

**Thermo-Ply® Blue & Thermo-Ply® Blue AMG
Structural Sheathing**

TER No. 1004-02

Issue Date: November 8, 2013

Updated: April 17, 2018

Subject to Renewal: April 1, 2019

Ox Engineered Products, LLC

700 Centreville Rd.
Constantine, MI 49042
269-435-2425
www.oxengineeredproducts.com

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

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

DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION

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

1. Products Evaluated:

- 1.1. Thermo-Ply® Blue Structural Sheathing
- 1.2. Thermo-Ply® Blue AMG Structural Sheathing¹
- 1.3. For the most recent version of this Technical Evaluation Report (TER), visit drjengineering.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjengineering.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.
- 1.4. This TER can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found [here](#)) and covered by an [IAF MLA Evaluation](#) per the [Purpose of the MLA](#) (as an example, see [letter to ANSI](#) from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other [IAF MLA Signatory Countries](#) and have their products readily approved by authorities having jurisdiction using [DrJ's ANSI accreditation](#).
- 1.5. Building code regulations require that evaluation reports are provided by an approved agency meeting specific

¹ Throughout this TER, wherever Thermo-Ply® Blue is cited, the provisions are applicable to Thermo-Ply® Blue AMG as well.

DrJ is a Professional Engineering Approved Source

 **Learn more about DrJ's Accreditation**

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

Technical Evaluation Report (TER)

requirements, such as those found in [IBC Section 1703](#). Any agency accredited in accordance with ANSI ISO/IEC 17065 meets this requirement within ANSI's scope of accreditation. For a list of accredited agencies, visit ANSI's [website](#). For more information, see [drjcertification.org](#).

- 1.6. Requiring an evaluation report from a specific private company (i.e. ICC-ES, IAPMO, CCMC, DrJ, etc.) can be viewed as discriminatory and is a violation of international, federal, state, provincial and local anti-trust and free trade regulations.
- 1.7. DrJ's code compliance work:
 - 1.7.1. Conforms to code language adopted into law by individual states and any relevant consensus based standard such as an ANSI or ASTM standard.
 - 1.7.2. Complies with accepted engineering practice, all professional engineering laws and by providing an engineer's seal DrJ takes professional responsibility for its specified scope of work.

2. Applicable Codes and Standards:²

- 2.1. 2012, 2015 and 2018 International Residential Code (IRC)
- 2.2. 2012, 2015 and 2018 International Building Code (IBC)
- 2.3. 2012, 2015 and 2018 International Energy Conservation Code (IECC)
- 2.4. 2014 and 2017 Florida Building Code (FBC) (FL 16391)
- 2.5. ASCE 7 – Minimum Design Loads for Buildings and Other Structures
- 2.6. AWC Wind & Seismic – Special Design Provisions for Wind and Seismic (SDPWS)
- 2.7. ASTM E72 – Standard Methods of Conducting Strength Test of Panels for Building Construction
- 2.8. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials
- 2.9. ASTM E564 – Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings
- 2.10. ASTM E283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- 2.11. ASTM E330 / E330M – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- 2.12. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- 2.13. ASTM E2126 – Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings
- 2.14. ASTM E2178 – Standard Test Method for Air Permeance of Building Materials
- 2.15. UL 723 – Test for Surface Burning Characteristics of Building Materials

3. Performance Evaluation:

- 3.1. Thermo-Ply® Blue Structural Sheathing has been evaluated to determine:
 - 3.1.1. Structural performance under lateral load conditions (wind and seismic) for use as an alternative to the IRC Intermittent Wall Bracing provisions of [IRC Section R602.10](#) and the IRC Continuous Wall Bracing provisions of [IRC Section R602.10.4](#) Method CS-WSP and CS-PF.
 - 3.1.2. Structural performance under lateral load conditions for both wind and seismic loading for use with the performance-based provisions, [IBC Section 2306.1](#) and [2306.3](#), for light-frame wood wall assemblies.

² Unless otherwise noted, all references in this code compliant technical evaluation report (TER) are from the 2018 version of the codes and the standards referenced therein, including, but not limited to, ASCE 7, SDPWS and WFCM. This product also complies with the 2000-2015 versions of the IBC and IRC and the standards referenced therein. As required by law, where this TER is not approved, the building official shall respond in writing, stating the reasons this TER was not approved. For variations in state and local codes, if any see [Section 8](#).

Technical Evaluation Report (TER)

- 3.1.2.1.** [Table 5](#) provides seismic design coefficients (SDC) that conform to the requirements in *ASCE 7-10* Section 12.2.1 and Table 12.2-1 for design of wall assemblies in buildings that require seismic design in accordance with *ASCE 7* (i.e., all seismic design categories).
- 3.1.2.2.** The basis for equivalency testing is outlined in Section 12.2.1 of *ASCE 7*.
Seismic force-resisting systems not contained in Table 12.2-1 are permitted provided analytical and test data are submitted to the authority having jurisdiction for approval that establish their dynamic characteristics and demonstrate their lateral force resistance and energy dissipation capacity to be equivalent to the structural systems listed in Table 12.2-1 for equivalent values of response modification coefficient, R, overstrength factor, Ω_o , and deflection amplification factor, C_d .
- 3.1.2.3.** The SDC evaluation uses the approach found in documentation entitled “Equivalency Characteristics and Parameters for Proprietary Shearwalls Used in Wood Framed or Cold-formed Steel Construction”³ using code defined accepted engineering procedures, experience, and good technical judgment.
- 3.1.3.** Structural performance under lateral load conditions for use as an alternative to *SDPWS* Section 4.3 Wood-Frame Shear Walls.
- 3.1.4.** Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with [IRC Section R301.2.1](#) and [IBC Section 1609.1.1](#).
- 3.1.5.** Resistance to uplift loads for wall assemblies used for light-frame wood construction in accordance with [IRC Section R301.2.1](#) and [IBC Section 1609](#).
- 3.1.6.** Performance for use as a water-resistive barrier (WRB) in accordance with [IRC Section R703.2](#) and [IBC Section 1404.2](#).
- 3.1.7.** Performance for use as an air barrier in accordance with [IRC Section N1102.4.1.1](#), and [IECC Section R402.4.1.1](#) and [C402.5.1.1](#)⁴.
- 3.1.8.** Performance for use as a draftstop in accordance with [IRC Section 302.12](#), and [IBC Section 708.4.2](#)⁵, [718.3](#) and [718.4](#).
- 3.2.** Use of Thermo-Ply® Blue Structural Sheathing in a portal frame with hold-down (PFH) is outside the scope of this evaluation.
- 3.2.1.** For this application, see [TER No.1101-01: Ox STYROFOAM SIS™, ISO RED ci & Thermo-Ply® “Portal Frame with Hold-Down” \(12" to 24" CI PFH\)](#).
- 3.3.** Use of Thermo-Ply® Blue Structural Sheathing in a fire resistance rated assembly is outside the scope of this evaluation.
- 3.3.1.** For this application, see [TER No. 1210-01: UL U356 One-Hour Fire-Resistance Rated, Limited Load Bearing Wall Assemblies for Thermo-Ply® Red & Blue Protective Sheathing Using IBC Section 722 Calculation Method \(Exposed to Fire on Interior Face Only\)](#).
- 3.4.** Any code compliance issues not specifically addressed in this section are outside the scope of this evaluation.

