



**CERTIFICATION**



# Technical Evaluation Report™

**TER 1507-07**

Thermo-Brace® Green Structural Sheathing and Thermo-Brace® Green Guard

**INDEVCO Building Products**

**Product:**

**Thermo-Brace® Green Structural  
Sheathing**

**Issue Date:**

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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 Innovative Products Evaluated<sup>1,2</sup>

1.1 Thermo-Brace® Green Structural Sheathing

1.2 Thermo-Brace® Green Guard

1.3 PermaBrace Green Structural Sheathing

1.4 PermaBrace Green Guard

1.4.1 Unless otherwise noted, where Thermo-Brace® Green Structural Sheathing is cited, the provisions apply equally to Thermo-Brace® Green Guard, PermaBrace Green Structural Sheathing, and PermaBrace Green Guard.

<sup>1</sup> For more information, visit [drjcertification.org](http://drjcertification.org) or call us at 608-310-6748.

<sup>2</sup> **Federal Regulation Definition.** 24 CFR 3280.2 "Listed or certified" means included in a list published by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner. **International Building Code (IBC) Definition of Listed.** Equipment, materials, products or services included in a list published by an organization acceptable to the [building official](#) and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose Listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. **IBC Definition of Labeled.** Equipment, materials or products to which has been affixed a [label](#), seal, symbol or other identifying mark of a nationally recognized testing laboratory, [approved agency](#) or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-[labeled](#) items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.



## 2 Applicable Codes and Standards<sup>3,4</sup>

### 2.1 Codes

- 2.1.1 IBC—15, 18, 21: *International Building Code*®
- 2.1.2 IRC—15, 18, 21: *International Residential Code*®
- 2.1.3 IECC—15, 18, 21: *International Energy Conservation Code*®
- 2.1.4 FBC-B—17, 20: *Florida Building Code – Building*<sup>5</sup>
- 2.1.5 FBC-R—17, 20: *Florida Building Code – Residential*<sup>5</sup>
- 2.1.6 FBC-EC—17, 20: *Florida Building Code – Energy Conservation*<sup>5</sup>

### 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 Systems 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*
- 2.2.10 UL 723: *Test for Surface Burning Characteristics of Building Materials*

## 3 Performance Evaluation

- 3.1 Tests, testing, test reports, research reports, duly authenticated reports and related engineering evaluations are defined as intellectual property and/or trade secrets and protected by Defend Trade Secrets Act 2018 (DTSA).<sup>6</sup>

<sup>3</sup> This Listing is a code defined research report, which is also known as a duly authenticated report, provided by an approved agency (see IBC Section 1703.1) and/or an approved source (see IBC Section 1703.4.2). An approved agency is “approved” when it is ANAB accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory. A professional engineer is “approved” as an approved source when that professional engineer is properly licensed to transact engineering commerce. Where sealed by a professional engineer, it is also a duly authenticated report certified by an approved source. (i.e., Registered Design Professional). DrJ is an ANAB accredited product certification body.

<sup>4</sup> Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.

<sup>5</sup> All references to the FBC-B, FBC-R, and FBC-EC are the same as the 2018 IBC, IRC, and IECC unless otherwise noted in the Florida Supplement found at the end of this TER.

<sup>6</sup> <https://www.law.cornell.edu/uscode/text/18/part-II/chapter-90>. Given our professional duty to inform, please be aware that whoever, with intent to convert a trade secret (TS), that is related to a product or service used in or intended for use in interstate or foreign commerce, to the economic benefit of anyone other than the owner thereof, and intending or knowing that the offense will, injure any owner of that trade secret, knowingly without authorization copies, duplicates, sketches, draws, photographs, downloads, uploads, alters, destroys, photocopies, replicates, transmits, delivers, sends, mails, communicates, or conveys such information; shall be fined under this title or imprisoned not more than 10 years, or both. Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of \$5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. As the National Society of Professional Engineers states, “Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.” Therefore, to protect intellectual property (IP) and TS, and to achieve compliance with public records and trade secret legislation, requires approval through the use of Listings, certified reports, technical evaluation reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

- 3.2 Testing and/or inspections conducted for this TER were performed at an ISO/IEC 17025 accredited testing laboratory,<sup>7</sup> an ISO/IEC 17020 accredited inspection body,<sup>8</sup> which are internationally recognized accreditations through International Accreditation Forum (IAF), and/or a licensed Registered Design Professional (RDP).
- 3.2.1 Structural performance for shear wall assemblies used as lateral force resisting systems in Seismic Design Categories A through F, have been tested and evaluated in accordance with the following standards:
- 3.2.1.1 ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures,
  - 3.2.1.2 ASTM D7989: Standard Practice for Demonstrating Equivalent In-Plane Lateral Seismic Performance to Wood-Frame Shear Walls Sheathed with Wood Structural Panels,
  - 3.2.1.3 ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction,
  - 3.2.1.4 ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings, and
  - 3.2.1.5 ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings.
- 3.2.2 Lateral force resisting systems for use in both wind and seismic applications follow the performance-based provisions of IBC Section 2306.1, IBC Section 2306.3, and/or Section 4.3 SDPWS for light-frame wood wall assemblies.
- 3.2.2.1 Table 2 provides seismic design coefficients (SDC) that conform to the requirements in ASCE 7 Section 12.2.1, 12.2.1.1 and Table 12.2-1 for design of wall assemblies in buildings that require seismic design.
- 3.2.2.1.1 ASTM D7989 is accepted engineering practice used to establish SDCs. Test data generated by ISO/IEC 17025 approved agencies and/or professional engineers, and all associated professional engineering evaluations, which use ASTM D7989 as their basis, are defined as intellectual property and/or trade secrets and are also defined as an independent design review (i.e., Listings, certified reports, duly authenticated reports from approved agencies, and/or research reports prepared by approved agencies and/or approved sources).
- 3.3 Thermo-Brace® Green Structural Sheathing has been evaluated to determine the following:
- 3.3.1 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 Method WSP (Wood Structural Panel), and the IRC continuous wall bracing provisions of IRC Section R602.10.4 Methods CS-WSP (Continuously Sheathed Wood Structural Panel) and CS-PF (Continuously Sheathed Portal Frame).
  - 3.3.2 Structural performance under lateral load conditions for use as an alternative to the IRC Continuous Wall Bracing provisions of IRC Section R602.10.6.2 Method PFH (Portal Frame with Hold-down).
  - 3.3.3 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.
  - 3.3.4 Structural performance under lateral load conditions for use as an alternative to SDPWS Section 4.3 Wood Frame Shear Walls.
  - 3.3.5 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.
  - 3.3.6 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.

<sup>7</sup> Internationally recognized accreditations are performed by members of the International Accreditation Forum (IAF). Accreditation Body and Regional Accreditation Group Members of IAF are admitted to the IAF MLA only after a stringent evaluation of their operations by a peer evaluation team, which is charged to ensure that the applicant complies fully with both international standards and IAF requirements. Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.

<sup>8</sup> Ibid.

