



CERTIFICATION



Approved. Sealed. Code Compliant.

Technical Evaluation Report

TER 1608-04

Brace-Plate™

Fibre Converters, Inc.

Product:

Brace-Plate™

Issue Date:

September 21, 2016

Revision Date:

October 30, 2020

Subject to Renewal:

October 1, 2021



COMPANY
INFORMATION:

ADDITIONAL
LISTEES:

Fibre Converters, Inc.
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269-279-1700
fibreconverters.com

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Issaquah, WA 98027-3807
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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

1 PRODUCT EVALUATED¹

1.1 Brace-Plate™

2 APPLICABLE CODES AND STANDARDS^{2,3}

2.1 Codes

- 2.1.1 *IBC—12, 15, 18: International Building Code®*
- 2.1.2 *IECC—12, 15, 18: International Energy Conservation Code*
- 2.1.3 *IRC—12, 15, 18: International Residential Code®*

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 E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*

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.



3 PERFORMANCE EVALUATION

3.1 Brace-Plate™ was 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.
- 3.1.2 Structural performance under lateral load conditions for use as an alternative to the *IRC* Continuous Wall Bracing provisions of Section R602.10.4 Method CS-WSP.
- 3.1.3 Structural performance under lateral load conditions for use as an alternative to the *IBC* Conventional Wall Bracing provisions, Section 2308.6, Method 3, for Type V construction.
- 3.1.4 Structural performance under lateral load conditions for wind loading for use with the *IBC* performance-based provisions, Section 2306.1 and 2306.3 for light-frame wood wall assemblies.
- 3.1.5 Structural performance under lateral load conditions for use as an alternative to *SDPWS* Section 4.3 Wood-Frame Shear Walls.

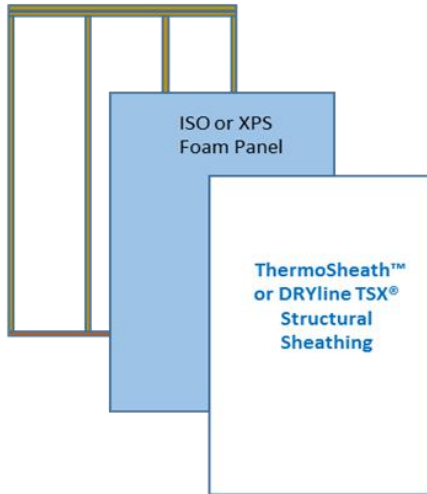
3.2 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.

3.3 Any engineering evaluation conducted for this TER was performed on the dates provided in this TER and within DrJ's professional scope of work.

4 PRODUCT DESCRIPTION AND MATERIALS

- 4.1 Brace-Plate™, pictured in Figure 1, is a proprietary application of ThermoSheath™ and DRYline TSX® sheathing brands manufactured by Fibre Converters, Inc. The proprietary application consists of ThermoSheath combined with Polyisocyanurate Rigid Foam Insulation (polyiso) or Extruded Polystyrene Rigid Foam Insulation (XPS).

Brace Plate Installation



1. **Framing**
 - 16" On-center stud spacing
 - Studs/Plates: nominal 2" x 4"
 - Framing fasteners: Typical
2. **ISO or XPS Foam panels**
Mechanically fasten ISO or XPS Foam panel securely against framing with enough fasteners to secure to framing (Do not pin the corners).
3. **Structural ThermoSheath™ or DRYline TSX® Sheathing**
Install the ThermoSheath™ or DRYline TSX® Sheathing over the top of the Foam Panels with 1 3/4" ring-shank Galvanized Coil roofing nails. Seat the nail head flush with the Sheathing surface, ensuring that the nail shank is embedded into the framing. Fasten the nails 3" on-center, a minimum of 3/8" from the edge of the sheathing.

