



Thermo-Brace® Green Structural Sheathing

TER No. 1507-07

Issue Date: April 15, 2016

Updated: September 7, 2018

Subject to Renewal: July 1, 2019

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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® Green Structural Sheathing
- 1.2. For the most recent version of this Technical Evaluation Report (TER), 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.
- 1.3. This TER can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found [here](#)) and covered by an [IAF MLA Evaluation](#) per the [Purpose of the MLA](#) (as an example, see [letter to ANSI](#) from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other [IAF MLA Signatory Countries](#) and have their products readily approved by authorities having jurisdiction using [DrJ's ANSI accreditation](#).

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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- 1.4. Building code regulations require that evaluation reports are provided by an approved agency meeting specific requirements, such as those found in [IBC Section 1703](#). Any agency accredited in accordance with ANSI ISO/IEC 17065 meets this requirement within ANSI's scope of accreditation. For a list of accredited agencies, visit ANSI's [website](#). For more information, see [dricertification.org](#).
- 1.5. Requiring an evaluation report from a specific private company (i.e., ICC-ES, IAPMO, CCMC, DrJ, etc.) can be viewed as discriminatory and is a violation of international, federal, state, provincial and local anti-trust and free trade regulations.
- 1.6. DrJ's code compliance work:
 - 1.6.1. Conforms to code language adopted into law by individual states and any relevant consensus based standard such as an ANSI or ASTM standard.
 - 1.6.2. Complies with accepted engineering practice, all professional engineering laws and by providing an engineer's seal DrJ takes professional responsibility for its specified scope of work.

2. Applicable Codes and Standards:¹

- 2.1. *2012, 2015 and 2018 International Residential Code (IRC)*
- 2.2. *2012, 2015 and 2018 International Building Code (IBC)*
- 2.3. *2015 and 2018 International Energy Conservation Code (IECC)*
- 2.4. *2014 and 2017 Florida Building Code – Building (FBC-B)*
- 2.5. *2014 and 2017 Florida Building Code – Residential (FBC-R)*
- 2.6. *2014 and 2017 Florida Building Code – Energy Conservation (FBC-EC)*
- 2.7. *ASCE 7 – Minimum Design Loads for Buildings and Other Structures*
- 2.8. *AWC Wind & Seismic – Special Design Provisions for Wind and Seismic (SDPWS)*
- 2.9. *ASTM E72 – Standard Methods of Conduction Strength Test of Panels for Building Construction*
- 2.10. *ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials*
- 2.11. *ASTM E330 / E330M – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.12. *ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.*
- 2.13. *ASTM E564 – Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
- 2.14. *ASTM E2126 – Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*
- 2.15. *ASTM E2178 – Standard Test Method for Air Permeance of Building Materials*
- 2.16. *UL 723 – Test for Surface Burning Characteristics of Building Materials*

3. Performance Evaluation:

- 3.1. Thermo-Brace® Green Structural Sheathing has been evaluated to determine:
 - 3.1.1. Structural performance under lateral load conditions (wind and seismic) for use as an alternative to the IRC Intermittent Wall Bracing provisions of [IRC Section R602.10](#).
 - 3.1.2. Structural performance under lateral load conditions for wind loading for use with the IBC performance-based provisions, [IBC Section 2306.1](#) and [IBC Section 2306.3](#), for light-frame wood wall assemblies.

¹ Unless otherwise noted, all references in this code compliant technical evaluation report (TER) are from the 2018 version of the codes and the standards referenced therein, including, but not limited to, ASCE 7, SDPWS and WFCM. This product also complies with the 2000-2015 versions of the IBC and IRC and the standards referenced therein. As required by law, where this TER is not approved, the building official shall respond in writing, stating the reasons this TER was not approved. For variations in state and local codes, if any, see [Section 8](#).

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- 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 [IRC Section R301.2.1](#) and [IBC Section 1609.1.1](#).
- 3.1.3. Resistance to uplift loads for wall assemblies used for light-frame wood construction in accordance with [IRC Section R301.2.1](#) and [IBC Section 1609](#).
- 3.1.4. Performance for use as a water-resistive barrier (WRB) in accordance with [IRC Section R703.2](#) and [IBC Section 1404.2](#).
- 3.1.5. Performance for use as an air barrier in accordance with [IRC Section N1102.4.1.1](#), and [IECC Section R402.4.1.1](#) and [IECC Section C402.5.1.1](#)².
- 3.1.6. Performance for use as a draftstop in accordance with [IRC Section 302.12](#), and [IBC Section 708.4.2](#), [718.3](#) and [718.4](#).
- 3.1.7. Performance of surface burn characteristics in accordance with [IBC Section 2603.3](#).
- 3.1.8. Any code compliance issues not specifically addressed in this section including the use of Thermo-Brace® Green Structural Sheathing in a portal frame with hold-down (PFH) or in a fire resistance rated assembly are outside the scope of this TER.

4. Product Description and Materials:



Figure 1: Thermo-Brace® Green Structural Sheathing

- 4.1. Thermo-Brace® Green 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® Green Structural Sheathing panels have a nominal thickness of 0.075" and nominal weight of 0.278 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) and 108" (2743 mm).
 - 4.2.3. Other custom sizes up to 60" widths and 144" lengths can be manufactured.

² [2012 IECC Section C402.4.1.1](#)

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5. Applications:

5.1. General

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

- 5.1.1.1. Wall sheathing in buildings constructed in accordance with the *IRC and IBC* for light-frame wood construction.
- 5.1.1.2. Structural wall sheathing to provide lateral load resistance (wind) for braced wall panels used in light-frame wood construction.
- 5.1.1.3. Wall sheathing in buildings constructed in accordance with the *IBC* 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.

5.2. Structural Applications

5.2.1. General Structural Provisions

- 5.2.1.1. Except as otherwise described in this TER, Thermo-Brace® Green 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® Green 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® Green 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 *IRC* Bracing Applications

- 5.2.2.1. Thermo-Brace® Green Structural Sheathing may be used on braced wall lines as an equivalent alternative to Method WSP of the *IRC*, when installed in accordance with [IRC Section R602.10](#) and this TER.
 - 5.2.2.2. For wind design, required braced wall panel lengths for Thermo-Brace® Green Structural Sheathing shall be as shown in [Table 1](#), and shall be used in conjunction with [IRC Table R602.10.3\(2\)](#)³, which provides the required adjustments.
 - 5.2.2.3. For seismic design, required braced wall panel lengths for Thermo-Brace® Green Structural Sheathing shall be as shown in [Table 2](#), and shall be used in conjunction with [IRC Table R602.10.3\(4\)](#)⁴, which provides the required adjustments.
- 5.2.3. Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience and technical judgment.

³ [2009 IRC Table R602.10.1.2\(1\)](#) including all footnotes

⁴ [2009 IRC Table R602.10.1.2\(2\)](#) including all footnotes

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Required Bracing Lengths for Thermo-Brace® Green Structural Sheathing Installed with ½" Gypsum Wallboard @ 16" o.c. Stud Spacing (2x4 or 2x6 Studs) – Wind

Condition	Braced Wall Line Spacing	Intermittent Sheathing					Continuous Sheathing				
		Nails or Staples 3" o.c. Edges & in the Field					Nails or Staples 3" o.c. Edges & in the Field				
		Length of Wall Line to be Braced (ft.)					Length of Wall Line to be Braced (ft.)				
		≤ 110 mph	≤ 115 mph	≤ 120 mph	≤ 130 mph	≤ 140 mph	≤ 110 mph	≤ 115 mph	≤ 120 mph	≤ 130 mph	≤ 140 mph
One Story or the Top of Two or Three Stories	10	1.8	1.8	2.3	2.3	2.7	1.4	1.8	1.8	2.3	2.3
	20	3.2	3.2	3.6	4.6	5.0	2.7	3.2	3.2	3.6	4.6
	30	4.6	5.0	5.5	6.4	7.3	4.1	4.1	4.6	5.5	6.4
	40	5.9	6.4	7.3	8.2	9.6	5.0	5.5	5.9	6.8	8.2
	50	7.3	8.2	8.6	10.0	11.8	6.4	6.8	7.3	8.6	10.0
	60	8.6	9.6	10.5	11.8	13.7	7.3	8.2	8.6	10.0	11.8
First Story of Two Stories or Second Story of Three Stories	10	3.2	3.6	4.1	4.6	5.5	2.7	3.2	3.2	4.1	4.6
	20	5.9	6.8	7.3	8.6	10.0	5.0	5.9	6.4	7.3	8.2
	30	8.6	9.6	10.5	12.3	14.1	7.3	8.2	8.6	10.5	11.8
	40	11.4	12.3	13.7	15.9	18.2	9.6	10.5	11.4	13.7	15.5
	50	14.1	15.0	16.4	19.6	22.3	11.8	12.7	14.1	16.4	19.1
	60	16.4	18.2	19.6	22.8	26.4	14.1	15.5	16.8	19.6	22.8
First Story of Three Stories	10	5.0	5.5	5.9	6.8	7.7	4.1	4.6	5.0	5.9	6.8
	20	9.1	10.0	10.5	12.3	14.6	7.7	8.2	9.1	10.5	12.3
	30	12.7	14.1	15.5	17.7	20.9	10.9	11.8	13.2	15.5	17.7
	40	16.8	18.2	20.0	23.2	26.8	14.1	15.5	16.8	20.0	22.8
	50	20.5	22.3	24.6	28.7	33.2	17.3	19.1	20.9	24.1	28.2
	60	24.1	26.4	29.1	34.1	39.1	20.9	22.8	24.6	28.7	33.2

1. EnergyShield to be a minimum ½" thickness installed with nails and an approved construction adhesive per section 6 of this TER.
2. Demonstrates equivalency to [IRC Table R602.10.3\(1\)](#). All adjustment factors from [IRC Table R602.10.3\(2\)](#) shall be applied. Except when used with method CS-PF, a minimum of ½" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1¼" #6 types W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
3. Thermo-Brace® Green shall be installed with minimum 15/16" crown x 1¼" leg 16 gauge galvanized staples.
3. Demonstrates equivalency to [2009 IRC Table R602.10.1.2\(1\)](#). All adjustment factors from [IRC Table R602.10.1.2\(1\)](#) shall be applied. Except when used with method CS-PF, a minimum of ½" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1¼" #6 types W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
4. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 1.3.
5. Where studs are spaced 24" o.c., bracing lengths shall be multiplied by a factor of 1.1.
6. Bracing lengths are the results of comparative equivalency testing and analysis using both tested and published design values as points of comparison. DrJ relies upon the design values published in the codes and standards listed in [Section 2](#) that are adopted into law and that the manufacturers of those products stand behind. DrJ performs all equivalency analysis based on legally defined design values, the responsibility for which is the manufacturer of those products or the members of the associations that publish those design values.

Table 1: Required Bracing Lengths for Thermo-Brace® Green Structural Sheathing in Accordance with the IRC Wind Bracing Provisions

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Required Bracing Lengths for Thermo-Brace® (Green) Structural Sheathing Installed with ½" Gypsum Wallboard @ 16" o.c. Stud Spacing (2x4 or 2x6 Studs) – Seismic									
Condition	Braced Wall Line Length (ft.)	Intermittent Sheathing				Continuous Sheathing			
		Nails or Staples 3" o.c. Edges & in the Field				Nails or Staples 3" o.c. Edges & in the Field			
		Minimum Length of Braced Wall Panels Required Along Each Braced Wall Line (ft.)				Minimum Length of Braced Wall Panels Required Along Each Braced Wall Line (ft.)			
		SDC C (townhouses only)	SDC D ₀	SDC D ₁	SDC D ₂	SDC C (townhouses only)	SDC D ₀	SDC D ₁	SDC D ₂
One Story or Top of Two Stories or Top of Three Stories	10	1.5	1.6	1.8	2.3	1.3	1.5	1.5	1.9
	20	2.9	3.3	3.6	4.6	2.5	2.8	3.1	3.9
	30	4.4	4.9	5.5	6.9	3.8	4.2	4.6	5.8
	40	5.8	6.5	7.3	9.1	4.9	5.6	6.2	7.7
	50	7.3	8.1	9.1	11.4	6.2	7.0	7.7	9.6
First Story of Two Stories or Second Story of Three Stories	10	2.7	3.4	4.1	5.0	2.4	2.9	3.4	4.3
	20	5.5	6.9	8.1	10.0	4.6	5.8	7.0	8.6
	30	8.1	10.3	12.3	15.0	7.0	8.7	10.5	12.8
	40	10.9	13.6	16.4	20.0	9.3	11.6	13.9	17.0
	50	13.6	17.1	20.5	25.0	11.6	14.6	17.4	21.3
First Story of Three Stories	10	4.1	4.8	5.5	NP	3.4	4.1	4.6	NP
	20	8.1	9.5	10.9	NP	7.0	8.1	9.3	NP
	30	12.3	14.4	16.4	NP	10.5	12.2	13.9	NP
	40	16.4	19.1	21.8	NP	13.9	16.3	18.5	NP
	50	20.5	23.9	27.3	NP	17.4	20.3	23.2	NP

For SI: 1" = 25.4 mm

- Demonstrates equivalency to [IRC Table R602.10.3\(3\)](#). All adjustment factors from [IRC Table R602.10.3\(4\)](#) shall be applied. Except when used with method CS-PF, a minimum of ½" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1¼" #6 types W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
- Demonstrates equivalency to [2009 IRC Table R602.10.1.2\(2\)](#). All adjustment factors from [IRC Table R602.10.1.2\(3\)](#) shall be applied. Except when used with method CS-PF, a minimum of ½" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1¼" #6 types W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
- Thermo-Brace® Green shall be installed with minimum 15/16" crown x 1¼" leg 16 gauge galvanized staples.
- Tabulated bracing lengths are based on the following:
 - Soil Class D
 - Wall Height = 10'
 - 10 psf floor dead load
 - 15 psf roof/ceiling dead load
 - Braced wall line spacing ≤ 25'
- Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 2.0.
- Linear interpolation is permitted.
- Bracing lengths are the result of comparative equivalency testing and analysis using both tested and published design values as points of comparison. DrJ relies upon the design values published in the codes and standards listed in [Section 2](#) that are adopted into law and that the manufacturers of those products stand behind. DrJ performs all equivalency analysis based on legally defined design values, the responsibility for which is the manufacturer of those products or the members of the associations that publish those design values.

Table 2: Required Bracing Lengths for Thermo-Brace® Green Structural Sheathing in Accordance with the *IRC* Seismic Bracing Provisions

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5.2.3.1. Required braced wall panel lengths for Thermo-Brace® Green Structural Sheathing shall be as determined by the equivalency factor shown in [Table 3](#) and [IRC Table R602.10.3\(1-4\)](#)⁵ including all footnotes.

5.2.3.1.1. The braced wall line length equivalency factors in [Table 3](#) are based on equivalency testing and are used to comply with Method WSP and Method CS-WSP of the *IRC*.

5.2.3.1.2. Thermo-Brace® Green Structural Sheathing tested equivalency factors in [Table 3](#) allow the user to determine the length of bracing required, by multiplying the factor from [Table 3](#) by the length shown in the WSP or CS columns in [IRC Table R602.10.3\(1 and 3\)](#), as modified by all applicable factors in [Table R602.10.3\(2 and 4\)](#), respectively.

5.2.3.2. All *IRC* prescriptive bracing minimums, spacing requirements and rules must still be met.

5.2.3.3. Where a building, or portion thereof, does not comply with one or more of the bracing requirements within the prescriptive section of the *IRC*, those portions shall be designed and constructed in accordance with [IRC Section R301.1](#).

Wall Bracing Factors	Maximum Stud Spacing (in.)	Fastener	Fastener Spacing (edge/field) (in.)	Gypsum Wallboard Fastening Schedule (blocked or unblocked) (edge/field) (in.)	SPF Framing
					Thermo-Brace® Green Tested Equivalency Factors to <i>IRC</i> WSP or CS-WSP
Thermo-Brace® Green Structural Sheathing	16" o.c.	¹⁵ / ₁₆ " Crown x 1 ¹ / ₄ " Leg Staples	3/3	8/8	0.91

1. Staples shall be a minimum 16 gauge.
 2. Thermo-Brace® Green Structural Sheathing tested equivalency factors allow the user to determine the length of bracing required, by multiplying the factor by the length of bracing shown in the WSP or CS columns in [IRC Table R602.10.3\(1 and 3\)](#), as modified by all applicable factors in [IRC Table R602.10.3\(2 and 4\)](#) respectively.
 3. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths in [IRC Table R602.10.3\(1 and 3\)](#), as modified by all applicable factors in [IRC Table R602.10.3\(2 and 4\)](#), shall be used, except the factor for omitting the gypsum wallboard shall be 2.0.
 4. Valid for single top plate (advanced framing method) wall installations or double top plate wall installations.

Table 3: Thermo-Brace® Green Structural Sheathing Braced Wall Line Length Equivalency Factors
Based on Equivalency Testing for Use with the *IRC*

5.2.4. Prescriptive *IBC* Conventional Light-Frame Wood Construction

5.2.4.1. Thermo-Brace® Green Structural Sheathing may be used to brace exterior walls of buildings as an equivalent alternative to Method 3 of the *IBC* 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 [IBC Section 2308.6](#)⁶ and this TER.

5.2.5. Performance-Based Wood-Framed Construction

5.2.5.1. Thermo-Brace® Green 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 4](#) and [Table 5](#).

5.2.5.2. Thermo-Brace® Green 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 4](#).

⁵ [2009 IRC Table R602.10.1.2\(1\)](#) and [R602.10.1.2\(2\)](#)

⁶ [2012 IBC Section 2308.9.3](#)

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Thermo-Brace® Green Nominal Unit Shear Capacity (NUSC) & Allowable Strength Design (ASD) Capacity – Wind						
Thermo-Brace® Green Structural Sheathing	Joint Condition	Maximum Stud Spacing (in.)	Gypsum Wallboard (GWB)	Gypsum Wallboard Fastener Spacing (edge/field)(in.)	Ultimate Unit Shear Capacity (plf)	Allowable Unit Shear Capacity (plf)
	Butted or Lapped	16" o.c.	No GWB	-	485	245
		16" o.c.	½" GWB	8/8	790	395

1. Thermo-Brace® Green attached with a minimum 16 gauge, 15/16" 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 4: Ultimate Unit Shear & Allowable Unit Shear Capacities for Thermo-Brace® Green Structural Sheathing – Wind

5.2.5.3. Thermo-Brace® Green Structural Sheathing panels are permitted to resist uplift load forces using the allowable uplift loads (in pounds per linear foot) set forth in [Table 5](#).

Type of Structural Sheathing	Uplift Capacity (lbs.)	Nominal Uplift Capacity (plf)	Allowable Unit Uplift Capacity (plf)	Maximum Stud Spacing (in.)	Fastener Schedule
Thermo-Brace® Green: Single Bottom Plate	3,200	800	400	16" o.c.	15/16" crown, 1¼" leg 16 gage galvanized staples or 0.120" x 1¼" roofing nails, 3" o.c. 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 4.4.2 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 5: Uplift Performance of Thermo-Brace® Green Structural Sheathing

5.2.5.4. Thermo-Brace® Green Structural Sheathing panels are permitted to resist transverse wind load forces using the allowable transverse loads (in pounds per linear foot) set forth in [Table 6](#).

Nominal Uniform Load Capacities (psf) for Thermo-Brace® Green 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® Green	16" o.c.	128	80	116	72	15/16" crown, 1¼" leg 16 gage galvanized staples or 0.120" x 1¼" roofing nails, 3" o.c. to perimeter/field	≤ 93	≤ 120

1. The ASD allowable uniform load capacities to be used for wind design are determined by dividing the ultimate average pressure 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 [IBC 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 6: Transverse Load Performance of Thermo-Brace® Green Structural Sheathing

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5.3. Fire Resistance Properties

5.3.1. Surface Burn Characteristics

5.3.1.1. Thermo-Brace® Green Structural Sheathing panels have the flame spread characteristics shown in [Table 7](#).

Flame Spread & Smoke Developed Indexes of Thermo-Brace® Green Structural Sheathing		
Thermo-Brace® Green Structural Sheathing	Flame Spread	Smoke Developed
	< 200	< 450
1. Tested in accordance with ASTM E84.		

Table 7: Flame Spread & Smoke Developed Indexes of Thermo-Brace® Green Structural Sheathing

5.4. Water-Resistive Barrier

- 5.4.1. Thermo-Brace® Green Structural Sheathing may be used as a WRB as prescribed in [IRC Section R703.2](#) and [IBC Section 1404.2](#), when installed on exterior walls as described in [Section 5.4](#) of this TER.
- 5.4.2. Thermo-Brace® Green Structural Sheathing shall be installed with board joints placed directly over exterior framing spaced a maximum of 16" (610 mm) o.c. The fasteners used to attach the board shall be installed in accordance with [Section 6](#).
- 5.4.3. Where seams and joints between boards are overlapped nominally ¾" (19 mm) and fastened in accordance with [Section 6](#), seam tape is not required for approval as a WRB.
- 5.4.4. Where seams and joints between boards are butt jointed, they shall be sealed with Barricade® Seam Tape or equivalent in accordance with [Section 6](#).
- 5.4.5. A separate WRB system may also be provided. If a separate WRB system is used, taping of the sheathing joints is not required.
- 5.4.6. Flashing must be installed at all sheathing penetrations and shall comply with all applicable code sections.

5.5. Air Barrier

5.5.1. Thermo-Brace® Green Structural Sheathing may be used as an air barrier material as prescribed in [IRC Section N1102.4.1.1](#), and [IECC Section R402.4.1.1](#) and [IECC Section C402.5.1](#)⁷ in accordance with [ASTM E2178](#).

5.6. Draftstop

- 5.6.1. Thermo-Brace® Green Structural Sheathing may be used as a draftstop material in accordance with [IRC Section 302.12](#), and [IBC Section 708.4.2](#), [IBC Section 718.3](#) and [IBC Section 718.4](#).
- 5.6.2. When installed as of a draftstop, Thermo-Brace® Green Structural Sheathing shall be installed in accordance with [Section 6](#).

5.7. Non-Structural Applications

- 5.7.1. 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.
 - 5.7.1.1. The sheathing panels are applied to wall framing with 16 ga galvanized staples having a 15/16" crown and 1¼" leg lengths.
 - 5.7.1.2. Fastener spacing shall be a maximum of 6" o.c in the field and 3" o.c. around the perimeter.
 - 5.7.1.3. Stud spacing shall be a maximum of 16" o.c.
 - 5.7.1.4. Minimum fastener penetration into the framing members is 1".
 - 5.7.1.5. Fasten all staples parallel to the framing member, with an edge spacing of 3/8" (9.5 mm).

⁷ 2012 IECC Section C402.4.1

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5.7.1.6. All panels are vertically or horizontally installed with all joints backed by studs, plates or blocks when water or air barrier functionality is desired.

5.7.1.7. When used as a WRB, joints shall overlap nominally $\frac{3}{4}$ " (19.1 mm), or be butted and covered with Barricade® Seam Tape or equivalent. Overlapped joints are not required to be covered with Barricade® Seam Tape.

6. Installation:

6.1. General for Structural and WRB Applications

6.1.1. Thermo-Brace® Green 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. Installation shall comply with the manufacturer's installation instructions and this TER. 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® Green Structural Sheathing may be installed in either the vertical or horizontal 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® Green Structural Sheathing

6.3.1.1. Minimum $\frac{15}{16}$ " crown by $1\frac{1}{4}$ " 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 $\frac{1}{2}$ " thickness and shall be attached with one of the following.

6.3.2.1.1. #6 x $1\frac{1}{4}$ " 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 $\frac{3}{8}$ " (9.5 mm) for Thermo-Brace® Green Structural Sheathing and gypsum.

6.5. Treatment of Joints

6.5.1. Thermo-Brace® Green 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. Overlapped joints do not require Barricade® Seam Tape.

6.5.1.2. Butt joints shall be placed over framing members and fastened with a single row of fasteners at each panel edge. Seal butted seams with Barricade® Seam Tape or equivalent when finished with attaching the wall panels and all fasteners in the wall line.

6.5.2. Thermo-Brace® Green 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.

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.

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- 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 [IRC Section R104.11](#) and [IBC Section 104.11](#).
- 7.8. The product(s) evaluated by this TER fall 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 engineering mechanics based means of compliance. This TER assesses compliance with defined standards, 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. The information in this TER conforms with DrJ's procedure for acceptance of data from approved sources.
- 7.12. DrJ's responsibility for data provided by approved sources conforms with [IBC Section 1703](#) and any relevant 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., IRC, WFCM, IBC, SDPWS, NDS, ACI, AISI, PS-20, PS-2, etc.). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g. lumber, steel, concrete, etc), DrJ relies upon grade/properties provided by the raw material supplier to be accurate and conforming to the mechanical properties defined in the relevant material standard.

8. Findings:

- 8.1. When installed in accordance with the manufacturer installation instructions and this TER, Thermo-Brace® Green 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 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 [IRC Section R703.2](#) and [IBC Section 1404.2](#).
 - 8.1.5. Performance for use as an air barrier in accordance with [IRC Section N1102.4.1.1](#), and [IECC Section R402.4.1.1](#) and [IECC Section C402.5.1.1](#)⁸.
 - 8.1.6. Performance for use as a draftstop in accordance with [IRC Section 302.12](#), and [IBC Section 708.4.2](#), [718.3](#) and [718.4](#).
 - 8.1.7. Surface burn characteristics in accordance [IBC Section 2603.3](#).

⁸ [2012 IECC Section C402.4.1.1](#)

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- 8.2. [IBC Section 104.11](#) ([IRC Section R104.11](#) and [IFC Section 104.9](#) are similar) 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, not less than 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*.

- 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. Dr.J'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 TER 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 and/or by the Building Designer (e.g., Owner, Registered Design Professional, etc.).
- 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® Green Structural Sheathing shall not be used as a nailing base for claddings, trim, windows and doors. Fastening through the Thermo-Brace® Green Structural Sheathing into the framing is acceptable.
- 9.6. Walls sheathed with Thermo-Brace® Green Structural Sheathing shall not be used to resist horizontal loads from concrete and masonry walls.
- 9.7. When Thermo-Brace® Green 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 5.4](#).
- 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. When used in accordance with the *IBC* in high wind areas, special inspections shall comply with [IBC Section 1705.11](#)⁹.
- 9.9. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.9.1. Allowable shear loads shall not exceed values in [Table 4](#) for wind loads.
- 9.9.2. Allowable uplift loads shall not exceed values in [Table 5](#).
- 9.9.3. Transverse design loads shall not exceed those described in [Table 6](#), unless an approved exterior wall covering capable of separately resisting loads perpendicular to the face of the walls is installed over the sheathing.
- 9.10. Thermo-Brace® Green Structural Sheathing is manufactured under a quality control program with quality control inspections in accordance with [IRC Section R109.2](#) and [IBC Section 110.3.8](#) and [IBC Section 110.4](#).

⁹ [2012 IBC Section 1705.10](#)

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9.11. Design

9.11.1. Building Designer Responsibility

- 9.11.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer for the Building and shall be in accordance with [/IRC Section R106](#) and [/BC Section 107](#).
- 9.11.1.2. 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 [/IRC Section R301](#) and [/BC Section 1603](#).

9.11.2. Construction Documents

- 9.11.2.1. 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.

9.12. Responsibilities

- 9.12.1. The information contained herein is a product, material, detail, design and/or application TER evaluated in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering practice, experience and technical judgment.
- 9.12.2. DrJ TERs provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated sections.
- 9.12.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.
- 9.12.4. This product is manufactured under a third-party quality control program in accordance with [/IRC Section R104.4](#) and [R109.2](#) and [/BC Section 104.4](#) and [110.4](#).
- 9.12.5. The actual design, suitability and use of this TER, for any particular building, is the responsibility of the Owner or the Owner's authorized agent, and the TER shall be reviewed for code compliance by the Building Official.
- 9.12.6. The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the Building Official's inspection and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

10. Identification:

- 10.1. Each Thermo-Brace® Green 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.

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](#)