

Technical Evaluation Report™

TER 1004-01

Thermo-Ply® Red & Thermo-Ply® Red
AMG Structural Sheathing

OX Engineered Products, LLC

Product:

**Thermo-Ply® Red and
Thermo-Ply® Red AMG
Structural Sheathing**

Issue Date:

November 8, 2013

Revision Date:

August 31, 2023

Subject to Renewal:

April 1, 2024



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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^{1,2}

1.1 Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing³

2 Applicable Codes and Standards^{4,5}

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—20, 23: Florida Building Code – Building (FL 16391)⁶
- 2.1.5 FBC-R—20, 23: Florida Building Code – Residential (FL 16391)⁶

¹ For more information, visit drjcertification.org or call us at 608-310-6748.

² 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. 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. 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.

³ Throughout this TER, wherever Thermo-Ply® Red is cited, the provisions are applicable to Thermo-Ply® Red AMG as well.

⁴ This Listing is a code defined research report, which is also known as a duly authenticated report, provided by an approved agency (see [IBC 1703.1](#)) and/or an approved source (see [IBC 1703.4.2](#)). An approved agency is "approved" as an approved agency 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.

⁵ 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.

⁶ All references to the FBC-B and FBC-R are the same as the 2021 IBC and IRC unless otherwise noted in the Florida Supplement at the end of this TER.

- 2.1.6 *CBC—16, 19: California Building Code*
- 2.1.7 *CRC—16, 19: California 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 D7989: Standard Practice for Demonstrating Equivalent In-Plane Lateral Seismic Performance to Wood-Frame Shear Walls Sheathed with Wood Structural Panels
 - 2.2.4 ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings
 - 2.2.5 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
 - 2.2.6 ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference
 - 2.2.7 ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
 - 2.2.8 ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings
 - 2.2.9 ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
 - 2.2.10 ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
 - 2.2.11 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 2016 (DTSA).⁷
- 3.2 Testing and/or inspections conducted for this TER were performed an ISO/IEC 17025 accredited testing laboratory⁸, an ISO/IEC 17020 accredited inspection body,⁹ which are internationally recognized accreditations through International Accreditation Forum (IAF), and/or a licensed registered design professional.
- 3.3 Thermo-Ply® Red Structural Sheathing has been evaluated to determine:
 - 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 and the IRC Continuous Wall Bracing provisions of IRC Section R602.10.4 Method CS-WSP (continuously sheathed wood structural panel) and CS-PF (continuously sheathed portal frame).

⁷ <https://www.law.cornell.edu/uscode/text/18/part-I/chapter-90>. As 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.

⁸ 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.

⁹ Ibid.

- 3.3.2 Structural performance under lateral load conditions for both wind and seismic loading for use with the performance-based provisions of [IBC Section 2306.1](#) and [Section 2306.3](#) for light-frame wood wall assemblies.
- 3.3.2.1 Table 4 provides seismic design coefficients (SDC) that conform to the requirements in ASCE 7 Section 12.2.1.1 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).
- 3.3.2.2 The basis for equivalency testing is outlined in Section 12.2.1.1 of ASCE 7:
- 12.2.1.1 Alternative Structural Systems.** Use of seismic force-resisting systems not contained in Table 12.2-1 shall be permitted contingent on submittal to and approval by the Authority Having Jurisdiction and independent structural design review of an accompanying set of design criteria and substantiating analytical and test data. The design criteria shall specify any limitations on system use, including Seismic Design Category and height; required procedures for designing the system's components and connections; required detailing; and the values of the response modification coefficient, R; overstrength factor, Ω_o ; and deflection amplification factor, C_d .
- 3.3.2.3 The basis of the seismic evaluation performed as part of this TER is based on ASTM D7989 and testing per ASTM E2126 to establish SDCs that conform to the requirements of ASCE 7 Section 12.2.1.1.
- 3.3.3 Structural performance under lateral load conditions for use as an alternative to SDPWS Section 4.3 Wood-Frame Shear Walls.
- 3.3.4 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](#).
- 3.3.5 Resistance to uplift loads for wall assemblies used for light-frame wood construction in accordance with [IBC Section 1609](#) and [IRC Section R301.2.1](#).
- 3.3.6 Performance for use as a water-resistive barrier (WRB) in accordance with [IBC Section 1403.2](#)¹⁰ and [IRC Section R703.2](#).
- 3.3.7 Performance for use as an air barrier in accordance with [IRC Section N1102.4.1.1](#) and [IECC Section R402.4.1.1](#) and [Section C402.5.1](#).
- 3.3.8 Performance for use as a draftstop in accordance with [IBC Section 708.4.2](#),¹¹ [Section 718.3](#), and [Section 718.4](#) and [IRC Section R302.12](#).
- 3.3.9 Surface burn characteristic performance for use as a Class C interior finish material in accordance with [IBC Section 803.1.2](#)¹² and [IRC Section R302.9](#).
- 3.4 Use of Thermo-Ply® Red Structural Sheathing in a portal frame with hold-down (PFH) is outside the scope of this evaluation. For this application, see [TER 1101-01](#).
- 3.5 Use of Thermo-Ply® Red Structural Sheathing in a fire resistance rated assembly is outside the scope of this evaluation. For this application, see [TER 1510-04](#).
- 3.6 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 [registered design professionals / approved sources](#). DrJ is qualified¹³ to practice product and code compliance services within its scope of accreditation and engineering expertise, respectively.

