



SECTION 07321

COMPOSITE ROOF TILE

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Composite roof tiles.
- B. Metal roof flashing.
- C. Underlayments and self seal membrane.
- D. Related roof accessories.

1.2 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry; Roof sheathing and nailers.
- B. Section 06200 - Finish Carpentry.
- C. Section 07530 - Elastomeric Sheet Roofing.
- D. Section 07600 - Flashing and Sheet Metal.
- E. Section 07710 - Roof Specialties; Roof gutters and downspouts.
- F. Section 07721 - Roof Tile Ridge Vents; Trimline VariaVent.
- G. Section 08600 - Skylights.
- H. Division 15 - Mechanical: Mechanical work projecting through roof.
- I. Division 16: - Electrical: Electrical work projecting through roof.

1.3 REFERENCES

- A. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

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Ph: 800-474-7570, 602-272-8128 Fx: 602-272-8014
www.BestMaterials.com Email: Sales@BestMaterials.com

- B. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- C. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- D. ASTM B 370 - Standard Specification for Copper Sheet and Strip for Building Construction.
- E. ASTM C 290 - Method of Test for Resistance of Concrete Specimens to Rapid Freezing and Thawing in Water.
- F. ASTM C 387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
- G. ASTM C 887 - Standard Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar.
- H. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- I. ASTM D 2822 - Standard Specification for Asphalt Roof Cement.
- J. FS SS-S-153C - Sealants used with EPDM.
- K. FS TT-S-00230C - Chlorosulfonated polyethylene sealants.
- L. ICBO-ES AC48 - Acceptance Criteria for Roof Underlayment for Use in Severe Climate Areas.
- M. ICC-ES -AC07 - Acceptance Criteria for Special Roofing Systems.
- N. ICC-ESR -1368 - Roofing Felt and Underlayment.
- O. Canadian Standard 19-HP-5M - Sealing Compound, One Component, Acrylic Base, Solvent Curing.
- P. NRCA - Steep Roofing Manual; National Roofing Contractors of America.
- Q. SMACNA - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors National Association.

1.4 DESIGN REQUIREMENTS

- A. Roofing tile materials and installation shall conform to ICC-ES -AC07.
- B. Wind Resistance:
 - 1. Medium Slope Roofs: Pitch 3 in 12.
 - 2. Basic wind conditions up to 80 miles per hour.
 - 3. High wind conditions up to 110 miles per hour.
- C. Roofing tile materials and installation shall conform to the requirements of the applicable building code.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Indicate metal flashing profiles, joint locations, fastening locations, and installation details. Indicate tile layout with location of cut and special shaped tiles identified.
- D. Verification Samples: For each finish product specified, two full size samples representing actual product, color, and patterns.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- F. Warranty documents, issued and executed by manufacturer of roof tile, countersigned by Contractor.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum three years documented experience producing composite roof tile.
- B. Installer Qualifications: Minimum five years documented experience installing products specified in this section and/or supervision by a manufacturer's authorized installation representative.
- C. Mock-Up:
 - 1. Construct mock-up using materials specified in this section.
 - 2. Construct mock-up as directed, at location indicated or directed.
 - 3. Construct mock-up at location indicated or directed, size ___ feet by ___ feet (___ m by ___ m).
 - 4. Obtain Architect's acceptance of mock-up before beginning construction activities of this section; accepted mock-up will be standard by which completed work of this section is judged.
 - 5. Mock-up may not remain as part of Work.
 - 6. Accepted mock-up may remain as part of Work.
- D. Pre-Installation Meeting:
 - 1. Convene at job site seven calendar days prior to scheduled beginning of construction activities of this section to review requirements of this section.
 - 2. Require attendance by representatives of the following:
 - a. Installer of this section.
 - b. Other entities directly affecting, or affected by, construction activities of this section.
 - 3. Notify Architect four calendar days in advance of scheduled meeting date.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site in manufacturer's unopened pallets, labeled with data indicating compliance with specified requirements.