³ www.structuremag.org/C-StructuralPerformance

⁴ [2012 IECC Section C402.4.1.1](#)

⁵ [2015 IBC Section 708.4](#)

Technical Evaluation Report (TER)

4. Product Description and Materials:

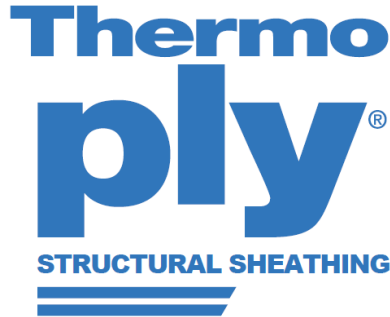


Figure 1: Thermo-Ply® Blue Structural Sheathing

4.1. Thermo-Ply® Blue Structural Sheathing is composed of pressure laminated plies consisting of high-strength cellulosic fibers placed in proprietary orientation(s) to provide a given set of strength properties. These fibers are specially treated to be water resistant and are bonded with a proprietary water-resistive adhesive. A protective polymer layer is applied on both sides of the panel, and foil facings may be additionally applied on one or both faces.

4.1.1. Thermo-Ply® Blue Structural Sheathing panels have a nominal thickness of 0.135" and nominal weight of 0.504 lbs. per square foot.

4.2. Material Availability

4.2.1. Standard widths include 48" (1219 mm) and 48^{3/4}" (1238 mm).

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

4.2.3. Other custom widths and lengths can be manufactured.

5. Applications:

5.1. General

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

- 5.1.1.1. Wall sheathing in buildings constructed in accordance with the *IRC* and *IBC* for light-frame wood construction
- 5.1.1.2. Structural wall sheathing to provide lateral load resistance (wind and seismic) for braced wall panels used in light-frame wood construction.
- 5.1.1.3. Wall sheathing in buildings constructed in accordance with the *IBC* requirements for Type V light-frame construction.
- 5.1.1.4. Structural wall sheathing to provide resistance to transverse loads for wall assemblies used in light-frame wood construction.
- 5.1.1.5. Structural wall sheathing to provide resistance to uplift loads for wall assemblies used in light-frame wood construction.
- 5.1.1.6. An approved alternative WRB when installed in accordance with [Section 5.3](#) and [Section 6](#).
- 5.1.1.7. An approved air barrier material when installed in accordance with [Section 5.4](#) and [Section 6](#).
- 5.1.1.8. An approved draftstop material when installed in accordance with [Section 5.5](#) and [Section 6](#).

5.2. Structural Applications

5.2.1. General Structural Provisions

5.2.1.1. Except as otherwise described in this Technical Evaluation Report (TER), Thermo-Ply® Blue Structural Sheathing shall be installed in accordance with the applicable building codes listed in [Section 2](#) using the provisions set forth therein for the design and installation of wood structural panels (WSP).

Technical Evaluation Report (TER)

- 5.2.1.1.1.** Thermo-Ply® Blue 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.
- 5.2.1.1.2.** 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](#).
- 5.2.1.1.3.** Except as provided for in [Section 5.2.3](#), the maximum aspect ratio for Thermo-Ply® Blue Structural Sheathing shall be 4:1.
- 5.2.1.1.4.** The minimum full height panel width shall be 24", except as allowed by [Section 3.2.1](#) or [Section 5.2.3](#).
- 5.2.1.1.5.** Installation is permitted for single top plate or double top plate applications.
- 5.2.1.1.6.** Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience and technical judgment.

5.2.2. Simplified *IRC* Bracing Provisions

Story Level	Eave to Ridge Height (ft.)	Minimum Bracing Units Required (long side)						Minimum Bracing Units Required (short side)					
		Length of Short Side (ft.)						Length of Long Side (ft.)					
		10'	20'	30'	40'	50'	60'	10'	20'	30'	40'	50'	60'
One Story or Top of Two Story	10'	1	1	2	2	2	3	1	1	2	2	2	3
First of Two Story		1	2	3	4	4	5	1	2	3	4	4	5
One Story or Top of Two Story	15'	1	2	2	3	3	4	1	2	2	3	3	4
First of Two Story		2	2	3	4	5	6	2	2	3	4	5	6

1. This simplified bracing table is based on the provisions of [IRC Section 602.12](#). All provisions therein shall be observed, except that this table shall replace [IRC Table R602.12.4](#), and Thermo-Ply® shall replace the sheathing material.

2. Interpolation shall not be permitted.

3. Cripple walls or wood-framed basement walls in a walk-out condition of a one-story structure shall be designed as the first floor of a two-story house.

