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Thermal insulating products for building applications — Determination of the apparent density

Produits isolants thermiques destinés aux applications du bâtiment — Détermination de la masse volumique apparente

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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.

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 29470 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*.

Introduction

For this document, the conditions of approval within the Fast-Track procedure were not met, thus this document could not progress to the publication stage. ISO/TC 163/SC 1 decided per Resolution 205 in its Nanjing-meeting on 2008-04-15, that this document shall be forwarded modified to the FDIS-vote.

This International Standard includes the original EN 1602:1996 and EN 1602:1996/AC:1997 prepared by Technical Committee CEN/TC 88, *Thermal insulating materials and products*.

This International Standard is one of a series of documents specifying test methods, based on existing European Standards, that are being adopted by ISO. This “package” of standards includes the following group of interrelated documents.

ISO document	Respective EN standard
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 °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

Thermal insulating products for building applications — Determination of the apparent density

1 Scope

This International Standard specifies the equipment and procedures for determining the apparent overall density and the apparent core density under reference conditions. It is applicable to full-size thermal insulating products and test specimens. This International Standard can also be applied to the individual layers of multi-layered 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 29465, *Thermal insulating products for building applications — Determination of length and width*

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
apparent overall density
ρ_a
mass per unit volume of a product, including all surface skins formed during production, but excluding any facings and/or coatings

3.2
apparent core density
ρ_c
mass per unit volume of the core of a product after all surface skins formed during production and all facings and/or coatings have been removed

4 Principle

The density is determined as the ratio of the mass and the volume of the specimen.

5 Apparatus

5.1 Balance, capable of determining the mass of a specimen to an accuracy of 0,5 %.

5.2 Equipment, for the determination of linear dimensions (see 7.2).

6 Test specimens

6.1 Dimensions of test specimens

The specimens shall be full-size products or parts thereof, or specimens used for other tests.

The shape of specimens shall be such that their volume can be easily calculated.

When the apparent overall density is being determined using specimens cut from a product with surface skins formed during production, the ratio of the area of the surface skin to the total volume shall be the same for the specimen as for the product.

The size of a specimen should preferably be as large as possible, commensurate with the apparatus available and with the shape of the original product. The size of the specimens may also be specified in other test methods.

6.2 Number of test specimens

The number of specimens for full-size products shall be as specified in the relevant product standard. If specimens from other tests are used, the number shall be as specified in the test method. If the number is not specified, then at least five test specimens shall be used.

In the absence of a product standard or any other international or European technical specification, the number of specimens may be agreed between parties.

6.3 Preparation of test specimens

The specimens shall be cut by methods that do not change the original structure of the product.

The location from which the specimens are taken shall be such that the density obtained is representative of the density of the product.

For a determination of the apparent overall density, any facings and/or coatings shall be removed from the product. For a determination of the apparent core density, any surface skins formed during production and any facings and/or coatings shall be removed from the product.

When it is not possible to remove the facings and/or coatings without influencing the apparent density of the product, the mass of the facings and/or coatings shall be deducted by calculation.

NOTE Special methods of preparation, when needed, are given in the relevant product standard.

6.4 Conditioning of test specimens

The specimens shall be conditioned at (23 ± 2) °C and (50 ± 5) % relative humidity until a constant mass is achieved.

The time for conditioning and the required accuracy of the constant-mass measurements shall be given in the relevant product standard.

If it can be shown that temperature and humidity have negligible influence on the determination of the density, then the conditioning may be carried out at (23 ± 5) °C.

The conditioning time can be shortened by pre-drying the specimen in a ventilated oven at a prescribed temperature. Appropriate procedures may be given in the relevant product standard.

In tropical countries, different conditioning and testing conditions can be relevant. In this case, the conditions shall be 27 °C/65 % RH and be stated clearly in the test report.

7 Procedure

7.1 Test conditions

The test shall be carried out at (23 ± 2) °C and (50 ± 5) % relative humidity.

If it can be shown that temperature and humidity have negligible influence on the determination of the density, testing may be carried out at (23 ± 5) °C.

In tropical countries, different conditioning and testing conditions can be relevant. In this case, the conditions shall be 27 °C/ 65 % RH and be stated clearly in the test report.

7.2 Test procedure

Measure the linear dimensions of full-size products in accordance with ISO 29465 and ISO 29466.

Measure the linear dimensions of specimens in accordance with ISO 29768.

For full-size products, the length, width and thickness shall be given to the nearest millimetre. For specimens, the measurements shall be made to an accuracy of 0,5 %.

Calculate the volumes of the specimens from these measurements.

Weigh each specimen to an accuracy of 0,5 % and record its mass expressed in kilograms.

If the facings and/or coatings are retained, the mass of the product shall be calculated by deducting the mass of the facings and/or coatings and adhesives, if any, from the overall mass.

If a greater accuracy for the dimensions of full size products is needed, this shall be specified in the relevant product standard.

8 Calculation and expression of results

Calculate the apparent overall density, ρ_a, or apparent core density, ρ_c, expressed in kilograms per cubic metre, using Equation (1):

$$\rho = \frac{m}{V} \tag{1}$$

where

m is the mass of the specimen, expressed in kilograms;

V is the volume of the specimen, expressed in cubic metres.

ρ (ρ_a or ρ_c) for the specimen shall be given to three significant figures.