- B. Storage and Protection:
 - 1. Store products of this section in manufacturer's unopened packaging until installation.
 - 2. Maintain dry storage area for products of this section until installation of products.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 SEQUENCING

- A. Ensure that installer of this section is in possession of roof tile manufacturer's complete installation instructions before beginning construction activities of this section.
- B. Maintain copy of manufacturer's complete installation instructions at project site.

1.10 WARRANTY

- A. Manufacturer's Warranty: Furnish roof tile manufacturer's 50-year warranty against defects in product workmanship and materials.

1.11 EXTRA MATERIALS

- A. Provide an additional 1 percent of installed roof tiles, but not less than one full square, for Owner's use in roof maintenance.
- B. Furnish extra materials packaged with protective covering for storage and identified with labels clearly describing contents.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Company; Trimline Building Products, an LDI Company, 705 Pennsylvania Ave., Minneapolis, MN 55426. ASD. Toll Free: (800) 438-2920, Tel: (763) 540-9700, Fax: 763-540-9709, Email: info@trimline-products.com.
- B. The following substitution will be permitted.
 - 1. Vande Hey Raleigh Double Roman Lightweight Tile.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 ROOF TILE

- A. Roof Tiles: Distinction Composite Tile, Double Roman Lightweight Tile; Similar to a high barrel spanish tile with two factory fastener hole in each tile.
 - 1. Size: 16-1/2 inches (419 mm) long by 13 inches (330 mm) wide.
 - 2. Exposure Per Tile: 13-1/2 inches (343 mm) wide by 11-9/16 inches (394 mm) long.

3. Weight/Tile 3.3 lb (1.50 kg).
 4. Weight/Square 303.6 lbs (137.7 kg).
 5. Color: Selected from manufacturer's available colors.
 6. Color: Black.
 7. Color: Canyon Earth.
 8. Color: Desert Red.
 9. Color: Goldenrod.
 10. Color: Sage.
 11. Color: Saddle Brown.
 12. Multi-Color Custom Blend:
 - a. Color _____: _____ percent.
 - b. Color _____: _____ percent.
- B. Trim: Supply manufactured shapes of same material, style, color, and texture as roof tile for indicated hips, ridges, and rakes.

2.3 UNDERLAYMENTS

- A. Asphalt Saturated Organic Felt: No. 30 Asphalt Saturated Organic Felt, to meet requirements of ASTM D-226, Type 2 or equal.
- B. Rubberized Underlayment: ASTM D 1970 sheet barrier of self-adhering rubberized asphalt membrane underlayment having internal reinforcement, and "split" back plastic release film.
- C. Single ply EPDM with a counter batten system.

2.4 METAL FLASHINGS

- A. General Requirements: Form flashings to profiles indicated on Drawings, in accordance with manufacturer's printed instructions, and as recommended by SMACNA Architectural Sheet Metal Manual to protect materials from physical damage and to shed water.
 2. Form flashing lengths square, accurate to profile, in maximum possible lengths; form flashing lengths free from distortion or defects detrimental to appearance or performance.
 3. Hem edges of flashings exposed to view a minimum 1/4 inch (6 mm) on underside.
- B. Eave Flashings and Other Metal Flashings: Copper sheet, ASTM B 370, cold rolled, natural finish; 16 ounces per square foot minimum thickness.
- C. Eave Flashings and Other Metal Flashings: Copper sheet, ASTM B 370, cold rolled, natural finish; 20 ounces per square foot minimum thickness.
- D. Eave Flashings and Other Metal Flashings: Stainless Steel Sheet for Flashings: ASTM A 666, Type 304 alloy, soft tempered; 24 gauge minimum thickness.
- E. Eave Flashings and Other Metal Flashings: 24 gauge galvanized steel sheet, ASTM A 653/A 653M, minimum G90/Z275 hot-dip zinc coating.
- F. Eave Flashings: Aluminum sheet, ASTM B 209; 0.019 inch minimum thickness.

