BS EN 1602:2013

BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 1602:2013. It supersedes BS EN 1602:1997, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/540, Energy performance of materials components and buildings.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

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

Wärmedämmstoffe für das Bauwesen - Bestimmung der Rohdichte

This European Standard was approved by CEN on 15 December 2012.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 1602:2013) has been prepared by Technical Committee CEN/TC 88 “Thermal insulating materials and products”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1602:1996.

The revision of this standard contains no major changes, only minor corrections and clarifications of an editorial nature.

This European Standard is one of a series of standards which specify test methods for determining dimensions and properties of thermal insulating materials and products. It 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 European Standard has been drafted for applications in building, but it may also be used in other areas where it is relevant.

This European test standard is one of the following group of interrelated standards on test methods for determining dimensions and properties of thermal insulation materials and products, all of which fall within the scope of CEN/TC 88:

— EN 822, *Thermal insulating products for building applications — Determination of length and width*

— EN 823, *Thermal insulating products for building applications — Determination of thickness*

— EN 824, *Thermal insulating products for building applications — Determination of squareness*

— EN 825, *Thermal insulating products for building applications — Determination of flatness*

— EN 826, *Thermal insulating products for building applications — Determination of compression behaviour*

— EN 1602, *Thermal insulating products for building applications — Determination of the apparent density*

— EN 1603, *Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 °C/50 % relative humidity)*

— EN 1604, *Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions*

— EN 1605, *Thermal insulating products for building applications — Determination of deformation under specified compressive load and temperature conditions*

— EN 1606, *Thermal insulating products for building applications — Determination of compressive creep*

— EN 1607, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*

— EN 1608, *Thermal insulating products for building applications — Determination of tensile strength parallel to faces*

— EN 1609, *Thermal insulating products for building applications — Determination of short-term water absorption by partial immersion*

— EN 12085, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

— EN 12086, *Thermal insulating products for building applications — Determination of water vapour transmission properties*

— EN 12087, *Thermal insulating products for building applications — Determination of long-term water absorption by immersion*

— EN 12088, *Thermal insulating products for building applications — Determination of long-term water absorption by diffusion*

— EN 12089, *Thermal insulating products for building applications — Determination of bending behaviour*

— EN 12090, *Thermal insulating products for building applications — Determination of shear behaviour*

— EN 12091, *Thermal insulating products for building applications — Determination of freeze-thaw resistance*

— EN 12429, *Thermal insulating products for building applications — Conditioning to moisture equilibrium under specified temperature and humidity conditions*

— EN 12430, *Thermal insulating products for building applications — Determination of behaviour under point load*

— EN 12431, *Thermal insulating products for building applications — Determination of thickness for floating floor insulating products*

— EN 13793, *Thermal insulating products for building applications — Determination of behaviour under cyclic loading*

— EN 13820, *Thermal insulating materials for building applications — Determination of organic content*

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European 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 standard can also be applied to the individual layers of multi-layered 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.

EN 822, *Thermal insulating products for building applications — Determination of length and width*

EN 823, *Thermal insulating products for building applications — Determination of thickness*

EN 12085, *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 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 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 shall be the same for the test specimen as for the product.

The size of a test 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 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 European Technical Specification, the number of test specimens may be agreed between parties.

6.3 Preparation of test specimens

The test specimens shall be cut by methods that do 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.

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 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.

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.

7.2 Test procedure

Measure the linear dimensions of full size products in accordance with EN 822 and EN 823.

Measure the linear dimensions of specimens in accordance with EN 12085.

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

Calculate the volumes of the test specimens from these measurements.

Weigh each test specimen to an accuracy of 0,5 % and record its mass 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 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, in kg/m^3, using the formula:

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

where

m is the mass of the test specimen, in kg;

V is the volume of the test specimen, in m^3.

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

9 Accuracy of measurement

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

10 Test report

The test report shall include the following information:

a) reference to this European 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 dimensions);

c) test procedure:

1) pre-test history and sampling (e.g. who sampled and place of sampling);

2) conditioning;

3) drying conditions;

4) presence of facings, the mass of the facing and the method of removal, if necessary;

5) presence of surface skins and the method of removal, if necessary;

6) presence of densification, stratification or defects on the test specimens;

7) deviations from Clauses 6 and 7, if any;

8) date of testing;

9) general information relating to the test;

10) events which may have affected the results. Information about the apparatus and identity of the person responsible for the test should be available in the laboratory but it need not be recorded in the report;

d) results: all individual values and the mean value.

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