SECTION 07 31 00

SYNTHETIC ROOF TILES

Display hidden notes to specifier. (Don't know how? [Click Here](https://www.arcat.com/sd/display_hidden_notes.shtml))

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\*\* NOTE TO SPECIFIER \*\* Brava Roof Tile; synthetic roof tiles.
This section is based on the products of Brava Roof Tile, which is located at:
915 E. Tyler St.
Washington, IA 52353
Tel: 844-290-4196
Fax: 319-343-1038
Email: [request info (marketing@bravarooftile.com)](https://arcat.com/rfi?action=email&company=Brava%252BRoof%252BTile&message=RE%253A%2520Spec%2520Question%2520(07320bra)%253A%2520&coid=50185&spec=07320bra&rep=&fax=319-343-1038)
Web: <https://www.bravarooftile.com>
 [ [Click Here](https://arcat.com/company/brava-roof-tile-50185) ] for additional information.
When deciding on what roofing material to use on your home, Brava composite tile should be at the top of your list. You might be wondering: "What is composite tile?" or "Why should I use Brava composite roof tile on my home?"
Brava composite tile is the best alternative to traditional Spanish clay tile, natural slate, and cedar shake roofing! Our composite roofing products last longer, are far more durable, and much more aesthetically and architecturally pleasing than asphalt shingles, concrete tiles, or slate, shake, and clay tiles.

1. GENERAL
	1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Synthetic roof tiles of the following types:
			1. Shake shingles. (Cedar Shake)
			2. Spanish tiles. (Spanish Barrel Tile)
			3. Slate tiles. (Slate)
		2. Accessories.
	1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required.

* + 1. Section 06 10 00 - Rough Carpentry.
		2. Section 07 60 00 - Flashing and Sheet Metal.
		3. Section 07 91 13 - Compression Seals.
	1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. ASTM International (ASTM):
			1. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
			2. ASTM D3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method).
			3. ASTM E108 (UL 790) - Standard Test Methods for Fire Tests of Roof Coverings.
			4. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
			5. ASTM D8257- Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing.
		2. Florida Building Code Testing Application Standard (TAS):
			1. TAS 100 - Standard Test Method for Wind and Wind Driven Rain Resistance of Discontinuous Roof Systems.
			2. TAS 125 - Test for Uplift Resistance on Roof Assemblies.
		3. International Code Council (ICC):
			1. ES Acceptance Criteria AC07 Section 4.9.
		4. Miami Dade County, FL. (www.miamidade.gov).
		5. Texas Department of Insurance. (www.tdi.texas.gov).
		6. Underwriters Laboratories (UL):
			1. UL 790 - (Exterior Exposure), Standard Test Methods for Fire Tests of Roof Coverings.
			2. UL 997 - Wind Resistance of Prepared Roof Covering Materials.
			3. UL 2218 - Impact Resistance of Prepared Roof Covering Materials.
	1. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. 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.

\*\* NOTE TO SPECIFIER \*\* Delete selection samples if colors have already been selected.

* + 1. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
		2. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.
		3. Shop Drawings: Include details of materials, construction and finish. Include relationship with adjacent construction.
	1. QUALITY ASSURANCE
		1. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section.

\*\* NOTE TO SPECIFIER \*\* Delete the documented experience option not required.

* + - 1. Minimum Years of Documented Experience: 5.
			2. Minimum Years of Documented Experience: \_\_\_.
		1. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
		2. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up on might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project. Delete if not required.

* + 1. 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. PRE-INSTALLATION CONFERENCE
		1. 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.
	2. DELIVERY, STORAGE, AND HANDLING
		1. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
		2. Protect from damage due to weather, excessive temperature, and construction operations.
		3. Store and dispose of solvent-based materials, and materials used with solvent based materials, in accordance with requirements of local authorities having jurisdiction.
	3. PROJECT CONDITIONS
		1. 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.
	4. WARRANTY
		1. Manufacturer's Warranty: Provide manufacturer's standard limited warranty:
			1. Manufacturer's 50 year warranty for shingles against breakage and deterioration that causes leaks under normal weather and use conditions.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Brava Roof Tile, which is located at:
		915 E. Tyler St.
		Washington, IA 52353
		Tel: 844-290-4196
		Fax: 319-343-1038
		Email: [request info (marketing@bravarooftile.com)](https://arcat.com/rfi?action=email&company=Brava%252BRoof%252BTile&message=RE%253A%2520Spec%2520Question%2520(07320bra)%253A%2520&coid=50185&spec=07320bra&rep=&fax=319-343-1038);Web: <https://www.bravarooftile.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
	1. PERFORMANCE REQUIREMENTS
		1. Roof system to consist of manufactured synthetic tiles attached to structural substrate to form weather tight roof envelope with no measurable water penetration.
		2. Tiles shall be manufactured with variations in color and size, textured faces and edges, and sufficient thickness to provide a realistic installed appearance.
		3. Method of attachments shall be designed to adequately resist wind uplift for roof configuration and project location.