- 3.3.7 Performance for use as a water-resistive barrier (WRB) in accordance with [IBC Section 1403.2<sup>9</sup>](#) and [IRC Section R703.2](#).
- 3.3.8 Performance for use as an air barrier in accordance with [IRC Section N1102.4.1.1](#), [IECC Section R402.4.1.1](#) and [IECC Section C402.5.1.1](#).
- 3.3.9 Performance for use as a draftstop in accordance with [IBC Section 708.4.2](#), [IBC Section 718.3](#), [IBC Section 718.4](#) and [IRC Section R302.12](#).
- 3.3.10 Surface burn characteristic performance for use as a Class C interior finish material in accordance with [IBC Section 803.1.2<sup>10</sup>](#) and [IRC Section R302.9](#).
- 3.4 Use of Thermo-Brace® Green Structural Sheathing in a fire resistance rated assembly is outside the scope of this TER.
- 3.5 Any building code and/or accepted engineering evaluations (i.e. research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an [ISO/IEC 17065 accredited certification body](#) and a professional engineering company operated by RDPs / [approved sources](#). DrJ is qualified<sup>11</sup> to practice product and code compliance services within its scope of accreditation and engineering expertise, respectively.
- 3.6 Engineering evaluations are conducted with DrJ's ANAB [accredited ICS code scope](#), which are also its areas of professional engineering competence.
- 3.7 Any regulation specific issues not addressed in this section are outside the scope of this TER.

## 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® and PermaBrace Green Structural Sheathing

<sup>9</sup> [2015 IBC Section 1404.2](#)

<sup>10</sup> [2015 IBC Section 803.1.1](#)

<sup>11</sup> Qualification is performed by a legislatively defined [Accreditation Body](#). [ANSI National Accreditation Board \(ANAB\)](#) is the largest independent accreditation body in North America and provides services in more than 75 countries. [DrJ](#) is an ANAB accredited [product certification body](#).



**Figure 2.** Thermo-Brace® Green Guard

- 4.2 Thermo-Brace® Green Structural Sheathing and PermaBrace 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® Green Structural Sheathing and PermaBrace Green Structural Sheathing panels have a nominal thickness of 0.075" and nominal weight of 0.278 lbs. per square foot.
- 4.3 PermaBrace Green Guard and Thermo-Brace® Green Guard are comprised of the same material as the Thermo-Brace® Green Structural Sheathing. The center and edges of the Guard panels are scored in order to apply the Guard panels to the corner of a building without disturbing the air and water barriers.
- 4.4 *Material Availability*
  - 4.4.1 Thermo-Brace® Green Structural Sheathing and PermaBrace Green Structural Sheathing
    - 4.4.1.1 Standard widths include 48" (1219 mm), 48 3/4" (1238 mm) and 64" (1626 mm)
    - 4.4.1.2 Standard lengths include 96" (2438 mm) and 108" (2743 mm)
    - 4.4.1.3 Other custom sizes up to 60" widths and 144" lengths can be manufactured
  - 4.4.2 PermaBrace Green Guard and Thermo-Brace® Green Guard
    - 4.4.2.1 Standard width on each side past the corner is 32" (813 mm)
    - 4.4.2.2 Standard lengths include 96" (2438 mm) and 108" (2743 mm)

## 5 Applications

5.1 Thermo-Brace® 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 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 herein 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.

#### 5.2.2 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), 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) which provides the required adjustments.
- 5.2.2.4 Use of Thermo-Brace® with Method CS-PF is also permitted, in lieu of WSP specified in accordance with IRC Section R602.10.6.4.
- 5.2.2.5 Use of Thermo-Brace® with Method PFH is also permitted, in lieu of WSP specified in accordance with IRC Section R602.10.6.4.



**Table 1.** Required Bracing Lengths for Thermo-Brace® Green – Wind<sup>1,2,3,4,5,6</sup>

Condition	Braced Wall Line Spacing (ft)	Minimum Total Length (ft) of Braced Wall Panels Required Along Each Braced Wall Line											
		Intermittent Sheathing						Continuous Sheathing					
		Wind Speeds (mph)											
		< 95	≤ 110	≤ 115	≤ 120	≤ 130	≤ 140	< 95	≤ 110	≤ 115	≤ 120	≤ 130	≤ 140
One Story or the Top of Two or Three Stories	10	1.4	1.8	1.8	2.3	2.3	2.7	1.4	1.4	1.8	1.8	2.3	2.3
	20	2.3	3.2	3.2	3.6	4.6	5.0	2.3	2.7	3.2	3.2	3.6	4.6
	30	3.6	4.6	5.0	5.5	6.4	7.3	3.2	4.1	4.1	4.6	5.5	6.4
	40	4.6	5.9	6.4	7.3	8.2	9.6	3.6	5.0	5.5	5.9	6.8	8.2
	50	5.5	7.3	8.2	8.6	10.0	11.8	4.6	6.4	6.8	7.3	8.6	10.0
	60	6.4	8.6	9.6	10.5	11.8	13.7	5.5	7.3	8.2	8.6	10.0	11.8
First Story of Two Stories or Second Story of Three Stories	10	2.7	3.2	3.6	4.1	4.6	5.5	2.3	2.7	3.2	3.2	4.1	4.6
	20	4.6	5.9	6.8	7.6	8.6	10.0	4.1	5.0	5.9	6.4	7.3	8.2
	30	6.4	8.6	9.6	10.5	12.3	14.1	5.5	7.3	8.2	8.6	10.5	11.8
	40	8.6	11.4	12.3	13.7	15.9	18.2	7.3	9.6	10.5	11.4	13.7	15.5
	50	10.5	14.1	15.0	16.4	19.6	22.3	9.1	11.8	12.7	14.1	16.4	19.1
	60	12.3	16.4	18.2	19.6	22.8	26.4	10.5	14.1	15.5	16.8	19.6	22.8
First Story of Three Stories	10	3.6	5.0	5.5	5.9	6.8	7.7	3.2	4.1	4.6	5.0	5.9	6.8
	20	6.8	9.1	10.0	10.5	12.3	14.6	5.9	7.7	8.2	9.1	10.5	12.3
	30	9.6	12.7	14.1	15.5	17.7	20.9	8.2	10.9	11.8	13.2	15.5	17.7
	40	12.3	16.8	18.2	20.0	23.2	26.8	10.5	14.1	15.5	16.8	20.0	22.8
	50	15.5	20.5	22.3	24.6	28.7	33.2	13.2	17.3	19.1	20.9	24.1	28.2
	60	18.2	24.1	26.4	29.1	34.1	39.1	15.5	20.9	22.8	24.6	28.7	33.2

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

- Thermo-Brace® Green shall be installed on 2x4 or 2x6 studs spaced 16" o.c. and fastened with minimum 15/16" crown x 1 1/4" leg 16 gauge galvanized staples spaced 3":3" (edge:field) per Section 6. Joints may be butted or lapped.
- Where studs are spaced 24" o.c., bracing lengths shall be multiplied by a factor of 1.4.
- 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 1/2" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1 1/4" #6 types W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
- Minimum 1/2" gypsum wallboard must 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 2.0.
- 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 manufacturer 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.
- Linear interpolation is permitted.