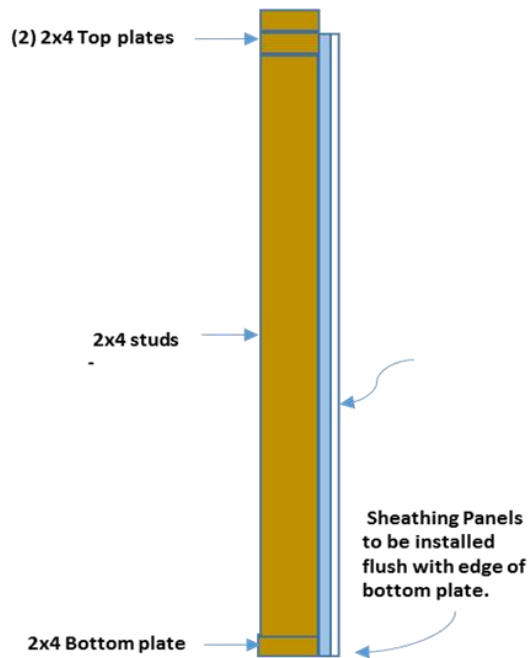
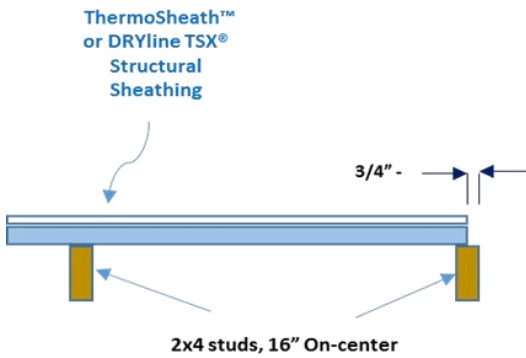


FIGURE 1. BRACE-PLATE™ STRUCTURAL SHEATHING

4.1.1 Brace-Plate™ described in this TER and shown in Figure 1 contains a combination of the following materials:

4.1.1.1 Fibre Converters Red or Blue ThermoSheath™ or DRYline TSX® and,



- 4.1.1.2 One of the following insulation products:
- 4.1.1.3 ¾" or thinner Rmax® Thermasheath® foam plastic insulating sheathing (FPIS) or
- 4.1.1.4 1" or thinner Dow® STYROFOAM™ Brand (Square Edge or Tongue and Groove) XPS
- 4.1.2 Material Availability
 - 4.1.2.1 Standard product width: 48" (1219 mm) or 48-¾" (1238 mm)
 - 4.1.2.2 Standard lengths: 96" (2438 mm), 108" (2743 mm), 120" (3048 mm), and other sizes are available by request.

5 APPLICATIONS

5.1 General

- 5.1.1 Brace-Plate™ is used as wall sheathing in buildings constructed in accordance with the *IRC* and *IBC* for light-frame wood construction.
- 5.1.2 Brace-Plate™ is used as structural wall sheathing to provide lateral load resistance (wind) for braced wall panels used in light-frame wood construction.
- 5.1.3 Brace-Plate™ panels are permitted to be used as wall sheathing in buildings constructed in accordance with the *IBC* requirements for Type V light-frame construction.

5.2 Structural Applications

5.2.1 General Structural Provisions

- 5.2.1.1 Except as otherwise described in this TER, Brace-Plate™ shall be installed in accordance with the applicable building codes listed in Section 2 using the provisions set forth therein for the design and installation of wood structural panels (WSP).
 - 5.2.1.1.1 Brace-Plate™ 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.
 - 5.2.1.2.1 For wind design, anchor bolt spacing shall not exceed 6' o.c. (1829 mm).
- 5.2.1.3 The maximum aspect ratio for Brace-Plate™ shall be 4:1.
- 5.2.1.4 The minimum full height panel width shall be 24" (610 mm).
- 5.2.1.5 All panel edges shall be blocked with a minimum 2" (51 mm) nominal lumber.
- 5.2.1.6 Installation is permitted for single top plate (advanced framing method) or double top plate applications.
- 5.2.1.7 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.



5.2.2 Prescriptive IRC Bracing Applications

5.2.2.1 The following provisions are permitted:

- 5.2.2.1.1 Brace-Plate™ 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.
- 5.2.2.1.2 Brace-Plate™ may be used to brace walls of buildings as an alternative to the Continuous Wall Bracing provisions of IRC Section R602.10.4.
- 5.2.2.1.3 Required braced wall panel lengths for Brace-Plate™ shall be as determined by the equivalency factor shown in Table 1 and IRC Table R602.10.3(1) and Table R602.10.3(2), including all footnotes. Brace-Plate™ tested equivalency factors in Table 1 allow the user to determine the length of bracing required by multiplying the factor from Table 1 by the length shown in the WSP or CS columns in IRC Table R602.10.3(1), as modified by all applicable factors in IRC Table R602.10.3(2).