4. Actual lengths of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.

5. Maximum stud spacing is 24" o.c.

6. Thermo-Ply® Blue Structural Sheathing shall be attached with minimum 15/16" crown x 1/4" leg staples fastened 3" o.c. at panel edges and 3" o.c. in the field. Roofing nails (minimum 0.120" x 1 1/4" with a 3/8" head) are a permitted alternate fastener.

7. Minimum 1/2" gypsum wallboard attached to the interior side of the wall in accordance with [IRC Section R702.3.5](#) and [Table R702.3.5](#).

Table 1: Thermo-Ply® Blue Structural Sheathing Simplified Bracing Table

- 5.2.2.1.** Thermo-Ply® Blue Structural Sheathing is permitted to be used in accordance with the *IRC* simplified bracing method of [IRC Section R602.12](#) and [Table 1](#).

5.2.3. Prescriptive *IRC* Bracing Applications

- 5.2.3.1.** Thermo-Ply® Blue Structural Sheathing may be used on braced wall lines as an equivalent alternative to Method WSP and CS-WSP of the *IRC*, when installed in accordance with [IRC Section R602.10](#) and this TER.
- 5.2.3.2.** Required braced wall panel lengths for Thermo-Ply® Blue Structural Sheathing shall be as determined by the equivalency factor shown in [Table 2](#) and [IRC Table R602.10.3\(1-4\)](#)⁶ including all footnotes.
- 5.2.3.2.1.** The 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*.
- 5.2.3.2.2.** Thermo-Ply® Blue Structural Sheathing tested equivalency factors in [Table 2](#) allow the user to determine the length of bracing required, by multiplying the factor from [Table 2](#) by the length shown in the WSP or CS columns in [IRC Table R602.10.3\(1 and 3\)](#), as modified by all applicable factors in [Table R602.10.3\(2 and 4\)](#), respectively.
- 5.2.3.3.** All *IRC* prescriptive bracing minimums, spacing requirements and rules must still be met.

⁶ [2009 IRC Table R602.10.1.2\(1\)](#) and [R602.10.1.2\(2\)](#)

Technical Evaluation Report (TER)

5.2.3.4. 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](#).

Thermo-Ply® Blue Structural Sheathing Wall Bracing Factors	Maximum Stud Spacing (in.)	Fastener	Thermo-Ply® Fastener Spacing (edge/field)	Gypsum Wallboard Fastening Schedule (blocked or unblocked)	Wind
					SPF Framing
					Thermo-Ply® Blue Tested Equivalency Factors to <i>IRC</i> WSP or CS-WSP
Thermo-Ply® Blue Structural Sheathing	16" o.c.	Minimum ¹⁵ / ₁₆ " Crown x 1 ¹ / ₄ " Leg Staples	3:3	16:16	0.84
	24" o.c.				0.87

1. Staples shall be a minimum 16 gauge.
2. Roofing nails (minimum 0.120" x 1¹/₄" with a ³/₈" head) are a permitted alternate fastener.
3. Thermo-Ply® Blue Structural Sheathing tested equivalency factors allow the user to determine the length of bracing required, by multiplying the factor by the length of bracing shown in the WSP or CS columns in [IRC Table R602.10.3\(1 and 3\)](#), as modified by all applicable factors in [Table R602.10.3\(2 and 4\)](#) respectively.
4. Where gypsum wallboard is not applied to the interior side of the wall assembly, bracing lengths in [IRC Table R602.10.3\(1 and 3\)](#), as modified by all applicable factors in [Table R602.10.3\(2 and 4\)](#), shall be used, except the factor for omitting the gypsum wallboard shall be 1. 4. Valid for single top plate (advanced framing method) wall installations or double top plate wall installations.
5. Gypsum wallboard shall be installed according to the provision listed in [IRC Table R702.3.5](#).

Table 2: Thermo-Ply® Blue Structural Sheathing Braced Wall Line Length Equivalency Factors
Based on Equivalency Testing for Use with the *IRC*

5.2.4. Thermo-Ply® Blue Structural Sheathing CS-PF Portal Frame

- 5.2.4.1.** A “Thermo-Ply® Blue Structural Sheathing CS-PF” was tested and evaluated for equivalency to the *IRC* Method CS-PF (Continuous Sheathed Portal Frame) in accordance with [IRC Section R602.10.6.4](#) and [Table R602.10.5](#).
- 5.2.4.2.** [Table R602.10.5](#) establishes the contributing length of bracing of the CS-PF as equivalent to its actual length and that it contributes this length of bracing to that required by method CS-WSP.
- 5.2.4.3.** The capacity of the Thermo-Ply® Blue 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.
- 5.2.4.4.** The Thermo-Ply® Blue Structural Sheathing CS-PF is described as follows:

Technical Evaluation Report (TER)

