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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Asbestos-cement products —

Part 5 : Short corrugated and asymmetrical section sheets and fittings for roofing

Produits en amiante-ciment —

Partie 5 : Plaques ondulées et plaques nervurées courtes et leurs accessoires pour couvertures

Reference number
ISO 393-5 : 1987 (E)

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 393-5 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 5 :
Short corrugated and asymmetrical section sheets and fittings for roofing

0 Introduction

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

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.

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 Scope and field of application

This International Standard specifies the technical characteristics of corrugated and asymmetrical section sheets, described as short sheets[1] the length of which is less than or equal to 1,25 m; it also covers asbestos-cement fittings used as roofing materials.

It specifies tests to check them and conditions of acceptance.

It also specifies appropriate marking to identify these short sheets from those covered by ISO 393-1 and ISO 393-3.

2 References

ISO 393-1, *Asbestos-cement products — Part 1 : Corrugated sheets and fittings for roofing and cladding.*

ISO 393-3, *Asbestos-cement products — Part 3 : Asymmetrical section corrugated sheets and fittings for roofing and cladding.*

3 Sheets

3.1 Composition

Corrugated sheets and short asymmetrical section sheets to which this part of ISO 393 applies consist essentially of an inorganic hydraulic binder[2] or a calcium silicate binder resulting from a chemical reaction of ground silica and calcium, reinforced with asbestos[3] with or without other fibres.

Fillers 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.

3.2 General appearance and finish

The sheets described as short sheets are components the cross-section of which is defined as follows :

— either by ISO 393-1 for corrugated sheets;

— or by ISO 393-3 for asymmetrical section sheets.

The surface intended to be exposed to the weather shall be generally of smooth finish. Variations of the surface appearance are permitted if they do not impair the characteristics of the sheets as defined in this part of ISO 393.

1) Sheets which are suitable for placing on supports separated normally by about 0,6 to 0,8 m but never exceeding 1,1 m.

2) National standards may specify the binder to be used.

3) In some countries regulations restrict the use of certain fibres.

Edges shall be straight, clean and square. Sheets may have one or two mitred corners and may be drilled for fixing.

3.3 Classification

3.3.1 According to height of the corrugation or rib (category)

The sheets are classified according to the nominal height of their corrugations or ribs h, as in table 1.

Table 1

Category	Nominal height of corrugation, h mm
Shallow corrugations or ribs	15 to 25
Medium corrugations or ribs	26 to 45
Deep corrugations or ribs	46 to 60

3.3.2 According to thickness

The thickness, e, of the sheets may

— be approximately constant throughout the width of the profile (see figure 1, type A); or

— vary regularly between the valley and the crown for corrugated sheets or between the lower part and the upper part of ribs for asymmetrical section sheets, in the same cross-section (see figure 2, type B).

3.3.3 According to minimum bending breaking moment

The different classes of sheets are defined by their category followed by the value of the minimum bending breaking moment (see table 4).

3.4 Characteristics

3.4.1 Geometrical characteristics

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

3.4.1.1 Width

The width, l, is defined by

— the pitch of the corrugation or rib, a,

— the number of complete corrugations or ribs,

— the dimensions of longitudinal overlapping corrugations or ribs.

3.4.1.2 Thickness

In all cases, the effective thickness measured according to 3.5.3 shall not be less than the values in table 2.

Table 2

Category	Minimum thickness, e mm
Shallow corrugations or ribs	3
Medium corrugations or ribs	4
Deep corrugations or ribs	4

3.4.1.3 Number of corrugations or ribs

The number of corrugations or ribs to be considered for the designation is the number of complete corrugations or ribs of the sheet.