- G. Concealed sealants along gable rakes, ridge/hip trim and flashings with asphalt saturated felt underlayment shall be non-running, heavy body Plastic Roof Cement that meets or exceeds the requirements of ASTM D 2822 and Federal Specifications SS-S-153C (Type 1) or equal. Sealants used with EPDM or Synthetic Underlayments shall be per manufacturer's recommendation.
- H. Exposed sealants, such as those used on counter flashings or non-soldered joints, should be high quality sealants to meet or exceed requirements of U.S. TT-S-00230C, U.S. Fed Cat. No 8030-965-2397, Canadian 19-HP-5M, ASTM C 290 or equal.
- I. Ridge Vents: Trimline VariaVent as specified in Section 07721.

2.5 ACCESSORY MATERIALS

- A. Batten Strips: Softwood lumber preservative-treated under pressure; sized and located as specified.
- B. Flow Thru Battens: Trimline Flow-Thru Tile Battens, manufactured of corrosion-free, laminated high-density polyethylene corrugated plastic. Layers of corrugated plastic must be glued.
 - 1. Color: Black.
 - 2. Dimensions: 1-1/2 inches (38 mm) wide by 8 feet (2.4 m) long by 3/4 inch (19 mm) high.
- C. Fasteners for Underlayment: 11 gauge, 3/8 inch (9.5 mm) diameter head by 7/8 inch (22 mm) long ring-shank roofing nails of galvanized steel, copper or stainless steel.
- D. Fasteners for field tile:
 - 1. For batten installation with screws use two 1-1/2 inch (38 mm) non-corrosive #10 coarse thread .344 inch (8.7 mm) diameter pan head screws.
 - 2. For batten installation with nails use two 2 inch (63.5 mm) non-corrosive 10/11 gauge ring shank 3/8 inch diameter nails.
 - 3. Use Trimline Colored Grout where required in place of ridge closures to provide structural support and prevent wind uplift in heavy snow/wind areas.
- E. Fasteners for Cut Tiles: All cut pieces without factory fastener holes shall be attached to a larger piece or full tile with an approved adhesive or concealed 3/4 inch (19 mm) #12 sheet metal screws.
- F. Fasteners for Hip/Ridge/Rake trim and Hip/Ridge Starter shall be 2-1/2 inch (63.5 mm) non-corrosive #10, coarse thread, .344 inch (8.7 mm) diameter bugle head screws or 3 inch (76 mm) non-corrosive ring shank nail in combination with an approved adhesive under the nose of each trim piece.
- G. Fasteners for Battens: 5d ring-shank nails of stainless steel or 16 gauge stainless steel staples of sufficient length to penetrate sheathing.
- H. Fasteners for Metal Flashings: Ring-shank nails, 11 gauge by 1 inch (25 mm) length, of same material as flashing metal (copper, stainless, galvanized).
- I. Snow Guard: Roof tile manufacturer's fabricated unit for protection over entrances, lower roof areas, or other areas where falling snow is not desired; fabricated from copper sheet, 38 ounces per square foot.

- J. Mortar/grout for hips, open valleys and saddles shall be a combination of 50 lb mix of Quickwall Surface Bonding Cement and 120 lb Mason Mix to meet or exceed strength requirements of ASTM C-387 for Type "N" mortar and Concrete Acrylic Fortifier to meet or exceed ASTM C-887 standard specifications as manufactured by Quikrete, Atlanta, GA. Grout and colored oxide to match field tile available from the Manufacturer.
- K. Adhesives to secure cut pieces of field tile along hips, valleys, flying gables, and protrusions and to install hip/ridge/rake trim shall be Titebond as manufactured by Franklin International, Columbus, OH; RT-600 as manufactured by Ohio Sealant Inc., Mentor, OH, or 3500 Roof Tile Adhesive/Sealant by Geocel, Elkhart, IN, or equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification roof deck structure to meet roof tile manufacturer's installation requirements.
 - 1. Verify roof penetrations are in place and flashed to deck surface.
 - 2. Verify roof openings are correctly framed prior to installing Work of this section.
 - 3. Verify deck is of sufficient thickness to accept fasteners.
 - 4. Verify deck surfaces are dry, unfrozen, and free of ridges, warps, and voids
- B. Examine condition of deck prior to installation. Notify Architect if conditions are unacceptable. Beginning construction activities of this section indicates installer's acceptance of conditions.