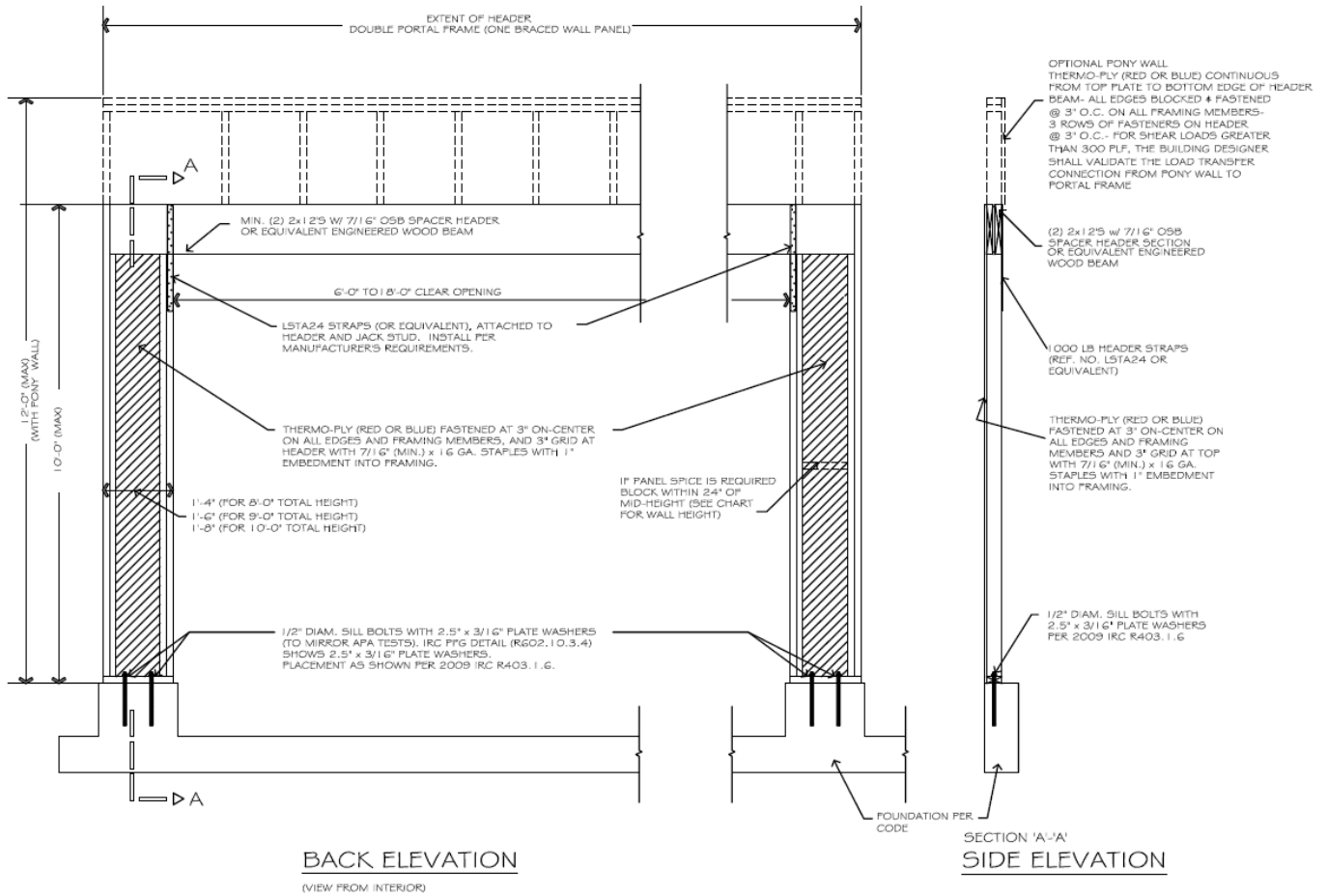


Figure 2: Thermo-Ply® Blue Structural Sheathing CS-PF Back Elevation

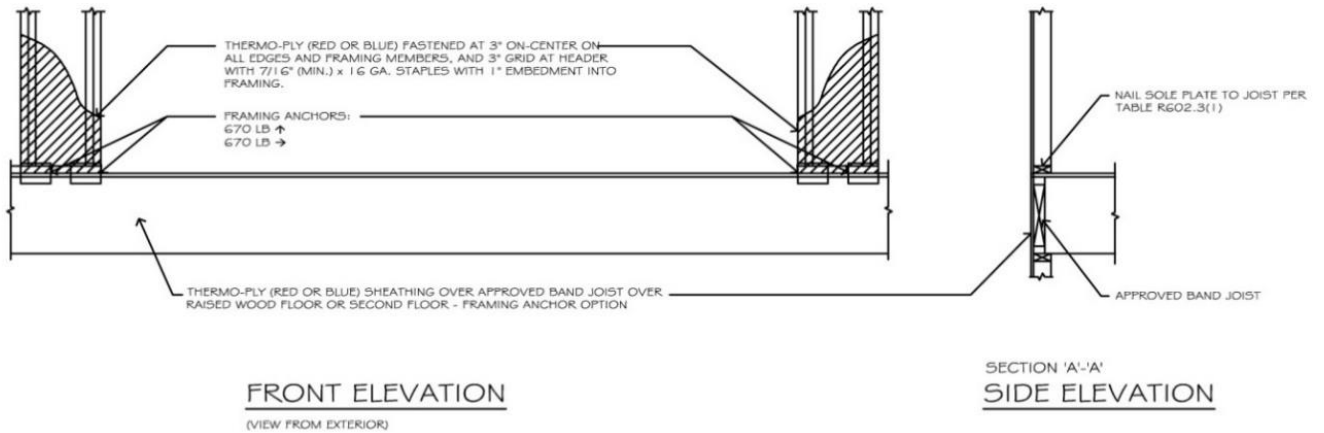


Figure 3: Thermo-Ply® Blue Structural Sheathing CS-PF Front Elevation 1

Technical Evaluation Report (TER)

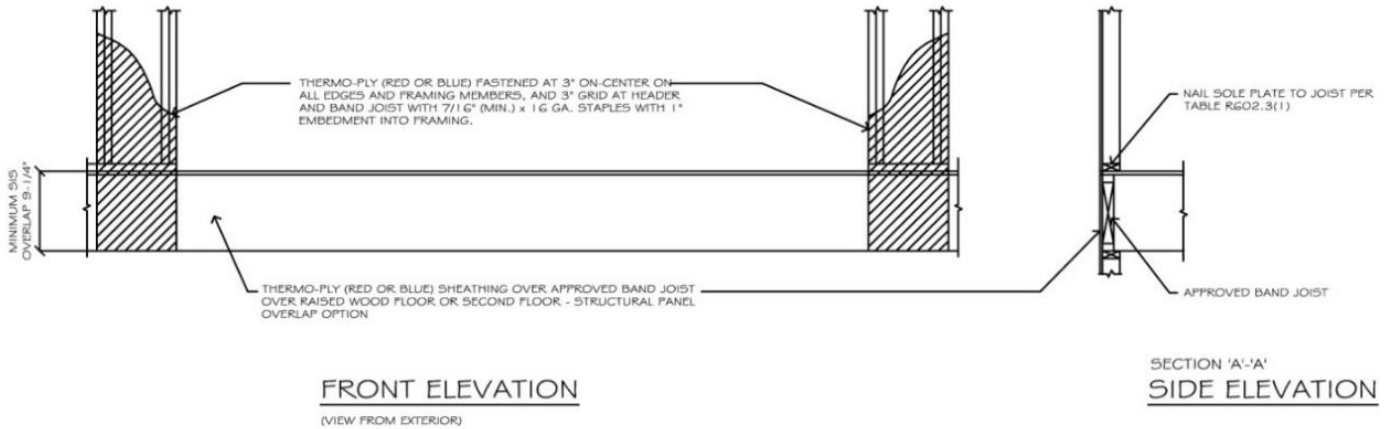


Figure 4: Thermo-Ply® Blue Structural Sheathing CS-PF Front Elevation 2

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

5.2.5.1. Thermo-Ply® Blue 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 $\frac{1}{2}$ " 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](#)⁷ and this TER.

