TEXAS DEPARTMENT OF INSURANCE

Engineering Services Program / MC 103-3A 333 Guadalupe Street P.O. Box 149104 Austin, Texas 78714-9104
Phone No. (512) 322-2212 Fax No. (512) 463-6693

PRODUCT EVALUATION Effective Date: October 1, 2010
RC-261 Revised: May 1, 2013

*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 shall be subject to reevaluation **October 2014**.*

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 shall not exceed the allowable wind loads shown in 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.

Clay Roof Tiles manufactured by

Boral Roofing LLC
7575 Irvine Center Drive, Suite 100
Irvine, California 92618
Telephone: (949) 756-1605

will be accepted 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 Texas Department of Insurance, and the manufacturer's installation instructions as referenced in the document entitled "*Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions*" April 2010, except for the attachment methods, which are specified in Tables 3 through 7 of this evaluation report.

PRODUCT DESCRIPTION

Boral Roofing 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: The Boral Roofing clay roof tiles specified in this report are to be installed using either a mechanical fastening system or an adhesive fastening system. The roof tiles may be secured directly to the roof deck over the underlayment.

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

Flat/Low profile: Flat/Low profile tiles are defined as tiles having a rise equal to or less than ½ inch.

Medium profile: Medium profile tiles are defined as tiles having a rise greater than ½ inch and a rise to width ratio of less than or equal to 1.5.

High/Barrel profile: High/Barrel profile tiles are defined as those tiles having a rise to width ratio greater than 1.5.

Roof Tile Designations, Profile Classifications, and Dimensions: The roof tile designations, profile classifications, and dimensions for the U.S. Tile clay roof tiles that apply to this product evaluation report are specified in Table 1.

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)		
ProShake® Plus	ProSlate	Flat/Low	14	8-½	7.7	0.663	0.472
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	8½	1.211	0.861
Monterey 600	Shake, Slate	Flat/Low	13¾	11	10½	0.8731	0.621
Monterey 700	Shake, Slate	Flat/Low	13¾	11	10½	0.8731	0.621
Monterey 700L	Shake, Slate	Flat/Low	13¾	11	10½	0.8731	0.621

INSTALLATION INSTRUCTIONS and LIMITATIONS

Roof Framing and Roof Deck: Roof framing members shall be in accordance with either the International Residential Code or the International Building Code. The roof framing members shall not be spaced greater than 24 inches on center. The roof deck shall be solidly sheathed with minimum $^{15}/_{32}$" plywood. The roof deck shall be fastened to the roof framing members in accordance with either the International Residential Code or the International Building Code.

If the existing roof deck is a spaced board roof deck, then the spaced boards shall either be removed or covered with the minimum thickness of plywood deck specified in the International Residential Code or the International Building Code. The plywood sheathing shall be installed over the spaced boards in accordance with either the International Residential Code or the International Building Code.

Metal drip edge: A metal drip edge shall be installed as specified in the manufacturer's installation instructions as referenced in the *Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions*.

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. The underlayment shall be installed as specified in either the International Residential Code or the International Building Code and in the manufacturer's installation instructions as referenced in the document entitled *Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions*.

4:12 roof slope and greater: One layer of underlayment complying with ASTM D 226, Type I (No. 30 asphalt felt) or equivalent. The underlayment shall be lapped a minimum of 2" at the head laps and a minimum of 6" at the side laps. The underlayment shall be installed as specified in either the International Residential Code or the International Building Code and in the manufacturer's installation instructions as referenced in the document entitled *Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions*.

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

Battens: Monterey roof tiles may be installed over battens. The roof deck shall be solidly sheathed with minimum $^{15}/_{32}$" plywood. Battens shall be nominal 1x3 wood members. Battens shall be spaced to allow for a minimum 2 ¼" headlap. The battens shall be fastened to the roof deck with minimum 8d corrosion resistant common, box or fastener with equivalent nail size. The nails shall be spaced a maximum of 24" o.c. As an alternative, the battens may be fastened to the roof deck with No. 16 gauge by $^{15}/_{32}$" crown by 1½" long staple. The staples shall be spaced a maximum of 12 inches o.c. Batten ends shall be separated a minimum of ¼" every 4 feet to allow for drainage.

Roof Tile Installation: The limitations on mean roof height and roof slope for installing the roof tiles shall be in accordance with the following guidelines:

Roof Slope Limitations: The roof tiles shall only be installed on buildings with a roof slope greater than or equal to 2-½:12. 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 is to use 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.

