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EVALUATION REPORT

Boral Roofing /MonierLifetile
7575 Irvine Center Drive
Suite 100
Irvine, CA. 92618

Evaluation Report M35710.12.10-R2
FL14317-R1
Date of Issuance: 12/21/2010
Revision 2: 06/24/2011

SCOPE:

This Evaluation Report is issued under Rule 9N-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 designed to comply with the 2007 Florida Building Code sections noted herein.

DESCRIPTION: Boral Roof Underlayments

LABELING: Each unit shall bear labeling in accordance with the requirements 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. if the product changes or the referenced Quality Assurance documentation changes. Trinity|ERD requires a complete review of this Evaluation Report relative to updated Code requirements with each Code Cycle.

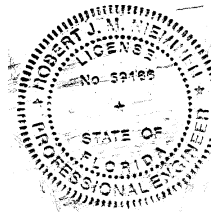
ADVERTISEMENT: The Evaluation Report number preceded by the words "Trinity|ERD Evaluated" may be displayed in advertising literature. If any portion of the Evaluation Report is displayed, then it shall be done in its entirety.

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 9.

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 06/24/2011. This does not serve as an electronically signed document. Signed, sealed hardcopies have been transmitted to the Product Approval Administrator and to the named client

CERTIFICATION OF INDEPENDENCE:

1. Trinity|ERD 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. Trinity|ERD 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.

ROOFING COMPONENT EVALUATION:

1. SCOPE:

Product Category: Roofing
Sub-Category: Underlayment
Compliance Statement: Boral Roof Underlayments, as produced by Boral Roofing / MonierLifetile, have demonstrated compliance with the following sections of the 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>
1507.2.3, 1507.3.3, 1507.5.3, 1507.7.3, T1507.8, 1507.8.3, 1507.9.3, 1507.9.4	Physical Properties	ASTM D226	1997
1507.3.3	Physical Properties	ASTM D2626	2004
1507.2.4, 1507.2.9.2, 1507.3.9, 1507.5.6, 1507.8.7, 1507.9.8	Physical Properties	ASTM D1970	2001
1523.6.5.2.1	Physical Properties	TAS 103	1995
1507.3.3	Installation Practice	FRSA/TRI 07320	2005

3. REFERENCES:

<u>Entity</u>	<u>Examination</u>	<u>Reference</u>	<u>Date</u>
ERD (TST 6049)	Physical Properties	M33180.08.10	10/09/2010
PRI (TST 5878)	Physical Properties	NEI-006-02-01	04/01/2002
PRI (TST 5878)	Physical Properties	NEI-034-02-02	03/23/2006
PRI (TST 5878)	Physical Properties	NEI-045-02-01	08/08/2007
PRI (TST 5878)	Physical Properties	NEI-053-02-01	05/01/2008
PRI (TST 5878)	Physical Properties	NEI-070-02-01	08/12/2009
PRI (TST 5878)	Physical Properties	NEI-031-02-02:REV 10.27.10	10/27/2010
PRI (TST 5878)	Physical Properties	NEI-029-02-01REV: 11.03.10	12/03/2010
PRI (TST 5878)	Physical Properties	NEI-046-02-01REV	12/17/2010
UL (QUA 1743)	Quality Assurance	Service Confirmation	Exp. 12/20/2013

4. PRODUCT DESCRIPTION:

- 4.1 **Self-Adhering Underlayments:**
 - 4.1.1 **Boral TileSeal™ 50^{HT}** is a nominal 50-mil thick, polyester-surfaced, self-adhering SBS modified bitumen roof underlayment.
 - 4.1.2 **Boral TileSeal™ HT** is a nominal 60-mil thick, polyester-surfaced, self-adhering SBS modified bitumen roof underlayment.
 - 4.1.3 **GatorSeal™** is a nominal 55-mil thick, granular-surfaced, fiberglass reinforced, self-adhering SBS modified bitumen roof underlayment.
 - 4.1.4 **StormSentry™** is a nominal 120-mil thick, mineral-surfaced, fiberglass reinforced, self-adhering SBS modified bitumen roof underlayment.
 - 4.1.5 **Citadel™** is a nominal 42-mil thick, smooth-surfaced, fiberglass reinforced, self-adhering SBS modified bitumen roofing underlayment for use as a base-layer in two-ply underlayment systems.

