determining the thickness of the test specimen the thermal movement of the apparatus (e. g. quartz rod) shall be taken into account up to the maximum service temperature.

5.5 Temperature sensors (e.g. thermocouples) capable of recording the hot plate temperature to the nearest ± 1 % in centigrade but not less than ± 1 °C, which are placed within grooves on the hot plate.

Dimensions in millimetres



Key

1 Device for measuring thickness, e.g. electromechanical device
2 Test specimen
3 Pressure plate
4 Edge insulation
5 Hot plate
6 Thermocouple
7 Small gap

Figure 1 — Example of an apparatus for determining maximum service temperature

6 Test specimens

6.1 Dimensions of test specimens

Length and width: Test specimens shall be cut as squares or cylinders (as appropriate) and the cross section dimensions shall be as follows:

100 mm × 100 mm (or diameter 100 mm) or

150 mm × 150 mm (or diameter 150 mm) or

200 mm × 200 mm (or diameter 200 mm) or

300 mm × 300 mm (or diameter 300 mm)

Thickness: The thickness shall be 100 mm or the largest thickness below 100 mm available.

The length and width or diameter shall be as specified in the relevant product standard or in annexes to this European Standard.

NOTE 1 In the absence of a product standard or any other European Technical Specification the dimensions may be agreed between parties.

NOTE 2 Testing may be performed on multilayer systems to simulate the conditions existing in the application.

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 used.

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 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 or at least 24 h.

7 Procedure

7.1 Test conditions

The initial temperature of the test specimen and the hot plate shall be (23 ± 5) °C.

7.2 Test procedure

Measure the length and width of the test specimen, l_1, b_1, (or diameter) in accordance with EN 12085, read to the nearest 0,5 mm.

Measure the thickness of the test specimen, d_0, in accordance with EN 823 using the load specified in the relevant product standard.

Install the test specimen in the apparatus ensuring contact between the test specimen and the hot plate.

Load the test specimen with a pressure of 500 Pa and record the thickness, d_1, to the nearest 0,1 mm.

NOTE For polyethylene foam and flexible elastomeric foam products see Annex D.

Heat the test specimen using a temperature rate of increase of 50 °C/h or 300 °C/h, as specified in the relevant product standard or annex of this European Standard.

Maintain the temperature of the hot side, at the expected maximum service temperature, for 72 hours within ± 2 % of this temperature or ± 10 °C whichever is smaller.

Record the thickness continuously during the test and at the end of the 72 h period, d_2, to the nearest 0,1 mm.

Cool the test specimen in the equipment, to a temperature of < 35 °C and remeasure the thickness, d_3, to the nearest 0,1 mm, unless otherwise specified in the relevant product standard or annex of this European Standard.

Take the test specimen from the apparatus and remeasure the length, l_2, and the width, b_2, (or diameter) of the test specimen as before to the nearest 0,5 mm.

In the case of non rectangular edges this shall be taken into account when measuring l_2 and b_2 (or diameter).

Examine the test specimen visually and note any changes caused by the test.

If the relevant product standard or annex of this European Standard specifies additional requirements the observations and/or tests shall be performed accordingly.

Repeat the test procedure for the other test specimens.

8 Calculation and expression of results

8.1 Thickness deformation versus time

The curves thickness deformation versus time and temperature versus time recorded during testing shall be given. An example is shown in figure 2.

8.2 Dimensional changes

Calculate the dimensional changes of thickness, $\Delta\varepsilon_d$, length, $\Delta\varepsilon_l$, and width, $\Delta\varepsilon_b$, in percentage, using the following equations:

$$\Delta\varepsilon_d = 100 \times \frac{d_{2(or3)} - d_1}{d_1} \quad (1)$$

$$\Delta\varepsilon_l = 100 \times \frac{l_2 - l_1}{l_1} \quad (2)$$

$$\Delta\varepsilon_b = 100 \times \frac{b_2 - b_1}{b_1} \quad (3)$$

where:

d_1 is the measured thickness installed before heating, in millimetres;

d_2 is the measured thickness installed after the 72 hours at constant temperature, in millimetres;

d_3 is the measured thickness after cooling down to a temperature of < 35 °C, in millimetres;

l_1, b_1 are the measured length and width before heating, in millimetres;

l_2, b_2 are the measured length and width after the 72 hours at constant temperature and after cooling down, in millimetres.

In case of circular test specimens the diameter/diameter change is calculated instead of length and width. Equation (2) can be used by inserting diameter instead of length.