Mean Roof Height Limitations: The mean roof height limitations shall be as specified in Table 3 through Table 6 for the mechanical attachment systems listed in these tables. The roof tiles shall not be installed on structures with a mean roof height greater than 60 feet when installed using these tables. For heights greater than 60 feet or for other attachment systems use the procedures described in **Required Aerodynamic Uplift Moment.**

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

The One Piece "S" and Claylite® roof tiles shall be laid out from the left to the right, starting at the left rake. The ProShake® Plus roof tiles shall be laid out from the right to the left, starting at the right rake. The Tapered Two Piece Mission may be laid out either from the left or the right. All roof tiles shall be installed with a minimum 3 inch headlap except the ProShake® Plus roof tiles shall be installed with a minimum 2¼ inch headlap.

The Monterey roof tiles shall be laid out right to left, starting at the right rake. Monterey roof tiles shall be installed with a minimum 2 ¼" headlap. When battens are used, the top edge or head of tile should align evenly with the top edge of the batten. Refer to Table 7a for direct deck installation and Table 7b for batten installation.

The Tapered Two Piece Mission shall be installed 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 shall 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".

Required Aerodynamic Uplift Moment: The required aerodynamic uplift moment may be calculated using Section 1609.5.3 of the International Building Code using the length and exposed width in Table 1. The allowable resistance to required aerodynamic uplift moment is the sum of the ultimate attachment system resistance plus the restoring gravity moment from Table 2 divided by a safety factor of 2.

Table 2
Restoring Moment due to Gravity – M_g

Direct Deck Installation (ft-lbf)						
Tile	**2-½:12**	**3:12**	**4:12**	**5:12**	**6:12**	**7:12 or Greater**
ProShake® Plus	2.31	2.30	2.26	2.22	2.16	2.10
Claylite	4.73	4.69	4.60	4.48	4.35	4.21
One Piece “S”	6.42	6.38	6.25	6.10	5.93	5.74
Tapered Two Piece Mission	4.47	4.44	4.35	4.24	4.12	3.99
Monterey 600	2.90	2.88	2.84	2.78	2.71	2.63
Monterey 700	3.41	3.39	3.34	3.27	3.19	3.10
Monterey 700L	3.46	3.44	3.38	3.31	3.23	3.14

Table 3[1]
Mean Roof Height Limitations

ProShake® Plus						
Gable/Hip Roof **7° < θ ≤ 27°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Hip Roof **7° < θ ≤ 25°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Gable Roof **27° < θ ≤ 45°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Monoslope Roof **10° < θ ≤ 30°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]

Table 4[1]
Mean Roof Height Limitations

Claylite						
Gable/Hip Roof **7° < θ ≤ 27°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	30[4] 60[5]	50[4] 60[5]	NA[4] 50[5]	30[4,5] 60[5]	NA[4] 20[5]
1-#8 screw	60[4,5]	20[4,5]	30[4,5]	NA[4,5]	NA[4,5]	NA[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Hip Roof **7° < θ ≤ 25°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	50[4] 60[5]	60[4,5]	25[4] 50[5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	30[4,5]	60[4,5]	15[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Gable Roof **27° < θ ≤ 45°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	40[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Monoslope Roof **10° < θ ≤ 30°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	20[4] 60[5]	40[4] 60[5]	NA[4] 30[5]	NA[4] 60[5]	NA[4] 15[5]
1-#8 screw	50[4,5]	NA[4,5]	30[4,5]	NA[4,5]	NA[4,5]	NA[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	40[4,5]

Table 5[1]
Mean Roof Height Limitations

One Piece "S"						
Gable/Hip Roof **7° < θ ≤ 27°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	30[4] 60[5]	NA[4] 60[5]	NA[4] 60[5]	NA[4] 30[5]	NA[4] 50[5]	NA[4,5]
1-#8 screw	30[4,5]	NA[4,5]	NA[4,5]	NA[4,5]	NA[4,5]	NA[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	40[4,5]
Hip Roof **7° < θ ≤ 25°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	30[4] 60[5]	50[4] 60[5]	NA[4] 60[5]	30[4] 60[5]	NA[4] 50[5]
1-#8 screw	60[4,5]	30[4,5]	50[4,5]	NA[4,5]	30[4,5]	NA[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Gable Roof **27° < θ ≤ 45°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	30[4] 60[5]	60[4,5]	15[4] 60[5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	30[4,5]	60[4,5]	15[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Monoslope Roof **10° < θ ≤ 30°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	NA[4] 60[5]	NA[4] 40[5]	NA[4] 60[5]	NA[4] 20[5]	NA[4] 40[5]	NA[4,5]
1-#8 screw	NA[4,5]	NA[4,5]	NA[4,5]	NA[4,5]	NA[4,5]	NA[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	30[4,5]

Table 6[1]
Mean Roof Height Limitations

Tapered Two Piece Mission						
Gable/Hip Roof $7° < \theta \leq 27°$						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	25[4] 60[5]	40[4] 60[5]	NA[4] 60[5]	NA[4] 60[5]	NA[4] 40[5]
1-#8 screw	60[4,5]	25[4,5]	50[4,5]	NA[4,5]	NA[4,5]	NA[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Hip Roof $7° < \theta \leq 25°$						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	40[4] 60[5]	60[4,5]	20[4] 60[5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	40[4,5]	60[4,5]	20[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Gable Roof $27° < \theta \leq 45°$						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	50[4] 60[5]
1-#8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	50[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Monoslope Roof $10° < \theta \leq 30°$						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4,5]	15[4] 60[5]	30[4] 60[5]	NA[4] 60[5]	NA[4] 60[5]	NA[4] 30[5]
1-#8 screw	60[4,5]	15[4,5]	30[4,5]	NA[4,5]	NA[4,5]	NA[4,5]
2-#8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]

Table 7a[1]
Mean Roof Height Limitations
Direct Deck Installation

Monterey 600, 700 and 700L						
Gable/Hip Roof **7° < θ ≤ 27°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	40[4]	NA	NA	NA	NA	NA
1-#8 screw	NA	NA	NA	NA	NA	NA
2-#8 screws	60[4]	NA	40[4]	NA	NA	NA
Hip Roof **7° < θ ≤ 25°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4]	30[4]	60[4]	15[4]	30[4]	NA
1-#8 screw	30[4]	NA	NA	NA	NA	NA
2-#8 screws	60[4]	60[4]	60[4]	30[4]	60[4]	15[4]
Gable Roof **27° < θ ≤ 45°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4]	60[4]	60[4]	30[4]	60[4]	15[4]
1-#8 screw	60[4]	20[4]	40[4]	NA	NA	NA
2-#8 screws	60[4]	60[4]	60[4]	60[4]	60[4]	30[4]
Monoslope Roof **10° < θ ≤ 30°**						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	30[4]	NA	NA	NA	NA	NA
1-#8 screw	NA	NA	NA	NA	NA	NA
2-#8 screws	60[4]	15[4]	30[4]	NA	NA	NA

Table 7b[1]
Mean Roof Height Limitations
Batten Installation

Monterey 600, 700 and 700L						
Gable/Hip Roof $7° < \theta \leq 27°$						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4]	25[4]	50[4]	NA	30[4]	NA
1-#8 screw	40[4]	NA	NA	NA	NA	NA
2-#8 screws	50[4]	NA	NA	NA	NA	NA
Hip Roof $7° < \theta \leq 25°$						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4]	60[4]	60[4]	50[4]	60[4]	25[4]
1-#8 screw	60[4]	30[4]	60[4]	15[4]	30[4]	NA
2-#8 screws	60[4]	50[4]	60[4]	20[4]	40[4]	NA
Gable Roof $27° < \theta \leq 45°$						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4]	60[4]	60[4]	60[4]	60[4]	50[4]
1-#8 screw	60[4]	60[4]	60[4]	30[4]	60[4]	15[4]
2-#8 screws	60[4]	60[4]	60[4]	50[4]	60[4]	25[4]
Monoslope Roof $10° < \theta \leq 30°$						
Mechanical Fastener System	**Mean Roof Height Limitation[2]**					
	Inland II		**Inland I**		**Seaward**	
	Exposure B[3]	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**	**Exposure B[3]**	**Exposure C[3]**
2-10d ring shank nails (18-22 rings per inch)	60[4]	15[4]	30[4]	NA	NA	NA
1-#8 screw	30[4]	NA	NA	NA	NA	NA
2-#8 screws	40[4]	NA	NA	NA	NA	NA

Notes for Tables 3, 4, 5, 6, 7a and 7b:

1. Tables are based on an importance Factor of 1.00.
2. Mean roof height shall be as defined in ASCE 7-05.
3. The Exposure category for the structure location shall be as defined in ASCE 7-05.
4. Installation in a $^{15}/_{32}$" roof deck.
5. Installation in a $^{19}/_{32}$" roof deck.

Mechanical Fastening Systems:

Fasteners: Fasteners for direct deck installations must be long enough to penetrate a minimum of ¾" into or through the roof deck. Fasteners for batten installations (when used) must be long enough to penetrate through the batten entirely and a minimum of ¾" into or through the roof deck. The following types of fasteners may be required, depending on the installation method used as specified in ICC-ES ESR 2015P and *Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions*:

Screws: No. 8 steel wood screws.

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

Rake Tiles: Rake tiles shall 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 shall 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 7 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 7.

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 7.

Table 8
Hip and Ridge Tile Fastener Requirements

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

Adhesive Fastening Systems:

Adhesive fastening systems shall 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 resistance equal to or greater than the code required aerodynamic uplift moment. Installation of roof tiles using an adhesive fastening system shall be done by technicians trained and having a current certification by the adhesive fastening system manufacturer.

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

Notes: A copy of ICC-ES ESR 2015P and *Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions* shall 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 shall 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 shall be available at the job site. Fasteners shall be corrosion resistant as specified in the International Residential Code (IRC), the International Building Code (IBC), and the Texas Revisions.