**Table 2.** Required Bracing Lengths for Thermo-Brace® Green (Studs 16" o.c.) – Seismic<sup>1,2,3,4,5,6</sup>

Condition	Braced Wall Line Length (ft)	Minimum Total Length (ft) of Braced Wall Panels Required Along Each Braced Wall Line							
		Intermittent Sheathing				Continuous Sheathing			
		Seismic Design Category (SDC)							
		C	D <sub>0</sub>	D <sub>1</sub>	D <sub>2</sub>	C	D <sub>0</sub>	D <sub>1</sub>	D <sub>2</sub>
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	10.8	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

SI: 1 in = 25.4 mm

NP = Not Provided

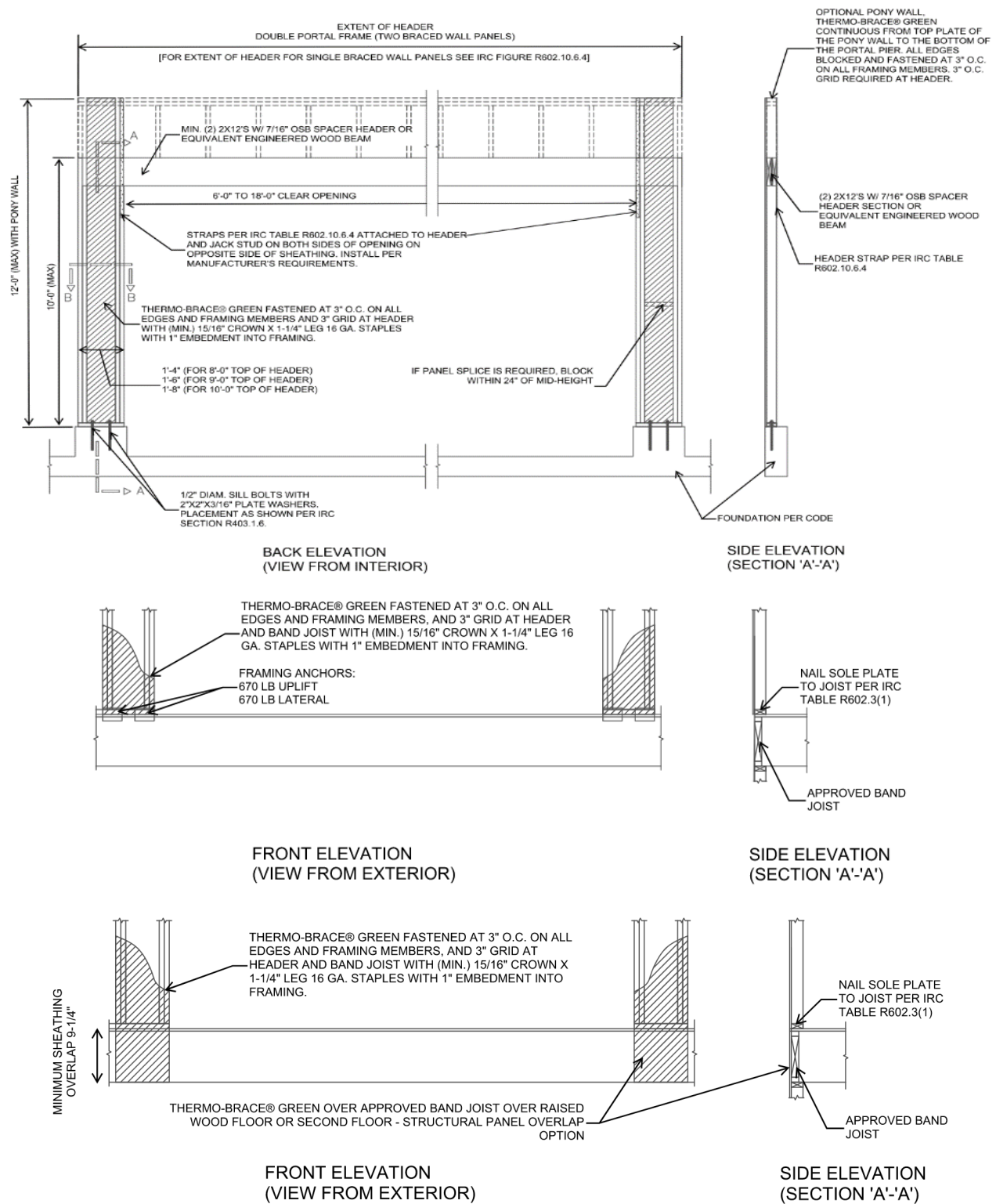
- Thermo-Brace® Green to be installed on 2x4 or 2x6 studs spaced 16" o.c. and fastened with minimum <sup>15</sup>/<sub>16</sub>" crown x 1 1/4" leg 16 gauge galvanized staples spaced 3":3" (edge:field) per Section 6. Joints may be butted or lapped.
- Minimum 1/2" gypsum wallboard must be installed as 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 2.0.
- 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 1/2" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or 1/4" #6 types W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
- 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'
- 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 manufacturer 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.



### 5.2.3 *Thermo-Brace® Green CS-PF Portal Frame:*

- 5.2.3.1 A “Thermo-Brace® Green Structural Sheathing CS-PF” was evaluated for equivalency to the IRC Method CS-PF (Continuous Sheathed Portal Frame) in accordance with [IRC Section R602.10.6.4](#) and [IRC Table R602.10.5](#).
- 5.2.3.2 [IRC Table R602.10.5](#) establishes the contributing length bracing of the CS-PF as equivalent to 1.5 times its actual length and that it contributes this length of bracing to that required by method CS-WSP.
- 5.2.3.3 The capacity of the Thermo-Brace® Green Structural Sheathing CS-PF exceeds the capacity of the IRC Method CS-WSP and is therefore permitted to be substituted for an equivalent length of bracing (i.e., 1.5 times its actual length).

### 5.2.3.4 The Thermo-Brace® Green Structural Sheathing CS-PF is shown in Figure 3.



**Figure 3. Thermo-Brace® Green Structural Sheathing CS-PF**

## 5.2.4 Thermo-Brace® Green Structural Sheathing Method PFH

- 5.2.4.1 In accordance with the [IRC Section R602.10.6.2](#), the PFH referenced in the IRC is permitted to be an equivalent replacement for a 4' length of Method WSP bracing.
- 5.2.4.2 Testing of the Thermo-Brace® Green Structural Sheathing PFH assemblies was conducted and compared to testing of Method WSP braced wall panel assemblies using oriented strand board (OSB) to determine whether equivalence could be achieved for the Thermo-Brace® PFH.
- 5.2.4.3 The portal frames were tested in accordance with ASTM E2126 testing procedures. Testing determined their lateral resistance within an identical braced wall line using Method WSP braced wall panels so that a direct performance comparison could be made between the two series of tests.
- 5.2.4.4 A comparison of the WSP braced wall lines, and the Thermo-Brace® Green Structural Sheathing 12" PFH and 24" PFH, is shown in Table 3.

