



# Standard Specification for Asbestos-Cement Roofing Shingles<sup>1</sup>

This standard is issued under the fixed designation C 222; 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 approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers asbestos-cement roofing shingles, including accessories, designed to provide the weather-exposed surfaces on roofs of buildings.

1.2 Shingles supplied under this specification are of the following types as to shape and method of application:

1.2.1 *American Method*—Uniform thickness, generally rectangular in shape, with straight or irregular edges. They are intended to be laid with a minimum 2-in. (51-mm) head lap and with no side lap and to provide double coverage. They may be made either as individual or multiple units to simulate the appearance of individual shingles.

1.2.2 *Strip Shingles*—Uniform thickness, various shapes and designs to provide top lap only and shingle coverage under the butt joints, with the design such that it provides only single coverage.

1.2.3 *Strip Shingles*—Uniform thickness, various shapes and designs to provide top lap only and shingle coverage under the butt joints, with the design such that it provides only single coverage.

1.2.4 *Dutch or Scotch Method (Including Ranch Design)*—Uniform thickness with straight or irregular edges and designed to be laid with a lap at the top and on one side of each shingle.

1.2.4.1 *Dutch*—Square in shape.

1.2.4.2 *Ranch*—Oblong-rectangular in shape, with the greater dimension horizontal.

1.2.5 *French or Hexagonal Method*—Uniform thickness, square in shape, having at least three corners clipped to give the desired pattern when the shingles are laid with their diagonals perpendicular to the eave of the roof, with their apex sides lapped.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 **Warning**—Breathing of asbestos dust is hazardous. Asbestos and asbestos products present demonstrated health

risks for users and for those with whom they come into contact. In addition to other precautions, when working with asbestos-cement products, minimize the dust that results. For information on the safe use of chrysotile asbestos, refer to “Safe Use of Chrysotile: A Manual on Preventive and Control Measures.”<sup>2</sup>

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>3</sup>

**C 459** Test Methods for Asbestos-Cement Flat Products

2.2 *Federal Standard*:<sup>4</sup>

**Fed. Std. No. 123** Marking for Domestic Shipment (Civilian Agencies)

2.3 *Military Standard*:<sup>4</sup>

**MIL-STD-129** Marking for Shipment and Storage

2.4 *Other Documents*:

Uniform Freight Classification Rule<sup>5</sup>

National Motor Freight Classification Rules<sup>6</sup>

## 3. Materials and Manufacture

3.1 Asbestos-cement roofing shingles shall be composed of a combination of asbestos fiber and portland cement or portland blast-furnace slag cement, and not more than 1 weight % of organic fiber, with or without the addition of curing agents, water-repellent substances, mineral fillers, coatings, pigments, or mineral granules, formed under pressure and cured to meet the physical requirements of this specification.

## 4. Physical Requirements

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

4.2 *Flexural Strength*—The average breaking load obtained by loading equally and simultaneously at both one-third points of the test span.

<sup>2</sup> Available from The Asbestos Institute, [http://www.chrysotile.com/en/sr\\_use/manual.htm](http://www.chrysotile.com/en/sr_use/manual.htm).

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> Available from Standardization Documents, Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA. 19111-55094, Attn: NPODS.

<sup>5</sup> Available from the Uniform Classification Commission Room 1106, 222 S. Riverside Plaza, Chicago, IL. 60606.

<sup>6</sup> Available from National Motor Freight Inc., 1616 P. St., N. W., Washington, DC 20036.

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4.3 *Deflection*—The average deflection at mid-span at maximum load obtained by loading equally and simultaneously at both one-third points of the test span.

4.4 *Water Absorption*—The average water absorption shall not exceed 25 weight %.

## 5. Dimensions, Mass, and Permissible Variations

5.1 Shingles supplied under this specification shall conform to the dimensions prescribed in **Table 1**. Units of one half normal width shall be supplied in an amount not exceeding two per bundle.

5.2 *Thickness*—The average thickness of all units supplied under these specifications shall be as shown in **Table 2**, and the average thickness of any one unit shall not vary from the average of all units within the shipment by more than 10 %. For textured shingles, this thickness shall be construed as the gross overall measurement from the top of the textured surface to the back of the unit.

5.3 *Width and Length*—The permissible variation from the nominal width or length shall be  $\pm 1/8$  in. ( $\pm 3.18$  mm), as measured after 48 h at 73°F (23°C) and 50 % relative humidity.

## 6. Workmanship, Finish, and Appearance

6.1 *Workmanship*—The surface of the shingles to be exposed shall be free of defects that impair appearance or serviceability.

6.2 *Finish*—The surface of the shingles to be exposed shall be smooth, grained, granuled, coated, or otherwise textured.

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

6.4 *Holes for Nails and Fasteners*—Holes for nails and fasteners shall be provided in the units during manufacture and shall be so placed as to provide at least the minimum lap as specified in **Table 1** and to allow for proper application of necessary clips or storm fasteners.

6.5 *Efflorescence*—Efflorescence that sometimes appears on asbestos-cement shingles is not a defect and shall not result in a permanent change in color.

## 7. Supplementary Shapes

7.1 *Starters*—Starter pieces, for application at the eaves, are available for each type of shingle and shall have the same general characteristics as the shingles.

