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EVALUATION REPORT

Boral Roofing

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(602) 269-2288

Evaluation Report M35710.12.10-R11

FL14317-R10

Date of Issuance: 12/21/2010

Revision 11: 10/12/2018

SCOPE:

This Evaluation Report is issued under **Rule 61G20-3** and the applicable rules and regulations governing the use of construction materials in the State of Florida. The documentation submitted has been reviewed by Robert Nieminen, P.E. for use of the product under the Florida Building Code and Florida Building Code, Residential Volume. The products described herein have been evaluated for compliance with the **6th Edition (2017) Florida Building Code** sections noted herein.

DESCRIPTION: Boral Roof Underlayments

LABELING: Labeling shall be in accordance with the requirements of the Accredited Quality Assurance Agency noted herein.

CONTINUED COMPLIANCE: This Evaluation Report is valid until such time as the named product(s) changes, the referenced Quality Assurance documentation changes, or provisions of the Code that relate to the product change. Acceptance of this Evaluation Report by the named client constitutes agreement to notify Robert Nieminen, P.E. of any changes to the product(s), the Quality Assurance or the production facility location(s). NEMO ETC, LLC requires a complete review of this Evaluation Report relative to updated Code requirements with each Code Cycle.

ADVERTISEMENT: The Evaluation Report number preceded by the words "NEMO|etc. Evaluated" may be displayed in advertising literature. If any portion of the Evaluation Report is displayed, then it shall be done in its entirety.

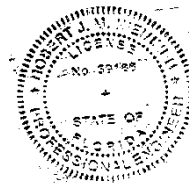
INSPECTION: Upon request, a copy of this entire Evaluation Report shall be provided to the user by the manufacturer or its distributors and shall be available for inspection at the job site at the request of the Building Official.

This Evaluation Report consists of pages 1 through 8.

Prepared by:

Robert J.M. Nieminen, P.E.

Florida Registration No. 59166, Florida DCA ANE1983



The facsimile seal appearing was authorized by Robert Nieminen, P.E. on 10/12/2018. This does not serve as an electronically signed document.

CERTIFICATION OF INDEPENDENCE:

1. NEMO ETC, LLC does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products it evaluates.
2. NEMO ETC, LLC is not owned, operated or controlled by any company manufacturing or distributing products it evaluates.
3. Robert Nieminen, P.E. does not have nor will acquire, a financial interest in any company manufacturing or distributing products for which the evaluation reports are being issued.
4. Robert Nieminen, P.E. does not have, nor will acquire, a financial interest in any other entity involved in the approval process of the product.
5. This is a building code evaluation. Neither NEMO ETC, LLC nor Robert Nieminen, P.E. are, in any way, the Designer of Record for any project on which this Evaluation Report, or previous versions thereof, is/was used for permitting or design guidance unless retained specifically for that purpose.

ROOFING COMPONENT EVALUATION:
1. SCOPE:

Product Category: Roofing

Sub-Category: Underlayment

Compliance Statement: **Boral Roof Underlayments**, as marketed by **Boral Roofing**, have demonstrated compliance with the following sections of the **6th Edition (2017) Florida Building Code** through testing in accordance with the following Standards. Compliance is subject to the Installation Requirements and Limitations / Conditions of Use set forth herein.

2. STANDARDS:

<u>Section</u>	<u>Property</u>	<u>Standard</u>	<u>Year</u>
1504.3.1	Wind Uplift	UL 1897	2012
1507.1.1, T1507.1.1, 1507.2.9.2	Physical Properties	ASTM D1970	2015
1507.3.3	Physical Properties	FRSA/TRI April 2012 (04-12)	2012

