

Product Evaluation

RC261 | 0422

Engineering Services Program

The following product has been evaluated for compliance with the wind loads specified in the International Residential Code (IRC) and the International Building Code (IBC).

This product evaluation is not an endorsement of this product or a recommendation that this product be used. The Texas Department of Insurance has not authorized the use of any information contained in the product evaluation for advertising, or other commercial or promotional purpose.

This product evaluation is intended for use by those individuals who are following the design wind load criteria in Chapter 3 of the IRC and Section 1609 of the IBC. The design loads determined for the building or structure shall not exceed the design load rating specified for the products shown in the limitations section of this product evaluation. This product evaluation does not relieve a Texas licensed engineer of his responsibilities as outlined in the Texas Insurance Code, the Texas Administrative Code, and the Texas Engineering Practice Act.

For more information, contact TDI Engineering Services Program at (800) 248-6032.

Evaluation ID: RC-261

Effective Date: April 1, 2022

Re-evaluation Date: February 2025

Product Name: USTile Clay Roofing Tiles

Manufacturer: Westlake Royal Roofing, LLC
2801 Post Oak
Suite 600
Houston, TX 77056
(800) 669-8453

General Description:

Westlake Royal Roofing, LLC clay roof tiles are acceptable for use in designated catastrophe areas along the Texas Gulf Coast when installed in accordance with this product evaluation report, the building specifications adopted by the TDI, and the manufacturer's installation instructions as referenced in the "*Florida High Wind Concrete and Clay Tile Installation Manual*," 6th Edition (FRSA-TRI Installation Manual), except for the attachment methods specified in this evaluation report.

Product Description:

Westlake Royal Roofing, LLC clay roof tiles are tiles that are manufactured from various clays and are kiln-fired. The tiles are available in a variety of earth tone and authentic kiln-flashed colors.

Attachment: Install the Westlake Royal Roofing, LLC clay roof tiles specified in this report using either a mechanical fastening system or an adhesive fastening system. Secure the roof tiles directly to the roof deck over the underlayment.

Roof Tile Profile Classifications: Roof tile profiles are classified as one of the following:

- **Flat/Low Profile:** Flat/Low profile tiles are tiles having a rise equal to or less than 1/2".
- **Medium Profile:** Medium profile tiles are defined as tiles having a rise greater than 1/2" and a rise to width ratio of less than or equal to 1.5.
- **High/Barrel Profile:** High/Barrel profile tiles are those tiles having a rise to width ratio greater than 1.5.
- **Roof Tile Designations, Profile Classifications, and Dimensions:** Table 1 specifies the roof tile designations, profile classifications, and dimensions for the clay roof tiles that apply to this product evaluation report.

Table 1
Roof Tile Designations, Profile, Dimensions, Factor, and Factor Ratio

Tile Name	Alternate Name	Tile Profile	Tile				
			Length (in.)	Width		Factor (ft ³)	Factor Ratio
				Total (in.)	Exposed (in.)		
Claylite®	Lightweight S	Medium	18	13	11	1.568	1.114
One Piece "S"	S	High	18	13	11	1.568	1.114
Tapered Two Piece Mission	Two Piece Mission	High	18	8½	8-1/2	1.211	0.861

Installation and Limitations:

Roof Framing and Roof Deck: Install roof framing members in accordance with either the IRC or the IBC. Do not space the roof framing members greater than 24" on center. The roof deck must be solidly sheathed with minimum 15/32" plywood. Fasten the roof deck to the roof framing members in accordance with either the IRC or the IBC.

If the existing roof deck is a spaced board roof deck, then either remove or cover the spaced boards with the minimum thickness of plywood deck specified in the IRC or the IBC. Install the plywood sheathing over the spaced boards in accordance with either the IRC or the IBC.

Metal Drip Edge: Install a metal drip edge as specified in the manufacturer's installation instructions as referenced in the *Concrete and Clay Roof Tile Installation Manual*.

Roof Underlayment:

3:12 Roof Slope to Under 4:12 Roof Slope: Two layers of underlayment complying with ASTM D 226, Type II (No. 30 asphalt felt) or equivalent. Install the underlayment as specified in either the IRC or the IBC and in the manufacturer's installation instructions as referenced in the FRSA-TRI Manual.

4:12 Roof Slope and Greater: One layer of underlayment complying with ASTM D 226, Type I (No. 30 asphalt felt) or equivalent. Lap the underlayment a minimum of 2" at the head laps and a minimum of 6" at the side laps. Install the underlayment as specified in either the IRC or the IBC and in the manufacturer's installation instructions as referenced in the FRSA-TRI Manual.

Self-Adhering Underlayment: Self-adhering underlayment must comply with ASTM D 1970 and ICC-ES acceptance criteria AC152 Section 3.4 Alternate Underlayments. Install the self-adhering underlayment in accordance with the self-adhering underlayment product evaluation report and the self-adhering underlayment manufacturer's installation instructions.

Battens: The roof deck must be solidly sheathed with minimum 15/32" plywood. Battens must be nominal 1x3 wood members. Space battens to allow for a minimum 2-1/4" headlap. Fasten the battens to the roof deck with minimum 8d corrosion resistant common, box or fastener with equivalent nail size. Space the nails a maximum of 24" on center. As an alternative, the battens may be fastened to the roof deck with No. 16 gauge by 15/32" crown by 1-1/2" long staples. Space the staples a maximum of 12" on center. Separate batten ends a minimum of 1/4" every 4' to allow for drainage.