\*\* NOTE TO SPECIFIER \*\* Select one of the first three paragraphs below for fire resistance. Second option is not available for Cedar Shake tiles. Delete fire resistance not required.

* + - 1. Click on this link "HYPERLINK "https://assets.bravarooftile.com/web/resources/CERu-1014rev2-Wildhawk-Investments-dba-Brava-Tile-02112023.pdf?v=1701718847"Code Evaluation Report" to see the document referred to in in the following paragraphs.
		1. Fire Resistance: When installed over one layer of 30 lbs (13.6 kg). felt that meets ASTM D226 Type II standard or a listed synthetic underlayment: Class C tested in accordance with ASTM E108/UL790. See Code Evaluation Report for specific fire classified assemblies.
		2. Fire Resistance: When installed over one layer of Low-E ThermaSheet or Eco Chief Solarhide. Class A tested in accordance with ASTM E108/UL790. See Code Evaluation Report for specific fire classified assemblies.
		3. Fire Resistance: When installed over one layer of GAF VersaShield Fire Resistant Underlayment. Class A tested in accordance with ASTM E108/UL790. See Code Evaluation Report for specific fire classified assemblies.
		4. Wind Uplift Resistance: When installed over minimum 15/32 inch (12 mm) thick plywood. Tested in accordance with method TAS 125. See Code Evaluation Report for specific fire classified assemblies.
		5. Hail Impact Resistance: Class 4 to withstand two drops of 2 inches (51 mm) diameter, 1.2 lbs. (0.54 kg) steel ball dropped from 20 feet (6096 mm) tested in accordance with UL 2218.
		6. Freeze-thaw resistance: No crazing, cracking, delamination of coating, or other deleterious surface changes after one month exposure with temperature cycled from -40 to 180 degrees F (0 degrees to 82 degrees C) in 22 hours tested in accordance with International Code Council (ICC)- ES Acceptance Criteria AC07 Section 4.9.
		7. Accelerated weathering: Little change after 2,500 hours exposure to ultraviolet (UV) radiation, elevated temperature, moisture, and thermal shock.

\*\* NOTE TO SPECIFIER \*\* Brava composite shake tile offers the aesthetics of hand split cedar, that even the most fastidious consumer would agree is stunningly the same. Our multi-colored synthetic roof tile is unparalleled in the composite roofing market and is available in three different widths. Our product can be installed in straight courses or in a staggered application to give it a more rugged appearance. No other imitation shake comes close to our authentic appearance and quality. Delete if not required.

* 1. SYNTHETIC SHAKE TILES
		1. Basis of Design: Brava Roof Tile, Cedar Shake; as manufactured by Brava Roof Tile.
		2. Lightweight, synthetic shake shingles with the appearance, color, texture, and thickness of natural wood shakes.
		3. Material: Engineered polymer formulated from post-industrial recycled plastic.
		4. Installed weight: At 10 inch (254 mm) exposure: 304 lbs per 100 sq ft (17.4 kg per sq m).
		5. Profile: Rectangular shape with exposed to view upper surface and edges textured to resemble natural wood shake. Underside formed with reinforcing ribs for added strength and stability.
		6. Size:
			1. Thickness: 3/8 to 1 inch (9.5 to 25 mm) at butt end.
			2. Length: 22 inches (559 mm).
			3. Variable widths: 5, 7, and 12 inches (127, 178, and 305 mm).
		7. Starter Tile: 12 inches (305 mm) long by 12 inches (305 mm) wide.
		8. Markings: Form tiles with markings on upper surface to indicate nailing locations and provide alignment guidelines for different exposure lengths.
		9. Finish: Multi color comparable to natural wood shakes. Internal UV stabilizers to provide durable color stability.