3. REFERENCES:

<u>Entity</u>	<u>Examination</u>	<u>Reference</u>	<u>Date</u>
ERD (TST 6049)	Physical Properties	M36790.07.11	09/30/2011
ERD (TST 6049)	Physical Properties	B40380.08.12	08/28/2012
ERD (TST 6049)	Tensile Adhesion / LTA	C41420.09.12-2	09/11/2012
ERD (TST 6049)	Adhesion	B41940.09.12	09/13/2012
ERD (TST 6049)	Tensile Adhesion / LTA	B47390.07.14-1	07/31/2014
ERD (TST 6049)	Tensile Adhesion / LTA	B47390.09.14	09/04/2014
OC (PDM1838)	Physical Properties	Equivalency statement	11/02/2017
PRI (TST 5878)	ASTM D1970	NEI-031-02-02:REV	10/27/2010
PRI (TST 5878)	ASTM D1970	NEI-029-02-01:REV	12/03/2010
PRI (TST 5878)	Tensile Adhesion / LTA	NEI-046-02-01REV	12/17/2010
PRI (TST 5878)	FRSA/TRI April 2012	NEI-076-02-01	02/14/2011
PRI (TST 5878)	ASTM D1970	NEI-034-02-02	01/29/2013
PRI (TST 5878)	Wind Uplift	BORR-001-02-01	03/17/2015
PRI (TST 5878)	Wind Uplift	BORR-005-02-01	06/24/2015
PRI (TST 5878)	Tensile Adhesion / LTA	DAPF-002-02-01	03/08/2018
PRI (TST 5878)	ASTM D1970 (adhesion)	OCF-443-02-01	10/11/2018
UL, LLC. (QUA 9625)	Quality Assurance	Service Confirmation	Exp. 08/21/2020

4. PRODUCT DESCRIPTION:

- 4.1 **Boral® TileSeal 50^{HT}** is a nominal 50-mil thick, polyester-surfaced, self-adhering SBS modified bitumen roof underlayment; meets ASTM D1970.
- 4.2 **Boral® TileSeal^{HT}** is a nominal 60-mil thick, polyester-surfaced, self-adhering SBS modified bitumen roof underlayment; meets ASTM D1970 and FRSA/TRI 04-12.
- 4.3 **Boral® MetalSeal^{HT}** is a nominal 60-mil thick, polyester-surfaced, self-adhering SBS modified bitumen roof underlayment; meets ASTM D1970 and FRSA/TRI 04-12.
- 4.4 **GatorSeal®** is a nominal 55-mil thick, granular-surfaced, fiberglass reinforced, self-adhering SBS modified bitumen roof underlayment; meets ASTM D1970.
- 4.5 **Citadel® Plus** is a nominal 48-mil thick, fabric-surfaced, fiberglass reinforced, self-adhering SBS modified bitumen roofing underlayment for use as a base-layer in multi-ply underlayment systems; meets ASTM D1970.

5. LIMITATIONS:

- 5.1 This is a building code evaluation. Neither NEMO ETC, LLC nor Robert Nieminen, P.E. are, in any way, the Designer of Record for any project on which this Evaluation Report, or previous versions thereof, is/was used for permitting or design guidance unless retained specifically for that purpose.
- 5.2 This Evaluation Report is not for use in FBC HVHZ jurisdictions.
- 5.3 Fire Classification is not part of this Laboratory Report; refer to current Approved Roofing Materials Directory for fire ratings of this product.
- 5.4 **Boral Roof Underlayments** may be used with any prepared roof cover where the product is specifically referenced within FBC approval documents. If not listed, a request may be made to the Authority Having Jurisdiction for approval based on this evaluation combined with supporting data for the prepared roof covering.
- 5.5 **Allowable Roof Covers:** Table 1 pertains to use of each listed underlayment by-itself beneath the stated roof covers. Refer to the installation instructions for multi-ply underlayment options.

TABLE 1: ROOF COVER OPTIONS						
Underlayment	Asphalt Shingles	Nail-On Tile	Adhesive-set Tile	Metal	Wood Shakes & Shingles	Slate
Boral TileSeal 50 ^{HT}	Yes	No	No	Yes	Yes	Yes
Boral TileSeal ^{HT}	Yes	Yes	Yes (See 5.5.1)	Yes	Yes	Yes
Boral MetalSeal ^{HT}	Yes	Yes	Yes (See 5.5.1)	Yes	Yes	Yes
GatorSeal	Yes	No	No	No	Yes	Yes

- 5.5.1 “Adhesive-set Tile” is limited to use of following Approved tile adhesives / underlayment combinations.