Type A

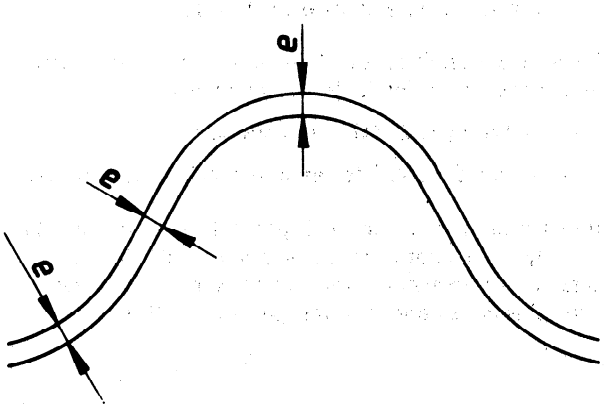

Figure 1

Type B

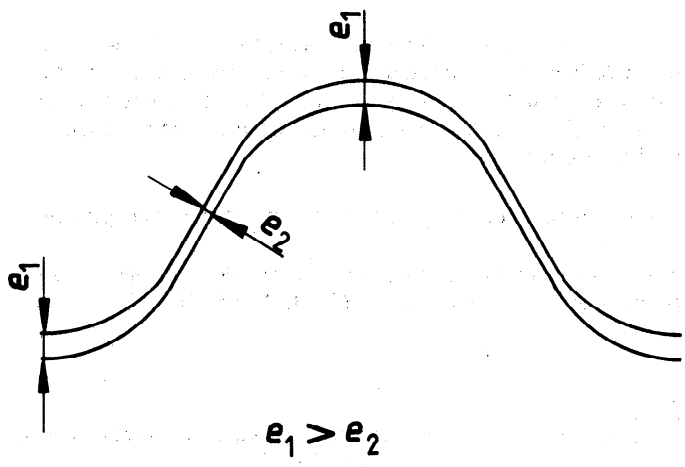

Figure 2

3.4.1.4 Tolerances on dimensions

The tolerances given below apply to nominal dimensions :

a) on the pitch, a, and on the height, h, of the corrugations or ribs : see table 3;

b) on the length, L : ± 10 mm;

c) on the width, l : $\pm \frac{10}{5}$ mm;

d) on the thickness, e : ± 10 % with a maximum of 0,6 mm;

e) on the corrugations of the edges : out-of-squareness < 6 mm per sheet;

f) height of edges (only for sheets having a rising corrugation or rib on one side and a descending corrugation or rib on the other side) : positive or negative tolerance on nominal height of an edge shall be such that the difference between extreme values is always less than or equal to 8 mm.

Table 3

Category	Tolerances mm	
	on the pitch, a	on the height, h
Shallow corrugations or ribs	± 1,5	± 2
Medium corrugations or ribs	± 2	± 2
Deep corrugations or ribs	± 2	± 3

3.4.2 Mechanical characteristics

Tested as provided for in 3.5.5 (compulsory test), sheets shall have, according to their category and class, a bending breaking moment expressed in newton metres per metre of sheet length at least equal to the values indicated in table 4.

Table 4[1)]

Category	Class		
	I	II	III
	N·m/m	N·m/m	N·m/m
Shallow corrugations or ribs	20	30	40
Medium corrugations or ribs	30	40	55
Deep corrugations or ribs	40	55	70

3.4.3 Physical characteristics

3.4.3.1 Watertightness

Tested as specified in 3.5.6.1 (optional test), traces of moisture may appear on the lower surface of the sheets but in no instance shall there be any formation of drops of water.

3.4.3.2 Frost cracking (if local conditions justify it or if national standards so specify)

The sheets tested as specified in 3.5.6.2 (optional test) shall not show any sign of cracking, surface alteration or delamination. This specification does not apply to surface coatings.

3.4.3.3 Density

Measured as indicated in 3.5.6.3 (optional test), the density shall not be less than 1,4 g/cm^3.

In some countries where local conditions of use allow it, national standards may reduce this limit to 1,2 g/cm^3.

3.5 Tests

The acceptance tests shall be carried out at the manufacturer's works on sheets and test pieces cut off the sheets which the manufacturer guarantees to be sufficiently matured.

a) Compulsory tests[2)]

1) Geometrical characteristics (3.4.1)

2) Mechanical characteristics (3.4.2)

b) Optional tests (at purchaser's request) [2)]

3) Watertightness (3.4.3.1)

4) Frost cracking test (3.4.3.2)

5) Density (3.4.3.3).

3.5.1 Corrugation profile check

3.5.1.1 Apparatus

The apparatus necessary is as follows (see figures 3 to 6) :

a) a flat, smooth checking area;

b) steel rolls : length 200 mm and diameter approximately twice the radius of corrugations or ribs, with a conical point at their axis at one end;

1) National standards may choose only one, two or three classes, depending on the local conditions in the area of use.

2) See annex A.

NOTE — For asymmetrical section sheets, with flat corrugations joined by flats, the rolls are replaced by steel blocks, length 200 mm, the cross-section of which is profiled according to the corrugation of the sheet.

c) a micrometer with a hemispherical head, accurate to 0,1 mm;

d) a metal rule of 1 m length, graduated in half-millimetres.

3.5.1.2 Measurement of corrugation pitch, *a*

At one end of the sheet, lay the rolls in each valley of the corrugations or ribs, with the conical point of each roll slightly outside of the sheet. With the graduated rule, measure to the nearest 0,5 mm the distance between consecutive conical points.

