Product Evaluation

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-102

Effective Date: April 1, 2016
Reevaluation Date: February 2021

Product Name: Extruded Interlocking Concrete Roof Tiles

Manufacturer: Eagle Roofing Products, a Division of Burlingame Industries, Inc.
3546 North Riverside Avenue
Rialto, CA 92377
(909) 822-6000

General Description:
The roof tiles specified in this evaluation report 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 document entitled *Concrete and Clay Roof Tile Installation Manual,* dated July 2015, published by the Tile Roofing Institute and Western States Contractors Association (TRI/WSRCA), except for the attachment methods, which are specified in this evaluation report.

Product Description:
Eagle Roofing Products roofing tiles are interlocking extruded concrete roof tiles that are composed of Type II Portland cement, washed sand, and proprietary additives. Mineral coloring oxides are mixed with the Portland cement and water for through color or for surface application following extrusion. All roof tiles are available in a variety of colors and are cured to reach required strength before shipment. Each tile is manufactured with 3/4" wide interlocking sidelaps designed to resist water penetration and maintain proper alignment. All tiles have protruded head lugs on the underside. The head lugs provide for mechanical attachment over battens or provide a stable foundation for nail attachment to solid decking. Two nail holes are provided for flat/low profile tiles. Three nail holes are provided for medium and high/barrel profile tiles.

Attachment: Install the Eagle Roofing Products roofing tiles specified in this report using a mechanical fastening system. The roofing tiles may be secured either directly to the roof deck or over battens. Holes are provided at the top of each roofing tile for fastening as specified in this evaluation report.

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.

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 roof tiles that apply to this product evaluation report. Tile profiles and dimensions are shown in Figure 1.

Table 1
Roof Tile Designations, Profile, and Dimensions

Tile Name	Profile Classification	Tile		
		Length (in.)	Width (in.)	Exposed Width (in.)
Capistrano	High/Barrel	17	12.375	11.506
Malibu	Medium	17	12.375	11.691
Ponderosa	Flat/Low	17	12.375	11.552
Bel Air/Artisan	Flat/Low	17	12.375	11.552
Estate	Flat/Low	17	12.375	11.552
Double-Eagle Bel Air	Flat/Low	17	12.375	11.552
Double-Eagle Ponderosa	Flat/Low	17	12.375	11.552
Golden Eagle	Flat/Low	17	12.375	11.552

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 a minimum 15/32" plywood deck. Install the plywood sheathing 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 Manual*, dated July 2015, published by the TRI/WSRCA.

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 document entitled *Concrete and Clay Roof Tile Manual*, dated July 2015, published by the TRI/WSRCA.

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 4" 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 document entitled *Concrete and Clay Roof Tile Manual*, dated July 2015, published by the TRI/WSRCA.

Roof Tile Installation: Follow the limitations on mean roof height and roof slope for installing the roof tiles:

Roof Slope Limitations: Install the roof tiles on buildings with a roof slope greater than or equal to 3:12 and less than or equal to 12:12.

Mean Roof Height Limitations: Table 4 specifies the mean roof height limitations for the mechanical attachment of the roof tiles. Install the roof tiles on structures with a mean roof less than or equal to 60' when installed using these tables. As an alternative, the mean roof height limitation for the tiles may be determined using Table 2 and Table 3. For heights greater than 60' or for other attachment systems, use the procedures described in **Required Aerodynamic Uplift Moment.**

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.

Battens: The roofing tiles may be installed over battens. The roof deck must be solidly sheathed with minimum 15/32" plywood. Battens must be minimum nominal 1x2 wood members. Space the battens a maximum of 14" on center to allow for a 3" headlap. Fasten the battens to the roof deck with minimum 8d corrosion resistant common wire nails, box nails, or equivalent diameter pneumatic gun nails. Space the fasteners a minimum of 24" on center. As an alternative, the battens may be fastened to the roof deck with 16-gauge by 7/16" crown by 1-1/2" long corrosion resistant staples. Space the staples a maximum of 12" on center.

Required Aerodynamic Uplift Moment: The required aerodynamic uplift moment may be calculated using Section 1609.5.3 of the IBC using the length and exposed width in Table 1. The allowable aerodynamic moment may be determined using Table 3.

Table 2[1]
Required Aerodynamic Uplift Moment (ft-lbf)
Capistrano (High/Barrel)

2.5:12 (12°) < Roof Slope ≤ 6.1:12 (27°) Exposure B[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
0-30	1	10	12	14
	2	15	17	20
	3	20	23	27
	2 Overhang	17	21	24
	3 Overhang	25	30	36
40	1	11	13	16
	2	16	19	22
	3	21	25	30
	2 Overhang	19	23	26
	3 Overhang	28	33	39
50	1	12	14	17
	2	17	20	24
	3	23	27	32
	2 Overhang	20	24	28
	3 Overhang	30	35	41
60	1	13	15	18
	2	18	21	25
	3	24	28	33
	2 Overhang	21	25	30
	3 Overhang	31	37	43
6.1:12 (27°) < Roof Slope ≤ 12:12 (45°) Exposure B[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
0-30	1	11	13	15
	2 & 3	12	14	17
	2 & 3 Overhang	16	19	23
40	1	12	14	17
	2 & 3	13	15	18
	2 & 3 Overhang	18	21	25
50	1	13	15	18
	2 & 3	14	16	19
	2 & 3 Overhang	19	22	26
60	1	13	16	18
	2 & 3	15	17	20
	2 & 3 Overhang	20	24	28

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 2[1] (Continued)
Required Aerodynamic Uplift Moment (ft-lbf)
Capistrano (High/Barrel)

2.5:12 (12°) < Roof Slope ≤ 6.1:12 (27°) Exposure C[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
15	1	12	15	17
	2	18	21	25
	3	24	28	33
	2 Overhang	21	25	29
	3 Overhang	31	37	43
20	1	13	16	19
	2	19	22	26
	3	25	30	35
	2 Overhang	22	27	31
	3 Overhang	33	39	46
30	1	14	17	20
	2	20	24	29
	3	27	33	38
	2 Overhang	24	29	34
	3 Overhang	36	42	50
40	1	15	18	21
	2	22	26	30
	3	29	35	41
	2 Overhang	26	31	36
	3 Overhang	38	45	53
50	1	16	19	22
	2	23	27	32
	3	30	36	43
	2 Overhang	27	32	38
	3 Overhang	40	47	56
60	1	17	20	23
	2	24	28	33
	3	32	38	44
	2 Overhang	28	33	39
	3 Overhang	41	49	58

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 2[1] (Continued)
Required Aerodynamic Uplift Moment (ft-lbf)
Capistrano (High/Barrel)

6.1:12 (27°) < Roof Slope ≤ 12:12 (45°) Exposure C[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
15	1	13	16	18
	2 & 3	14	17	20
	2 & 3 Overhang	20	23	27
20	1	15	18	21
	2 & 3	17	20	23
	2 & 3 Overhang	23	27	32
30	1	15	18	21
	2 & 3	17	20	23
	2 & 3 Overhang	23	27	32
40	1	16	19	23
	2 & 3	18	21	25
	2 & 3 Overhang	24	29	34
50	1	17	20	24
	2 & 3	19	22	26
	2 & 3 Overhang	25	30	35
60	1	18	21	25
	2 & 3	19	23	27
	2 & 3 Overhang	26	31	37

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 2[1] (Continued)
Required Aerodynamic Uplift Moment (ft-lbf)
Malibu (Medium)

2.5:12 (12°) < Roof Slope ≤ 6.1:12 (27°) Exposure B[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
0-30	1	10	12	15
	2	15	18	21
	3	20	23	28
	2 Overhang	18	21	24
	3 Overhang	26	31	36
40	1	11	14	16
	2	16	19	23
	3	22	26	30
	2 Overhang	19	23	27
	3 Overhang	28	33	39
50	1	12	14	17
	2	17	20	24
	3	23	27	32
	2 Overhang	20	24	28
	3 Overhang	30	36	42
60	1	13	15	18
	2	18	21	25
	3	24	29	34
	2 Overhang	21	25	30
	3 Overhang	31	37	44
6.1:12 (27°) < Roof Slope ≤ 12:12 (45°) Exposure B[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
0-30	1	11	13	15
	2 & 3	12	14	17
	2 & 3 Overhang	16	20	23
40	1	12	14	17
	2 & 3	13	16	18
	2 & 3 Overhang	18	21	25
50	1	13	15	18
	2 & 3	14	17	20
	2 & 3 Overhang	19	23	27
60	1	13	16	19
	2 & 3	15	18	21
	2 & 3 Overhang	20	24	28

