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Legacy report on the 1997 *Uniform Building Code*™

DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07320—Roof Tiles

STEEL AND ALUMINUM ROOFING PANELS

DELTA BUILDING PRODUCTS LTD.
9969 RIVER WAY
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CANADA

1.0 SUBJECT

Delta Tile Panels and Delta Hidden Fastener Tile Panels.

2.0 DESCRIPTION

2.1 General:

2.1.1 Delta Tile Panels: The Delta Tile panels are pressure-formed from corrosion-resistant, structural-quality steel sheet and from aluminum sheet, and have an overall width of 43.5 inches (1105 mm), with an installed horizontal exposure of 39.3 inches (998 mm). The panels consist of six modules, each 7.8 inches (198 mm) wide and 15 inches (381 mm) long, with panel lengths of up to 30 feet (9144 mm). The panels overlap on the side and ends and are fastened with screws supplied by Delta Building Products. Accessory gable, ridge, hip and other trim components are produced in a similar manner. See Figure 1 for panel and trim component profiles.

2.1.2 Delta Hidden Fastener Tile Panels: The Delta Hidden Fastener Tile panels are pressure-formed from corrosion-resistant, structural-quality steel sheet and from aluminum sheet and have an overall width of 21.5 inches (546 mm), with an installed exposure of 18 inches (457 mm). The panels consist of two modules, each 9 inches (229 mm) wide and 15 inches (381 mm) long, with panel lengths from 16.25 inches to 15 feet (413 mm to 4572 mm). The panels are fastened on the overlapping left edge with screws supplied by Delta Building Products Ltd., and interlock with adjacent panels from right to left and overlap on the top and bottom. Accessory gable, ridge, hip and other trim components are produced in a similar manner. See Figure 1 for panel and trim component profiles and Figures 2 and 4 for attachment.

2.2 Materials:

2.2.1 Steel Roofing Panels: Steel panels are manufactured from steel complying with ASTM A 653, SS, Grade 33, and have a G90 galvanized coating. The base-metal thickness of

the steel is 0.019 inch (0.482 mm). The panels have an installed weight of 0.90 psf (4.39 kg/m²). The panels are coated on the top with a fluorocarbon paint to a minimum thickness of 1.0 mil (0.0254 mm).

2.2.2 Aluminum Roofing Panels: Aluminum panels are manufactured from 3003-H24 aluminum alloy complying with ASTM B 209, and have a minimum uncoated thickness of 0.0276 inch (0.701 mm). The panels have an installed weight of 0.45 psf (2.20 kg/m²). The panels are coated on the top with a fluorocarbon paint to a minimum thickness of 1.0 mil (0.0254 mm).

2.2.3 Fasteners: Fasteners for the steel panels are No. 10 [0.155-inch-diameter shank (3.94 mm)], 1/4-inch-diameter-head (6.4 mm), galvanized steel screws, having both a galvanized steel washer and a butyl rubber washer, and are supplied by Delta Building Products Ltd.

Fasteners for the aluminum panels are No. 10 [0.155-inch-diameter shank (3.94 mm)], 1/4-inch-diameter-head (6.4 mm), stainless steel screws, having both a stainless steel washer and a butyl rubber washer, and are supplied by Delta Building Products Ltd.

2.2.4 Roof Slope: Minimum roof slope is 3:12 (25%), except as noted in Section 2.2.5.

2.2.5 Underlayment: The panels described in this report, installed on roofs having a minimum slope of 3:12 (25%), require spaced or solid sheathing with a minimum of one layer of Type 15 or Type 30 organic-fiber felt underlayment or one layer of Elk VersaShield (recognized in ESR-2053). On construction permitted to be nonrated roofing, a membrane complying with the ICC-ES Acceptance Criteria for Roof Underlayments (AC188) may be used as an alternative to Type 15 or Type 30 saturated felt.

2.2.6 Barrier Materials: The barrier materials consist of minimum 1/4-inch-thick (6.4 mm) Dens-Deck® Roof Board, manufactured by Georgia-Pacific Corporation, or 0.035-inch-thick (0.889 mm) FR-50 cap sheet manufactured by Atlas Roofing Corporation, or Elk VersaShield (ESR-2053).

