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Thermal insulation — Mineral wool board for overdeck insulation of roofs — Specification

Isolation thermique — Panneaux rigides en laine minérale pour l'isolation par l'extérieur des toitures-terrasses — Spécifications

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Contents

Page

1 Scope 1

2 Normative references 1

3 Definitions 1

4 Sampling and conformity control 2

5 Required properties 2

6 Marking 3

7 Test report 3

Annexes

A Determination of dimensions of boards 4

B Determination of deformation resistance 8

C Determination of interlaminar strength 9

D Determination of breaking load 10

E Determination of thermal transmission properties 12

F Sampling and conformity control 13

G System of third-party certification of conformity of mineral wool boards 18

H Bibliography 23

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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.

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.

International Standard ISO 8145 was prepared by Technical Committee ISO/TC 163, *Thermal insulation*, Sub-Committee SC 3, *Insulation products for building applications*.

Annexes A, B, C, D and E form an integral part of this International Standard. Annexes F, G and H are for information only.

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Thermal insulation — Mineral wool board for overdeck insulation of roofs — Specification

1 Scope

This International Standard specifies the properties and acceptable tolerances for bonded man-made mineral wool board for the overdeck insulation of roofs of buildings. The product is intended for roofs carrying foot traffic by maintenance personnel only (for examples of intended uses, see ISO/TR 9774, figure 1, sketches 7 and 9).

The properties to be declared by the manufacturer at the time of delivery are specified, as are some test methods for the determination of these properties. Caution should be exercised in using test results as design values.

This International Standard provides limiting values for most of the properties. These limiting values are for specification purposes only, design values may be derived from these by taking into account the environmental factors affecting the thermal performance of the product, the influence of the product properties on installation, and the effect of workmanship on the thermal performance. For converting declared R or λ values to design values, see, for example, ISO/TR 9165.

It applies to board with or without a membrane for the insulation of the upper surface of roofs under roofing systems protected against water. The properties of a facing membrane are not described. When the board is supplied with a facing membrane, it is not intended to be waterproof.

The board is intended to be fixed to the roof surface. When boards are fixed mechanically, some modification of the specified mechanical properties may be necessary.

The sampling and conformity control plan described in annex F and the certification procedure described in annex G are recommendations only.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7345:1987, *Thermal insulation — Physical quantities and definitions.*

ISO 8301:1991, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Heat flow meter apparatus.*

ISO 8302:1991, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Guarded hot plate apparatus.*

ISO/TR 9165:1988, *Practical thermal properties of building materials and products.*

ISO/TR 9774:1990, *Thermal-insulation materials — Application categories and basic requirements — Guidelines for the harmonization of International Standards and other specifications.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 bonded mineral wool insulation: Vitreous fibres having a woolly consistency made from rock, slag or glass and bonded with a suitable binder.

3.2 board: Rigid insulation product of rectangular shape with or without a facing with the thickness significantly smaller than the other dimensions.

NOTE 1 A common method for checking the suitability of the binder in the insulation boards is the measurement of interlaminar strength, and deformation under compression, before and after treating the product with both temperature and moisture.

4 Sampling and conformity control

For the purposes of sampling and conformity control by inspection lots, the procedures described in annex F are recommended.

In plants where different product types are manufactured on the same production line within short intervals as regards time and quantity, it is recommended that production be subjected to a third-party certification system as described in annex G.

NOTE 2 Annexes F and G, which are not an integral part of this International Standard, provide some possible procedures for attestation of conformity which have to be agreed between the manufacturer and the consumer. A general International Standard on the procedure of attestation of conformity for all thermal insulation products is under preparation and will replace the common causes of these annexes.

5 Required properties

5.1 Dimensions

The manufacturer shall declare the nominal length, width and thickness of the board.

These dimensions shall be measured in accordance with annex A and shall be subject to the tolerances detailed in table 1. Tighter tolerances can be necessary for certain applications; these shall be agreed to between the supplier and purchaser.

