

Technical Evaluation Report™

TER 1808-03

Thermo-Ply® Red and Thermo-Ply® Red AMG Structural Sheathing – Canada – Limit States Design

OX Engineered Products, LLC

Products:

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

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CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 06 12 00 - Structural Panels

SECTION: 07 25 00 - Water-Resistive Barriers/Weather Barriers

SECTION: 06 12 19 - Shear Wall Panels

SECTION: 07 27 00 - Air Barriers

SECTION: 06 16 00 - Sheathing

1 Innovative Products Evaluated¹

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

2 Applicable Codes and Standards²

2.1 Codes

- 2.1.1 *NBC—10, 15, 20: National Building Code of Canada*
- 2.1.2 *NECB—17, 20: National Energy Code of Canada for Buildings*

2.2 Standards and Referenced Documents

- 2.2.1 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*
- 2.2.2 *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*
- 2.2.3 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.2.4 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.2.5 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
- 2.2.6 *ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*
- 2.2.7 *CAN/ULC-S102: Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies*
- 2.2.8 *CSA O86: Engineering Design in Wood*
- 2.2.9 *CWC: Engineering Guide for Wood Frame Constructionist of referenced code in alphabetical order and formatted according to NBC Division B Table 1.3.1.2.*

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

² Unless otherwise noted, all references in this TER are from the 2020 version of the NBC. This alternative solution is also approved for use with the 2010 and 2015 NBC and the standards referenced therein.

3 Performance Evaluation

- 3.1 Testing and related engineering evaluations are defined as intellectual property and/or trade secrets.³
- 3.2 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing have been evaluated to determine:
 - 3.2.1 Structural performance under lateral load conditions (wind and seismic) in accordance with NBC Division B Subsection 9.23.13 and Subsection 4.1.8.
 - 3.2.1.1 **Table 2** provides Seismic Design Coefficients (SDC) that conform to the requirements in NBC Division B Subsection 4.1.8 for design of wall assemblies in buildings that require seismic design in accordance with NBC (i.e., all seismic design categories).
 - 3.2.1.2 The basis for equivalency testing is outlined in Sentence 4.1.8.9.(5) of NBC:

If it can be demonstrated through testing, research and analysis that the seismic performance of a structural system is at least equivalent to one of the types of SFRS mentioned in Table 4.1.8.9., then such structural system will qualify for values of R_d and R_o corresponding to the equivalent type in that Table. (See Note A-4.1.8.9.(5).)
 - 3.2.2 Structural performance under transverse loads for use to resist factored external wind loads in accordance with NBC Division B Subsection 4.1.7.
 - 3.2.3 Structural performance under uplift and gravity loads for use with single top plates when constructed in accordance with NBC Division B Article 9.23.11.3.
 - 3.2.4 Performance for use as a Water-Resistive Barrier (WRB) in accordance with NBC Division B Note A-5.6.2.1.
 - 3.2.5 Performance for use as an air barrier material in accordance with NBC Division B Article 9.36.2.10.
 - 3.2.6 Performance for surface burning characteristics in accordance with NBC Division B Subsection 3.1.12 and 9.10.3.2.
- 3.3 Engineering evaluations are conducted within DrJ's ANAB accredited ICS code scope, which are also its areas of professional engineering competence.⁴
- 3.4 Any regulation specific issues not addressed in this section are outside the scope of this report.

³ 18 U.S. Code § 1831 - Economic espionage - Whoever, intending or knowing that the offense will benefit any foreign government, foreign instrumentality, or foreign agent, knowingly steals, or without authorization appropriates, takes, carries away, or conceals, or by fraud, artifice, or deception obtains a trade secret shall be fined not more than \$5,000,000 or imprisoned not more than 15 years, or both. Any organization that commits any offense described shall be fined not more than the greater of \$10,000,000 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.
<https://www.law.cornell.edu/uscode/text/18/part-11/chapter-90>.

⁴ ANAB is part of the [USMCA](#) and [IAF MLA](#), where the purpose of these agreements are to ensure mutual recognition of accredited certification and validation/verification statements between agreement signatories, and subsequent acceptance of ANAB accredited certification and validation/verification statements by professional engineers based upon having one universal approval process for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction.

4 Product Description and Materials

4.1 The innovative products evaluated in this report are shown in **Figure 1**.



Figure 1. Thermo-Ply® Red Structural Sheathing and Logo

4.2 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing are composed of pressure-laminated plies consisting of high strength cellulosic fibers. These fibers are specially treated to be water resistant and are bonded with a proprietary water-resistive adhesive. A protective polymer layer is applied on both sides of the panel, and foil facings may be additionally applied on one or both faces.