5.2.6. Performance-Based Wood-Framed Construction

- 5.2.6.1. Thermo-Ply® Blue 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 3](#), [Table 4](#) and [Table 5](#).
- 5.2.6.2. Thermo-Ply® Blue 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 3](#).
- 5.2.6.3. Thermo-Ply® Blue Structural Sheathing shear walls that require seismic design in accordance with [IBC Section 1613](#) shall use the seismic allowable unit shear capacities set forth in [Table 4](#).
- 5.2.6.3.1. The response modification coefficient, R , system overstrength factor, Ω_0 , and deflection amplification factor, C_d , indicated in [Table 4](#) shall be used to determine the base shear, element design forces, and design story drift in accordance with *ASCE 7* Chapter 12 and Section 14.5.
- 5.2.6.4. Thermo-Ply® Blue Structural Sheathing panels are permitted to resist uplift load forces using the allowable uplift loads (in pounds per linear foot) set forth in [Table 5](#).
- 5.2.6.5. Thermo-Ply® Blue Structural Sheathing panels are permitted to resist transverse wind load forces using the allowable transverse loads (in pounds per linear foot) set forth in [Table 6](#).

⁷ [2012 IBC Section 2308.9.3](#)

Technical Evaluation Report (TER)

Thermo-Ply® Blue Structural Sheathing Nominal Unit Shear Capacity (NUSC) & Allowable Strength Design (ASD) Capacity – Wind						
Thermo-Ply® Blue Structural Sheathing	Joint Condition	Maximum Stud Spacing (in.)	Gypsum Wallboard (GWB)	Gypsum Wallboard Fastener Spacing (edge/field)	Ultimate Unit Shear Capacity (plf)	Allowable Unit Shear Capacity (plf)
	Lapped or Butted	16" o.c.	½" GWB	4/16	1155	580
				8/8	1035	520
				8/16	1000	500
				16/16	915	460
	Lapped or Butted	24" o.c.	½" GWB	8/8	960	480
				16/16	845	420
	Lapped	16" o.c.	No GWB	-	845	425
		24" o.c.			775	390
	Butted	16" o.c.			800	400
24" o.c.		735			370	

1. Thermo-Ply® Blue attached with a minimum 16 gauge, ¹⁵/₁₆" crown staples shall penetrate a minimum of 1" into the stud. Fasteners are to be installed with the crown parallel to the framing and spaced a maximum of 3" o.c. at the panel edges and 3" o.c. in the field. Fastener edge distance shall be a minimum of ³/₈". Fastener head shall be in contact with the Thermo-Ply® surface. Roofing nails (minimum 0.120" x 1¼" with a ³/₈" head) are a permitted alternate fastener.

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

3. Where lapped joints are used, the panels shall be overlapped nominally ³/₄".

4. Straight line interpolations between fastening patterns is acceptable.

Table 3: Ultimate Unit Shear & Allowable Unit Shear Capacities for Thermo-Ply® Blue Structural Sheathing – Wind

Seismic Allowable Unit Shear Capacity & Seismic Design Coefficients for Thermo-Ply® Blue Structural Sheathing ¹											
Seismic Force Resisting System	Gypsum Wallboard	Seismic Allowable Unit Shear Capacity (plf)	Apparent Shear Stiffness, G _a (kips/in.)	Response Modification Factor, R ²	System Overstrength Factor, Ω ₀ ³	Deflection Amplification Coefficient, C _d ⁴	Structural System Limitations and Building Height (ft.) Limit ⁵				
							Seismic Design Category				
							B	C	D	E	F
Light-Frame (Wood) Walls Sheathed with Thermo-Ply® Blue	½" Gypsum	365	12.5	6.5	3	4	NL	NL	65	65	65
	No Gypsum	335	8.6	6.5	3	4	NL	NL	65	65	65

1. Thermo-Ply® Blue Structural Sheathing attached to maximum 16" o.c. framing with a minimum 16 gauge, ¹⁵/₁₆" crown staples shall penetrate a minimum of 1" into the stud. Fasteners are to be installed with the crown parallel to the framing and spaced a maximum of 3" o.c. at the panel edges and 3" o.c. in the field. Fastener edge distance shall be a minimum of ³/₈". Fastener head shall be in contact with the Thermo-Ply® surface. Roofing nails (minimum 0.120" x 1¼" with a ³/₈" head) are a permitted alternate fastener.

2. Gypsum attached with minimum #6 type W or S screws 1¼" long spaced 16" o.c. at panel edges and in the field with a minimum edge distance of ³/₈".

3. All seismic design parameters follow the equivalency as defined in [Section 3](#) of this TER.

4. The allowable unit shear capacity is calculated using a factor of safety of 2.5 per ASCE 7.

5. Response modification coefficient, R, for use throughout ASCE 7. Note: R reduces forces to a strength level, not an allowable stress level.

6. The tabulated value of the overstrength factor, Ω₀, is permitted to be reduced by subtracting one-half (0.5) for structures with flexible diaphragms.

