



BORAL ROOFING

CLAY ROOF TILES

CSI Section:

07 32 13 Clay Roof Tiles

1.0 RECOGNITION

Boral Roofing Clay Roof Tiles recognized in this report has been evaluated for use as roof covering material. The weather resistance, wind uplift resistance and fire classification properties have been evaluated and comply with the intent of the provisions of the following codes and regulations:

- 2015, 2012, 2009 International Building Code® (IBC)
- 2015, 2012, 2009 International Residential Code® (IRC)
- 2013 California Building Code (CBC) and 2013 California Residential Code (CRC) – see attached Supplement
- 2017 and 2014 Florida Building Code, Building (FBC, Building) and 2017 and 2014 Florida Building Code, Residential (FBC, Residential) – see attached Supplement

2.0 LIMITATIONS

Use of the Clay Roof Tiles recognized in this report is subject to the following limitations:

2.1 The roof tiles shall be manufactured, identified and installed in accordance with this report, the applicable code and the Roof Tile Installation Manual.

2.2 Roof sheathing and roof framing shall be designed for the design loads determined in accordance with the applicable code.

2.3 Boral Roofing Clay Roof Tiles are manufactured in the facilities specified in [Table 1](#) of this report, under a quality control program administered by an approved inspection agency.

3.0 PRODUCT USE

3.1 General: The Boral Roofing Clay Roof Tiles described in this report are used as roof covering materials complying with Chapter 15 of the IBC and Chapter 9 of the IRC, and may be used where Class A, B or C roof assemblies are required.

3.2 Design General: Boral Roofing clay roof tiles shall be installed in accordance with the Concrete and Clay Roof Tile Installation Manual, dated July 2015, published by

the Tile Roofing Institute, except as modified in this evaluation report. The Roof Tile Installation Manual and this report shall be available at all times on the jobsite during installation. Where conflicts between this report and the installation instructions occur, the more restrictive shall govern.

3.2.1 Sheathing: Solid sheathing shall be 7/16-inch-thick (11.1 mm) or greater oriented strand board complying with DOC PS2 or 15/32-inch-thick (11.9 mm) or greater wood structural panels complying with DOC PS1.

3.2.2 Fasteners: Nails shall be minimum No. 11 gage [0.1196 inch (3.03 mm)] with a 7/16-inch-diameter (11.1 mm) head for use with Claylite and Claymax tiles and 5/16-inch-diameter (7.9 mm) head for use with all other tiles. Screws shall be minimum No. 8 flat head, coarse-thread wood screws, 2½-inch-long (64 mm), with minimum 0.341-inch-diameter (7.98 mm) head. Nails shall be long enough to penetrate into the sheathing ¾-inch (19 mm) or through the thickness of the sheathing, whichever is less.

3.3 Adhesively Attached Systems: The Boral Roofing Clay Roof Tiles may be installed with roof tile adhesives that are recognized in an approved evaluation report for use in clay roof tile applications. Installations, including underlayment, shall be in accordance with the adhesive manufacturer’s approved evaluation report.

3.4 Wind Resistance

3.4.1 High Wind Applications – One-Piece “S”, Mission and Roman Pan Tiles: For installations of the One-Piece “S”, Mission and Roman Pan tiles beyond the prescriptive parameters of Table 1507.3.7 of the IBC and Section R905.3.7 of the IRC, as applicable, the fastening systems shall be determined to withstand the aerodynamic uplift moment in accordance with the Design Considerations for High Wind Applications, in Appendix B or C of the Roof Tile Installation Manual, as applicable, using the Tile Factor Ratio from [Table 2](#) of this report.