Table 1 — Dimensional tolerances

Dimension	Permissible deviations of measured values from nominal dimensions	Test method
Length, l	± 5 mm or ± 1 % whichever is the greater on average of measured values for each single specimen.	Clause A.1
Width, b	± 5 mm on average of measured values for each single specimen.	Clause A.1
Thickness, d	± 3 mm on average of measured values for all specimens tested.	Clause A.2
Squareness	For each 1 000 mm of the longest face dimension, the maximum deviation shall be not more than 3 mm. The edge plane of the thickness dimension of the board shall be not more than 3 mm out of square.	Clause A.3
Flatness	The maximum deviation shall be not more than 0,40 % of the length or width as appropriate.	Clause A.4

5.2 Fire behaviour

These insulation materials with or without a membrane shall meet with the fire regulations and codes that apply in the locality in which they are applied.

5.3 Thermal transmission properties

The thermal transmission properties of a product shall be declared by the manufacturer as either thermal resistance, R, or thermal conductivity, λ. (See ISO 7345.) The mean test temperature shall also be declared.

R or λ shall be determined in accordance with annex E (see also ISO 8301 or ISO 8302), and shall be subject to the tolerances given below.

Thermal transmission properties may be measured directly or they may be determined from measurements on other thicknesses of the material, provided that:

a) the material is of the same quality (density, fibre diameter and distribution, etc.) and is produced on the same production line;

b) it can be demonstrated that λ does not vary by more than 2 % over the range of thicknesses, where the calculation is applied.

The thermal conductivity shall be less than or equal to the manufacturer's declared values.

The thermal resistance shall be greater than or equal to 95 % of the manufacturer's declared values.

NOTES

3 The apparent discrepancy between the requirements for thermal conductivity compared to thermal resistance arises from the negative tolerance on thickness permitted in table 1.

4 Because of the differences in manufacturing processes, one manufacturer can have the same thermal resistance but at a slightly different thickness and/or density to that produced by some other manufacturer.

5.4 Deformation resistance

When measured in accordance with annex B, average deformation shall not be greater than 10 % after maintaining the load of 20 kPa for 24 h at 23 °C. Additional deformation shall not be greater than 5 % after maintaining the load of 20 kPa for an additional 24 h at 80 °C.

5.5 Interlaminar strength

When tested in accordance with annex C, the strength shall be greater than or equal to 7,5 kPa.

If, for special conditions, higher values are required, this shall be agreed upon between the supplier and the purchaser.

5.6 Breaking load

When tested in accordance with annex D, the breaking load shall be greater than 80 N in both directions.

5.7 General properties

5.7.1 There are no test procedures specified for the following requirements. However, for the requirements in 5.7.2, visual inspection is recommended.

For the requirements in 5.7.3 and 5.7.4, the manufacturer should be consulted.

5.7.2 The insulation material shall be free of extraneous and coarse material and the fibre shall be distributed evenly.

5.7.3 The insulation material shall not sustain the growth of fungus.

5.7.4 The insulation material shall not accelerate the corrosion of metallic surfaces with which it comes into contact in normal use.

6 Marking

Mineral wool insulation boards shall be delivered with the following information marked on the product or the package:

a) the manufacturer's name and product designation;

b) manufacturing origin (location);

c) type of facing (if any);

d) production code;

e) nominal length, width, thickness and area of insulation in the package;

f) nominal R value or nominal λ value and mean temperature;

g) additional markings, as required by national regulations of countries where the product is to be used, such as design values for R or λ, reaction to fire and safety and health information;

h) reference to this International Standard.

7 Test report

The test report shall be prepared by the laboratory that conducted the test and shall include the following information:

a) the manufacturer's name and product designation;

b) the type of product and other description about facing and type;

c) nominal dimensions;

d) production code;

e) information about sampling;

f) the manufacturer's declared R value or λ value and corresponding mean temperature;

g) report of all test results including maximum or minimum values;

h) comparison of test results and assessment with the manufacturer's claim and the requirements of this International Standard;

i) statement of conformity with this International Standard;

j) name and location of laboratory carrrying out the tests.

Annex A
(normative)

Determination of dimensions of boards

A.1 Determination of length and width

A.1.1 Measuring device

A steel tape graduated in millimetres shall be used as a measuring device.

A.1.2 Specimens

Every board in a package but not more than five boards shall be tested.

