
International Standard



393 / 4

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Asbestos-cement products — Part 4 : Trapezoidal section sheets for roofing and cladding

Produits en amiante-ciment — Partie 4 : Plaques à section trapézoïdale pour couvertures et revêtements

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 393/4 was prepared by Technical Committee ISO/TC 77, *Products in fibre reinforced cement*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Asbestos-cement products — Part 4 : Trapezoidal section sheets for roofing and cladding

0 Introduction

This part of ISO 393 is one of a series covering asbestos-cement products used mainly for roofing and cladding. The series will comprise :

ISO 393, *Asbestos-cement products* —

Part 1 : Corrugated sheets and fittings for roofing and cladding.

*Part 2 : Asbestos-cement-cellulose corrugated sheets and fittings for roofing and cladding.*¹⁾

Part 3 : Asymmetrical section corrugated sheets and fittings for roofing and cladding.

Part 4 : Trapezoidal section sheets for roofing and cladding.

*Part 5 : Short corrugated and asymmetrical section sheets and fittings for roofing.*¹⁾

1 Scope and field of application

This part of ISO 393 specifies requirements for asbestos-cement trapezoidal section sheets used mainly for roofing and cladding. It also specifies test methods to check conformity with these requirements, together with requirements for marking and acceptance conditions.

It does not apply to corrugated sheets, to asymmetrical section corrugated sheets or to corrugated or asymmetrical section "short sheets"²⁾, which are covered as indicated in clause 0.

2 References

The following International Standard will be needed to apply this part of ISO 393 :

ISO 390, *Asbestos-cement products — Sampling and inspection.*

The following International Standards provide complementary information to this part of ISO 393 :

ISO 7337, *Asbestos reinforced cement products — Guidelines for on-site work practices.*

ISO 8108, *Directives for fixing asbestos-corrugated and asymmetrical section sheets and fittings for roofing.*¹⁾

3 Requirements

3.1 Composition

The trapezoidal section sheets to which this part of ISO 393 applies consist essentially of an inorganic hydraulic binder³⁾ reinforced with asbestos fibres to which other fibres may be added.

Filler and pigments may be added.

The sheets may be left in their natural colour or colouring matter may be added in the composition; they may also receive adherent coloured or uncoloured coatings on their surfaces.

1) At present at the stage of draft.

2) These sheets (about 0,60 m long) are small roofing components.

3) National standards may specify the hydraulic binder to be used.

3.2 Description

3.2.1 Profile (see figures 1 to 7)

The sheets are straight components, the cross-section of which has a trapezoidal shape.

The longitudinal sides are :

- one ribbed, the other flat (see figure 1), or
- both ribbed (see figures 2 and 3), or
- both flat (see figure 4).

In the case of two flat sides, the adjoining sheets meet longitudinally by means of a joint cover of an appropriate form. The characteristics of joint covers shall be defined in manufacturers' technical literature.

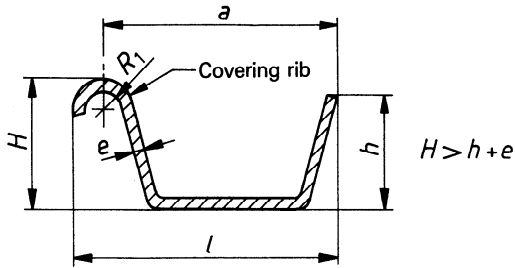


Figure 1

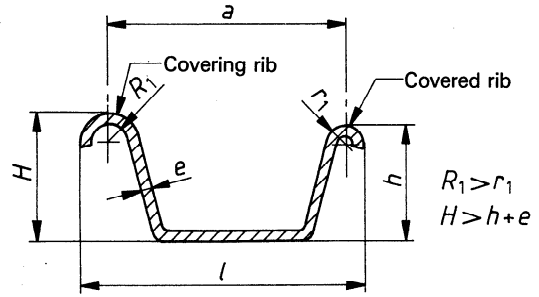


Figure 2

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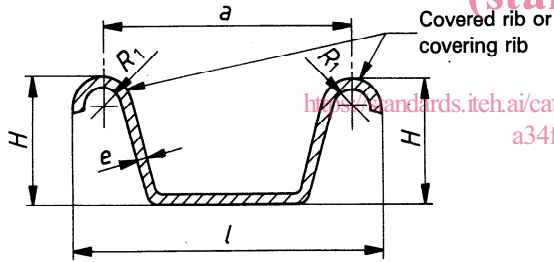


