

भारतीय मानक

एस्बेस्टॉस सीमेंट की नालीदार और अर्ध-नालीदार
सीमेंट की चद्दरों की विशिष्टि
(तीसरा पुनरीक्षण)

Indian Standard

**CORRUGATED AND SEMI-CORRUGATED
ASBESTOS CEMENT SHEETS — SPECIFICATION**

(Third Revision)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

This standard was originally published in 1955 and subsequently revised in 1962 and 1970. The present revision has been taken up in the light of experience gained with the use of this standard. The major changes in this revision include deletion of acid resistance and water absorption test, and inclusion of density test as an optional requirement in line with the international practices. Impermeability test has been made optional in this revision. In the composition of such sheets, addition of some other suitable fibres and pozzolanic material have also been permitted.

In the formulation of this standard, due weightage has also been given to the international coordination among the standards and practices in different countries in addition to relating it to the practices in the field in this country.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (revised)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

CORRUGATED AND SEMI-CORRUGATED ASBESTOS CEMENT SHEETS — SPECIFICATION

(*Third Revision*)

1 SCOPE

This standard covers corrugated and semi-corrugated asbestos cement sheets, designed to provide structural weather exposed surfaces of roofs and building walls of industrial, residential, agricultural, commercial and institutional types of buildings and for decorative and other purposes.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
269 : 1989	33 grade ordinary Portland cement (<i>fourth revision</i>)
455 : 1989	Portland slag cement (<i>fourth revision</i>)
1489 (Part 1) : 1991	Portland pozzolana cement: Flyash based
(Part 2) : 1991	Calcined clay based
5913 : 1989	Methods of test for asbestos cement products (<i>first revision</i>)
8041 : 1990	Rapid hardening Portland cement (<i>second revision</i>)
8112 : 1989	43 grade ordinary Portland cement (<i>first revision</i>)
11769 (Part 1) : 1987	Guidelines for safe use of products containing asbestos; Part 1 Asbestos cement products
12081 (Part 2) : 1987	Recommendations for pictorial warning signs and precautionary notice for asbestos and products containing asbestos; Part 2 Asbestos and its products

3 COMPOSITION

The products shall be composed of an inert aggregate consisting of clean asbestos fibre, including other suitable fibres, cemented together either by 33 grade ordinary Portland cement conforming to IS 269 : 1989, rapid hardening Portland cement conforming to IS 8041 : 1990, Portland slag cement conforming to IS 455 : 1989,

Portland pozzolana cement conforming to IS 1489 (Parts 1 and 2) : 1991 or 43 grade ordinary Portland cement conforming to IS 8112 : 1989. Pozzolanic materials, pigments and fillers which are compatible with asbestos cement may be added.

NOTE — In case of Portland pozzolana cement and Portland slag cement, addition of pozzolanic materials shall not be permitted.

4 COLOURING MATTER

4.1 Pigments which are embodied in asbestos for colouring purposes shall be of permanent colour and shall conform to the relevant Indian Standards. For guidance in ascertaining the colour and staining power of the pigments see IS 5913 : 1989.

4.2 The sheets may be left in their natural colour or colouring matter may be added in the composition. They may receive coloured or uncoloured coatings on their surfaces.

5 DIMENSIONS AND TOLERANCES

5.1 The sheets shall conform to the dimensions and tolerances given in Table 1 and Fig. 1 and 2.

5.1.1 For the purpose of measuring the thickness, a dial thickness gauge having a flat anvil of not less than 9 mm diameter accurate to measure 0.1 mm shall be used. The thickness measurement shall be made along the width on each end of the sheet. For corrugated sheets, measure at least three corrugations at each end of the sheet excluding side laps. For semi-corrugated sheets, measure at least three spots at each end of the sheet in which extreme flat portions shall be included. Thickness shall be measured at a distance not less than 20 mm from the edge. Each individual measurement shall be not less than the minimum value specified in Table 1.

5.1.2 The depth of corrugation shall be measured with the help of a depth gauge as follows:

- a) In the case of corrugated sheets, the depth of each of the six corrugations shall be measured on the smooth side and the maximum deviation in any of the cases measured shall not exceed the limits specified in Table 1.

- b) In the case of semi-corrugated sheets, the depths of two central corrugations shall be measured on the rough side and the maximum deviation in any of the two cases measured shall not exceed the limits specified in Table 1.

5.1.3 The pitch of corrugation shall be measured as follows:

- a) In the case of corrugated sheets, the total length over six pitches shall be measured and the length measured over these six pitches shall not vary from six times the specified pitch by the tolerance given (see foot note in Table 1).
- b) In the case of semi-corrugated sheets, the total length over three pitches shall be measured and the length measured over these three pitches shall not vary from three times the specified pitch by the tolerances given (see foot note in Table 1).

