



Technical Evaluation Report

TO ASSIST WITH CODE COMPLIANCE

Thermo-Brace® Red Structural Sheathing

TER No. 1507-08

For FL Product Approval

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Barricade® Building Products

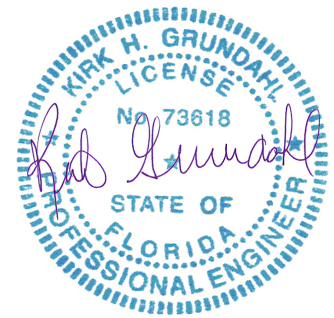
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DIVISION: 06 00 00 – WOOD, PLASTICS, AND COMPOSITES

Section: 06 12 00 – Structural Panels
Section: 06 12 19 – Shear Wall Panels
Section: 06 16 00 – Sheathing

DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION

Section: 07 25 00 – Water-Resistive Barriers/Weather Barriers
Section: 07 27 00 – Air Barriers



1. Products Evaluated:

- 1.1. Thermo-Brace® Red Structural Sheathing
- 1.2. For the most recent version of this report, visit drjengineering.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjengineering.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.

DrJ is a Professional Engineering Approved Source

Learn more about DrJ's Accreditation

- DrJ is an ISO/IEC 17065 accredited product certification body through ANSI Accreditation Services.
- DrJ provides certified evaluations that are signed and sealed by a P.E.
- DrJ's work is backed up by professional liability insurance.
- DrJ is fully compliant with IBC Section 1703.

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2. Applicable Codes and Standards:¹

- 2.1. 2010 and 2014 Florida Building Code – Building (FBC-B)
- 2.2. 2010 and 2014 Florida Building Code – Residential (FBC-R)
- 2.3. 2010 and 2014 Florida Building Code – Energy Conservation (FBC-EC)
- 2.4. ASCE 7 – Minimum Design Loads for Buildings and Other Structures
- 2.5. AWC Wind & Seismic – Special Design Provisions for Wind and Seismic (SDPWS)
- 2.6. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- 2.7. ASTM E330 / E330M – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- 2.8. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- 2.9. ASTM E2178 – Standard Test Method for Air Permeance of Building Materials
- 2.10. UL 723 – Test for Surface Burning Characteristics of Building Materials

3. Performance Evaluation:

3.1. Thermo-Brace® Red Structural Sheathing has been evaluated to determine:

- 3.1.1. Structural performance under lateral load conditions (wind and seismic) for use with the *FBC-B* performance-based provisions, *FBC-B* Section 2306.1 and *FBC-B* Section 2306.3, for light-frame wood wall assemblies.
 - 3.1.2.1. [Table 2](#) provides seismic design coefficients (SDC) that conform to the requirements in *ASCE 7* Section 12.2.1 and Table 12.2-1 for design of wall assemblies in buildings that require seismic design in accordance with *ASCE 7* (i.e., all seismic design categories).
 - 3.1.2.2. The basis for equivalency testing is outlined in Section 12.2.1 of *ASCE 7*:

Seismic force-resisting systems not contained in Table 12.2-1 are permitted provided analytical and test data are submitted to the authority having jurisdiction for approval that establish their dynamic characteristics and demonstrate their lateral force resistance and energy dissipation capacity to be equivalent to the structural systems listed in Table 12.2-1 for equivalent values of response modification coefficient, R , overstrength factor, Ω_o , and deflection amplification factor, C_d .
 - 3.1.2.3. The SDC evaluation uses the approach found in documentation entitled “Equivalency Characteristics and Parameters for Proprietary Shearwalls Used in Wood Framed or Cold-formed Steel Construction”² using code defined accepted engineering procedures, experience, and good technical judgment.
- 3.1.2. Structural performance under lateral load conditions for use as an alternative to *SDPWS* Section 4.3 Wood-Frame Shear Walls.
- 3.1.3. Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with *FBC-R* Section R301.2.1 and *FBC-B* Section 1609.1.1.
- 3.1.3. Resistance to uplift loads for wall assemblies used for light-frame wood construction in accordance with *FBC-R* Section R301.2.1 and *FBC-B* Section 1609.
- 3.1.4. Performance for use as a water-resistive barrier (WRB) in accordance with *FBC-R* Section R703.2 and *FBC-B* Section 1404.2.
- 3.1.5. Performance for use as an air barrier in accordance with *FBC-R* Section R402.4.1.1.
- 3.1.6. Performance for use as a draftstop in accordance with *FBC-R* Section 302.12, and *FBC-B* Section 708.4, 718.3 and 718.4.

¹ Unless otherwise noted, all references in this code compliant research report (TER) are from the 2014 version of the *Florida Building Codes* and the standards referenced therein, including, but not limited to, *ASCE 7*, *SDPWS* and *WFCM*. This product also complies with the 2010 version of the *FBC* and the standards referenced therein. As required by law, where this research report is not approved, the building official shall respond in writing, stating the reasons this research report was not approved.

² structuremag.org

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3.1.7. Performance of surface burn characteristics in accordance with *FBC-B* Section 2603.3.

3.2. Any code compliance issues not specifically addressed in this section including the use of Thermo-Brace® Red Structural Sheathing in a portal frame with hold-down (PFH) or in a fire resistance rated assembly are outside the scope of this evaluation.

4. Product Description and Materials:



Figure 1: Thermo-Brace® Red Structural Sheathing

4.1. Thermo-Brace® Red Structural Sheathing is composed of pressure laminated plies consisting of high-strength cellulosic fibers. These fibers are specially treated to be water resistant and are bonded with a proprietary water-resistive adhesive. A protective polymer layer is applied on both sides of the panel and foil facings may be additionally applied on one or both faces.

4.1.1. Thermo-Brace® Red Structural Sheathing panels have a nominal thickness of 0.101" and a nominal weight of 0.370 lbs. per square foot.

4.2. Material Availability

4.2.1. Standard widths include 48" (1219 mm) and 48³/₄" (1238 mm).

4.2.2. Standard lengths include 96" (2438 mm), 108" (2743 mm) and 120" (3048 mm).

4.2.3. Other custom widths and lengths can be manufactured.

5. Applications:

5.1. General

5.1.1. Thermo-Brace® Red Structural Sheathing panels are used in the following applications as:

5.1.1.1. Wall sheathing in buildings constructed in accordance with the *FBC-R* and *FBC-B* for light-frame wood construction.

5.1.1.2. Structural wall sheathing to provide lateral load resistance (wind and seismic) for braced wall panels used in light-frame wood construction.

5.1.1.3. Wall sheathing in buildings constructed in accordance with the *FBC-B* requirements for Type V light-frame construction.

5.1.1.4. Structural wall sheathing to provide resistance to transverse loads for wall assemblies used in light-frame wood construction.

5.1.1.5. Structural wall sheathing to provide resistance to uplift loads for wall assemblies used in light-frame wood construction.

5.1.1.6. An approved alternative WRB when installed in accordance with [Section 6](#).

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5.1.1.7. An Approved air barrier material when installed in accordance with [Section 5.7](#) and [Section 6](#).

5.2. Structural Applications

5.2.1. General Structural Provisions

- 5.2.1.1. Except as otherwise described in this Technical Evaluation Report (TER), Thermo-Brace® Red Structural Sheathing shall be installed in accordance with the applicable building codes listed in [Section 2](#) using the provisions set forth therein for the design and installation of wood structural panels (WSP).
 - 5.2.1.1.1. Thermo-Brace® Red Structural Sheathing is permitted to be designed in accordance with *SDPWS* for the design of shear walls using the methods set forth therein, including the perforated shear wall methodology, and subject to the *SDPWS* boundary conditions, except as specifically allowed in this TER.
- 5.2.1.2. Anchorage for in-plane shear shall be provided to transfer the induced shear force into and out of each shear wall. Shear wall anchorage shall be in accordance with the applicable code referenced in [Section 2](#).
- 5.2.1.3. Except as provided for in [Section 5.2.2](#), the maximum aspect ratio for Thermo-Brace® Red Structural Sheathing shall be 4:1.
- 5.2.1.4. The minimum full height panel width shall be 24", except as allowed by [Section 5.2.2](#).
- 5.2.1.5. Installation is permitted for single top plate or double top plate applications.
- 5.2.1.6. Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment

5.2.2. Prescriptive *FBC-B* Conventional Light-Frame Wood Construction

- 5.2.2.1. Thermo-Brace® Red Structural Sheathing may be used to brace exterior walls of buildings as an equivalent alternative to Method 3 of the *FBC-B* when installed with blocked or unblocked ½" gypsum fastened with a minimum 5d cooler nail or #6 type W or S screw spaced a maximum of 16" o.c. at panel edges and 16" o.c. in the field. Bracing shall be in accordance with the conventional light-frame construction method of *FBC-B* Section 2308.9.3 and this TER.

5.2.3. Performance-Based Wood-Framed Construction

- 5.2.3.1. Thermo-Brace® Red Structural Sheathing panels used in wall assemblies designed as shear walls are permitted to be designed in accordance with the methodology used in *SDPWS* for WSP using the capacities shown in [Table 1](#), [Table 2](#) and [Table 3](#).
- 5.2.3.2. Thermo-Brace® Red Structural Sheathing shear walls are permitted to resist horizontal wind load forces using the allowable shear loads (in pounds per linear foot) set forth in [Table 1](#).

Thermo-Brace® Red Nominal Unit Shear Capacity (NUSC) & Allowable Strength Design (ASD) Capacity – Wind						
	Joint Condition	Maximum Stud Spacing (in.)	Gypsum Wallboard (GWB)	Gypsum Wallboard Fastener Spacing (edge/field)	Ultimate Unit Shear Capacity (plf)	Allowable Unit Shear Capacity (plf)
Thermo-Brace® Red Structural Sheathing	Butted	16" o.c.	No GWB	-	660	330
			½" GWB	8/8	950	475
	Lapped		No GWB	-	710	355
			½" GWB	8/8	1,000	500

1. Thermo-Brace® Red attached with a minimum 16 gauge, 1" crown staples shall penetrate a minimum of 1" into the stud. Fasteners are to be installed with the crown parallel to the framing and spaced a maximum of 3" o.c. at the panel edges and 3" o.c. in the field. Fastener edge distance shall be a minimum of 3/8". Fastener head shall be in contact with the Thermo-Brace® surface.

2. Gypsum attached with minimum #6 type W or S screws 1¼" long or 5d cooler nails with a minimum edge distance of 3/8".

Table 1: Ultimate Unit Shear & Allowable Unit Shear Capacities for Thermo-Brace® Red Structural Sheathing – Wind

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5.2.3.3. Thermo-Brace® Red Structural Sheathing shear walls that require seismic design in accordance with *FBC-B* Section 1613 shall use the seismic allowable unit shear capacities set forth in [Table 2](#).

5.2.3.3.1. The response modification coefficient, R , system overstrength factor, Ω_0 , and deflection amplification factor, C_d , indicated in [Table 2](#) shall be used to determine the base shear, element design forces, and design story drift in accordance with *ASCE 7* Chapter 12 and Section 14.5.

Seismic Allowable Unit Shear Capacity & Seismic Design Coefficients for Thermo-Brace® Red Structural Sheathing ¹													
Seismic Force-Resisting System	Joint Condition	Gypsum Wallboard (GWB)	Maximum Stud Spacing (in.)	Seismic Allowable Unit Shear Capacity (plf)	Apparent Shear Stiffness, G_a (kips/in.)	Response Modification Factor, R^5	System Overstrength Factor, Ω_0^6	Deflection Amplification Coefficient, C_d^7	Structural System Limitations & Building Height (ft.) Limit ⁸				
									Seismic Design Category				
									B	C	D	E	F
Light-Frame (Wood) Walls Sheathed with Thermo-Brace® Red	Butted or Lapped	½" GWB Fasteners Spaced 8/8	16" o.c.	320	12.0	6.5	3	4	NL	NL	65	65	65
		No GWB	16" o.c.	205	6.8	6.5	3	4	NL	NL	65	65	65

1. Thermo-Brace® Red sheathing attached with a minimum 16 gauge, 1" crown staples shall penetrate a minimum of 1" into the stud. Fasteners are to be installed with the crown parallel to the framing and spaced a maximum of 3" o.c. at the panel edges and 3" o.c. in the field. Fastener edge distance shall be a minimum of ¾". Fastener head shall be in contact with the Thermo-Brace® Red surface.
 2. Gypsum attached with minimum #6 type W or S screws 1¼" long with a minimum edge distance of ¾".
 3. All seismic design parameters follow the equivalency as defined in [Section 3](#) of this TER.
 4. The allowable unit shear capacity is calculated using a factor of safety of 2.5 per *ASCE 7*.
 5. Response modification coefficient, R , for use throughout *ASCE 7*. Note: R reduces forces to a strength level, not an allowable stress level.
 6. The tabulated value of the overstrength factor, Ω_0 , is permitted to be reduced by subtracting one-half (0.5) for structures with flexible diaphragms.
 7. Deflection amplification factor, C_d , for use with *ASCE 7* Section 12.8.6, 12.8.7, and 12.9.2.
 8. NL = Not Limited. Heights are measured from the base of the structure as defined in *ASCE 7* Section 11.2.
 9. Thermo-Brace® Red sheathing may be installed with either lapped joints or butted joints.

Table 2: Seismic Performance of Thermo-Brace® Red Structural Sheathing

5.2.3.4. Thermo-Brace® Red Structural Sheathing panels are permitted to resist uplift load forces using the allowable uplift loads (in pounds per linear foot) set forth in [Table 3](#).

Type of Structural Sheathing	Uplift Capacity (lbs.)	Nominal Uplift Capacity (plf)	Allowable Unit Uplift Capacity (plf)	Max Stud Spacing (in.)	Fastener Schedule
Thermo-Brace® Red: Single Bottom Plate	3,200	800	400	16" o.c.	1" crown, 1¼" leg 16 gage galvanized staples or 0.120" x 1¼" roofing nails, 3" o.c. to perimeter/field. Staple crowns to be installed parallel to grain.

1. The ASD allowable unit uplift capacity is determined by dividing the tabulated uplift capacity by the ASD reduction factor of 2.0 per *SDPWS* Section 4.3 for determining the ASD allowable capacity for uplift conditions. The additional capacity of gypsum wallboard, when applied, has not been considered in this evaluation.

Table 3: Uplift Performance of Thermo-Brace® Red Structural Sheathing

5.2.3.5. Thermo-Brace® Red Structural Sheathing panels are permitted to resist transverse wind load forces using the allowable transverse loads (in pounds per square foot) set forth in [Table 4](#).

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Nominal Uniform Load Capacities (psf) for Thermo-Brace® Red Structural Sheathing Resisting Transverse Wind Loads								
Thermo-Brace® Grade	Transverse Wind Load Resistance							
	Maximum Stud Spacing (in.)	Negative		Positive		Fastener Schedule	Basic Wind Speed V_{asd} per ASCE 7-05 (mph)	Basic Wind Speed V_{ult} per ASCE 7-10 (mph)
		Ultimate Average Pressure (psf)	Allowable Design Value (psf)	Ultimate Average Pressure (psf)	Allowable Design Value (psf)			
Thermo-Brace® Red (0.097")	16" o.c.	128	80	116	72	1" crown, 1/4" leg 16 gage galvanized staples or 0.120" x 1/4" roofing nails, 3" o.c. to perimeter/field	≤ 139	≤ 180

1. The ASD allowable uniform load capacities to be used for wind design are determined by dividing the ultimate uniform load capacities in by an ASD reduction factor of 1.6, per *SDPWS* Section 3.2.1 for determining the ASD allowable uniform load capacity.
 2. Design wind load capacity shall be in accordance with *FBC-B* Section 1609.1.1.
 3. Staple crowns shall be installed parallel to grain.
 4. Allowable wind speeds are based on the following: Components and Cladding wind loads, Mean roof height 30', Exposure B, 10 sq. ft. effective wind area. See the applicable building code for any adjustment needed for specific building location and configuration.

Table 4: Transverse Load Performance of Thermo-Brace® Red Structural Sheathing

5.3. Perforated Shear Walls

5.3.1. Thermo-Brace® Red Structural Sheathing is permitted to be designed in accordance with the methodology found in *SDPWS* Section 4.3.3.5 with the following exceptions:

5.3.1.1. *SDPWS* Equation 4.3-5 for C_o shall be replaced with the equation from [Table 5](#).

Wall Assembly	Replace <i>SDPWS</i> Eq. 4.3-5 with the Following
Thermo-Brace® Red (0.101")	$C_o = \frac{r}{(2 - r)} * \frac{L_{tot}}{\sum L_i}$

Table 5: C_o for Use with *SDPWS* Perforated Shear Wall Methodology

5.3.1.2. [Figure 2](#) shows how to calculate the capacity of a perforated shear wall with Thermo-Brace® Red Structural Sheathing using [Table 5](#).

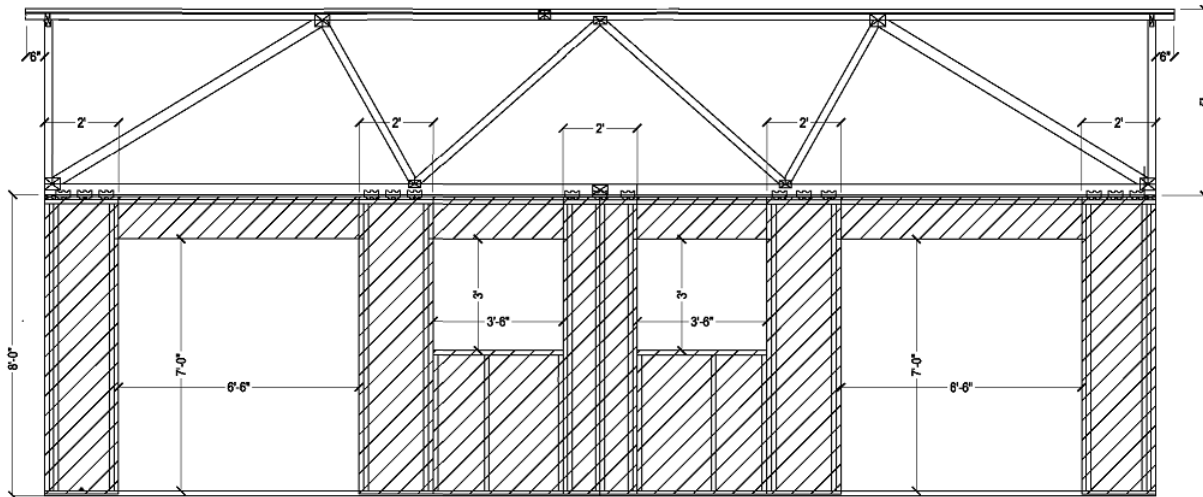


Figure 2: Example of a Perforated Shear Wall

1. The total length of the perforated shear wall, L_{tot} , is 30'.
2. The height of the perforated shear wall, h , is 8'.

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3. The sum of the perforated shear wall segment lengths, ΣL_i , is 10'.
4. The total area of the openings, A_o , is:
 - 4.1. Two (2) 7' x 6" openings – 45.5 sq. ft. x 2 = 91 sq. ft.
 - 4.2. Two (2) 3' x 3' 6" openings – 10.5 sq. ft. x 2 = 21 sq. ft.
 - 4.3. Total opening area is: 91 + 21 = 112 sq. ft.
5. Using *SDPWS* Equation 4.3-6, the sheathing area ratio, r , is:

$$r = \frac{1}{1 + \frac{A_o}{h\Sigma L_i}} = \frac{1}{1 + \frac{112}{8 * 10}} = 0.417$$

6. Using [Table 5](#), the shear capacity adjustment factor, C_o , is:

$$C_o = \frac{r}{2 - r} * \frac{L_{tot}}{\Sigma L_i} = \frac{0.417}{2 - 0.417} * \frac{30}{10} = .790$$

7. From [Table 1](#), the allowable unit shear capacity, v , is: 330 plf.
8. In accordance with *SDPWS* Section 4.3.3.5, the total ASD shear capacity of this perforated shear wall, $V_{perforated}$, is:

$$V_{perforated} = v * \Sigma L_i * C_o = 330 \text{ plf} * 10 \text{ ft.} * .790 = 2607 \text{ lbs.}$$

5.4. Fire Resistance Properties

5.4.1. Surface Burn Characteristics

- 5.4.1.1. Thermo-Brace® Red Structural Sheathing panels have the flame spread characteristics shown in [Table 6](#).

Flame Spread & Smoke Developed Indexes of Thermo-Brace® Red Structural Sheathing		
Thermo-Brace® Red Structural Sheathing	Flame Spread	Smoke Developed
	< 200	< 450
1. Tested in accordance with <i>ASTM E84</i> and <i>UL 723</i> .		

Table 6: Flame Spread & Smoke Developed Indexes of Thermo-Brace® Red Structural Sheathing

5.5. Water-Resistive Barrier

- 5.5.1. Thermo-Brace® Red Structural Sheathing may be used as a WRB as prescribed in *FBC-R* Section R703.2 and *FBC-B* Section 1404.2, when installed on exterior walls as described in this section of the TER.
- 5.5.2. Thermo-Brace® Red Structural Sheathing shall be installed with board joints placed directly over exterior framing spaced a maximum of 16" (406 mm) o.c. The fasteners used to attach the board shall be installed in accordance with [Section 6](#).
- 5.5.3. All seams and joints between boards shall be butt jointed or overlapped and sealed with Barricade® Seam Tape or equivalent in accordance with [Section 6](#).
- 5.5.4. A separate WRB system may also be provided. If a separate WRB system is used, taping of the sheathing joints is not required.
- 5.5.5. Flashing must be installed at all sheathing penetrations and shall comply with all applicable code sections.

5.6. Air Barrier

- 5.6.1. Thermo-Brace® Red Structural Sheathing may be used as an air barrier material as prescribed in *FBC-EC*-Section R402.4.1.1 in accordance with *ASTM E2178*.

5.7. Draftstop

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- 5.7.1. Thermo-Brace® Red Structural Sheathing may be used as a draftstop material in accordance with *FBC-R* Section 302.12, and *FBC-B* Section 708.4, 718.3 and 718.4.
- 5.7.2. When installed as of a draftstop, Thermo-Brace® Red Structural Sheathing shall be installed in accordance with [Section 6](#).

5.8. Non-Structural Applications

- 5.8.1. Where other means of wall bracing are provided, or are not required, any grade of Thermo-Brace® Structural Sheathing may be used to provide other wall functions, when installed in accordance with this section.
 - 5.8.1.1. The sheathing panels are applied to wall framing with 16 ga galvanized staples having a 1" crown and 1¼" leg lengths.
 - 5.8.1.2. Fastener spacing shall be a maximum of 6" o.c in the field and 3" o.c. around the perimeter.
 - 5.8.1.3. Stud spacing shall be a maximum of 16" o.c.
 - 5.8.1.4. Minimum fastener penetration into the framing members is 1".
 - 5.8.1.5. Fasten all staples parallel to the framing member, with an edge spacing of ⅜" (9.5 mm) minimum.
 - 5.8.1.6. All panels are vertically or horizontally installed with all joints backed by studs, plates or blocks when water or air barrier functionality is desired.
 - 5.8.1.7. Joints overlap nominally ¾" (19.1 mm) or butted and covered with Barricade® Seam Tape or equivalent.

6. Installation:

6.1. General for Structural and WRB Applications

- 6.1.1. Thermo-Brace® Red Structural Sheathing shall be installed in accordance with the manufacturer's published installation instructions and this TER. Basic instructions are printed on every Thermo-Brace® pallet or insert.
- 6.1.2. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.

6.2. Orientation

- 6.2.1. Thermo-Brace® Red Structural Sheathing shall be installed in the vertical orientation. To be recognized for the structural values listed in this TER, or as a water barrier, all joints must be backed by studs, plates, or blocks and fastened.

6.3. Fastener Type

6.3.1. Thermo-Brace® Red Structural Sheathing

- 6.3.1.1. Minimum 1" crown by 1¼" leg, 16 ga galvanized staples shall be installed per the staple manufacturer's instructions.
- 6.3.1.2. Fasteners shall be driven such that the head of the fastener is in contact with the surface of the Thermo-Brace® Structural Sheathing. Do not overdrive fasteners.

6.3.2. Gypsum Wallboard

- 6.3.2.1. Where required, gypsum wallboard shall be a minimum ½" thickness and shall be attached with one of the following.
 - 6.3.2.1.1. #6 x 1¼" type W or S screws
 - 6.3.2.1.2. 5d cooler nails

6.4. Fastener Edge Distance

- 6.4.1. Fasteners shall be installed with a nominal edge distance of ⅜" (9.5 mm) for Thermo-Brace® Red Structural Sheathing and gypsum.

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6.5. Treatment of Joints

6.5.1. Thermo-Brace® Red Structural Sheathing joints may be either butted or overlapped.

6.5.1.1. Lapped joints shall be overlapped by nominally $\frac{3}{4}$ " (19 mm) and fastened with a single row of fasteners. Always run staples parallel with framing.

6.5.1.2. Butt joints shall be placed over framing members and fastened with a single row of fasteners at each panel edge.

6.5.2. Seal all overlapped seams with approved construction tape after all fasteners have been installed.

6.5.3. Thermo-Brace® Red Structural Sheathing must be installed with appropriate flashing and counter flashing, in conformance with accepted building standards and in compliance with local building codes and the flashing manufacturer's installation instructions.

6.6. Installation

6.6.1. Overlapped Joint

6.6.1.1. Overlap the next panel $\frac{3}{4}$ " over the first panel, and fasten the joint with a common line of fasteners. Seal overlapped seams with approved construction tape when finished with attaching the wall panels and all fasteners in the wall line

6.6.2. Butted Joint with Flashing

6.6.2.1. Seal butted seams with Barricade® Seam Tape or other high quality construction tape when finished with attaching the wall panels and all fasteners in the wall line.

7. Test and Engineering Substantiating Data:

7.1. Transverse load testing in accordance with *ASTM E330*, performed by SBCRI.

7.2. Uplift load testing in accordance with *ASTM E72*, performed by SBCRI.

7.3. Lateral load testing and data for determining comparative equivalency for use as an alternative material in accordance with *ASTM E2126*, performed by SBCRI.

7.4. Test reports and data for determining use as a water-resistive barrier material in accordance with *ASTM E331*, performed by Intertek.

7.5. Test reports and data for determining use as an air barrier in accordance with *ASTM E2178*, performed by Intertek.

7.6. Flame spread and smoke developed ratings in accordance with *ASTM E84*, performed by Intertek.

7.7. Test reports and data for determining comparative equivalency for use as an alternative material in accordance with *FBC-B* Section 104.11.

7.8. The product(s) evaluated by this TER falls within the scope of one or more of the model, state or local building codes for building construction. The testing and/or substantiating data used in this TER is limited to buildings, structures, building elements, construction materials and civil engineering related specifically to buildings.

7.9. The provisions of model, state or local building codes for building construction do not intend to prevent the installation of any material or to prohibit any design or method of construction. Alternatives shall use consensus standards, performance-based design methods or other engineered alternative means of compliance. This TER assesses compliance with defined standards, generally accepted engineering analysis, performance-based design methods, etc. in the context of the pertinent building code requirements.

7.10. Some information contained herein is the result of testing and/or data analysis by other sources, which DrJ relies on to be accurate as it undertakes its engineering analysis.

7.11. DrJ has reviewed and found the data provided by other professional sources are credible. This information has been approved in accordance with DrJ's procedure for acceptance of data from approved sources.

7.12. DrJ's responsibility for data provided by approved sources is in accordance with professional engineering law.

7.13. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through codes and standards (e.g., *FBC-R*, *WFCM*, *FBC-B*, *SDPWS*, etc.). This includes review of code provisions and

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any related test data that helps with comparative analysis or provides support for equivalency to an intended end-use application.

8. Findings:

8.1. When installed in accordance with the manufacturer installation instructions and this TER, Thermo-Brace® Red Structural Sheathing complies with, or is a suitable alternative to, the applicable sections of the codes listed in [Section 2](#) for the following applications:

- 8.1.1. Lateral load resistance due to wind and seismic loads carried by shear walls.
- 8.1.2. Transverse load resistance due to components and cladding pressures on building surfaces.
- 8.1.3. Uplift load resistance due to wind uplift loads carried by the walls.
- 8.1.4. Performance for use as a WRB in accordance with *FBC-R* Section R703.2 and *FBC-B* Section 1404.2.
- 8.1.5. Performance for use as an air barrier in accordance with *FBC-EC* Section R402.4.1.1.
- 8.1.6. Performance for use as a draftstop in accordance with *FBC-R* Section 302.12, and *FBC-B* Section 708.4, 718.3 and 718.4.
- 8.1.7. Surface burn characteristics in accordance *FBC-B* Section 2603.3.

8.2. *FBC-B* Section 104.11 states:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. ... Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.³

8.3. This product has been evaluated with the codes listed in [Section 2](#), and is compliant with all known state and local building codes. Where there are known variations in state or local codes that are applicable to this evaluation, they are listed here:

8.3.1. No known variations

8.4. This TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its criteria for all testing and engineering analysis. DrJ's professional engineering work falls under the jurisdiction of each state Board of Professional Engineers, when signed and sealed.

9. Conditions of Use:

- 9.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this report and the installation instructions shall be submitted at the time of permit application.
- 9.2. Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the code official for review and approval.
- 9.3. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.4. This report and the installation instructions shall be available to the jurisdiction in which the project is to be constructed.
- 9.5. Thermo-Brace® Red Structural Sheathing shall not be used as a nailing base for claddings, trim, windows and doors. Fastening through the Thermo-Brace® Red Structural Sheathing into the framing is acceptable.
- 9.6. Walls sheathed with Thermo-Brace® Red Structural Sheathing shall not be used to resist horizontal loads from concrete and masonry walls.

³ The last sentence is adopted language in the 2015 codes.

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- 9.7. When Thermo-Brace® Red Structural Sheathing is installed as a wall sheathing but is not installed per structural requirements, light-framed walls shall be braced by other means. When used as a WRB, installation shall be in accordance with [Section 5.5](#).
- 9.7.1. When Thermo-Brace® Structural Sheathing is not installed as a WRB, other means of providing a WRB shall be required, as per the code.
- 9.8. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.8.1. Allowable uplift loads shall not exceed values in [Table 3](#).
- 9.8.2. Transverse design loads shall not exceed those described in [Table 4](#), unless an approved exterior wall covering capable of separately resisting loads perpendicular to the face of the walls is installed over the sheathing.
- 9.9. Thermo-Brace® Red Structural Sheathing is manufactured under a quality control program with quality control inspections in accordance with *FBC-B* Section 110.3.8.
- 9.10. Design
- 9.10.1. Building Designer Responsibility
- 9.10.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer (e.g., Owner, Registered Design Professional, etc.) for the Building and shall be in accordance with *FBC-B* Section 107.
- 9.10.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with *FBC-R* Section R301 and *FBC-B* Section 1603.
- 9.10.2. Construction Documents
- 9.10.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.
- 9.11. Responsibilities
- 9.11.1. The information contained herein is a product, engineering or building code compliance research report performed in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering procedures, experience and technical judgment.
- 9.11.2. DrJ research reports provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated section.
- 9.11.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.
- 9.11.4. The actual design, suitability and use of this research report for any particular building is the responsibility of the Owner or the Owner's authorized agent, and the report shall be reviewed for code compliance by the Building Official.
- 9.11.5. The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party inspection process, proper installation per the manufacturer's instructions, the Building Official's inspection and any other code requirements that may apply to assure accurate compliance with the applicable building code.
- 10. Identification:**
- 10.1. Each Thermo-Brace® Red Structural Sheathing panel described in this TER is identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance.
- 10.2. Additional technical information can be found at barricadebp.com.

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11. Review Schedule:

- 11.1. This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjengineering.org.
- 11.2. For information on the current status of this TER, contact [DrJ Engineering](#).



- [Mission and Professional Responsibilities](#)
- [Product Evaluation Policies](#)
- [Product Approval – Building Code, Administrative Law and P.E. Law](#)