

William R. Heiden III, P.E.

Boral Industries

Product Evaluation Report

3/4" TruExterior Trim (painted)
3/4" TruExterior Trim (unprimed)
3/4" TruExterior Trim (unpainted)
3/4" TruExterior Exterior Siding

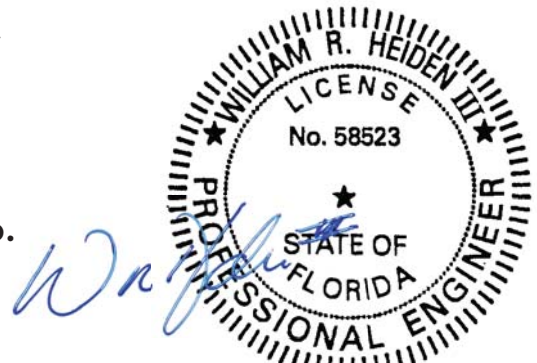
Applicable Codes, Standards, & Rules

2010 Florida Building Code (FBC)
American Society of Civil Engineers 7-10 (ASCE 7-10)
Florida Department of Business and Professional Regulation rule 61G20-3

Independent Product Evaluator:

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WRH Project No.
2014-08-015



December 1, 2014

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Table of Contents

<u>Description</u>	<u>Pages</u>
Product Evaluated, Mfg. & Test Agency info., Evaluation Entity, Evaluation Objective	1
Statement of Compliance, Applicable ASTM Tests & Referenced Test Reports	2
Summary of Test Results (ICC-ES AC389)	3
Summary of Test Results (ASTM E84-12c & E96-13)	4
Calculation of Wind Pressure Coefficients per ASCE 7-10 (C&C Method 1)	5
Summary of Test Results (ASTM E330) & ASCE 7-10 Basic Wind Speeds	6
Limitations of Use	7
Boral Industries TruExterior Trim & TruExterior Siding Installation Guides	8 - 9



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Product Evaluated

1. 3/4" TruExterior Trim (painted)
2. 3/4" TruExterior Trim (unprimed)
3. 3/4" TruExterior Trim (unpainted)
4. 3/4" TruExterior Siding

Manufacturer Location(s):

Plant	Address
Boral Industries	500 Correll Street, Salisbury, NC 28039

Testing Organization:

Progressive Engineering, Inc. (*Pei*)
 58640 State Road 15
 Goshen, IN 46528

Intertek Testing Services NA, Inc. (*Intertek*)
 16015 Shady Falls Road
 Elmendorf, TX 78112

Home Innovation Research Labs, Inc.
 400 Prince Georges Boulevard
 Upper Marlboro, MD 20774

Independent Product Evaluation Entity

Florida Professional Engineer
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 15401 N 500 E
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Evaluation Objective:

- 1) Determination of the Water Vapor Transmission rate for the TruExterior Trim material tested.
- 2) Determination of the Flame Spread & Smoke Density developed for the "Salisbury April Mannich" material tested.
- 3) Determination of the Flexural Strength, Modulus of Rupture, Density, Linear Coefficient of Thermal Expansion, Impact Resistance, Water Absorption, Freeze/Thaw, & Transverse Load Resistance for 3/4" TruExterior Siding material tested.

Statement of Compliance:

This product evaluation is being issued per Rule Chapter 9N-3 section 9N-3.005 of the Florida Department of Business & Professional Regulation. As the product evaluator, the undersigned certifies that the product is in compliance with the requirements of the 2010 Florida Building Code.