A.1.3 Procedure

Lay the full board on a flat surface and measure its dimensions as follows.

Place the steel tape (A.1.1) across the surface of the full board parallel to one edge and at right angles to the adjacent edge.

Take measurements at two positions on one face for length l, and three positions on one face for width b, as shown in figure A.1.

Measurements shall be read to the nearest 1 mm.

The length and width recorded shall be the mean of those measurements of each board.

Note the results in the test report.

A.1.4 Test report

The test report shall indicate the mean of the measured values for length and for width, for each single specimen.

A.2 Determination of thickness

A.2.1 Measuring device

The measuring device may consist of the following parts, as shown in figure A.2:

a) a **dial gauge**, graduated in 0,1 mm, suitably mounted on a rigid frame fastened to a flat rigid base plate which is approximately 300 mm square;

b) a **circular flat foot** 200 mm in diameter at the lower end of the dial gauge rod which together exert a total pressure on the specimen of 0,1 kPa.

NOTE 5 Any other suitable apparatus is acceptable provided it is capable of applying a pressure of 0,1 kPa on a disc of the same diameter.

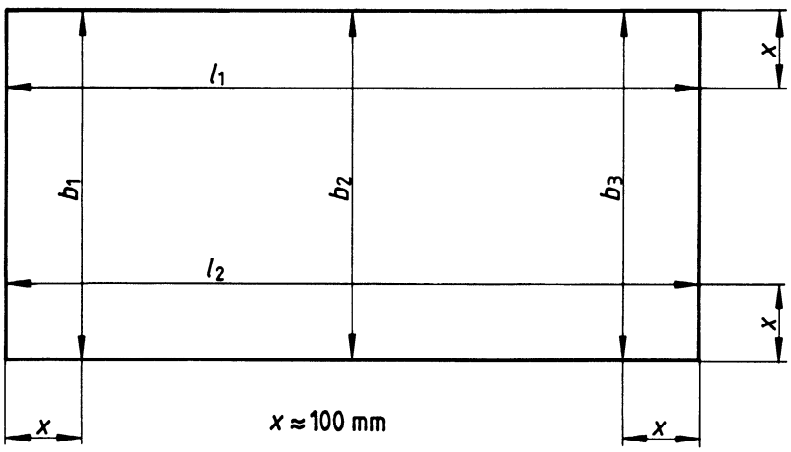

Figure A.1 — Location of measurements for length and width

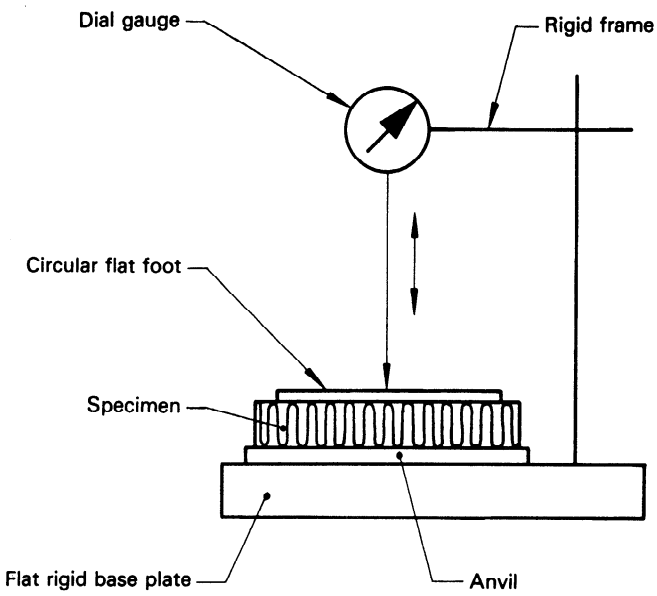

Figure A.2 — Example of suitable apparatus for determination of thickness

A.2.2 Sample

Every board in a package but not more than five boards shall be tested.

A.2.3 Procedure

Take measurements d_1 and d_2 at the two positions marked D_1 and D_2 on the board surface, as shown in figure A.3.

Place the specimen between the anvil and the circular flat foot. Lower the circular flat foot until it is resting freely on the specimen at a marked position. The edge of the foot shall not extend over the edge of the specimen.

The dial gauge shall be read to the nearest millimetre.

Note the results in the test report.

A.2.4 Test report

The test report shall give the following information:

a) each measured value and the mean of the two readings d_1 and d_2 as the specimen thickness;

b) the mean of all the specimen thicknesses as the sample thickness.

A.3 Determination of squareness

A.3.1 Principle

Determination of the deviation from squareness for width and thickness for a full board.

A.3.2 Measuring device

A steel square with limbs at least 500 mm in length and a steel tape graduated in millimetres shall be used as measuring devices.

A.3.3 Specimens

Every board in a package but not more than five boards shall be tested.

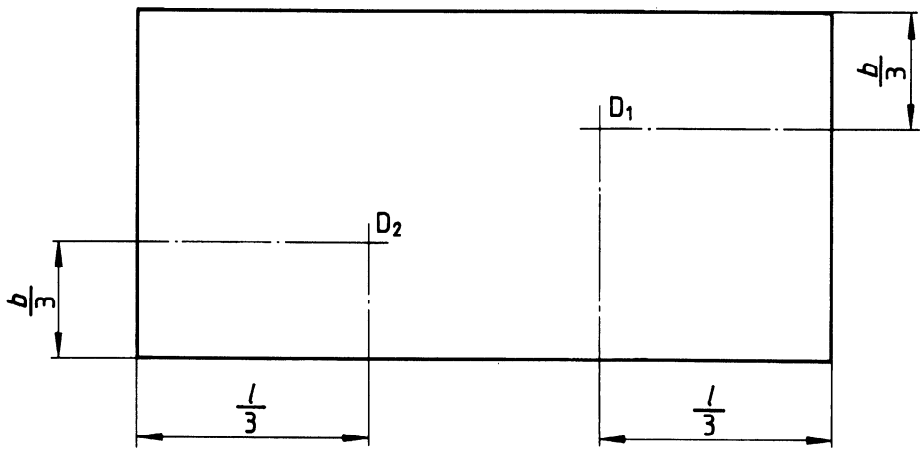

Figure A.3 — Locations for thickness measurements

A.3.4 Procedure

Lay the full sheet or board on a flat surface and measure the deviation from squareness of the thickness and width as follows.

A.3.4.1 Thickness deviation

Place the steel square on the flat surface against one end of the board as in figure A.4. Measure the distance, a, to the nearest 1 mm, between the edge corner of the board and the edge of the square at the point of greatest deviation. Note this distance, which is the deviation from squareness, in millimetres. Repeat for all four corners of the board. Repeat the whole operation for each specimen. Record the average deviation of each board.

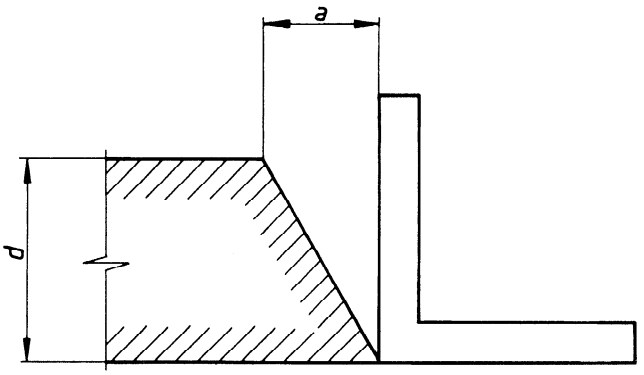

Figure A.4 — Deviation from squareness for thickness

A.3.4.2 Width deviation

Place the steel square along one of the parallel sides of the insulation with the right angle of the square aligned against the adjoining edge as in figure A.5.

Measure the distance, a, to the nearest 1 mm, between the edge of the board and the edge of the square at the point of greatest deviation. Note this distance, which is the deviation from squareness, in millimetres per 1 000 mm of width. Repeat for all four corners of the board. Repeat the whole operation for each specimen. Record the maximum deviation for each specimen.

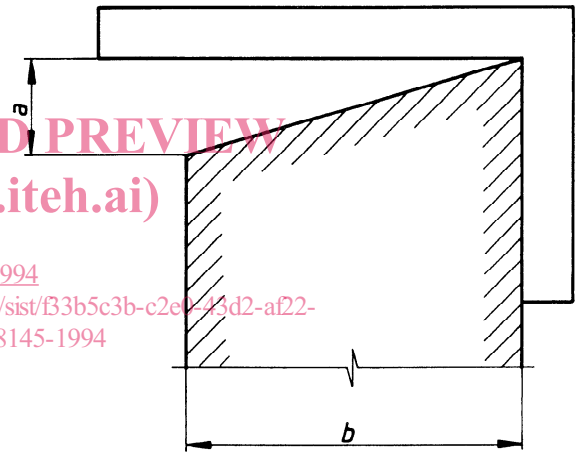

Figure A.5 — Deviation from squareness for width

A.3.5 Test report

A.3.5.1 Squareness on thickness

The test report shall indicate the mean deviation from squareness in millimetres, for each specimen.

A.3.5.2 Squareness on width

The test report shall indicate the maximum deviation from squareness in millimetres per 1 000 mm, for each specimen.

A.4 Determination of flatness

A.4.1 Principle

Determination of the flatness of a board by measuring local flatness deviations using a straightedge.

A.4.2 Measuring devices

A rigid straightedge, 150 mm longer than the board, a steel tape or ruler graduated in millimetres and two identical wooden blocks with planed surfaces about 100 mm in length, and about 25 mm wide and of the same thickness, y, shall be used as measuring devices.

A.4.3 Specimens

Every board in a package but not more than five boards shall be tested.

A.4.4 Procedure

See figure A.6.

A.4.4.1 Lay each insulating board on a flat surface with the convex face upwards. Place the wooden blocks or fillets of equivalent hardness and known thickness, y, on the board surface, flush with the edges and located midway along the edge.

Using the steel tape or ruler, measure the maximum distance, to the nearest 1 mm, from the underside of the straightedge to the board surface, x.

The local flatness deviation is the distance x-y.

A.4.4.2 Repeat the procedure of A.4.4.1 for each specimen in the direction at right angles to the first line.

A.4.4.3 Record all measurements taken on the specimens.

A.4.4.4 The local flatness deviation of each specimen is divided by length or width as appropriate to determine which is the greater.

A.4.5 Test report

The test report shall indicate all x-y values for each specimen and the maximum deviation for each specimen.

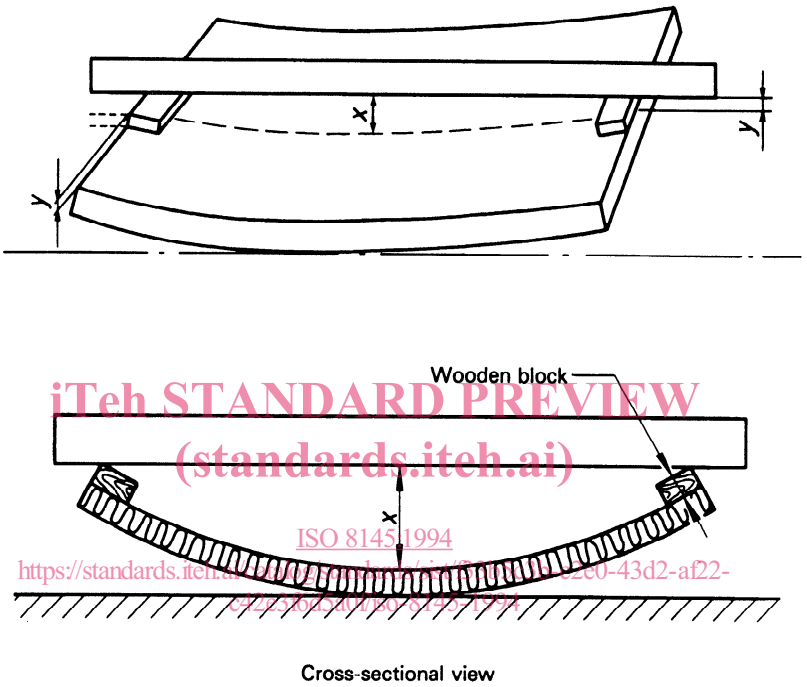

Figure A.6 — Measurement of local flatness