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R 1896

THERMAL INSULATING ASBESTOS BOARDS

1st EDITION

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Also issued in French and Russian. Copies to be obtained through the national standards organizations.

BRIEF HISTORY

The ISO Recommendation R 1896, *Thermal insulating asbestos boards,* was drawn up by Technical Committee ISO/TC 77, *Products in asbestos cement,* the Secretariat of which is held by the Association Suisse de Normalisation (SNV).

Work on this question led to the adoption of Draft ISO Recommendation No. 1896, which was circulated to all the ISO Member Bodies for enquiry in June 1970. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Australia	France	Romania
Austria	Germany	South Africa, Rep. of
Belgium	Greece	Spain
Brazil	India	Switzerland
Chile	Israel	Thailand
Czechoslovakia	Italy	U.A.R.
Denmark	New Zealand	United Kingdom
Finland	Poland	

The following Member Bodies opposed the approval of the Draft :

Norway
Sweden

This Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided to accept it as an ISO RECOMMENDATION.

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ISO Recommendation R 1896 May 1971

THERMAL INSULATING ASBESTOS BOARDS*

1. SCOPE

This ISO Recommendation applies to thermal insulating asbestos boards. These boards are of two types :

- those essentially for use where thermal insulating is the paramount characteristic, and which are known as asbestos insulating boards;
- those where this property is of less importance due to a higher material density, and which are primarily intended for wall linings and for partitions; they are known as asbestos wallboards.

Both asbestos insulating boards and asbestos wallboards are intended primarily for interior use; however, such boards may be used externally when suitably protected against the ingress of moisture.

Moulded pieces of the same material as thermal insulating boards should have the same basic characteristics as the boards themselves.

This ISO Recommendation defines certain conditions of manufacture, dimensions and acceptance tests** applicable to these products.

2. REQUIREMENTS

2.1 Composition

The boards should be made from a close and homogeneous mixture consisting solely of asbestos fibre and suitable mineral agents and inorganic fillers.

The boards may be left in their natural colour or may be coloured by the addition of mineral colouring matter in the composition; they may also receive adherent coloured or uncoloured coatings or veneers on their surfaces.

2.2 Classification

The boards are classified both according to their density and their thermal conductivity, as follows :

(*a*) *insulating boards*, having a density below 0.9 kg/dm^3 and a thermal conductivity, determined on dried test pieces, not greater than 0.145 W/(m·K) [0.125 kcal/(h·m·°C)],

(*b*) *asbestos wallboards*, having a density from 0.9 to 1.2 kg/dm^3 and a thermal conductivity, determined on dried test pieces, not greater than 0.291 W/(m·K) [0.250 kcal/(h·m·°C)].

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* See also ISO Recommendation R 396, *Asbestos-cement flat sheets.*

** For certain specialized purposes a screw-holding test may be demanded by the purchaser. If so, a testing method as described in Annex B should be used.

2.3 General appearance and finish

The boards should have at least one smooth surface. If required, one surface or both surfaces may be specially finished to produce decorative effects or to assist in subsequent adhesive operations.

The boards should be rectangular and should have straight and regular edges.

2.4 Characteristics

2.4.1 *Geometrical characteristics*. The nominal dimensions (length, width and thickness) of the boards should conform to those in the national standards of the producing country or, failing this, should be as specified in the manufacturers' catalogues.

2.4.1.1 TOLERANCES ON THE NOMINAL LENGTH AND WIDTH

For dimensions

- up to and including 0.25 m : ± 1 mm
- over 0.25 m up to 1.25 m : ± 0.4 %
- over 1.25 m : ± 5 mm

2.4.1.2 TOLERANCES ON THE NOMINAL THICKNESS

For all thicknesses : ± 10 %

2.4.2 *Mechanical characteristics*. Tested as prescribed in clause 2.5.1 (compulsory test), the boards should give the following minimum unit bending strength* :