Each measurement for the pitch of the corrugations shall be in accordance with the specifications of 3.4.1.4 (table 3).

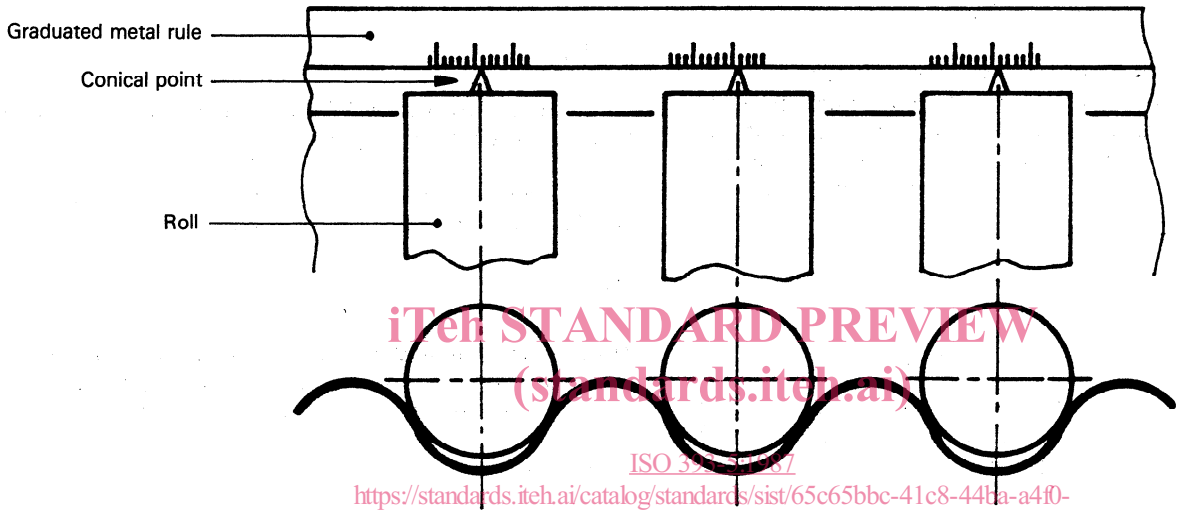

Figure 3

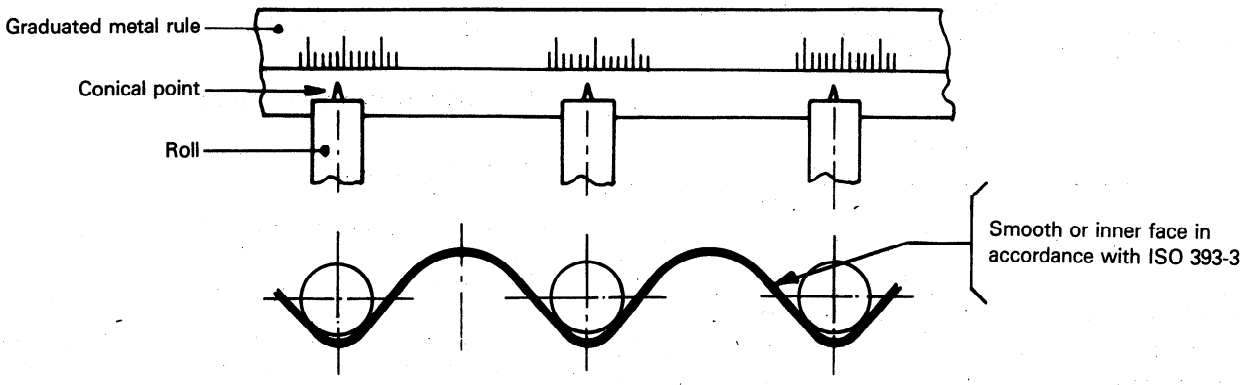

Figure 4

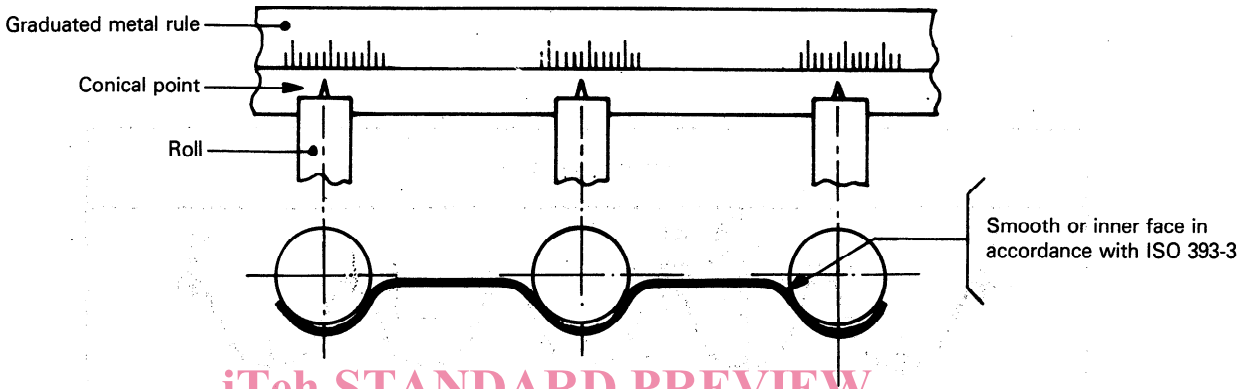

Figure 5

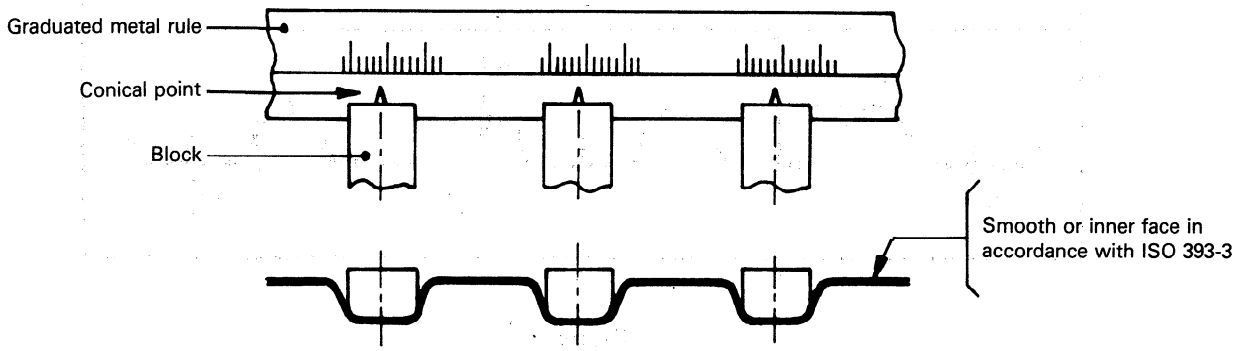

Figure 6

3.5.1.3 Measurement of corrugation or rib height

Choose, on a sheet, two complete corrugations or ribs.

On each of them with the micrometer, take two measurements regularly spaced on the length of the sheet, as shown in figure 7.

Calculate, for each corrugation or rib, the arithmetic average of the measurements. It shall be in accordance with the specifications of 3.4.1.4 (table 3).