2.2.7 Flashing: Flashing components are manufactured of the same steel and aluminum materials and with the same gage thickness described in Sections 2.2.1 and 2.2.2, except for the aluminum Gable Cap and Ridge Cap, which are manufactured from aluminum alloy 5182 Temper 0, complying with ASTM B 209 and having a minimum uncoated thickness of 0.22 inch (0.559 mm).

2.3 Installation—New Roofing:

2.3.1 Delta Tile Panels: The panels are designed to be installed directly on wood sheathing or on spaced sheathing complying with the UBC. Underlayment is attached to the deck in accordance with the UBC.

Valleys are formed using valley trim, illustrated in Figure 1, supplied by Delta Building Products. The valley trim is attached to the deck using screw clips, installed four per side every 10 feet (3048 mm). Valley flashing end laps must be a minimum of 4 inches (102 mm). The valley flashing must have one layer of Type 15 felt underlayment, 36 inches (914 mm) wide, directly under the full flashing length. See Figure 3 for typical installation details.

The panels are overlapped with adjacent panels a minimum of 4.25 inches (107.9 mm), and are fastened to sheathing with the fasteners described in Section 2.2.3 using the fastener pattern illustrated in Figure 4. Fasteners must be of sufficient length to penetrate through the sheathing. Panels adjacent to the ridge are adjusted by cutting in the field.

Hip and ridge caps are supplied by Delta Building Products. The hip and ridge caps must be attached with fasteners described in Section 2.2.3 to the panels on both sides of the caps, using fasteners spaced at 15 inches (381 mm) on center.

Prefabricated rubber or silicone pipe flashings must be used for pipe penetrations in the roof. The flashings must be attached in accordance with the flashing manufacturer's instructions. Openings through the tile for roof vents must be adequately weatherproofed and supported by additional blocking or roof framing as necessary.

2.3.2 Delta Hidden Fastener Tile Panels: Delta Hidden Fastener Tile panels are installed similarly to the Delta Steel Tile panels except that the panels are fastened on the left side with screws described in Section 2.2.3. Panel attachment is located as shown in Figure 4.

2.3.3 Severe Climate Areas: For use in severe climate areas subject to wind-driven snow, ice buildup, or wind-driven dust or sand, both of the following are required:

1. Solid sheathing with two layers of Type 15 felt or one layer of Type 30 felt for the field of the roof.
2. Solid sheathing with two layers of Type 15 felt applied shingle-fashion, solid- cemented together with approved cementing material between the plies, the felt layers extending from the eave up the roof to a point 36 inches (914 mm) inside the exterior wall line of the building.

2.3.4 Roof Classification:

2.3.4.1 Noncombustible Roof Covering: When installed in accordance with Section 2.3 of this report over spaced or solid sheathing, the steel roof panels are noncombustible roof coverings in accordance with UBC Section 1504.2.

2.3.4.2 Class A Roofing Assemblies: When the steel and aluminum panels are installed in accordance with this section, the assemblies are Class A roof covering assemblies in accordance with UBC Section 1504.1.

The panels are installed over solid sheathing in accordance with Sections 2.3.1 or 2.3.2 of this report, as applicable, with the following exception: A barrier material of either one layer of minimum $\frac{1}{4}$ -inch-thick (6.4 mm) Dens-Deck Roof Board or two layers of Atlas Roofing Corporation FR-50 slipsheet are attached to the sheathing with a sufficient number of corrosion-resistant nails to hold the boards in place until attachment of the metal roof covering. Joints in the Dens-Deck Roof Board must be staggered 6 inches (152 mm) from joints in the sheathing. FR-50 slipsheets are installed with

minimum 2-inch (51 mm) overlaps on sides and ends. The underlayment described in Section 2.2.5 must be installed over the barrier material.

Class A assemblies incorporating Elk VersaShield shall be installed in accordance with ESR-2053 and Section 2.3.1 or 2.3.2 of this report, as applicable.

2.3.4.3 Class B Roofing Assembly: The steel or aluminum panels are installed over plywood or solid sheathing complying with the UBC, with a barrier material of one layer of Atlas Roofing Corporation FR-50 cap sheet overlaid with one layer of Type 30 underlayment, on roofs having a minimum slope of 3:12 (25%). This installation is a Class B roof covering in accordance with UBC Section 1504.1.