4.2.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing panels have a nominal thickness of 2.9 mm (0.113") and nominal weight of 2.02 kg/m² (0.414 lb per square foot).

4.3 Material Availability

4.3.1 Standard widths include 1219 mm (48") and 1238 mm (48³/₄").

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

4.3.3 Other custom widths and lengths can be manufactured.

5 Applications

5.1 General

5.1.1 Thermo-Ply® Red Structural Sheathing panels may be used in the following applications as:

5.1.1.1 Wall sheathing in buildings constructed in accordance with the NBC Division B Section 9.23 for wood frame 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 Structural wall sheathing to provide resistance to transverse loads for wall assemblies used in light frame wood construction.

5.1.1.4 Structural wall sheathing to provide resistance to uplift loads for wall assemblies used in light-frame wood construction.

5.1.1.5 An approved alternative WRB when installed in accordance with Section 5.3 and Section 6.

5.1.1.6 An approved air barrier material when installed in accordance with Section 5.4 and Section 6.

5.2 Structural Applications

5.2.1 General Structural Provisions

- 5.2.1.1 Except as otherwise described in this report, Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing shall be installed in accordance with the applicable building codes listed in Section 2 using the provisions set forth herein for the design and installation of wood structural panels (WSP).
 - 5.2.1.1.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing are permitted to be designed in accordance with NBC Division B Part 9 Articles 9.23.13.1, 9.23.13.2, and 9.23.13.3 for the design of lateral-load-resisting systems using the methods and conditions set forth therein.
- 5.2.1.2 Anchorage for in-plane shear shall be provided to transfer the induced shear force into and out of each shear wall in accordance with NBC Division B Subsection 9.23.6.
- 5.2.1.3 The maximum aspect ratio for Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing shall be 4:1.
- 5.2.1.4 The minimum full height panel width shall be 610 mm (24").
- 5.2.1.5 Installation is permitted for single top plate or double top plate applications.

5.2.2 Performance-Based Wood-Framed Construction

- 5.2.2.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing panels used in wall assemblies designed as shear walls are permitted to be designed in accordance with the methodology used in CAN/CSA-O86 for WSP using the capacities shown in **Table 1**, **Table 2**, and **Table 3**.
- 5.2.2.2 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing shear walls are permitted to resist horizontal wind load forces using the specified shear strengths set forth in **Table 1**.
- 5.2.2.3 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing shear walls that require seismic design in accordance with NBC Division B Subsection 4.1.8 shall use the seismic specified shear strengths set forth in **Table 2**.
 - 5.2.2.3.1 The ductility response modification factor, R_d , and overstrength-related force modification factor, R_o , indicated in **Table 2** shall be used to determine the base shear, element design forces, and design story drift in accordance with NBC Division B Subsection 4.1.8.
- 5.2.2.4 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing panels are permitted to resist uplift load forces using the factored uplift loads set forth in **Table 3**.
- 5.2.2.5 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing panels are permitted to resist transverse wind load forces using the specified transverse loads set forth in **Table 4**.

Table 1. Thermo-Ply® Red Structural Sheathing – Specified Shear Capacity for Limit States Design – Wind^{1,4}

Product	Joint Condition ³	Maximum Stud Spacing mm (in)	Gypsum Wallboard (GWB) ²	Gypsum Wallboard Fastener Spacing [edge/field] mm (in)	Specified Shear Strength kN/m (plf)
Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing	Lapped or Butted	406 (16) o.c.	12.7 mm (1/2") GWB	102/406 (4/16)	10.2 (700)
				203/203 (8/8)	8.6 (585)
				203/406 (8/16)	8.2 (560)
				406/406 (16/16)	7.1 (485)
				203/203 (8/8)	8.4 (575)
				406/406 (16/16)	7.0 (480)
	Lapped	406 (16) o.c.	No GWB	-	6.2 (420)
					610 (24) o.c.
		610 (24) o.c.			5.8 (395)
					5.3 (360)
	Butted	406 (16) o.c.	No GWB	-	6.2 (420)
					610 (24) o.c.
610 (24) o.c.		5.8 (395)			
		5.3 (360)			

SI: 25.4 mm = 1 in, 1 kN/m = 737.6 lb/ft

- Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing attached with staples of minimum 16-gauge, 24 mm (15/16") crown. Staples shall penetrate a minimum of 25.4 mm (1") into the stud. Fasteners are to be installed with the crown parallel to the framing and spaced a maximum of 76 mm (3") o.c. at the panel edges and 76 mm (3") o.c. in the field. Fastener edge distance shall be a minimum 9.5 mm (3/8"). Fastener head shall be in contact with the Thermo-Ply surface. Roofing nails (minimum 3 mm [0.120"] x 32 mm [1 1/4"] with a 9.5 mm [3/8"] head) are a permitted alternative fastener.
- Gypsum attached with minimum #6 type W or S screws 32 mm (1 1/4") long with a minimum edge distance of 9.5 mm (3/8").
- Where lapped joints are used, the panels shall be overlapped nominally 19 mm (3/4").
- Straight-line interpolations between fastening patterns are acceptable.

Table 2. Seismic Performance of Thermo-Ply® Red Structural Sheathing^{1,3,7}

Seismic Force-Resisting System (SFRS)	Joint Condition ^{4,9}	Gypsum Wallboard (edge/field) mm	Max. Stud Spacing mm (in)	Specified Shear Strength kN/m (plf)	Ductility Factor, $R_d^{5,6}$	Overstrength Force Modification Factor, R_o^6	Structural System Limitations & Building Height Limit ⁸ M (ft)				
							$I_E F_a S_a(0.2)$				$I_E F_a S_a(1.0)$
							< 0.2	≥ 0.2 to < 0.35	≥ 0.35 to ≤ 0.75	> 0.75	> 0.3
Light-Frame (Wood) Walls Sheathed with Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing	Lapped or Butted	12.7 mm Gypsum-Fasteners Spaced 203/203	406 (16) o.c.	8.6 (585)	2.0	1.7	NL	NL	20 (65.6)	20 (65.6)	20 (65.6)
	Lapped	15.9 mm Gypsum-Fasteners Spaced 406/406	610 (24) o.c.	7.0 (480)	2.0	1.7	NL	NL	20 (65.6)	20 (65.6)	20 (65.6)
	Lapped or Butted	No GWB	406 (16) o.c.	5.8 (395)	3.0	1.7	NL	NL	30 (98.4)	20 (65.6)	20 (65.6)

SI: 25.4 mm = 1 in, 1 kN/m = 737.6 lb/ft

- Thermo-Ply® Red sheathing attached with staples of minimum 16-gauge, 24 mm (¹⁵/₁₆" crown. Staples shall penetrate a minimum of 25.4 mm (1") into the stud. Fasteners are to be installed with the crown parallel to the framing and spaced a maximum of 76 mm (3") o.c. at the panel edges and 76 mm (3") o.c. in the field. Fastener edge distance shall be a minimum 9.5 mm (³/₈"). Fastener head shall be in contact with the Thermo-Ply® surface. Roofing nails (minimum 3 mm [0.120"] x 32 mm [1 1/4"] with a 9.5 mm [³/₈"] head) are a permitted alternative fastener.
- Gypsum attached with minimum #6 type W or S screws 32 mm (1 1/4") long with a minimum edge distance of 9.5 mm (³/₈").
- All seismic design parameters follow the equivalency as defined in Section 3 of this report.
- Where lapped joints are used, the panels shall be overlapped nominally 19 mm (³/₄").
- Response modification coefficient, R_d , for use throughout NBC.
- For combinations of different types of SFRS acting in the same direction in the same story, $R_d R_o$ shall be taken as the lowest value of $R_d R_o$ corresponding to these systems. See NBC Division B Subsection 4.1.8.9.
- Consider the additional system restrictions in Subsection 4.1.8.10 of NBC Division B.
- NL = Not Limited. Heights are maximum height limits above grade, as defined in NBC Division B Table 4.1.8.9.
- Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing may be installed with either lapped joints or butted joints.
- NBC Table 9.23.13.6 requires 15.9 mm (⁵/₈") thick gypsum with framing 610 mm (24") o.c.

Table 3. Uplift Performance of Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing Single Top Plate¹

Type of Thermo-Ply Structural Sheathing	Specified Uplift Capacity kN/m (plf)	Maximum Stud Spacing mm (in)	Fastener Schedule
Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing Single Top Plate	4.5 (310)	406 (16) o.c.	Minimum 24 mm (¹⁵ / ₁₆ " crown, 32 mm (1 1/4") leg 16-gauge galvanized staples or 3 mm (0.120") x 32 mm (1 1/4") roofing nails, 76 mm (3") o.c. to perimeter/field

SI: 25.4 mm = 1 in, 1 kN/m = 737.6 lb/ft

- The capacities shown are for the purpose of providing information on the hold-down capacity of the sheathing to the top-plate connection independent of lateral loading. Where combined shear and uplift loading is needed, consult a professional engineer.