6 PHYSICAL AND MECHANICAL CHARACTERISTICS

6.1 Load Bearing Capacity

The load bearing capacity of corrugated and semi-corrugated sheets shall be not less than 5 N/mm width of specimen tested, when tested in accordance with IS 5913 : 1989.

6.2 Impermeability (Optional Test)

The specimens shall not show during 24 hours of test any formation of drops of water except traces of moisture on the lower surface, when tested in accordance with IS 5913 : 1989.

6.3 Frost Cracking (Optional Test)

This test may be performed by mutual agreement between the purchaser and the manufacturer for sheets to be used in special situations likely to be affected by frost. Visual examination of the specimens when tested for frost cracking in accordance with IS 5913 : 1989, shall not show any cracking, surface alteration or delamination.

6.4 Density (Optional Test)

Density of the specimens shall be not less than 1.40 g/cm³, when tested in accordance with IS 5913 : 1989.

7 GENERAL APPEARANCE AND FINISH

7.1 The surface of the sheets intended to be exposed to the weather shall be generally of smooth finish and the finish should permit any minor variation of surface appearance due to method of manufacture which does not impair the strength or performance of the sheets.

7.2 The finished products when delivered shall have a rectangular shape. The corrugations shall be true and regular. The edges of the sheets shall be straight, clean and square.

Table 1 Dimensions and Tolerances of Corrugated and Semi-Corrugated Sheets

(Clauses 5.1, 5.1.1, 5.1.2 and 5.1.3)

All dimensions in millimetres.

Sl No.	Type of Sheet	Depth of Corrugation		Pitch of Corrugation		Overall Width		Effective Width		Nominal Thickness		Length of Sheet ²⁾	
		D	Tolerance	P	Tolerance ¹⁾	B	Tolerance	C	Tolerance	T	Tolerance	A	Tolerance
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
i)	Corrugated	48	+ 3 - 5	146	+ 6 - 2	1 050	+ 10 - 5	1 010	+ 10 - 5	6	+ free - 0.5	1 500 1 750	+ 5 - 10
												2 000 2 250 2 500 2 750 3 000	
ii	Semi-corrugated	45	+ 3 - 5	338	+ 6 - 2	1 100	+ 10 - 5	1 014	+ 10 - 5	6	+ free - 0.5	1 500 1 750	+ 5 - 10
												2 000 2 250 2 500 2 750 3 000	

¹⁾ Tolerance given in this table for pitch of corrugation relates to measurement over six pitches for corrugated sheets and three pitches for semi-corrugated sheets.

²⁾ Nominal lengths other than those specified in col 13 may also be manufactured by mutual agreement between the manufacturer and purchaser.