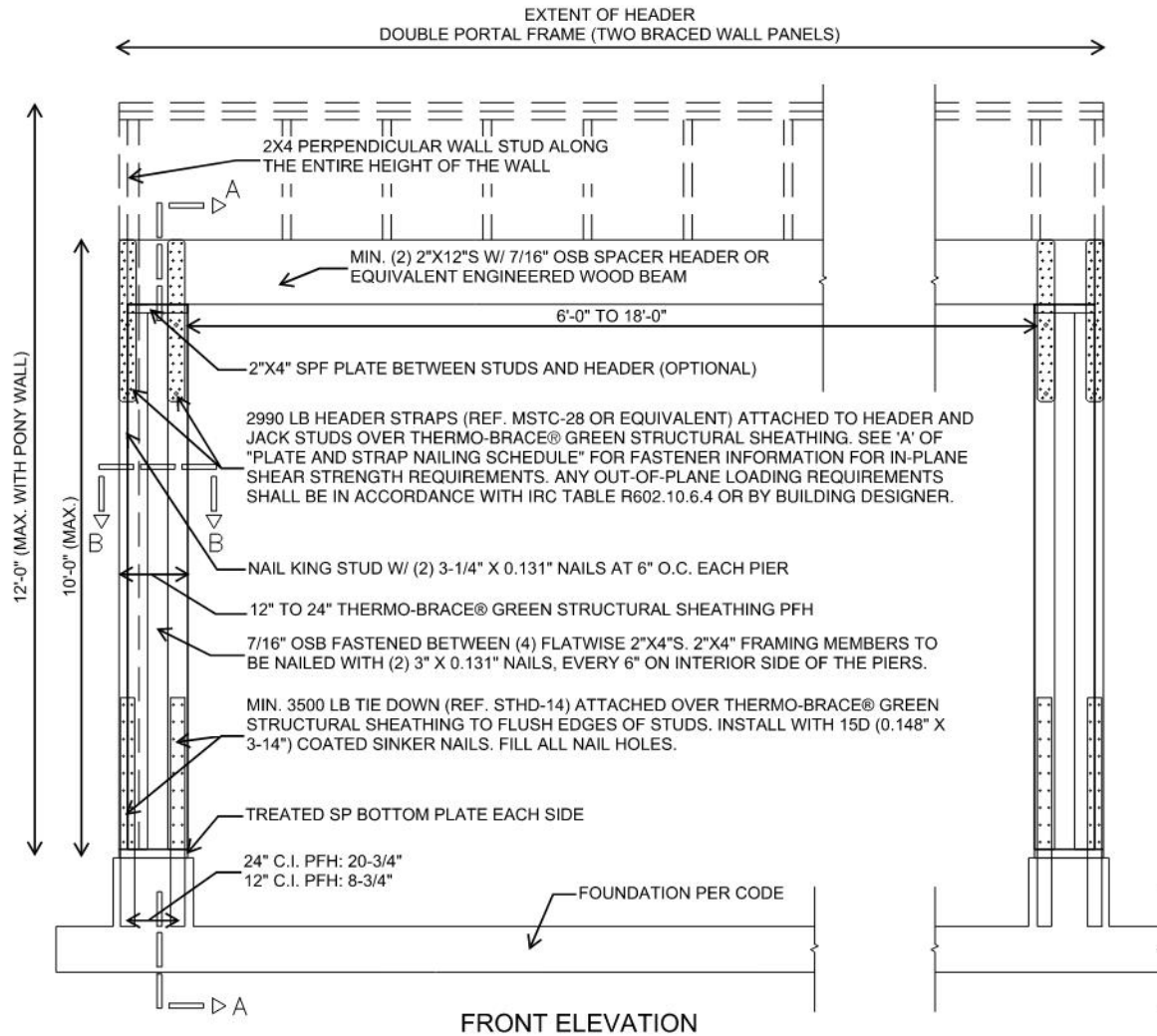
**Table 3.** Design values for PFH<sup>1,2,3</sup>

Test Name	Sheathing Method	Fastener Size & Spacing	Total Bracing Width (in)	Maximum Wall Height (ft)	ASD Allowable Design Value per Panel/Pier <sup>4,5</sup> (lbs)
IBC/IRC Benchmark	¾" OSB, Isolated 4'x8' panels	(min) 2 ¾" x 0.113Ø nails, 6:12 spacing	96	10	700
12" PFH	Thermo-Brace® Green Structural Sheathing	See Figure 3 to Figure 6	12	8	1,280
				10	960
24" PFH	Thermo-Brace® Green Structural Sheathing	See Figure 3 to Figure 6	24	8	2,560
				10	1,920

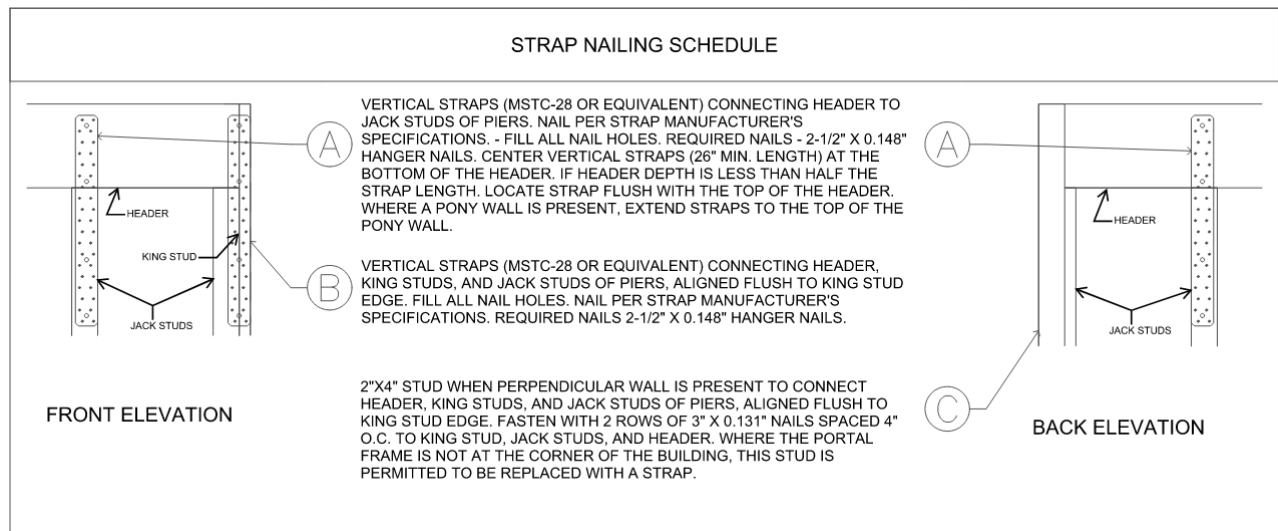
SI: 1 in = 25.4 mm, 1 lb. = 4.45 N

- Capacity derived from multiple full-scale tests, showing the capacity of OSB sheathing in buildings constructed in accordance with the minimum requirements of the IRC.
- The PFH bracing type in the IRC/IBC is defined as equivalent to a 4' BWP using ¾" WSP. Equivalent capacity is based on comparison testing of the PFH and ¾" OSB as compared to the published capacities as defined in the IBC and SDPWS.
- For seismic design, reduce capacities by a factor of 1.4.
- Interpolation between the wall heights and pier widths for the 12" PFH & 24" PFH is permitted.
- 10'-high wall design values are provided here that use a 75% factor to reduce the 8'-high wall design values generated by test data.

