



SECTION 07 32 16
CONCRETE ROOF TILES

Display hidden notes to specifier. (Don't know how? [Click Here](#))

Copyright 2021 - 2021 ARCAT, Inc. - All rights reserved

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete roofing tiles with all required accessory trim pieces.
 - 1. Flat Tile: Laid in a random, half joint, staggered or straight.
 - a. Slate.
 - b. Brushed.
 - c. Shake.
 - d. Cotswold stone.
 - 2. Riviera; Mediterranean. Tile laid in a straight pattern
 - 3. Spanish; High barrel.
 - a. Tile laid in a straight or half joint pattern.
 - b. Pans and Covers laid in a straight or slightly curved pattern.
 - c. Turret Pans and Covers laid in a straight pattern on curved areas.
 - 4. English shingle. Non-tapered, non-interlocking shingle laid in half joint, random or staggered pattern.
 - 5. Turrets: Tapered, non-interlocking shingle laid in half joint, random or staggered pattern on curved areas.
 - 6. Custom.
 - 7. Pans, and covers.
 - 8. Copper Accessories.

1.2 RELATED SECTIONS

- A. Division 6 Section "Rough Carpentry" for wood framing, decking, eave and gable fascia, blocking and vent openings.
- B. Division 7 Section "Flashing and Sheet Metal" for flashing, gutters, saddles and other sheet metal work.
- C. Division 7 Section "Roof Specialties and Accessories" for skylights and other roof penetrations.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry

- Units and Related Units.
 - 2. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
 - 3. ASTM C1492 - Standard Specification for Concrete Roof Tile.
 - 4. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.
- B. Factory Mutual (FM):
 - 1. FM 4473 - Impact resistance Testing of Rigid Roofing Materials by Impacting with Freezer Ice Balls.
 - C. Canadian Ministry of Housing.
 - D. Florida Product Approval including HVHZ, FL 6021-R1
 - E. Florida Roofing and Sheet Metal Contractors Association, Inc. (FRSA):
 - 1. FRSA-TRA Florida High Wind Concrete and Clay Roof Tile Installation Manual.
 - F. International Conference of Building Officials (ICBO):
 - 1. ICBO Number 4907.
 - G. International Code Council (ICC):
 - 1. ICC-ESR-1759 - Evaluation Report.
 - H. Southern Building Code Congress International (SBCCI).
 - I. Tile Roofing Industry (TRI).
 - J. Universal Business Code (UBC).
 - K. City of Los Angeles.
- 1.4 SUBMITTALS
- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
 - B. Product Data:
 - 1. Manufacturer's data sheets on each product to be used.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Typical installation methods.
 - C. Verification Samples: Two full-size tiles for verification of each color, style, feature, and surface texture selected.
 - D. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.
- 1.5 QUALITY ASSURANCE
- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
 - 1. A minimum of five projects of at least on half the size of this project within the last five years. List projects and provide to architect prior to bidding.
 - 2. For areas where experienced contractors are not available, Vande Hey-Raleigh will arrange an instructor/technician for instruction or inspection.
 - B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.
- D. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
 - 1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
 - 2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
 - 3. Retain mock-up during construction as a standard for comparison with completed work.
 - 4. Do not alter or remove mock-up until work is completed or removal is authorized.

1.6 PRE-INSTALLATION CONFERENCE

- A. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
 - 1. Deliver materials to project site in manufacturer's unopened bundles or containers with labels intact.
- B. Handle and store materials at project site to prevent water damage, staining, or other physical damage. Store roll goods on end. Comply with manufacturer's recommendations for job site storage, handling, and protection.

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 recommended limits.

1.9 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage and identified with labels clearly describing contents.
- B. Furnish quantity of full-size roofing tiles equal to 1 percent of amount installed.