Figure 3

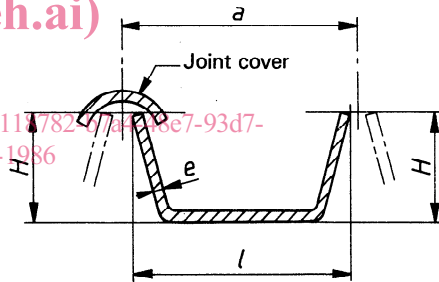


Figure 4

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The sheets are defined by the heights of the sides (H and h), the useful width (a), the total width (l) and, if necessary, by the radius of the ribs (R_1 or r_1).

The useful width a depends on the method of transverse overlapping and varies according to the profile (see figures 1 to 4). Consequently, it shall be defined in manufacturers' catalogues together with the corresponding tolerances.

All dimensions shall be defined to ensure the watertightness of the assembly of the elements (longitudinal assembly, transverse assembly whenever used).

The bottom of the sheets may be flat (see figure 5) or profiled (see figures 6 and 7).

3.2.2 Appearance and finish

The surface intended to be exposed to the weather shall generally have a smooth finish. Variations of the surface ap-

pearance which do not affect the characteristics of the sheets as defined in this part of ISO 393 are permitted.

3.3 Classification

The sheets are classified according to

- the height of their sides, H , in millimetres;
- the minimum bending breaking moment, M , in newton metres per metre of total width.

See table 1.

National standards or, failing this, manufacturers' catalogues shall specify from table 1 the class(es) to be used according to the application.

When the additional deflection is laid down, the total width of the sheet should be known in order to allow determination of half of its minimum bending breaking moment.

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Figure 5



Figure 6

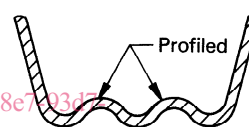


Figure 7

Table 1 – Classification

| Height of sides, H mm | Minimum bending breaking moment, M N·m/m | | | | | | | |
|----------------------------|---|---------|---------|---------|---------|---------|----------|----------|
| | 2 500 | 3 000 | 3 750 | 4 750 | 5 600 | 7 500 | 10 000 | 12 500 |
| < 200 | A 2 500 | A 3 000 | A 3 750 | A 4 750 | — | — | — | — |
| > 200 | — | — | — | B 4 750 | B 5 600 | B 7 500 | B 10 000 | B 12 500 |

3.4 Characteristics

3.4.1 Geometrical characteristics

The dimensions given in this part of ISO 393 are nominal dimensions as defined by national standards or, if not, by the manufacturer.

3.4.1.1 Total width, l

The total width l is defined by

- the useful width a and the dimensions of the ribs (see figures 1, 2 and 3);

or

- the distance between the horizontal edges (see figure 4).

3.4.1.2 Thickness, e

Independent of the class, the effective thickness, determined in accordance with 3.5.3, shall in no case be less than 6 mm.

3.4.1.3 Tolerances on dimensions

The tolerances specified below apply to the nominal dimensions :

- a) on length, L
 - if $L < 6$ m : ± 15 mm
 - if $L > 6$ m : $\pm 0,25$ %
- b) on total width, l
 - + 15 mm
 - 10 mm
- c) on thickness, e
 - + 2 mm
 - 1 mm
- d) on the height of edges (only for sheets having an ascending corrugation on one side and a descending corrugation on the other side) : the difference between extreme values for tolerances, positive or negative, on the nominal height of a given side shall be less than or equal to 15 mm;
- e) on the corrugation of the edges : out of squareness < 10 mm per metre length.

3.4.2 Mechanical characteristics

3.4.2.1 Characteristics of the sheet

The bending moment at rupture shall be determined by the method described in 3.5.4.1 and shall be at least equal to the value given in table 1.

The additional deflection which corresponds to half of the minimum bending breaking moment of the sheet shall not exceed 0,5 % of the free span between the supports.