Applicable Tests:

ASTM E96-13	Standard Test Methods for Water Vapor Transmission of Materials
ASTM E84-12c	Test for Surface Burning Characteristics of Building Materials
ASTM E330	Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
AC389	Acceptance Criteria for composite Siding Containing Inorganic Microspheres and Proprietary Resins, Used as Exterior Wall Cladding

Referenced Test Reports

- 1) Progressive Engineering, Inc. (*Pei*), Report Number: 2014-349 (A), Dated 4/30/14, pages 1-12, 3/4" TruExterior Trim, ASTM E96-13
- 2) Progressive Engineering, Inc. (*Pei*), Report Number: 2014-349 (B), Dated: 6/09/14 (revised 7/14/14), pages 1-12, 3/4" TruExterior Trim, ASTM E96-13
- 3) Intertek Testing Services NA, Inc. (*Intertek*), Report Number: 101157846SAT-001A, pages 1-9, Salisbury April Mannich Specimen, ASTM E84-12c
- 4) Home Innovation Research Labs, Report Number: 41621912312013, pages 1-33, 3/4" TruExterior Siding, ICC AC389

Table 1. Test Results: (ICC-ES AC389)¹

Test Criteria	AC/ASTM No.	SPECIMEN INFO.		TEST RESULTS ¹
		Width	Length	Average
Flexural Modulus of Rupture (MOR)	D6109	Full	8"	1755 psi
Density	D1622	4"	4"	49.5 lb/ft ³
Linear Coefficient of Thermal Expansion (COE)	D6341	Full	8"	1.22E-05 in/in/F°
Water Absorption	C1185	4"	4"	1.51% mass increase
Impact Resistance	D1037	8"	10"	63.9" to 1st crack (front) 85.5" to 1st crack (back)
Fastener Pull Through	D1037	3"	6"	229 lbs. Ultimate Load
Freeze/Thaw	AC92 D618	8"	12"	Face up 2007 (96.5% of Control) Face Down 1780 psi (90.5% of Control)
Accelerated Weathering	G155 Cycle 1	2.5"	5"	"The accelerated weathering did not appear to cause additional pitting and cracking than was typical in the unexposed specimens." ²

Notes:

1. Results per test report by Home Innovation Research Labs, Report Number: 41621912312013
2. Conclusion per Home Innovation Research Lab's researchers, Report Number: 41621912312013

Evaluation Results:

AC389 does not provide pass/fail criteria for flexural strength, density, linear coefficient of thermal expansion, impact resistance, water absorption, or fastener pull through.

AC92 requires the flexural strength of the freeze/thaw specimens to exceed 60% of the flexural strength of the control specimens. Freeze/thaw specimens exceeded this criteria.

ASTM G155 requires that after exposure, there shall be no cracking, checking, crazing, erosion or other characteristics that might affect product performance as an exterior wall cladding in any specimens, when viewed under 5x magnification. Based on the Researchers observations, the material met the requirements of ASTM G155.

Table 2. Test Results: ASTM E84-12c¹

Tested Material	ASTM No.	SPECIMEN INFO.					RESULTS ¹	
		Report No.	Flame Exposure	Width	Length	Thk.	Flame Spread Index	Smoke Developed Index
"Salisbury April Mannich"	E84-12c	101157846SAT-001A	Textured Side	21-3/4"	24'	3/4"	20	400

Notes:

1. Results per test report by Intertek Testing Services NA, Inc. (Intertek), Report Number: 101157846SAT-001A

Evaluation Results: The 2010 Florida Building Code (FBC) requires a Flame Spread Index of ≤ 25 and a Smoke Developed Index of ≤ 450 . The "Salisbury April Mannich" specimen tested meets the requirements of the 2010 Florida Building Code (sections 703.2.4 & 719.3)

Table 3. Test Results: ASTM E96-13³

Tested Material	ASTM No.	SPECIMEN INFO.					RESULTS ³
		Report No.	Specimen Assembly ²	Width	Length	Thk.	Average WVT ¹ (g/m ² /24 hrs)
TruExterior Trim	E96-13	2014-349(A)	painting	11"	11"	0.755"	0.96
		2014-349(A)	unprimed	11"	11"	0.792"	0.64
		2014-349(B)	painting with joint & OSB	11"	11"	1.196"	0.96
		2014-349(B)	unpainted with joint & OSB	11"	11"	1.197"	1.29

Notes:

1. WVT = Water Vapor Transmission

2. Specimens were tested to Procedure A - Desiccant Method as described in ASTM E96-13.

3. Results per test report by Progressive Engineering, Inc. (Pei), Report Number: 2014-349 (A-B)

Table 4a. Basic Wind Speed Coefficients & Constants

Building Ht. (ft)	K_z^2			K_{zt}	K_d^1	Zone 4	Zone 5	GC_{pi}^4
	Exp B	Exp C	Exp D			GC_p^3	GC_p^3	
0 - 15	0.70	0.85	1.03	1	0.85	1.1	1.4	0.55
20	0.70	0.90	1.08	1	0.85	1.1	1.4	0.55
25	0.70	0.94	1.12	1	0.85	1.1	1.4	0.55
30	0.70	0.98	1.16	1	0.85	1.1	1.4	0.55
35	0.73	1.01	1.19	1	0.85	1.1	1.4	0.55
40	0.76	1.04	1.22	1	0.85	1.1	1.4	0.55
45	0.78	1.06	1.24	1	0.85	1.1	1.4	0.55
50	0.81	1.09	1.27	1	0.85	1.1	1.4	0.55

Table 4b. Wind Velocity Pressure (q_z)⁵

Building Ht. (ft)	q (Zone 4)			q (Zone 5)		
	Exp B	Exp C	Exp D	Exp B	Exp C	Exp D
0 - 15	0.002513	0.003052	0.003698	0.002970	0.003607	0.004370
20	0.002513	0.003231	0.003878	0.002970	0.003819	0.004583
25	0.002513	0.003375	0.004021	0.002970	0.003989	0.004752
30	0.002513	0.003519	0.004165	0.002970	0.004158	0.004922
35	0.002621	0.003626	0.004273	0.003098	0.004286	0.005049
40	0.002729	0.003734	0.004380	0.003225	0.004413	0.005177
45	0.002801	0.003806	0.004452	0.003310	0.004498	0.005262
50	0.002908	0.003914	0.004560	0.003437	0.004625	0.005389

Notes:

1. Values per American Society of Civil Engineers (ASCE 7-10), Table 26.6-1
2. Values per American Society of Civil Engineers (ASCE 7-10), Table 30.3-1
3. Values per American Society of Civil Engineers (ASCE 7-10), Figure 30.4-1
4. Values per American Society of Civil Engineers (ASCE 7-10), Figure 26.11-1
5. Values per American Society of Civil Engineers (ASCE 7-10), Section 30.3.2, Equation 30.3-1

Sample: Maximum Basic Wind Speed (mph)

$$q_z = 0.00256 * K_z * K_{zt} * K_d * V^2 * I \quad (\text{Equation 30.3-1})$$

$$\text{Design Wind Pressure (PSF)} = q_z * (GC_p \pm GC_{pi})$$

Therefore, by substituting the panel Allowable Load (PSF) for the Design Wind Pressure and solving for the Maximum Basic Wind Speed the following equation is obtained.

$$\text{Max. Basic Wind Speed (V)} = [(\text{Allowable Load}) / (0.00256 * K_z * K_{zt} * K_d * (GC_p + GC_{pi}))]^{1/2}$$

Table 5. Test Results - ASTM E330³

Testing Agency	Report No.	Sample	RESULTS ³	
			Ultimate Load (PSF)	Allowable Load ¹ (PSF)
Home Innovation Research Labs	41621912312013	1	134.50	44.8
		2	134.90	45.0
		3	102.80	34.3
Average			124.1	41.4

Notes:

1. The values are based on testing per ASTM E330, and represent the capacity of the sample to resist flexural failure or fastener pull-through using a 3.0 safety factor.
2. Framing design is the responsibility of the Designer of Record.
3. Results per test report by Home Innovation Research Labs, Report Number: 41621912312013

Evaluation Results: The 2010 Florida Building Code (FBC) requires Structural members, systems, components & cladding be designed to resist forces due to wind, with consideration of overturning, sliding & uplift. The 3/4" TruExterior Siding specimens tested meet the requirements of the 2010 Florida Building Code (sections 1604.9, 1609.1, & 1715.9.14). See Table 6 below for applicable design wind speeds.

Table 6. Maximum Basic Wind Speeds (Non-HVHZ)

ASCE 7-10 Components & Cladding Method 1 (see Sample Calculation, pg. 5)

Maximum Ultimate Wind Speed - 3-second gust, Based on 2010 FBC

Sheathing Panels	Panel Size & Direction	Fastener Type	Fastener Spacing (in.)	Frame Type	Allowable Load ^{1,4} (PSF)	Basic Wind Speed (MPH)			Basic Wind Speed (MPH)			
						Bldg. Ht. (ft)	Wall Zone 4			Wall Zone 5		
							Exp. B	Exp. C	Exp. D	Exp. B	Exp. C	Exp. D
3/4" Boral TruExterior Siding ⁵	4'x8' Assy. Siding applied Horizontal	8d x 2.5" Stainless Steel Ring Shank	(2) @ 16" o.c.	7/16" OSB on 2x4 SPF Studs @ 16" o.c.	41.4	0 - 15	128	116	106	118	107	97
						20	128	113	103	118	104	95
						25	128	111	101	118	102	93
						30	128	108	100	118	100	92
						35	126	107	98	116	98	90
						40	123	105	97	113	97	89
						45	122	104	96	112	96	89
						50	119	103	95	110	95	88

Notes:

1. Allowable Load = Average Ultimate Load/3 (Factor of Safety = 3)
2. Tabulated wind speeds are based on an effective wind area of 10 ft²
3. Values listed are based on Risk Category II, Wind Load Importance Factor of 1.00 & "Building, Partially Enclosed" as defined by ASCE 7-10 Section 26.2
4. Allowable Loads per test report by Home Innovation Research Labs, Report Number: 41621912312013
5. Painting of Boral TruExterior SidingTM is a requirement, and failure to do so will void the manufacturer warranty.

Limitations of Use

- 1) Product(s) is to be installed on framing that is equal to or better than the materials listed.
- 2) Product(s) is to be installed on framing that is equal to or better than the studs listed.
- 3) Product(s) is to be installed only where the product assemblies listed meet or exceed the local wind speed and are in conformance with the 2010 FBC installation requirements.
- 4) Product(s) shall not be used as a nail base. Mechanical attachment of exterior claddings must be made directly to the framing.
- 5) Fasteners shall be driven flush with the panel surface without countersinking or being deep enough to break the material.
- 6) Fasteners for wood panel sheathings (plywood and OSB) shall be over-driven no more than 1/16" from the panel surface with no more than two (2) out of ten (10) fasteners over-driven greater than 1/16" (per APA Technical Note TT-012A, 01/2007).
- 7) Product(s) shall be stored in the original unopened packaging at the site and stored in an enclosed shelter providing protection from physical damage and exposure from the elements until use.
- 8) Product(s) shall be stored to prevent exposure to standing or cascading water.
- 9) Product(s) must be installed per manufacturer's product literature and specifications.
- 10) Painting of Boral TruExterior Siding™ is a requirement, and failure to do so will void the manufacturer warranty.
- 11) Independent product evaluator is not responsible for any product warranty, either expressed or implied. Independent product evaluator's liability shall not exceed the amount required to produce this report.
- 12) Engineer of Record is responsible for specifying the appropriate use and application of the product tested.
- 13) This product evaluation report pertains only to the assemblies and actual material tested.

Boral TruExterior™ Siding

INSTALLATION GUIDELINES

The following information offers typical installation techniques when working with Boral TruExterior™ Siding Craftsman™ Collection profiles. These products are intended to be used as vertical cladding and **THEY ARE NOT TO BE USED FOR LOAD BEARING APPLICATIONS (E.G. FRAMING OR DECKING)**. Techniques described herein are guidelines. As with installing any building material, care should be taken to adhere to local code requirements and construction best practices to ensure installation is adequate for each specific application.

Storage and Handling

Boral TruExterior™ Siding should be stored on a flat, level surface. Pallets are shipped from the manufacturing facility in a protective covering and each board has a factory applied primer.

Wall Preparation

As a best practice, a weather-resistant barrier should be used in accordance with local building code requirements. However, it is highly recommended to use a drainable house wrap in conjunction with Boral TruExterior™ Siding.

Working With Boral TruExterior™ Siding

This product is an excellent replacement for wood siding and can be installed using proven woodworking tools and methods. For ease of use, consider the following before working:

Cutting – Boral TruExterior™ Siding can be cut using standard saw blades. However, for longer tool life, carbide tipped blades are recommended.

Routing & Drilling – Boral TruExterior™ Siding can be drilled and routed using standard woodworking tools, but a carbide tipped router and drill bits are recommended.

Fastening

- Use fasteners designed for exterior trim and siding.
 - Use of 8d x 2 1/2" Stainless Steel Ring Shank Nails are recommended to meet the wind load and performance results stated in the Florida Product Report #17285.
 - Use a fastener that is long enough to penetrate a solid wood substrate a minimum of 1 1/2".
- The product will accept other types of fasteners including various types of exterior grade nails and screws. Care should be taken to ensure both fastener type and fastening pattern will meet local code requirements and performance needs.
- Standard nail guns can be used to install the Boral TruExterior™ Siding. Nail guns should be adjusted to ensure nail head is flush with surface.
- **For Horizontal Installation**
 - Use 2 fasteners per every framing member.
 - At least one fastener should be through the face of the profile, simply fastening the product through the tongue alone is not sufficient.
 - Fasteners should be installed every 16" OC or less to meet the performance results stated in the Florida Product Report #17285. For best results, place fasteners within 2" of the edge of each board.
 - Fasteners should penetrate a framing member. Sheathing alone will not provide adequate support or holding power.
- **For Vertical Installation**
 - Use a minimum of 7/16" sheathing. Consult your local building code to determine requirements.
 - Fasteners should be installed every 16"OC or less. For best results, place fasteners within 2" of the edge of each board.

- At least one fastener should be through the face of the profile, simply fastening the product through the tongue alone is not sufficient.

Safety – In working with any product that may cause airborne debris such as nuisance dust, be sure to take proper measures to protect against eye and inhalation hazards.

Expansion and Contraction – Boral TruExterior™ Siding is very stable during periods of temperature and moisture change; no special precautions such as gluing or gapping are necessary to control or limit movement.

Use at Grade – Since Boral TruExterior™ Siding is highly resistant to moisture, termite attacks and the product won't rot, it is approved for ground contact.

Nail Holes and Repair – Filling nail and screw holes or repairing any minor damage caused by handling may be done using high-grade acrylic caulk or wood fillers.

Painting – Painting Boral TruExterior™ Siding is a requirement, and failure to do so will void the warranty. As in preparing for any painting project, be sure the surface of the product is free of dirt, debris or other contaminants prior to paint application. Boral TruExterior™ Siding can be painted using any high grade exterior paint. Make sure to follow the paint manufacturer's application recommendations.+

Boral TruExterior™ Siding may be painted any color without special precaution as the product is not prone to excessive movement due to heat buildup.+

Boral TruExterior™ Siding is virtually impervious to moisture+, so there is no need to prime or paint end-cuts or field-cut edges.

Moisture cycling is a primary cause for paint failure on wood products. Since Boral TruExterior™ Siding is resistant to this moisture cycling+, paint will perform better.

Caulks & Sealants – While Boral TruExterior™ Siding does not require priming or sealing of end cuts, a variety of caulks and sealants may be used in conjunction with the product to help prevent water intrusion to the structure+

+ More information can be found in Boral's technical bulletins for paint and adhesives and sealants or in the product warranty. Documents can be found at www.BoralTruExterior.com