¹⁰ [2015 IBC Section 1404.2](#)

¹¹ [2015 IBC Section 708.4](#)

¹² [2015 IBC Section 803.1.1](#)

¹³ 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](#).

- 3.7 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope, which are also its areas of professional engineering competence.
- 3.8 Any regulation specific issues not addressed in this section are outside the scope of this TER.

4 Product Description and Materials

- 4.1 The product evaluated in this TER is shown in Figure 1.



Figure 1. Thermo-Ply® Red Structural Sheathing

- 4.2 Thermo-Ply® Red Structural Sheathing is composed of pressure-laminated plies consisting of high strength cellulosic fibers. These fibers are specially treated to be water resistant and are bonded with a proprietary water-resistive adhesive. A protective polymer layer is applied on both sides of the panel, and foil facings may be additionally applied on one or both faces.
 - 4.2.1 Thermo-Ply® Red Structural Sheathing panels have a nominal thickness of 0.113" and nominal weight of 0.414 lbs. per square foot.
- 4.3 *Material Availability*
 - 4.3.1 Standard widths include 48" (1219 mm) and 48¾" (1238 mm).
 - 4.3.2 Standard lengths include 96" (2438 mm), 108" (2743 mm), and 120" (3048 mm).
 - 4.3.3 Other custom widths and lengths can be manufactured.

5 Applications

- 5.1 Thermo-Ply® Red Structural Sheathing panels are used in the following applications:
 - 5.1.1 Wall sheathing in buildings constructed in accordance with the IRC and IBC for light-frame wood construction.
 - 5.1.2 Structural wall sheathing to provide lateral load resistance (wind and seismic) for braced wall panels used in light-frame wood construction.
 - 5.1.3 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.
 - 5.1.5 Structural wall sheathing to provide resistance to uplift loads for wall assemblies used in light-frame wood construction.
 - 5.1.6 An approved alternative WRB when installed in accordance with Section 5.3 and Section 6.
 - 5.1.7 An approved air barrier material when installed in accordance with Section 5.4 and Section 6.
 - 5.1.8 An approved draftstop material when installed in accordance with Section 5.5 and Section 6.

5.2 Structural Applications

- 5.2.1 Except as otherwise described in this TER, Thermo-Ply® Red Structural Sheathing shall be installed in accordance with the applicable building codes listed in Section 2 using the provisions set forth therein for the design and installation of wood structural panels (WSP).
- 5.2.1.1 Thermo-Ply® Red 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.
- 5.2.2 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.
- 5.2.3 Except as provided for in Section 5.2.8, the maximum aspect ratio for Thermo-Ply® Red Structural Sheathing shall be 4:1.
- 5.2.4 The minimum full height panel width shall be 24", except as allowed by Section 3.2 or Section 5.2.8.
- 5.2.5 Installation is permitted for single top plate or double top plate applications.
- 5.2.6 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.
- 5.2.7 *Simplified IRC Bracing Provisions*
- 5.2.7.1 Thermo-Ply® Red Structural Sheathing is permitted to be used in accordance with the IRC simplified bracing method of IRC Section R602.12 and Table 1.



Table 1. Thermo-Ply® Red Structural Protective Sheathing Simplified Bracing Table^{1,2,3,4,5,6,7,8}

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

SI: 1 in = 25.4 mm

1. This simplified bracing table is based on the provisions of [IRC Section R602.12](#). All provisions therein shall be observed, except that this table shall replace [IRC Table R602.12.4](#), and Thermo-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 shall be designated as the first story and the stories above shall be re-designated as the second and third stories, respectively, and shall be prohibited in a three-story structure.
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. For Exposure Category C, multiply bracing units by a factor of 1.20 for a one-story building, 1.30 for a two-story building, and 1.40 for a three-story building. Actual length of the sides of the circumscribed rectangle shall be rounded to the next highest unit of 10 when using this table.
6. Maximum stud spacing is 24" o.c.
7. Thermo-Ply® attached with minimum 15/16" crown x 1 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.
8. Minimum 1/2" gypsum wallboard (GWB) attached to the interior side of the wall in accordance with [IRC Section R702.3.5](#) and [Table R702.3.5](#).