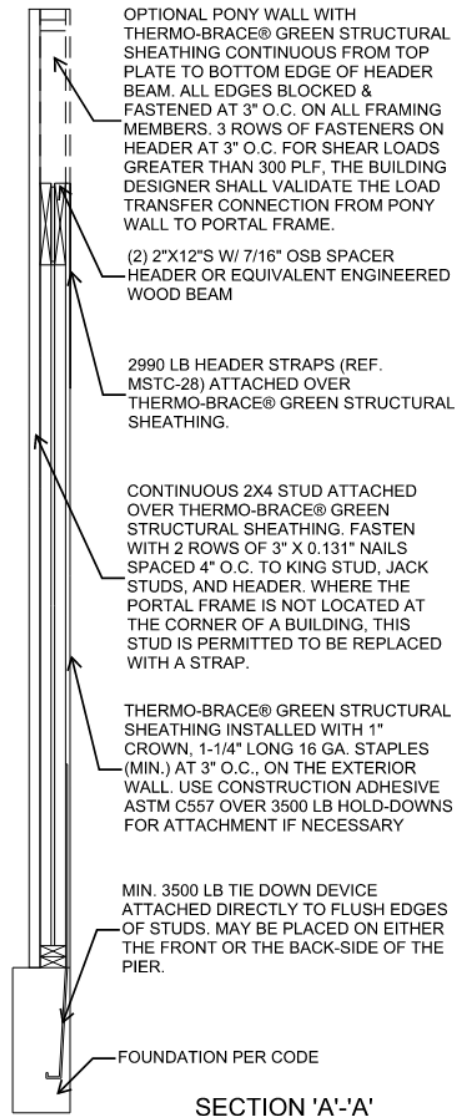
- 5.2.4.5 The test data and subsequent engineering analysis provides confirmation that the performance of the Thermo-Brace® Green Structural Sheathing 12" PFH and 24" PFH provide comparable equivalence to the Method WSP braced wall panels.
- 5.2.4.6 As detailed in Figure 4, Figure 5, Figure 6, and Figure 7, the maximum allowable compressive strength of the Thermo-Brace® Green Structural Sheathing 12" to 24" PFH is 11,156 lbs. per pier. Additional compressive capacity may be engineered into each pier.
- 5.2.4.7 **PFH Assembly**
  - 5.2.4.7.1 The Thermo-Brace® Green Structural Sheathing 12" PFH and 24" PFH is constructed in accordance with Figure 4, Figure 5, Figure 6, and Figure 7.
  - 5.2.4.7.2 The piers in the PFH Assembly are made up of 7/16" OSB sandwiched between nominal 2x4 studs installed flatwise with additional 2x4 studs framing the outside corner (Figure 7).



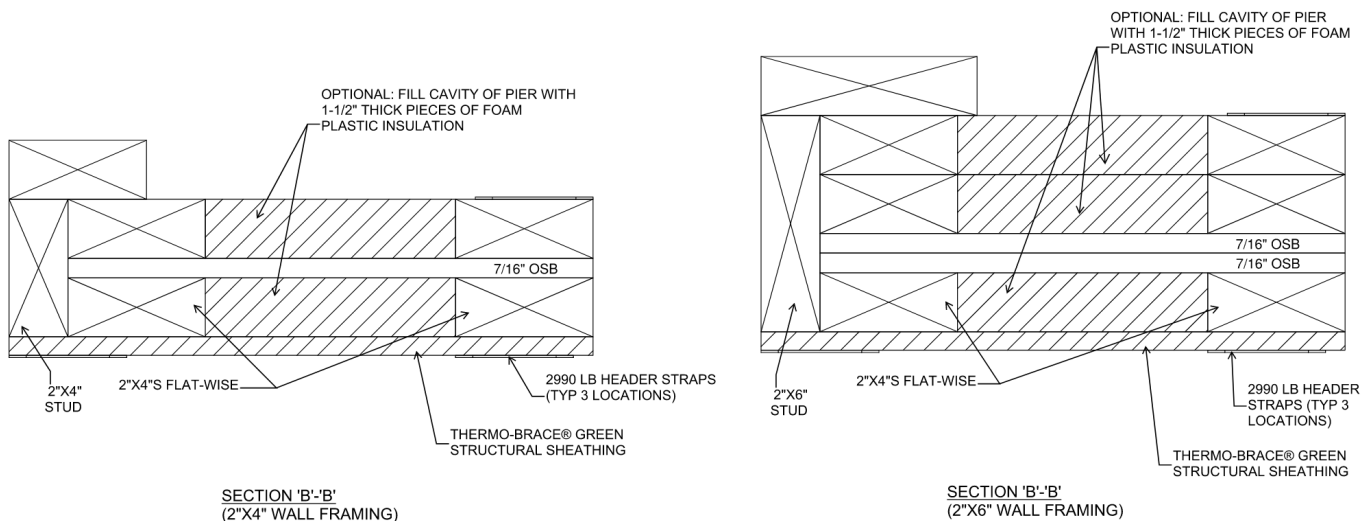
**Figure 4.** Construction Details of Thermo-Brace® Green Structural Sheathing 12" to 24" PFH



**Figure 5.** Header Connection Detail



**Figure 6. PFH Section A-A**



**Figure 7. PFH Section B-B**



## 5.2.5 Alternative to Prescriptive IRC Bracing Applications:

5.2.5.1 As an alternative to the requirements of Section 5.2.2 of this TER, the following provisions are permitted:

- 5.2.5.1.1 Thermo-Brace® Red SIB™ may be used on braced wall lines as an equivalent alternative to the WSP method when installed in accordance with [IRC Section R602.10](#) and this TER.
- 5.2.5.1.2 Thermo-Brace® Red SIB™ may be used to brace the walls of buildings as an alternative to the continuous wall bracing provisions of the CS-WSP method described in [IRC Section R602.10.4](#).
- 5.2.5.1.3 Required braced wall panel lengths for Thermo-Brace® Green Structural Sheathing shall be as determined by the equivalency factor shown in Table 4 and [IRC Section R602.10.3](#) and [IRC Table R602.10.3\(1\)](#) through [IRC Table R602.10.3\(4\)](#), including all footnotes.
- 5.2.5.1.3.1 Bracing lengths in the IRC tables for the WSP or CS-WSP methods shall be multiplied by the equivalency factors listed in Table 4 below.

**Table 4. Braced Wall Line Length Equivalency Factors<sup>4,5</sup>**

Product	Fastener	Fastener Spacing (edge:field) (in)	Maximum Stud <sup>1</sup> Spacing (in)	Gypsum Wallboard <sup>3</sup> (GWB)	GWB Fastening Spacing (edge:field) (in)	Equivalency Factors <sup>2</sup> to IRC WSP or CS-WSP
Thermo-Brace® Green	15/16" crown x 1 1/4" leg 16 ga. staple (min)	3:3	16 o.c.	1/2" GWB	8:8	0.91

SI: 1" = 25.4 mm

- Factors based on SPF framing materials.
- Multiply the bracing lengths indicated for the WSP or CS-WSP continuous sheathing methods in [IRC Table R602.10.3\(1\)](#) and [IRC Table R602.10.3\(3\)](#), and as modified by all applicable factors in [IRC Tables 602.10.3\(2\)](#) and [IRC Table R602.10.3\(4\)](#), by the factors shown here to establish the required bracing length.
- Gypsum wallboard (blocked or unblocked) shall be installed according to the provisions listed in [IRC Table R702.3.5](#). 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.
- These equivalency factors are valid for single top plate (advanced framing method) wall installations or double top plate wall installations.
- Equivalency factors 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 of this TER that are adopted into law and that the manufacturer of those products stand behind. DrJ performs all equivalency analysis based on legally defined design values, the responsibility for which belongs to the manufacturer of those products or the members of the associations that publish those design values.

5.2.5.1.3.2 The braced wall line length equivalency factors in Table 4 are based on equivalency testing and are used to comply with Method WSP and Method CS-WSP of the IRC.

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

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

5.2.5.1.5 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](#).

## 5.2.6 Prescriptive IBC Conventional Light-Frame Wood Construction:

5.2.6.1 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 1/2" 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](#) and this TER.



### 5.2.7 Performance-Based Wood-Framed Construction:

- 5.2.7.1 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 5 and Table 6.
- 5.2.7.2 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 5.