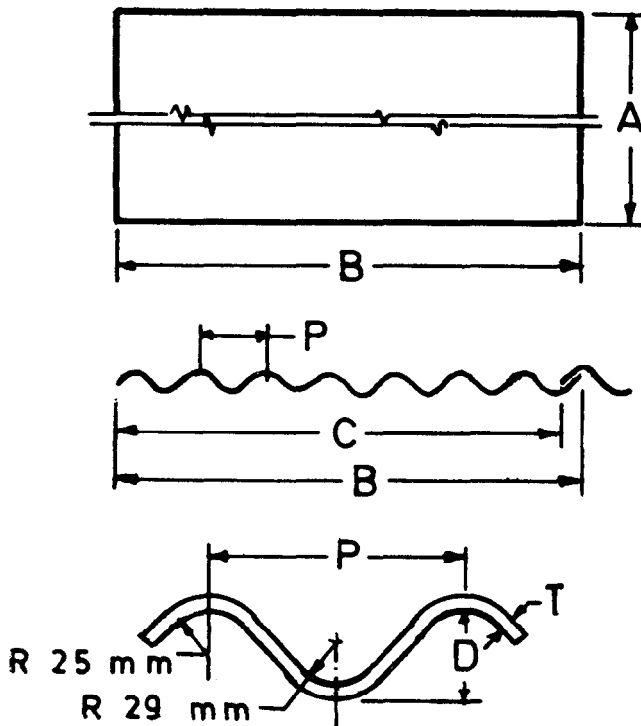


FIG. 1 CORRUGATED SHEETS

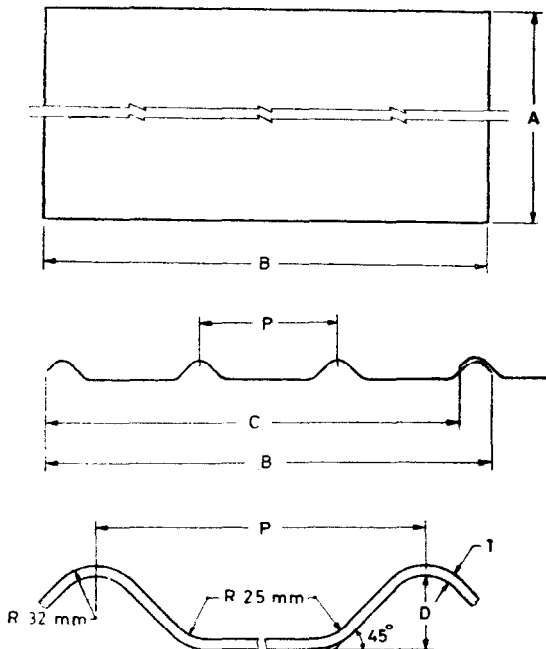


FIG. 2 SEMI-CORRUGATED SHEETS

8 SAMPLING AND NUMBER OF TESTS

8.1 Scale of Sampling

8.1.1 Lot

In any consignment all the sheets of the same type and of the same thickness and manufactured

under similar conditions of production shall be grouped together to constitute a lot.

8.1.1.1 The conformity of a lot to the requirements of this specification shall be ascertained on the basis of tests on the sheets selected from it.

8.1.2 The number of sheets to be selected at random from the lot shall be in accordance with Table 2.

Table 2 Sample Size
(Clause 8.1.2)

Lot Size	Sample Size
(1)	(2)
Up to 500	3
501 to 1 000	5
1001 to 1 500	7
1 501 and above	10

8.2 Number of Test

8.2.1 All the sheets selected as in 8.1.2 shall be measured for dimensions and examined for visual defects.

8.2.2 On each selected sheet, the tests shall be performed as indicated in 6.

9 CRITERIA FOR CONFORMITY

9.1 The lot shall be considered as conforming to the requirements of the specification if the conditions given under 9.2 and 9.3 are satisfied.

9.2 Dimensions, Visual Defects Impermeability, Frost Cracking and Density

The selected sheets shall conform to the requirements specified in 5 and 7. For impermeability, frost cracking and density test the sheets shall conform to the requirements specified in 6.

9.3 Load Bearing Capacity

From the test results of the characteristic, the average (\bar{X}) and the range (R) (difference between the maximum and minimum test result) shall be calculated. The requirement of the characteristic shall be considered to have satisfied if $\bar{X} - 0.2 R$ is greater than or equal to corresponding limit.

10 INSPECTION AND MANUFACTURER'S TEST CERTIFICATE

10.1 The purchaser or his representative shall have access at all reasonable times to the manufacturer's stock area for the purpose of inspecting the materials and products, and selecting and testing the sheets, which shall be so conducted as not to interfere unnecessarily with the loading in the carriers.

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10.2 The manufacturer shall, upon request, furnish the purchaser or his representative with a certificate that the finished products comply with this specification in all respects.

11 TESTING FACILITIES

The manufacturer shall, in all cases and at his own expense, supply labour and appliances for such tests as may be carried out in his premises in accordance with this specification.

12 MARKING

Each sheet shall be indelibly stamped or marked

by any suitable method with the following information:

- a) Indication of source of manufacture,
- b) Year and date of manufacture, and
- c) Pictorial warning signs as given in IS 12081 (Part 2) : 1987.

13 SAFETY RULES SHEET

All deliveries of asbestos cement sheets by the manufacturer shall be accompanied by safety rules sheet as given in IS 11769 (Part 1) : 1987.

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(Continued on page 6)

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 323 01 31, 323 94 02, 323 33 75

Telegrams: Manaksanstha
(Common to
all offices)

Regional Offices:

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

Telephone

{ 323 76 17
323 38 41

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola
CALCUTTA 700054

{ 337 84 99, 337 85 61
337 86 26, 337 86 62

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

{ 60 38 43
60 20 25

Southern : C. I. T. Campus, IV Cross Road, CHENNAI 600113

{ 275 02 16, 235 04 42
235 15 19, 235 23 15

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400093

{ 832 92 95, 832 78 58
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**AMENDMENT NO. 1 MAY 2002
TO
IS 459 : 1992 CORRUGATED AND
SEMI-CORRUGATED ASBESTOS CEMENT
SHEETS — SPECIFICATION**

(Third Revision)

(Page 1, clause 2) — Insert the following reference at the end :

'12269 : 1987 Specification for 53 grade ordinary Portland Cement'

(Page 1, clause 3, line 10) — 'Insert 'or 53 grade ordinary Portland cement conforming to IS 12269 : 1987' after 'IS 8112 : 1989'.

(CED 53)

Reprography Unit, BIS, New Delhi, India