5.2.8 Prescriptive IRC Bracing Applications

- 5.2.8.1 Thermo-Ply® Red 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](#) except where modified by this TER.
- 5.2.8.2 Required braced wall panel lengths for Thermo-Ply® Red Structural Sheathing shall be as determined by the equivalency factor shown in Table 2 and [IRC Table R602.10.3\(1-4\)](#) including all footnotes.
 - 5.2.8.2.1 The braced wall line length equivalency factors in Table 2 are based on equivalency testing and are used to comply with Method WSP and CS-WSP of the IRC.
 - 5.2.8.2.2 Thermo-Ply® Red 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.
- 5.2.8.3 All IRC prescriptive bracing minimums, spacing requirements, and rules must also be met.



5.2.8.4 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](#).

Table 2. IRC Braced Wall Panel Equivalency for Thermo-Ply® Red Structural Sheathing⁵

Product	Maximum Stud Spacing (in)	Fastener ^{1,2}	Maximum Fastener Spacing (edge:field) (in)	Gypsum Wallboard ^{4,6} Fastening Spacing (blocked or unblocked) (edge:field)	Wind
					SPF Framing
					Equivalency Factors ³ to IRC WSP or CS-WSP
Thermo-Ply® Red Structural Sheathing	16 o.c.	Minimum 16 Gauge ^{15/16"} Crown x ^{1 1/4"} Leg Staple	3:3	16:16	1.00
				8:8	0.81
	24 o.c.			16:16	1.02
				8:8	0.83

- SI: 1 in = 25.4 mm
1. Staples shall be a minimum 16 gauge.
 2. Roofing nails (minimum 0.120" x 1 1/4" with a 3/8" head) are a permitted alternate fastener.
 3. Thermo-Ply® Red Structural Sheathing tested equivalency factors allow the user to determine the length of bracing required, by multiplying the factor by the length of bracing shown in the WSP or CS-WSP columns in [IRC Table R602.10.3\(1 and 3\)](#), as modified by all applicable factors in [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 1.5 for gypsum fastened 16:16, and 1.8 for gypsum fastened 8:8.
 5. Valid for single top plate (advanced framing method) wall installations or double top plate wall installations.
 6. Gypsum wallboard shall be installed according to the provision listed in [IRC Table R702.3.5](#).

5.2.9 Thermo-Ply® Red Structural Sheathing CS-PF Portal Frame

- 5.2.9.1 A Thermo-Ply® Red Structural Sheathing CS-PF was tested and evaluated for equivalency to the IRC Method CS-PF in accordance with [IRC Section R602.10.6.4](#) and [Table R602.10.5](#).
- 5.2.9.2 [IRC Table R602.10.5](#) establishes the contributing length of 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.
- 5.2.9.3 The capacity of the Thermo-Ply® Red 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.
- 5.2.9.4 The Thermo-Ply® Red Structural Sheathing CS-PF is depicted in Figure 2.

