

CHAPTER 7

ASBESTOS-CEMENT ROOFING

Section I. DESCRIPTION AND GENERAL DISCUSSION

7.1.1 General

Asbestos-cement roofing is composed mainly of portland cement and asbestos fibers. The mixture is formed, while wet, under pressure and is then cured, usually by steam. Since it is composed entirely of inorganic materials, asbestos-cement roofing is extremely resistant to normal weathering. It is quite brittle initially and becomes more brittle on long exposure. Hence, foot traffic on asbestos-cement roofing must be strictly limited, particularly on shingles. For information on the application of asbestos-cement shingles, it is suggested that the following publication be obtained: "Mineral Fiber Roof Shingles Application Manual," published by the Mineral Fiber Products Bureau, 509 Madison Avenue, New York, N.Y. 10022.

7.1.2 Types

7.1.2.1 General. Basically, asbestos-cement roofing consists of four major types of shingles and the corrugated sheets. The American method shingles (individual shingles) are $\frac{1}{4}$ inch thick and should not be applied on slopes of less than 4 inches per foot. Multiple-unit shingles and shingles laid by the dutch-lap and hexagonal methods are $\frac{5}{32}$ inch thick and should not be applied on slopes lower than 5 inches per foot. Corrugated sheets should not be applied on slopes of less than 3 inches per foot.

7.1.2.2 American Method Shingles. American method shingles are so-called because of their shape and finish. Laid in a rectangular pattern and having a simulated wood grain surface, they produce an appearance similar to wood shingles. Their butt thickness results in deep shadow lines. They are, as other types of shingles, packaged and sold by the square. In size, number per square, and weight per square, they vary slightly among different manufacturers; however, they are generally $\frac{1}{4}$ inch thick and provide greater weight and better coverage than any of the other types. This type shingle is also produced with surface, color, and edges similar to slate.

7.1.2.3 Dutch Lap Shingles. Dutch lap shingles, sometimes called Scotch lap, are larger than conventional shingles and are lapped at one side. This method of application can effect savings in both material and labor. They are 16 inches by 16 inches in size and are manufactured with a simulated texture. Always head-lapped 3 inches, they can be applied either with a $\frac{1}{4}$ or a $\frac{1}{3}$ side-lap. With a $\frac{1}{4}$ side-lap the exposed area is 13 inches by 12 inches. A square (92 shingles) weighs approximately 265 pounds. A $\frac{1}{3}$ side-lap leaves an exposed area of 13 inches by $10\frac{2}{3}$ inches. This type shingle is also available in the 12 inches by 24 inches Ranch Design.

7.1.2.4 Hexagonal Shingles. The hexagonal type shingle, also known as the French method, is nearly square and has a smooth finish. They are 16 inches by 16 inches and are applied in a diamond pattern, thus creating a hexagonal or honeycomb appearance. A square (88 shingles) weighs approximately 240 pounds.

7.1.2.5 Multiple-Unit Shingles. Multiple unit shingles are produced in large units, each of which covers an area equal to that of 2 to 5 standard-sized shingles. Different manufacturers make various styles and sizes, but when installed they all retain the general appearance of American method shingles applied individually. The five-sided triangular top shingle, which is one of the most popular, for example, is 14 inches by 30 inches with a weather exposure of 6 inches by 30 inches when applied. A square (80 shingles) weighs approximately 325 pounds.

7.1.2.6 Corrugated Sheets. Corrugated asbestos-cement roofing is furnished in sheets 42 inches wide and 1 to 12 feet long in increments of 6 inches. Each sheet has 10 corrugations having 4.2 inch pitch and $1\frac{1}{2}$ inch depth. The corrugations are thicker at ridges and valleys than at sides but average about $\frac{3}{8}$ inch thick. Roofing may weigh slightly over 500 pounds per square applied, and is used principally on industrial buildings. All roofing laps should be laid in a continuous bead of cement as recommended by the manufacturers. Sheets are

normally laid with a side lap of one corrugation and an end lap of not less than 6 inches. In localities where driving rain or snow occur or if roof slope is less than 4 inches per foot, side and laps should be increased.