3.4.2.2 Characteristics of the side of the sheet

The unit bending breaking strength shall be determined by the method described in 3.5.4.2 and shall be at least equal to 16 N/mm².

3.4.3 Physical characteristics

3.4.3.1 Watertightness (optional test)

When tested as described in 3.5.5.1, traces of moisture may appear on the lower surface of the sheets but in no case shall there be formation of drops of water.

3.4.3.2 Frost cracking (if justified by local conditions or specified in national standards) (optional test)

When tested as described in 3.5.5.2, visual examination shall show no cracking, surface alteration or delamination.

3.4.3.3 Density (optional test)

When determined as described in 3.5.5.3, the density shall not be less than 1,40 g/cm³.

3.5 Tests¹⁾

Acceptance tests shall be carried out at the manufacturer's works on sheets and test pieces cut from the sheets, which the manufacturer guarantees to be sufficiently matured.

a) Compulsory tests

- 1) Geometrical characteristics (see 3.4.1),
- 2) Mechanical characteristics, except the measurement of deflection (see 3.4.2);

b) Optional tests (carried out at the purchaser's request) :

- 1) watertightness (see 3.4.3.1),
- 2) frost cracking (if justified by local conditions) (see 3.4.3.2),
- 3) density (see 3.4.3.3),
- 4) mechanical characteristics [additional deflection under load (see 3.4.2)].

3.5.1 Measurement of heights of edges, H and h

The following apparatus is required :

- a flat control area;

1) See annex A.

- a set square, with sides graduated in 0,5 mm divisions, having a length at least equal to the height H , or a metallic rule, graduated in 0,5 mm divisions.

Take three measurements on each edge, whether it is ribbed or not, in the middle and at approximately 50 mm from each end.

The scatter between extreme measurements shall be in accordance with 3.4.1.3.

3.5.2 Measurement of length and width

The apparatus required consists of a smooth flat plane (control area), with dimensions appropriate to the dimensions of the sheets, a rule of length 2 m or a measuring rod graduated in 0,5 mm divisions, two tip-squares or any other appropriate device for measuring the total width.

If the length of the sheet exceeds 2 m, use a decameter graduated in 1 mm divisions or any other appropriate device.

The sheet shall be laid flat on the control area. For each dimension make three measurements : for the width, in the middle and at approximately 50 mm from each end; for the length, in the middle of the bottom and at the top of each side.

Read to the nearest 1 mm and record, for the width and the length, the arithmetic mean of the three measurements. It shall comply with the requirements of 3.4.1.3.

3.5.3 Measurement of thickness

The apparatus required consists of a micrometer with hemicylindrical plates (see figure 9), of dimensions 4 mm x 10 mm and accurate to 0,1 mm.

The measurement shall be made at one end of the sheet at the locations specified in table 2.

Dimensions in millimetres

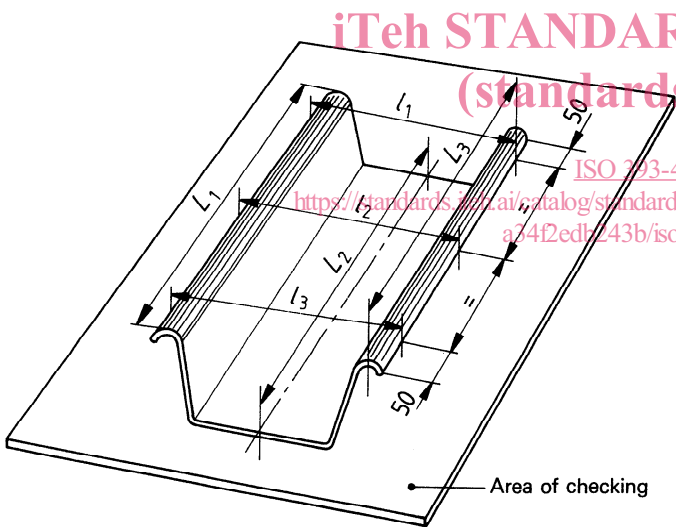


Figure 8

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Dimensions in millimetres

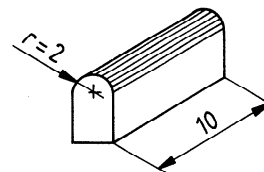


Figure 9