

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

TER No. 1808-03

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

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

DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION

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

1. Products Evaluated:

- 1.1. Thermo-Ply® Red Structural Sheathing
- 1.2. Thermo-Ply® Red AMG Structural Sheathing¹
- 1.3. For the most recent version of this Technical Evaluation Report (TER), visit drjengineering.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjengineering.org/statelaw. DrJ is fully compliant with all state/provincial professional engineering and code compliance laws. Douglas Consultants Inc. has collaborated with DrJ through the review of this technical evaluation and conformity to Canadian building codes.
- 1.4. This TER can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found [here](#)) and covered by an [IAF MLA Evaluation](#) per the [Purpose of the MLA](#) (as an example, see [letter to ANSI](#) from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other [IAF MLA Signatory Countries](#) and have their products readily

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

DrJ is a Professional Engineering Approved Source

 **Learn more about DrJ's Accreditation**

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

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approved by authorities having jurisdiction using [DrJ's ANSI accreditation](#).

- 1.5. Building code regulations require that evaluation reports be provided by an approved agency meeting specific requirements. Any agency accredited in accordance with ANSI ISO/IEC 17065 meets this requirement within ANSI's scope of accreditation. For a list of accredited agencies, visit ANSI's [website](#). For more information, see [drjcertification.org](#).
- 1.6. Requiring an evaluation report from a specific private company (i.e. ICC-ES, IAPMO, CCMC, DrJ, etc.) can be viewed as discriminatory and is a violation of international, federal, state, provincial and local anti-trust and free trade regulations.
- 1.7. DrJ's code compliance work:
 - 1.7.1. Conforms to code language adopted into law by individual states/provinces and relevant consensus based standards such as an ANSI or ASTM standards.
 - 1.7.2. Complies with accepted engineering practice, all professional engineering laws and by providing an engineer's seal DrJ takes professional responsibility for its specified scope of work.

2. Applicable Codes and Standards:²

- 2.1. *2010 and 2015 National Building Code of Canada (NBC)*
- 2.2. *2017 National Energy Code of Canada (NECC)*
- 2.3. *ASTM E72 – Standard Methods of Conducting Strength Test of Panels for Building Construction*
- 2.4. *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*
- 2.5. *ASTM E330 / E330M – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.6. *ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.7. *ASTM E564 – Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
- 2.8. *ASTM E2126 – Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*
- 2.9. *ASTM E2178 – Standard Test Method for Air Permeance of Building Materials*
- 2.10. *Canadian Wood Council - Engineering Guide For Wood Frame Construction*
- 2.11. *CAN/CSA O86 – Engineering Design in Wood*
- 2.12. *CAN/ULC S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies*

3. Performance Evaluation:

- 3.1. Thermo-Ply® Red Structural Sheathing has been evaluated to determine:
 - 3.1.1. Structural performance under lateral load conditions (wind and seismic) in accordance with *NBC* Division B Subsection 9.23.13 and Subsection 4.1.8.
 - 3.1.1.1. [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).

² Unless otherwise noted, all references in this code compliant technical evaluation report (TER) are from the 2015 version of the *NBC*. This product is also approved for use with the 2010 *NBC* and the standards referenced therein. Where this TER is not approved, the building official shall respond in writing, stating the reasons this TER was not approved. For variations in state and local codes, if any see [Section 8](#).

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3.1.1.2. 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).)

3.1.2. Structural performance under transverse loads for use to resist factored external wind loads in accordance with *NBC* Division B Subsection 4.1.7.

3.1.3. Structural performance under uplift and gravity loads for use with single top plates in accordance with *NBC* Division B Article 9.23.11.3.

3.1.4. Performance for use as a water-resistive barrier (WRB) in accordance with *NBC* Division B Note A-5.6.2.1.

3.1.5. Performance for use as an air barrier in accordance with *NBC* Division B Section 5.4 and Subsection 9.25.3 and *NECC* Division B Subsection 3.2.4.

3.1.6. Performance for surface burning characteristics in accordance with *NBC* Division B Subsection 3.1.12 and 9.10.3.2.

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

4. Product Description and Materials:

Figure 1: Thermo-Ply® Red Structural Sheathing



4.1. 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.