7.2 *Hip and Ridge Finishing Pieces*—Finishing pieces, for application on hips and ridges, are available for each type of shingle and shall have the same general characteristics as the shingles.

7.3 *Ridge Roll*—Curved or angular ridge roll is available for certain types of shingles and shall have the same general characteristics as the shingles.

## 8. Nails and Fasteners

8.1 Nails for application of shingles to wood decks, special fasteners for attaching shingles to nonwood decks, and storm anchors and clips are accessories which are not furnished with the shingles, but must be purchased separately.

8.2 Nails and fasteners shall have flat heads substantially larger than the diameter of the holes in the shingles with which they are to be used. The nails shall be of such length as to hold securely in the deck.

8.3 Storm anchors or clips shall have flat bases substantially larger than the diameter of the holes in the shingles with which they are to be used. Storm anchors shall be of adequate length to secure the shingles in place.

8.4 Nails and fasteners shall be made of corrosion-resistant, nonstaining metal. Storm anchors or clips shall be corrosion-resistant, nonstaining metal, and shall be readily bendable.

## 9. Underlayment Sheet

9.1 Underlayment sheet material for use in the application of asbestos-cement shingles is not furnished with the shingles, but must be purchased separately.

9.2 Asphalt-saturated felt, preferably asbestos felt where maximum fire resistance of the roof covering is desired, is suitable for underlayment use. Coal tar-saturated felt is not suitable. The felt shall weigh not less than 13 lb/100 ft<sup>2</sup> (63.5 kg/100 m<sup>2</sup>). Underlayment sheet material for use with asbestos-cement shingles shall be water-resistant, of the “breather” type, permeable to water vapor.

## 10. Rejection and Retesting

10.1 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.

**TABLE 1 Nominal Dimensions, in. (mm)**

Type	Width (Horizontal)	Height (Vertical)	Minimum Lap		
			Top <sup>A,B</sup>	Head <sup>A,B</sup>	Side <sup>A,B</sup>
American method	8 to 32 (203 to 813)	12 to 18.5 (305 to 470)	...	2 (51)	...
Strip shingle	12 to 32 (305 to 813)	variable	2 (51)	...	...
Dutch or Scotch	16 (406)	16 (406)	3 (76)	...	4 (102)
Ranch	24 (610)	12 (305)	2.5 (64)	...	4 (102)
French or hexagonal	16 (406)	16 (406)	3 (76)	...	3 (76)

<sup>A</sup> Headlap with shingles that provide double coverage and top lap with shingles that provide single coverage is defined as the shortest distance between the lower edge of a course of shingles and the most proximate underlying area of roof deck not covered by the preceding courses of shingles. At butted side joints, between individual units, complete and continuous coverage shall be provided by the undercourse shingles. Side lap has a similar meaning in respect to the shortest horizontal distance from the exposed side edge to uncovered roof deck area.

<sup>B</sup> The unit dimensions and laps given in this table are an indication of customary current manufacture and shall not be construed to limit or fix the width, length, or lap dimensions of shingles that conform to all other requirements of this specification.



TABLE 2 Physical Requirements

Nominal Thickness, in. (mm)	Minimum Thickness, in. (mm)	Minimum Breaking Load, lbf (N)		Minimum Deflection, in. (mm)
		Strong Direction	Weak Direction	
3/16 (4.5)	0.150 (4.1)	47 (210)	30 (170)	0.25 (7)
1/4 (6)	0.220 (5.7)	83 (370)	70 (310)	0.2 (5)
5/8 (10)	0.340 (8.8)	155 (690)	128 (570)	0.01 (2.5)

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

### 11. Inspection

11.1 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.

### 12. Packaging and Shipping

12.1 *Commercial Quantities*—The commercial unit for marketing asbestos-cement roofing shingles is the “square.”

One square is sufficient material to cover 100 ft<sup>2</sup>(9.29 m<sup>2</sup>) of roof area when applied according to the manufacturer’s directions. Supplementary shapes (starters, hip and ridge pieces, ridge roll) are not included with the shingles, but must be purchased separately.

12.2 *Commercial Packaging*—Unless otherwise specified, asbestos-cement roofing shingles shall be packaged in bundles in accordance with accepted commercial practice, to ensure acceptance by common carrier.

12.3 *Job Protection*—Packages of asbestos-cement roof shingles shall be stacked upon a raised, rigid, flat supporting base, and to avoid discoloration, shall be kept completely covered, protected from the weather, clean and dry, until applied.

### 13. Keywords

13.1 asbestos-cement; roofing shingles; shingles

## 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 producer’s standard practice which will be acceptable to the carrier at lowest rates. Containers and packing shall comply with Uniform Freight Classification Rules or National Motor Freight Classification Rules. Marking for shipment of such material shall be in accordance with **Fed. Std. No. 123** for civil agencies and **MIL-STD-129** for military agencies.

### S2. Responsibility for Inspection

S2.1 Unless otherwise specified in the contract or purchase order, the producer is responsible for the testing of all material

to assure compliance with the requirements specified herein. Except as otherwise specified in the contract or order, the producer shall 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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