If the dimensional change in thickness is larger by using d_3 instead of d_2 in equation (1), this thickness shall be used in the calculation of the test result.

Calculate the test result as the mean values of dimensional changes, $\overline{\Delta\varepsilon_d}$, $\overline{\Delta\varepsilon_l}$, $\overline{\Delta\varepsilon_b}$, as a percentage rounded to the nearest 0,5 % from the test results of the individual test specimens.

If the change in the mean value (test result) for any of the dimensions exceeds the value specified in the relevant product standard the test shall be repeated at a lower temperature until the dimensional changes are smaller than or equal to the specified value. This temperature is then considered as the maximum service temperature (see figure 3), providing that the requirements given in 8.3 and 8.4 are also fulfilled.

The steps in centigrade for the indication of the maximum service temperature shall be as specified in the relevant product standard or annex to this European Standard. If the steps are not specified the maximum service temperature shall be declared in steps of not less than 5 °C for temperatures up to 100 °C and in steps of not less than 10 °C for temperatures above 100 °C.

NOTE Results may not be comparable for a product tested at different thicknesses and/or different loads.

8.3 Additional tests and/or observations

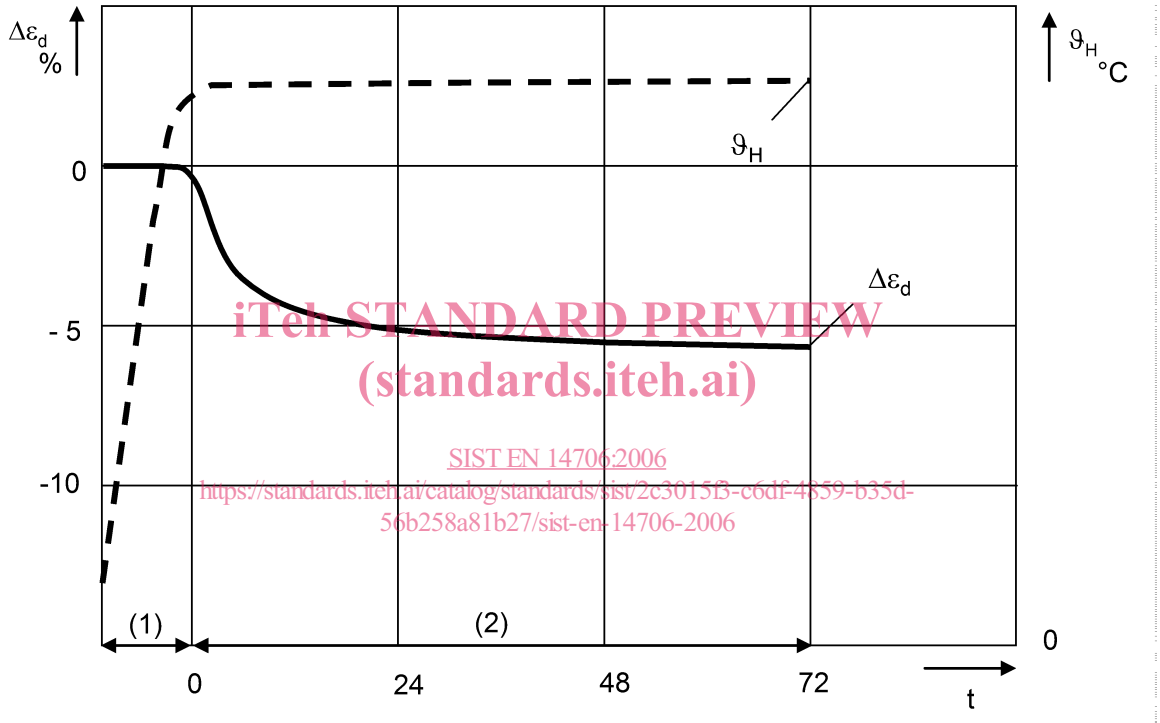
The result of the visual examination shall be noted.

If a relevant annex of this European Standard and/or the relevant product standard specifies additional requirements, the calculations and/or observations shall be noted accordingly.

8.4 Internal self heating

Evidence of internal self heating is found when the test specimen temperature at any time during the test exceeds the temperature of the hot plate.

The test procedure is described in the relevant annexes of this European Standard.



Key

(1) Period of heating

(2) Period of testing

$\Delta\varepsilon_d$ Change in thickness in percentage

ϑ_H Temperature of the hot plate in centigrade

t Time in hours

Figure 2 — Example of hot plate temperature and thickness change versus time curves