(*a*) *insulating boards*

- having a density from 0.5 to 0.7 kg/dm^3 ** : 5 MN/m^2 (50 kgf/cm^2)
- having a density exceeding 0.7 but less than 0.9 kg/dm^3 : 8 MN/m^2 (80 kgf/cm^2)

(*b*) *asbestos wallboards*

- having a density from 0.9 to 1.2 kg/dm^3 : 12.5 MN/m^2 (125 kgf/cm^2)

2.4.3 *Physical characteristics*

2.4.3.1 DENSITY. Tested as prescribed in clause 2.5.2 (compulsory test), the boards should have the following densities :

(*a*) *insulating boards* : below 0.9 kg/dm^3

(*b*) *asbestos wallboards* : from 0.9 to 1.2 kg/dm^3

2.4.3.2 THERMAL CONDUCTIVITY. Tested as prescribed in clause 2.5.3 (optional test), the boards should have a thermal conductivity, determined on dried test pieces, not greater than the following values :

(*a*) *insulating boards* : 0.145 W/(m·K) [0.125 kcal/(h·m·°C)]

(*b*) *asbestos wallboards* : 0.291 W/(m·K) [0.250 kcal/(h·m·°C)]

NOTE. – The presence of water in such materials appreciably increases their thermal conductivity. The values given above should therefore be doubled when considering the practical uses of the boards, such as when calculating the total thermal transmission of a complete element of structure. The attention of the user is drawn to this fact.

* The preferred units for pressure and stress used in this ISO Recommendation are in accordance with ISO Recommendation R 1000, *Rules for the use of units of the International System of Units and a selection of the decimal multiples and sub-multiples of the SI units*. The following approximate conversion factor was used :

$$1 \text{ kgf/cm}^2 = 0.1 \text{ MN/m}^2$$

** No test is required on insulating boards of a density below 0.5 kg/dm^3.

2.5 Tests

The acceptance tests should be carried out at the manufacturer's works on boards and test pieces cut from boards which the manufacturer guarantees to be sufficiently matured.

(*a*) COMPULSORY TESTS

1. Bending test (method as specified in clause 2.5.1; number of tests as specified in ISO Recommendation R 390, *Sampling and inspection of asbestos-cement products*).
2. Measurement of the density (method as specified in clause 2.5.2; number of tests as specified in ISO Recommendation R 390).

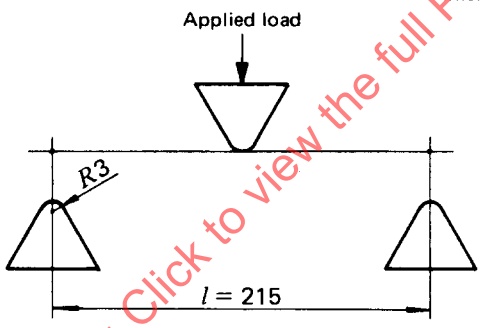
(*b*) OPTIONAL TEST AT PURCHASER'S REQUEST

3. Measurement of the thermal conductivity (method as specified in clause 2.5.3; number of tests as specified in ISO Recommendation R 390).

2.5.1 *Bending test*. The test should be carried out on square test pieces measuring 250 mm × 250 mm, cut from boards. Before testing, the test pieces should be dried to constant mass at a temperature between 100 and 105 °C.

The test piece should be placed on two parallel supports with edges rounded at a radius of 3 mm, leaving between them a clear span of 215 mm. It should be loaded at mid-span by means of a bar of the same shape as and parallel to the supports. (See Figure.) The load should be applied at constant speed and should be so regulated that the breaking point is reached within 15 to 30 seconds.

Dimensions in millimetres



FIGURE

The unit bending strength, expressed in meganewtons per square metre, is given by the formula

$$R_f = \frac{M}{W}$$

where

$$M = \frac{P\,l}{4}$$

$$W = \frac{b\,e^2}{6}$$

P being the breaking load, expressed in newtons;

l being the clear span between the supports, expressed in millimetres;

e being the actual thickness of the test piece in the breaking section, expressed in millimetres; take as the thickness the average of three measurements made along the line of fracture;

b being the actual width of the test piece, expressed in millimetres.

When the test piece has been broken by bending along one axis, the broken pieces should be collected, pieced together and tested again by bending along the axis perpendicular to the first.

Take as the bending strength R_f the arithmetical average of two values so obtained on the same test piece.

2.5.2 *Measurement of the density*. The density should be determined, after drying to constant mass at a temperature between 100 and 105 °C, by weighing and measuring of the volume. The latter may be carried out by any precise method such as by immersion in mercury.

2.5.3 *Measurement of the thermal conductivity*. The thermal conductivity should be derived from measurements of the electrical energy dissipated in a hot plate carefully maintained at a temperature of 50 ± 5 °C, faced on each side with similar test pieces of boards previously dried to constant mass, weighed and measured as indicated in clause 2.5.2.

2.6 Marking

If marking is required, the method used should conform to the national standards of the producing country.

3. INSPECTION AND ACCEPTANCE

Enquiries and orders should specify whether the consignment is to be delivered with or without acceptance tests. Failing this specification in the order, it is presumed to be with acceptance tests if agreements on the date of the tests or the nature of the optional tests have been made between the manufacturer and the purchaser. Otherwise, the consignment is presumed to be without acceptance tests. .

3.1 Inspection of each item of the consignment

3.1.1 The required general appearance and finish (see clause 2.3), the geometrical characteristics (see clause 2.4.1) and the marking (see clause 2.6) of the boards may be verified on each item of the consignment.

3.1.2 Boards which do not satisfy the requirements when submitted to inspection in this way may be rejected.

3.2 Inspection by sampling

3.2.1 The required mechanical characteristics (see clause 2.4.2) and physical characteristics (see clause 2.4.3) of the boards should be verified, if requested, by sampling.

3.2.2 The procedure described in ISO Recommendation R 390, *Sampling and inspection of asbestos-cement products*, applies for the sampling, inspection and acceptance, the maximum and minimum inspection lots being agreed between the manufacturer and the purchaser; failing such an agreement, these should be 400 and 100 boards respectively. If the average size of the boards within a consignment is 1 m^2 or less, the maximum and minimum inspection lots should be 800 and 200 boards respectively.

ANNEX A

TESTING

A.1 CARRYING OUT OF TESTS

The tests should be carried out on a date fixed by agreement.

Unless agreed otherwise, the purchaser should inform the manufacturer when ordering, or not later than two weeks before dispatch, which tests (see clause 2.5) are required.

A.2 ACCESS TO THE WORKS

The purchaser should have free access at any reasonable time to the place of testing and to the stocks for the sole purpose of inspection and testing the materials which he has ordered.

A.3 COSTS OF TESTING

The following tests only should be carried out at the expense of the manufacturer :

- the compulsory tests;
- the optional tests called for when the order is placed;
- the optional tests asked for after ordering and resulting in the rejection of the lot.

By agreement between the manufacturer and the purchaser when ordering, additional tests may be carried out at the purchaser's expense, at the works or in an independent laboratory designated by agreement. The manufacturer should have the right to be represented.

A.4 INSPECTION OF EACH ITEM OF THE CONSIGNMENT

In order to reduce the duration and the costs of the acceptance operations in practice, the inspection of the characteristics made on each item of the consignment (see clause 3.1.1) may, at the purchaser's request, be carried out by an inspection by sampling.

In this case, if the inspection results tend toward the rejection of the lot, the manufacturer may ask for a 100 % inspection on all items of the consignment with regard to the failing characteristic (rejection according to clause 3.1.2).

A.5 PERIOD FOR TESTING

All tests should be completed before delivery of the consignment and at the latest four weeks after the date of sampling.

A.6 MANUFACTURER'S CERTIFICATE

A.6.1 Orders with acceptance tests

If a purchaser or his representative is not present at all or part of the tests, the manufacturer should supply the purchaser with a certificate that the boards satisfied the tests he was unable to witness.

A.6.2 Orders without acceptance tests

For orders without acceptance tests, the manufacturer is considered to have discharged his obligations on completion of delivery.