TABLE 1A: ALLOWABLE TILE ADHESIVE / UNDERLAYMENT COMBINATIONS ¹		
Adhesive	Florida Product Approval	Underlayments
DAP Foam Touch ‘n Seal StormBond Roof Tile Adhesive	FL14506	Boral TileSeal ^{HT} or Boral MetalSeal ^{HT}
DAP Foam Touch ‘n Seal StormBond 2 Two-Component Polyurethane Roof Tile Adhesive	FL21374	Boral TileSeal ^{HT} or Boral MetalSeal ^{HT}
Dow TILE BOND™ Roof Tile Adhesive	FL22525	Boral TileSeal ^{HT} or Boral MetalSeal ^{HT}
ICP Adhesives Polyset® AH-160	FL6332	Boral TileSeal ^{HT} or Boral MetalSeal ^{HT}
ICP Adhesives Polyset® RTA-1	FL6276	Boral TileSeal ^{HT} or Boral MetalSeal ^{HT}

¹ Refer to Tile Manufacturer’s or Adhesive Manufacturer’s Florida Product Approval for Overturning Moment Resistance Performance.

5.6 **Allowable Substrates:**

5.6.1 **Direct-Bond to Deck:**

Citadel Plus, Boral TileSeal 50^{HT}, Boral TileSeal^{HT}, Boral MetalSeal^{HT} or GatorSeal:

- Plywood (unprimed or primed with ASTM D41 primer).

Boral TileSeal^{HT} or Boral MetalSeal^{HT}:

- OSB (unprimed or primed with ASTM D41 primer).

*Note: Refer to **Section 5.6.4** for uplift limitations associated with direct-deck underlayment installations where the overlying roof cover is adhesive-set tile roofing*

5.6.2 **Bond to Base Layer Underlayment:**

Citadel Plus, Boral TileSeal 50^{HT}, Boral TileSeal^{HT}, Boral MetalSeal^{HT} or GatorSeal:

- ASTM D226, Type II felt; Citadel Plus.

For installations under mechanically attached prepared roof coverings, base layer shall be attached per minimum codified requirements. For installations under adhesive-set tile systems, base layer shall be attached per minimum requirements of **FRSA/TRI April 2012 (04-12), Appendix A, Table 1**, or as listed in **Section 5.6.4** herein, or as tested in accordance with **FBC 1504.3.1**.

5.6.3 **Bond to Other Substrate Types:**

Citadel Plus, Boral TileSeal 50^{HT}, Boral TileSeal^{HT}, Boral MetalSeal^{HT} or GatorSeal:

- ASTM D41 primed metal (e.g., flashing metal, valley metal, etc.).

Boral TileSeal^{HT}:

- Huber Zip Deck (unprimed or primed with ASTM D41 primer); Dens Deck Prime.

Note: For installation under mechanically attached prepared roof coverings, insulation shall be attached per minimum requirements of the prepared roof covering manufacturer's Product Approval.

5.6.4 **Wind Resistance for Underlayment Systems in Adhesive-set Tile Applications:** **FRSA/TRI April 2012 (04-12)** does not address wind uplift resistance of all underlayment systems beneath adhesive-set tile systems, where the underlayment forms part of the load-path. The following wind uplift limitations apply to underlayment systems that are not addressed in **FRSA/TRI April 2012 (04-12)** and are used in adhesive-set tile applications. Maximum Design Pressure is the result of testing for wind load resistance based on allowable wind loads, and reflects the ultimate passing pressure divided by 2 (the 2 to 1 margin of safety per **FBC 1504.9** has already been applied). Refer to **FRSA/TRI April 2012 (04-12), Appendix A, Table 1A** or **FBC 1609** for determination of design wind loads

#1 **Maximum Design Pressure = -120.0 psf:**

Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.

Primer: (Optional) ASTM D41 to the plywood deck

Base Ply: Citadel Plus, self-adhered

Cap Sheet: Boral TileSeal^{HT} or Boral MetalSeal^{HT}, self-adhered, and back-nailed within the selvedge-edge side laps using 12 ga. x 1¼" ring shank nails through 32 ga., 1-5/8" diameter tin caps spaced 12-inch o.c.

