



# Standard Specification for Flat Asbestos-Cement Sheets<sup>1</sup>

This standard is issued under the fixed designation C 220; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers asbestos-cement sheets in flat form designed for industrial, commercial, and general building purposes, of the following types:

1.1.1 *Flat Sheets, Type F (Flexible)*—An asbestos-cement flat sheet suitable for exterior and interior use, where a board having higher strength and density, smoother surface, greater flexibility, and lower moisture absorption is desired.

1.1.2 *Flat Sheets, Type U (Utility)*—An asbestos-cement flat sheet suitable for exterior and interior use, having sufficient strength for general utility and construction purposes, and where a board having maximum flexibility, highest density, smoother surface, and lower moisture absorption is not essential.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:

C 458 Test Method for Organic Fiber Content of Asbestos-Cement Products<sup>2</sup>

C 459 Test Methods for Asbestos-Cement Flat Products<sup>2</sup>

### 2.2 Federal Standard:

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)<sup>3</sup>

### 2.3 Military Standard:

MIL-STD-129 Marking for Shipment and Storage<sup>3</sup>

## 3. Materials and Manufacture

3.1 Flat asbestos-cement sheets shall be composed of a combination of asbestos fiber and portland cement or portland blast-furnace slag cement, with or without the addition of curing agents, water-repellent substances, mineral fillers, coat-

ings, pigments, or mineral granules, formed under pressure and cured to meet the physical requirements of this specification. Sheets shall not contain more than 1 mass % organic fiber, as determined in accordance with Test Method C 458. Table 1 and Table 2.

## 4. Dimensions

4.1 Flat asbestos-cement sheets are normally supplied in the commercial dimensions given in Table 3.

## 5. Permissible Variations in Dimensions

5.1 *Thickness*—The average thickness of all flat sheets supplied under this specification shall be as prescribed in Table 4. The average thickness of any one sheet shall not differ from the average of all sheets by more than 10 %.

5.2 *Width and Length*—The permissible variation from the nominal width shall be  $\pm 1/16$  in. ( $\pm 1.6$  mm), and, from the nominal length,  $\pm 1/8$  in. ( $\pm 3.2$  mm), as measured after 48 h at 73°F (25°C) and 50 % relative humidity.

5.3 *Squareness*—The length of the diagonals shall not vary by more than  $1/64$  in./ft (1.3 mm/m) of length of the sheet. Opposite sides of the sheet shall not vary in length by more than  $1/64$  in./ft.

5.4 *Edge Straightness*—The sheet edges shall be straight within  $1/64$  in./ft (1.3 mm/m) of length or width. Straightness shall be determined by stretching a string or wire along the edge to be measured from one corner to the adjacent corner and measuring the greatest distance between the string or wire and the sheet edge.

## 6. Physical Requirements

6.1 *Flexural Strength*—The average breaking load in newtons (or pounds-force) of dried specimens loaded as simple beams on a span of 10 in. (254 mm) with the load applied equally and simultaneously at both one-third points of the span.

6.1.1 Flexural strength shall not be less than that shown in Table 1.

6.2 *Water Absorption*—The average water absorption shall not exceed the following mass percentages:

Type	Water Absorption, max, %
F	25
U	30

6.3 All measurements and tests necessary for determining the conformity of the asbestos-cement sheets with this specification shall be made in accordance with Test Methods C 459.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C-17 on Fiber-Reinforced Cement Products and is the direct responsibility of Subcommittee C17.03 on Asbestos Cement Sheet Products and Accessories.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.05.

<sup>3</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

**TABLE 1 Flexural Strength Requirements for Dried Specimens Loaded Simultaneously at Both One-Third Points of the Span**

Type		Average Flexural Strength, nominal thickness, mm, (in.)					
		3 (1/8)	4.5 (3/16)	6 (1/4)	10 (3/8)	12 (1/2)	16 (5/8)
F	N (lbf)	140 (30)	330 (75)	589 (130)	1310 (300)	2330 (520)	3620 (810)
U	N (lbf)	... (...)	210 (50)	370 (80)	820 (180)	1470 (330)	2590 (580)

**TABLE 2 Deflection Requirements for Dried Specimens Loaded Simultaneously at Both One-Third Points of the Span**

Nominal Thickness		Average Deflection Under Maximum Load							
		Type F				Type U			
		Parallel to length		Parallel to width		Parallel to length		Parallel to width	
mm	(in.)	mm	(in.)	mm	(in.)	mm	(in.)	mm	(in.)
3	(1/8)	15.5	(0.06)	13	(0.5)	...	...	...	...
4.5	(3/16)	10	(0.4)	7	(0.25)	7	(0.25)	6	(0.24)
6	(1/4)	7	(0.3)	5	(0.2)	5	(0.2)	3	(0.12)
9	(3/8)	4.5	(0.18)	2.5	(0.1)	2.5	(0.1)	2.5	(0.1)
12	(1/2)	0.1	(0.004)	...	...	0.1	(0.004)	0.1	(0.004)
16	(5/8)	...	...	...	...	...	...	...	...