Class B roofing assemblies incorporating Elk VersaShield shall be installed in accordance with ESR-2053 and Section 2.3.1 or 2.3.2 of this report, as applicable.

2.4 Installation—Reroofing Applications:

2.4.1 General: With the old roof covering completely removed, all conditions noted in Sections 2.3.1 through 2.3.4 apply. The panels may also be installed over existing wood shake, wood shingle, or asphalt shingle roofing, subject to the conditions set forth in Sections 2.4.2 and 2.4.3; installation conditions not addressed in Sections 2.4.2 and 2.4.3 must be in accordance with Sections 2.3.1 through 2.3.4. The existing structure must be inspected as set forth in Appendix Chapter 15 of the UBC.

2.4.2 Class A Roofing Assembly: Ridge and hip caps must be removed and the existing wood shake, wood shingle or asphalt shingle roof covering cut back flush with the fascia or barge cover. A barrier material of either one layer of minimum $\frac{1}{4}$ -inch-thick (6.4 mm) Dens-Deck Roof Board or two layers of Atlas Roofing Corporation FR-50 cap sheet are attached to the deck. An underlayment described in Section 2.2.5 must be installed over the barrier materials. If the existing roof covering is installed over solid sheathing, the panels are installed over the existing roof covering without battens. If solid sheathing is not present, 1-by-4 wood battens are installed at 15 inches (381 mm) on center and attached over the barrier material to framing members spaced a maximum of 24 inches (610 mm) on center with 8d, corrosion-resistant box or common nails penetrating at least 1 inch (25.4 mm) into the roof framing member. Application of underlayment, barrier material and roof panel is as described in Section 2.3.4 of this report. Fasteners attaching the panel must be of sufficient length to penetrate through solid sheathing or penetrate $\frac{3}{4}$ inch (19.1 mm) into battens. When installation is over existing wood shake or wood shingle roofs, Section 1516.3 of Appendix Chapter 15 of the UBC, and Footnote 2 to Table A-15-A of the UBC, must be addressed. New flashing must be installed over and around all existing flashing, vents and chimneys in accordance with this report and the UBC. The valley used in reroofing must be as shown in Figures 1 and 3.

Class A reroofing assemblies incorporating Elk VersaShield shall be installed in accordance with ESR-2053 and other installation details noted in this section.

2.4.3 Class B Roofing Assembly: The Class B roofing assembly consists of one layer of Type 30 or two layers of Type 15 saturated felt installed over an existing Class B composition shingle roof on minimum $\frac{15}{32}$ -inch-thick (11.9 mm) plywood or solid sheathing, roofed with metal panels. Minimum roof slope is 3:12 (25%).

Class B reroofing assemblies incorporating Elk VersaShield shall be installed in accordance with ESR-2053 and other installation details noted in this section.

2.5 Wind Uplift:

The Delta Tile Panels, installed in accordance with this report, are acceptable on any portion of a roof having a maximum height of 40 feet (12 192 mm) in areas identified as Exposure D as set forth in Table 16-G of the UBC, with a maximum basic wind speed of 80 miles per hour (129 km/h). When the conditions exceed 90 miles per hour basic wind speed, and Exposure C areas, special inspection is required in accordance with Section 2.6 of this report.

Wind uplift resistance of the Delta Hidden Tile Fastener Panels is as noted in Table 1.

2.6 Special Inspection:

When required by Section 2.5 of this report, tile installation requires special inspection in accordance with Chapter 17 of the UBC. The special inspector shall observe the installation and record the product description, name, dimensions, and steel thickness; fastener type, diameter and length; wood sheathing and batten dimensions; and verification of the components and tile installation in accordance with this report. The special inspector shall be a qualified person in accordance with Section 1701.2 of the UBC.

2.7 Identification:

A label bearing the manufacturer's name (Delta Building Products Ltd.) and address and the evaluation report number (ER-5447) is affixed to each pallet or bundle.

3.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Metal Roof Coverings (AC166), dated November 2001, and a quality control manual.