7. Deflection amplification factor, C_d, for use with ASCE 7 Section 12.8.6, 12.8.7, and 12.9.2.

8. NL = Not Limited. Heights are measured from the base of the structure as defined in ASCE 7 Section 11.2.

9. Thermo-Ply® Blue Structural Sheathing may be installed with either lapped joints or butted joints.

Table 4: Seismic Performance of Thermo-Ply® Blue Structural Sheathing

Technical Evaluation Report (TER)

Type of Thermo-Ply® Structural Sheathing	Uplift Capacity (lbs.)	Uplift Capacity of Thermo-Ply® (plf)	Allowable Unit Uplift Capacity (plf)	Maximum Stud Spacing (in.)	Fastener Schedule
Thermo-Ply® Blue: Single Bottom Plate	4,400	550	275	16" o.c.	Minimum 15/16" crown, 1¼" leg 16 gage galvanized staples or 0.120" x 1¼" roofing nails with a 3/8" head, 3" o.c. to perimeter/field. Staple crowns to be installed parallel to grain.
Thermo-Ply® Blue: Double Bottom Plate	8,655	1,080	540		

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

Table 5: Uplift Performance of Thermo-Ply® Structural Sheathing

Nominal Uniform Load Capacities (psf) for Thermo-Ply® Blue Structural Sheathing Resisting Out-of-Plane Wind Loads									
Thermo-Ply® Grade	Transverse Wind Load Resistance						Fastener Schedule	Basic Wind Speed V_{asd} per ASCE 7-05 (mph)	Basic Wind Speed V_{ult} per ASCE 7-10 (mph)
	Maximum Stud Spacing (in.)	Negative		Positive					
		Ultimate Average Pressure (psf)	Allowable Design Value (psf)	Ultimate Average Pressure (psf)	Allowable Design Value (psf)				
Thermo-Ply® Blue (0.135")	16" o.c.	230	145	190	120	Minimum 15/16" crown, 1¼" leg 16 gage galvanized staples or 0.120" x 1¼" roofing nails with a 3/8" head, 3" o.c. to perimeter/field	≥ 190	≥ 245	
	24" o.c.	150	95	155	95				

1. The ASD allowable uniform load capacities to be used for wind design are determined by dividing the nominal uniform load capacities in [Table 3](#) by an ASD reduction factor of 1.6, per SDPWS Section 3.2.1 for determining the ASD allowable uniform load capacity.
2. Design wind load capacity shall be in accordance with [IBC Section 1609.1.1](#).
3. Capacities assume minimum ½" gypsum wallboard installed on the interior side of the wall. Where gypsum wallboard is not installed on the interior side of the wall, a 40% reduction in wind pressure resistance shall be applied (V_{asd} windspeed less than 150 mph, V_{ult} less than 190 mph).
4. Staple crowns shall be installed parallel to grain.
5. Allowable wind speeds are based on the following: Components and Cladding wind loads, Mean roof height 30', Exposure B, 10 sq. ft. effective wind area. See the applicable building code for any adjustment needed for specific building location and configuration.

Table 6: Transverse Load Performance of Thermo-Ply® Blue Structural Sheathing

5.3. Water-Resistive Barrier

- 5.3.1. Thermo-Ply® Blue Structural Sheathing may be used as a WRB as prescribed in [/IRC Section R703.2](#) and [/IBC Section 1404.2](#), when installed on exterior walls as described in this section.
- 5.3.2. Thermo-Ply® Blue Structural Sheathing shall be installed with board joints placed directly over exterior framing spaced a maximum of 24" (610 mm) o.c. The fasteners used to attach the board shall be installed in accordance with [Section 6](#).
- 5.3.3. All seams and joints between boards shall be butt jointed and sealed with an approved construction tape or overlapped in accordance with [Section 6](#). Approved construction tapes include 17/8" minimum width 3M (8087), Venture White 1585 CW-W Sheathing Tape, or equivalent construction tape.
- 5.3.4. A separate WRB system may also be provided. If a separate WRB system is used, overlapping or taping of the sheathing joints is not required.
- 5.3.5. Flashing must be installed at all sheathing penetrations and shall comply with the all applicable code sections.

Different Thermo-Ply® Structural Sheathing grades may be used adjacent to one another on the same wall line. In this application, the WRB, air barrier, and transverse load resistance is maintained, provided all seams and joints between boards are overlapped or sealed by the approved construction tapes listed in [Section 5.3.3](#).

Technical Evaluation Report (TER)

5.4. Air Barrier

- 5.4.1. Thermo-Ply® Blue Structural Sheathing may be used as an air barrier material as prescribed in [IRC Section N1102.4.1.1](#), and [IECC Section R402.4.1.1](#) and [C402.5.1](#)⁸ in accordance with ASTM E2178.

5.5. Draftstop

- 5.5.1. Thermo-Ply® Blue Structural Sheathing may be used as a draftstop material in accordance with [IRC Section 302.12](#), and [IBC Section 708.4.2](#), [718.3](#) and [718.4](#).
- 5.5.2. When installed as a draftstop, Thermo-Ply® Blue Structural Sheathing shall be installed in accordance with [Section 6](#).

5.6. Fire Resistance Properties

5.6.1. Surface Burn Characteristics

- 5.6.1.1. Thermo-Ply® Blue Structural Sheathing panels have the flame spread characteristics shown in [Table 7](#).

Flame Spread & Smoke Developed Indexes of Thermo-Ply® Blue Structural Sheathing		
Thermo-Ply® Blue Structural Sheathing	Flame Spread	Smoke Developed
	< 200	< 450
1. Tested in accordance with ASTM E84 and UL 723.		

Table 7: Flame Spread & Smoke Developed Indexes of Thermo-Ply® Blue Structural Sheathing

5.7. Non-Structural Applications

- 5.7.1. Where other means of wall bracing are provided, or are not required, any grade of Thermo-Ply® Structural Sheathing may be used to provide other approved wall functions, when installed in accordance with this section.
- 5.7.1.1. The sheathing panels are applied to wall framing with minimum 0.120" x 1¼" galvanized roofing nails or No.16 gage galvanized staples having a 15/16" crown and 1¼" leg lengths.
- 5.7.1.2. Fastener spacing shall be a maximum of 6" at the edges and 12" on intermediate members.
- 5.7.1.3. Stud spacing shall be a maximum of 24" 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 distance of 3/8" (9.5 mm) minimum.
- 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.
- 5.7.2. Incidental tears or penetrations of Thermo-Ply® Structural Sheathing must be repaired with an approved construction tape. See [Section 5.3.3](#).
- 5.7.3. All joints must be installed in one of the following methods:
- 5.7.3.1. Joints overlap nominally ¾" (19.1 mm).
- 5.7.3.2. Butted joints are sealed with an approved construction tape. See [Section 5.3.3](#).