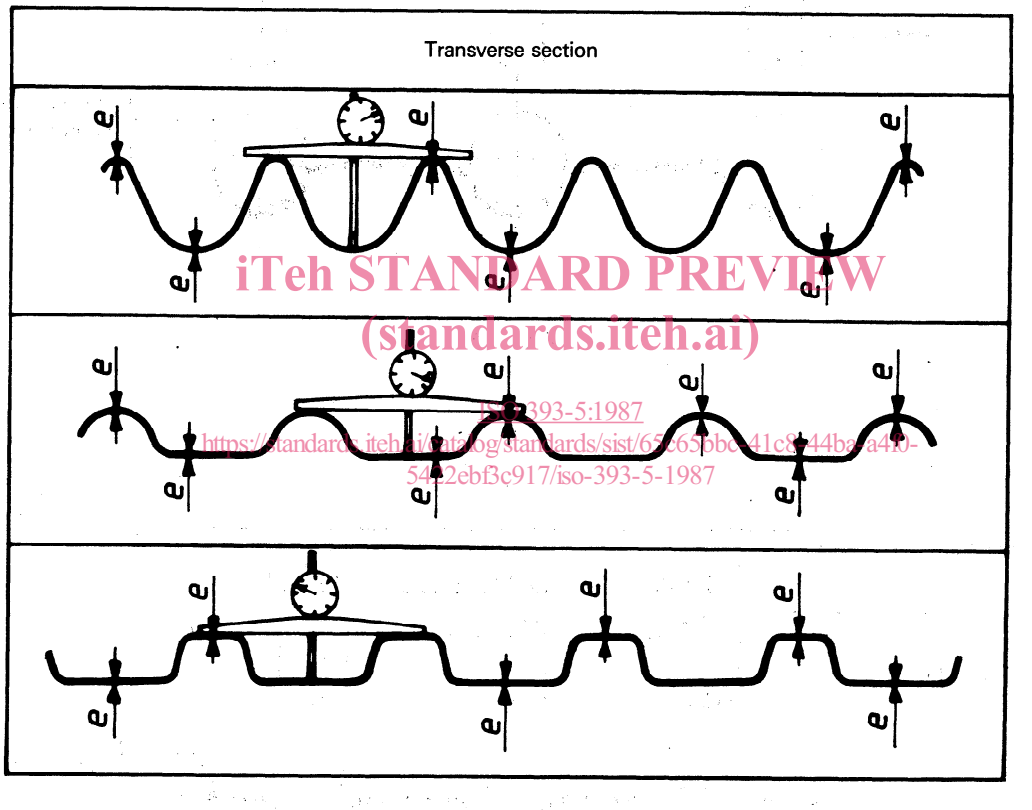

Figure 7

3.5.2 Length and width check

The apparatus consists of a smooth flat surface, with dimensions appropriate to the dimensions of the sheets, a two-metre rule graduated in half-millimetres and two rectangular caliper blocks (see figure 8).

Dimensions in millimetres

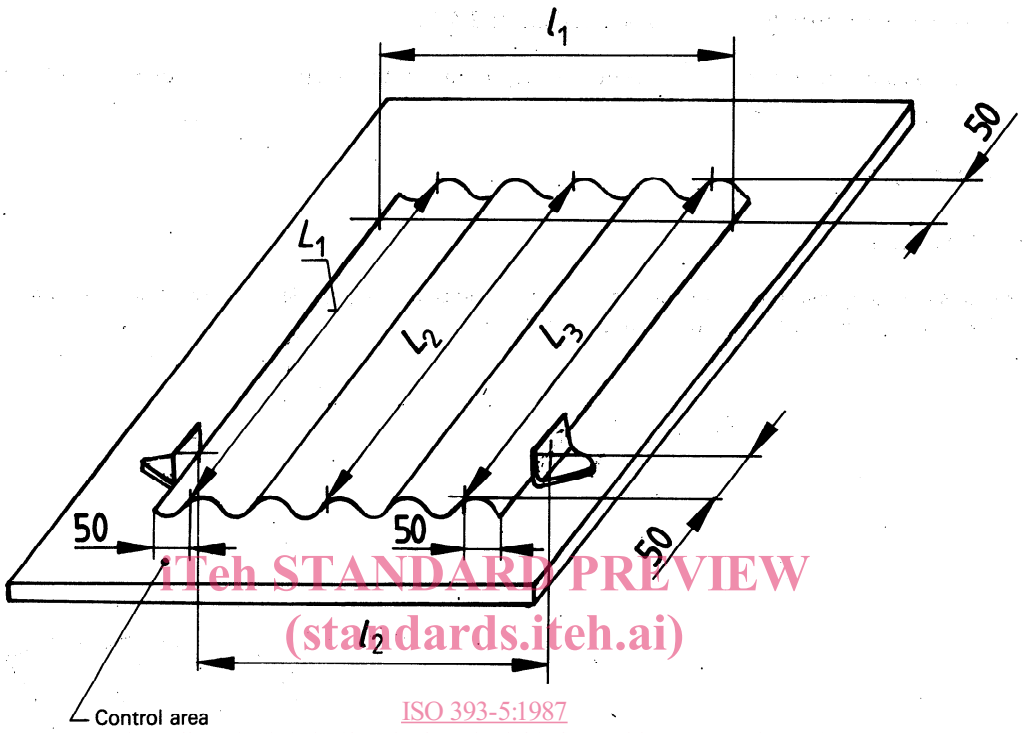

Figure 8

The sheet shall be laid flat and square on the checking area; it shall be verified that the valley of every corrugation or rib is in contact with the surface.

For length take three measurements : in the middle and at approximately 50 mm from each end.

For width, take two measurements at approximately 50 mm from each side with the aid of the rectangular caliper blocks.

Read to the nearest 0,5 mm in all cases. The arithmetic average of the measurements shall be in accordance with the specifications of 3.4.1.4 b) and c).

3.5.3 Thickness check

The apparatus shall consist of a micrometer with hemicylindrical plates (see figure 9) of 4 mm × 10 mm, accurate to 0,5 mm.

Dimensions in millimetres

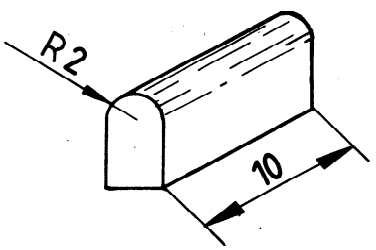

Figure 9