Table 4. Summary of Specified Pressures for Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing Resisting Transverse Wind Loads^{1,3}

Structural Sheathing Product	Transverse Wind Load Resistance	
	Maximum Stud Spacing mm (in)	Hourly 1-in-50 Wind Pressure ² kPa
Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing (2.9 mm)	406 (16) o.c.	8.2
	610 (24) o.c.	6.5

SI: 25.4 mm = 1 in, 1 kN/m² = 20.9 psf

- Fastener Schedule: Minimum 24 mm (1⁵/₁₆" crown, 32 mm (1¹/₄" leg 16-gauge galvanized staples or 3 mm (0.120") x 32 mm (1¹/₄" roofing nails, 76 mm (3") o.c. to perimeter/field. Staple crowns shall be installed parallel to framing.
- Hourly Wind Pressure (1-in-50) for selected locations can be located in NBC Division B, Appendix C, Table C-2.
- Capacities assume minimum 12.7 mm (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.

5.3 Water-Resistive Barrier

- 5.3.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing may be used as a WRB as prescribed in with NBC Division B Note A-5.9.4.1.(1), when installed on exterior walls as described in this section.
- 5.3.2 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing shall be installed with board joints placed directly over exterior framing spaced a maximum of 610 mm (24") 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. Use approved construction tape, such as 73 mm (2⁷/₈") OX SeamTape®.
- 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 all applicable code sections. Approved flashing tapes include ArcticFLASH® Synthetic Flashing, Flexible Butyl Flashing, and HomeGuard® RA-Plus Flashing.
- 5.3.6 Where Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG 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 and Thermo-Ply Red AMG 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

- 5.4.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing may be used as an air barrier material as prescribed in NBC Division B Article 9.36.2.10.

5.5 Fire Safety Performance

5.5.1 Surface Burn Characteristics

- 5.5.1.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing were evaluated for surface burning characteristics.
- 5.5.1.2 Flame-spread and smoke developed ratings as shown in **Table 5**, when tested in accordance with CAN/ULC-S102 per NBC Division B Subsection 3.1.12 and 9.10.3.2.

Table 5. Surface Burn Characteristics of Thermo-Ply® Red Structural Sheathing

Product	Flame Spread	Smoke Developed
Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing ¹	120	60
1. Tested in accordance with CAN/ULC-S102.		

5.6 Non-Structural Applications

- 5.6.1 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.
 - 5.6.1.1 The sheathing panels are applied to wall framing with minimum 3 mm (0.120") x 32 mm (1¹/₄") galvanized roofing nails or 16-gauge galvanized staples having a 24 mm (1⁵/₁₆") crown and 32 mm (1¹/₄") leg lengths.
 - 5.6.1.2 Fastener spacing shall be a maximum of 152 mm (6") at the edges and 305 mm (12") on intermediate members.
 - 5.6.1.3 Stud spacing shall be a maximum of 610 mm (24") o.c.
 - 5.6.1.4 Minimum fastener penetration into the framing members is 25.4 mm (1").
 - 5.6.1.5 Fasten all staples parallel to the framing member, with an edge spacing of 9.5 mm (3/8") minimum.
 - 5.6.1.6 All panels are vertically or horizontally installed with all joints backed by studs, plates, or blocks when water or air barrier functionality is desired.
- 5.6.2 Incidental tears or penetrations of Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing must be repaired with an approved construction tape. See Section **5.3.3**.
- 5.6.3 All joints must be installed in one of the following methods:
 - 5.6.3.1 Joints overlap nominally 19 mm (3/4").
 - 5.6.3.2 Butted joints are sealed with approved construction tape. See Section **5.3.3**.
- 5.7 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 manufacturer installation instructions, this report, the approved construction documents, and the applicable building code.
- 6.2 In the event of a conflict between the manufacturer installation instructions this report and the applicable building code, the more restrictive shall govern.
- 6.3 *Installation Procedure*
 - 6.3.1 *General for Structural and WRB Applications*
 - 6.3.1.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing shall be installed in accordance with the manufacturer published installation instructions and this report. Basic instructions are also printed on every Thermo-Ply panel.
 - 6.3.1.2 Where the Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG 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, or fasten tightly with one fastener every 305 mm (12") to smooth out, if necessary.

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

6.3.2 *Orientation*

6.3.2.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing may be installed in either the vertical or the 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.

6.3.3 *Fastener Type*

6.3.3.1 *Thermo-Ply Red Structural Sheathing*

6.3.3.1.1 Minimum 3 mm (0.120") x 32 mm (1¹/₄") galvanized roofing nail.

6.3.3.1.2 Minimum 24 mm (1⁵/₁₆") crown by 32 mm (1¹/₄") leg, 16-gauge staples shall be installed per the staple manufacturer instructions.

6.3.3.1.3 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.

Table 6. Fastener Spacing of Thermo-Ply® Red Structural Sheathing

Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing Application	Maximum Panel Edge Fastener Spacing mm (in)	Maximum Panel Intermediate Fastener Spacing mm (in)
Lateral Shear	76 (3)	76 (3)
Transverse Loads		
Uplift Loads		
Water-Resistive Barrier	152 (6)	305 (12)
Air Barrier		

SI: 25.4 mm = 1 in

6.3.3.2 *Gypsum Wallboard*

6.3.3.2.1 Where required, gypsum wallboard shall be a minimum 12.7 mm (1/2") thickness and shall be attached with #6 x 32 mm (1¹/₄") type W or S screws, diameter 3.3 mm (0.13").

6.3.4 *Fastener Edge Distance*

6.3.4.1 For NBC Division B Part 9 applications, fastener edge distance is a minimum of 10 mm (0.39") for both Thermo-Ply® Structural Sheathing and gypsum in accordance with Division B, Article 9.29.5.8 or Division B, Article 9.29.5.9 when installing with nails or screws.

6.3.4.2 Edge distances for staples are specified in the applicable tables in Section 5.

6.3.5 *Treatment of Joints*

6.3.5.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing joints may be either butted or overlapped.

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

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

6.3.6 Window Jamb Adjustments

- 6.3.6.1 If windows are made to accommodate traditional 12.7 mm (1/2") sheathing materials, order windows with adjustable nailing fins from the supplier. Door brick moldings may be planed or routed 9 mm (0.35") in order to accommodate the different sheathing thickness, either at the jobsite or by the millwork supplier.
- 6.3.6.2 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG 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.

6.3.7 The structural installation procedure shall be in accordance with **Figure 2**.

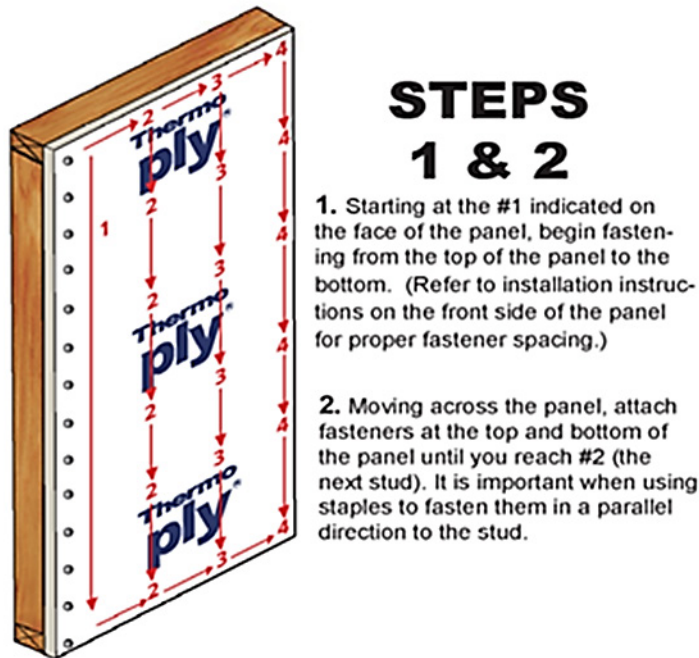


Figure 2. Installation Instructions – WRB Installation Procedure

6.3.7.1 Overlapped Joint – Install the first panel per **Figure 2**.

- 6.3.7.1.1 Overlap the next panel 19 mm (3/4") over the first panel, and fasten the joint with a common line of fasteners.
- 6.3.7.1.2 For Thermo-Ply Red AMG Structural Sheathing, 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.