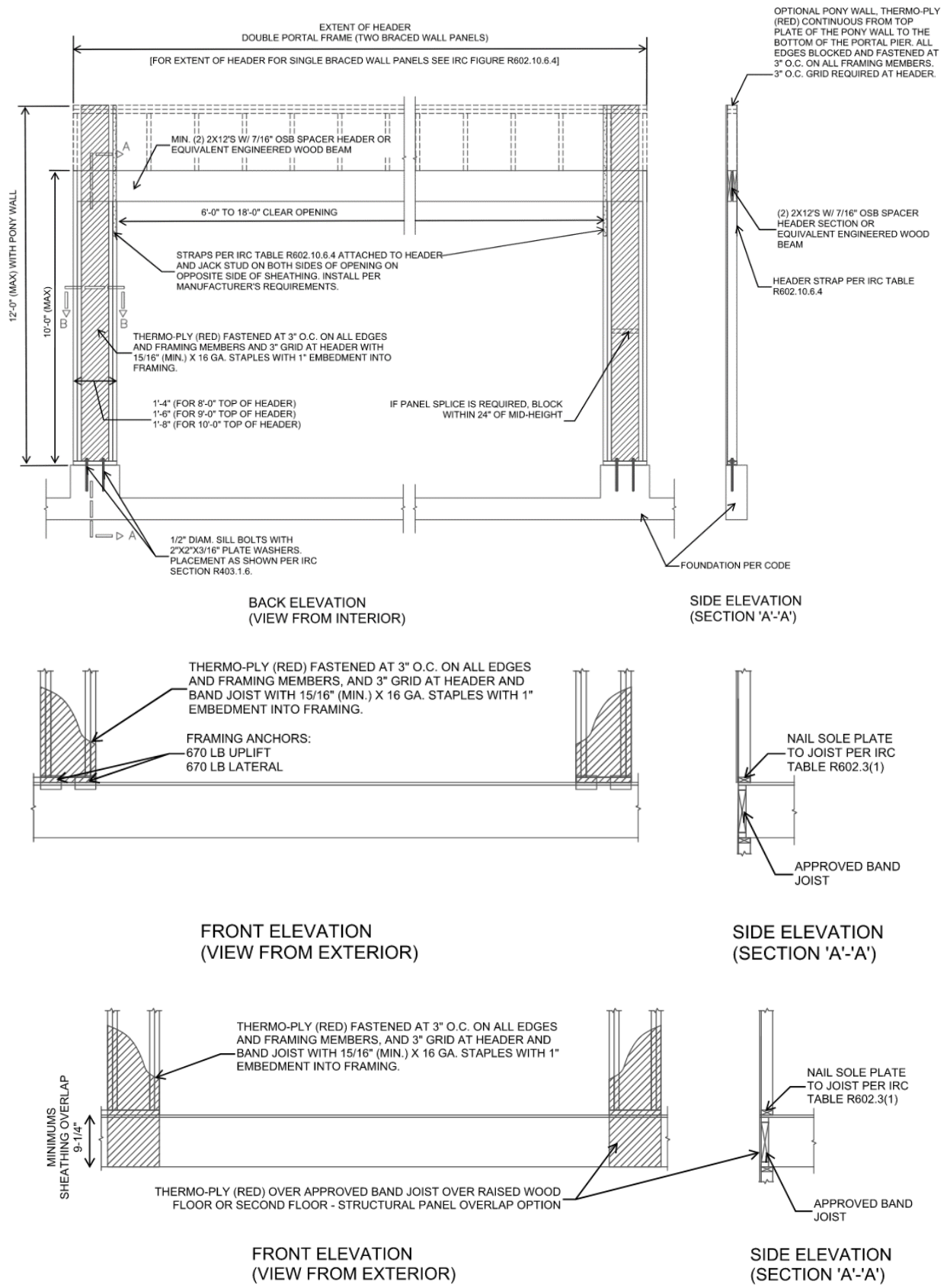


Figure 2. Thermo-Ply® Red Structural Sheathing CS-PF

5.2.10 *Prescriptive IBC Conventional Light-Frame Wood Construction*

5.2.10.1 Thermo-Ply® Red Structural Sheathing may be used to brace exterior walls of buildings as an equivalent alternative to Method WSP of the IBC when installed with blocked or unblocked ½" gypsum fastened with a minimum 5d cooler nail or #6 type W or S screw spaced a maximum of 16" o.c. at panel edges and 16" o.c. in the field. Bracing shall be in accordance with the conventional light-frame construction method of IBC Section 2308.6 and this TER.

5.2.11 *Performance-Based Wood-Framed Construction*

5.2.11.1 Thermo-Ply® Red 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.

5.2.11.2 Thermo-Ply® Red 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.

5.2.11.3 Thermo-Ply® Red 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.

5.2.11.3.1 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.

5.2.11.4 Thermo-Ply® Red 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.

5.2.11.5 Thermo-Ply® Red 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.

Table 3. Allowable Stress Design (ASD) Capacity for Thermo-Ply® Red Structural Sheathing – Wind

Product ^{1,5}	Joint Condition ³	Maximum Stud Spacing (in)	Gypsum Wallboard Thickness	Gypsum Wallboard Fastener Spacing ^{2,4} (edge:field)	Allowable Unit Shear Capacity (plf)		
Thermo-Ply® Red Structural Sheathing	Lapped or Butted	16 o.c.	½" GWB	4:16	530		
				8:8	445		
				8:16	425		
				16:16	370		
				8:8	435		
				16:16	365		
	Lapped	16 o.c.	None	-	320		
					295		
					Butted	16 o.c.	300
							24 o.c.

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

1. Thermo-Ply® Red attached with a minimum 16 gauge, ¹⁵/₁₆" crown staples. 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 ¾". Fastener head shall be in contact with the Thermo-Ply® surface. Roofing nails (minimum 0.120" x 1¼" with a ¾" 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 ¾".
3. Where lapped joints are used, the panels shall be overlapped nominally ¾".
4. Straight-line interpolations between fastening patterns is acceptable.
5. Thermo-Ply® Red may be installed on either the interior or exterior side of the wall.