Tile	Tile Factor (ft ³)	Tile Factor Ratio ¹
One-Piece “S”	1.568	1.114
Tapered 2-Piece Mission	1.10	0.78
Monarch 2-Piece Mission	0.86	0.61
Claylite	1.568	1.114
Claymax	1.568	1.114
Romano Pan	1.140	0.810
Monterey 600-Shake/Slate	0.842	0.598
Monterey 700-Shake/Slate		
Monterey 700L-Shake/Slate		

¹ Tile Factor Ratio = Tile Factor (ft³) / Base Tile Factor of 1.407 ft³





3.4.2 Claylite and Claymax Tiles: Claylite and Claymax tiles shall be fastened to the sheathing with two nails per tile. Alternatively, a single nail through the fastener hole located in the pan side of the tile 1¾ inch (44.3 mm) from the head of the tile may be used provided the maximum allowable wind speed and roof height are as shown in [Table 3](#) of this report.

3.4.3 Monterey 600-, 700- and 700L-Shake/Slate Tiles: Monterey 600-, 700- and 700L-Shake/Slate tiles shall be fastened to the sheathing with either one screw per tile or alternatively with two nails per tile in accordance with [Table 4](#) of this report.

3.5 Fire Classification: Boral Roofing Clay Roof Tiles, installed in accordance with this evaluation report have the fire classification noted in [Table 5](#) of this report. Roof classifications for adhesively attached systems shall be in accordance with the adhesive manufacturer’s approved evaluation report.

3.6 Roof Slope Limitations: Boral Roofing Clay Roof Tiles, except for Monterey-Shake tiles, shall be installed on roof slopes of 2½ units vertical in 12 units horizontal, 2½:12 (21-percent slope) or greater. Monterey-Shake tiles shall be installed on minimum roof slopes of 4:12 (33-percent slope) when installed with a single layer of underlayment or on minimum roof slopes of 3:12 (25-percent slope) when installed over solid sheathing with two layers of underlayment. When installed on roof slopes greater than 21:12 (175-percent slope) the noses of all tiles shall be securely fastened.

3.7 Reroofing Applications: Boral Roofing Clay Roof Tiles may be installed over existing roofs provided the requirements of Section 1511 of the 2015 IBC (Section 1510 of the 2012 and 2009 IBC) and Section R908 of the 2015 IRC (Section R907 of the 2012 and 2009 IRC), as applicable, are met. Roof classifications are as noted in Section 3.5 of this report.

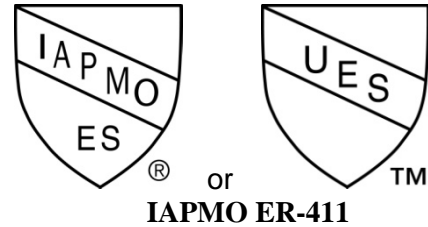
4.0 PRODUCT DESCRIPTION

Boral Roofing Clay Roof Tiles are vitrified clay roof tiles complying with ASTM C1167. All tiles, except for the Monarch 2-Piece Mission tiles, are Grade 1 in accordance ASTM C1167. Monarch 2-Piece Mission tiles are Grade 3 in accordance with ASTM C1167. See [Table 1](#) of this report for product designations, dimensions and weights. See [Figure 1](#) of this report for roof tile profiles.

5.0 IDENTIFICATION

Shipping pallets are identified with the report holder’s name (Boral Roofing), manufacturing address, product name, installed weight, approved inspection agency, the UES Mark of conformity and evaluation report number (ER-411). The

name Boral, Boral Roofing LLC, or “U.S.T.” is embossed on the underside of the tile, near the nail hole. Either Mark of Conformity may be used as shown below:



6.0 SUBSTANTIATING DATA

Data in accordance with ICC-ES AC180, dated February 2012 (editorially revised April 2015), manufacturer’s descriptive literature and installation instructions. Test results are from laboratories in compliance with ISO/IEC 17025.

7.0 CONTACT INFORMATION

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(949) 756-1605
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8.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on Boral Roofing Clay Roof Tiles to assess conformance to the codes shown in Section 1.0 of this report, and serves as documentation of the product certification.

