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

Produits isolants thermiques pour l'équipement du bâtiment et les installations industrielles — Détermination de la température maximale de service des coquilles isolantes préformées

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committee responsible for this document is ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*.

ISO 18096 includes the original EN 14707 prepared by Technical Committee CEN/TC 88, *Thermal insulating materials and products.* However

— subclause 6.3 “Conditioning of test specimens”,

— subclause 7.1 “Test conditions”,

— Clause 10 “Test report” and

— C.2 “Conditioning of test specimens”

have been modified to reflect conditions for tropical countries.

Introduction

This International Standard is one of a series of International Standards which specify test methods for determining dimensions and properties of thermal insulating materials and products. The original EN 14707 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 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 International Standard, ISO 18097, is available for testing of flat products.

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 insulating 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 standard	Title	Respective EN standard
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 standard	Title	Respective EN standard
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.

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

1 Scope

This International Standard specifies the equipment and procedures for determining the maximum service temperature for preformed pipe insulation. It is applicable to thermal insulating products.

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 9229, *Thermal insulation — Vocabulary*

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

ISO 12628, *Thermal insulating products for building equipment and industrial installations — Determination of dimensions, squareness and linearity of preformed pipe insulation*

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

[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 and 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 multi-layer systems or for faced products where the facing may limit the maximum service temperature.

4 Principle

Measure thickness and length 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 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 the 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 Figures 1 and 2 and is comprised of:

5.1 Hot pipe, with a uniform temperature distribution in the measuring zone on the hot surface and a heat flux perpendicular to the surface of the pipe within the measuring zone (two pipes are required, with diameters that fulfil the requirements of 6.1). The hot pipe shall be linear to within ± 1 mm in the measuring zone at ambient temperature.

The hot pipe shall be capable of being controlled to within ± 2 % of a predetermined temperature ± 10 °C whichever is smaller over the central 60 % of the total pipe length.

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

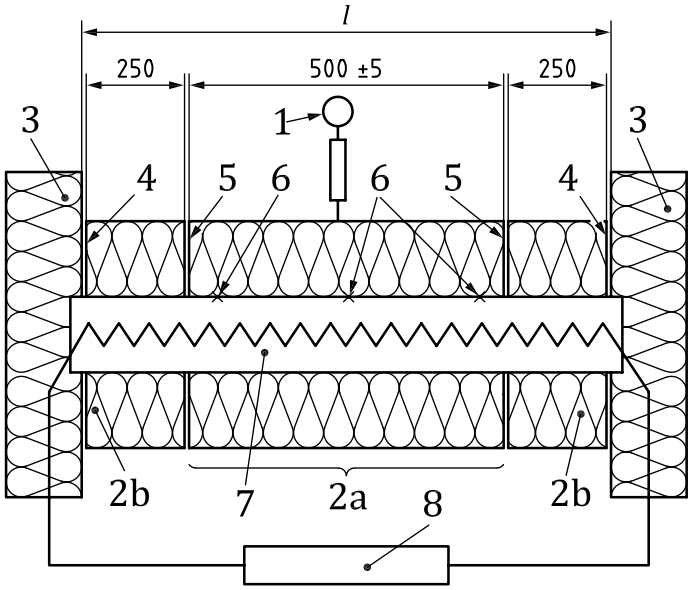
5.2 End insulation, with a gap as small as possible between end insulation and guard piece of the test specimen (e.g. ≤ 3 mm) which will permit free movement during the test of the test specimen.

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

5.4 Flexible metal foil, three pieces, (e.g. brass) capable of exerting a uniform pressure of 500 Pa on the upper surface of the test specimen along its testing length of (500 ± 5) mm and the two end guards, length (250 ± 5) mm. The pressure shall be calculated using the area: e.g. the test length of 500 mm times the diameter of the hot pipe.

5.5 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.



Key

1	device for measuring thickness, e. g. electromechanical device	5	circumferential joints
2a	test length of the test specimen	6	thermocouples
2b	test specimen end guard	7	hot pipe
3	end insulation	8	power supply and temperature control
4	small gap		

NOTE All dimensions are in millimetres.

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