Table 4. Seismic Performance of Thermo-Ply® Red Structural Sheathing^{1,3,8,9}

Seismic Force Resisting System	Joint Condition	Gypsum Wallboard ²	Maximum Stud Spacing (in)	Seismic Allowable Unit Shear Capacity (plf)	Apparent Shear Stiffness, G_a (kips/in)	Response Modification Factor, R^4	System Overstrength Factor, Ω_0^5	Deflection Amplification Coefficient, C_d^6	Structural System Limitations and Building Height Limit ⁷ (ft)				
									Seismic Design Category				
									B	C	D	E	F
Light-Frame (Wood) Walls Sheathed with Thermo-Ply® Red	Lapped or Butted	½" GWB Fasteners Spaced 8/8	16 o.c.	355	11.5	6.5	3	4	NL	NL	65	65	65
Light-Frame (Wood) Walls Sheathed with Thermo-Ply® Red	Lapped or Butted	No GWB	16 o.c.	240	6.7	6.5	3	4	NL	NL	65	65	65
Light-Frame (Wood) Walls Sheathed with Thermo-Ply® Red	Lapped	½" GWB Fasteners Spaced 16/16	24 o.c.	290	11	6.5	3	4	NL	NL	65	65	65
Light-Frame (Wood) Walls Sheathed with Thermo-Ply® Red	Butted	½" GWB Fasteners Spaced 16/16	24 o.c.	275	11	6.5	3	4	NL	NL	65	65	65

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m, 1 psi = 0.00689 MPa

- Thermo-Ply® Red sheathing attached with a minimum 16 gauge, ¹⁵/₁₆" crown staples. 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.
- Gypsum attached with minimum #6 type W or S screws 1¼" long with a minimum edge distance of ³/₈".
- All seismic design parameters follow the equivalency as defined in Section 3 of this TER.
- Response modification coefficient, R , for use throughout ASCE 7. Note: R reduces forces to a strength level, not an allowable stress level.
- The tabulated value of the overstrength factor, Ω_0 , is permitted to be reduced by subtracting one-half (0.5) for structures with flexible diaphragms.
- Deflection amplification factor, C_d , for use with ASCE 7 Section 12.8.6, 12.8.7, and 12.9.2.
- NL = Not Limited. Heights are measured from the base of the structure as defined in ASCE 7 Section 11.2.
- Thermo-Ply® Red sheathing may be installed with either lapped joints or butted joints.
- Thermo-Ply® Red may be installed on either the interior or exterior side of the wall.

Table 5. Uplift Performance of Thermo-Ply® Red Structural Sheathing

Product	Allowable Uplift Capacity (plf)	Maximum Stud Spacing (in)	Fastener Schedule
Thermo-Ply® Red: Single Bottom Plate	220	16 o.c.	Minimum ¹⁵ / ₁₆ " crown, 1¼" leg 16 gage galvanized staples ¹ OR 0.120" x 1¼" roofing nails, 3" o.c. to perimeter/field.

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

- Staple crowns to be installed parallel to framing.

Table 6. Load Capacity (psf) for Thermo-Ply® Red Structural Sheathing Resisting Transverse Wind Loads^{1,2,4}

Product	Maximum Stud Spacing (in)	Allowable Design Value (psf)	Fastener Schedule	Basic Wind Speed V_{asd} per ASCE 7-05 (mph)	Basic Wind Speed V_{ult} per ASCE 7-10 & 7-16 (mph)
Thermo-Ply® Red	16 o.c.	120	Minimum $1\frac{5}{16}$ " crown, $1\frac{1}{4}$ " leg 16 gage galvanized staples ³ OR 0.120" x $1\frac{1}{4}$ " roofing nails, 3" o.c. to perimeter/field	155	200
	24 o.c.	95			

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

- Design wind load capacity shall be in accordance with [IBC Section 1609.1.1](#).
- Capacities assume minimum $\frac{1}{2}$ " 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} wind speed less than 90 mph, V_{ult} less than 120 mph).
- Staple crowns shall be installed parallel to framing.
- Allowable wind speeds are based on the following: Components and Cladding wind loads, Mean roof height 30', Exposure B, Zone 5, 10 sq. ft. effective wind area. See the applicable building code for any adjustment needed for specific building location and configuration.

