

BS EN 824:2013



BSI Standards Publication

# Thermal insulating products for building applications — Determination of squareness

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**National foreword**

This British Standard is the UK implementation of EN 824:2013. It supersedes BS EN 824:1995 which is withdrawn.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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EUROPEAN STANDARD

**EN 824**

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2013

ICS 91.100.60

Supersedes EN 824:1994

English Version

## Thermal insulating products for building applications - Determination of squareness

Produits isolants thermiques destinés aux applications du  
bâtiment - Détermination de l'équerrage

Wärmedämmstoffe für das Bauwesen - Bestimmung der  
Rechtwinkligkeit

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

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## Contents

Page

Foreword.....	3
1 Scope.....	5
2 Normative references.....	5
3 Terms and definitions .....	5
4 Principle.....	5
5 Apparatus .....	5
6 Test specimens .....	5
7 Procedure .....	6
8 Calculation and expression of results .....	8
9 Accuracy of measurement.....	8
10 Test report .....	8

## Foreword

This document (EN 824:2013) 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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.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 824:1994.

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 buildings but it may also be used in other areas where it is relevant.

This European test standard is one of the following group of inter-related 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 procedure for determining the deviation from squareness for length, width and/or thickness of full-size products. It is applicable to thermal insulating products. The method is normally applicable to products with straight edges. For products of other shape, e.g. profiled edges, the method can be adapted accordingly.

## 2 Normative references

This European Standard contains no normative references.

## 3 Terms and definitions

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

### 3.1

#### **deviation from squareness**

distance from one limb of a perfect square to the edge of the product at a given distance from a corner

Note 1 to entry: See Figures 1 to 3.

## 4 Principle

Apply a metal square to the product edges and measure the deviation between one limb of the metal square and the products edge (see Figure 1).

## 5 Apparatus

### 5.1 Flat surface.

**5.2 Metal rule or metal tape**, graduated in millimetres and permitting reading to 0,5 mm;

**5.3 Metal square**, with limbs at least 500 mm long with a deviation from squareness of not more than  $\pm 0,1$  mm when measured at 500 mm from the corner.

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

## 6 Test specimens

### 6.1 Dimensions of test specimens

The test specimens shall be the full-size product.

### 6.2 Number of test specimens

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

In the absence of a product standard, the number of test specimens may be agreed between parties.

### 6.3 Conditioning of test specimens

The test specimens should be stored for a least 6 h at  $(23 \pm 5)$  °C. In case of dispute they shall be stored at  $(23 \pm 2)$  °C and  $(50 \pm 5)$  % relative humidity for the time specified in the relevant product standard.

## 7 Procedure

### 7.1 Determination of the squareness of the length and width edges

#### 7.1.1 Test conditions

The test should be carried out at  $(23 \pm 5) ^\circ\text{C}$ . In case of dispute it shall be carried out at  $(23 \pm 2) ^\circ\text{C}$  and  $(50 \pm 5) \%$  relative humidity.

#### 7.1.2 Test procedure

Lay the test specimen on a flat surface and measure the deviation from squareness of length and width as follows:

- a) place the metal square along one of the sides of the test specimen with the right angle of the square aligned against the adjoining edge as in Figure 2;
- b) measure the distance  $a_b$  between the edge of the test specimen and the edge of the metal square, at a distance  $c$  from the corner, to the nearest 0,5 mm, where:
  - 1) for the test specimens with a side of less than 500 mm,  $c$  is the maximum width or length of the specimen;
  - 2) for the test specimen with a side equal to or greater than 500 mm,  $c$  is the length of the inner side of the square (see Figure 2);
- c) repeat for all corner of the test specimen having angles smaller than or equal to  $90^\circ$ ;
- d) if there is any significant deviation from linearity of the edges in the length or the width, this shall be reported as the maximum deviation from linearity  $a_{\text{max}}$ , expressed in millimetres (see Figure 4).

### 7.2 Determination of the squareness of the thickness edge

#### 7.2.1 Test conditions

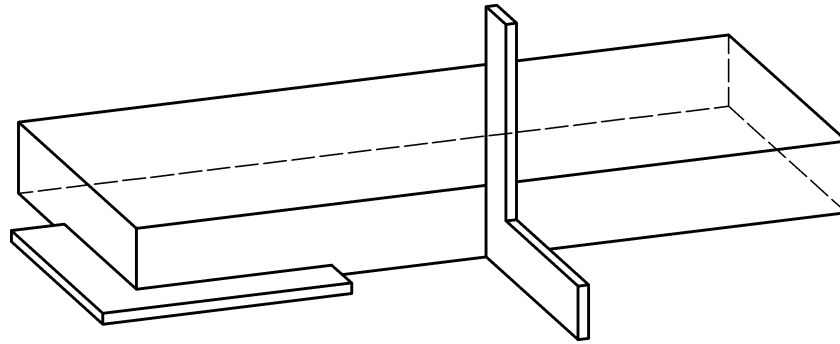
The test should be carried out at  $(23 \pm 5) ^\circ\text{C}$ . In case of dispute it shall be carried out at  $(23 \pm 2) ^\circ\text{C}$  and  $(50 \pm 5) \%$  relative humidity.

#### 7.2.2 Test procedure

Lay the test specimen on a flat surface and measure the deviation from squareness of the thickness as follows:

- a) place the metal square on the flat surface against one edge of the test specimen as in Figure 3;
- b) measure the distance  $a_d$  to the nearest 0,5 mm between the edge of the test specimen and the edge of the square at the point of the greatest deviation along the side;
- c) repeat for all sides;
- d) turn the test specimen over and repeat items a) to c);
- e) report the largest figure as the deviation from squareness of the thickness edge.

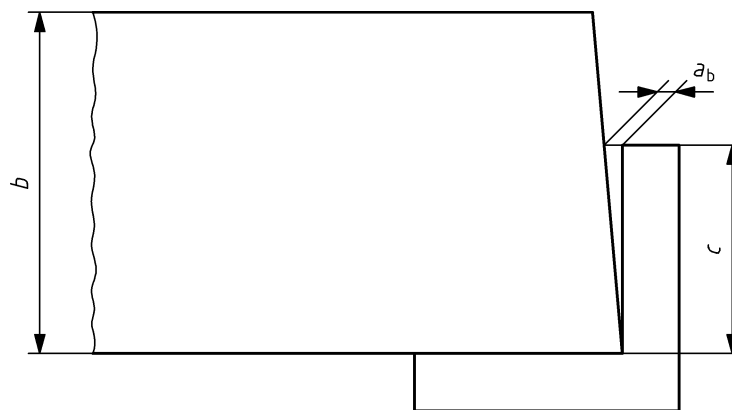




See Figure 2.

See Figure 3.

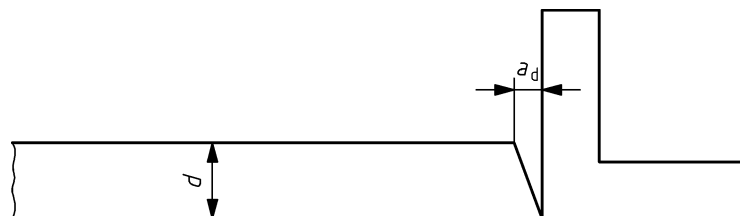
**Figure 1 — Example of the measurement of length and width edge squareness and of thickness edge squareness**



**Key**

- $b$  length or width of the product depending on the corner which is controlled
- $a_b$  deviation from squareness of length or width
- $c$  length of inner side of the square

**Figure 2 — Example of the measurement of length and width edge squareness**



**Key**

- $d$  thickness of the product
- $a_d$  deviation from squareness

**Figure 3 — Example of the measurement of thickness edge squareness**

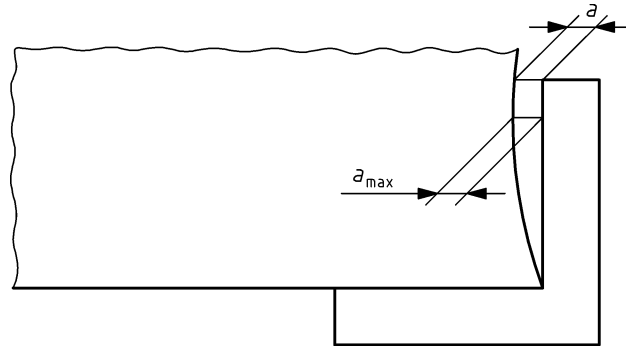


Figure 4 — Example of measurement of deviation from linearity of the edge

## 8 Calculation and expression of results

### 8.1 Calculation of the deviation from the squareness of the length and width edges

Calculate deviation from squareness  $S_b$  using the following formula:

$$S_b = \frac{a_b}{c} \quad (1)$$

where

$a_b$  is the measured value in millimetres;

$c$  is the measured value in millimetres.

Express the deviation from squareness  $S_b$  in millimetres per metre and round to the nearest millimetre per metre.

### 8.2 Calculation of the deviation from squareness of the thickness edge

Calculate deviation from squareness  $S_d$  using the following formula:

$$S_d = a_d \quad (2)$$

where

$a_d$  is the maximum measured value in millimetres.

Round the deviation,  $S_d$ , to the nearest millimetre and report the thickness of the test specimen.

## 9 Accuracy of measurement

NOTE It has not been possible to include a statement of 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:

- reference to this European Standard;
- product identification:

- 1) product name, factory, manufacturer or supplier;
  - 2) production code number;
  - 3) type of products;
  - 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) deviation from Clauses 6 and 7, if any;
  - 4) date of testing;
  - 5) general information relating to the test;
  - 6) any occurrences 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 the maximum value for deviation from squareness in millimetres/metres for the length and width and deviation from squareness in millimetres for thickness and any deviation from linearity.





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