**Table 5. Allowable Stress Design (ASD) Capacities – Wind**

Product	Joint Condition	Fastener <sup>1</sup>	Fastener Spacing (edge:field) (in)	Maximum Stud Spacing (in)	Gypsum Wallboard <sup>2</sup> (GWB)	GWB Fastener Spacing (edge:field) (in)	Allowable Unit Shear Capacity (plf)
Thermo-Brace® Green	Butted or Lapped	15/16" crown x 1 1/4" leg 16 gauge staple (min)	3:3	16 o.c.	None	-	245
					1/2" GWB	8:8	395

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

1. Thermo-Brace® Green fasteners 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 1 1/4" long or 5d cooler nails with a minimum edge distance of 3/8".

### 5.2.8 Uplift Resistance:

- 5.2.8.1 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 6.

**Table 6. Uplift Performance**

Product	Maximum Stud Spacing (in)	Fastener <sup>2</sup>	Fastener Spacing (edge:field) (in)	Allowable Unit Uplift Capacity <sup>1</sup> (plf)
Thermo-Brace® Green: Single Bottom Plate	16 o.c.	15/16" crown x 1 1/4" leg 16 gauge galvanized staples (min) or 0.120" x 1 1/4" roofing nails (min)	3:3	400

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

1. Gypsum wallboard on the back (interior) side of the wall

2. Staple crowns to be installed parallel to grain.

## 5.2.9 Transverse Wind Loading

- 5.2.9.1 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 7 and Table 8.

**Table 7.** Transverse (Out-Of-Plane) Wind Load Resistance

Product	Maximum Stud Spacing (in)	Fastener <sup>3</sup>	Fastener Spacing (edge:field) (in)	Allowable Design Value <sup>1,2</sup> (psf)
Thermo-Brace® Green	16 o.c.	<sup>15</sup> / <sub>16</sub> " crown x <sup>1</sup> / <sub>4</sub> " leg 16 gauge galvanized staples (min) or 0.120" x <sup>1</sup> / <sub>4</sub> " roofing nails (min)	3:3	80

SI: 1" = 25.4 mm, 1 psf = 0.0479 kN/m<sup>2</sup>, 1 mph = 1.61 km/h

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

**Table 8.** Basic Wind Speed for Use in Exterior Wall Covering Assemblies

Product	Allowable Components & Cladding Basic Wind Speed <sup>1</sup> (mph)	
	ASCE 7-05 ( $V_{asd}$ )	ASCE 7-10 and 7-16 ( $V_{ult}$ )
Thermo-Brace® Green	155	200

SI: 1 mph = 1.61 km/h

- 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, Zone 5. See the applicable building code for any adjustment needed for specific building location and configuration.

## 5.3 Water Resistive Barrier

- 5.3.1 Thermo-Brace® Green Structural Sheathing may be used as a WRB as prescribed in [IBC Section 1403.2](#)<sup>12</sup> and [IRC Section R703.2](#) when installed on exterior walls as described in this section.
- 5.3.2 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.
- 5.3.3 Where seams and joints between boards overlap nominally <sup>3</sup>/<sub>4</sub>" (19 mm) and are fastened in accordance with Section 6, seam tape is not required for approval as a WRB.
- 5.3.4 Where seams and joints between boards are butt jointed, they shall be sealed with Barricade® Seam Tape or equivalent in accordance with Section 6. A slight gap of approximately <sup>1</sup>/<sub>8</sub>" between panels is allowed.
- 5.3.5 A separate WRB system may also be provided. If a separate WRB system is used, taping of the sheathing joints is not required.
- 5.3.6 Flashing must be installed at all sheathing penetrations and shall comply with all applicable code sections.

## 5.4 Air Barrier

- 5.4.1 Thermo-Brace® Green Structural Sheathing may be used as an air barrier material as prescribed in [IRC Section N1102.4.1.1](#), [IECC Section R402.4.1.1](#) and [IECC Section C402.5.1.1](#) in accordance with ASTM E2178.

<sup>12</sup> 2015 IBC Section 1404.2

## 5.5 Draftstop

5.5.1 Thermo-Brace® Green Structural Sheathing may be used as a draftstop material in accordance with [IBC Section 708.4.2](#), [IBC Section 718.3](#), [IBC Section 718.4](#) and [IRC Section R302.12](#).

5.5.2 When installed as of a draftstop, Thermo-Brace® Green Structural Sheathing shall be installed in accordance with Section 6.

## 5.6 Surface Burn Characteristics

5.6.1 Thermo-Brace® Green Structural Sheathing may be used as a Class C interior finish material in accordance with [IBC Section 803.1.2](#)<sup>13</sup> and [IRC Section R302.9](#).

5.6.2 Thermo-Brace® Green Structural Sheathing have flame spread characteristics shown in Table 9.

**Table 9.** Surface Burn Characteristics

Product <sup>1</sup>	Flame Spread	Smoke Developed
Thermo-Brace® Green	< 200	< 450
1. Tested in accordance with ASTM E84.		

## 5.7 Minimum Fastening Requirements for 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 gauge galvanized staples having a minimum <sup>15</sup>/<sub>16</sub>" 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 <sup>3</sup>/<sub>8</sub>" (9.5 mm).

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 <sup>3</sup>/<sub>4</sub>" (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.

5.8 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

## 6 Installation

6.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this TER and the applicable building code.

6.2 In the event of a conflict between the manufacturer installation instructions and this TER, the more restrictive shall govern.

6.3 Basic instructions are printed on every Thermo-Brace® pallet or insert.

6.4 *Orientation*

<sup>13</sup> [2015 IBC Section 803.1.1](#)



- 6.4.1 Thermo-Brace® Green Structural Sheathing and PermaBrace 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.
- 6.4.2 PermaBrace Green Guard Thermo-Brace® Green Guard must be installed vertically, centered on the corner of the building. To be recognized as a water barrier, all joints must be backed by studs, plates, or blocks and fastened in accordance with Section 6.4.
- 6.5 *Fastener Type*
  - 6.5.1 *Thermo-Brace® Green Structural Sheathing:*
    - 6.5.1.1 Minimum  $^{15}/_{16}$ " crown x  $1\frac{1}{4}$ " leg, 16 gauge galvanized staples shall be installed per the staple manufacturer instructions.
    - 6.5.1.2 Where permitted in Section 5, 0.120" x  $1\frac{1}{4}$ " minimum roofing nails shall be installed per the nail manufacturer instructions.
    - 6.5.1.3 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.
  - 6.5.2 *Gypsum Wallboard:*
    - 6.5.2.1 Where required, gypsum wallboard shall be a minimum  $\frac{1}{2}$ " thickness and shall be attached, at a minimum, with one of the following:
      - 6.5.2.1.1 #6 x  $1\frac{1}{4}$ " type W or S screws.
      - 6.5.2.1.2 5d cooler nails.
- 6.6 *Fastener Edge Distance*
  - 6.6.1 Fasteners shall be installed with a nominal edge distance of  $\frac{3}{8}$ " (9.5 mm) for Thermo-Brace® Green Structural Sheathing, and gypsum.
- 6.7 *Treatment of Joints*
  - 6.7.1 Thermo-Brace® Green Structural Sheathing joints may be either butted or overlapped.
    - 6.7.1.1 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.
    - 6.7.1.2 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. Overlapped joints do not require Barricade® Seam Tape.
  - 6.7.2 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 installation instructions.