#2 **Maximum Design Pressure = -142.5 psf:**

Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.

Base Ply: None

Cap Sheet: Boral TileSeal^{HT} or Boral MetalSeal^{HT}, self-adhered and back-nailed within the selvedge-edge side laps using 12 ga. x 1¼" ring shank nails through 32 ga., 1-5/8" diameter tin caps spaced 12-inch o.c.

#3 Maximum Design Pressure = -202.5 psf:

- Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.
- Primer: Tropical Roofing Products #410 Quick Dry Primer or other ASTM D41 primer to the plywood deck
- Base Ply: None
- Cap Sheet: Boral TileSeal^{HT} or Boral MetalSeal^{HT}, self-adhered, and back-nailed within the selvedge-edge side laps using 12 ga. x 1¼” ring shank nails through 32 ga., 1-5/8” diameter tin caps spaced 12-inch o.c.

#4 Maximum Design Pressure = -210.0 psf:

- Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of Authority Having Jurisdiction.
- Primer: KARNAK #89 Sta-Tak Primer to the plywood deck
- Base Ply: None
- Cap Sheet: Boral TileSeal^{HT} or Boral MetalSeal^{HT}, self-adhered, and back-nailed within the selvedge-edge side laps using 12 ga. x 1¼” ring shank nails through 32 ga., 1-5/8” diameter tin caps spaced 12-inch o.c.

#5 Maximum Design Pressure = -120.0 psf:

- Deck: Min. 2,500 psi structural concrete to meet project requirements to satisfaction of Authority Having Jurisdiction.
- Primer: ASTM D41 to the concrete deck
- Base Ply: (Optional) Citadel Plus, self-adhered
- Cap Sheet: Boral TileSeal^{HT} or Boral MetalSeal^{HT}, self-adhered

5.6.4.1 Note: For adhesive-set tile systems, if there is a base ply or mid-ply of Citadel Plus in the system, the project design pressure requirements may not exceed -120 psf.

5.7 **Exposure Limitations:**

GatorSeal shall not be left exposed for longer than **30-days** after installation, prior to placement of final roof cover.
Boral TileSeal 50^{HT}, **Boral TileSeal^{HT}** or **Boral MetalSeal^{HT}** shall not be left exposed for longer than **180-days** after installation, prior to placement of final roof cover.
Citadel Plus, for use as a base-layer in a multi-ply underlayment system, shall not be left exposed for longer than **180-days** after installation, prior to placement of subsequent underlayment layer.

5.8 **Tile Slippage Limitations [FRSA/TRI April 2012 (04-12)]:**

When loading roof tiles on the underlayment in direct-deck tile assemblies, the maximum roof slope shall be as follows. These slope limitations can only be exceeded by using battens during loading of the roof tiles.

TABLE 2: TILE SLIPPAGE LIMITATIONS FOR DIRECT-DECK TILE INSTALLATIONS			
Underlayment	Tile Profile	Staging Method	Maximum Slope
Boral TileSeal ^{HT} or Boral MetalSeal ^{HT}	Flat	Max. 10-tile stack	6:12
	Lugged	Max. 10-tile stack	6:12

6. INSTALLATION:

- 6.1 **Boral Roof Underlayments** shall be installed in accordance with **Boral Roofing** published installation instructions subject to the Limitations set forth in Section 5 herein and the specifics noted below.
- 6.2 Re-fasten any loose decking panels, and check for protruding nail heads. Sweep the substrate thoroughly to remove any dust and debris prior to application, and prime the substrate (if applicable).
- 6.3 Install self-adhering underlayment when ambient and surface temperatures are minimum 40°F and rising.

6.4 **Citadel Plus:**

6.4.1 Citadel Plus is limited to use as a base or mid-layer in multi-ply underlayment systems beneath Boral TileSeal 50^{HT}, Boral TileSeal^{HT} or GatorSeal.

6.4.2 Slope limitations are those associated with the top-layer underlayment.

6.4.3 Direct to Deck:

Cut the membrane into manageable lengths, typically 10 to 12 ft. Align the membrane parallel to the roof edge, extending over by ¼-inch. Fold the membrane away from the edge onto itself. Remove the release sheet. Place the membrane with the exposed rubberized asphalt onto the deck, pressing firmly into place. Roll into place with a weighted roller.