3.2 PREPARATION

- A. Broom clean deck surfaces prior to installation of underlayment.
- B. Coordinate with installation of flashing, gutters, vents, skylights and other adjoining work to ensure proper sequencing. Do not install roofing materials until all vent stacks and other penetrations through roof sheathing have been installed and securely fastened.
- C. Arrange three or more stacks of roof tile at installation area; mix tile from stacks as installation progresses for consistent color blend. Do not overload roof surface with staged materials.

3.3 INSTALLATION

- A. Install roof tile in accordance with shop drawings, manufacturer's printed installation instructions for specified project conditions and the following:
 - 1. ICC-ES -AC07.
 - 2. NRCA Steep Slope Roofing Manual.
 - 3. SMACNA Architectural Sheet Metal Manual.
- B. Eave Flashings: Install metal eave flashing 1/8 inch (3 mm) beyond the fascia; lap end joints minimum 3 inches (76 mm), with plastic cement seal between overlapping metal surfaces.

1. Apply self seal membrane over eave flashing parallel to eave edge in accordance with manufacturer's printed instructions.
 2. Extend self seal membrane up roof slope minimum 2 feet (610 mm) beyond interior face of exterior wall or as required by code, whichever is greater.
 3. Place each successive ply overlapping top edge of previous ply 3 inches (76 mm).
- C. Valley Flashings: Install 24 inch (610 mm) to 28 inch (711 mm) standing seam, double rib (for closed valleys) or 24 inch (610 mm) double rib valley flashing (for open grouted valleys).
1. Form flashings in accordance with manufacturer's instructions for valley type indicated.
 2. Apply flashing over 36 inch (914 mm) full width vertical underlayment centered in all valley areas.
 3. Install flashings centered on valley; nail in place at 12 inches (305 mm) on center, 1 inch (25 mm) from metal edges.
 4. Roof Pitch 4 in 12 or Greater: Lap flashing end joints minimum 4 inches (102 mm).
 5. Roof Pitch Less Than 4 in 12: Lap flashing end joints minimum 6 inches (152 mm).
 6. For slopes below 3:12 or 4:12 in severe weather areas, install flashings and EPDM underlayment per details provided by the Manufacturer.
- D. Sidewall Flashings: Coordinate with the installation of sidewall flashings specified in Section 07600.
- E. No.30 Underlayment: Install 2 plies underlayment over entire roof area, parallel to eaves.
1. Place first ply 18 inches (457 mm) wide at eave edge, with bottom edge extending 1/4 inch (6 mm) over lower edge of eave flashing; seal to eave flashing.
 2. Place second ply 36 inches (914 mm) wide over first ply flush at bottom and sealed to first ply.
 3. Place third ply 36 inches (914 mm) wide 15 inches (381 mm) up from bottom edge of first ply.
 4. Place each successive ply 18 inches (457 mm) up from bottom of each previous ply.
 5. Nail horizontal seams 1 inch (25 mm) from exposed edge of felt; space nails in accordance with manufacturer's printed instructions for roof slope.
 6. Overlap vertical seams minimum 6 inches (457 mm), seal lap with plastic cement, then nail at 3 inches (76 mm) on center; stagger vertical laps of each successive layer so that vertical joints do not align in any two adjacent plies.
 7. Ridges, Except at Ridge Vents: Extend underlayment over ridges 6 inches (152 mm) on each side making a double layer.
 8. Hips: Extend underlayment over hips 6 inches (152 mm) on each side making a double layer.
 9. Valleys: Overlap metal valley flashing 3 inches (76 mm) and seal to metal.
- F. Rubberized Underlayment: Install underlayment over entire roof area, parallel to eaves.
1. Install in accordance with manufacturer's printed instructions.
 2. Place first ply at eave edge, with bottom edge extending 1/4 inch (6 mm) over lower edge of eave flashing; seal to eave flashing.
 3. Place each successive ply overlapping top edge of previous ply 3 inches (76 mm).