1.10 WARRANTY

- A. Lifetime, non-pro-rated, transferrable written tile warranty from the manufacturer.
- B. Material and workmanship shall also be guaranteed by the installation contractor for 3 years; residential, or 5 years; commercial from the date of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturer: Vande Hey Raleigh, which is located at: 1565 Bohm Dr.; Little Chute, WI 54140-2529; Toll Free Tel: 800-236-8453; Tel: 920-766-0156; Fax: 920-766-0776; Email:[request info \(ryanlukis@vrmtile.com\)](mailto:request%20info%20(ryanlukis@vrmtile.com)); Web:<http://www.vrmtile.com>

2.2 PERFORMANCE REQUIREMENTS

2.3 NOTE: Specifications, installation procedures and working drawings available upon request.

- A. All tile are tested in accordance with the following standards and exceed minimums for strength, water absorption, freeze-thaw, dimensions and installed weight:
1. ICC-ESR-1759.
 2. ASTM C140 Dimensional Tolerances plus or minus 5 percent.
 3. ASTM C67 Freeze/Thaw 1.0 percent Max Loss of dry weight 50 cycles.
 4. ASTM C67 Transverse Strength, 300 lbf.
 5. ASTM C1492 Permeability, Zero Free water on underside in 2 hours.
 6. ASTM C140 Water Absorption, 10.5 percent maximum.
 7. FM 4473 Impact Test, Class 3.
 8. ASTM E 108, Fire Rating, Class A.
 9. Metropolitan Dade County, Florida, building and Zoning Department, Number 970506.03.
 10. Canadian Ministry of Housing.
 11. ICBO Number 4907.
 12. SBCCI.
 13. UBC.
 14. City of Los Angles.
 15. FRSA-TRA Florida High Wind Concrete and Clay Roof Tile Installation Manual.
- B. Tile Color: Colored throughout and not colored on front surface only.

2.4 CONCRETE ROOFING TILE

A. Cover sloped roofs so indicated on plans with concrete tile by Vande Hey Raleigh Mfg., Inc.

B. Technical Data:

1. Style: Flat.
 - a. Maximum Dimensions: 15-3/8 x 10-5/8 inch (390 x 270 mm).
 - b. Tile per Square: 124.
 - 1) Tile Laid in Staggered Pattern: Increase weight and tile per square by 20 percent.
 - c. Exposure per Tile: 12 x 9-3/4 inch (305 x 248 mm).
 - d. Approximate Weight: 1,050 lbs per sq ft (5126.5 kgs per sq m).
 - 1) For Heavy Duty Tile: Add 100 lbs per sq ft (488.2 kg per sq m).
 - e. Color: As determined by the Architect from Manufacturer's standard range.
2. Style: Riviera:
 - a. Maximum Dimensions: 15-3/8 x 10-1/4 inch (390 x 260 mm).
 - b. Tile per Square: 138.
 - 1) Tile Laid in Staggered Pattern: Increase weight and tile per square by 20 percent.
 - c. Exposure per Tile: 12 x 8-11/16 inch (305 x 221 mm).
 - d. Approximate Weight: 1,000 lbs per sq ft (4882.4 kgs per sq m).
 - 1) For Heavy Duty Tile: Add 100 lbs per sq ft (488.2 kg per sq m).
 - e. Color: As determined by the Architect from Manufacturer's standard range.
3. Style: Spanish:
 - a. Maximum Dimensions: 17-1/4 x 13 inch (438 x 330 mm).
 - b. Tile per Square: 86.
 - 1) Tile Laid in Staggered Pattern: Increase weight and tile per square by 20 percent.
 - c. Exposure per Tile: 14 x 12 inch (356 x 305 mm).
 - d. Approximate Weight: 1,000 lbs per sq ft (4882.4 kgs per sq m).
 - 1) For Heavy Duty Tile: Add 100 lbs per sq ft (488.2 kg per sq m).
 - e. Color: As determined by the Architect from Manufacturer's standard range.

4. Style: English:
 - a. Maximum Dimensions: 15 x 7-1/2 inch (381 x 191 mm).
 - b. Tile per Square: 315.
 - 1) Tile Laid in Staggered Pattern: Increase weight and tile per square by 20 percent.
 - c. Exposure per Tile: 6 x 7-1/2 inch (152 x 191 mm).
 - d. Approximate Weight: 2,006 lbs per sq ft (9794.1 kgs per sq m).
 - 1) For Heavy Duty Tile: Add 100 lbs per sq ft (488.2 kg per sq m).
 - e. Color: As determined by the Architect from Manufacturer's standard range.
 5. Style: Shingle, English:
 - a. Maximum Dimensions: 16-3/4 x 9-1/4 inch (425 x 235 mm).
 - b. Tile per Square: 75.
 - 1) Tile Laid in Staggered Pattern: Increase weight and tile per square by 20 percent.
 - c. Exposure per Tile: 13-3/4 x 14 inch (349 x 356 mm).
 - d. Approximate Weight: 1,490 lbs per sq ft (7274.8 kgs per sq m).
 - 1) For Heavy Duty Tile: Add 100 lbs per sq ft (488.2 kg per sq m).
 - e. Color: As determined by the Architect from Manufacturer's standard range.
 6. Style: Covers:
 - a. Maximum Dimensions: 16-3/4 x 10-3/4 inch (425 x 273 mm).
 - b. Tile per Square: 75.
 - c. Color: As determined by the Architect from Manufacturer's standard range.
 7. Style: Shingle, Turret:
 - a. Maximum Dimensions: Varies.
 - b. Tiles per Square: Varies.
 - c. Exposure per Tile: Varies.
 - d. Approximate Weight: 1,800 lbs per sq ft (87883.4 kg per sq m).
 - e. Color: As determined by the Architect from Manufacturer's standard range.
 - f. Flat Field Tile: Pre-punched with two 3/16 inch (5 mm) holes at time of manufacture for nailing purposes. Other field tile will be pre-punched with one 3/16 inch (5 mm) hole.
- C. Trim for Hips, Ridges and Gables: Match color, style, features, surface, texture of field tile.
- D. Field Tile at Hips and Valleys: Cut to correct angles on job by roofer.
- E. Non-Interlocking Shingles in Tapered Sizes; Turret for Round Surfaces: Non-tapered, English for flat surfaces, with various textures are available for custom applications.
- F. Spanish Turret Pans and Covers: Tapered Sizes with various textures available for round surface applications.

2.5 UNDERLAYMENT

- A. Roof Slopes 3:12 and Above in Sun Belt and 4:12 and Above in Severe Weather Areas:
 1. Underlayment: Two layers of No. 30 asphalt saturated felt as manufactured by Tamko Roofing Products, Joplin, MO to meet requirements of ASTM D-226, Type 2 or equal.
 2. Underlayment: Tri-flex 30 as manufactured by Flexia Corp., Ontario, Canada, to meet requirements of ICBO AC-48 or equal.
 3. Underlayment: Duck's Back rubberized underlayment as manufactured by Cetco, Clinton, SC.
 4. Underlayment: Daltex Roofshield Roof Underlayment (a breather membrane not requiring ventilation to the underside of the roof deck) as manufactured by the Proctor Group, Ltd., Forfer, Scotland.
- B. Roof Slopes Below 3:12 in Sun Belt and Below 4:12 in Severe Weather Areas: Tiles are installed for cosmetic purposes only. Use single ply membrane over counter batten system.

1. Self-seal membrane meeting requirements of ICBO AC-48 along roof perimeters and protrusions in severe weather areas.
 - a. Strong Seal Plus as manufactured by Cetco, Clinton, SC or equal.

2.6 WOOD BATTENS AND NAILERS

- A. Slopes 3:12 and Above in Sun Belt and 4:12 and Above in Severe Weather Areas:
 1. Pressure Treated Batten Strips: 1 x 2 x 96 inch (25 x 51 x 2438 mm) with notches or ports 16 (406 mm) on center, laid horizontally 12 inch (305 mm) maximum.
 - a. Spanish Tile: Lay batten strips horizontally at 14 inch (356 mm) maximum. Leave 3/4 inch (19 mm) space between the ends.
- B. Slopes Below 3:12 in Sun Belt and Below 4:12 in Severe Weather Areas:
 1. Pressure Treated Batten Strips: 1 x 4 inch (25 x 102 mm) horizontal batten strips at 12 inch (305 mm) on center, over 1 x 3 (25 x 76 mm) vertical battens 24 inch (610 mm) on center installed under EPDM are required.
 - a. Spanish Tile: Lay batten strips horizontally at 14 inch (356 mm) maximum.
- C. Slopes 3:12 and Above in Sun Belt and 4:12 and Above in Severe Weather Areas: In lieu of the ported batten system.
 1. Pressure Treated Horizontal Battens: 1 x 4 inch (25 x 102 mm) horizontal battens at 12 inch (305 mm), 14 on center, over 1 x 3 inch (25 x 76 mm) vertical battens 24 inch (610 mm) on center over the underlayment.
 - a. Spanish Tile: Lay horizontal batten strips at 14 inch (356 mm) on center maximum.
- D. Wood Nailers: 1 x 2 inch (25 x 51 mm) of sufficient height, depending on slope, to nail hip trim.
- E. Spanish Tile Nailers: 1 x ____ inch (25 x ____ mm) of sufficient height, depending on slope, with mounting flashing attached is used for the hip nailer which should be of sufficient height, depending on slope, to nail hip trim so they rest on the field tile with minimum clearance.
- F. Hip/Ridge Nailers: 1 x ____ inch (25 x ____ mm) of sufficient height, depending on slope, with mounting flashing attached for the ridge nailers or ridge venting is used at the ridges to fasten the ridge trim so they rest on the field tile with minimum clearance.

2.7 FLASHINGS

- A. Eave Metal Type: Dependent on material used for gutters.
 1. Copper: 16 oz.
 2. Aluminum: 0.019 inch (0.48 mm).
 3. Girth: Minimum 7-3/16 (183 mm) without gutters.
 4. Girth: 9 inch (229 mm) girth with gutters.
- B. Other Flashings: 16 oz soft-temper copper.

2.8 SEALANT, MORTAR, GROUT, ADHESIVE

- A. Concealed sealants along ridge and hip trim and flashings with asphalt saturated felt underlayment.
 1. Non-running, heavy body plastic roof cement as manufactured by Henry Co., Huntington Park, CA, for Vande Hey-Raleigh Mfg., Inc.
 2. Meet ASTM D2822 and SS-S-153C, Type 1.
 3. Sealants used with EPDM: Duck's Back, StrongSeal Plus, Tri-Flex 30.
 - a. Daltex Roofshield Roof Underlayment: Per manufacturer's recommendation.
- B. Exposed sealants, such as those used on counter flashings or non-soldered joints:

1. High quality such as Dymonic as manufactured by TREMCO, Cleveland, OH.
 2. Roof Tile Adhesive/Sealant No. 3500 by Geoce, Elkhart, IN.
 3. Meet U.S. TT-S-00230C, U.S. Fed Cat. No 8030-965-2397, Canadian 19-GP-5M, and ASTM C290-79.
- C. Mortar/Grout for Hips with Spanish Tile, Open Valleys, and Saddles:
1. Combination of 50 lb Quickwall Surface Bonding Cement and 120 lb Mason Mix.
 2. Meet or exceed strength requirements of ASTM C-387 for Type "N" mortar.
 3. Concrete Acrylic Fortifier to meet or exceed ASTM C- 887, as manufactured by Quikrete, Atlanta, GA. Grout and colored oxide to match field tile available from Manufacturer.
- D. Adhesives Securing Cut Pieces of Field Tile Along Hips, Valleys, Gables, Sidewalls, Flying Gables, and Protrusions, and for Installing hip, ridge, and rake trim.
1. Titebond as manufactured by Franklin International, Columbus, OH, RT-600 Adhesive as manufactured by OSI Sealants, Mentor, OH.
 2. Roof Tile Adhesive/Sealant No. 3500 by Geoce, Elkhart, IN.

2.9 FASTENERS

- A. Underlayment: Nails. 11 gauge, 7/16 inch (11 mm) long with 3/8 inch (9 mm) round head galvanized, copper or stainless steel. See "Underlayments" Paragraph on the Part 3 "Installation" Article of this specification for nailing pattern.
- B. See paragraph 3.3 E for nailing pattern.
- C. Flashings: Nails. 11 gauge, 1 inch (25 mm) R/S compatible with flashing material used; copper, galvanized, etc.
- D. Batten Strips: Nails: 5 penny stainless steel. Staples: 16 gauge stainless steel of sufficient length to penetrate sheathing. See "Fastening Requirements" Paragraph in the "Installation" Article in Part 3 of this specification.
- E. Field Tile: Nails. 11 gauge copper or stainless steel with 5/16 inch (8 mm) heads, 1-3/4 inch (44 mm) long to penetrate 11/16 inch (17 mm) into batten strips.
1. For Spanish Tile: Nails. 10 gauge copper or stainless steel, 3 inches (76 mm) long to penetrate 5/8 inch (16 mm) into batten strips.
 2. Nailing of Tiles: Determined by roof slope and prevailing wind condition.
 - a. Minimum Standards: UBC Table 15-D-2. See Figure 1 for Manufacturer's recommendations.
 - b. Cut pieces without a lug must be secured with copper wire or masonry construction adhesive.
- F. Trim Pieces: Nails. 10 gauge copper or stainless steel. 2-1/2 inch (64 mm) long to penetrate into wood nailers.
1. For Spanish Tile: Nails. 10 gauge copper or stainless steel 3 inches (76 mm) long to penetrate into wood nailers.
 2. Ridge, hip, rake and ridge end caps are to be nailed.
 3. Shingles: Nailed, 2 per piece. 11 gauge non-corrosive nails. Material: Copper, hot dipped galvanized steel, or stainless steel. Length: 1-3/4 inch (44 mm) R/S to penetrate sheathing.
- G. For High Wind Specs and Slopes above 18:12: Screws are required.
- H. Fasteners for Pans and Covers: 2-1/4 inch (57 mm) TP thread point stainless steel screws of sufficient length for 1/4 inch (6 mm) penetration through underside of plywood decking.

- I. Hurricane Clips for High Wind Specifications: 20 oz soft temper copper.

2.10 SNOW GUARDS/SNOW FENCE

- A. Snow Guards: 38 oz copper.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Check rafters, trusses and roof deck for humps, dips and loading capacity. A minimum 5/8 inch (16 mm) plywood deck is required for rafters and trusses 24 inch (610 mm) O.C. Install decking at hips to allow for a 1 inch (25 mm) flat surface to install the hip nailer and at the ridge to allow a 1-1/2 inch (38 mm) opening if ridge venting is to be installed. A minimum 3/4 inch (19 mm) deck is required for English shingle tile.

3.2 PREPARATION

- A. The roof deck should be clean, smooth and dry when underlayment is applied.
- B. Coordinate installation with 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 are securely fastened against movement. When tile vents are used they have to be installed prior to cutting the penetrations.

3.3 INSTALLATION

- A. Comply with the FRSA-TRA Florida High Wind Concrete and Clay Roof Tile Installation Manual.
- B. Comply with manufacturer's installation instructions and recommendations, but not less than recommended by The NRCA's Steep Slope Roofing Manual and the Roof Tile Institute's Cold and Moderate Climate Manual, SMACNA Manual and local code requirements.
- C. Eave fascia and plywood eave blocking shall extend above roof deck 1-7/8 inches (48 mm) to ensure proper cant for bottom row of tile.
 - 1. Slopes Below 3:12 in Sun Belt or 4:12 in Severe Weather Areas: Use two piece eave metal and cant strip instead of blocking over fascia.
 - a. Details available from the manufacturer.
 - 2. Spanish Tile: Eave fascia is level with roof deck.
 - 3. When Vertical Battens are Installed: Raise eave fascia to compensate for thickness of the vertical batten for Flat, Riviera and Spanish tile.
 - a. Details available from the manufacturer.
 - 4. Eave Fascia and Plywood Eave Blocking:
 - a. Extend above roof deck 3/4 inch (19 mm) to ensure proper cant for bottom row of shingles with English and Turret shingles.
 - 1) Minimum Slope for Shingles: 6:12.
 - b. Extend above roof deck 1-1/4 to 7 inch (32 to 178 mm) to ensure proper cant for bottom row of pans and covers with Spanish Pans and Covers.
 - 1) Minimum slope for Pans and Covers is 5:12.
- D. Install eave metal overlapping joints 3 inches (76 mm) with sealant in between.
- E. Install 24 inch (610 mm) standing seam, double rib (for closed valleys), or 24 inch (610 mm) double rib valley flashing (for open grouted valleys) lapped a minimum of 4 inch (102 mm) for slopes 4:12 and above and 6 inch (152 mm) for slopes below 4:12 over 36 inch (914 mm) full width vertical underlayment centered in all valley areas. Apply at least one layer of

underlayment under all flashings.