4.2 **Mechanically Fastened Underlayments:**

4.2.1 **Alcazar™** is a nominal 30-mil thick, smooth-surfaced, fiberglass reinforced, SBS modified bitumen roofing underlayment with self-adhering side laps; meets physical requirements of ASTM D226, Type II, ASTM D2626 and ASTM D4601, Type II.

5. LIMITATIONS:

- 5.1 This Evaluation Report is not for use in the HVHZ.
- 5.2 Fire Classification is not part of this Laboratory Report; refer to current Approved Roofing Materials Directory for fire ratings of this product.
- 5.3 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 AHJ for approval based on this evaluation combined with supporting data for the prepared roof covering.
- 5.4 Allowable roof covers applied atop Boral Roof Underlayments are follows. Table 1 pertains to use of each listed underlayment by-itself beneath the stated roof covers. Refer to the installation instructions and Table 2 for two-ply underlayment options.

Table 1: Roof Cover Options						
Underlayment	Asphalt Shingles	Nail-On Tile	Foam-On Tile	Metal	Wood Shakes & Shingles	Slate
Alcazar	Yes	Yes	No	No	Yes	Yes
Boral TileSeal 50 ^{HT}	Yes	No	No	Yes	Yes	Yes
Boral TileSeal ^{HT}	Yes	Yes	Yes (See 5.4.1)	Yes	Yes	Yes
GatorSeal	Yes	No	No	No	Yes	Yes
StormSentry	Yes	Yes	No	No	Yes	Yes

- 5.4.1 "Foam-On Tile" is limited to use of Polyfoam PolyPro AH160 unless tensile adhesion / long term aging data from an accredited testing laboratory is provided.
- 5.5 Allowable substrates are noted below:
 - 5.5.1 Direct-Bond to Deck:
 - Citadel, Boral TileSeal 50^{HT}, Boral TileSeal^{HT}, StormSentry or GatorSeal self-adhered to: plywood or ASTM D41 primed plywood.
 - 5.5.2 FRSA/TRI 07320 does not address wind uplift resistance of direct-deck, adhered underlayment systems beneath foam-on tile systems, where the bonded underlayment forms part of the load-path. The following wind uplift limitations apply to direct-deck, adhered Boral underlayment systems.
 - 5.5.2.1 Maximum Design Pressure = -45 psf.
 - Deck: Min. 15/32-inch plywood to meet project requirements to satisfaction of AHJ.
 - Primer: (Optional) ASTM D41
 - Base Layer: (Optional) Citadel, self-adhered
 - Underlayment: Boral TileSeal^{HT}, self-adhered

5.5.3 Bond to Base Layer Underlayment:

- Boral TileSeal 50^{HT}, Boral TileSeal^{HT} or GatorSeal self-adhered to: ASTM D226, Type II felt, Alcazar or Citadel.
- StormSentry self-adhered to: ASTM D226, Type II felt

For installations under mechanically attached prepared roof coverings, base layer shall be attached per minimum codified requirements. For installations under foam-on tile systems, base layer shall be attached per minimum requirements of FRSA/TRI 07320/8-05 or RAS 120.

5.5.4 Bond to Other Substrate Types:

- Citadel, Boral TileSeal 50^{HT}, Boral TileSeal^{HT}, StormSentry or GatorSeal self-adhered to: ASTM D41 primed metal (e.g., flashing metal, valley metal, etc).

5.6 Exposure Limitations:

5.6.1 GatorSeal shall not be left exposed for longer than 30-days after installation, prior to placement of final roof cover.

5.6.2 StormSentry shall not be left exposed for longer than 90-days after installation, prior to placement of final roof cover.

5.6.3 Alcazar, Boral TileSeal 50^{HT} and Boral TileSeal^{HT} shall not be left exposed for longer than 180-days after installation, prior to placement of final roof cover.

5.6.4 Citadel, for used as a base-layer in a two-ply underlayment system, shall not be left exposed for longer than 180-days after installation, prior to placement of subsequent underlayment layer.

5.7 For tile roof installations governed by the FRSA/TRI 07320/8-05 Installation Manual, Fourth Edition, use is limited to the following. Reference is made to the FRSA/TRI Technical Brief titled "Florida High Wind Roof Tile Self-Adhered Underlayment Requirements" for limitations for self-adhering underlayments used beneath tile roof systems.

Table 2: Tile System Options per FRSA/TRI 07320/8-05				
System	Underlay Option	Section	Reference	Product(s)
<u>System One:</u> Mechanically Fastened Tile, Unsealed or Sealed Underlayment System	1	3.02A	Single-Ply No. 43	Alcazar
	4	3.02D	Two Ply No. 30 or No. 43	Alcazar
	5	3.02E	Self-Adhered Underlayment	Base Layer: (Optional) Citadel Top Layer: Boral TileSeal ^{HT}
	5	3.02E	Self-Adhered Underlayment	StormSentry
	6	3.02F	No. 30 / Self-Adhered Underlayment	Base Layer: ASTM D226, Type II or Alcazar Top Layer: Boral TileSeal ^{HT}
	6	3.02F	No. 30 / Self-Adhered Underlayment	Base Layer: ASTM D226, Type II Top Layer: StormSentry
<u>System Two:</u> Mechanically Fastened Tile, Sealed Underlayment System	4	3.02D	Self-Adhered Underlayment	Base Layer: (Optional) Citadel Top Layer: Boral TileSeal ^{HT}
	4	3.02E	Self-Adhered Underlayment	StormSentry
	5	3.02E	No. 30 / Self-Adhered Underlayment	Base Layer: ASTM D226, Type II or Alcazar Top Layer: Boral TileSeal ^{HT}
	5	3.02E	No. 30 / Self-Adhered Underlayment	Base Layer: ASTM D226, Type II Top Layer: StormSentry

Table 2 (continued): Tile System Options per FRSA/TRI 07320/8-05				
System Four "A": Adhesive-Set Tile, Unsealed or Sealed Underlayment System	4	3.02D	Self-Adhered Underlayment	Base Layer: (Optional) Citadel Top Layer: Boral TileSeal ^{HT}
	5	3.02E	No. 30 / Self-Adhered Underlayment	Base Layer: ASTM D226, Type II or Alcazar Top Layer: Boral TileSeal ^{HT}
System Four "B": Adhesive-Set Tile, Sealed Underlayment System	3	3.02C	Self-Adhered Underlayment	Base Layer: (Optional) Citadel Top Layer: Boral TileSeal ^{HT}
	4	3.02D	No. 30 / Self-Adhered Underlayment	Base Layer: ASTM D226, Type II or Alcazar Top Layer: Boral TileSeal ^{HT}

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 **Alcazar:**
 - 6.4.1 Install Alcazar in compliance with manufacturer's published installation instructions and the requirements for ASTM D226, Type I and II or ASTM D2626 underlayments in FBC Sections 1507 for the type of prepared roof covering to be installed.
 - 6.4.2 Address metal drip-edge, rakes, valleys and penetrations in accordance with Boral Roofing published installation instructions.
 - 6.4.3 **Slopes of 4:12 or greater:**
 - 6.4.3.1 Starting at the eaves, lay Alcazar underlayment, lapping each course minimum 2-inches (horizontal lap) and with minimum 6-inch end (vertical) laps. At all head (horizontal) laps, pull the release film from the bottom of the overlapping course and fully adhere to the selvedge edge of the course below. End (vertical) laps in a succeeding course shall be staggered from those in preceding course by minimum 6-feet.
 - 6.4.3.2 Secure with standard roofing nails, nails & tin-tags or 1-inch diameter plastic or steel cap nails maximum 6-inch o.c. at the laps and 12-inch o.c. in two, equally spaced, staggered rows in the center of the sheet.
 - 6.4.3.3 If a top-layer-underlayment is required atop the mechanically attached base layer, install Boral TileSeal 50^{HT}, Boral TileSeal^{HT} or GatorSeal in accordance with Boral Roofing published installation instructions and the applicable sections below.

6.4.4 Slopes of 3:12 to less than 4:12:

6.4.4.1 Double layer application; begin by fastening a 19-inch wide strip of Alcazar underlayment placed along the eaves. Place a full-width sheet over the starter, completely overlapping the starter course. Overlap succeeding courses by 19-inches. Minimum 6-inch end (vertical) laps shall be staggered from those in preceding course by minimum 6-feet.

6.4.4.2 Secure the top layer with standard roofing nails, nails & tin-tags or 1-inch diameter plastic or steel cap nails maximum 6-inch o.c. at the laps and 12-inch o.c. in two, equally spaced, staggered rows in the center of the sheet.

6.4.5 For use in asphalt-shingle applications, reference is made to the current edition of the ARMA Asphalt Roofing Manual. For use in applications that do not involve asphalt-shingles or tile, reference is made to the current edition of the NRCA Steep-slope Roofing Manual.

6.4.6 For use in tile applications, reference is made to FRSA/TRI 07320/8-05 Installation Manual, Fourth Edition, and Table 2 herein.

6.4.6.1 Boral Roofing published attachment requirements, as noted above, for Alcazar are more stringent than and take precedence over those published in FRSA/TRI 07320/8-05.

6.5 Citadel:

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

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

6.5.3 Direct to deck:

6.5.3.1 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.

6.5.3.2 Boral recommends fastening of the black selvedge edge to the deck with 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 width of the black-selvedge area, minimum 3-inch.

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

6.5.3.4 Install final underlayment layer atop Citadel.

6.5.4 To mechanically attached base sheet:

6.5.4.1 Install Alcazar in accordance with Boral Roofing published installation instructions and Section 6.4.3 or install ASTM D226, Type II felt in accordance with Section 6.4.3 but using minimum 4-inch head (horizontal) laps.

6.5.4.2 Install Citadel in accordance with Boral Roofing published installation instructions and Section 6.5.3, except end (vertical) laps, described below.

6.5.4.3 Apply SBS Mastic under all end (vertical) laps, rolling the interface into place with a weighted roller.

6.5.4.4 Install final underlayment layer atop Citadel.

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

- 6.6.1 Install Boral TileSeal 50^{HT} in compliance with manufacturer's published installation instructions and the requirements for ASTM D1970 underlayments in FBC Sections 1507 for the type of prepared roof covering to be installed.
- 6.6.2 Do not use Boral TileSeal 50^{HT} on roof pitches less than 2:12.
- 6.6.3 For non-tile applications, direct to deck:
 - 6.6.3.1 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.
 - 6.6.3.2 Boral recommends fastening of the black selvedge edge to the deck with 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 width of the black-selvedge area, minimum 3-inch.
 - 6.6.3.3 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.
- 6.6.4 For non-tile applications, to mechanically attached base sheet:
 - 6.6.4.1 Install Alcazar in accordance with Boral Roofing published installation instructions and Section 6.4.3 or install ASTM D226, Type II felt in accordance with Section 6.4.3 but using minimum 4-inch head (horizontal) laps.
 - 6.6.4.2 Install Boral TileSeal 50^{HT} in accordance with Boral Roofing published installation instructions and Section 6.6.3, except end (vertical) laps, described below.
 - 6.6.4.3 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 **GatorSeal and StormSentry:**

- 6.7.1 Install GatorSeal and StormSentry in compliance with manufacturer's published installation instructions and the requirements for ASTM D1970 underlayments in FBC Sections 1507 for the type of prepared roof covering to be installed.
- 6.7.2 Do not use GatorSeal or StormSentry on roof pitches less than 2:12. For tile applications (StormSentry only), do not use StormSentry on roof pitches less than 2½:12.
- 6.7.3 For non-tile applications, direct to deck:
 - 6.7.3.1 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.
 - 6.7.3.2 Boral recommends fastening of the black selvedge edge to the deck with 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 width of the black-selvedge area, minimum 3-inch.
 - 6.7.3.3 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.

- 6.7.4 For non-tile applications, to mechanically attached base sheet:
- 6.7.4.1 Install Alcazar in accordance with Boral Roofing published installation instructions and Section 6.4.3 or install ASTM D226, Type II felt in accordance with Section 6.4.3 but using minimum 4-inch head (horizontal) laps.
 - 6.7.4.2 Install GatorSeal (over Alcazar or ASTM D226, Type II felt) or StormSentry (over ASTM D226, Type II felt only) in accordance with Boral Roofing published installation instructions and Section 6.7.3 except end (vertical) laps, described below.
 - 6.7.4.3 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.
- 6.7.5 For tile applications (StormSentry only):
- 6.7.5.1 Reference is made to FRSA/TRI 07320/8-05 Installation Manual, Fourth Edition, and Table 2 herein, using the instructions noted above as a guideline. Tile shall be loaded and staged in a manner that prevents tile slippage and/or damage to the underlayment.
- 6.8 **Boral TileSeal^{HT}:**
- 6.8.1 Install Boral TileSeal^{HT} in compliance with manufacturer's published installation instructions and the requirements for ASTM D1970 underlayments in FBC Sections 1507 for the type of prepared roof covering to be installed.
 - 6.8.2 Do not use Boral TileSeal^{HT} on roof pitches less than 2:12. For tile applications, do not use Boral TileSeal HT on pitches less than 2½:12.
 - 6.8.3 For non-tile applications, direct to deck:
 - 6.8.3.1 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.
 - 6.8.3.2 Boral recommends fastening of the black selvedge edge to the deck with 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 width of the black-selvedge area, minimum 3-inch.
 - 6.8.3.3 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.
 - 6.8.4 For non-tile applications, to mechanically attached base sheet:
 - 6.8.4.1 Install Alcazar in accordance with Boral Roofing published installation instructions and Section 6.4.3 or install ASTM D226, Type II felt in accordance with Section 6.4.3 but using minimum 4-inch head (horizontal) laps.
 - 6.8.4.2 Install Boral TileSeal^{HT} in accordance with Boral Roofing published installation instructions and Section 6.8.3, except end (vertical) laps, described below.
 - 6.8.4.3 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.

6.8.5 For tile applications:

6.8.5.1 Reference is made to FRSA/TRI 07320/8-05 Installation Manual, Fourth Edition, and Table 2 herein, using the instructions noted above as a guideline. Tile shall be loaded and staged in a manner that prevents tile slippage and/or damage to the underlayment.

6.8.5.2 Battens must be used for all tile installations atop Boral TileSeal^{HT} with roof pitches of 2½ to less than 3:12. Boral Roofing's Elevated Batten System, Tru-Flow Battens or counter battens are required.

7. LABELING:

Each unit shall bear a permanent label with the manufacturer's name, logo, city, state and logo of the Accredited Quality Assurance Agency noted herein.

8. BUILDING PERMIT REQUIREMENTS:

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

9. MANUFACTURING PLANTS:

Contact the manufacturer or the named QA entity for information on plants covered under Rule 9N-3 QA requirements.

10. QUALITY ASSURANCE ENTITY:

Underwriters Laboratories – QUA1743; (414) 248-6409; Karen.buchmann@us.ul.com

- END OF EVALUATION REPORT -