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 2[1] (Continued)
Required Aerodynamic Uplift Moment (ft-lbf)
Malibu (Medium)

2.5:12 (12°) < Roof Slope ≤ 6.1:12 (27°) Exposure C[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
15	1	13	15	18
	2	18	21	25
	3	24	28	33
	2 Overhang	21	25	30
	3 Overhang	31	37	44
20	1	13	16	19
	2	19	23	27
	3	25	30	36
	2 Overhang	23	27	32
	3 Overhang	33	40	46
30	1	15	17	20
	2	21	25	29
	3	28	33	39
	2 Overhang	25	29	34
	3 Overhang	36	43	50
40	1	16	18	22
	2	22	26	31
	3	29	35	41
	2 Overhang	26	31	36
	3 Overhang	38	46	54
50	1	16	19	23
	2	23	27	32
	3	31	37	43
	2 Overhang	27	33	38
	3 Overhang	40	48	56
60	1	17	20	24
	2	24	29	33
	3	32	38	45
	2 Overhang	28	34	40
	3 Overhang	42	50	58

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 2[1] (Continued)
Required Aerodynamic Uplift Moment (ft-lbf)
Malibu (Medium)

6.1:12 (27°) < Roof Slope ≤ 12:12 (45°) Exposure C[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
15	1	13	16	19
	2 & 3	15	17	20
	2 & 3 Overhang	20	24	28
20	1	15	18	22
	2 & 3	17	20	24
	2 & 3 Overhang	23	28	32
30	1	15	18	21
	2 & 3	17	20	24
	2 & 3 Overhang	23	27	32
40	1	16	19	23
	2 & 3	18	21	25
	2 & 3 Overhang	24	29	34
50	1	17	20	24
	2 & 3	19	22	26
	2 & 3 Overhang	26	31	36
60	1	18	21	25
	2 & 3	20	23	27
	2 & 3 Overhang	27	32	37

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 2[1] (Continued)
Required Aerodynamic Uplift Moment (ft-lbf)
Flat/Low Tiles

2.5:12 (12°) < Roof Slope ≤ 6.1:12 (27°) Exposure B[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
0-30	1	10	12	14
	2	15	17	20
	3	20	23	27
	2 Overhang	17	21	24
	3 Overhang	25	30	36
40	1	11	13	16
	2	16	19	22
	3	21	25	30
	2 Overhang	19	23	26
	3 Overhang	28	33	39
50	1	12	14	17
	2	17	20	24
	3	23	27	32
	2 Overhang	20	24	28
	3 Overhang	30	35	41
60	1	13	15	18
	2	18	21	25
	3	24	28	33
	2 Overhang	21	25	30
	3 Overhang	31	37	43
6.1:12 (27°) < Roof Slope ≤ 12:12 (45°) Exposure B[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
0-30	1	11	13	15
	2 & 3	12	14	17
	2 & 3 Overhang	16	19	23
40	1	12	14	17
	2 & 3	13	15	18
	2 & 3 Overhang	18	21	25
50	1	13	15	18
	2 & 3	14	16	19
	2 & 3 Overhang	19	22	26
60	1	13	16	18
	2 & 3	15	17	20
	2 & 3 Overhang	20	24	28

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 2[1] (Continued)
Required Aerodynamic Uplift Moment (ft-lbf)
Flat/Low Tiles