4.1.1. Thermo-Ply® Red Structural Sheathing panels have a nominal thickness of 2.9 mm (0.113") and nominal weight of 19.82 Pa (0.414 psi).

4.2. Material Availability

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

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

4.2.3. Other custom widths and lengths can be manufactured.

5. Applications:

5.1. General

5.1.1. Thermo-Ply® Red Structural Sheathing panels are 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.

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- 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 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).
 - 5.2.1.1.1. Thermo-Ply® Red Structural Sheathing is 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 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.
- 5.2.1.6. Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and good technical judgment.

5.2.2. Performance-Based Wood-Framed Construction

- 5.2.2.1. 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 *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 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 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 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 panels are permitted to resist transverse wind load forces using the specified transverse loads set forth in [Table 4](#).

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Thermo-Ply® Red Structural Sheathing – Specified Shear Capacity for Limit States Design – Wind^{1, 4}					
Thermo-Ply® Red Structural Sheathing	Joint³ Condition	Maximum Stud Spacing mm. (in.)	Gypsum Wallboard (GWB)²	Gypsum Wallboard Fastener Spacing [edge/field] mm. (in.)	Specified Shear Strength, kN/m (plf)
	Lapped or Butted	406 (16) o.c.	12.7 mm (½") GWB	102/406 (4/16)	9.8 (675)
				203/203 (8/8)	7.2 (495)
				203/406 (8/16)	6.9 (470)
				406/406 (16/16)	5.9 (405)
	610 (24) o.c.	15.9 mm (5/8") GWB	203/203 (8/8)	7.0 (480)	
			406/406 (16/16)	5.7 (395)	
	Lapped	406 (16) o.c.	No GWB	-	4.9 (335)
		610 (24) o.c.			4.5 (310)
	Butted	406 (16) o.c.			4.6 (315)
610 (24) o.c.		4.2 (290)			

1" = 25.4 mm; 1 lb/ft = 0.0146 kN/m

- 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 mm (0.35"). Fastener head shall be in contact with the Thermo-Ply® surface. Roofing nails (minimum 3 mm (0.120") x 32 mm (1¼") with a 9.5-mm (0.35") head) are a permitted alternative fastener.
- Gypsum attached with minimum #6 type W or S screws 32 mm (1¼") long with a minimum edge distance of 10 mm (0.375").
- Where lapped joints are used, the panels shall be overlapped nominally 19 mm (¾").
- Straight-line interpolations between fastening patterns is acceptable.

Table 1: Specified Shear Capacity for Limit States Design for Thermo-Ply® Red Structural Sheathing – Wind

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Specified Shear Capacity for Limit States Design & Seismic Design Coefficients for Thermo-Ply® Red Structural Sheathing ^{1, 3, 7}											
Seismic Force-Resisting System (SFRS)	Joint Condition ^{4, 9}	Gypsum ^{2, 10} 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 m. (ft.) Limit ⁸				
							$I E F_a S_a(0.2)$				$I E F_a S_a(1.0)$
							< 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	Lapped or Butted	12.7 mm Gypsum-Fasteners Spaced 203 / 203	406 (16) o.c.	7.2 (495)	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.	5.7 (395)	2.0	1.7	NL	NL	20 (65.6)	20 (65.6)	20 (65.6)
	Lapped or Butted	No GWB	406 (16) o.c.	4.6 (315)	3.0	1.7	NL	NL	30 (98.4)	20 (65.6)	20 (65.6)

¹" = 25.4 mm; 1 lb/ft = 0.0146 kN/m
¹. 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 10 mm (0.375"). Fastener head shall be in contact with the Thermo-Ply® surface. Roofing nails (minimum 3 mm (0.120") x 31.8 mm (1¼") with a 9.5-mm (0.375") head) are a permitted alternative fastener.
². Gypsum attached with minimum #6 type W or S screws 32 mm (1¼") long with a minimum edge distance of 9 mm (0.35").
³. All seismic design parameters follow the equivalency as defined in [Section 3](#) of this TER.
⁴. Where lapped joints are used, the panels shall be overlapped nominally 19 mm (¾").
⁵. Response modification coefficient, R_d , for use throughout NBC.
⁶. For combinations of different types of SFRS acting in the same direction in the same storey, $R_d R_o$ 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.
⁷. Consider the additional system restrictions in Subsection 4.1.8.10 of NBC Division B.
⁸. NL = Not Limited. Heights are maximum height limits above grade, as defined in NBC Division B Table 4.1.8.9.
⁹. Thermo-Ply® Red sheathing may be installed with either lapped joints or butted joints.
¹⁰. NBC Table 9.23.13.6 requires 15.9 mm (5/8") thick gypsum with framing 610 mm (24") o.c.