Fasten the top edge of the sheet to the deck with corrosion resistant roofing nails, nails & tin-tags or 1-inch diameter plastic or steel cap nails spaced maximum 12-inch o.c. Overlap successive courses the entire width of the black-selvedge area, minimum 2 inches (horizontal lap) and minimum 6" end (vertical) laps.

Install final underlayment layer atop Citadel Plus per 'direct-to-deck' instructions for Boral TileSeal 50^{HT}, Boral TileSeal^{HT}, Boral MetalSeal^{HT} or GatorSeal.

6.4.4 To Base Sheet:

Install base sheet of ASTM D226, Type II felt in accordance with Code requirements or install base ply of Citadel Plus in accordance with Boral Roofing published installation instructions and Section 6.4.3 and when used as part of a multi-ply system.

Install optional Citadel Plus as a mid-ply in accordance with Boral Roofing published installation instructions and Section 6.4.3.

Install final underlayment layer atop Citadel Plus per 'direct-to-deck' instructions for Boral TileSeal 50^{HT}, Boral TileSeal^{HT} or GatorSeal.

Note: For adhesive-set tile systems, if there is a base ply or mid-ply of Citadel Plus in the system, the project design pressure requirements may not exceed -120 psf.

6.5 **Boral TileSeal 50^{HT}:**

6.5.1 Shall be installed in compliance with the requirements for ASTM D1970 underlayment in **FBC Table 1507.1.1** for the type of prepared roof covering to be installed.

6.5.2 Do not use Boral TileSeal 50^{HT} on roof pitches less than 2:12.

6.5.3 Non-Tile Applications, Direct to Deck:

Cut the membrane into manageable lengths, typically 10 to 12 ft. Align the membrane parallel to the roof edge, extending over by ¼-inch. Fold the membrane away from the edge onto itself. Remove the release sheet. Place the membrane with the exposed rubberized asphalt onto the deck, pressing firmly into place. Roll into place with a weighted roller.

Fasten the black selvedge edge to the deck with corrosion resistant roofing nails, nails & tin-tags or 1-inch diameter plastic or steel cap nails spaced maximum 24-inch o.c. for slopes below 7:12 and maximum 12-inch o.c. for slopes 7:12 and greater. Overlap successive courses the entire width of the black-selvedge area, minimum 3-inch.

Seal under end (vertical) laps using approved mastic, or use Joined and Folded Seam or Inverted Sheet Seam method detailed in Boral Roofing published installation instructions.

6.5.4 Non-Tile Applications, to Base Sheet:

Install ASTM D226, Type II felt in accordance with Code requirements or install Citadel Plus in accordance with Boral Roofing published installation instructions and Section 6.4.

Install Boral TileSeal 50^{HT} in accordance over ASTM D226, Type II felt or Citadel Plus with Boral Roofing published installation instructions and Section 6.5.3, except end (vertical) laps, described below.

Apply SBS Mastic under all end (vertical) laps or any other laps where the self-adhering bituminous underside is in contact with the fabric top surface, rolling the interface into place with a weighted roller.

6.6 GatorSeal:

6.6.1 Shall be installed in compliance with the requirements for ASTM D1970 underlayment in **FBC Table 1507.1.1** for the type of prepared roof covering to be installed.

6.6.2 Do not use GatorSeal on roof pitches less than 2:12.

6.6.3 Non-Tile applications, Direct to Deck:

Cut the membrane into manageable lengths, typically 10 to 12 ft. Align the membrane parallel to the roof edge, extending over by ¼-inch. Fold the membrane away from the edge onto itself. Remove the release sheet. Place the membrane with the exposed rubberized asphalt onto the deck, pressing firmly into place. Roll into place with a weighted roller.

Fasten the black selvedge edge to the deck with corrosion resistant roofing nails, nails & tin-tags or 1-inch diameter plastic or steel cap nails spaced 24-inch o.c. for slopes below 7:12 and 12-inch o.c. for slopes 7:12 and greater. Overlap successive courses the entire width of the black-selvedge area, minimum 3-inch.