6.3.7.2 Butted Joint with Flashing – Install panels per **Figure 2** with joints butted (no overlap).

6.3.7.3 Seal butted seams with approved construction tape (Section **5.3.3**), after attachment of 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 Water penetration testing in accordance with ASTM E331
- 7.1.4 Test reports and data for determining use as an air barrier in accordance with ASTM E283
- 7.1.5 Lateral load testing and data for determining comparative equivalency for use as an alternative material in accordance with ASTM E2126
- 7.1.6 Test reports and data for determining surface burning characteristics in accordance with CAN/ULC S102
- 7.1.7 Test reports and data for determining comparative equivalency for use as an alternative material in accordance with NBC Division A Section 1.2
- 7.2 Information contained herein is the result of testing and/or data analysis by sources that conform to the evaluation requirements of NBC Volume 1 Relationship of the NBC to Standards Development and Conformity Assessment and/or professional engineering regulations. DrJ relies upon accurate data to perform its ISO/IEC 17065 evaluations.
- 7.3 Where appropriate, DrJ's analysis is based on provisions that have been codified into law through provincial, territorial, or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ analysis may use code-adopted provisions as a control sample. A control sample versus a test sample establishes innovative products as being equivalent to that prescribed in this code in 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 report, 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.
- 7.6 Where additional condition of use and/or code compliance information is required, please search for Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing on the DrJ Certification website.

8 Findings

- 8.1 As delineated in Section 3, Thermo-Ply Red Structural Sheathing 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 report and the manufacturer installation instructions, Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing shall be approved for the following applications:
 - 8.2.1 Lateral (in-plane) load resistance due to wind and seismic loads carried by shear walls.
 - 8.2.2 Transverse (perpendicular-to-plane) load resistance due to components and cladding pressures on building surfaces.
 - 8.2.3 Resistance to uplift loads in single top plate applications.
 - 8.2.4 Performance for use as a WRB in accordance with NBC Division B Note A-5.6.2.1.
 - 8.2.5 Performance for use as an air barrier in accordance with NBC Division B Section 5.4 and Subsection 9.25.3.
 - 8.2.6 Surface Burn Characteristics in accordance with **Table 5**.
- 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 These innovative products have been evaluated in the context of the codes listed in Section 2 and is compliant with all known provincial, territorial, and local building codes. Where there are known variations in provincial, territorial, or local codes applicable to this TER, they are listed here:
 - 8.4.1 No known variations
- 8.5 NBC Volume 1 Relationship of the NBC to Standards Development and Conformity Assessment:

Certification

Certification is the confirmation by an independent organization that a product, service, or system meets a requirement...Certification bodies publish lists of certified products and companies...Several organizations, including the Canadian Construction Materials Centre (CCMC), offer such evaluation services.

Evaluation

An evaluation is a written opinion by an independent professional organization that a product will perform its intended function. An evaluation is very often done to determine the ability of an innovative product, for which no standards exist, to satisfy the intent of the Code requirement...

- 8.6 ISO/IEC 17065 accredited third-party certification bodies,⁵ including but not limited to, Standards Council of Canada (SCC)⁶ and ANSI National Accreditation Board (ANAB),⁷ confirm that product certification bodies have the expertise to provide technical evaluation services within their scope of accreditation. All SCC and ANAB product certification bodies meet NBC requirements to offer evaluation services for alternative solutions.⁸
 - 8.6.1 DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131⁹ and employs professional engineers.¹⁰
- 8.7 Through ANAB accreditation and the IAF Multilateral Agreements, this report can be used to obtain innovative products 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.”¹¹
- 8.8 Product certification organizations, accredited by the SCC and ANAB, are defined as equivalent evaluation services:
 - 8.8.1 Canada-United States-Mexico Agreement (CUSMA), Article 11.6 Conformity Assessment confirms mutual recognition by stating, “...each Party shall accord to conformity assessment bodies located in the territory of another Party treatment no less favorable than that it accords to conformity assessment bodies located in its own territory or in the territory of the other Party.”
 - 8.8.2 The SCC National Conformity Assessment Principles states, “SCC is a member of a number of international organizations developing voluntary conformity assessment agreements that help ensure the international acceptance of Canadian conformity assessment results. Signatories to these agreements (like SCC) recognize each other’s accreditations as being equivalent to their own.”¹²

⁵ <https://anabpd.ansi.org/Accreditation/product-certification/DirectoryListingAccredited?menuID=1&prgID=1>

⁶ https://iaf.nu/en/member-details/?member_id=91

⁷ https://iaf.nu/en/member-details/?member_id=14

⁸ NBC Division A Clause A-1.2.1.1.(1)(b) provides information on code compliance via alternative solutions and defines alternative solutions as “...achiev[ing] at least the minimum level of performance required by Division B.” NBC Division C Section 2.3 includes additional guidance for documentation of alternative solutions.