6. Installation:

6.1. General for Structural and WRB Applications

- 6.1.1. Installation shall comply with the manufacturer's installation instructions and this TER. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern. Basic instructions are printed on every Thermo-Ply® panel as well.
- 6.1.2. Where the Thermo-Ply® Structural Sheathing extends beyond the bottom of a wall and overlaps the band joist below, fasten the bottom edge of the Thermo-Ply® to the wall bottom plate where it meets the band

⁸ [2012 IECC Section C402.4.1](#)

Technical Evaluation Report (TER)

joist. Due to possible shrinkage of the band joist, do not fasten the sheathing to the band joist, or fasten tightly with one fastener every 12" to smooth out, if necessary.

6.2. Orientation

- 6.2.1.** Thermo-Ply® Blue Structural Sheathing may be installed in either the vertical or horizontal orientation. To be recognized for the structural values listed in this report, or as a water or air barrier, all joints must be backed by studs, plates, or blocks and fastened.

6.3. Fastener Type

6.3.1. Thermo-Ply® Blue Structural Sheathing

6.3.1.1. Minimum 0.120" x 1¼" galvanized roofing nail.

6.3.1.2. Minimum 15/16" crown by 1¼" leg, 16 ga staples shall be installed per the staple manufacturer's instructions.

6.3.1.3. Fasteners shall be driven such that the head of the fastener is in contact with the surface of the Thermo-Ply® Structural Sheathing. Do not overdrive fasteners.

Thermo-Ply® Blue Structural Sheathing Application	Maximum Panel Edge Fastener Spacing (in.)	Maximum Panel Intermediate Fastener Spacing (in.)
Lateral Shear	3"	3"
Transverse loads		
Uplift loads		
Water-Resistive Barrier	6"	12"
Air Barrier		
Draftstop		

Table 8: Fastener Spacing of Thermo-Ply® Blue Structural Sheathing

6.3.2. Gypsum Wallboard

6.3.2.1. Where required, gypsum wallboard shall be a minimum ½" thickness and shall be attached with one of the following.

6.3.2.1.1. #6 x 1¼" type W or S screws.

6.3.2.1.2. 5d cooler nails.

6.4. Fastener Edge Distance

6.4.1. Fasteners shall be installed with a nominal edge distance of 3/8" (9.5 mm) for Thermo-Ply® Blue Structural Sheathing and gypsum.

6.5. Treatment of Joints

6.5.1. Thermo-Ply® Blue Structural Sheathing joints may be either butted or overlapped.

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

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

6.6. Window Jamb Adjustments

6.6.1. If windows are made to accommodate traditional 1/2" sheathing materials, order windows with adjustable nailing fins from the supplier. Door brick moldings may be planed or routed 3/8" in order to accommodate the different sheathing thickness, either at the jobsite or by the millwork supplier.

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

6.7. The structural installation procedure shall be in accordance with [Figure 5](#).

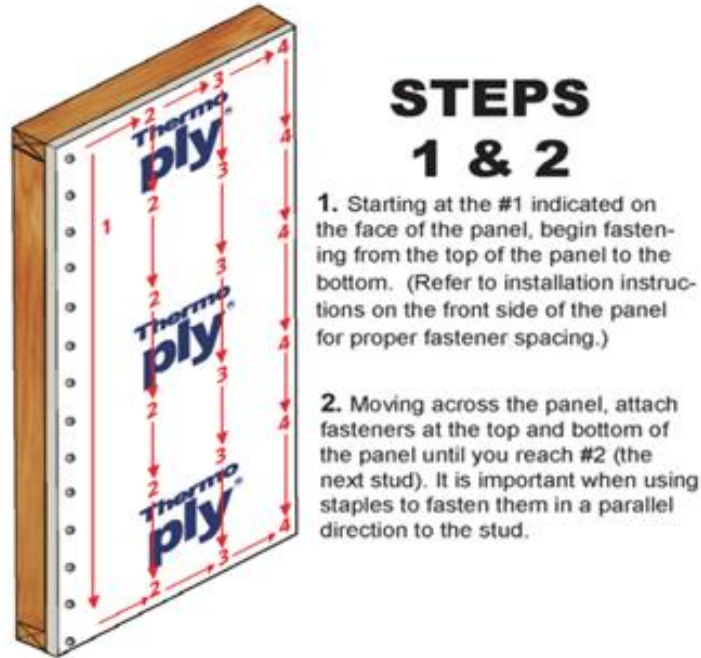


Figure 5: Installation Instructions – WRB Installation Procedure

6.7.1. Overlapped Joint – Install the first panel per [Figure 5](#).

6.7.1.1. Overlap the next panel $\frac{3}{4}$ " over the first panel and fasten the joint with a common line of fasteners.

6.7.1.2. For Thermo-Ply® Blue AMG, ensure the panel is properly positioned on the wall prior to removal of the adhesive release liners on vertical edges. Fasten the overlapped joint with a common line of fasteners.

6.7.2. Butted Joint with Flashing – Install panels per [Figure 5](#) with joints butted (no overlap).

6.7.3. Seal butted seams with approved construction tape (see [Section 5.3.3](#)), when finished with attaching the wall panels and all fasteners in the wall line.

7. Test and Engineering Substantiating Data:

7.1. Transverse load testing based on *ASTM E330*.

7.2. Uplift load testing, based on *ASTM E72*.

7.3. Test reports and data for determining use as a water-resistive barrier material based on *ASTM E331*.

7.4. Test reports and data for determining use as an air barrier material based on *ASTM E2178*.

7.5. Test reports and data for determining use as a draftstop, based on [TER No.1303-07](#).

7.6. Lateral load testing and data for determining comparative equivalency for use as an alternative material, based on *ASTM E2126*.