## 7 Substantiating Data

- 7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
  - 7.1.1 Lateral load testing in accordance with ASTM E2126
  - 7.1.2 Transverse load testing in accordance with ASTM E330
  - 7.1.3 Uplift load testing in accordance with ASTM E72
  - 7.1.4 Water-resistive barrier testing in accordance with ASTM E331
  - 7.1.5 Air barrier material testing in accordance with ASTM E2178
  - 7.1.6 Flame spread and smoke developed ratings in accordance with ASTM E84

- 7.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies (i.e., ANAB accredited agencies), approved sources (i.e., RDPs), and/or professional engineering regulations. Accuracy of external test data and resulting analysis is relied upon.
- 7.3 Where pertinent, testing and/or engineering analysis is based upon provisions that have been codified into law through state or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ's engineering practice may use a code-adopted provision as the control sample. A control sample versus a test sample establishes a product as being equivalent to the code-adopted provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.
- 7.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, Listings, certified reports, duly authenticated reports from approved agencies, and research reports prepared by approved agencies and/or approved sources provided by the suppliers of products, materials, designs, assemblies and/or methods of construction. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this TER, may be dependent upon published design properties by others.
- 7.5 Testing and engineering analysis: The strength, rigidity and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.<sup>14</sup>
- 7.6 Where additional condition of use and/or code compliance information is required, please search for Thermo-Brace® Green Structural Sheathing on the DrJ Certification website.

## 8 Findings

- 8.1 As delineated in Section 3, Thermo-Brace® Green Structural Sheathing have performance characteristics that were tested and/or meet pertinent standards and is suitable for use pursuant to its specified purpose.
- 8.2 When used and installed in accordance with this TER and the manufacturer installation instructions, Thermo-Brace® Green Structural Sheathing shall be approved for the following applications:
- 8.2.1 Lateral load resistance due to wind loads carried by shear walls.
  - 8.2.2 Use as equivalent to the CS-PF as described in IRC Section R602.10.5 and IRC Section R602.10.6.4.
  - 8.2.3 Use as an equivalent alternative to Method PFH as described in IRC Section R602.10.6.2.
  - 8.2.4 Transverse load resistance due to components and cladding pressures on building surfaces.
  - 8.2.5 Uplift load resistance due to wind uplift loads carried by the walls.
  - 8.2.6 Performance for use as a WRB in accordance with IBC Section 1403.2<sup>15</sup> and IRC Section R703.2.
  - 8.2.7 Performance for use as an air barrier in accordance with IRC Section N1102.4.1.1, IECC Section R402.4.1.1 and IECC Section C402.5.1.1.
  - 8.2.8 Performance for use as a draftstop in accordance with IBC Section 708.4.2, IBC Section 718.3, IBC Section 718.4 and IRC Section R302.12.
  - 8.2.9 Performance for use as a Class C interior finish material in accordance with IBC Section 803.1.2<sup>16</sup> and IRC Section R302.9.
- 8.3 Unless exempt by state statute, when the Thermo-Brace® Green Structural Sheathing is to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.
- 8.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from INDEVCO Building Products.

<sup>14</sup> See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

<sup>15</sup> 2015 IBC Section 1404.2

<sup>16</sup> 2015 IBC Section 803.1.1

8.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10<sup>17</sup> are similar) in pertinent part 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. 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.

- 8.6 **Approved:**<sup>18</sup> Building codes require that the building official shall accept duly authenticated reports<sup>19</sup> or research reports<sup>20</sup> from approved agencies and/or approved sources (i.e., licensed RDP) with respect to the quality and manner of use of new products, materials, designs, services, assemblies, or methods of construction.
- 8.6.1 Acceptability of an approved agency, by a building official, is performed by verifying that the agency is accredited by a recognized accreditation body of the International Accreditation Forum (IAF).
- 8.6.2 Acceptability of a licensed RDP, by a building official, is performed by verifying that the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.
- 8.6.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved, as denial without written reason deprives a protected right to free and fair competition in the marketplace.
- 8.7 DrJ is an engineering company, employs RDPs and is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.
- 8.8 Through ANAB accreditation and the IAF Multilateral Agreements, this TER 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.*” IAF specifically says, “*Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.*”<sup>21</sup>

## 9 Conditions of Use

- 9.1 Material properties shall not fall outside the boundaries defined in Section 3.
- 9.2 As defined in Section 3, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.
- 9.3 As listed herein, Thermo-Brace® Green Structural Sheathing shall not be used:
- 9.3.1 As a nailing base for claddings, trim, windows, and doors. Fastening through the Thermo-Brace® Green Structural Sheathing into the framing is acceptable.
- 9.3.2 Walls sheathed with Thermo-Brace® Green Structural Sheathing shall not be used to resist horizontal loads from concrete and masonry walls.
- 9.4 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 5.3.

<sup>17</sup> 2018 IFC Section 104.9

<sup>18</sup> Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

<sup>19</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>

<sup>20</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>

<sup>21</sup> <https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise>



- 9.4.1 When Thermo-Brace® Structural Sheathing is not installed as a WRB, other means of providing a WRB shall be required, as per the code.
- 9.5 When used in accordance with the IBC in high wind areas, special inspections shall comply with IBC Section 1705.12<sup>22</sup>.
- 9.6 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.6.1 Allowable shear loads shall not exceed values in Table 5 for wind loads.
- 9.6.2 Allowable uplift loads shall not exceed values in Table 6.
- 9.6.3 Transverse design loads shall not exceed those described in Table 7 and 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.
- 9.7 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
- 9.7.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice, and, when prepared by an approved source, shall be approved when requirements of adopted legislation are met.
- 9.7.2 This TER and the installation instructions shall be submitted at the time of permit application.
- 9.7.3 These products have an internal quality control program and a third-party quality assurance program.
- 9.7.4 At a minimum, these products shall be installed per Section 6 of this TER.
- 9.7.5 The review of this TER, by the AHJ, shall be in compliance with IBC Section 104 and IBC Section 105.4.
- 9.7.6 These products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4 and IRC Section R109.2.
- 9.7.7 The application of these products in the context of this TER is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2 and any other regulatory requirements that may apply.
- 9.8 The approval of this TER by the AHJ shall comply with IBC Section 1707.1, where legislation states in pertinent part, *"the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11", all of IBC Section 104, and IBC Section 105.4.*
- 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 and/or by the building designer (i.e., owner or RDP).
- 9.10 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.

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<sup>22</sup> 2018 IBC Section 1705.11





## 10 Identification

- 10.1 The products listed in Section 1.1 through Section 1.4 are identified by a label on the board or packaging material bearing the manufacturer name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at [barricadebp.com](http://barricadebp.com).

## 11 Review Schedule

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

## 12 Approved for Use Pursuant to US and International Legislation Defined in Appendix A

- 12.1 Thermo-Brace® Green Structural Sheathing are included in this TER published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services, and whose TER Listing states either that the material, product, or service meets identified standards or has been tested and found suitable for a specified purpose. This TER meets the legislative intent and definition of being acceptable to the AHJ.