4.0 FINDINGS

That the Delta Building Products Ltd. steel and aluminum roofing panels described in this report comply with the 1997 *Uniform Building Code*TM, subject to the following conditions:

- 4.1 The panels are manufactured, identified and installed in accordance with this report and the manufacturer's instructions.
- 4.2 Installation is by installers approved by the manufacturer.
- 4.3 Installation is limited to wind exposure areas described in Section 2.5 of this report.
- 4.4 Barrier materials described in Section 2.2.6 of this report bear the label of an approved inspection agency as being listed for roof classification.

This report is subject to re-examination in two years.

TABLE 1—WIND UPLIFT

PANEL TYPE	SHEATHING ¹	FASTENING PATTERN ²	ALLOWABLE UPLIFT CAPACITY (psf)	ALLOWABLE LOCATION BASED ON WIND UPLIFT CAPACITY ³		
				Wind Speed (fastest mile)	Building Height (ft.)	Exposure Category
Delta Hidden Fastener Tile Panels	Solid	See Figure 5, Pattern 2	65	80	40	C
Delta Hidden Fastener Tile Panels	Spaced	See Figure 5, Pattern 2	92	80	40	D
Delta Hidden Fastener Tile Panels	Solid	See Figure 5, Pattern 1	53	80	30	C

For **SI**: 1 psf = 0.0479 kN/m², 1 mph = 1.61 km/h, 1 inch = 25.4 mm.

¹Solid sheathing is minimum 1/2-inch-thick plywood sheathing; spaced sheathing is minimum 1-by-4 Douglas fir lumber having a minimum specific gravity of 0.51.

²Fasteners are described in Section 2.2.3.

³Allowable location is based on mean building height of 40 feet (12 192 mm), in areas of discontinuity as defined in Footnote 4 of UBC Table 16-H, and importance factor equal to 1.