7.7. Test reports and data for determining comparative equivalency for use as an alternative material in accordance with [IRC Section R104.11](#) and [IBC Section 104.11](#).

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

7.9. The provisions of model, state or local building codes for building construction do not intend to prevent the installation of any material or to prohibit any design or method of construction. Alternatives shall use consensus standards, performance-based design methods or other engineering mechanics based means of compliance.

Technical Evaluation Report (TER)

This TER assesses compliance with defined standards, accepted engineering analysis, performance-based design methods, etc. in the context of the pertinent building code requirements.

- 7.10. Some information contained herein is the result of testing and/or data analysis by other sources, which DrJ relies on to be accurate, as it undertakes its engineering analysis.
- 7.11. DrJ has reviewed and found the data provided by other professional sources are credible. The information in this TER conforms with DrJ's procedure for acceptance of data from approved sources.
- 7.12. DrJ's responsibility for data provided by approved sources conforms with [IBC Section 1703](#) and any relevant professional engineering law.
- 7.13. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through codes and standards (e.g., *IRC, WFCM, IBC, SDPWS, NDS, ACI, AISI, PS-20, PS-2*, etc.). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g. lumber, steel, concrete, etc), DrJ relies upon grade/properties provided by the raw material supplier to be accurate and conforming to the mechanical properties defined in the relevant material standard.

8. Findings:

- 8.1. When installed in accordance with the manufacturer's installation instructions and this TER, Thermo-Ply® Blue Structural Sheathing complies with, or is a suitable alternative to, the applicable sections of the codes listed in [Section 2](#) for the following applications:
 - 8.1.1. Lateral load resistance due to wind and seismic loads carried by shear walls.
 - 8.1.2. Transverse load resistance due to components and cladding pressures on building surfaces.
 - 8.1.3. Uplift load resistance due to wind uplift loads carried by the walls.
 - 8.1.4. Performance for use as a WRB in accordance with [IRC Section R703.2](#) and [IBC Section 1404.2](#).
 - 8.1.5. Performance for use as an air barrier material in accordance with [IRC Section N1102.4.1.1](#) and [IECC Section R402.4.1.1](#).
 - 8.1.6. Performance for use as a draftstop in accordance with [IRC Section 302.12](#), and [IBC Section 708.4.2, 718.3](#) and [718.4](#).
- 8.2. [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 TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its criteria for all testing and engineering analysis. DrJ's professional engineering work falls under the jurisdiction of each state Board of Professional Engineers, when signed and sealed.

9. Conditions of Use:

- 9.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this report and the installation instructions shall be submitted at the time of permit application.
- 9.2. Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the code official for review and approval.
- 9.3. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.

Technical Evaluation Report (TER)

- 9.4. This report and the installation instructions shall be available to the jurisdiction in which the project is to be constructed.
- 9.5. Thermo-Ply® Blue Structural Sheathing shall not be used as a nailing base for claddings, trim, windows and doors.
- 9.6. Walls sheathed with Thermo-Ply® Blue Structural Sheathing shall not be used to resist horizontal loads from concrete and masonry walls.
- 9.7. When Thermo-Ply® Blue Structural Sheathing is not installed for use as wall bracing, as described in this TER, the stud walls shall be braced by other materials, in accordance with the applicable code. When used as a WRB, installation shall be in accordance with [Section 5.3](#).
- 9.7.1. When Thermo-Ply® Structural Sheathing is not installed as a WRB, other means of providing a WRB shall be required, as per the code.
- 9.8. When used in accordance with the *IBC* in Seismic Design Categories C, D, E or F, special inspections shall comply with [IBC Section 1705.12](#)⁹.
- 9.9. When used in accordance with the *IBC* in high wind areas, special inspections shall comply with [IBC Section 1705.11](#)¹⁰.
- 9.10. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.10.1. Allowable shear loads shall not exceed values in [Table 3](#) for wind loads and [Table 4](#) for seismic loads.
- 9.10.2. Allowable uplift loads shall not exceed values in [Table 5](#).
- 9.10.3. Transverse design loads shall not exceed those described in [Table 6](#), unless an approved exterior wall covering capable of separately resisting loads perpendicular to the face of the walls is installed over the sheathing.
- 9.11. Thermo-Ply® Blue Structural Sheathing is manufactured under a quality control program with quality control inspections in accordance with [IRC Section R109.2](#), and [IBC Section 110.3.8](#) and [110.4](#).
- 9.12. Design
- 9.12.1. Building Designer Responsibility
- 9.12.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer for the Building and shall be in accordance with [IRC Section R106](#) and [IBC Section 107](#).
- 9.12.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with [IRC Section R301](#) and [IBC Section 1603](#).
- 9.12.2. Construction Documents
- 9.12.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.
- 9.13. Responsibilities
- 9.13.1. The information contained herein is a product, material, detail, design and/or application TER evaluated in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering practice, experience and technical judgment.
- 9.13.2. DrJ TERs provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated sections.
- 9.13.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.

⁹ [2012 IBC Section 1705.11](#)

¹⁰ [2012 IBC Section 1705.10](#)

Technical Evaluation Report (TER)

- 9.13.4. This product is manufactured under a third-party quality control program in accordance with [/RC Section R104.4](#) and [R109.2](#) and [/BC Section 104.4](#) and [110.4](#).
- 9.13.5. The actual design, suitability and use of this TER, for any particular building, is the responsibility of the Owner or the Owner's authorized agent, and the TER shall be reviewed for code compliance by the Building Official.
- 9.13.6. The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the Building Official's inspection and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

10. Identification:

- 10.1. Each Thermo-Ply® Blue Structural Sheathing panel described in this TER is identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance.
- 10.2. Additional technical information can be found at www.oxengineeredproducts.com.

11. Review Schedule:

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



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