\*\* NOTE TO SPECIFIER \*\* Delete colors not required.

* + - 1. Color: Lake Forest.
			2. Color: Aged Cedar.
			3. Color: Aspen.
			4. Color: Natural Cedar.
			5. Color: Canyon Gray.
			6. Color: New Cedar.
			7. Color: Cool Lake Forest.
			8. Color: Cool Weathered.
			9. Color: Sierra.
			10. Color: Weathered.
			11. Color: White.
			12. Color: To be selected by Architect.
			13. Color: As indicated on Drawings.

\*\* NOTE TO SPECIFIER \*\* Barrel roof tile, more commonly known as Spanish Tile (or Double Roman), is a term often used to describe the multiple forms of semi-cylindrical roofing tile that is laid in an interlocking pattern. Spanish tile roofing has been around for centuries and continues to be the preference of many homeowners today. Brava composite barrel tile undoubtedly kindles the beauty of European Old World roofing. Delete if not required.

* 1. SYNTHETIC SPANISH BARREL TILES
		1. Basis of Design: Brava Roof Tile, Spanish Barrel Tile; as manufactured by Brava Roof Tile.
		2. Lightweight, synthetic Spanish tiles with the appearance, texture, and thickness of concrete or clay Spanish tiles.
		3. Material: Engineered polymer formulated from post-industrial recycled plastic.
		4. Installed weight: At 13 inch (330 mm) exposure: 281 lbs. per 100 sq ft (12.6 kg per sq m).
		5. Profile: Barrel shape with exposed upper surface and edges to resemble concrete or clay Spanish tile.
		6. Size:
			1. Length: 16.5 inches (419 mm).
			2. Width: 13 inches (330 mm).
		7. Eave Starter: 3 inches (76 mm) wide by 11.75 inches (298 mm) wide.
		8. Markings: Form tiles with markings on upper surface to indicate nailing locations and provide alignment guidelines.
		9. Finish: Specified color patterning comparable to concrete or clay Spanish tiles. Internal UV stabilizers to provide durable color stability.

\*\* NOTE TO SPECIFIER \*\* Delete colors not required.

* + - 1. Color: Aged Mission.
			2. Color: Antique Clay.
			3. Color: Black Brown Blend.
			4. Color: Arendale.
			5. Color: Graphite.
			6. Color: Onyx.
			7. Color: Terra Cotta Brown.
			8. Color: Tuscan Clay.
			9. Color: Vintage Terra Cotta.
			10. Color: Autumn (Premium Blend).
			11. Color: Mediterranean (Premium Blend).
			12. Color: Pine Green (Premium Blend).
			13. Color: Spanish Barrel (Premium Blend).
			14. Color: Cool French Clay (T24 Color).
			15. Color: Cool Terra Cotta (T24 Color).
			16. Color: Antiqua (Legacy Blend).
			17. Color: New Aged terra Cotta (Legacy Blend).
			18. Color: To be selected by Architect.
			19. Color: As indicated on Drawings.

\*\* NOTE TO SPECIFIER \*\* With a 1 inch profile, Brava's Old World Slate polymer tile has the volume of traditional slate roof tiles with a fraction of the weight. This allows for less expensive shipping costs and ease of installation. Our Old World Slate shingles have the thickest synthetic slate roof profile available. The 1 inch thick profile of this product creates beautiful color exposure and an unsurpassed durability. Our composite slate roof tiles are available in any custom color or color combination. Delete if not required.

* 1. SYNTHETIC SLATE TILES
		1. Basis of Design: Brava Roof Tile, Old World Slate; as manufactured by Brava Roof Tile.
		2. Lightweight, synthetic slate tiles with the appearance, texture, and thickness of traditional slate tiles.
		3. Material: Engineered polymer formulated from post-industrial recycled plastic.
		4. Installed weight: At 10 inch (254 mm) exposure: 311 lbs. per 100 square feet (16.5 kg per sq m).
		5. Profile: Rectangular shape with exposed upper surface and edges to resemble traditional slate tile.
		6. Size:
			1. Length: 22 inches (559 mm).
			2. Width: 12 inches (305 mm).
		7. Starter Shingle: 12 inches (305 mm) long by 12 inches (305 mm) wide.
		8. Markings: Form tiles with markings on upper surface to indicate nailing locations and provide alignment guidelines.
		9. Finish: Specified color patterning comparable to traditional slate tiles. Internal UV stabilizers to provide durable color stability.

\*\* NOTE TO SPECIFIER \*\* Delete colors not required.

* + - 1. Color: Arendale.
			2. Color: Cottage.
			3. Color: Atlantic.
			4. Color: Onyx.
			5. Color: Graphite.
			6. Color: Light Arendale.
			7. Color: Washington.
			8. Color: European (Premium Blend).
			9. Color: Pine Green (Premium Blend).
			10. Color: White (Premium Blend).
			11. Color: Tuscan Clay (Premium Blend).
			12. Color: Victorian (Premium Blend).
			13. Color: Deep Green (Legacy Green).
			14. Color: Gray (Legacy Blend).
			15. Color: Welsh (Legacy Blend).
			16. Color: To be selected by Architect.
			17. Color: As indicated on Drawings.

\*\* NOTE TO SPECIFIER \*\* Delete if not required.

* 1. ACCESSORIES
		1. Underlayment: Asphalt saturated and coated organic felt base sheet which meets or exceeds requirements of ASTM D226 Type II No. 30 non-perforated saturated asphalt felt or a listed synthetic underlayment which meets or exceeds requirements of ASTM D8257, in accordance with manufacturer's instructions.
			1. Approved synthetic membranes include, but are not limited to:
				1. Titanium UDL 50.
				2. Low-E ThermaSheet.
				3. Eco Chief SOLARHIDE-SRW.
				4. GAF VersaShield Resistant Roof Deck Protection.
		2. Waterproof Sheet Membrane: Cold applied, self-adhering waterproof membrane composed of polyethylene film coated one side with rubberized asphalt adhesive which meets or exceeds requirements of ASTM D1970, in accordance with manufacturer's instructions.
			1. Thickness: 40 mils (1 mm).
			2. Low temperature flexibility: Unaffected at minus 32 degrees F (minus 36 degrees C).
			3. Minimum tensile strength: 250 psi (1724 kPa).
			4. Minimum elongation: 250 percent.
			5. Permeance: 0.05 perms maximum.
			6. Approved membranes include, but are not limited to:
				1. Titanium PSU 30.
		3. Flashing: Fabricate from sheet to profiles and dimensions indicated on Drawings and approved shop drawings and in accordance with general requirements specified in Section 07 60 0 - Flashing and Sheet Metal.

\*\* NOTE TO SPECIFIER \*\* Delete material not required.

* + - 1. Material: 16 ounce copper.
			2. Material: 26 gage (0.455 mm) galvanized steel.
			3. Base Flashings: To be used over or under the roof coverings and are turned up on the vertical surface.
				1. Base flashings should extend under the uppermost row of tile the full depth of the tile or at least 4 inches (102 mm) over the tile immediately below the metal. The vertical leg of the metal should be turned up a minimum of 4 inches (102 mm) and extend 4 inches (102 mm) on the tile as it is laid.
			4. Linear Components: Form in longest possible lengths with 8 ft (2.5 m) as minimum.
			5. Counter Flashings: Extend 4 inches (102 mm) minimum up vertical surfaces and 4 inches (102 mm) minimum under shingles.
			6. Eave Flashings: Form bottom edge outward 1/4 inch (6 mm) and hem to form drip.
			7. Valley Flashings: 24 inches (610 mm) minimum width and extending 10 inches (254 mm) minimum from valley center line.

\*\* NOTE TO SPECIFIER \*\* Delete fasteners not required.

* + 1. Standard Fasteners: 3/8 inch (9.5 mm) diameter, corrosion resistant flat head ring shank roofing nails 1-3/4 inches (44 mm) long.

\*\* NOTE TO SPECIFIER \*\* Delete materials not required.

* + - 1. Material: Copper.
			2. Material: Stainless steel.
			3. Material: Hot-dipped galvanized.
		1. Standard Fasteners: No. 10 DSVT T25 screws 2 inches (51 mm) long.

\*\* NOTE TO SPECIFIER \*\* Delete materials not required.

* + - 1. Material: Copper.
			2. Material: Stainless steel.
			3. Material: Hot-dipped galvanized.
		1. High wind fasteners (90,100, 130 mph): 1/8 inch (3 mm) diameter, No. 8 x 2 inch (51 mm) screws.

\*\* NOTE TO SPECIFIER \*\* Delete materials not required.

* + - 1. Material: Copper.
			2. Material: Stainless steel.
			3. Material: Hot-dipped galvanized.
		1. High wind fasteners (90,100, 130 mph): No. 10 x 2-1/2 inch (64 mm) screws.
			1. Epoxy, polymer or ceramic coated.

\*\* NOTE TO SPECIFIER \*\* Delete materials not required.

* + - 1. Material: Stainless steel.
			2. Material: Hot-dipped galvanized.

\*\* NOTE TO SPECIFIER \*\* Delete snow guard paragraph if not required or delete snow guards not required.

* + 1. Snow Guards:
			1. Alpine Fusion-Guard Hybrid Pad-Style Snow Guard.
			2. Snow Gem Half Carat Metal Snow Guard with Plate.
			3. TRA Snow and Sun - Snow Bracket Brava - APEX.

\*\* NOTE TO SPECIFIER \*\* Delete solar mounts paragraph if not required or delete solar mount option not required.

* + 1. Solar Mounts:
			1. QBase Metal, Shake and Slate Mount.
			2. QBase Universal Tile Mount.
1. EXECUTION
	1. EXAMINATION
		1. Do not begin installation until substrates have been properly constructed and prepared.
		2. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
	2. PREPARATION
		1. Clean surfaces thoroughly prior to installation.
		2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
		3. Coordinate installation with provision of gutters and downspouts as specified herein.
		4. Verify roof is complete, rigid, braced, and deck members are securely fastened. Ensure proper ventilation has been provided for roof space. Do not proceed with roofing until deficiencies are addressed.
		5. Verify roof deck is clean, dry, and ready to receive Brava synthetic Shake, Slate, or Spanish Barrel tiles.
	3. INSTALLATION - GENERAL
		1. Install products in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.
		2. Underlayment Installation: Install self-adhered waterproof sheet membrane on the eaves. Cover the waterproof sheet membrane and the remaining portions of the roof as scheduled with the approved underlayment. Then install waterproof sheet membrane in valleys, along walls and around projections terminating on top of underlayment. Install underlayment in accordance with underlayment and tile manufacturers' recommendations.
			1. Stripping Ply: Install full sheet of self-adhered waterproof sheet membrane in valleys, and minimum 18 inch (457 mm) width on gable ends, against walls, and around projections.
			2. In areas where January average daily temperature is 25 degrees F (minus 4 degrees C) or lower or where ice buildup is possible, install self-adhered waterproof sheet membrane from bottom edge extending two feet (610 mm) above exterior wall line on eaves.
			3. Install waterproof sheet membrane over entire roof area.
				1. Apply waterproof sheet membrane at temperatures of 40 degrees F (4 degrees C) or higher.
				2. Adhere and attach as recommended by manufacturer of waterproof sheet membrane.
				3. Start underlayment installation at lower edge of roof. Install perpendicular to roof slope with minimum 4 inch (102 mm) side laps and minimum 6 inch (152 mm) end laps.
				4. Extend underlayment minimum 4 inches (102 mm) up vertical wall intersections and at least 6 inches (152 mm) onto the roof.
				5. Do not leave underlayment membrane exposed in excess of time limit required by manufacturer. Do not puncture or tear underlayment.
		3. Flashing Installation:
			1. Install overhanging drip edge on eaves and gable ends and metal flashings at valleys, ridges, hips, roof curbs, penetrations, and intersections with vertical surfaces in accordance with Section 07 60 00 - Flashing and Sheet Metal.
			2. Weather lap joints 2 inches (52 mm) minimum and seal with sealant as specified in Section 07 91 14 - Compression Seals, Joint Fillers.
			3. Secure in place with clips, nails, and other fasteners.
	4. TILE INSTALLATION GENERAL

\*\* NOTE TO SPECIFIER \*\* For an active link for the URL below. Click HYPERLINK "https://www.bravarooftile.com/resources/" "installation-application"here.