Table 2: Seismic Performance of Thermo-Ply® Red Structural Sheathing

Uplift Performance of Thermo-Ply® Red Structural Sheathing Single Top Plate			
Type of Thermo-Ply® Structural Sheathing	Specified Uplift Capacity kN/m (lbs/ft)	Maximum Stud Spacing mm. (in.)	Fastener Schedule
Thermo-Ply® Red: Single Top Plate	4.5 (310)	406 (16) o.c.	Minimum 24-mm (¹⁵ / ₁₆ " crown, 32-mm (1¼") leg 16-gauge galvanized staples or 3-mm (0.120") x 32-mm (1¼") roofing nails, 76 mm (3") o.c. to perimeter/field.

¹" = 25.4 mm; 1 lb/ft = 0.01459 kN/m
¹. 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 3: Uplift Performance of Thermo-Ply® Red Structural Sheathing

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Summary of Specified Pressures for Thermo-Ply® Red 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 (2.9 mm)	406 (16) o.c.	8.2
	610 (24) o.c.	6.5

¹" = 25.4 mm 1 psf= 0.04788 kPa
¹. Fastener Schedule: Minimum 24-mm (¹⁵/₁₆" crown, 32-mm (¹/₄" leg 16-gauge galvanized staples or 3-mm (0.120") x 32-mm (¹/₄" roofing nails, 76 mm (3") o.c. to perimeter / field. Staple crowns shall be installed parallel to framing.
². Hourly Wind Pressure (1-in-50) for selected locations can be located in NBC Division B, Appendix C, Table C-2
³. 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.

Table 4: Transverse Load Performance of Thermo-Ply® Red Structural Sheathing

5.3. Water-Resistive Barrier

- 5.3.1. Thermo-Ply® Red 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 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](#). Approved construction tapes include 48 mm (¹⁷/₈" minimum width 3M (8087), Venture White 1585 CW-W Sheathing Tape, or equivalent construction tape.
- 5.3.4. A separate WRB system may also be provided. If a separate WRB system is used, overlapping or taping of the sheathing joints is not required.
- 5.3.5. Flashing must be installed at all sheathing penetrations and shall comply with all applicable code sections.
- 5.3.6. 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](#).

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5.4. Air Barrier

- 5.4.1. Thermo-Ply® Red Structural Sheathing may be used as an air barrier material as prescribed in *NBC* Division B Section 5.4 and Subsection 9.25.3, and *NECC* Division B Subsection 3.2.4 in accordance with *ASTM E2178*.

5.5. Fire Safety Performance

5.5.1. Surface Burn Characteristics

- 5.5.1.1. Thermo-Ply® Red Structural Sheathing has the flame-spread 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.

Product	Flame Spread	Smoke Developed
Thermo-Ply® Red ¹	120	60
<small>¹ = 25.4 mm Tested in accordance with <i>CAN/ULC-S102</i>.</small>		

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

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 (1¼") galvanized roofing nails or No.16 gauge galvanized staples having a 24-mm (¹⁵/₁₆") crown and 32-mm (1¼") 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 mm (0.35") 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 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 19.1 mm (³/₄").
- 5.6.3.2. Butted joints are sealed with approved construction tape. See [Section 5.3.3](#).

6. Installation:

6.1. General for Structural and WRB Applications

- 6.1.1. Thermo-Ply® Red Structural Sheathing shall be installed in accordance with the manufacturer's published installation instructions and this TER. Basic instructions are printed on every Thermo-Ply® panel as well.
- 6.1.2. If there are any conflicts between the manufacturer's instructions and this TER, the more restrictive shall apply.
- 6.1.3. 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, or fasten tightly with one fastener every 305 mm (12") to smooth out, if necessary.

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6.2. Orientation

- 6.2.1. 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.

6.3. Fastener Type

6.3.1. Thermo-Ply® Red Structural Sheathing

- 6.3.1.1. Minimum 3-mm (0.120") x 32-mm (1¼") galvanized roofing nail.
- 6.3.1.2. Minimum 24-mm (15/16") crown by 32-mm (1¼") leg, 16-gauge staples shall be installed per the staple manufacturer's instructions.
- 6.3.1.3. Fasteners shall be driven such that the head of the fastener is in contact with the surface of the Thermo-Ply® Structural Sheathing. Do not overdrive fasteners.

Thermo-Ply® Red 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		

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

6.3.2. Gypsum Wallboard

- 6.3.2.1. Where required, gypsum wallboard shall be a minimum 12.7 mm (½") thickness and shall be attached with #6 x 32-mm (1¼") type W or S screws, diameter 3.3 mm (0.13").

6.4. Fastener Edge Distance

- 6.4.1. For NBC Division B Part 9 applications, fastener edge distance is a minimum of 10 mm (.375") for both Thermo-Ply® Structural Sheathing and gypsum in accordance with Division B, Article 9.29.5.8.

6.5. Treatment of Joints

- 6.5.1. Thermo-Ply® Red Structural Sheathing joints may be either butted or overlapped.
- 6.5.1.1. Lapped joints shall be overlapped by 19 mm (¾") nominally and fastened with a single row of fasteners. Always run staples parallel with framing.
- 6.5.1.2. Butt joints shall be placed over framing members and fastened with a single row of fasteners at each panel edge.

6.6. Window Jamb Adjustments

- 6.6.1. If windows are made to accommodate traditional 12.7 mm (½") 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.
- 6.6.2. 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's installation instructions.

- 6.7. The structural installation procedure shall be in accordance with [Figure 2](#).

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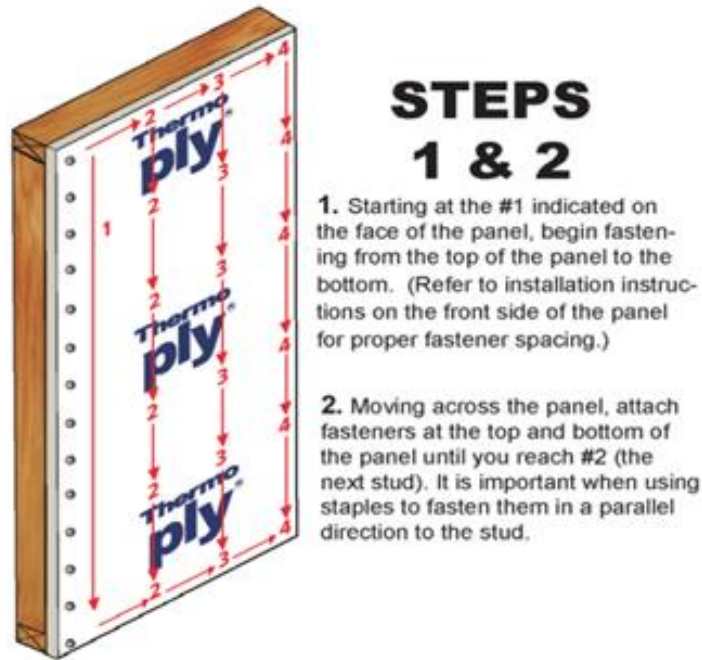


Figure 2: Installation Instructions – WRB Installation Procedure

6.7.1. Overlapped Joint – Install the first panel per [Figure 2](#).

6.7.1.1. Overlap the next panel 19 mm ($\frac{3}{4}$ ") over the first panel, and fasten the joint with a common line of fasteners.

6.7.1.2. 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.

6.7.2. Butted Joint with Flashing – Install panels per [Figure 2](#) with joints butted (no overlap).

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

7. Test and Engineering Substantiating Data:

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

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

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

7.4. Test reports and data for determining use as an air barrier, based on *ASTM E283*.

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

7.6. Test reports and data for determining surface burning characteristics in accordance with *CAN/ULC S102*.

7.7. Test reports and data for determining comparative equivalency for use as an alternative material in accordance with *NBC Division A Section 1.2*.

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

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

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

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

8. Findings:

- 8.1. When installed in accordance with the manufacturer's installation instructions and this TER, Thermo-Ply® Red Structural Sheathing complies with, or is a suitable alternative to, the applicable sections of the codes listed in [Section 2](#) for the following applications:
 - 8.1.1. Lateral (in-plane) load resistance due to wind and seismic loads carried by shear walls.
 - 8.1.2. Transverse (perpendicular-to-plane) load resistance due to components and cladding pressures on building surfaces.
 - 8.1.3. Resistance to uplift loads in single top plate applications.
 - 8.1.4. Performance for use as a WRB in accordance with *NBC* Division B Note A-5.6.2.1.
 - 8.1.5. Performance for use as an air barrier in accordance with *NBC* Division B Section 5.4 and Subsection 9.25.3.
 - 8.1.6. Surface Burn Characteristics in accordance with [Table 5](#).
- 8.2. *NBC* Section 1.2.1 states:
 - 1.2.1 Compliance with this Code**
 - 1) Compliance with this Code shall be achieved by
 - a) complying with the applicable acceptable solutions in Division B (see Appendix A), or
 - b) using alternative solutions that will achieve at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the applicable acceptable solutions (see Appendix A).
 - 2) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Division B shall be the objectives and functional statements referred to in Subsection 1.1.2. of Division B.
- 8.3. *NBC* Division C Section 2.3 includes additional guidance for Alternative Solutions.
- 8.4. This product has been evaluated with the codes listed in [Section 2](#), and is compliant with all known state, provincial, and local building codes. Where there are known variations in state, provincial, or local codes that are applicable to this evaluation, they are listed here:
 - 8.4.1. No known variations
- 8.5. This TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its criteria for all testing and engineering analysis. DrJ's professional engineering work falls under the jurisdiction of each state or provincial board of professional engineers, when signed and sealed.

Technical Evaluation Report (TER)

9. Conditions of Use:

- 9.1. Where required by the authority having jurisdiction (AHJ), as defined in *NBC* Division A Section 1.4, in which the project is to be constructed, this report and the installation instructions shall be submitted at the time of permit application.
- 9.2. Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the code official for review and approval.
- 9.3. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.4. This report and the installation instructions shall be available to the jurisdiction in which the project is to be constructed.
- 9.5. Thermo-Ply® Red Structural Sheathing shall not be used as a nailing base for claddings, trim, windows and doors. Fastening through the Thermo-Ply® Red Structural Sheathing into the framing is acceptable.
- 9.6. Walls sheathed with Thermo-Ply® Red Structural Sheathing shall not be used to resist horizontal loads from concrete and masonry walls.
- 9.7. When Thermo-Ply® Red 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](#).
 - 9.7.1. When Thermo-Ply® Structural Sheathing is not installed as a WRB, other means of providing a WRB may be required, as per the relevant code.
- 9.8. 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 with *NBC* Division B Article 9.23.13.2 (2).
- 9.9. 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.
 - 9.9.1. Specified shear strengths shall not exceed values in [Table 1](#) for wind loads and [Table 2](#) for seismic loads.
 - 9.9.2. Factored uplift loads shall not exceed values in [Table 3](#).
 - 9.9.3. 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.
- 9.10. Thermo-Ply® Red 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.
- 9.11. Design
 - 9.11.1. Building Designer Responsibility
 - 9.11.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer (e.g., Registered Design Professional) for the Building and shall be in accordance with *NBC* Division C Sentence 2.2.4.3.(1).
 - 9.11.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with *NBC* Division C Sentence 2.2.4.3.(1) and Note A-2.2.6.2.(1).
 - 9.11.2. Construction Documents
 - 9.11.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.

Technical Evaluation Report (TER)

9.12. Responsibilities

- 9.12.1. The information contained herein is a product, material, detail, design and/or application TER evaluated in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering practice, experience and technical judgment.
- 9.12.2. DrJ TERs provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated sections.
- 9.12.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.
- 9.12.4. The limits of DrJ's responsibility as stated in this document shall also apply to the responsibility of Douglas Consultants Inc.
- 9.12.5. The actual design, suitability and use of this TER, for any particular building, is the responsibility of the Owner or the Owner's authorized agent, and the TER shall be reviewed for code compliance by the Building Official.
- 9.12.6. The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the Building Official's inspection and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

10. Identification:

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

11. Review Schedule:

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



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