2.5:12 (12°) < Roof Slope ≤ 6.1:12 (27°) Exposure C[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
15	1	12	15	17
	2	18	21	25
	3	24	28	33
	2 Overhang	21	25	29
	3 Overhang	31	37	43
20	1	13	16	19
	2	19	22	26
	3	25	30	35
	2 Overhang	22	27	31
	3 Overhang	33	39	46
30	1	14	17	20
	2	20	24	29
	3	27	33	38
	2 Overhang	24	29	34
	3 Overhang	36	42	50
40	1	15	18	21
	2	22	26	30
	3	29	35	41
	2 Overhang	26	31	36
	3 Overhang	38	45	53
50	1	16	19	22
	2	23	27	32
	3	30	36	43
	2 Overhang	27	32	38
	3 Overhang	40	47	56
60	1	17	20	23
	2	24	28	33
	3	32	38	44
	2 Overhang	28	33	39
	3 Overhang	41	49	58

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 2[1] (Continued)
Required Aerodynamic Uplift Moment (ft-lbf)
Flat/Low Tiles

6.1:12 (27°) < Roof Slope ≤ 12:12 (45°) Exposure C[2]				
Mean Roof Height (ft)	**Roof Pressure Zone[3]**	**Inland II**	**Inland I**	**Seaward**
15	1	13	16	18
	2 & 3	14	17	20
	2 & 3 Overhang	20	23	27
20	1	15	18	21
	2 & 3	17	20	23
	2 & 3 Overhang	23	27	32
30	1	15	18	21
	2 & 3	17	20	23
	2 & 3 Overhang	23	27	32
40	1	16	19	23
	2 & 3	18	21	25
	2 & 3 Overhang	24	29	34
50	1	17	20	24
	2 & 3	19	22	26
	2 & 3 Overhang	25	30	35
60	1	18	21	25
	2 & 3	19	23	27
	2 & 3 Overhang	26	31	37

Note: [1] Table is based on an Importance factor of 1.0 and enclosed buildings.
[2] The Exposure category for the structure location must be as defined in either the IRC or the IBC.
[3] The dimensions of Roof Pressure Zones 2 and 3 (perimeter and corners) must be as defined in Figures 6-11C or 6-11D of ASCE 7-05.

Table 3
Allowable Aerodynamic Uplift Moment (ft-lbf)

Tile Profile	Fastener Requirements	Substrate		
		15/32" Plywood	19/32" Plywood	Battens
Flat/Low	Two 10d ring shank nails	39.1	46.4	24.6
Medium		36.1	45.5	36.4
High/Barrel		28.6	41.2	26.8
Flat/Low	One No. 8 screw	39.1	39.1	25.6
Medium		33.3	33.3	30.1
High/Barrel		28.7	28.7	25.5
Flat/Low	Two No. 8 screws	50.1	50.1	36.1
Medium		55.5	55.5	41.9
High/Barrel		51.3	51.3	37.1
Flat/Low	One 10d smooth or screw shank nail with one clip	25.2	25.2	27.5
Medium		25.2	25.2	27.5
High/Barrel		35.5	35.5	29.4
Flat/Low	Two 10d smooth or screw shank nails with one clip	38.1	38.1	37.6
Medium		38.1	38.1	37.6
High/Barrel		44.3	44.3	47.2

Table 4[1]: Mean Roof Height Limitations

Capistrano						
Roof Slope: 2.5:12 < θ ≤ 6.1:12 Minimum 15/32" Plywood without Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	60[4,5]	60[4,5]	40[4,5]	60[4,5]	20[4,5]
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d ring shank nails	60[4,5]	30[4,5]	60[4,5]	15[4,5]	30[4,5]	N/A
One No. 8 screw	60[4,5]	30[4,5]	60[4,5]	15[4,5]	30[4,5]	N/A
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Roof Slope: 2.5:12 < θ ≤ 6.1:12 Minimum 15/32" Plywood with Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	40[4,5]	60[4,5]	15[4,5]	30[4,5]	N/A
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d ring shank nails	60[4,5]	20[4,5]	40[4,5]	N/A	N/A	N/A
One No. 8 screw	60[4,5]	20[4,5]	40[4,5]	N/A	N/A	N/A
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	50[4,5]	60[4,5]	20[4,5]

Notes for Table 4:

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

Table 4[1]: Mean Roof Height Limitations

Capistrano						
Roof Slope: 6.1:12 < θ ≤ 12:12 Minimum 15/32" Plywood without Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
One No. 8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Roof Slope: 6.1:12 < θ ≤ 12:12 Minimum 15/32" Plywood with Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	50[4,5]
One No. 8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	40[4,5]
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]

Notes for Table 4:

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

Table 4[1]: Mean Roof Height Limitations

Malibu						
Roof Slope: 2.5:12 < θ ≤ 6.1:12 Minimum 15/32" Plywood without Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	15[4,5]	30[4,5]	N/A[5]	N/A	N/A
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	20[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	40[4,5]	60[4,5]	20[4,5]
One No. 8 screw	60[4,5]	60[4,5]	60[4,5]	30[4,5]	50[4,5]	N/A
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Roof Slope: 2.5:12 < θ ≤ 6.1:12 Minimum 15/32" Plywood with Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	20[4,5]	50[4,5]	N/A	N/A	N/A
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	50[4,5]	60[4,5]	20[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	40[4,5]	60[4,5]	40[4,5]
One No. 8 screw	60[4,5]	40[4,5]	60[4,5]	15[4,5]	40[4,]	N/A
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	20[4,5]

Notes for Table 4:

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

Table 4[1]: Mean Roof Height Limitations

Malibu						
Roof Slope: 6.1:12 < θ ≤ 12:12 Minimum 15/32" Plywood without Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	40[4,5]
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
One No. 8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Roof Slope: 6.1:12 < θ ≤ 12:12 Minimum 15/32" Plywood with Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
One No. 8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]

Notes for Table 4:

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

Table 4[1]: Mean Roof Height Limitations

Flat/Low						
Roof Slope: 2.5:12 < θ ≤ 6.1:12 Minimum 15/32" Plywood without Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	20[4,5]	30[4,5]	N/A[5]	N/A	N/A
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	20[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	30[4,5]
One No. 8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	30[4,5]
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Roof Slope: 2.5:12 < θ ≤ 6.1:12 Minimum 15/32" Plywood with Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	30[4,5]	50[4,5]	N/A	30[4,5]	N/A
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	50[4,5]	60[4,5]	20[4,5]
Two 10d ring shank nails	60[4,5]	15[4,5]	30[4,5]	N/A	N/A	N/A
One No. 8 screw	60[4,5]	20[4,5]	40[4,5]	N/A	N/A	N/A
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	40[4,5]	60[4,5]	20[4,5]

Notes for Table 4:

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

Table 4[1]: Mean Roof Height Limitations

Flat/Low						
Roof Slope: 6.1:12 < θ ≤ 12:12 Minimum 15/32" Plywood without Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	40[4,5]
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
One No. 8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Roof Slope: 6.1:12 < θ ≤ 12:12 Minimum 15/32" Plywood with Battens						
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]**
One 10d smooth or screw shank nail with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d smooth or screw shank nails with one clip	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]
Two 10d ring shank nails	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	30[4,5]
One No. 8 screw	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	40[4,5]
Two No. 8 screws	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]	60[4,5]

Notes for Table 4:

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

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 the *Concrete and Clay Roof Tile* Manual, dated July 2015, published by TRI/WSCRA:

- No. 8 steel wood screws.
- 10d ring shank nails (0.283" flat head diameter, 0.131" ring shank diameter).
- 10d smooth or screw shank (0.283" flat head diameter, 0.131" smooth or screw shank diameter).
- Clips: Eagle Talon © clips. The clips are 18-gauge x 0.50" wide galvanized steel or Type 304 stainless steel. The following clip sizes are used:
  - 3/4" (flat/low tiles – Eave)
  - 2-5/8" (flat/low tiles)
  - 2-7/8" (medium tiles)
  - 3-3/16" (high/barrel tiles)

Rake Tiles: Rake tiles must be secured to minimum Spruce-Pine-Fir lumber framing with minimum two 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 (Southern Yellow Pine dimensional lumber of sufficient height to support the hip and ridge tiles) with either one 10d box nail (3" long, 0.128" shank diameter) or one No. 8 x 2-1/2" long steel wood screw. Refer to Table 5.

Table 5
Hip and Ridge Tile Fastener Requirements

Lumber Species	Fasteners per Tile
Southern Pine	One No. 8 x 2-1/2" wood screw
	One 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 *Concrete and Clay Roof Tile Manual*, dated July 2015, and published by the TRI/WSCRA must be available at the job site. Use corrosion resistant fasteners as specified in the IRC, the IBC, and the Texas Revisions.

Figure 1
Tile Diagrams

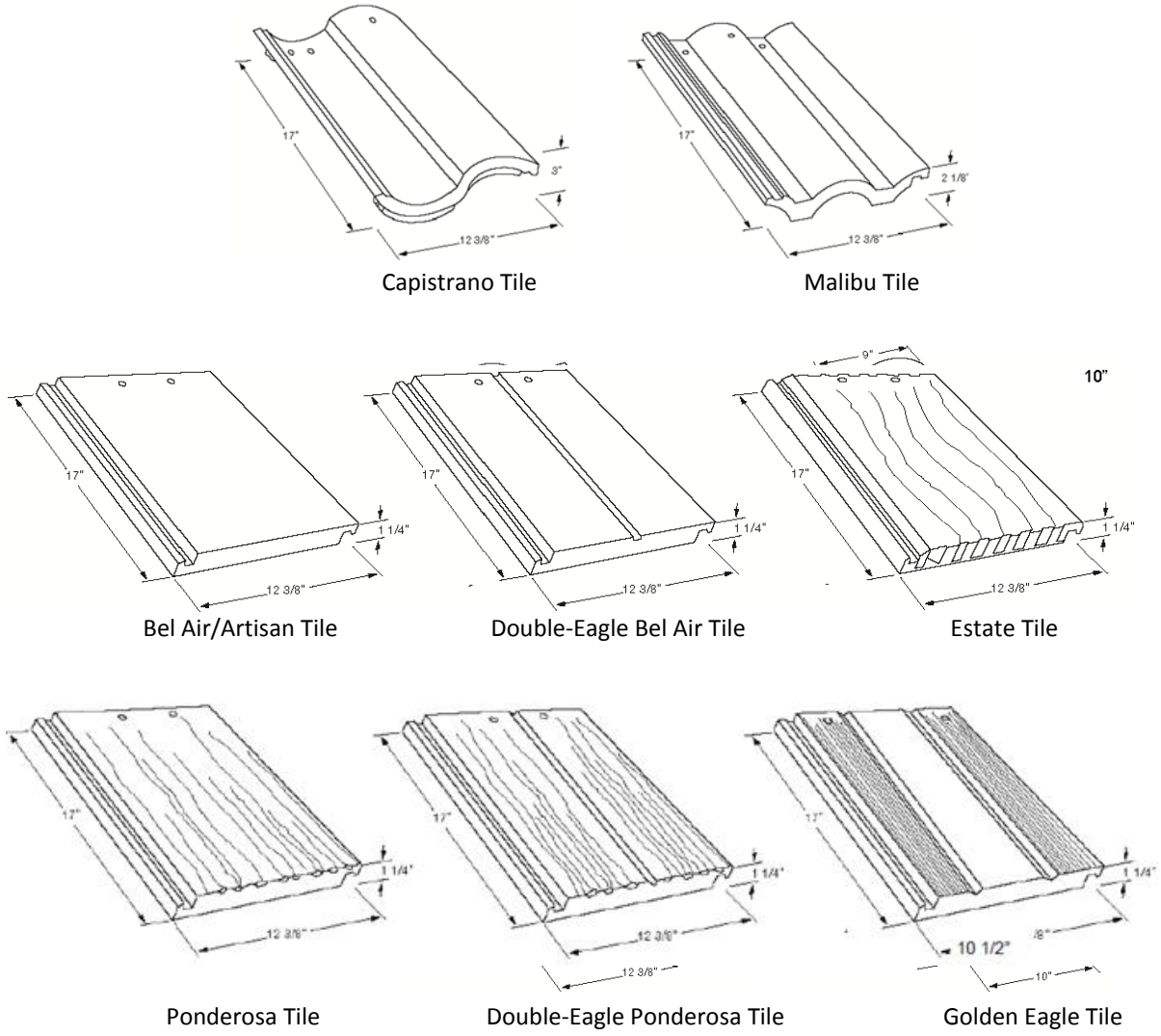

Figure 1. Tile Illustrations