
**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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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Contents

	Page
Foreword.....	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle.....	1
5 Apparatus.....	1
6 Test specimens.....	1
6.1 Dimensions of test specimens.....	1
6.2 Number of test specimens	2
6.3 Conditioning of test specimens.....	2
7 Procedure.....	2
7.1 Test conditions.....	2
7.2 Test procedure.....	2
8 Calculation and expression of results	3
9 Accuracy of measurement.....	3
10 Test report.....	3

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 88, *Thermal insulating materials and products*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 29468:2008), which has been technically revised.

The main changes are as follows:

- [Clause 2](#), Normative references, has been added and the following numbering of clauses has been changed;
- some editorial corrections.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Thermal insulating products for building applications — Determination of flatness

1 Scope

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

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org>

3.1

deviation from flatness

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

4 Principle

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

5 Apparatus

5.1 Flat surface.

5.2 Metal rule or metal tape, graduated in millimetres and allowing a reading to 0,5 mm.

5.3 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.

6 Test specimens

6.1 Dimensions of test specimens

The test specimen 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 or any other technical specification, the number of specimens may be agreed between parties.

6.3 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 (RH) for the time specified in the relevant product standard.

In tropical climates, different conditioning and testing conditions can be relevant. In this case, the conditions shall be $(27 \pm 2) ^\circ\text{C}$ and $(65 \pm 5) \%$ RH and be clearly stated in the test report.

7 Procedure

7.1 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 $(50 \pm 5) \%$ RH.

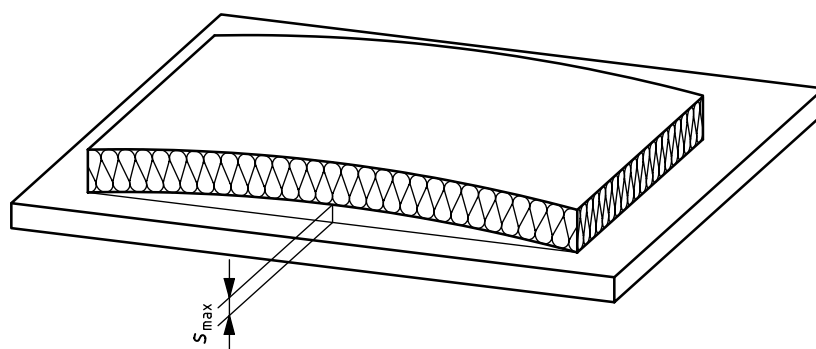
In tropical climates, different conditioning and testing conditions can be relevant. In this case, the conditions shall be $(27 \pm 2) ^\circ\text{C}$ and $(65 \pm 5) \%$ RH and be clearly stated in the test report.

7.2 Test procedure

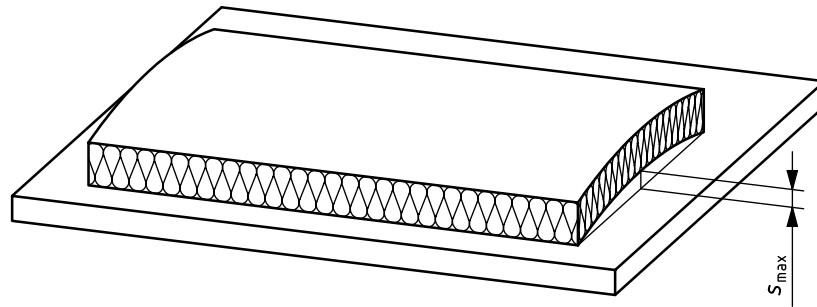
7.2.1 Lay the test specimen with the convex face, if any, uppermost on a flat surface. If there is a visible deviation from flatness only along the length or only along the width, make the measurement in accordance with 7.2.2 [see Figure 1 a) and b)]. If there is a deviation from flatness along both the length and width (warped products), make the measurement in accordance with 7.2.3 (see Figure 2).

7.2.2 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.

7.2.3 Locate the maximum and minimum distances from the flat surface using the measuring device (see 5.3) 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.



a) Deviation from flatness in length



b) Deviation from flatness in width

Figure 1 — Measurement of deviation from flatness

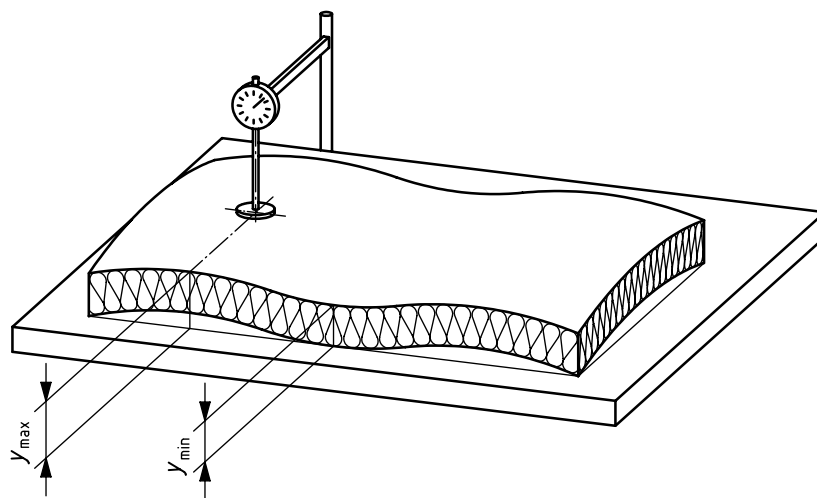


Figure 2 — Location of maximum and minimum distances

8 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 [Formula \(1\)](#):

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

9 Accuracy of measurement

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

10 Test report

The test report shall include the following information:

- a) reference to this document, i.e. ISO 29468:2022;

- b) product identification:
 - 1) product name, factory, manufacturer or supplier;
 - 2) production code number;
 - 3) type of product;
 - 4) packaging;
 - 5) 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, i.e. the name of person taking the samples and sampling site;
 - 2) conditioning;
 - 3) deviation from [Clauses 6](#) and [7](#), if any;
 - 4) conditioning and testing conditions in tropical climates, if applicable;
 - 5) date of the test;
 - 6) general information relating to the test;
 - 7) any occurrences which can have affected the results;
- d) results:
 - 1) all individual values and the maximum value of the deviation from flatness and the position where it occurred.