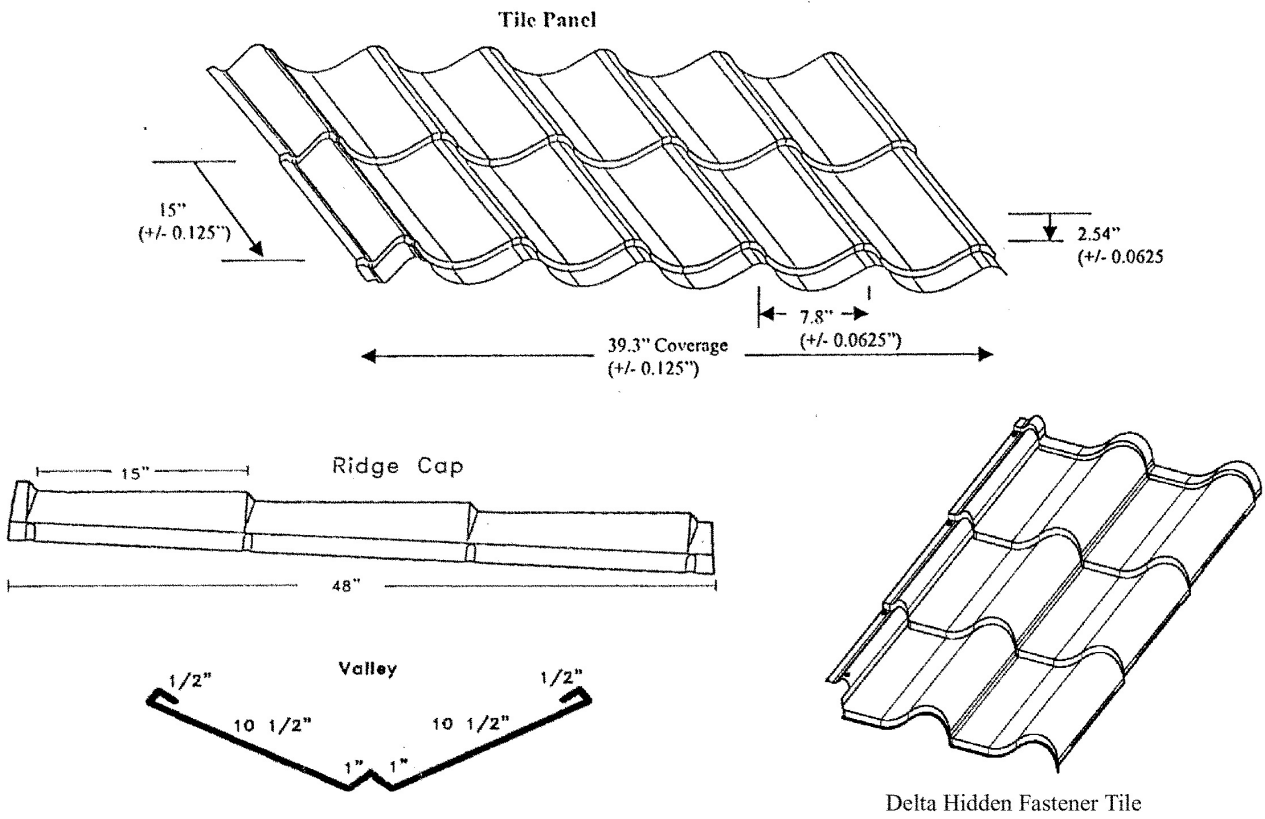


FIGURE 1—TILE AND ACCESSORY PROFILES

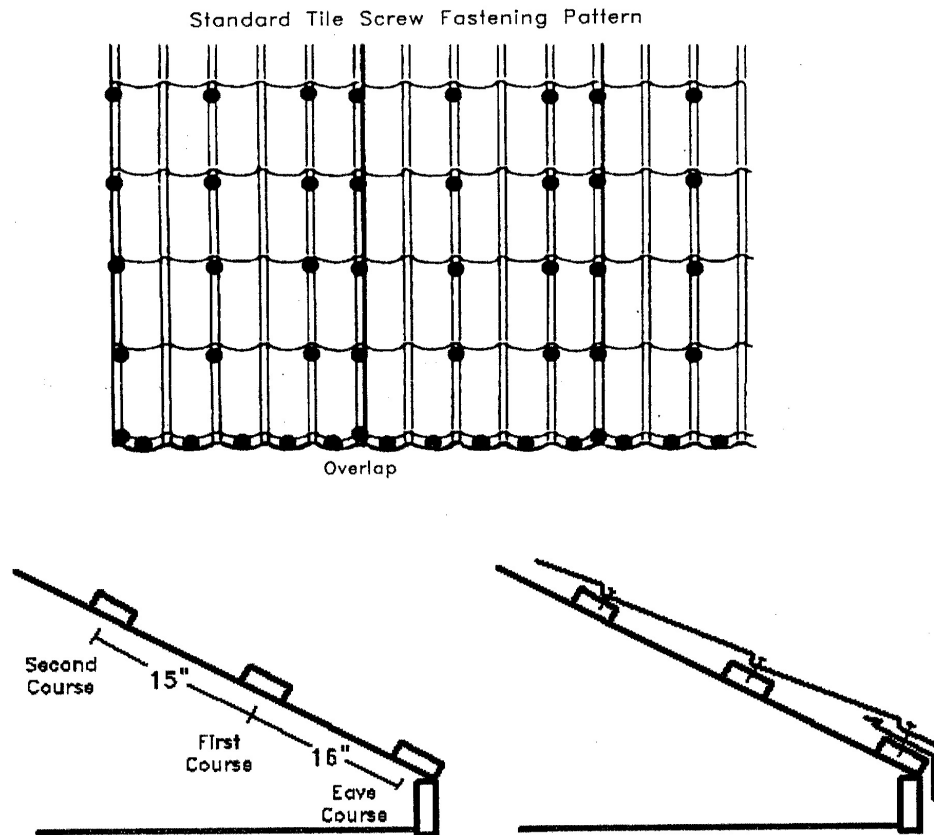


FIGURE 2—PANEL ATTACHMENT DETAILS

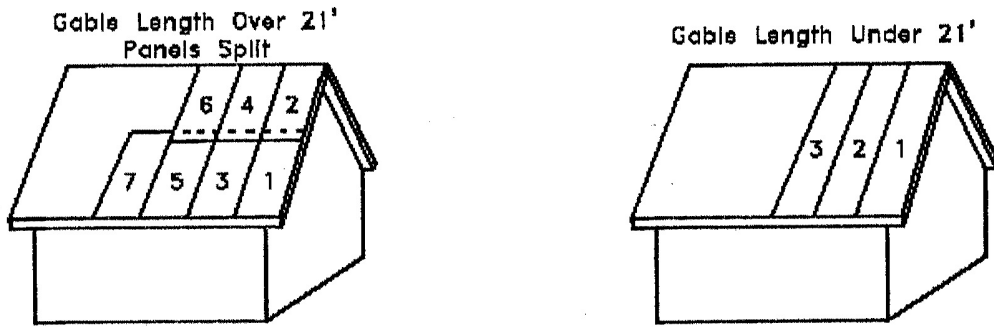


FIGURE 2—PANEL ATTACHMENT DETAILS (Continued)

Trim Installation

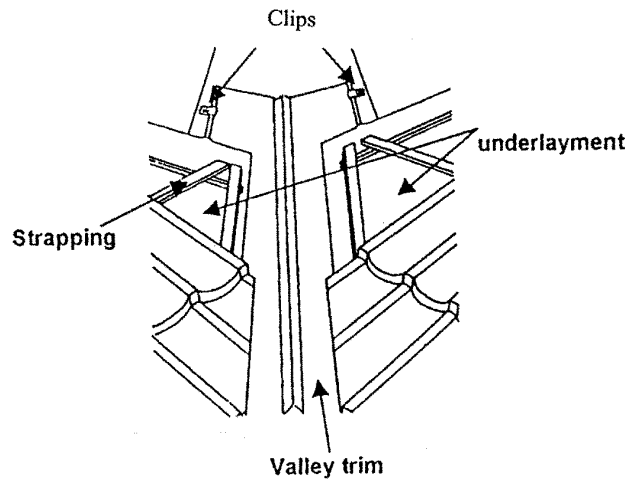
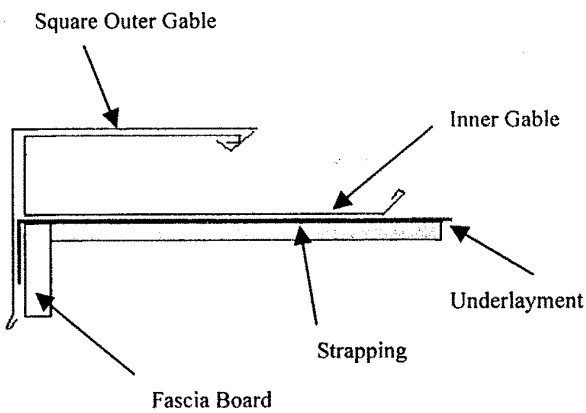
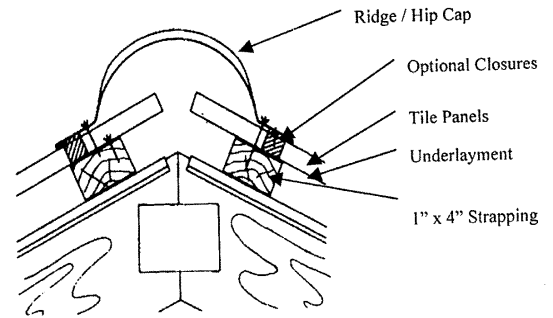
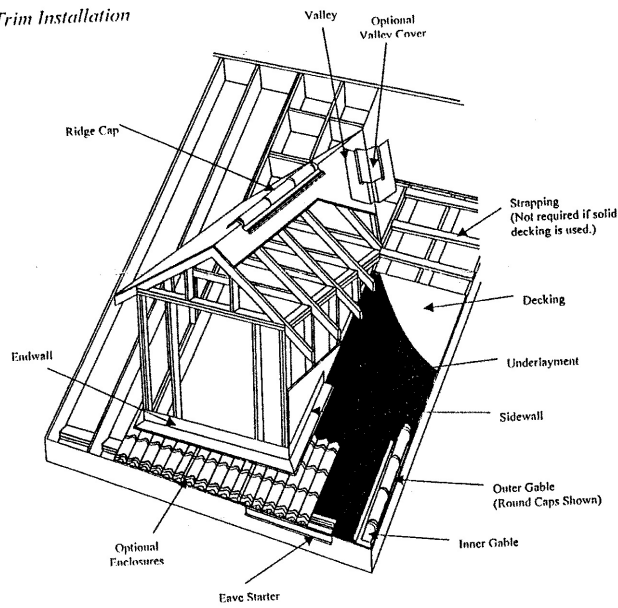
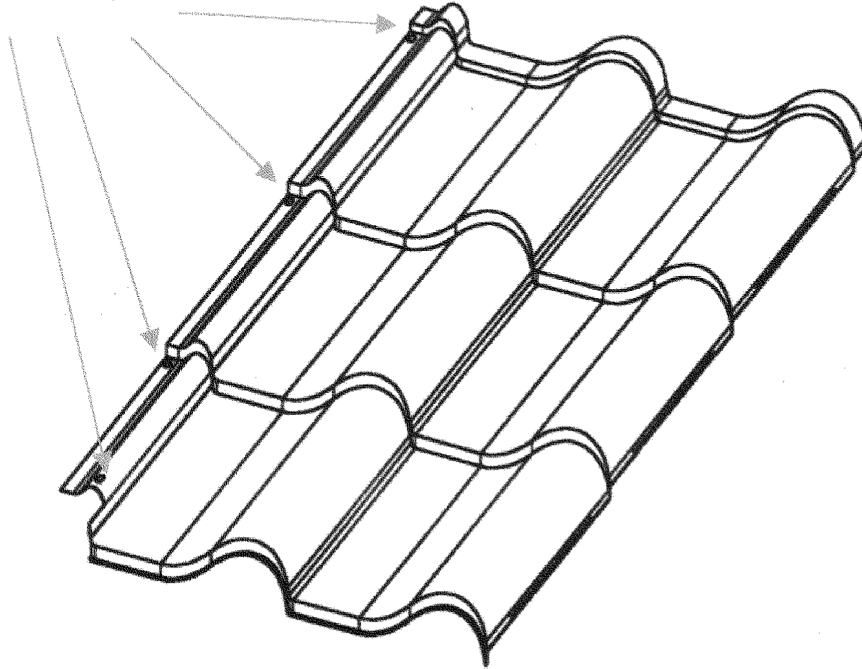


FIGURE 3—TYPICAL INSTALLATION DETAILS

PATTERN 1

Screw insertion points



PATTERN 2

Screw insertion points

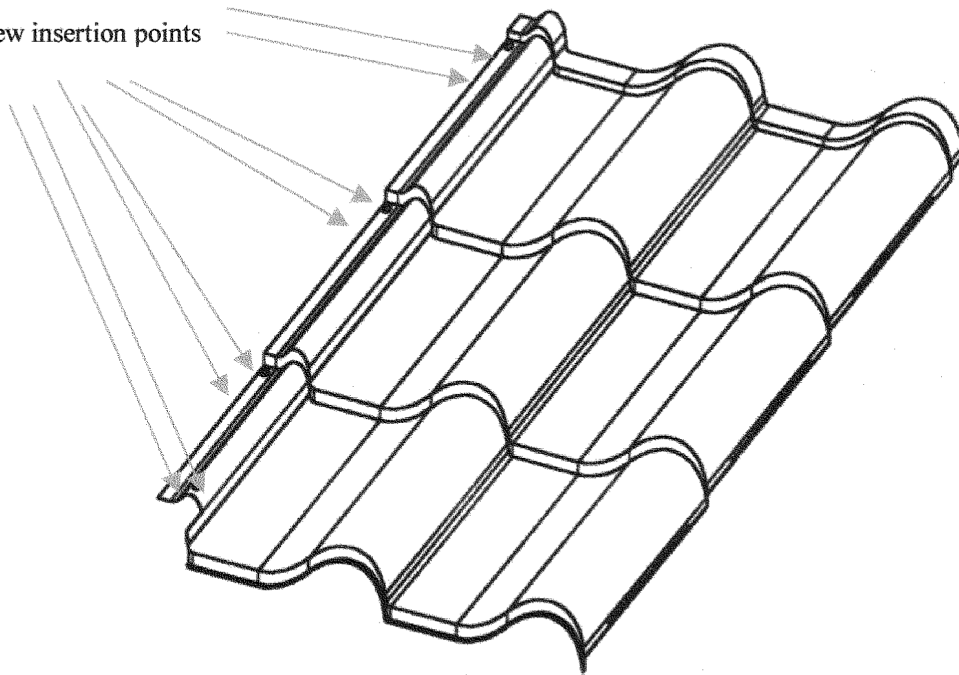


FIGURE 4—DELTA HIDDEN FASTENER TILE FASTENING PATTERN