Roof Tile Installation:

Roof Slope Limitations: Install the roof tiles on buildings with a roof slope greater than or equal to 2-1/2:12. The minimum roof slope is 3:12 unless installed on an approved waterproofing system. An installation on a roof with a roof slope greater than 7:12 requires a minimum of two fasteners per tile. When an adhesive fastening system is used, refer to the adhesive fastening system manufacturer's product evaluation for roof slope limitations.

Moment of Resistance: The overturning resistance (moment of resistance) due to wind of the roof tiles based on the installation method for the roof tiles is shown in Table 2.

Table 2: Moment of Resistance Based on Roof Tile Installation Method

Tile Designation	Fastener Type	Minimum 15/32" Plywood Roof Deck
Claylite®	2-10d Ring Shank Nails (18-22 Rings Per inch)	29.6 ft-lbs
One Piece "S"		22.1 ft-lbs
Tapered Two Piece Mission		22.1 ft-lbs
Claylite®	1-#8 Screw	26.8 ft-lbs
One Piece "S"		22.2 ft-lbs
Tapered Two Piece Mission		22.2 ft-lbs
Claylite®	2-#8 Screws	49.0 ft-lbs
One Piece "S"		44.8 ft-lbs
Tapered Two Piece Mission		44.8 ft-lbs

Table 2: Moment of Resistance Based on Roof Tile Installation Method

Tile Designation	Fastener Type	Minimum 19/32" Plywood Roof Deck
Claylite®	2-10d Ring Shank Nails (18-22 Rings Per inch)	39.0 ft-lbs
One Piece "S"		34.0 ft-lbs
Tapered Two Piece Mission		34.0 ft-lbs

Aerodynamic Uplift Moment: The aerodynamic uplift moment for the roof tile is calculated using Equation 16-34 from the 2018 IBC. The aerodynamic uplift moment is calculated based on the mean roof height for the installation and the required wind speed and Exposure condition for the installation location using ASCE 7-16.

Permissible Tile Installation: The roof tiles may be installed if the Moment of Resistance for the roof tile specified in this evaluation report is greater than the Aerodynamic Uplift Moment for the roof tile calculated for the structure location.

General: Install the roof tiles in accordance with this product evaluation report and the manufacturer's installation instructions. The roof tiles and the underlayment system must be clean and dry at the time of their application.

The One Piece "S" and Claylite® roof tiles must be laid out from the left to the right, starting at the left rake. The Tapered Two-Piece Mission may be laid out either from the left or the right. Install all roof tiles with a minimum 3" headlap.

Install the Tapered Two-Piece Mission using either a mechanical fastening system or an adhesive fastening system. The mechanical fastening system is to comply with "Mechanical Fastening Systems" except a nailer board is required for the cap tile. The nailer board must be of sufficient height so that the nailer board and the underside of the cap tile are touching. The adhesive fastening system is to comply with the "Adhesive Fastening System".

Mechanical Fastening Systems:

Fasteners: Use fasteners for direct deck installations long enough to penetrate a minimum of 3/4" into or through the roof deck. Use fasteners for batten installations (when used) long enough to penetrate through the batten entirely and a minimum of 3/4" into or through the roof deck. The following types of fasteners may be required, depending on the installation method used as specified in FRSA-TRI Manual:

Screws: No. 8 steel wood screws.

Nails: 10d ring shank nails (shank diameter of 0.121").

Rake Tiles: Rake tiles must be secured to minimum Spruce-Pine-Fir lumber framing with minimum two (2) 10d box nails (3" long, 0.128" shank diameter).

Hip and Ridge Tiles: The hip and ridge tiles must be fastened to hip and ridge boards (dimensional lumber of sufficient height to support the hip and ridge tiles) in accordance with one of the following options:

- (1) Drill a 3/16" hole in the lower 1/3 of the starter tile. Use a fastener as specified in Table 3 and secure the starter tile at both the drilled hole in the lower 1/3 and at the head of the tile. Seal the head of the fastener with a UV resistant sealant.
- (2) Prior to installing the starter tile, apply a roof tile adhesive along the entire length of the starter tile. Secure the head of the starter tile with a fastener as specified in Table 3.

The remaining hip and ridge tiles are to be installed with a minimum 1" headlap. Place the toe of the tile into a 4" to 5" bead of roof tile adhesive along the head of the lower tile. The head of the hip or ridge tile is to be secured using a fastener as specified in Table 3.

Table 3
Hip and Ridge Tile Fastener Requirements

Lumber Species	Fasteners per Tile
Spruce-Pine-Fir	One No. 8 wood screw
Southern Pine	One No. 8 wood screw or One (1) 10d box nail

Adhesive Fastening Systems:

Adhesive fastening systems must comply with ICC-ES AC152, **Acceptance Criteria for Adhesive Fastening of Concrete or Clay Roof Tiles**. Refer to the adhesive fastening system manufacturer product evaluation for the allowable aerodynamic uplift moment and the installation method to develop a resistance equal to or greater than the code required aerodynamic uplift moment. Installation of roof tiles using an adhesive fastening system must be done by technicians trained and having a current certification by the adhesive fastening system manufacturer.

Adhesive fastening systems must not be used with polyethylene or silicon surfaced underlayments.

Notes: A copy of the "*Florida High Wind Concrete and Clay Tile Installation Manual*," 6th Edition (FRSA-TRI Installation Manual) must be available at the job site. When a self-adhering underlayment is used, the self-adhering underlayment product evaluation and the self-adhering underlayment manufacturer's installation instructions must be available at the job site. When an adhesive fastening system is used, the adhesive fastening system product evaluation and the adhesive fastening system manufacturer's installation instructions must be available at the job site. Use corrosion resistant fasteners as specified in the IRC and the IBC.