
**Thermal insulating products for building
applications — Determination of flatness**

*Produits isolants thermiques destinés aux applications du bâtiment —
Détermination de la planéité*

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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 29468 was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*.

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Introduction

This International Standard comprises the original EN 825:1994 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, <i>Thermal insulating products for building applications — Determination of behaviour under point load</i>	EN 12430

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ISO 29770, <i>Thermal insulating products for building applications — Determination of thickness for floating-floor insulating products</i>	EN 12431
ISO 29771, <i>Thermal insulating materials for building applications — Determination of organic content</i>	EN 13820
ISO 29803, <i>Thermal insulation products for building applications — Determination of the resistance to impact of external thermal insulation composite systems (ETICS)</i>	EN 13497
ISO 29804, <i>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</i>	EN 13494
ISO 29805, <i>Thermal insulation products for building applications — Determination of the mechanical properties of glass fibre meshes</i>	EN 13496

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Thermal insulating products for building applications — Determination of flatness

1 Scope

This International Standard specifies the equipment and procedures for determining the deviation from flatness for full-size products. It is applicable to thermal insulating products.

2 Terms and definitions

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

2.1

deviation from flatness

the maximum distance between the product, placed on a flat surface with the convex side uppermost, and the flat surface

3 Principle

The maximum distance between the product placed on a flat surface and the flat surface is measured.

4 Apparatus

4.1 Flat surface.

4.2 Metal rule or metal tape, graduated in millimetres and permitting reading to 0,5 mm.

4.3 Rigid frame, with a movable measuring device consisting of a disc with a diameter of 30 mm, fixed to a graduated pin or a dial gauge (graduated to at least 0,5 mm) applying a load of $(2,0 \pm 0,1)$ N.

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

5 Test specimens

5.1 Dimensions of test specimens

The test specimen shall be the full-size product.

5.2 Number of test specimens

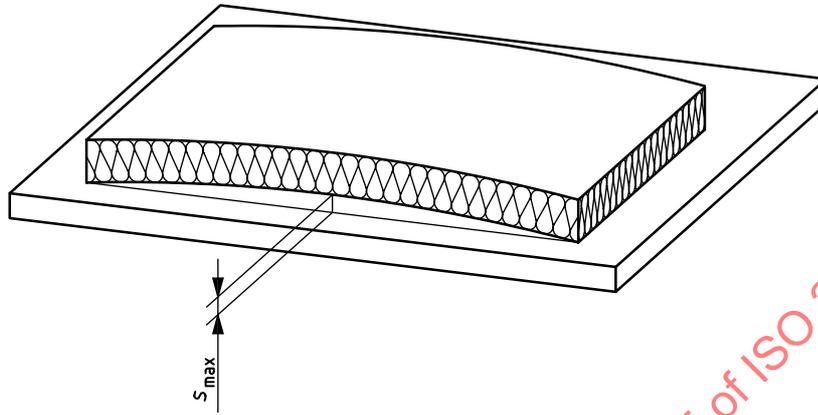
The number of test specimens shall be as specified in the relevant product standard.

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

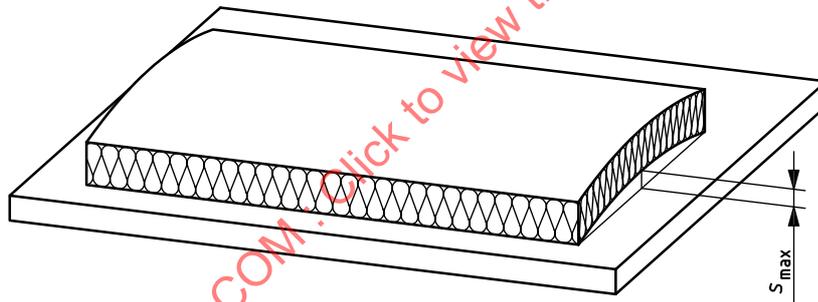
5.3 Conditioning of test specimens

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

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.



a) Deviation from flatness in length



b) Deviation from flatness in width

Figure 1 — Measurement of deviation from flatness

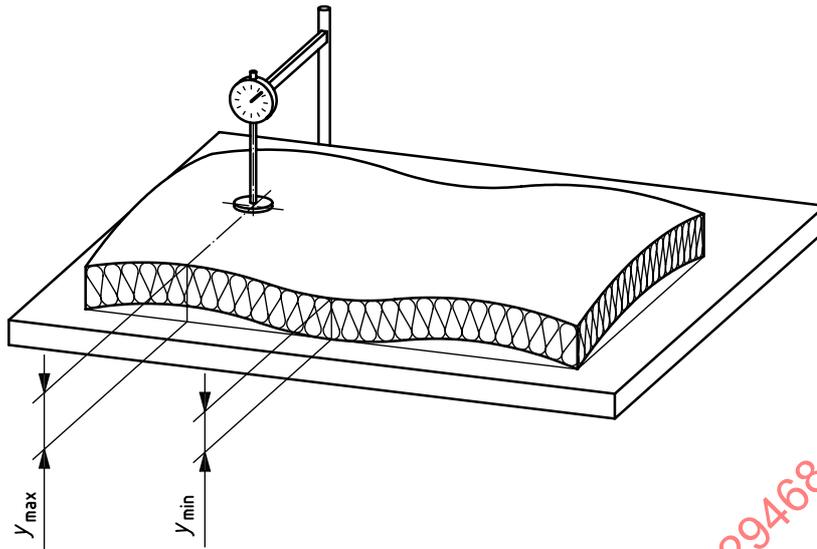


Figure 2 — Location of maximum and minimum distances

6 Procedure

6.1 Test conditions

The test shall 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.

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

6.2.1 Lay the test specimen with the convex face, if any, uppermost on a flat surface. If there is a visible deviation from flatness only along the length or only along the width, make the measurement in accordance with 6.2.2 [see Figure 1, a) and 1b)]. If there is a deviation from flatness along both the length and width (warped products), make the measurement in accordance with 6.2.3 (see Figure 2).

6.2.2 Using the metal tape or rule, measure the maximum distance between the bottom edge of the specimen and the flat surface, S_{max} , to the nearest 0,5 mm.

6.2.3 Locate the maximum and minimum distances from the flat surface using the measuring device (see 4.3) as shown in Figure 2. At these positions, read the distances Y_{max} and Y_{min} to the nearest 0,5 mm. If the test specimen rests on only three points, there exists the possibility of alternative flatness measurements; all shall be measured.

7 Calculation and expression of results

For test specimens with deviation from flatness in one direction only, report the deviation as the maximum value measured, expressed in millimetres.

For warped products, calculate the deviation from flatness, S_{max} , expressed in millimetres, using Equation (1):

$$S_{\text{max}} = Y_{\text{max}} - Y_{\text{min}} \quad (1)$$