⁹ <https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?&prgID=1&OrgId=2125&statusID=4>

¹⁰ Through ANAB accreditation and the IAF MLA, DrJ certification can be used to obtain material, product, design, or method of construction approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – “certified once, accepted everywhere”.

¹¹ <https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise>

¹² The National Conformity Assessment Principles states, “Product regulations and standards may vary from country to country. If these are set arbitrarily, they could be deemed as protectionist. The World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) is intended to ensure that technical regulations, standards and conformity assessment procedures of member countries do not create unnecessary obstacles to trade. Under the TBT Agreement, members of the WTO agree to use international standards, including conformity assessment standards and guides, as a basis for their technical requirements.”

- 8.9 Building official approval of a licensed professional engineer is performed by verifying the professional engineer and/or their business entity are listed by the engineering regulators of the relevant jurisdiction.

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 Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing shall not be used:
- 9.3.1 As a nailing base for claddings, trim, windows, and doors. Fastening through the Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing into the framing is acceptable.
 - 9.3.2 To resist horizontal loads from concrete and masonry walls.
- 9.4 When Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing is installed as a wall sheathing but is not installed per structural requirements, light-framed walls shall be braced by other means. When used as a WRB, installation shall be in accordance with Section 5.3.
- 9.4.1 When Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing is not installed as a WRB, other means of providing a WRB may be required, as per the relevant code.
- 9.5 When used in high wind and high seismic areas as defined in NBC Division B Article 9.23.13.2.(1), bracing to resist lateral loads shall be designed and constructed in accordance with NBC Division B part 4 or good engineering practice in accordance with NBC Division B Article 9.23.13.2 (2).
- 9.6 When used in extreme wind and extreme seismic areas as defined in NBC Division B Article 9.23.13.3.(1), bracing to resist lateral loads shall be designed and constructed in accordance with NBC Division B Article 9.23.13.3.(2). Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.6.1 Specified shear strengths shall not exceed values in **Table 1** for wind loads and **Table 2** for seismic loads.
 - 9.6.2 Factored uplift loads shall not exceed values in **Table 3**.
 - 9.6.3 Transverse design loads shall not exceed those described in **Table 4**, unless an approved exterior wall covering capable of separately resisting loads perpendicular to the face of the walls is installed over the sheathing.
- 9.7 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing is manufactured under a quality control program with quality control inspections established by the governing legislation of the adopting province or territory, as described in the NBC Volume 1 commentary on Conformity Assessment.
- 9.8 Where 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:
- 9.8.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice, and, when prepared by an approved source, shall be approved when signed and sealed.
 - 9.8.2 This report and the installation instructions shall be submitted at the time of permit application.
 - 9.8.3 These innovative products have an internal quality control program and a third-party quality assurance program.
 - 9.8.4 At a minimum, these innovative products shall be installed per Section 6 of this report.
 - 9.8.5 This report shall be reviewed for code compliance by the AHJ in concert with the duties and powers granted to the building official by the provincial regulations governing such duties and powers.
 - 9.8.6 The application of these innovative products in the context of this report, are dependent on the accuracy of the construction documents, implementation of installation instructions, inspections, and any other regulatory requirements that may apply.

- 9.9 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the designer (e.g., owner).
- 9.10 The actual design, suitability, and use of this report, for any particular building, is the responsibility of the owner or the owner's authorized agent.

10 Identification

- 10.1 The innovative products listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at www.oxengineeredproducts.com.

11 Review Schedule

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

12 Legislation that Authorizes New Product Approval in International Markets is Found in Appendix A

- 12.1 Thermo-Ply Red Structural Sheathing and Thermo-Ply Red AMG Structural Sheathing have been tested by an [ISO/IEC 17025 accredited laboratory](#) and/or evaluated to be in conformance with accepted engineering practice to ensure durable, livable, and safe construction.
- 12.2 This report is published by an [ISO/IEC 17065 accredited certification body](#) with the [expertise](#) to evaluate products, materials, designs, services, assemblies, and/or methods of construction.
- 12.3 This report meets the legislative intent and definition of a [duly authenticated report](#), which shall be accepted by the AHJ, unless there are specific reasons why the alternative shall not be approved as provided for in writing.

Appendix A

1 Legislation that Authorizes New Product Approval in Canada

- 1.1 The Competition Act is a Canadian federal law governing competition law in Canada. The Act contains both criminal and civil provisions aimed at preventing anti-competitive practices in the marketplace. The Act is enforced and administered by the Competition Bureau, whose regulations encourage the approval of NBC 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 **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 (TBT) agreements and the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA), where these agreements proclaim the desire of both countries to have their markets open to innovation.
- 1.3 These agreements:
 - 1.3.1 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,
 - 1.3.2 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.
 - 1.3.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.
- 1.4 To this end, Canada operates an accreditation system as follows:



1.5 This includes ISO/IEC 17065 product certification as follows:



1.6 Similarly, the United States operates multiple accreditation process with ANAB being the most prominent ISO/IEC 17065 product certification organization as follows:

Accreditation Body | IAF MLA Signatory

ANAB (ANSI National Accreditation Board)

Code of Conduct Adopted: 01 Feb 2005 | <http://www.anab.org>

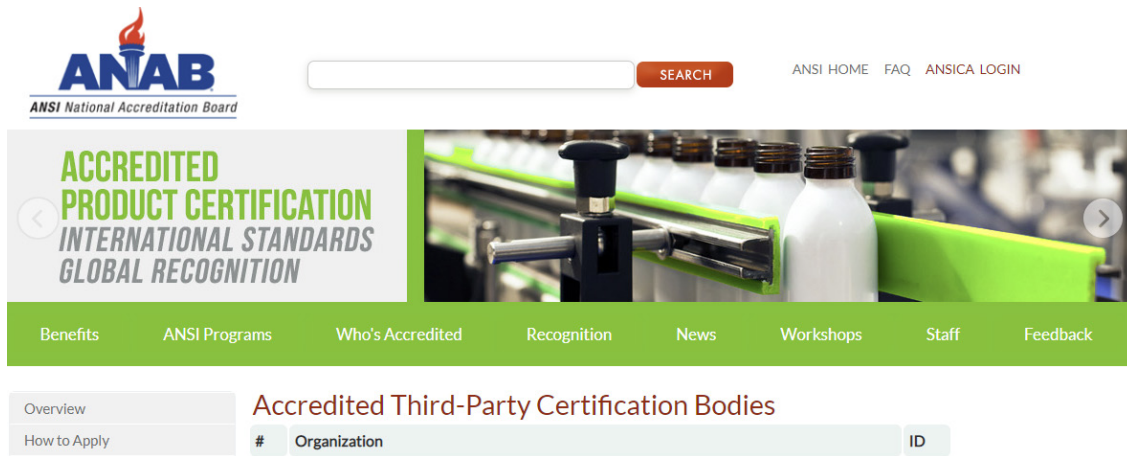
United States of America

IAAC APAC

1.7 This includes ISO/IEC 17065 product certification as follows:



- 1.8 The list of ANAB accredited ISO/IEC 17065 product certification organizations can be found at the following link: <https://anabpd.ansi.org/Accreditation/product-certification/DirectoryListingAccredited?menuID=1&prgID=1>



- 1.9 Approval is granted via International Agreement, where the purpose of the IAF MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories. Subsequent acceptance of accredited certification and validation/verification statements is required so that one accreditation can be used 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.
- 1.10 Consequently, these agreements permit product approval of innovative Australian and New Zealand products into US markets and vice-versa.
- 1.11 Finally, a question that often arises is, why do these agreements exist? In addition, another question is why is the ISO/IEC 17065 accredited third-party certification process so important?
- 1.11.1 The answer is because all countries desire to protect the intellectual property and trade secrets of their country's businesses.
 - 1.11.2 In the US this protection is provided by 18 U.S. Code § 1831 Under Economic Espionage, where it states "whoever, intending or knowing that the offense will benefit any foreign government, foreign instrumentality, or foreign agent, knowingly steals, or without authorization appropriates, takes, carries away, or conceals, or by fraud, artifice, or deception obtains a trade secret shall be fined not more than \$5,000,000 or imprisoned not more than 15 years, or both."
 - 1.11.3 Any organization that commits any offense described shall be fined not more than the greater of \$10,000,000 or three (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.¹³
 - 1.11.4 Protection of intellectual property and trade secrets reinforces the value of the IAF MLA, the GATT/TBT and the ISO/IEC 17065 product approval process.
- 1.12 The goal is to protect everyone's best interests while also facilitating economic freedom and opportunity by promoting free and fair competition in the marketplace.

¹³ <https://www.law.cornell.edu/uscode/text/18/part-II/chapter-90>