5.3 Water-Resistive Barrier (WRB)

- Thermo-Ply® Red Structural Sheathing may be used as a WRB as prescribed in [IBC Section 1403.2](#)¹⁴ and [IRC Section R703.2](#), when installed on exterior walls as described in this section.
- Thermo-Ply® Red 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.
- All seams and joints between boards shall be butt jointed and sealed with an approved construction tape or overlapped in accordance with Section 6. Use approved construction tape, such as $2\frac{7}{8}$ " OX SeamTape®.
- 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.
- Flashing must be installed at all sheathing penetrations and shall comply with all applicable code sections. Approved flashing tapes include Arctic Flash Synthetic Flashing, Flexible Butyl Flashing, and Home Guard RA-Plus Flashing.
- Where Thermo-Ply® Red Structural Sheathing is used in the intermittent bracing method along a braced wall line, Thermo-Ply® Green Structural Sheathing may be used as the infill panels between the Thermo-Ply® Red Structural Sheathing braced wall panels. 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.

5.4 Air Barrier

- Thermo-Ply® Red Structural Sheathing may be used as an air barrier assembly as prescribed in [IRC Section N1102.4.1.1](#) and [IECC Section R402.4.1.1](#) and [Section C402.5.1](#) in accordance with ASTM E283.

5.5 Draftstop

- Thermo-Ply® Red Structural Sheathing may be used as a draftstop material in accordance with [IBC Section 708.4.2](#), [Section 718.3](#), and [Section 718.4](#) and [IRC Section R302.12](#).
- When installed as a draftstop, Thermo-Ply® Red Structural Sheathing shall be installed in accordance with Section 6.

¹⁴ 2015 IBC Section 1404.2



5.6 Surface Burn Characteristics

5.6.1 Thermo-Ply® Red Structural Sheathing panels have the flame spread characteristics shown in Table 7.

Table 7. Flame spread and Smoke Developed Rating¹

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

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 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 spacing of ⅜" (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® Red 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 approved construction tape. See Section 5.3.3.

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 General for Structural and WRB Applications

6.3.1 Thermo-Ply® Red Structural Sheathing shall be installed in accordance with the manufacturer published installation instructions and this TER. Basic instructions are also printed on every Thermo-Ply® panel.

6.3.2 If there are any conflicts between the manufacturer instructions and this TER, the more restrictive shall apply.

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

6.3.4 Where hold-down straps are used, install Thermo-Ply® Red Structural Sheathing first, then install the strap over the face of the structural sheathing and attach per the manufacturer installation instructions.

6.4 *Orientation*

6.4.1 Thermo-Ply® Red 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.

6.5 *Fastener Type*

6.5.1 *Thermo-Ply® Red Structural Sheathing*

6.5.1.1 Minimum 0.120" x 1¼" galvanized roofing nail.

6.5.1.2 Minimum 15/16" crown by 1¼" leg, 16 ga staples shall be installed per the staple 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-Ply® Structural Sheathing. Do not overdrive fasteners. See Table 8 for fastening spacing.

Table 8. Fastener Spacing of Thermo-Ply® Red Structural Sheathing

Thermo-Ply® Red 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		
SI: 1 in = 25.4 mm		

6.5.2 *Gypsum Wallboard*

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

6.5.2.1.1 #6 x 1¼" 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 minimum edge distance of ⅜" (9.5 mm) for Thermo-Ply® Red Structural Sheathing and gypsum.

6.7 *Treatment of Joints*

6.7.1 Thermo-Ply® Red Structural Sheathing joints may be either butted or overlapped.

6.7.1.1 Lapped joints shall be overlapped by ¾" (19 mm) nominally and fastened with a single row of fasteners. Always run staples parallel with framing.

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

6.8 *Window Jamb Adjustments*

6.8.1 If windows are made to accommodate traditional ½" sheathing materials, order windows with adjustable nailing fins from the supplier. Door brick moldings may be planed or routed ⅜" in order to accommodate the different sheathing thickness, either at the jobsite or by the millwork supplier.