7.1.3 Fire Resistance Rating

Asbestos-cement shingles that provide two or more thicknesses (American method) over a layer of 15-

pound asphalt-saturated asbestos felt are eligible for the class A fire-resistance rating of the Underwriters' Laboratories, Inc., which indicates that they are effective against severe fire exposure. Single-coverage shingles (Dutch lap or hexagonal methods) over 15-pound asphalt-saturated asbestos felt are eligible for the class B rating, indicating effectiveness against moderate fire exposure.

Section II. ROOF DECKS FOR ASBESTOS-CEMENT ROOFS

7.2.1 Asbestos-Cement Shingles

Wood decks for asbestos-cement shingle roofs should be of well-seasoned sheathing lumber, not less than 1 inch in thickness, not more than 6 inches wide and, preferably, tongued and grooved. The roof deck should be kept dry at all times. Sheathing boards should be fastened to each rafter with two nails to provide a smooth, even surface. Plywood with exterior glue may also be used for sheathing. A rigid roof frame is required because of the tendency of asbestos-cement roofing to crack at the fasteners when small movements occur. The deck

should be covered with 15-pound asphalt-saturated felt prior to laying the shingles. Tar-saturated felt should not be used. This underlayment is necessary to guard against the infiltration of wind and rain. In addition, it provides a cushion for the asbestos-cement shingles.

7.2.2 Corrugated Asbestos-Cement Sheets

Corrugated asbestos-cement sheets are normally laid over open wood or steel framing.

Section III. STORAGE AND HANDLING OF ASBESTOS-CEMENT ROOFING

7.3.1 Asbestos-Cement Shingles

Asbestos-cement shingles should be kept dry at all times. Exposure to moisture during transportation or storage may cause discoloration of the shingles. Shingles should be stacked on edge, preferably on planks at least 4 inches from the ground, if stored outdoors. Piles of shingles should be not more than 4 feet high. Asbestos-cement shingles should be handled carefully to avoid breakage. If bundles are wired, they should not be lifted by the wires.

7.3.2 Corrugated Asbestos-Cement Sheets

Asbestos-cement corrugated sheets should be stored and handled with the same care as asbestos-cement shingles. They should always be kept dry. Crated sheets should not be uncrated until needed. When uncrated they should be placed on firm, level supports, preferably on pieces 2 inches by 4 inches spaced 12 inches to 18 inches and laid at right angles to the corrugations. Sheets should not be stacked more than 4 feet high. (Some manufacturers recommend 2 feet.)

Section IV. DETERMINING TREATMENT FOR ASBESTOS-CEMENT ROOFS

Investigation has shown that mechanical damage, such as from hail, traffic, limbs of trees, warping of the roof deck, etc., and failure of fasteners, constitute the principal causes of maintenance and repair work on asbestos-cement roofs. If only a few shingles or corrugated sheets are broken, they should be removed and new ones applied. If a large percentage (25 percent or more) are broken, they should all be removed and a new roof applied. The age and condition of undamaged units should determine whether those salvaged from the old roof

should be reused with new units. When an asbestos-cement roof fails because of failure of the fasteners, the failure is usually a general one and piecemeal repair is futile. When such failure occurs, normally on a very old roof, it is best to remove the entire roof. Whether the old roofing should be reapplied must be determined by its age and condition. No sharp distinction can be drawn between maintenance and repair work in asbestos-cement roofing. Maintenance and repair methods are therefore treated under one heading.

Section V. MAINTENANCE AND REPAIR METHODS—ASBESTOS-CEMENT ROOFING

7.5.1 Asbestos-Cement Shingles

7.5.1.1 Removing Broken Shingles and Applying New Ones.

7.5.1.1.1 Shingles Applied by the American Method. Follow the method described and illustrated in chapter 8, for replacing a broken slate with a new one. The same procedures can be followed with multiple-unit shingles.