**TABLE 3 Nominal Dimensions**

Type	Nominal Thickness, in. (mm)	Nominal Width, in. (mm)	Nominal Length, in. (mm)
F	1/8, 3/16, 1/4, 3/8, 1/2, 5/8, (3.2, 4.8, 6.4, 9.5, 12.7, 15.9)	48 (1219)	48, 96, 120, 144 (1219, 2438, 3048, 3658)
U	3/16, 1/4, 3/8, 1/2, 5/8 (4.8, 6.4, 9.5, 12.7, 15.9)	48 (1219)	48, 96, 120, 144 (1219, 2438, 3048, 3658)

grounds for rejection. In case of rejection, the seller shall have the right to reinspect the rejected shipment and resubmit the lot after removal of the portion of the shipment not conforming to the specified requirements, provided this is done within 20 days after receipt of notice of the specific cause for rejection.

## 9. Inspection

9.1 Inspection of material shall be made at the point of shipment. The inspector representing the purchaser shall have free access to the carriers being loaded for shipment to the purchaser. He shall be afforded all reasonable and available facilities at the point of shipment for sampling and inspection of the material, which shall be so conducted as not to interfere unnecessarily with the loading of the carriers.

## 10. Packaging and Shipping

10.1 *Commercial Quantities*—The commercial unit for marketing flat sheets is the square foot. Table 3 lists sizes generally available commercially.

10.2 *Commercial Packaging*—Flat sheets shall be so shipped as to ensure acceptance by common carrier. There is no standard package. The material is usually shipped in bulk, but may be crated when so specified by the purchaser.

10.3 *Storage*—Flat sheets should be piled on sufficient firm supports that will keep the sheets level and flat. The sheets shall be piled with the edges square and flush, and covered to provide protection from the weather until used.

## 11. Keywords

11.1 asbestos; abestos-cement flat sheet; sheeting

## 7. Workmanship, Finish, and Appearance

7.1 *Workmanship*— Sheets shall have a commercially smooth surface on one side and be free of major defects that will impair appearance, erection, use, or serviceability.

7.2 *Finish*—The surface of the sheet to be exposed shall be smooth, granular, or otherwise textured.

7.3 *Color*—The surface of the sheet shall be the natural color of the asbestos-cement product or may be colored by the addition of mineral pigments, chemical impregnation, pigmented coatings, veneers, or embedded mineral granules.

7.4 *Efflorescence*— Efflorescence that sometimes may appear on flat asbestos-cement sheets is not a defect and should not result in a permanent change in color.

## 8. Rejection and Retesting

8.1 If the sample fails to conform to any one of the requirements of this specification, a second sample from the same lot shall be prepared and tested. The results of the retest shall be averaged with the results of the original test to determine compliance with this specification.

8.2 Failure to conform to any one of the requirements of this specification, upon retest as prescribed above, shall constitute

**TABLE 4 Thickness Requirements**

Nominal Thickness, in. (mm)	1/8 (3.2)	3/16 (4.8)	1/4 (6.4)	3/8 (9.5)	1/2 (12.7)	5/8 (15.9)
Average Thickness:						
min, in. (mm)	0.100 (2.54)	0.162 (4.11)	0.225 (5.72)	0.345 (8.76)	0.470 (11.94)	0.595 (15.11)
max, in. (mm)	0.150 (3.81)	0.212 (5.38)	0.275 (6.99)	0.405 (10.29)	0.530 (13.46)	0.655 (16.64)

## SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall apply when material is supplied under this specification for U. S. Government Procurement.

### S1. Packaging

S1.1 Unless otherwise specified in the contract, the material shall be packaged in accordance with the suppliers standard practice which will be acceptable to the carrier at lowest rates. Containers and packing shall comply with Uniform Freight Classification Rules<sup>4</sup> or National Motor Freight Classification Rules.<sup>5</sup> Marking for shipment of such material shall be in accordance with Fed. Std. No. 123 for civil agencies and

<sup>4</sup> Available from The Uniform Classification Commission, Room 1106, 222 S. Riverside Plaza, Chicago, IL 60606.

<sup>5</sup> Available from National Motor Freight Inc., 1616 P. St., N. W., Washington, DC 20036.

MIL-STD-129 for military agencies.

### S2. Responsibility for Inspection

S2.1 Unless otherwise specified in the contract or purchase order, the manufacturer is responsible for the performance of all inspection and test requirements specified herein. Except as otherwise specified in the contract or order, the manufacturer may use his own or any other suitable facilities for the performance of the inspection and test requirements specified herein, unless disapproved by the purchaser. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification where such inspections are deemed necessary to assure that material conforms to prescribed requirements.

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