1. Slopes Below 3:12 in Sun Belt or 4:12 in Severe Weather Areas: Install flashings and EPDM underlayment per details provided by Manufacturer. For Spanish tile install 28 inch (711 mm) standing seam, double rib (for closed valleys) or 24 inch (610 mm) double rib valley flashing (for open grouted valleys).
- F. Underlayments; See "Underlayment" Article in Part 2 for Product Options: Apply with standard 3 inch (76 mm) lap laid parallel to eaves and ridge.
1. Roof deck must be clean, smooth and dry when underlayment is applied. Underlayment and flashings provide weather proofing for tile roof system. Building should be water tight before the tiles are installed. Do not use a slap stapler to install the underlayment or button/cap nails with the battens. Duck's Back underlayment will stretch in the hot sun. It must be rolled out and loose laid. Do not stretch when nailing.
 2. Horizontal Seams: Nail 1 inch (25 mm) from edge 6 inch (152 mm) on center. Nails: 11 gauge, 7/8 inch (22 mm) long, 3/8 inch (9 mm) round head, corrosive resistant.
 3. Vertical Seams: Lap 6 inches (152 mm). Seal with sealant. Nail 3 inch (76 mm) on center.
 4. Underlayment Extensions: 1/4 inch (6 mm) over lower edge of eave metal, to within 1 inch (25 mm) of outside valley rib and sealed to the metal. Extend 4 inches (102 mm) up head and side walls, 2 inches (51 mm) over gable fascia, and 6 inches over ridges and hips. providing a double layer on ridges and hips.
 5. Check Local Building Codes: Self-seal membrane may be required along eaves, valleys, sidewalls, gables and protrusions.
 6. Severe Weather Areas: Install self-seal membrane up roof slope 2 feet beyond interior face of exterior wall or as required by code, whichever is greater. Install 3 feet parallel to and overlapping valley metal 3 inch (76 mm) on each side.
 - a. For Slopes below 3:12 in Sun Belt and 4:12 in Severe Weather Areas:
 - 1) Single ply EPDM should be used as underlayment over vertical battens.
- G. Two layers of No. 30 felt can be applied in lieu of one layer of Duck's Back.
1. Place the first 18 inch (457 mm) wide ply parallel to eave edge, with bottom extending 1/4 inch (6 mm) over lower edge of eave flashing and seal to eave flashing. Place second 36 inch (914 mm) wide ply over first ply flush at bottom and sealed to first ply. Place bottom edge of third ply up 15 inches (681 mm) from bottom edge of second ply and each successive ply up 18 inches (457 mm) from the bottom of each previous ply. Stagger the vertical laps of each successive layer so that vertical joints do not align in any two adjacent plies. See "Underlayments" Paragraph in "Installation" Article in Part 3 of this specification for nailing of felt.
- H. Self-Seal Membrane or Tri-Flex 30: May be applied in lieu of one layer of Duck's Back on roofs that have ventilated air space below the deck.
1. Place first ply at eave edge, with bottom edge extending 1/4 inch (6 mm) over lower edge of eave flashing and seal to eave flashing. Place each successive ply overlapping top edge of previous ply 3 inch (76 mm).
- I. For Slopes Below 3:12 in the Sun Belt and 4:12 in Severe Weather Areas:
1. Install 0.045 inch (1.14 mm) thick EPDM over 1 x 3 inch (25 x 76 mm) vertical battens. Details available from manufacturer.
- J. Sidewall Flashing: Install at sidewalls and at sides of roof protrusions that have no saddles.
1. Vapor Barrier: should be used behind siding and extend over the flashing.
 2. A 3 ft (914 mm) strip of self-seal membrane extending 6 inches (152 mm) up sidewall should be installed under flashing.
- K. Angle Flashing: At lower sides of dormers, chimneys and other walls, extend 3 inches (76 mm) up walls and 3 inches (76 mm) over tile with 1/2 inch (13 mm) hem.
1. A 3 ft (914 mm) strip of self-seal membrane extending 3 inches (76 mm) up the angle

- should be installed under the flashing.
 - 2. Install Riviera closures with Riviera tile and ridge closures with Spanish tile.
 - 3. Counter flash, as necessary.
- L. Chimneys and Roof Protrusions Over 30 inches (762 mm): Require a framed saddle (cricket) with a maximum ridge length of 24 inches (610 mm).
 - 1. Saddle Flashing: Install over self-seal membrane and Rosin paper. Must extend 12 inches (305 mm) up the roof and 3-1/2 inch (89 mm) up back of chimney. Thoroughly counter flash, as necessary.
 - 2. Protrusions Less Than 30 inches (762 mm) Wide: Flat saddle flashing extending 6 inches (152 mm) up the vertical and 18 inches (457 mm) up the slope is used.
- M. All counter flashing is to be plugged, pointed, and made secure.
- N. Lay Out Roof as Follows:
 - 1. Install ridge nailer and vent.
 - 2. Strike lines centered on each hip if applicable.
 - 3. Strike horizontal line for top edge of first batten above the eave; 13-1/4 inch (337 mm) for flat, 12-3/4 inch (324 mm) for Riviera, and 15 inch (381 mm) for Spanish. Ensure tiles have approximately 1 inch (25 mm) overhang allowing for drainage and air flow under tile without causing ice damage or wind uplift.
 - 4. Strike horizontal line for top edge of top batten, approximately 1 inch (25 mm) below the ridge nailer and vent.
 - 5. Divide the distance between these two lines into equal increments not to exceed 12 inches (305 mm) for Flat and Riviera and 14 inch (356 mm) for Spanish and strike lines for top edges of battens.
- O. Install horizontal 1 x 2 x 96 inch (25 x 51 x 2438 mm) ported batten strips.
 - 1. Use pressure treated battens with notches or ports 16 inches (406 mm) on center leaving 3/4 inch (19 mm) space between the ends and fasten with 18 fasteners.
 - 2. For Slopes Below 3:12 in the Sun Belt and 4:12 in Severe Weather Areas:
 - a. Concrete Tile: Use a counter batten system. Details available from Manufacturer.
- P. Stack tile on roof selecting them randomly from several pallets to ensure an even color blend or order them pre-blended from the factory.
- Q. Laying Tile:
 - 1. Flat and Spanish Tile: Lay from right to left.
 - 2. Riviera: From left to right as viewed facing the ridge.
- R. Fastening Requirements: Fasten Tile as they are installed on the battens.
 - 1. Determined by slope, height of roof, and prevailing wind conditions. See Figure 1 for Fastening Specifications to provide a maximum basic wind protection of 80 mph (129 kph).
 - a. Flat and Riviera Slopes less than 10:12: Nail every tile with one fastener. Flat tile to be nailed in the right side hole.
 - b. Flat and Riviera Slopes 10:12 and Greater:
 - 1) Fasten every Flat tile with two nails.
 - 2) Fasten every Riviera tile with one screw.
 - c. Spanish Slopes less than 10:12: Nail every other tile; 50 percent.
 - d. Spanish Slopes 10:12 to 18:12: Nail every tile; 100 percent.
 - e. S h l 1812 | Architectural Specs 8/24/04.

3.4 FIELD TILE FASTENING SPECIFICATIONS

- A. Rake Trim: Install as tile are laid along the gable edge. Trowel sealant or use adhesive on

underside of rake trim and secure side with two 3 inch (76 mm) copper R/S 10 gauge nails or stainless steel screws.

- B. Ridge Trim: Installed as roof progresses. Use 2-1/2 inch (64 mm) long stainless steel nail for standard installation or No. 10, 2-1/2 inch (64 mm) long stainless steel screw for high wind areas.
 - 1. Ridge trim must be sealed between the laps with a generous amount of sealant, mastic, or foam to completely fill any voids between the lap of the two pieces.
 - 2. Fill space between tile and ridge nailer and vent with sealant.
 - 3. Install ridge closures with Spanish tile.
 - 4. Install end caps where gables meet ridge.
- C. Hip Starters and Hip Trim: Laid as hip tile are cut and secured in place.
 - 1. Fill space between the hip nailer and mitered tile with sealant.
 - 2. Use colored grout for Spanish tile.
 - 3. Wire, nail or screw small pieces to the hip nailer to prevent slippage.
- D. Hip, ridge, and ridge end cap trim must be nailed and lapped in sealant.
- E. For Tile in Heavy Snow Areas:
 - 1. Roofs that have gables within 5 ft (1524 mm) of a valley require special attention.
 - a. Using gable flashing instead of rakes is recommended.
 - b. If rakes are used, you have to prevent snow and ice slides from catching on the exposed edges and pushing them off.
 - 1) Use generous amount of adhesive between rake and field tile.
 - 2) Use screws, not nails, to fasten the two field tiles along the gable and for the rakes.
 - 3) Flat and Riviera Tile: Right and left rakes mitered 45 degrees along the top side should be used.
 - 4) Spanish Tile: Use grout to fill all voids along exposed edges.
 - 2. Proper Attic or Counter Batten Ventilation: Required for all styles of tile ensuring building heat loss is not trapped under tiles.
 - a. A 250 square foot minimum factor should be used instead of the standard 300 square foot factor in determining the eave and ridge venting requirements.
 - b. Give special attention to roofs without ventilated attic space.
 - c. Send a copy of plans to Manufacturer's estimating department for review and recommendations on your venting system.
 - 3. Snow Guards: Recommended for roof and valley areas with slopes of 17:12 or lower. Pay special attention to upper roofs with roofs below them. Decorative styles are available upon request.
- F. High Wind Specifications and roofs exceeding 40 ft (12.2 m):
 - 1. In Florida: Comply with installation procedures; 6th Edition FRSA/TRI Florida High Wind Concrete and Clay Roof Tile Installation Manual.
 - 2. Outside of Florida:
 - a. The following installation procedures are required in addition to the standard Vande Hey Raleigh specifications to increase the warranty to 125 mile per hour. With the counter batten system, the warranty is reduced to 100 mile per hour winds.
 - 1) Flat Tile: Fasten field tile with two 2-1/2 inch (64 mm) stainless steel roofing nails of sufficient length for 1/4 inch (6 mm) penetration through the underside of the plywood decking.
 - a) Tile to be pre-punched with two 3/16 inch (5 mm) holes at time of manufacture.
 - 2) Riviera Tile: Fasten field tile with one 2-1/4 inch (57 mm) stainless steel screw; TP thread point.
 - a) Tile to be pre-punched with one 3/16 inch (5 mm) hole at time of

manufacture.

- 3) Spanish Tile: Fasten field tile with two stainless steel screws; 2-1/4 inch (57 mm) TP thread point of sufficient length for 1/4 inch (6 mm) penetration through the underside of the plywood decking.
 - a) Tile to be pre-punched with two 3/16 inch (5 mm) holes at the time of manufacture.
- 4) Hip and Ridge Trim Pieces: Fasten with 2-1/4 inch (57 mm) stainless steel screws.
- 5) Rake Trim: Fasten with 3 inch (76 mm) stainless steel screws. Use a generous amount of adhesive at laps of the trim.
- 6) Hurricane Clips: Set on dab of sealant and fasten with 1 inch (25 mm) stainless steel screw at eaves.
- 7) Flat and Riviera Tile: Set every other tile in a dab of masonry adhesive on the underside of the water lock 1-1/2 inch (38 mm) from the bottom. Be sure the amount and location of adhesive used does not prevent tile from resting flat on the tile below. Fasten every other tile with regular hurricane clips. Do not lay in half joint pattern.
- 8) The openings under the Spanish hip pieces shall be closed with mortar grout, color to match the color of tile.

3.5 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
- B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

3.6 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturers recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION