
**Thermal insulating materials for building
applications — Determination of organic
content**

*Matériaux isolants thermiques destinés aux applications du bâtiment —
Détermination du contenu organique*



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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 29771 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

This International Standard comprises the original EN 13820:2003 prepared by Technical Committee CEN/TC 88, *Thermal insulating materials and products*, which has been amended by ISO/TC 163/SC 1 with reference to conditioning and testing conditions in tropical countries.

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.

International Standard	Respective EN standard
ISO 29465, <i>Thermal insulating products for building applications — Determination of length and width</i>	EN 822
ISO 29466, <i>Thermal insulating products for building applications — Determination of thickness</i>	EN 823
ISO 29467, <i>Thermal insulating products for building applications — Determination of squareness</i>	EN 824
ISO 29468, <i>Thermal insulating products for building applications — Determination of flatness</i>	EN 825
ISO 29469, <i>Thermal insulating products for building applications — Determination of compression behaviour</i>	EN 826
ISO 29470, <i>Thermal insulating products for building applications — Determination of the apparent density</i>	EN 1602
ISO 29471, <i>Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity)</i>	EN 1603
ISO 29472, <i>Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions</i>	EN 1604
ISO 29764, <i>Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions</i>	EN 1605
ISO 29765, <i>Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces</i>	EN 1607
ISO 29766, <i>Thermal insulating products for building applications — Determination of tensile strength parallel to faces</i>	EN 1608
ISO 29767, <i>Thermal insulating products for building applications — Determination of short-term water absorption by partial immersion</i>	EN 1609
ISO 29768, <i>Thermal insulating products for building applications — Determination of linear dimensions of test specimens</i>	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

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

Thermal insulating materials for building applications — Determination of organic content

1 Scope

This International Standard specifies the equipment and procedures for determining the organic content of thermal insulating materials.

The method is aimed at determining the organic content for products that are inorganic, i.e. products containing a low percentage of organic compounds, either unfaced products or the insulating material of a faced product.

This International Standard is not applicable for the determination of organic content in the presence of water of hydration and/or combined carbonate, sulfate, etc.

This International Standard is not applicable for the determination of organic content of adhesives, facings and/or coatings.

NOTE This International Standard can be used to verify that a thermal insulating product complies with the requirements of EN 13501-1 for classification as Euroclass A1 without testing.

2 Terms and definitions

For the purposes of this document, the following term and definition apply.

2.1 organic content

w_{oc}
total quantity of carbon compounds contained in a material or product

NOTE The organic content in a product shall be expressed as mass percentage.

3 Principle

The organic content is determined as the loss of mass of a previously dried test specimen heated at a specific temperature for a specific time period.

4 Apparatus

Any test equipment which provides the same result with at least the same accuracy may be used.

4.1 Balance, capable of determining the mass of a test specimen to 0,001 g.

4.2 Oven, temperature-controlled, ventilated, capable of maintaining a temperature of $(105 \pm 5) ^\circ\text{C}$ or a temperature specified in the relevant product standard or any other international or European technical specification.

4.3 Furnace, temperature-controlled, ventilated, capable of maintaining a temperature of $(500 \pm 20) ^\circ\text{C}$ or a temperature as specified in the relevant product standard or any other international or European technical specification.

4.4 Test specimen container, of an inert material, which shall not change mass during the test, e.g. porcelain crucible or aluminium tray, that has been preheated at least once at $500 ^\circ\text{C}$ for 2 h before being used.

4.5 Desiccator, capable of keeping the test specimen dry during cool-down.

5 Test specimens

5.1 Dimensions of test specimens

The thickness of the test specimens shall be the original product thickness. In the case of faced and/or coated products, all facings and/or coatings, including adhesives, shall be removed. A test specimen shall consist of at least eight separate pieces taken from different positions evenly distributed over the total surface of a full-size product. This can be accomplished by the use of a cork borer with a diameter of e.g. 21 mm or 25 mm; removing material throughout the full product thickness.

The mass of each test specimen shall be between 10 g and 200 g.

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

5.3 Preparation of test specimens

The test specimens shall be cut so that they do not include product edges.

Each test specimen shall be placed in a separate test specimen container of known mass.

5.4 Conditioning of test specimens

The test specimens shall be dried in the ventilated oven at the temperature of $(105 \pm 5) ^\circ\text{C}$ or a temperature as specified in the relevant product standard or any other international or European technical specification, normally for 2 h and cooled down in the desiccator to $(23 \pm 5) ^\circ\text{C}$ until constant mass is obtained.

Constant mass shall be considered as that mass recorded when the change in mass between two consecutive weighings, at a time interval of at least 1 h, is less than 0,05 % mass fraction. Once the conditioning time has been established for a product, it is not necessary to repeat the consecutive weighings.

In tropical countries, different conditioning and testing conditions can be relevant. In this case, the conditions shall be $27 ^\circ\text{C}$ and 65 % RH and be stated clearly in the test report.

6 Procedure

6.1 Test conditions

The test specimen shall be placed in a previously weighed empty container with the mass, m_1 , and shall be dried and cooled down as specified in 5.4 before the test is carried out.

In tropical countries, different conditioning and testing conditions can be relevant. In this case, the conditions shall be $27 ^\circ\text{C}$ and 65 % RH and be stated clearly in the test report.

6.2 Test procedure

Remove the container with the test specimen inside from the desiccator and weigh it within 1 min to determine the combined mass, m_2 .

Place the container with the test specimen inside in the furnace at a temperature of $(500 \pm 20) ^\circ\text{C}$ or at the temperature specified in the relevant product standard or any other international or European technical specification.

Remove the container with the test specimen inside from the furnace when it is considered that all organic compounds have burned off. This normally takes at least 2 h.

Place the container with the test specimen inside in the desiccator and allow it to cool down to $(23 \pm 5) ^\circ\text{C}$.

Weigh the container with the test specimen inside within 1 min after removal from the desiccator.

Return the container with the test specimen inside to the furnace at a temperature of $(500 \pm 20) ^\circ\text{C}$ or at the temperature specified in the relevant product standard or any other international or European technical specification for at least 30 min. Remove the container from the furnace and place it in the desiccator and allow it to cool down to $(23 \pm 5) ^\circ\text{C}$.

Repeat the procedure described in the previous paragraph until constant mass, as defined in 5.4, is obtained. Record this as m_3 .

The container with the test specimen inside shall be stored in the desiccator between weighings.

Repeat the procedure for the other test specimens.

7 Calculation and expression of results

Calculate the organic content, w_{oc} , expressed as a percent mass fraction, for each test specimen using Equation (1):

$$w_{\text{oc}} = \frac{(m_2 - m_3)}{(m_2 - m_1)} \times 100 \quad (1)$$

where

m_1 is the mass of the test specimen container, expressed in milligrams;

m_2 is the mass of the test specimen container with the dried test specimen inside, expressed in milligrams;

m_3 is the mass of the test specimen container with the dried and heated test specimen inside, expressed in milligrams.

The result shall be the mean value of the individual values. It shall be rounded to the nearest mass fraction of 0,01 %.

8 Accuracy of measurement

NOTE It has not been possible to include a statement on the accuracy of the measurements in this edition of this International Standard, but it is intended to include such a statement when this International Standard is next revised.

9 Test report

The test report shall include the following information:

- a) reference to this International Standard;
- b) product identification:
 - 1) product name, factory, manufacturer or supplier,
 - 2) production code number,
 - 3) type of product,
 - 4) packaging,
 - 5) the form in which the product arrived at the laboratory,
 - 6) other information as appropriate, e.g. nominal thickness, nominal density;
- c) test procedure:
 - 1) pre-test history and sampling, e.g. who sampled and where,
 - 2) conditioning,
 - 3) any deviation from Clauses 5 and 6,
 - 4) conditioning and testing conditions in tropical countries, if applicable,
 - 5) date of testing,
 - 6) number of test specimens,
 - 7) general information relating to the test, including the drying time and temperature, the furnace temperature and testing time in the furnace and whether any coatings and/or facings have been removed,
 - 8) events that can have affected the results;
- d) results: all individual values and the mean value of the organic content.

NOTE It is expected that information about the apparatus and identity of the person responsible for the test be available in the laboratory, but it is not necessary that it be recorded in the report.

Annex A (informative)

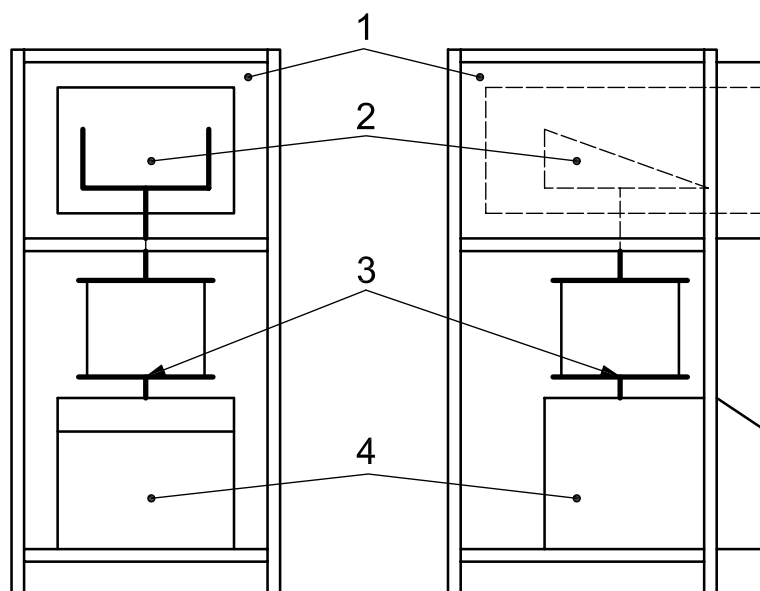
Example of a simplified method for the determination of organic content

A.1 General

The general procedure in this International Standard shall be modified in accordance with Clauses A.1 to A.4 if a simplified method is used, e.g. for factory production control.

A.2 Apparatus

A.2.1 Equipment set-up, as shown schematically in Figure A.1.



Key

- 1 furnace
- 2 weighing container inside the furnace
- 3 weighing plate outside the furnace, connected to the balance (room temperature)
- 4 balance, capable of determining the mass to 0,01 g

**Figure A.1 — Example of equipment for the determination
of organic content in accordance with Annex A**

A.3 Test specimen

No conditioning should be carried out if the test specimen is taken from the production line for factory production control.

NOTE If test specimens are not taken directly from the production line, conditioning according to 5.4 can be needed.

A.4 Procedure

A.4.1 Test conditions

The test specimen should be placed in a previously weighed container with the mass, m_1 .

A.4.2 Test procedure

Place the container with the test specimen inside on the cold weighing plate (see Figure A.1) of the balance at room temperature and weigh it within 1 min to determine the combined mass, m_2 .

Place the container with the test specimen inside in the furnace at a temperature of $(500 \pm 20) ^\circ\text{C}$ or at the temperature specified in the relevant product standard or any other international or European technical specification.

Weigh the container with the test specimen inside continuously until constant mass, m_3 (within $\pm 0,10 \%$).

Repeat the procedure for other test specimens.

A.4.3 Calculation and expression of results

Calculate the organic content, expressed as a percent mass fraction, for each test specimen using Equation (1). The result shall be the mean value of the individual values. It shall be rounded to the nearest mass fraction of 0,1 %.

Bibliography

- [1] EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire test*