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Uniform Evaluation Service

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GP Russ Chaney
CEO, The IAPMO Group

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org



Table 1 – Tile Weights, Dimensions, Manufacturing Location

Tile	Installed Dry Weight (psf)	Dimensions ¹ (In)			Head Lap, minimum (in.)	Side Lap ¹ (in.)	Tile Spacing (in.)	Manufacturing Location
		Length	Width Butt	Width Small				
One-Piece "S"	8	18	13	13	3	2	11	Corona, Ione
Tapered 2-Piece Mission	9.6	18	8½	7	3	--	11	Corona
Monarch 2-Piece Mission	10.7	18	6¾	5¼	3	--	9	Corona
Claylite	5.9	18	13	13	3	2	11	Corona
Claymax	5.8	18	13	13	3	2	11	Corona
Romano Pan	9.9	18	11	11	3	3	13	Corona
Monterey 600-Shake/Slate	5.9	13¾	11	11	2¼	7/8	-- ²	Ione
Monterey 700-Shake/Slate	6.9	13¾	11	11	2¼	7/8	-- ²	Ione
Monterey 700L-Shake/Slate	7	13¾	11	11	2¼	7/8	-- ²	Ione

SI: 1 inch = 25.4 mm, 1 psf = 4.88 kg/m²

¹ All dimensions are nominal unless specified differently.

² Not applicable, interlocking tiles.

Table 3 – Maximum Wind Speeds (mph) – Claylite Tiles and Claymax Tiles One Nail Installation^{1, 2, 3}

Building Height (ft.)	7° ≤ Roof Angle ≤ 27°		27° ≤ Roof Angle ≤ 45°	
	Zone 3	Zone 2	Zone 3	Zone 2
CLAYLITE TILES				
Exposure B				
20	117	160	177	177
40	112	153	170	170
60	NA	144	160	160
Exposure C				
20	NA	141	156	156
40	NA	132	144	144
60	NA	125	141	141
CLAYMAX TILES				
Exposure B				
20	135	183	202	202
40	129	175	195	195
60	122	166	183	183
Exposure C				
20	119	161	179	179
40	111	151	166	166
60	NA	144	160	160

SI: 1 mph = 1.61 km/h; 1 ft. = 305 mm

¹ See Figures 30.4.2B, 2C and 5B of ASCE 7-10 or Figure 6-3 of ASCE 7-05, as applicable.

² Calculations are based on a Risk Factor of II for ASCE 7-10 and an Importance Factor of 1.0 for ASCE 7-05, as applicable.

³ For applications under the 2009 IBC divide the table wind speeds by 1.29.



Table 4 – Maximum Wind Speeds (mph) – Monterey 600-, 700- and 700L-Shake/Slate ^{1, 2, 3}						
Building Height (ft.)	0° ≤ Roof Angle < 7°		7° ≤ Roof Angle ≤ 27°		27° ≤ Roof Angle ≤ 45°	
	Zone 3	Zone 2	Zone 3	Zone 2	Zone 3	Zone 2
ONE-SCREW INSTALLATION						
Exposure B						
20	134	179	138	159	175	175
40	129	173	132	152	169	169
60	121	164	124	144	160	160
Exposure C						
20	117	138	121	139	155	155
40	110	128	112	130	144	144
60	NA	122	NA	124	138	138
Exposure D						
20	NA	125	111	128	142	142
40	NA	117	NA	120	133	133
60	NA	113	NA	116	129	129
TWO-NAIL INSTALLATION						
Exposure B						
20	135	157	139	160	178	187
40	129	151	133	153	170	175
60	122	143	126	146	161	169
Exposure C						
20	119	139	122	142	156	204
40	111	129	113	132	146	190
60	NA	124	110	126	139	182
Exposure D						
20	NA	126	112	129	143	187
40	NA	119	NA	121	134	175
60	NA	115	NA	117	130	169

SI: 1 mph = 1.61 km/h; 1 ft. = 305 mm

¹ See Figures 30.4.2B, 2C and 5B of ASCE 7-10 or Figure 6-3 of ASCE 7-05, as applicable.

² Calculations are based on a Risk Factor of II for ASCE 7-10 and an Importance Factor or 1.0 for ASCE 7-05, as applicable.