Seal end (vertical) laps using SBS Mastic under all side (vertical) laps or any other laps where the self-adhering bituminous underside is in contact with the granular or mineral top surface, rolling the interface into place with a weighted roller, or using the Inverted Sheet Seam detailed in Boral Roofing published installation instructions.

6.6.4 Non-Tile Applications, to Base Sheet:

Install ASTM D226, Type II felt in accordance with Code requirements or install Citadel Plus in accordance with Boral Roofing published installation instructions and Section 6.4.

Install GatorSeal over ASTM D226, Type II felt or Citadel Plus in accordance with Boral Roofing published installation instructions and Section 6.6.3 except end (vertical) laps, described below.

Apply SBS Mastic under all side (vertical) laps or any other laps where the self-adhering bituminous underside is in contact with the granular top surface, rolling the interface into place with a weighted roller.

6.7 Boral TileSeal^{HT} or Boral MetalSeal^{HT}:

6.7.1 Shall be installed in compliance with the requirements for ASTM D1970 underlayment in **FBC Table 1507.1.1** for the type of prepared roof covering to be installed.

6.7.2 Do not use Boral TileSeal^{HT} or Boral MetalSeal^{HT} on roof pitches less than 2:12.

6.7.3 Non-Tile Applications, Direct to Deck:

For OSB substrate, prime with ASTM D41 primer and allow to dry prior to installation. Cut the membrane into manageable lengths, typically 10 to 12 ft. Align the membrane parallel to the roof edge, extending over by ¼-inch. Fold the membrane away from the edge onto itself. Remove the release sheet. Place the membrane with the exposed rubberized asphalt onto the deck, pressing firmly into place. Roll into place with a weighted roller.

Fasten the black selvedge edge to the deck with roofing nails, nails & tin-tags or 1-inch diameter plastic or steel cap nails spaced maximum 12-inch o.c. Overlap successive courses the entire width of the black-selvedge area, minimum 3-inch.

Seal under all end (vertical) laps using approved mastic or use Inverted Sheet Seam method detailed in Boral Roofing published installation instructions.

6.7.4 Non-Tile Applications, to Base Sheet:

Install ASTM D226, Type II felt in accordance with Code requirements or install Citadel Plus in accordance with Boral Roofing published installation instructions and Section 6.4.

Install Boral TileSeal^{HT} or Boral MetalSeal^{HT} over ASTM D226, Type II felt or Citadel Plus in accordance with Boral Roofing published installation instructions and Section 6.7.3, except end (vertical) laps, described below.

Apply SBS Mastic under all end (vertical) laps or any other laps where the self-adhering bituminous underside is in contact with the fabric top surface, rolling the interface into place with a weighted roller.

6.7.5 Tile Applications:

Reference is made to **FRSA/TRI April 2012 (04-12) Installation Manual** and **Table 1** herein, using the instructions noted above as a guideline.

For mechanically fastened tile roofing over 2-ply system, consisting of Base Sheet and self-adhering top sheet(s), Base Sheet fastening shall be not less than **FRSA/TRI April 2012 (04-12), Table 1**.

For adhesive-set tile applications, refer to **Section 5.6.4** herein.

Note: For adhesive-set tile systems, if there is a base ply or mid-ply of Citadel Plus in the system, the project design pressure requirements may not exceed -120 psf.

Refer to **Section 5.8** for tile staging limitations. Battens must be used for all tile installations atop Boral TileSeal^{HT} or Boral MetalSeal^{HT} with roof pitches of 2½ to less than 3:12. Boral Roofing's Elevated Batten System or counter battens are required.

7. BUILDING PERMIT REQUIREMENTS:

As required by the Building Official or Authority Having Jurisdiction in order to properly evaluate the installation of this product.

8. MANUFACTURING PLANTS:

Brentwood, NH

9. QUALITY ASSURANCE ENTITY:

UL, LLC. – QUA9625; (631) 546-2458; Kanchi.Agrawala-Dokania@ul.com

- END OF EVALUATION REPORT -