7.5.1.1.2 Shingles Applied by the Hexagonal Method. Straighten the anchors, shatter the shingle and remove the broken pieces. Use the nail ripper to cut or draw the nail. Punch a hole in a small piece of copper, galvanized iron, or painted tin, place over a bottom anchor and nail firmly to the roof deck. Notch a new shingle to pass side anchors. Slide the new shingle into place over the bottom anchor and bend down to hold it in place.

7.5.1.1.3 Shingles Applied by the Dutch-Lap

Method. Shear off nails and storm anchors with a ripper and remove the broken shingle. Loosen nail in exposed shingle and insert a new anchor. Drive loosened nail home. Apply two spots of roofing cement to the underlying shingle and insert new shingle engaging the storm anchors. Embed the new shingle in the spots of roofing cement and clinch anchors.

7.5.2 Asbestos-Cement Corrugated Sheets

Broken asbestos-cement corrugated sheets should be replaced with new ones fastened in the same manner as the original sheets. If this is not practicable, toggle bolts with lead or plastic washers may be used. These bolts pass through holes somewhat larger than the bolt and when drawn tight, the washer forms a waterproof seal.

Section VI. REROOFING WITH ASBESTOS-CEMENT ROOFING

7.6.1 Asbestos-Cement Shingles

7.6.1.1 Preparing Deck for Reroofing. For instructions for preparing the roof deck for reroofing with asbestos-cement shingles when the existing roofing is removed and when asbestos-cement shingles are to be applied over an existing asphalt-shingle or roll-roofing roof, refer to paragraph 5.6, "Reroofing with Asphalt Shingles." While it is entirely possible to apply asbestos-cement shingles over the roofings mentioned, the long service that is normally expected of asbestos-cement shingles indicates that the better practice is to remove the existing roofing, make the repairs to the deck necessary to bring it to as nearly "new" condition as practicable, and cover the deck with a 15-pound asphalt-saturated felt, laid horizontally, with a 2-inch headlap. End laps should be a minimum of 4 inches. Nail the felt with sufficient large-headed roofing nails to hold it in place during application of shingles.

7.6.1.2 Applying Asbestos-Cement Shingle Roof. Space limitations do not permit inclusion of instructions for applying all types of asbestos-cement shingles. Step-by-step directions for installing multiple-unit shingles are described below. Essentially this same method is used for American method shingles. Detailed instructions for applying other types can be obtained from their manufacturers.

7.6.1.2.1 Starter Course. Lift up the edge of underlayment at the eaves and lay a full-size starter shingle. Let it over-hang the eaves and gable

approximately 1 inch and secure it with four galvanized nails. Apply succeeding starters, spaced $\frac{1}{16}$ inch apart, in the same manner until entire course is laid.

7.6.1.2.2 First and Succeeding Courses. The first course of the main roof is laid directly over the starter course starting with a half shingle with the vertical edge projecting 1 inch beyond the gable and butt edge projecting 1 inch beyond the eaves. Fasten each shingle with four galvanized nails. Do not drive nails "home" as in laying wood shingles. Lay the second course with a full-size shingle so that the shoulder coincides with the point of the underlying course. A 6-inch exposure is automatically obtained. Start the succeeding course with a half-size shingle, then a full-size shingle, alternating with each course.

7.6.1.2.3 Hip and Ridge Finish. Lay roof shingles so that they butt closely against furring strips placed at hips and ridges. Cover furring strips with asbestos felt and apply hip and ridge shingles. Start laying the ridge shingles on main roof at the end of the ridge farthest away from prevailing storms. When covering hips, start at the lower end. Fasten each shingle with two nails and point up with slaters cement.

7.6.1.2.4 Nails. Large-head, galvanized, needle-point roofing nails should be used. For new roofs, $\frac{1}{4}$ inch nails are adequate; for application over existing roofs, 2-inch nails should be used. For application over plywood decks, nails should be barbed or threaded.

7.6.2 Asbestos-Cement Corrugated Sheets

Asbestos-cement corrugated sheets should be applied in accordance with current specifications for new construction. Manufacturers of asbestos-

cement corrugated sheets maintain engineering and estimating services to assist users in determining the quantities of materials required for particular jobs. At least two manufacturers should be consulted.