## Appendix A

### 1 Legislation that Authorizes AHJ Approval

- 1.1 **Fair Competition:** State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:
  - 1.1.1 Advance Innovation,
  - 1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and
  - 1.1.3 Benefit consumers through lower prices, better quality, and greater choice.
- 1.2 **Adopted Legislation:** The following local, state, and federal regulations affirmatively authorize Thermo-Brace® Green Structural Sheathing to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:
  - 1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies and/or methods of construction. The goal is to “protect economic freedom and opportunity by promoting free and fair competition in the marketplace.”
  - 1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation, and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.
  - 1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2018 (DTSA).
    - 1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.
  - 1.2.4 For new materials<sup>23</sup> that are not specifically provided for in any building code, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.
  - 1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.<sup>24</sup>
  - 1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence, provided in writing, that specific legislation has been violated by an individual registered PE.
  - 1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.<sup>25</sup>

<sup>23</sup> <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2>

<sup>24</sup> IBC 2021, Section 1706.1 Conformance to Standards

<sup>25</sup> IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

- 1.3 **Approved<sup>26</sup> by Los Angeles:** The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards, which apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.<sup>27</sup> The Superintendent of Building roster of approved testing agencies is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a CBI Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.<sup>28</sup>
- 1.4 **Approved by Chicago:** The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).
- 1.5 **Approved by New York City:** The NYC Building Code 2022 (NYCBC) states in pertinent part that an approved agency shall be deemed<sup>29</sup> an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement<sup>30</sup> (i.e., ANAB, International Accreditation Forum (IAF), etc.).
- 1.6 **Approved by Florida:** Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation, by 1) A certification mark or listing of an approved certification agency, 2) A test report from an approved testing laboratory, 3) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity; 4) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a professional engineer or architect, licensed in Florida. For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods; 1) A certification mark, listing, or label from a commission-approved certification agency indicating that the product complies with the code; 2) A test report from a commission-approved testing laboratory indicating that the product tested complies with the code; 3) A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code; 4) A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code; 5) A statewide product approval issued by the Florida Building Commission. The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).

<sup>26</sup> See Section 8 for the distilled building code definition of Approved

<sup>27</sup> Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

<sup>28</sup> https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

<sup>29</sup> New York City, The Rules of the City of New York, § 101-07 Approved Agencies

<sup>30</sup> New York City, The Rules of the City of New York, § 101-07 Approved Agencies

- 1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA]):** A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation [553.842](#) and [553.8425](#).
- 1.8 **Approved by New Jersey:** Pursuant to Building Code 2018 of New Jersey in [IBC Section 1707.1 General](#),<sup>31</sup> it states: “In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from [approved agencies](#) in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the [Uniform Construction Code \(N.J.A.C. 5:23\)](#)”.<sup>32</sup> Furthermore N.J.A.C 5:23-3.7 states: Municipal approvals of alternative materials, equipment, or methods of construction. **(a) Approvals:** Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations. 1. A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. 2. Reports of engineering findings issued by nationally recognized evaluation service programs, such as, but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of (a) above. The [New Jersey Department of Community Affairs](#) has confirmed that technical evaluation reports, from any accredited entity listed by [ANAB](#), meets the requirements of item 2 given that the listed entities are no longer in existence and/or do not provide “reports of engineering findings”.
- 1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards:** Pursuant to Title 24, Subtitle B, Chapter XX, [Part 3282.14](#),<sup>33</sup> and [Part 3280](#),<sup>34</sup> the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform with the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow: 1) “All construction methods shall be in conformance with accepted engineering practices”; 2) “The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.”; and 3) “The design stresses of all materials shall conform to accepted engineering practice.”
- 1.10 **Approval by US, Local, and State Jurisdictions in General:** In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:
- 1.10.1 For [new materials](#) that are not specifically provided for in this code, the [design strengths and permissible stresses](#) shall be established by tests.<sup>35</sup>
- 1.10.2 For [innovative alternative products, materials, designs, services and/or methods of construction](#), in the absence of approved rules or other approved standards...the building official shall accept duly authenticated reports (i.e., listing and/or research report) from [approved agencies](#) with respect to the quality and manner of use of [new materials or assemblies](#).<sup>36</sup> A building official [approved agency](#) is deemed to be approved via certification from an [accreditation body](#) that is listed by the [International Accreditation Forum](#)<sup>37</sup> or equivalent.

<sup>31</sup> [https://up.codes/viewer/new\\_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1](https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1)

<sup>32</sup> <https://www.nj.gov/dca/divisions/codes/codereg/ucc.html>

<sup>33</sup> <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14>

<sup>34</sup> <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280>

<sup>35</sup> [IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials](#). Adopted law pursuant to IBC model code language 1706.2.

<sup>36</sup> [IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General](#). Adopted law pursuant to IBC model code language 1707.1.

<sup>37</sup> Please see the [ANAB directory](#) for building official approved agencies.

- 1.10.3 The design strengths and permissible stresses of any structural material...shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.<sup>38</sup> An approved source is defined as a PE subject to professional engineering laws, where a research and/or a technical evaluation report certified by a PE, shall be approved.
- 1.11 **Approval by International Jurisdictions:** The USMCA and GATT agreements provide for approval of innovative materials, products, designs, services, assemblies and/or methods of construction through the Technical Barriers to Trade agreements and the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA), where these agreements:
- 1.11.1 Permit participation of conformity assessment bodies located in the territories of other Members (defined as GATT Countries) under conditions no less favourable than those accorded to bodies located within their territory or the territory of any other country,
  - 1.11.2 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.
  - 1.11.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.
  - 1.11.4 **Approved:** The purpose of the IAF MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA, and subsequently acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction. Accreditations granted by IAF MLA signatories are recognised worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to businesses and consumers.

<sup>38</sup> IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.



Issue Date: June 24, 2021  
Subject to Renewal: July 1, 2024

## FBC Supplement to TER 1507-07

REPORT HOLDER: INDEVCO Building Products

### 1 Evaluation Subject

- 1.1 Thermo-Brace® Green Structural Sheathing
- 1.2 PermaBrace Green Structural Sheathing
- 1.3 Thermo-Brace® Green Guard
- 1.4 PermaBrace Green Guard

### 2 Purpose and Scope

- 2.1 Purpose
  - 2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show Thermo-Brace® Green Structural Sheathing, recognized in TER 1507-07, has also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.
- 2.2 *Applicable Code Editions*
  - 2.2.1 *FBC-B—17, 20: Florida Building Code – Building*
  - 2.2.2 *FBC-R—17, 20: Florida Building Code – Residential*
  - 2.2.3 *FBC-EC—17, 20: Florida Building Code – Energy Conservation*

### 3 Conclusions

- 3.1 Thermo-Brace® Green Structural Sheathing, described in TER 1507-07, complies with the FBC-B, FBC-R, and FBC-EC and is subject to the conditions of use described in this supplement.
- 3.2 Where there are variations between the IBC, IRC, and IECC and the FBC-B, FBC-R, and FBC-EC applicable to this TER, they are listed here:
  - 3.2.1 FBC-B Section 104.4 and Section 110.4 are reserved.
  - 3.2.2 FBC-R Section R104, Section R109, Section R602.10, Section R602.10.3, Table R602.10.3(1), Table R602.10.3(2), Table R602.10.3(3), Table R602.10.3(4), Section R602.10.4, Table R602.10.5, and Section R602.10.6.4 are reserved.
  - 3.2.3 FBC-R Section N1101 replaces IRC Section N1102.4.1.1.
  - 3.2.4 FBC-B Section 708.4 replaces IBC Section 708.4.2.
  - 3.2.5 FBC-B Section 803.1.1 replaces IBC Section 803.1.2.
  - 3.2.6 FBC-B Section 2308 replaces IBC Section 2308.6 and is reserved.
  - 3.2.7 FBC-B Section 1404.2 replaces IBC Section 1403.2.
  - 3.2.8 FBC-B Section 1705 replaces both IBC Section 1705.12 and Section 1705.11 and is reserved.

### 4 Conditions of Use

- 4.1 Thermo-Brace® Green Structural Sheathing, described in TER 1507-07, must comply with all of the following conditions:
  - 4.1.1 All applicable sections in TER 1507-07
  - 4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.