6.8.2 Thermo-Ply® Red 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.

6.8.3 The structural installation procedure shall be in accordance with Figure 3.

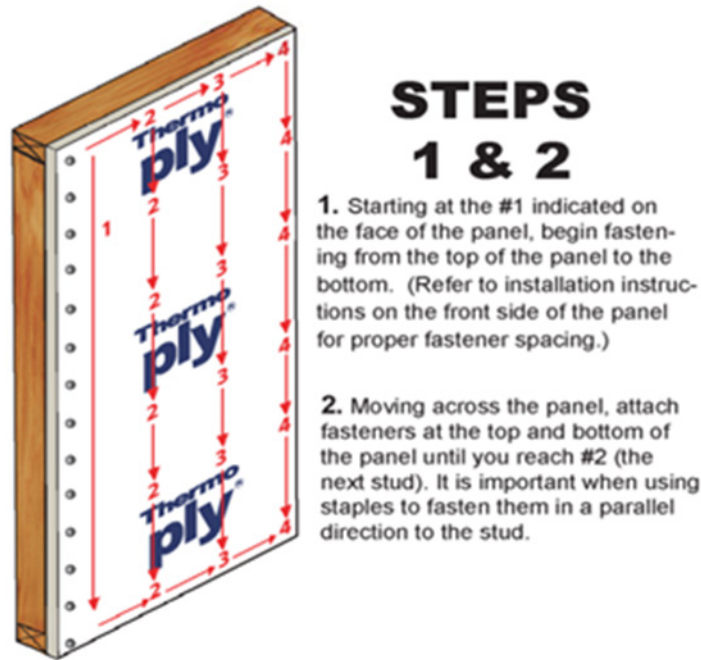


Figure 3. Installation Instructions - WRB Installation Procedure

6.8.4 Overlapped Joint – Install the first panel per Figure 3.

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

6.8.4.2 For Thermo-Ply® Red 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.

6.8.5 Butted Joint with Flashing – Install panels per Figure 3 with joints butted (no overlap).

6.8.6 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 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 Transverse load testing in accordance with ASTM E330

7.1.2 Uplift load testing in accordance with ASTM E72

7.1.3 Use as a WRB material testing in accordance with ASTM E331

7.1.4 Use as an air barrier testing in accordance with ASTM E283

7.1.5 Lateral load testing in accordance with ASTM E2126 and analysis per ASTM D7989

7.1.6 Surface burn characteristics testing 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., registered design professionals [RDP]), 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.¹⁵
- 7.6 Where additional condition of use and/or code compliance information is required, please search for Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing on the DrJ Certification website.

8 Findings

- 8.1 As delineated in Section 3, Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing have performance characteristics that were tested and/or meet pertinent standards and are 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-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing shall be approved for the following applications:
 - 8.2.1 Lateral load resistance due to wind and seismic loads carried by shear walls.
 - 8.2.2 Transverse load resistance due to components and cladding pressures on building surfaces.
 - 8.2.3 Uplift load resistance due to wind uplift loads carried by the walls.
 - 8.2.4 Performance for use as a WRB in accordance with IBC Section 1403.2¹⁶ and IRC Section R703.2.
 - 8.2.5 Performance for use as an air barrier in accordance with IRC Section N1102.4.1.1 and IECC Section R402.4.1.1 and Section C402.5.1.
 - 8.2.6 Performance for use as a draftstop in accordance with IBC Section 708.4.2, Section 718.3, and Section 718.4 and IRC Section R302.12.
 - 8.2.7 Performance for use as a Class C interior finish material in accordance with IBC Section 803.1.2¹⁷ and IRC Section R302.9.
- 8.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from OX Engineered Products, LLC.
- 8.4 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10¹⁸ 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.

¹⁵ See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

¹⁶ 2015 IBC Section 1404.2

¹⁷ 2015 IBC Section 803.1.1

¹⁸ 2018 IFC Section 104.9

- 8.5 **Approved:**¹⁹ Building codes require that the building official shall accept duly authenticated reports²⁰ or research reports²¹ 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.
- 8.5.1 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).
- 8.5.2 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.
- 8.5.3 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.
- 8.6 DrJ is an engineering company, employs RDPs and is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.
- 8.7 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.”²²

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-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing shall not be used:
- 9.3.1 As a nailing base for claddings, trim, windows, and doors.
- 9.4 Fastening through the Thermo-Ply® Red Structural Sheathing into the framing is acceptable.
- 9.5 Walls sheathed with Thermo-Ply® Red Structural Sheathing shall not be used to resist horizontal loads from concrete and masonry walls.
- 9.6 When Thermo-Ply® Red Structural Sheathing is installed as a wall sheathing but is not installed per structural requirements, light-frame walls shall be braced by other means. When used as a WRB, installation shall be in accordance with Section 5.3.
- 9.6.1 When Thermo-Ply® Structural Sheathing is not installed as a WRB, other means of providing a WRB shall be required, as per the code.
- 9.7 When used in accordance with the IBC in Seismic Design Categories C, D, E, or F, special inspections shall comply with IBC Section 1705.13.²³
- 9.8 When used in accordance with the IBC in high wind areas, special inspections shall comply with IBC Section 1705.12.²⁴

¹⁹ 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.

