BS EN 1603:2013

BSI Standards Publication

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

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National foreword

This British Standard is the UK implementation of EN 1603:2013. It supersedes BS EN 1603:1997, which is withdrawn.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.

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EN 1603

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Supersedes EN 1603:1996

English Version

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

Produits isolants thermiques destinés aux applications du bâtiment - Détermination de la stabilité dimensionnelle dans des conditions de laboratoire constantes et normales (23°C/50% d'humidité relative)

Wärmedämmstoffe für das Bauwesen - Bestimmung der Dimensionsstabilität im Normalklima (23°C/50% relative Luftfeuchte)

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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Contents

Foreword

This document (EN 1603:2013) 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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.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 1603:1996.

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 to evaluate irreversible dimensional changes of test specimens and full size products with time under constant normal laboratory conditions. It is applicable to thermal insulating 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 825, *Thermal insulating products for building applications — Determination of flatness*

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
length
l
long linear dimension of the major surface of the test specimen parallel to the longer linear dimension of the original product

3.2
width
b
short linear dimension of the major surface of the test specimen, measured at right angles to the length

3.3
deviation from flatness
S
maximum distance between the product placed on a flat surface with the convex side uppermost and the flat surface

3.4
normal laboratory conditions
(23 ± 2) °C and (50 ± 5) % relative humidity

4 Principle

Measure length, width and deviation from flatness of the test specimens at several time intervals under normal laboratory conditions until relative stability has been achieved.

Dimensional stability is determined using one or more of the following methods:

— Method A: determination of linear dimensions of full size products;

— Method B: determination of linear dimensions of products using test specimens with dimensions smaller than those of full size products;

— Method C: determination of deviation from flatness of full size products.

5 Apparatus

Method A: Measuring equipment as defined in EN 822.

Method B: A frame fixed on a flat reference surface with a dial gauge of 0,01 mm accuracy or any device (optical, electrical etc.) which has an accuracy of 0,1 mm/m (see examples in Figure 1 and Figure 2);

and either

Method B1: Metal plates of at least 20 mm in diameter (see Figure 1). The actual diameter is to be chosen so that the pressure exerted by the dial gauge is less than 2 kPa;

or

Method B2: Metal wire (see Figure 2).

Method C: Measuring equipment as defined in EN 825.

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

6 Test specimens

6.1 Dimensions of test specimens

The thickness of the test specimens shall be equal to the original product thickness.

Method A: The test specimen shall be the full size product.

Method B1: 500 mm × 500 mm or, if less than 500 mm × 500 mm, as large as possible. In every case, it shall be greater than 250 mm × 250 mm.

Method B2: 250 mm × 250 mm.

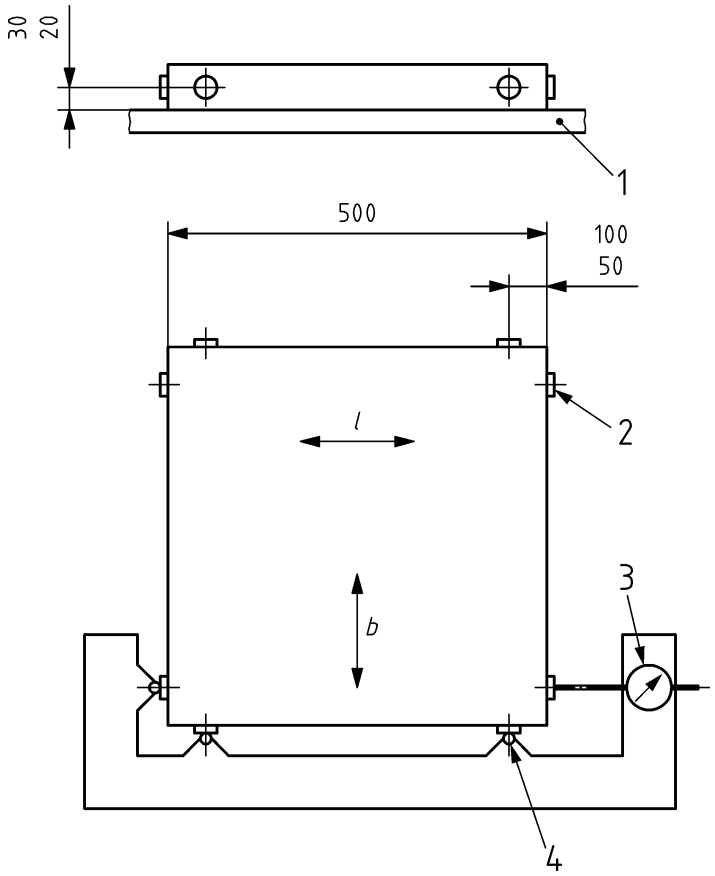
Method C: The test specimen shall be the full size product.

6.2 Number of test specimens

When testing full size products, the number of test specimens shall be as specified in the relevant product standard. If measurements are made on test specimens taken from a full size product, at least three test specimens shall be tested.

In the absence of a product standard or any other European Technical Specification, the number of test specimens may be agreed between parties.

Dimensions in millimetres

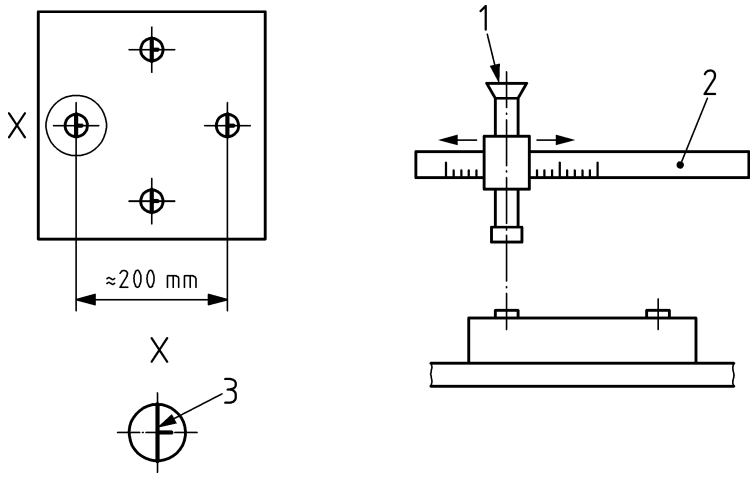


Key

1 flat reference surface
2 metal plate
3 dial gauge
4 metal bead

Figure 1 — Example of suitable equipment for method B1

Dimensions in millimetres



Key

1 optical or electrical device
2 rule
3 metal wire

Figure 2 — Example of suitable equipment for method B2

6.3 Preparation of test specimens

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

If test specimens are not the full size products, the length and width directions shall be marked on them.

The method of selection of the test specimens shall be as specified in the relevant product standard.

In the absence of a product standard or any other European Technical Specification, the method of selection may be agreed between parties.

6.4 Conditioning of test specimens

The test specimens shall be conditioned for at least 24 h at (23 ± 2) °C and (50 ± 5) % relative humidity.

7 Procedure

7.1 Test conditions

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

The test specimens shall be conditioned, either vertically or horizontally, with their major faces exposed to the test atmosphere (e.g. supported by a wire mesh away from the chamber walls).

7.2 Test procedure

Measure dimensional stability using either method A, B or C. The choice shall be as specified in the relevant product standard.

In absence of a product standard or any other European Technical Specification, the method to be used may be agreed between parties.

Measure the length, the width and the deviation from flatness at the start of the test *(l_0, b_0, S_0)* and thereafter at time intervals of 28 days *(l_t, b_t, S_t)*, with a minimum of 28 days of total test duration.

If a more accurate deformation curve is required, measurements may additionally be performed at 1 day, 3 days, 7 days, and 14 days.

Continue measurements until the change in dimensions between the last two measurements is less than 10 % of the total change permitted. The total change permitted, $\Delta\varepsilon$, is normally specified in the relevant product standard.

In the absence of such a specification, $\Delta\varepsilon$ may be agreed between parties.

The accuracy of the measuring equipment shall be equal to at least $\Delta\varepsilon$/10.

— Method A shall be used if $\Delta\varepsilon$ is 1 % or greater.

— Method B shall be used if $\Delta\varepsilon$ is less then 1 % but greater than 0,1 %.

— Method C requires an accuracy of 0,5 mm.

Method A

Measure the length and width of the full size product in accordance with EN 822.

Method B1

Glue the metal plates to the edges of the test specimen, as shown in Figure 1. Measure the dimensions and round to the nearest 0,01 mm.

Method B2

Glue the metal wires to the major faces of the test specimen, as shown in Figure 2. Measure the dimensions and round to the nearest 0,005 mm.

Method C

Measure the deviation from flatness in accordance with EN 825.

8 Calculation and expression of results

Calculate the dimensional changes, $\Delta\varepsilon_1$ and $\Delta\varepsilon_b$, as percentages and $\Delta\varepsilon_S$, in mm/m, from the individual measurements, using Formulae (1) to (3):

$$\Delta\varepsilon_1 = 100 \times \frac{\Delta l}{l_0} \quad (1)$$

$$\Delta\varepsilon_b = 100 \times \frac{\Delta b}{b_0} \quad (2)$$

$$\Delta\varepsilon_S = 10^3 \times \frac{\Delta S}{l_0 \text{ or } b_0} \quad (3)$$

where

Δl, Δb are the measured overall changes in length and width, in mm,

ΔS is the measured overall change in flatness, in mm;

l_0, b_0 are the measured initial length and width, in mm.

Calculate the mean values of each dimensional change, $\Delta\varepsilon_1$, $\Delta\varepsilon_b$ and $\Delta\varepsilon_S$, from the individual test results.

The dimensional changes, $\Delta\varepsilon_1$ and $\Delta\varepsilon_b$, are to be given to the nearest 0,5 % for Method A and to the nearest 0,1 % for Method B. The change in deviation from flatness, $\Delta\varepsilon_S$, shall be given to the nearest millimetre per metre.

9 Accuracy of measurement

Following the experience of a “round robin test” where comparable test equipment and test specimen preparation were used, the accuracy for dimensional stability, $\Delta\varepsilon_1$ and $\Delta\varepsilon_b$ can be estimated as given below.

Repeatability limit r with a probability of 95 %: Approximately 0,4 %

Reproducibility limit R with a probability of 95 %: Approximately 0,7 %

The above mentioned terms are applied as described in ISO 5725-2.

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 thickness, nominal density);

c) test procedure:

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

   2) conditioning;

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

   4) date of testing;

5) general information relating to the test (test method used);

6) events which may have affected the results. Information about the apparatus and identity of the technician should be available in the laboratory but it need not be recorded in the report;

d) results: all individual values and mean values.

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