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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.

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 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 88, *Thermal insulating materials and products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 29470:2008), which has been technically revised. The main changes compared to the previous edition are as follows:

- information was added to 6.1.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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

## 1 Scope

This document specifies the equipment and procedures for determining the apparent overall density and the apparent core density under reference conditions. This document is applicable to full size thermal insulating products and test specimens. This document can also be applied to the individual layers of multi-layered products.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### apparent overall density

$\rho_a$

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

$\rho_c$

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 test specimen.

## 5 Apparatus

**5.1 Balance**, capable of determining the mass of a test 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 test specimens shall be full-size products or parts of them or test specimens used for other tests.

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

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

When the shape or surface of the product is not rectangular and easy to measure and calculate, a representative piece of the product shall be cut out.

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

### 6.2 Number of test specimens

The number of test specimens for full-size products shall be as specified in the relevant product standard. If test 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 technical specification, the number of test specimens may be agreed between parties.

### 6.3 Preparation of test specimens

The test specimens shall be cut using a method that does not change the original structure of the product.

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

For determining the apparent overall density, any facings and/or coatings shall be removed from the product.

For determining 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  $(23 \pm 2) ^\circ\text{C}$  and  $(50 \pm 5) \%$  relative humidity (RH) until 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  $(23 \pm 5) ^\circ\text{C}$ .