²⁰ <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>

²¹ <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>

²² <https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise>

²³ 2018 IBC Section 1705.12

²⁴ 2018 IBC Section 1705.11

- 9.9 When required by regulation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
- 9.9.1 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.
 - 9.9.2 This TER and the installation instructions shall be submitted at the time of permit application.
 - 9.9.3 This product has an internal quality control program and a third-party quality assurance program.
 - 9.9.4 At a minimum, this product shall be installed per Section 6 of this TER.
 - 9.9.5 The review of this TER, by the AHJ, shall be in compliance with IBC Section 104 and IBC Section 105.4.
 - 9.9.6 This product has 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.
 - 9.9.7 The application of this product 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.
- 9.10 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 RDP).
- 9.11 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner's authorized agent.

10 Identification

- 10.1 The product listed in Section 1.1 is 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 oxengineeredproducts.com.

11 Review Schedule

- 11.1 This TER is subject to periodic review and revision. For the most recent version, visit drjcertification.org.
- 11.2 For information on the current status of this TER, contact DrJ Certification.

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

- 12.1 Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing is 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.

1 Appendix A: 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-Ply® Red and Thermo-Ply® Red AMG 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 2016 (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 materials²⁵ 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.²⁶
- 1.3 **Approved**²⁷ **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.²⁸ 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 1707.1.²⁹

²⁵ <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2>

²⁶ [IBC 2021, Section 1706.1 Conformance to Standards](#)

²⁷ See Section 8 for the distilled building code definition of Approved.

²⁸ [Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES](#)

²⁹ <https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1>

- 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 deemed³⁰ 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 agreement³¹ (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).
- 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.

³⁰ New York City, The Rules of the City of New York, § 101-07 Approved Agencies

³¹ New York City, The Rules of the City of New York, § 101-07 Approved Agencies

- 1.8 **Approved by New Jersey:** Pursuant to Building Code 2018 of New Jersey in IBC Section 1707.1 General,³² 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)”.³³ 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 3282.14³⁴ and Part 3280,³⁵ 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 **Approved by US, Local, and State Jurisdictions in General:** In all other local and state jurisdictions, the regulations require approval per Section 8 above.
- 1.11 **Approved 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.

³² https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

³³ <https://www.nj.gov/dca/divisions/codes/codreg/ucc.html>

³⁴ <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14>

³⁵ <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280>



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.



Issue Date: January 6, 2021
Subject to Renewal: April 1, 2024

FBC Supplement to TER 1004-01

REPORT HOLDER: OX Engineered Products, LLC

1 Evaluation Subject

- 1.1 Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing

2 Purpose and Scope

2.1 Purpose

- 2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing, recognized in TER 1004-01, have 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—20, 23: Florida Building Code – Building (FL 16391)
- 2.2.2 FBC-R—20, 23: Florida Building Code – Residential (FL 16391)

3 Conclusions

- 3.1 Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing, described in TER 1004-01, comply with the FBC-B and FBC-R and are subject to the conditions of use described in this supplement.
- 3.2 Where there are variations between the IBC and IRC and the FBC-B and FBC-R 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, Section R602.10.6.4, Section R602.12, and Table R602.12.4 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 2308 replaces IBC Section 2308.6 and is reserved.
 - 3.2.6 FBC-B Section 1404.2 replaces IBC Section 1403.2.
 - 3.2.7 FBC-B Section 1705 replaces IBC Section 1705.12 and Section 1705.11 and is reserved.

4 Conditions of Use

- 4.1 Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing, described in TER 1004-01, must comply with all of the following conditions:
 - 4.1.1 All applicable sections in TER 1004-01
 - 4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.

Issue Date: November 16, 2020
Subject to Renewal: April 1, 2024

CBC and CRC Supplement to TER 1004-01

REPORT HOLDER: OX Engineered Products, LLC

1 Evaluation Subject

1.1 Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing, recognized in TER 1004-01, has also been evaluated for compliance with the codes listed below.

2.2 Applicable Code Editions

2.2.1 *CBC—16, 19: California Building Code (Title 24, Part 2)*

2.2.2 *CRC—16, 19: California Residential Code (Title 24, Part 2.5)*

3 Conclusions

3.1 Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing, described in Sections 2.0 through 11.0 of TER 1004-01, complies with CBC Section 2306.1, Section 2306.3, Section 1609.1.1, Section 1609, Section 1404.2, Section 708.4, Section 718.3, and Section 718.4 and CRC Section R602.10, Section R602.10.4, Section R301.2.1, Section R703.2, Section N1102.4.1.1, and Section R302.12 and is subject to the conditions of use described in this supplement.

4 Conditions of Use

4.1 Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing, described in TER 1004-01, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 1004-01

4.1.2 The design, installation, conditions of use, and identification of Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing are in accordance with the 2018 International Building Code (IBC) provisions noted in TER 1004-01.

4.1.3 The design, installation, and inspections are in accordance with additional requirements of CBC and CRC, as applicable.