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Thermal insulating 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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Contents

Page

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 18097 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*.

ISO 18097 includes the original EN 14706 prepared by Technical Committee CEN/TC 88, *Thermal insulating materials and products*. However, the following have been modified to reflect conditions for tropical countries:

6.3 “Conditioning of test specimens”;

7.1 “Test conditions”;

Clause 10 “Test report.”

Introduction

This International Standard is one of a series of existing European Standards on test methods for products used to insulate building equipment and industrial installations which comprises the following group of International Standards:

ISO standard	Title	Respective EN standard
ISO 12623	*Thermal insulating products for building equipment and industrial installations — Determination of short-term water absorption by partial immersion of preformed pipe insulation*	EN 13472
ISO 12624	*Thermal insulation products for building equipment and industrial installations — Determination of trace quantities of water soluble chloride, fluoride, silicate, sodium ions and pH*	EN 13468
ISO 12628	*Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation*	EN 13467
ISO 12629	*Thermal insulating products for building equipment and industrial installations — Determination of water vapour transmission properties of preformed pipe insulation*	EN 13469
ISO 18096	*Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature for preformed pipe insulation*	EN 14707
ISO 18097	*Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature*	EN 14706
ISO 18098	*Thermal insulating products for building equipment and industrial installations — Determination of the apparent density of preformed pipe insulation*	EN 13470
ISO 18099	*Thermal insulating products for building equipment and industrial installations — Determination of the coefficient of thermal expansion*	EN 13471

A further series of existing European Standards on test methods was adopted by ISO. This “package” of standards comprises the following group of interrelated standards:

ISO standard	Title	Respective EN standard
ISO 12344	*Thermal insulating products for building applications — Determination of bending behaviour*	EN 12089
ISO 12968	*Thermal insulation products for building applications — Determination of the pull-off resistance of external thermal insulation composite systems (ETICS) (foam block test)*	EN 13495
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 degrees 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
ISO 16534	*Thermal insulating products for building applications — Determination of compressive creep*	EN 1606
ISO 16535	*Thermal insulating products for building applications — Determination of long-term water absorption by immersion*	EN 12087

ISO 16536	*Thermal insulating products for building applications — Determination of long-term water absorption by diffusion*	EN 12088
ISO 16537	*Thermal insulating products for building applications — Determination of shear behaviour*	EN 12090
ISO 16544	*Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions*	EN 12429
ISO 16545	*Thermal insulating products for building applications — Determination of behaviour under cyclic loading*	EN 13793
ISO 16546	*Thermal insulating products for building applications — Determination of freeze-thaw resistance*	EN 12091

The Application of Agreement on technical cooperation between ISO and CEN (Vienna Agreement), Modes 1, 2, 4, and 5, was not approved by CEN/TC 88 and the necessity not seen by its stakeholders.

This International Standard is one of a series of standards which specify test methods for determining dimensions and properties of thermal insulating materials and products. The original EN 14706 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 International Standard contains the following four 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 (PEF) and flexible elastomeric foam (FEF) products.

This International 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: ISO 18096:—[1)], *Thermal insulating products for building equipment and industrial installations — Determination of maximum service temperature for preformed pipe insulation*.

1) To be published.

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

1 Scope

This International 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 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.

ISO 5725-2:1994, *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*

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 point by beam bending*

ISO 16544, *Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions*

ISO 29466, *Thermal insulating products for building applications — Determination of thickness*

ISO 29768, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

3 Terms and definitions

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

3.1
maximum service temperature
highest temperature at which the insulation product, when installed at the recommended thickness in a given application, continues to function within specified limits of performance

[SOURCE: ISO 9229:2007, definition 2.6.9.1]

Note 1 to entry: 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 to entry: 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 International Standard or the relevant product standard or any other international 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.

If a small-size equipment (e.g. Ø 100 mm) is used, the free movement of the test specimen during the test is critical and shall be controlled strictly.

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.

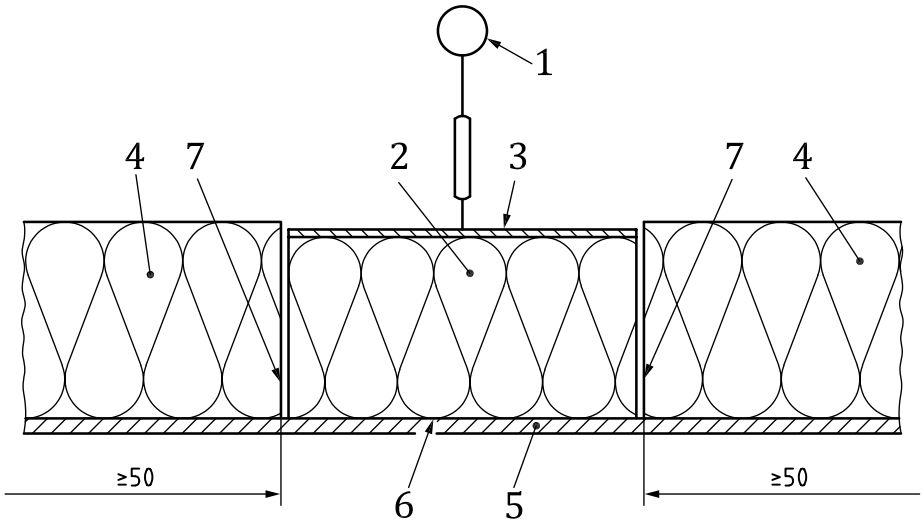
5.3 Square or circular pressure plate, with the same dimensions as the test specimen exerting the required load on the test specimen.

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	5	hot plate
2	test specimen	6	thermocouple
3	pressure plate	7	small gap
4	edge insulation		

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 ± 5) mm, prepared by slicing if needed.

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

NOTE 1 In the absence of a product standard or any other international 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.