TABLE 1. BRACE-PLATE™ BRACED WALL LINE LENGTH EQUIVALENCY FACTORS BASED ON EQUIVALENCY TESTING FOR USE WITH THE IRC

Products	Maximum Stud Spacing (in)	Fastener Type	Fastener Spacing	Wind
				SPF Framing
				Brace-Plate™ Tested Equivalency Factors to IRC WSP or CS-WSP
Brace-Plate™ (Blue ThermoSheath™ or Blue DRYline TSX® installed over 3/4" or thinner Rmax Thermasheath® or 1" or thinner DOW STYROFOAM™ Square Edge or Tongue and Groove Foam)	16 o.c.	1 3/4" x 0.120" Ring Shank Galvanized Roofing Nail	3:3	0.98
Brace-Plate™ (Red ThermoSheath™ or Red DRYline TSX® installed over 1/2" or thinner Rmax Thermasheath®)	16 o.c.	1 3/4" x 0.120" Ring Shank Galvanized Roofing Nail	3:3	1.02

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

- Demonstrates equivalency to IRC Table R602.10.3(1). All adjustment factors from IRC Table R602.10.3(2) shall be applied. 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 #6 x 1 1/4" Type W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
- Demonstrates equivalency to 2009 IRC Table R602.10.1.2(1). All adjustment factors shall be applied. A minimum 1/2" gypsum sheathing shall be applied to the interior side of the wall assembly and fastened with a minimum 5d cooler nails or #6 x 1 1/4" Type W or S screws spaced 8" o.c. at panel edges and 8" o.c. in the field of the panels.
- Brace-Plate™ attached with 1 3/4" x 0.120 ring shank galvanized roofing nail. Fasteners are to be spaced a maximum of 3" o.c. at the edges and 3" o.c. in the field with a minimum edge distance of 3/8".
- Brace-Plate™ joints shall be butted at framing members, and a single row of fasteners must be applied to each panel framing.

- 5.2.2.1.3.1 These braced wall line length equivalency factors are based on equivalency testing and are used to comply with Method WSP and CS-WSP of the IRC.
- 5.2.2.1.4 All IRC prescriptive bracing minimums, spacing requirements and rules must still be met.
- 5.2.2.1.5 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience and technical judgment.



5.2.3 Performance-Based Wood-Framed Construction

- 5.2.3.1 Brace-Plate™ 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 2.
- 5.2.3.2 Brace-Plate™ panel shear walls are permitted to resist horizontal wind load forces using the allowable shear loads (in pounds per linear foot) set forth in Table 2.

TABLE 2. ALLOWABLE UNIT SHEAR DESIGN VALUES FOR BRACE-PLATE™ STRUCTURAL SHEATHING - WIND

Brace-Plate™ Design Values	Allowable Unit Shear Design Values for Brace-Plate™ Structural Sheathing – Wind				
	Brace-Plate™ Fastener (Spaced 3" o.c. edge / 3" o.c. field)	Maximum Stud Spacing (in)	Gypsum Wallboard (GWB)	Gypsum Wallboard Fastener Spacing (edge/field) (in)	Allowable Unit Shear Capacity (plf)
Brace-Plate™ (Blue ThermoSheath™ or Blue DRYline TSX® over ¾" or thinner Rmax Thermasheath® Foam)	1¾" x 0.120 Ring Shank Galvanized Roofing Nail	16	½" GWB	8/8	400
Brace-Plate™ (Blue Thermosheath™ or DRYline TSX® over 1" or thinner Dow® STYROFOAM™ SE or Tongue and Groove Insulation)	1¾" x 0.0120 Ring Shank Galvanized Roofing Nail	16	½" GWB	8/8	395
Brace-Plate™ (Red ThermoSheath™ or DRYline TSX® over ½" or thinner Rmax Thermasheath® Foam)	1¾" x 0.120 Ring Shank Galvanized Roofing Nail	16	½" GWB	8/8	375

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

- Brace-Plate™ attached with 1¾" x 0.120 ring shank galvanized roofing nail. Fasteners are to be spaced a maximum of 3" o.c. at the edges and 3" o.c. in the field with a minimum edge distance of ¾".
- Gypsum attached with minimum 5d cooler nail or #6 x 1½" Type W or S screws. Fastener spacing shall be as required above.
- Brace-Plate™ joints shall be butted at framing members, and a single row of fasteners must be applied to each panel edge into the stud below.

6 INSTALLATION

- 6.1 Installation of Brace-Plate™ 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 A copy of the manufacturer’s published installation instructions shall be available at all times on the jobsite during installation.
- 6.3 Orientation
 - 6.3.1 Brace-Plate™ must be installed vertically or horizontally with all panel edges supported by framing or blocking.
 - 6.3.2 Brace-Plate™ must be installed over studs with framing that has a nominal thickness of not less than 2" (51 mm) and a spacing of not more than 16" (406 mm) o.c.



6.4 Fastener Type

6.4.1 *Brace-Plate*™:

- 6.4.1.1 Minimum 0.120" x 1¼" (3 mm x 44 mm) ring shank galvanized roofing nail installed with the underside of the head flush with the surface of the sheathing.

6.4.2 *Gypsum Wallboard*:

- 6.4.2.1 Gypsum wallboard shall be installed with a minimum:
 - 6.4.2.1.1 #6 x 11/4" (32 mm) Type W or S screws
 - 6.4.2.1.2 5d cooler nails

6.5 Fastener Spacing

6.5.1 *Brace-Plate*™:

- 6.5.1.1 Maximum of 3" o.c. (76 mm) along the edge and 3" o.c. in the field.

6.5.2 *Gypsum Wallboard*:

- 6.5.2.1 For *IRC* and *IBC* prescriptive applications, gypsum fasteners shall be spaced 8" (203 mm) o.c. at panel edges and 8" o.c. at intermediated framing. For engineered design, see Table 2.

6.6 Fastener Edge Distance

- 6.6.1 Fastener edge distance is a minimum of ¾" (10 mm) for both *Brace-Plate*™ and gypsum.

6.7 Treatment of Joints

- 6.7.1 *Brace-Plate*™ joints shall be butted at framing members, and a single row of fasteners must be applied to each panel edge into the stud below.
- 6.7.2 Do not tack *Brace-Plate*™ to framing but fasten each panel completely once fastening begins.

7 TEST ENGINEERING SUBSTANTIATING DATA

- 7.1 Lateral load testing conducted by an ISO/IEC 17025 accredited testing laboratory under contract with Qualtim, Inc. based on *ASTM E564*.
- 7.2 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.
- 7.3 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.



8.2 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 Brace-Plate™ shall not be used as a nailing base.
- 9.2 Walls sheathed with Brace-Plate™ shall not be used to resist horizontal loads from concrete and masonry walls.
- 9.3 When Brace-Plate™ is not installed for use as wall bracing, as described in this TER, the walls shall be braced by other materials in accordance with the applicable code.
- 9.4 When used in accordance with the *IBC* in high wind areas, special inspections shall comply with IBC Section 1705.11⁴.
- 9.5 Loads applied shall not exceed those recommended by the manufacturer as follows:
 - 9.5.1 Allowable shear loads do not exceed values in Table 2 for wind loads.
- 9.6 The manufacturer's installation instructions shall be available on the jobsite for inspection.
- 9.7 All panel edges shall be supported by wall framing or solid blocking a minimum of 2" (51 mm) nominal in thickness.
- 9.8 Brace-Plate™ is manufactured in Constantine, MI, under a quality control program with quality control inspections in accordance with IRC Section R109.2 and IBC Section 110.3.9⁵ and 110.4.
- 9.9 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.
- 9.10 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.11 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*).
- 9.12 At a minimum, this product shall be installed per Section 6 of this TER.
- 9.13 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.
- 9.14 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.

⁴ 2012 IBC Section 1705.10

⁵ 2015 IBC Section 110.3.8



- 9.15 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 fibreconverters.com or nationalshelter.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](#).