* + 1. Install tiles in accordance with manufacturer's instructions and approved Shop Drawings. https://www.bravarooftile.com/resources/#installation-application
		2. Layout: Accurately layout shingles. Ensure that edges are parallel and perpendicular to roof eaves.
		3. Confirm roof square before installation. Correct any out of square conditions and ensure that the eave line is straight.
		4. Color: Verify that materials are the selected color. Some color variation is to be expected. If color variation exceeds original selection, immediately cease installation and notify manufacturer.
		5. Selection: Pull materials from three separate pallets to ensure proper color blending.
		6. Roof Slope: Minimum roof slope recommended for the application of synthetic roof tile is 4:12. When installed on a 3:12 slope, a self-adhered waterproof membrane should be used on the entire slope.
	1. TILE INSTALLATION - SHAKE AND SLATE
		1. Spacing: Provide a minimum 3/16 inch (5 mm) gap between all tiles to allow for expansion and contraction. A 3/8 inch (9.5 mm) spacing is recommended.
		2. Exposure: Maximum 10 inches (254 mm). Minimum 4 inches (102 mm).
		3. Fastening: Attach each tile to wood deck with 2 approved fasteners.
			1. Place fasteners at locations indicated on tiles.
			2. Use approved nails or screws for the tile type being installed.
			3. Ensure full penetration but do not overdrive fasteners.
			4. Ensure min. 3/4 inch (19 mm) fastener penetration or completely through the deck.
			5. Do not fasten at an angle.
			6. Ensure that the fastener head is flush with shingle surface.
			7. At valleys do not fasten tiles within 5 inches (127 mm) of valley center line.
		4. Cutting: Layout work to avoid cutting shingles.
			1. At gables and vertical intersections, vary combination of shingle width and spacing of shingles to avoid cutting.
			2. If cutting is required, place shingle such that cut edge is not exposed. The use of solid field tiles is recommended be best aesthetics.
			3. Use circular saw or straight edge and utility knife if cuts are necessary.
		5. Sidelap: Stagger tiles joints in one course minimum 1-1/2 inches (38 mm) from joints in course below.
		6. Eaves: Install row of starter tiles at eaves as base layer. Overhang starter tile at eave edge approximately 1/2 inch (13 mm) and 1 inch (25 mm) past rake edge, or as required to allow water to drain.
		7. Ridges and Hips: After field shingle installation is complete, install an 8 inch wide (203 mm) strip of self-adhering membrane over the center of the hip and any unvented sections of ridge.
			1. Install ridge or hip caps using the correct profile for correct fit (Low, Standard, Steep).
			2. Install Hip/Ridge Caps with two fasteners at the formed fastener locators penetrating 3/4 inches (19 mm) or more into the deck or completely through the deck.
			3. Match Hip/Ridge exposure to Field Shake exposure to be no more than 10 inches (254 mm).
			4. 3 inch (76 mm) fasteners recommended for hip and ridge caps.
		8. Valleys: Install full 36 inch (914 mm) sheet of self-adhered waterproof sheet membrane in valleys.
			1. Open Valley: A minimum 4 inch (102 mm) opening at the top of the valley is recommended using Solid Shakes with a "W" style flashing and 1-inch center crimp. If Solid Shakes are not used with 1-1/2 inch (38 mm) crimps, a "Double W" flashing may be used to cover exposed structural ribbing on cut Field Shakes.
			2. Closed Valley: A "W" style flashing may be used with a 1-1/2 inch (38 mm) center crimp. Leave a minimum 3/16 inch (5 mm) gap between the shakes at the valley for thermal expansion.
			3. At valleys do not fasten tiles within 5 inches (127 mm) of valley center line.
	2. TILE INSTALLATION- SPANISH BARREL
		1. Hip and Ridge Nailers: Install Hip and Ridge Nailers (required) and Rake Nailers (optional) before Field Tile Installation.
			1. Determine Nailer height for hips and ridges.
			2. Install Hip and Ridge Nailers using code approved wood or metal hip and ridge nailers, fastened at a maximum of 24 inch (610 mm) on center, holding hip nailers back 4 inch (102 mm) from outside corners.
		2. Eave Starter: When installing Field Tile at the eave, the two tile ribs should engage with the vertical closure section of the Eave Starter. Use the eave reference line and Field Tile line to keep the first course of tile even and straight.
		3. Field Tile: Install the first Field Tile courses from right to left using chalk lines to maintain straight courses. Ribs underneath the Field Tile should engage with the vertical closure section of the Eave Starter.
			1. Dry fit the next Field Tile on the next Eave Starter and position the pair, fitting it with the previously installed Field Tile/Eave Starter pair and the chalk lines.
			2. Mark the location and Fasten the Eave Starter.
			3. Install the field tile with an offset seam.
			4. Repeat process of installing each eave starter / field tile pair.
			5. Optional installation of battens should be a weather-resistant material meeting application and code requirements.
		4. Exposure: Maximum 13 inches (330 mm). Minimum 4 inches (102 mm).
		5. Fastening: Attach each tile to wood deck with 2 approved fasteners.
			1. Place fasteners at locations indicated on tiles.
			2. Use approved nails or screws for the tile type being installed.
			3. Ensure full penetration but do not overdrive nails.
			4. Do not nail at an angle.
			5. Ensure that nail head is flush with shingle surface.
			6. At valleys do not nail shingles within 5 inches (127 mm) of valley center line.
		6. Cutting: Layout work to avoid cutting shingles.
			1. If cutting is required, cut tiles and accessories at valleys, rakes, and other details, make straight even cuts. When possible, place the factory edge to the outside.
		7. Valleys: Install full 36 inch (914 mm) sheet of self-adhered waterproof sheet membrane in valleys. Flashing should extend 11 inches (279 mm) in each direction from the valley centerline for slopes 4:12 or greater and 14 inches (355 mm) in each direction for slopes less than 4:12.
			1. Open Valley: For Open Valleys, use a "Double W" Style flashing with minimum 2-1/2 inch (63 mm) crimps.
			2. Closed Valley: For Closed Valleys, use a "W" style flashing with a minimum 2-1/2 inch (63 mm) center crimp.
			3. Cut Tiles before they are installed, dry fitting and marking to for an even line up the valley. Install Field Tile along the crimps leaving a minimum 3/16 inch (4.7 mm) gap between the tiles and crimps for expansion.
			4. At valleys do not fasten tiles within 5 inches (127 mm) of valley center line.
		8. Hip and Ridge:
			1. Trim Field Tiles, leaving a 3/16 inch (5 mm) gap at the hip and ridge nailers for expansion and contraction.
			2. Install a UV-resistant flashing over the hip nailers and any unvented ridge nailers. Flashing should extend at least 3 inch (76 mm) over the tile in each direction and conform to the tiles.
			3. At intersections, ensure a minimum lap of 4 inch (102 mm) of vented and unvented flashing or comply with the flashing manufacturer's guidance.
			4. Install the Bullnose and Hip and Rake up the hip using corrosion-resistant fasteners at the locators. Match the exposure of the Field Tile with a maximum exposure of 13 inches (330 mm).
			5. Install Ridge Closures by placing fasteners 1-1/4 inches (32 mm) from the top edge into the high side of the barrel. Avoid exposed fasteners.
			6. Miter/Trim Hip and Rake and Top Ridge at joints and intersections. Seal with flashing at the joint and paint to match if desired.
			7. Begin Ridges with a Bullnose or Top Ridge trimmed for the desired fit and appearance.
			8. Install Bullnose and Top Ridge using corrosion-resistant fasteners at the locators. Match the exposure of the Field Tile and Hip and Rake with a maximum exposure of 13 inch (330 mm).
		9. Rake:
			1. Dry Fit and Mark Hip and Rake. Measure the overhang and mark the distance from the top of the Hip and Rake piece.
			2. Cut the first Hip and Rake. Ensure the factory edge is flush with the visible face of the first course of Field Tile. Alternative installation methods include use optional Rake Edge.
			3. Fasten with two fasteners, one in the fascia board and one in the nailer (or roof deck).
			4. Install Full Hip and Rake Pieces. Proceed up the remaining rake using fasteners and sealant.
			5. Ridges and Transitions. Miter the Hip and Rake, Top Ridge, and Bullnose at ridges and transitions to complete the installation.
	3. FIELD QUALITY CONTROL
		1. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
		2. Inspect units as they are installed. Do not install cracked, broken, twisted, curled, or otherwise damaged units.
		3. As work progresses, exercise care not to scratch or mar installed units. Units damaged during installation shall be immediately removed and discarded.
		4. After approximately 200 sq ft (15.6 sq m)of tiles have been installed, inspect roof from ground. Verify proper layout and appearance. Repeat inspection throughout installation.
		5. Visually inspect complete installation to ensure that it is weather tight.
	4. CLEANING AND PROTECTION
		1. Clean products in accordance with the manufacturer's recommendations.
		2. Protect installed products until completion of project.
		3. Color match accessories for aesthetic purposes if desired.
		4. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION