



CERTIFICATION



Approved. Sealed. Code Compliant.

Technical Evaluation Report

TER 1912-06

**Thermo-Brace® ECO (Red) and
Thermo-Brace® ECO (Green) Structural
Sheathing**

Barricade® Building Products

Product:

**Thermo-Brace® ECO (Red) and
Thermo-Brace® ECO (Green)
Structural Sheathing**

Issue Date:

June 16, 2020

Revision Date:

October 7, 2020

Subject to Renewal:

July 1, 2021



COMPANY
INFORMATION:

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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 EVALUATED¹

1.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing

2 APPLICABLE CODES AND STANDARDS^{2,3}

2.1 Codes

- 2.1.1 *IBC—12, 15, 18: International Building Code®*
- 2.1.2 *IRC—12, 15, 18: International Residential Code®*
- 2.1.3 *IECC—12, 15, 18: International Energy Conservation Code®*
- 2.1.4 *FBC-B—14, 17: Florida Building Code – Building*
- 2.1.5 *FBC-R—14, 17: Florida Building Code – Residential*

¹ Building codes require data from valid [research reports](#) be obtained from [approved sources](#). Agencies who are accredited through ISO/IEC 17065 have met the [code requirements](#) for approval by the [building official](#). DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.

Through ANAB accreditation and the [IAF MLA](#), DrJ certification can be used to obtain product approval in any [jurisdiction](#) or country that has [IAF MLA Members & Signatories](#) to meet the [Purpose of the MLA](#) – “certified once, accepted everywhere.”

Building official approval of a licensed [registered design professional](#) (RDP) is performed by verifying the RDP and/or their business entity complies with all professional engineering laws of the relevant [jurisdiction](#). Therefore, the work of licensed RDPs is accepted by [building officials](#), except when plan (i.e. peer) review finds an error with respect to a specific section of the code. Where this TER is not approved, the [building official](#) responds in writing stating the reasons for [disapproval](#).

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, visit drjcertification.org or call us at 608-310-6748.

² Unless otherwise noted, all references in this TER are from the 2018 version of the codes and the standards referenced therein (e.g., *ASCE 7*, *NDS*, *ASTM*). This material, design, or method of construction also complies with the 2000-2015 versions of the referenced codes and the standards referenced therein.

³ All terms defined in the applicable building codes are italicized.



- 2.1.6 *FBC-EC—14, 17: Florida Building Code – Energy Conservation*
- 2.2 *Standards and Referenced Documents*
 - 2.2.1 *ANSI/AWC SDPWS: Special Design Provisions for Wind and Seismic*
 - 2.2.2 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*
 - 2.2.3 *ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting System for Buildings*
 - 2.2.4 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*
 - 2.2.5 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*
 - 2.2.6 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*
 - 2.2.7 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
 - 2.2.8 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*
 - 2.2.9 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

3 PERFORMANCE EVALUATION

- 3.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing have been evaluated to determine:
 - 3.1.1 Structural performance under lateral load conditions (wind) for use as an alternative to the *IRC* intermittent wall bracing provisions of [IRC Section R602.10](#) Method WSP (wood structural panel) and the *IRC* continuous wall bracing provisions of [IRC Section R602.10.4](#) Method CS-WSP (continuously sheathed wood structural panel).
 - 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.
 - 3.1.3 Structural performance under lateral load conditions for use as an alternative to *SDPWS* Section 4.3 Wood-Frame Shear Walls.
 - 3.1.4 Resistance to uplift loads for wall assemblies used for light-frame wood construction in accordance with [IBC Section 1609](#) and [IRC Section R301.2.1](#).
 - 3.1.5 Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with [IBC Section 1609.1.1](#) and [IRC Section R301.2.1](#).
 - 3.1.6 Performance for use as a water-resistive barrier (WRB) in accordance with [IBC Section 1404.2](#) and [IRC Section R703.2](#).
 - 3.1.7 Performance for use as an air barrier in accordance with [IRC Section N1102.4.1.1](#) and [IECC Section R402.4.1.1](#) and [Section C402.5.1.1](#).⁴
 - 3.1.8 Performance for use as a draftstop in accordance with [IBC Section 708.4.2](#), [Section 718.3](#), and [Section 718.4](#) and [IRC Section R302.12](#).
 - 3.1.9 Performance of surface burn characteristics in accordance with [IBC Section 2603.3](#).
- 3.2 Use in seismic design category (SDC) A and B is allowed. Structural performance under lateral load conditions (seismic) in seismic design category C and greater is outside the scope of this evaluation.
- 3.3 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.
- 3.4 Any engineering evaluation conducted for this TER was performed on the dates provided in this TER and within Dr.J's professional scope of work.

⁴ 2012 *IECC* Section C402.4.1.1

4 PRODUCT DESCRIPTION AND MATERIALS

4.1 The products evaluated in this TER are shown in Figure 1 and Figure 2.



FIGURE 1. THERMO-BRACE® ECO (RED) STRUCTURAL SHEATHING



FIGURE 2. THERMO-BRACE® ECO (GREEN) STRUCTURAL SHEATHING

4.2 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing are 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.

- 4.2.1 Thermo-Brace® ECO (Red) Structural Sheathing panels have a nominal thickness of 0.095" and a nominal weight of 0.348 lbs. per square foot.
- 4.2.2 Thermo-Brace® ECO (Green) Structural Sheathing panels have a nominal thickness of 0.075" and nominal weight of 0.278 lbs. per square foot.



4.3 Material Availability

- 4.3.1 Standard widths include 48" (1219 mm) and 48³/₄" (1238 mm).
- 4.3.2 Standard lengths include 96" (2438 mm), 108" (2743 mm), and 120" (3048 mm).
- 4.3.3 Other custom widths and lengths up to 144" can be manufactured.

5 APPLICATIONS

5.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing panels are used in the following applications:

- 5.1.1 Wall sheathing in buildings constructed in accordance with the *IBC* and *IRC* for light frame wood construction.
- 5.1.2 Structural wall sheathing to provide lateral load resistance (wind) for braced wall panels used in light-frame wood construction.
- 5.1.3 Wall sheathing in buildings constructed in accordance with the *IBC* requirements for Type V light frame construction.
- 5.1.4 Structural wall sheathing to provide resistance to transverse loads for wall assemblies used in light frame wood construction.

5.2 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

5.3 Structural Applications

5.3.1 General Structural Provisions:

- 5.3.1.1 Except as otherwise described in this TER, Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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).
 - 5.3.1.1.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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.
- 5.3.1.2 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 5.3.2.
- 5.3.1.3 Except as provided for in Section 5.3.2, the maximum aspect ratio for Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing shall be 4:1.
- 5.3.1.4 The minimum full height panel width shall be 24", except as allowed by Section 5.3.2.
- 5.3.1.5 Installation is permitted for single top plate or double top plate applications.

5.3.2 Simplified IRC Bracing Applications:

- 5.3.2.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) are permitted to be used in accordance with the *IRC* simplified bracing method of [IRC Section R602.12](#) as modified by Table 1 and Table 2 respectively. All other provisions of the *IRC* simplified bracing method shall be met.



TABLE 1. THERMO-BRACE® ECO (RED) SIMPLIFIED BRACING

Structural Sheathing Product	Ultimate Design Wind Speed, V_{ult} (mph)	Story Level ²	Eave to Ridge Height (ft.)	Minimum Number of Bracing Units Required (Long Side)						Minimum Number of Bracing Units Required (Short Side)					
				Length of Short Side (ft.)						Length of Long Side (ft.)					
				10	20	30	40	50	60	10	20	30	40	50	60
Thermo-Brace® ECO (Red)	115	One Story or Top of Two or Three Story	10	1	1	2	2	3	3	1	1	2	2	3	3
		First of Two Story or Second of Three Story		1	2	3	4	5	5	1	2	3	4	5	5
		First of Three Story		2	3	4	5	7	8	2	3	4	5	7	8
		One Story or Top of Two or Three Story	15	1	1	3	3	4	4	1	1	3	3	4	4
		First of Two Story or Second of Three Story		1	2	3	5	6	6	1	2	3	5	6	6
		First of Three Story		2	3	4	6	8	9	2	3	4	6	8	9
	130	One Story or Top of Two or Three Story	10	1	2	2	3	3	4	1	2	2	3	3	4
		First of Two Story or Second of Three Story		2	3	4	5	6	7	2	3	4	5	6	7
		First of Three Story		2	4	5	7	8	10	2	4	5	7	8	10
		One Story or Top of Two or Three Story	15	1	3	3	4	4	5	1	3	3	4	4	5
		First of Two Story or Second of Three Story		2	3	5	6	7	8	2	3	5	6	7	8
		First of Three Story		2	4	6	8	9	11	2	4	6	8	9	11

SI: 1 in. = 25.4 mm

1. This simplified bracing table is based on the provisions of [IRC Section R602.12](#). All provisions therein shall be observed, except that this table shall replace [IRC Table R602.12.4](#), and Thermo-Brace® ECO (Red) shall replace the sheathing material.
2. The [2012 IRC Section R602.12](#) limits the number of stories to two when using the simplified wall bracing method. Therefore, when using the 2012 IRC, the "First of Three Story" rows shall not be used.
3. Interpolation shall not be permitted.
4. Cripple walls or wood-framed basement walls in a walk-out condition shall be designated as the first story and the stories above shall be re-designated as the second and third stories, respectively, and shall be prohibited in a three-story structure.
5. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.
6. For Exposure Category C, multiply bracing units by a factor of 1.20 for a one-story building, 1.30 for a two-story building, and 1.40 for a three-story building.
7. Maximum stud spacing is 16" o.c.
8. Thermo-Brace® ECO (Red) installed with butted or lapped joints on 2"x4" studs spaced 16" o.c. and fastened with 16ga, galvanized, smooth shank staples with 15/16" crown x 1 1/4" leg installed 3" o.c. along the edges and 3" o.c. in the field.
9. Minimum 1/2" gypsum wallboard attached to the interior side of the wall in accordance with [IRC Section R702.3.5](#) and [Table R702.3.5](#).



TABLE 2. THERMO-BRACE® ECO (GREEN) SIMPLIFIED BRACING

Structural Sheathing Product	Ultimate Design Wind Speed, V_{ult} (mph)	Story Level ²	Eave to Ridge Height (ft.)	Minimum Number of Bracing Units Required (Long Side)						Minimum Number of Bracing Units Required (Short Side)					
				Length of Short Side (ft.)						Length of Long Side (ft.)					
				10	20	30	40	50	60	10	20	30	40	50	60
Thermo-Brace® ECO (Green)	115	One Story or Top of Two or Three Story	10	1	2	2	3	3	4	1	2	2	3	3	4
		First of Two Story or Second of Three Story		2	3	4	4	5	6	2	3	4	4	5	6
		First of Three Story		2	4	5	6	8	9	2	4	5	6	8	9
		One Story or Top of Two or Three Story	15	1	3	3	4	4	5	1	3	3	4	4	5
		First of Two Story or Second of Three Story		2	3	5	5	6	7	2	3	5	5	6	7
		First of Three Story		2	4	6	7	9	10	2	4	6	7	9	10
	130	One Story or Top of Two or Three Story	10	1	2	3	3	4	4	1	2	3	3	4	4
		First of Two Story or Second of Three Story		2	3	4	6	7	8	2	3	4	6	7	8
		First of Three Story		3	4	6	8	10	12	3	4	6	8	10	12
		One Story or Top of Two or Three Story	15	1	3	4	4	5	5	1	3	4	4	5	5
		First of Two Story or Second of Three Story		2	3	5	7	8	9	2	3	5	7	8	9
		First of Three Story		3	4	7	9	11	13	3	4	7	9	11	13

SI: 1 in. = 25.4 mm

1. This simplified bracing table is based on the provisions of IRC Section R602.12. All provisions therein shall be observed, except that this table shall replace IRC Table R602.12.4, and Thermo-Brace® ECO (Green) shall replace the sheathing material.
2. The 2012 IRC Section R602.12 limits the number of stories to two when using the simplified wall bracing method. Therefore, when using the 2012 IRC, the "First of Three Story" rows shall not be used.
3. Interpolation shall not be permitted.
4. Cripple walls or wood-framed basement walls in a walk-out condition shall be designated as the first story and the stories above shall be re-designated as the second and third stories, respectively, and shall be prohibited in a three-story structure.
5. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.
6. For Exposure Category C, multiply bracing units by a factor of 1.20 for a one-story building, 1.30 for a two-story building, and 1.40 for a three-story building.
7. Maximum stud spacing is 16" o.c.
8. Thermo-Brace® ECO (Green) installed with butted or lapped joints on 2"x4" studs spaced 16" o.c. and fastened with 16ga, galvanized, smooth shank staples with 15/16" crown x 1 1/4" leg installed 3" o.c. along the edges and 3" o.c. in the field.
9. Minimum 1/2" gypsum wallboard attached to the interior side of the wall in accordance with IRC Section R702.3.5 and Table R702.3.5.



5.3.3 Prescriptive IRC Bracing Applications:

5.3.3.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing may be used on braced wall lines as an equivalent alternative to Methods WSP and CS-WSP of the IRC, when installed in accordance with IRC Section R602.10 and this TER.

5.3.3.2 For wind design, required braced wall panel lengths for Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing shall be as shown in Table 3 and Table 4, and shall be used in conjunction with IRC Table R602.10.3(2), which provides the required adjustments.

TABLE 3. REQUIRED BRACING LENGTHS FOR THERMO-BRACE® ECO (RED)

Condition	Braced Wall Line Spacing (ft.)	Length of Wall Line to be Braced (ft.)									
		Intermittent Sheathing					Continuous Sheathing				
		Wind Speeds ⁶ (mph)									
		≤ 110	≤ 115	≤ 120	≤ 130	≤ 140	≤ 110	≤ 115	≤ 120	≤ 130	≤ 140
One Story or the Top of Two or Three Stories	10	2.0	2.0	2.5	2.5	3.0	1.5	2.0	2.0	2.5	2.5
	20	3.4	3.4	3.9	4.9	5.4	3.0	3.4	3.4	3.9	4.9
	30	4.9	5.4	5.9	6.9	7.9	4.4	4.4	4.9	5.9	6.9
	40	6.4	6.9	7.9	8.9	10.3	5.4	5.9	6.4	7.4	8.9
	50	7.9	8.9	9.4	10.8	12.8	6.9	7.4	7.9	9.4	10.8
	60	9.4	10.3	11.3	12.8	14.8	7.9	8.9	9.4	10.8	12.8
First Story of Two Stories or Second Story of Three Stories	10	3.4	3.9	4.4	4.9	5.9	3.0	3.4	3.4	4.4	4.9
	20	6.4	7.4	7.9	9.4	10.8	5.4	6.4	6.9	7.9	8.9
	30	9.4	10.3	11.3	13.3	15.3	7.9	8.9	9.4	11.3	12.8
	40	12.3	13.3	14.8	17.2	19.7	10.3	11.3	12.3	15.3	16.7
	50	15.3	16.3	17.7	21.2	24.1	12.8	13.8	15.3	17.7	20.7
	60	17.7	19.7	21.2	24.6	28.6	15.3	16.7	18.2	21.2	24.6
First Story of Three Stories	10	5.4	5.9	6.4	7.4	8.4	4.4	4.9	5.4	6.4	7.4
	20	9.9	10.8	11.3	13.3	15.8	8.4	8.9	9.9	11.3	13.3
	30	13.8	15.3	16.7	19.2	22.7	11.8	12.8	14.3	16.7	19.2
	40	18.2	19.7	21.7	25.1	29.1	15.3	16.7	18.2	21.7	24.6
	50	22.2	24.1	26.6	31.0	36.0	18.7	20.7	22.7	26.1	30.5
	60	26.1	28.6	31.5	36.9	42.4	22.7	24.6	26.6	31.0	36.0

SI: 1 in. = 25.4 mm, 1 mph = 1.61 km/h

- Linear interpolation is permitted.
- Thermo-Brace® ECO (Red) installed with butted or lapped joints on 2x4 studs spaced 16" o.c. and fastened with 16ga, galvanized, smooth shank staples with 15/16" crown x 1 1/4" leg installed 3" o.c. along the edges and 3" o.c. in the field.
- Demonstrates equivalency to IRC Table R602.10.3(1). All adjustment factors from IRC Table R602.10.3(2) shall be applied.
- Minimum 1/2" gypsum wallboard spaced 8" o.c. along the edges and 8" o.c. in the field shall be installed as part of the wall assembly. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 2.2.
- 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.
- Wind speeds are V_{ult} in accordance with ASCE 7-16. Convert to equivalent V_{asd} wind speed per IBC Section 1609.3.1.



TABLE 4. REQUIRED BRACING LENGTHS FOR THERMO-BRACE® ECO (GREEN)

Condition	Braced Wall Line Spacing (ft.)	Length of Wall Line to be Braced (ft.)									
		Intermittent Sheathing					Continuous Sheathing				
		Wind Speeds ⁶ (mph)									
		≤ 110	≤ 115	≤ 120	≤ 130	≤ 140	≤ 110	≤ 115	≤ 120	≤ 130	≤ 140
One Story or the Top of Two or Three Stories	10	2.4	2.4	3.0	3.0	3.5	1.8	2.4	2.4	3.0	3.0
	20	4.1	4.1	4.7	5.9	6.5	3.5	4.1	4.1	4.7	5.9
	30	5.9	6.5	7.1	8.3	9.5	5.3	5.3	5.9	7.1	8.3
	40	7.7	8.3	9.5	10.6	12.4	6.5	7.1	7.7	8.9	10.6
	50	9.5	10.6	11.2	13.0	15.4	8.3	8.9	9.5	11.2	13.0
	60	11.2	12.4	13.6	15.4	17.7	9.5	10.6	11.2	13.0	15.4
First Story of Two Stories or Second Story of Three Stories	10	4.1	4.7	5.3	5.9	7.1	3.5	4.1	4.1	5.3	5.9
	20	7.7	8.9	9.5	11.2	13.0	6.5	7.7	8.3	9.5	10.6
	30	11.2	12.4	13.6	16.0	18.3	9.5	10.6	11.2	13.6	15.4
	40	14.8	16.0	17.7	20.7	23.6	12.4	13.6	14.8	18.3	20.1
	50	18.3	19.5	21.3	25.4	29.0	15.4	16.5	18.3	21.3	24.8
	60	21.3	23.6	25.4	29.5	34.3	18.3	20.1	21.9	25.4	29.5
First Story of Three Stories	10	6.5	7.1	7.7	8.9	10.0	5.3	5.9	6.5	7.7	8.9
	20	11.8	13.0	13.6	16.0	18.9	10.0	10.6	11.8	13.6	16.0
	30	16.5	18.3	20.1	23.0	27.2	14.2	15.4	17.1	20.1	23.0
	40	21.9	23.6	26.0	30.1	34.9	18.3	20.1	21.9	26.0	29.5
	50	26.6	29.0	31.9	37.2	43.1	22.5	24.8	27.2	31.3	36.6
	60	31.3	34.3	37.8	44.3	50.8	27.2	29.5	31.9	37.2	43.1

SI: 1 in = 25.4 mm, 1 mph = 1.61 km/h

- Linear interpolation is permitted.
- Thermo-Brace® ECO (Green) installed with butted or lapped joints on 2x4 studs spaced 16" o.c. and fastened with 16ga, galvanized, smooth shank staples with 15/16" crown x 1 1/4" leg installed 3" o.c. along the edges and 3" o.c. in the field.
- Demonstrates equivalency to IRC Table R602.10.3(1). All adjustment factors from IRC Table R602.10.3(2) shall be applied.
- Minimum 1/2" gypsum wallboard spaced 8" o.c. along the edges and 8" o.c. in the field shall be installed as part of the wall assembly. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths shall be multiplied by a factor of 2.6.
- 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.
- Wind speeds are V_{ult} in accordance with ASCE 7-16. Convert to equivalent V_{asd} wind speed per IBC Section 1609.3.1.

5.3.3.3 Required braced wall panel lengths for Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing shall be as determined by the equivalency factors shown in Table 5 and IRC Table R602.10.3(1-4) including all footnotes.

5.3.3.3.1 The braced wall line length equivalency factors in Table 5 are based on equivalency testing and are used to comply with Method WSP and Method CS-WSP of the IRC.



5.3.3.3.2 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing tested equivalency factors in Table 5 allow the user to determine the length of bracing required by multiplying the factor from Table 5 by the length shown in the WSP or CS-WSP 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.

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

5.3.3.5 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.

TABLE 5. BRACED WALL LINE LENGTH EQUIVALENCY FACTORS¹

Product	Maximum Stud Spacing ² (in.)	Fastener	Fastener Spacing (edge:field) (in.)	½" Gypsum Wallboard Fastening Schedule (blocked or unblocked) (edge:field) (in.)	Equivalency Factor to <i>IRC</i> WSP or CS-WSP
Thermo-Brace® ECO (Red)	16 o.c.	15/16" crown x 1¼" leg staple	3:3	8:8	0.99
Thermo-Brace® ECO (Green)					1.18

SI: 1 in. = 25.4 mm

- Based on equivalency testing for use with the *IRC*
- Framing shall be SPF, at a minimum
- Staples shall be a minimum 16 gauge.
- Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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-WSP 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.
- 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 as follows:
 - Thermo-Brace® ECO (Red): 2.2
 - Thermo-Brace® ECO (Green): 2.6
- Gypsum shall be installed according to the provisions listed in IRC Table R702.3.5.
- Valid for single top plate (advanced framing method) wall installations or double top plate wall installations

5.3.4 *Prescriptive IBC Conventional Light-Frame Wood Construction:*

5.3.4.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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 #6 type W or S screw or 5d cooler nail spaced a maximum of 8" o.c. at panel edges and 8" o.c. in the field. Bracing shall be in accordance with the conventional light-frame construction method of IBC Section 2308.6⁵ and this TER.

5.3.5 *Performance-Based Wood-Framed Construction:*

5.3.5.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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 6 and Table 7.

5.3.5.2 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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 6.

⁵ 2012 *IBC* Section 2308.9.3



TABLE 6. ALLOWABLE STRESS DESIGN (ASD) CAPACITY FOR WIND

Product	Joint Condition	Maximum Stud Spacing (in.)	Gypsum Wallboard (GWB)	Gypsum Wallboard Fastener Spacing (edge:field) (in.)	Allowable Unit Shear Capacity (plf)
Thermo-Brace® ECO (Red)	Butted or Lapped	16 o.c.	None	-	210
			½" GWB	8:8	365
Thermo-Brace® ECO (Green)			None	-	145
			½" GWB	8:8	305

SI: 1 in. = 25.4 mm, 1 lb./ft. = 0.0146 kN/m

1. Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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® ECO (Red) or Thermo-Brace® ECO (Green) 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".

5.3.6 Uplift Resistance:

5.3.6.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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 7.

TABLE 7. UPLIFT PERFORMANCE

Product	Maximum Stud Spacing (in.)	Fastener	Fastener Spacing (edge:field) (in.)	Allowable Unit Uplift Capacity ¹ (plf)
Thermo-Brace® ECO (Red)	16 o.c.	15/16" crown, 1¼" leg, 16 gauge galvanized staples	3:3	245
Thermo-Brace® ECO (Green)				

SI: 1 in. = 25.4 mm, 1 lb./ft. = 0.0146 kN/m

1. Tested in accordance with ASTM E72
2. Gypsum wallboard on the back (interior) side of the wall

5.3.7 Transverse Load Resistance:

5.3.7.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing panels are permitted to resist transverse wind load forces using the allowable transverse loads (in pounds per linear foot) in Table 8 and the basic wind speeds in Table 9.

TABLE 8. TRANSVERSE (OUT-OF-PLANE) WIND LOAD RESISTANCE^{1,4}

Product	Maximum Stud Spacing (in.)	Fastener ⁵	Fastener Spacing (edge:field) (in.)	Allowable Design Value ^{2,3} (psf)
Thermo-Brace® ECO (Red)	16 o.c.	15/16" crown, 1¼" leg, 16 gauge galvanized staples	3:3	95
Thermo-Brace® ECO (Green)				

SI: 1 in. = 25.4 mm, 1 psf = 0.0479 kN/m²

1. Tested in accordance with ASTM E330
2. The ASD allowable uniform load capacities to be used for wind design are determined by dividing the ultimate uniform load capacities by an ASD reduction factor of 1.6, per SDPWS Section 3.2.1 for determining the ASD allowable uniform load capacity.
3. Applies to both negative and positive wind load
4. Design wind load capacity shall be in accordance with IBC Section 1609.1.1.
5. Staple crowns shall be installed parallel to grain.

TABLE 9. BASIC WIND SPEED FOR USE IN EXTERIOR WALL COVERING ASSEMBLIES

Product	Allowable Components & Cladding Basic Wind Speed (mph)	
	ASCE 7-05 (V_{asd})	ASCE 7-10 and 7-16 (V_{ult})
Thermo-Brace® ECO (Red)	≤ 170	≤ 220
Thermo-Brace® ECO (Green)		

SI: 1 mph = 1.61 km/h

- Design wind load capacity shall be in accordance with IBC Section 1609.1.1.
- Staple crowns shall be installed parallel to grain.
- 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.

5.4 *Water-Resistive Barrier*

- 5.4.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing may be used as a WRB as prescribed in IBC Section 1404.2 and IRC Section R703.2, when installed on exterior walls as described in Section 6 of this TER.
- 5.4.2 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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 All seams and joints between boards shall be sealed with Barricade® Seam Tape or equivalent in accordance with Section 6. A slight gap of approximately 1/8" between panels is allowed.
 - 5.4.3.1 A separate WRB system may also be provided. If a separate WRB system is used, taping of the sheathing joints is not required.
- 5.4.4 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® ECO (Red) and Thermo-Brace® ECO (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 Section C402.5.1⁶ in accordance with ASTM E2178.

5.6 *Draftstop*

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

5.7 *Surface Burn Characteristics*

- 5.7.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing panels have the flame spread characteristics shown in Table 10.

TABLE 10. SURFACE BURN CHARACTERISTICS

Product	Flame Spread	Smoke Developed
Thermo-Brace® ECO (Red)	< 200	< 450
Thermo-Brace® ECO (Green)		

1. Tested in accordance with ASTM E84

⁶ 2012 IECC Section C402.4.1



5.8 Non-Structural Applications

- 5.8.1 Where other means of wall bracing are provided, or are not required, Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) 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 either 16 gauge, galvanized staples having a $15/16$ " crown and $1\frac{1}{4}$ " leg lengths or 1" cap nails.
 - 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 $3/8$ " (9.5 mm).
 - 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 When used as a WRB, joints shall be either butted or overlapped nominally $3/4$ " (19.1 mm) and covered with Barricade® Seam Tape or equivalent.

6 INSTALLATION

- 6.1 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 Basic instructions are printed on every Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) pallet or insert.
- 6.3 *Orientation*
 - 6.3.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing may be installed in either the vertical or the 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.
- 6.4 *Fastener Type*
 - 6.4.1 *Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing:*
 - 6.4.1.1 For structural applications, minimum $15/16$ " crown by $1\frac{1}{4}$ " leg, 16 gauge, galvanized staples shall be installed per the staple manufacturer's instructions. Fasteners shall be spaced per Section 5.3 and the applicable tables.
 - 6.4.1.2 For non-structural applications, minimum $15/16$ " crown by $1\frac{1}{4}$ " leg, 16 gauge, galvanized staples or 1" cap nails shall be installed per the staple manufacturer's instructions. Fasteners shall be spaced per Section 5.8.
 - 6.4.1.3 Fasteners shall be driven such that the head of the fastener is in contact with the surface of the Thermo-Brace® ECO (Red) or Thermo-Brace® ECO (Green) Structural Sheathing. Do not overdrive fasteners.
 - 6.4.2 *Gypsum Wallboard:*
 - 6.4.2.1 Where required, gypsum wallboard shall be a minimum $1/2$ " thickness and shall be attached with one of the following:
 - 6.4.2.1.1 #6 x $1\frac{1}{4}$ " type W or S screws
 - 6.4.2.1.2 5d cooler nails
 - 6.4.2.2 Fasteners shall be spaced per Section 5.3 and the applicable tables.
- 6.5 *Fastener Edge Distance*
 - 6.5.1 Fasteners shall be installed with a nominal edge distance of $3/8$ " (9.5 mm) for Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing and gypsum wallboard.



6.6 Treatment of Joints

- 6.6.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing joints may be either butted or overlapped.
 - 6.6.1.1 Butted joints shall be placed over framing members and fastened with a single row of fasteners at each panel edge. A slight gap of approximately $\frac{1}{8}$ " between panels is allowed. Seal butted seams with Barricade® Seam Tape or equivalent when finished attaching the wall panels and all fasteners in the wall line.
 - 6.6.1.2 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. Seal overlapped seams with Barricade® Seam Tape or equivalent when finished attaching the wall panels and all fasteners in the wall line.
- 6.6.2 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (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 ENGINEERING SUBSTANTIATING DATA

- 7.1 Lateral load resistance testing in accordance with *ASTM E564* conducted by SBCRI
- 7.2 Uplift resistance testing in accordance with *ASTM E72* conducted by SBCRI
- 7.3 Transverse load resistance testing in accordance with *ASTM E330* conducted by SBCRI
- 7.4 Water-resistive barrier testing in accordance with *ASTM E331* conducted by Intertek
- 7.5 Air permeance testing in accordance with *ASTM E2178* conducted by Intertek
- 7.6 Flame spread and smoke developed ratings in accordance with *ASTM E84* conducted by Intertek
- 7.7 Some information contained herein is the result of testing and/or data analysis by other sources which conform to *IBC Section 1703* and relevant professional engineering law. DrJ relies on accurate data from these sources to perform engineering analysis. DrJ has reviewed and found the data provided by other professional sources to be credible.
- 7.8 Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *IBC*, *IRC*, *NDS*, and *SDPWS*). 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, and concrete), DrJ relies upon the grade mark, stamp, and/or design values provided by raw material suppliers to be accurate and conforming to the mechanical properties defined in the relevant material standard.

8 FINDINGS

- 8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the product(s) listed in Section 1.1 are approved for the following:
 - 8.1.1 Lateral load resistance due to wind loads carried by shear walls
 - 8.1.2 Uplift load resistance due to wind uplift loads carried by the walls
 - 8.1.3 Transverse load resistance due to components and cladding pressures on building surfaces
 - 8.1.4 Performance for use as a WRB in accordance with *IBC Section 1404.2* and *IRC Section R703.2*
 - 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 *Section C402.5.1*⁷

⁷ 2012 IECC Section C402.4.1



- 8.1.6 Performance for use as a draftstop in accordance with IBC Section 708.4.2, Section 718.3, and Section 718.4 and IRC Section R302.12
- 8.1.7 Surface burn characteristics in accordance IBC Section 2603.3
- 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 in the context of 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 applicable to this TER, they are listed here.
 - 8.3.1 No known variations

9 CONDITIONS OF USE

- 9.1 Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing shall not be used as a nailing base for claddings, trim, windows, and doors. Fastening through the Thermo-Brace® ECO (Red) and Thermo-Brace® ECO (Green) Structural Sheathing into the framing is acceptable.
- 9.2 Walls sheathed with Thermo-Brace® ECO (Red) or Thermo-Brace® ECO (Green) Structural Sheathing shall not be used to resist horizontal loads from concrete and masonry walls.
- 9.3 When Thermo-Brace® ECO (Red) or Thermo-Brace® ECO (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.
 - 9.3.1 When Thermo-Brace® ECO (Red) or Thermo-Brace® ECO (Green) Structural Sheathing is not installed as a WRB, other means of providing a WRB shall be required, as per the code.
- 9.4 When used in accordance with the *IBC* in high wind areas, special inspections shall comply with IBC Section 1705.11.⁸
- 9.5 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
 - 9.5.1 Allowable shear loads shall not exceed values in Table 6 for wind loads.
 - 9.5.2 Allowable uplift loads shall not exceed values in Table 7.
 - 9.5.3 Transverse design loads shall not exceed those described in Table 8, unless an approved exterior wall covering capable of separately resisting loads perpendicular to the face of the walls is installed over the sheathing.
- 9.6 Where required by the *building official*, also known as 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.
- 9.7 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 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 and/or by the Building Designer (e.g., *owner* or *registered design professional*).
- 9.9 At a minimum, this product shall be installed per Section 6 of this TER.

⁸ 2012 IBC Section 1705.10



- 9.10 This product is manufactured under a third-party quality control program in accordance with IBC Section 104.4 and 110.4 and IRC Section R104.4 and R109.2.
- 9.11 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. Therefore, the TER shall be reviewed for code compliance by the building official for acceptance.
- 9.12 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 The product(s) listed in Section 1.1 are 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 drjcertification.org.
- 11.2 For information on the current status of this TER, contact DrJ Certification.