³ For applications under the 2009 IBC divide the table wind speeds by 1.29.

Table 5 – Roof Assembly Fire Classifications ^{1, 2}					
Assembly No.	Roof Class	Cover Board	Underlayment ³	Wood Battens	Roof Tile
1	A	¼" DensDeck, G-P Gypsum Corp.	ASTM D226, Type II (No. 30)	none	Monterey 600-, 700-, 700L-Shake/Slate
2	A	none	ASTM D226, Type II (No. 30)	none	One-Piece "S", Tapered and Monarch 2-Piece Mission, Romano Pan, Claylite and Claymax
3	A	none	1-layer of Boral Ply 40, or 1-layer of MB Technology TU35	1x2 or 1x3 FirePRO battens, by Koppers Performance Chemicals ⁴	Monterey 600-, 700-, 700L-Shake/Slate
4	A	none	1-layer of Fontana VulcaSeal G40	1x2 or 1x3 FirePRO battens, by Koppers Performance Chemicals ⁴	Monterey 600-, 700-, 700L-Shake/Slate
5	A	none	2-layers of Fontana VulcaSeal G40	none	Monterey 600-, 700-, 700L-Shake/Slate
6	A	none	1-layer of Boral Ply 40, or 1-layer of MB Technology TU35	none	Monterey 600-, 700-, 700L-Shake/Slate
7	B	none	ASTM D226, Type II (No. 30)	none	Monterey 600-, 700-, 700L-Shake/Slate

SI: 1 inch = 25.4 mm

¹ Maximum roof slope is unlimited.

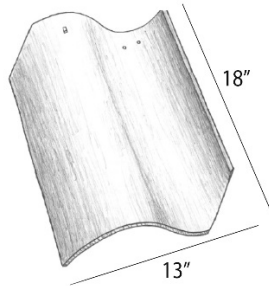
² All assemblies are over solid sheathing as described in Section 3.2.1 of this report.

³ Underlayment shall be ASTM D226, Type II (No. 30) or recognized in a valid and approved evaluation report.

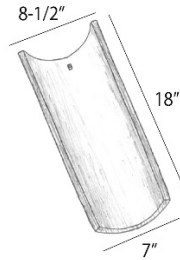
⁴ FirePRO wood battens shall be recognized in a valid and approved evaluation report.



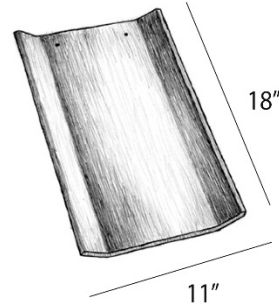
Figure 1 – Tile Profiles



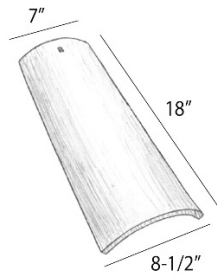
1-PIECE "S" TILE AND CLAYLITE®



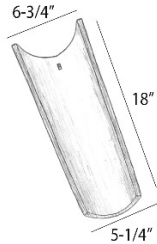
2-PIECE MISSION - PAN



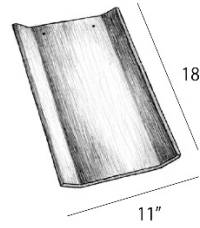
ROMANO PAN



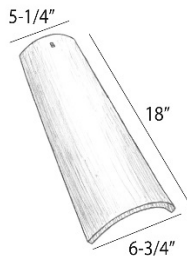
2-PIECE MISSION - TOP



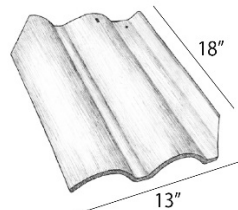
2-PIECE MONARCH - PAN



ROMANO PAN



2-PIECE MONARCH - TOP



CLAYMAX®



CALIFORNIA SUPPLEMENT

BORAL ROOFING

CLAY ROOF TILES

CSI Section:

07 32 13 Clay Roof Tiles

1.0 RECOGNITION

The Boral Roofing Clay Roof Tiles as evaluated and represented in IAPMO UES Evaluation Report ER-411 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2013 California Building Code (CBC)
- 2013 California Residential Code (CRC)

2.0 LIMITATIONS

The Boral Roofing Clay Roof Tiles described in IAPMO UES ER-411 comply with the 2013 CBC and the 2013 CRC. The design and installation of the Boral Roofing Clay Roof Tiles shall be in accordance with Sections 1507.3.10 and 1512 of the CBC or Section R905.3 of the CRC, as applicable, and ER-411.

The Boral Roofing Clay Roof Tiles may be used as a Class A roof covering complying with Section 1505.1.1 of the CBC or Section R902.1.1 of the CRC, or as a Class B roof covering complying with Section 1505.1.2 of the CBC or Section R902.1.2 of the CRC, or as a Class C roof covering complying with Section 1505.1.3 of the CBC or Section R902.1.3 of the CRC, as applicable.

Boral Roofing Clay Roof Tiles may be used in the construction of new buildings located in a Fire Hazard Severity Zone within State Responsibility Areas or a Wildland-Urban Interface Fire Area, provided installation is also in accordance with the 2012 IBC as presented in ER-411 and the requirements of Sections 701A.3 and 705A of the CBC or Sections R327.1.3.1 and R327.5 of the CRC, as applicable.

3.0 CONTACT INFORMATION

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FLORIDA SUPPLEMENT

BORAL ROOFING

CLAY ROOF TILES

CSI Section:

07 32 13 Clay Roof Tiles

1.0 RECOGNITION

The Boral Roofing Clay Roof Tiles as evaluated and represented in IAPMO UES Evaluation Report ER-411 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2017 and 2014 Florida Building Code, Building (FBC, Building)
- 2017 and 2014 Florida Building Code, Residential (FBC, Residential)

2.0 LIMITATIONS

The Boral Roofing Clay Roof Tiles described in IAPMO UES ER-411 complies with the 2017 and 2014 FBC-Building and the 2017 and 2014 FBC-Residential. The design and installation of the Boral Roofing Clay Roof Tiles shall be in accordance with the 2015 or 2012 International Building Code and the 2015 or 2012 International Residential Code, as applicable, as noted in ER-411. The Boral Roofing Clay Roof Tiles shall be installed in accordance with the requirements of FBC, Building Section 1507.3 and FBC, Residential Section R905.3, as applicable, and the FRSA/TRI *Florida High Wind Concrete and Clay Roof Tile Installation Manual*, Fifth Edition Revised, where the V_{asd} is determined in accordance with FBC, Building Section 1609.3.1, FBC, Residential Section R301.2.1, or the recommendations of RAS 118, 119 or 120.

Nails, screws, and clips used to install the clay roof tiles shall be corrosion resistant in accordance with FBC, Building Sections 1506.5, 1506.6, and 1506.7, as applicable.

Fire Classification for roofs in Florida HVHZ areas shall comply with Section 1516 of the FBC, Building. Fasteners for use in Florida's HVHZ areas shall be in accordance with FBC Building Section 1517.5. Installation in HVHZ areas shall comply with FBC, Building Section 1518.8 when appropriate. Underlayment for use in Florida's HVHZ areas shall be in accordance with FBC, Building Section 1518.2.

Design wind loads shall be in accordance with Section 1609.5 of the FBC, Building or Section R301.2.1.1 of the FBC-Residential, as applicable. Load combinations shall be in accordance with Sections 1605.2 or 1605.3 of the FBC,

Building as applicable. Permits shall be applied for and notifications shall be given in accordance with Sections 1524 and 1525 of the FBC, Building for HVHZ installations.

For products falling under Florida Rule 61G20-2.008 verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission (or the building official when the report holder does not possess an approval by the Commission), to provide oversight and determine that the products are being manufactured as described in this evaluation report to establish continual product performance is required.

3.0 CONTACT INFORMATION

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