4. Ridges, Except at Ridge Vents: Extend underlayment over ridges 6 inches (457 mm) on each side making a double layer.
 5. Hips: Extend underlayment over hips 6 inches (152 mm) on each side making a double layer.
 6. Valleys: Overlap metal valley flashing 3 inches (76 mm) and seal to metal.
- G. Single Ply Roof Membrane: Install EPDM membrane over entire roof area, parallel to eaves.
1. Install in accordance with manufacturer's printed instructions.
 2. Place first ply at eave edge, with bottom edge extending 1/4 inch (78 mm) over lower edge of eave flashing; seal to eave flashing.
 3. Place each successive ply overlapping top edge of previous ply 3 inches (76 mm).
 4. Bond lapped joints in accordance with EPDM manufacturer's printed instructions.
 5. Ridges, Except at Ridge Vents: Extend membrane over ridges 6 inches (152 mm) on each side making a double layer.
 6. Hips: Extend membrane over hips 6 inches (152 mm) on each side making a double layer.
 7. Valleys: Overlap metal valley flashing 3 inches (75 mm) and seal to metal.
- H. Intersections of Roof Surfaces and Abutting Vertical Surfaces:
1. Install continuous 36 inch (914 mm) wide strips of self seal membrane to extend 30 inches (762 mm) across roof deck and 6 inches (152 mm) up vertical surface.
 2. Install continuous metal flashing to extend 3 inches (76 mm) up vertical surface.
 3. At locations where vertical surface will abut top edge of tile, install metal flashing to extend 3 inches (76 mm) up vertical surface, form metal flashing to extend minimum 3 inches (76 mm) over tile, and form 1/2 inch (12.5 mm) return hem at edge of metal.
 4. Form saddle flashings for protrusions through roof in accordance with manufacturer's printed instructions.
- I. Ridge Vent: Install in accordance with manufacturer's printed instructions.
- J. Horizontal Battens for Tile Installation: Pressure treated, notched 1 inch (25 mm) by 2 inches (51 mm), nominal.
1. Install ridge batten with top edge approximately 1 inch (25 mm) from ridge nailer or vent.
 2. Strike horizontal line for top edge of first batten 15 inches (381 mm) up roof slope, and parallel to, eave edge.
 3. Strike intermediate horizontal lines between line for top edge of first batten and top edge of ridge batten; space lines equally, at maximum spacing of 13-1/2 inches (343 mm).
 4. Install battens with top edges aligned with struck lines; nail battens to roof deck at 5-1/4 inches (133 mm) on center, maximum using 5 penny non-corrosive nails long enough to penetrate sheathing.
- K. Roof Tile:
1. Install tile right to left, as viewed facing ridge.
 2. Install closure strips in accordance with manufacturer's printed instructions for project conditions.

3. Fasten tile each tile to battens with two 1-1/2 inch #10 non-corrosive course thread 0.344 inch (9 mm) diameter pan head screws and 13-1/2 inches (343 mm) exposure.
 4. Fasten tile each tile to battens with two 2 inch 10/11 gauge ring shank 3/8 inch diameter nails and 13-1/2 inches (343 mm) exposure.
 5. Cut tile, as tile installation progresses, for hip, valley, and wall conditions.
- L. Install venting as tile installation progresses; locate in accordance with manufacturer's instructions.
- M. Trim:
1. Install trim pieces for hips, ridges, and rakes as tile installation progresses; cut shapes, set in bed of plastic roof cement, and secure in place with minimum 2 fasteners per piece for rake trim, and minimum 1 fastener per piece for hip and ridge trim.
 2. Cut special shapes for project conditions as required.
 3. Overlap trim piece ends minimum 3 inches (76 mm); seal overlapping surfaces with plastic roof cement.
- N. Counterflashings:
1. Install counterflashings tight to substrates, with top edge of counterflashing concealing base flashings; lap end joints minimum 3 inches (76 mm).
 2. Fasten counterflashings using specified fasteners; fasten on vertical surfaces only, at maximum spacing 12 inches (305 mm) on center.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION