

Strong R Structural Insulation – Canada – Limit  
States Design

TER No. 1808-06

Ox Engineered Products, LLC

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22260 Haggerty Rd Ste 365  
Northville, MI 48167-8970  
989-798-5923  
[oxengineeredproducts.com](http://oxengineeredproducts.com)

1255 N 5th St  
Charleston, IL 61920  
269-435-2425

**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 21 00 – Thermal Insulation  
Section: 07 25 00 – Water-Resistive Barriers/Weather Barriers  
Section: 07 27 00 – Air Barriers

**1. Products Evaluated:**

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

***DrJ is a Professional Engineering Approved Source***

 **Learn more about DrJ's Accreditation**

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

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- 1.4. Building code regulations require that evaluation reports are 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](#).
- 1.5. 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.
- 1.6. DrJ's code compliance work:
  - 1.6.1. Conforms to code language adopted into law by individual provinces and any relevant consensus based standard such as an ANSI or ASTM standards.
  - 1.6.2. 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:<sup>1</sup>

- 2.1. *2010 and 2015 National Building Code of Canada (NBC)*
- 2.2. *2017 National Energy Code of Canada (NECC)*
- 2.3. *ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*
- 2.4. *ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.5. *ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.6. *ASTM E564 – Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
- 2.7. *ASTM E2126 – Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*
- 2.8. *ASTM E2178 – Standard Test Method for Air Permeance of Building Materials*
- 2.9. *Canadian Wood Council - Engineering Guide for Wood Frame Construction*
- 2.10. *CAN/CSA O86 – Engineering Design in Wood*
- 2.11. *CAN/ULC S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies*
- 2.12. *CAN/CSA S136 – North American Specification of Cold-Formed Steel Structural Members*

## 3. Performance Evaluation:

- 3.1. Strong R Structural Insulation was evaluated to determine:
  - 3.1.1. Structural performance under lateral load conditions (wind and seismic) in accordance with *NBC* Division B Subsection 4.1.8.
  - 3.1.2. Structural performance under lateral load conditions for both wind and seismic loading in accordance with *NBC* Division B Part 4 Structural Loads and Procedures and the *CWC Engineering Guide for Wood Frame Construction*.
    - 3.1.2.1. [Table 2](#) and [Table 6](#) provide 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).

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<sup>1</sup> 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 provincial and local codes, if any, see [Section 8](#).

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**3.1.2.2.** The basis for equivalency testing is outlined in Sentence 4.1.8.9.(5) of *NBC, Division B*:

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)].

- 3.1.3.** Resistance to transverse loads for wall assemblies used in light-frame wood and steel construction in accordance with *NBC* Division B Subsection 4.1.7.
- 3.1.4.** Performance for use as foam plastic insulation in accordance with *NBC* Division B Article 3.1.5.15 and *NECC* Division B Article 3.2.1.2.
- 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 use as a water-resistive barrier (WRB) in accordance with *NBC* Division B Note A-5.6.2.1.

**3.2.** Uplift performance is out of scope of this TER.

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

## 4. Product Description and Materials:

Figure 1: Strong R Structural Insulation



- 4.1.** Strong R Structural Insulation is a structural, rigid insulation sheathing product consisting of a proprietary fibrous sheathing board laminated to one side of a proprietary rigid foam plastic insulation.
  - 4.1.1.** The proprietary fibrous sheathing is made of specially treated plies that are pressure-laminated with a water-resistant adhesive. The surface finish consists of a facer on one or both side using a 2.9 mm (0.113") nominal thickness fibrous sheathing board.
  - 4.1.2.** The rigid foam plastic insulation is a Class A proprietary polyisocyanurate, which can have facings on one or both sides. The facers are designed with a base foil layer (0.0009 mil).
- 4.2. Material Availability**
  - 4.2.1.** Thickness: up to 54 mm (2-1/8")
  - 4.2.2.** Standard product width: 1219 mm (48")
  - 4.2.3.** Standard lengths: 2438 mm, 2743 mm and 3048 mm (96", 108" and 120")

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### 5. Applications:

#### 5.1. General

5.1.1. Strong R Structural Insulation is used in the following applications:

- 5.1.1.1. Wall sheathing in buildings constructed in accordance with the *NBC* for light-frame wood and steel 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 and steel construction.
- 5.1.1.3. Structural wall sheathing to provide resistance to transverse loads for wall assemblies used in light-frame steel construction.
- 5.1.1.4. Insulating sheathing applied as in-fill to portions of walls that are not designed as braced wall panels or shear walls.
- 5.1.1.5. Insulated sheathing in accordance with the *NBC* Division B Article 3.1.5.15, and *NECC* Division B Article 3.2.1.2.
- 5.1.1.6. An approved WRB in accordance with *NBC* Division B Article 5.6.2.1, when installed with approved Construction Tape on all sheathing seams, see [Section 5.3.3](#). See the manufacturer's product information for further details.
  - 5.1.1.6.1. Where the joints are not taped, a separate WRB shall be installed in accordance with the WRB manufacturer's installation instructions.
- 5.1.1.7. An air barrier material as part of an air barrier assembly in accordance with *NBC* Division B Section 5.4 and *NECC* Division B Subsection 3.2.4, in accordance with the manufacturer's installation instructions and this TER.

5.1.2. Strong R Structural Insulation contains foam plastics complying with *NBC* Division B, Article 3.1.5.15.

#### 5.2. Structural Applications

##### 5.2.1. General Provisions

- 5.2.1.1. Except as otherwise described in this TER, Strong R Structural Insulation shall be installed in accordance with the applicable building codes listed in [Section 2](#) using the provisions set forth therein for light-frame wood and steel construction.
- 5.2.1.2. Anchorage for in-plane shear shall be designed to transfer the induced shear force into and out of each shear wall. In no case shall the anchorage spacing exceed the following limits:
  - 5.2.1.2.1. For wind design, anchor bolt spacing shall not exceed 1.8 m (6') o.c.
  - 5.2.1.2.2. For seismic design, anchor bolt spacing shall not exceed 1.2 m (4') o.c.
- 5.2.1.3. The maximum aspect ratio for Strong R Structural Insulation shall be 4:1.
- 5.2.1.4. The minimum full height panel width shall be 610 mm (24").
- 5.2.1.5. All panel edges shall be supported by framing.
- 5.2.1.6. Fasteners may be countersunk beneath the outer surface of the foam plastic sheathing layer.
- 5.2.1.7. Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience and technical judgment.

##### 5.2.2. Steel-Framed Construction

5.2.2.1. Strong R Structural Insulation panels used in wall assemblies designed as shear walls:

- 5.2.2.1.1. Are permitted to be designed in accordance with the methodology used in *CAN/CSA S136* for cold form steel using the capacities shown in [Table 1](#) and [Table 2](#).
- 5.2.2.1.2. Resist lateral wind load forces using the specified shear strengths set forth in [Table 1](#).

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**5.2.2.1.3.** Resist seismic specified shear strengths using the seismic allowable unit shear capacities set forth in [Table 2](#) when seismic design is required in accordance with *NBC* Division B Subsection 4.1.8.

**5.2.2.1.3.1.** The ductility response modification factor and,  $R_d$ , over strength-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.

**5.2.2.2.** Strong R Structural Insulation panels are permitted to resist transverse wind load forces using the specified transverse loads set forth in [Table 3](#). Required component and cladding loads to be resisted are found in *NBC* Division B Subsection 4.1.7 (See Sentence 4.1.7.1[5]).

Table 1: Specified Shear Capacities for Limit States Design for Strong R Structural Insulation with Cold Formed Steel Stud Framing for Lateral Wind Loads							
Structural Sheathing Product	Thickness mm (in)	Fastener Spacing (edge/field) mm (in)	Maximum Stud Spacing mm (in)	Gypsum Wallboard (GWB) mm (in)	Gypsum Wallboard Fastener Spacing <sup>3</sup> (edge/field) mm (in)	Specified Shear Capacity kN/m (plf)	Fastener Schedule
Strong R Structural Insulation Light-Frame Cold Formed Steel <sup>1</sup>	32 (1- 1/4)	76/76 (3/3)	610 (24) o.c.	12.7 (1/2) GWB	203/203 (8/8)	6.5 (450)	See Note 4
		76/76 (3/3)			203/305 (8/12)	6.8 (465)	
		76/76 (3/3)			152/305 (6/12)	7.6 (520)	
		76/76 (3/3)		No GWB <sup>2</sup>	-	5.5 (375)	See Note 5
		305/305 (12/12)				2.5 (170)	See Note 6
		152/305 (6/12)				4.6 (310)	See Note 6
		76/76 (3/3)				3.3 (225)	See Note 7
		76/305 (3/12)		9.2 (630)	See Note 6		
	54 (2-1/8)	76/76 (3/3)	6.1 (415)	See Note 6			

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

1. 20 gage 345 MPa (50 ksi) 92 mm (3-5/8") metal studs @ 610 mm (24") o.c.
2. Mid height horizontal brace installed every other cavity space.
3. Gypsum attached with minimum #6 type S screws (32 mm) 1-1/4" long with a minimum edge distance of 9.5 mm (3/8").
4. #8 x 1-5/8" (41 mm) Self Drilling Modified Truss Head Screw (Head flush w/ exterior of foam board).
5. #8 x 1-5/8" (41 mm) Self Drilling Modified Truss Head Screw (Head driven down to paperboard).
6. #8 x 2-1/2" (64 mm) Self Drilling Modified Truss Head Screw (Head driven down to paperboard).
7. 2.5 mm (0.100") Diameter x 38 mm (1-1/2") Length Pins (Bostitch® C4S100 BG).

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Table 2: Seismic Performance of Strong R Structural Insulation with Cold Formed Steel Stud Framing											
Seismic Force Resisting System (SFRS)	Thickness mm (in)	Gypsum Wallboard Fastening Schedule <sup>4, 10</sup> mm (in)	Maximum Stud Spacing mm (in)	Specified Shear Strength, kN/m (plf)	Ductility Factor, $R_d$ <sup>6,7</sup>	Overstrength Force Modification Factor, $R_o$ <sup>7</sup>	Structural System Limitations and Building Height m (ft) Limit <sup>9</sup>				
							$I_e F_a S_a(0.2)$				$I_e F_a S_a(1.0)$
							< 0.2	$\geq 0.2$ to < 0.35	$\geq 0.35$ to $\leq 0.75$	> 0.75	> 0.3
Light-Frame Cold Formed Steel <sup>2</sup> Walls Sheathed with Strong R Structural Insulation <sup>1,5,8</sup>	32 (1-1/4)	No GWB <sup>3</sup>	610 (24) o.c.	5.5 (375)	2.5	1.7	20 (65.6)	20 (65.6)	20 (65.6)	20 (65.6)	20 (65.6)
		203:203 (8:8)		6.5 (450)	1.5	1.7	20 (65.6)	20 (65.6)	20 (65.6)	20 (65.6)	20 (65.6)

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

1. Strong R Structural Insulation attached with a minimum #8 x 1-5/8" Self Drilling Modified Truss Head Screw. Fasteners 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 of 9.5 mm (3/8"). Fastener head shall be in contact with the panel surface. Alternately, fastener heads are permitted to be overdriven into foam portion of the panel with no reduction in shear capacities.

2. 20 gage 345 MPa (50 ksi) 92 mm (3-5/8") metal studs @ 610 mm (24") o.c.

3. Mid height horizontal brace installed every other cavity space.

4. Walls installed with minimum 12.7 mm (1/2") Gypsum wallboard attached with minimum #6 type S screws 32 mm (1 1/4") long. Fasteners shall maintain a minimum edge distance of 9.5 mm (3/8").

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

6. Response modification coefficient,  $R_d$ , for use throughout *NBC*.

7. 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, Article 4.1.8.9.

8. Work this table with additional system restrictions in Article 4.1.8.10 of *NBC* Division B.

9. Heights are maximum height limits above grade, as defined in *NBC* Division B Table 4.1.8.9.

10. *NBC* Table 9.23.13.6 requires 15.9 mm (5/8") thick gypsum with framing 610 mm (24") o.c.

Table 3: Transverse Load Performance of Strong R Structural Insulation		
Summary of Specified Pressures for Strong R Structural Insulation Resisting Out-of-Plane Wind Loads		
Structural Sheathing Product	Transverse Wind Load Resistance	
	Maximum Stud Spacing mm (in)	Hourly 1-in-50 Wind Pressure <sup>2</sup> , kPa
Strong R	610 (24) o.c.	1.8

For SI: 1" = 25.4 mm; 1 psf = 0.04788 kPa

1. #8 x 2-1/2" Zinc Coated Self-Drilling Modified Truss Head Screw, 152 mm (6") o.c. in perimeter and 305 mm (12") o.c. in field.

2. Hourly Wind Pressure (1-in-50) for selected locations can be located in *NBC* Division B, Appendix C, Table C-2.

### 5.2.3. Performance-Based Wood-Framed Construction

**5.2.3.1.** Strong R Structural Insulation 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:

**5.2.3.1.1.** Using the capacities shown in [Table 4](#) for wind load forces.

**5.2.3.1.2.** To resist seismic load forces using the seismic specified shear strengths set forth in [Table 5](#) when seismic design is required in accordance with *NBC* Division B Subsection 4.1.8.

**5.2.3.1.2.1.** The ductility response modification factor and,  $R_d$ , over strength-related force modification factor,  $R_o$ , indicated in [Table 5](#) 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

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Table 4: Specified Shear Capacity for Limit States Design for Strong-R Structural Insulation with Wood Stud Framing – Wind					
Structural Sheathing Product	Thickness mm (in)	Fastener Spacing <sup>1</sup> [edge/field] mm (in)	Maximum Stud Spacing mm (in)	Gypsum Wallboard (GWB)	Specified Shear Strength, kN/m (plf)
<b>Strong R Structural Insulation</b>	32 (1-¼)	76/305 (3/12)	610 (24)	No GWB	7.9 (545)
		152/305 (6/12)			4.0 (270)
	54 (2-1/8)	76/305 (3/12)	610 (24)	No GWB	7.9 (545)
		152/305 (6/12)			4.0 (270)

<sup>1</sup>" = 25.4 mm 1 lb/ft = 0.0146 kN/m  
 1. Strong-R Structural Insulation attached with a minimum #8 x 1-¼" (32 mm) wafer head. Fastener edge distance shall be a minimum of 9 mm (0.35"). Fastener head shall be in contact with the panel surface. Alternately, fastener heads are permitted to be overdriven into foam portion of the panel with no reduction in shear capacities.

Table 5: Specified Shear Capacity for Limit States Design for Strong-R Structural Insulation with Wood Stud Framing – Seismic											
Seismic Force Resisting System (SFRS)	Thickness mm (in)	Gypsum Wallboard Fastening Schedule mm (in)	Maximum stud spacing mm (in)	Specified Shear Strength, kN/m (plf)	Ductility Factor, R <sub>d</sub> <sup>3, 4</sup>	Overstrength Force Modification Factor, R <sub>o</sub> <sup>4</sup>	Structural System Limitations and Building Height m (ft) Limit <sup>6</sup>				
							I <sub>E</sub> F <sub>a</sub> S <sub>a</sub> (0.2)				I <sub>E</sub> F <sub>a</sub> S <sub>a</sub> (1.0)
							< 0.2	≥ 0.2 to < 0.35	≥ 0.35 to ≤ 0.75	> 0.75	> 0.3
<b>Strong R Structural Insulation<sup>1, 2, 5</sup></b>	32 (1-¼)	No GWB	610 (24)	4.0 (270)	1.7	1.7	15	15	NP <sup>7</sup>	NP	NP

<sup>1</sup>" = 25.4 mm 1 lb/ft = 0.0146 kN/m  
 1. Strong-R Structural Insulation attached with a minimum #8 x 1-¼" (32 mm) wafer head screw and spaced a maximum of 152 mm (6") o.c. at the panel edges and 305 mm (12") o.c. in the field. Fastener edge distance shall be a minimum of 9 mm (0.35"). Fastener head shall be in contact with the panel surface. Alternately, fastener heads are permitted to be overdriven into foam portion of the panel with no reduction in shear capacities.  
 2. All seismic design parameters follow the equivalency as defined in [Section 3](#) of this TER.  
 3. Response modification coefficient, R<sub>d</sub>, for use throughout NBC.  
 4. For combinations of different types of SFRS acting in the same direction in the same storey, R<sub>d</sub>R<sub>o</sub> shall be taken as the lowest value of R<sub>d</sub>R<sub>o</sub> corresponding to these systems. See NBC Division B, Article 4.1.8.9.  
 5. Work this table with additional system restrictions in Article 4.1.8.10 of NBC Division B.  
 6. Heights are maximum height limits above grade, as defined in NBC Division B Table 4.1.8.9.  
 7. NP = Not Permitted

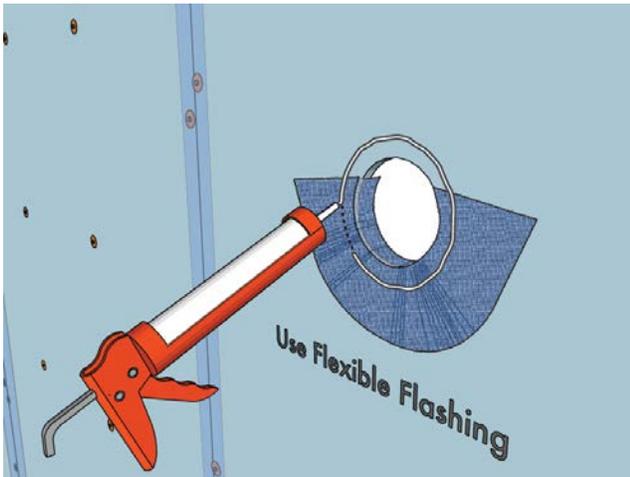
### 5.3. Water-Resistive Barrier

- 5.3.1.** Strong-R may be used as a WRB as prescribed in NBC Division B Note A-5.6.2.1 when installed on exterior walls as described in this section.
- 5.3.2.** Strong R 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.** A separate WRB may also be provided. If a separate WRB method is used, taping of the sheathing joints is not required.

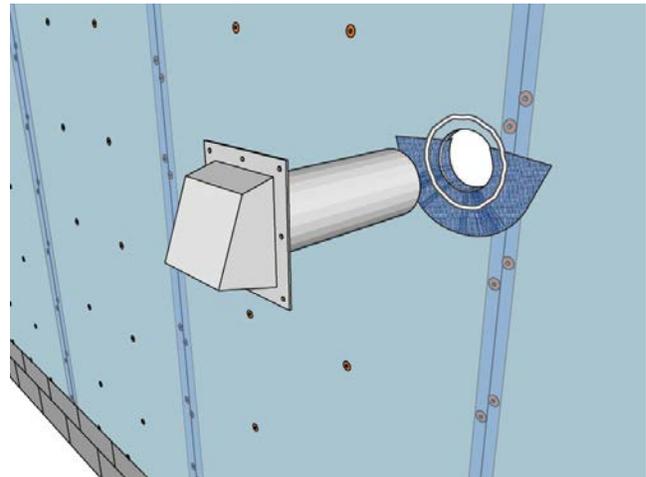
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- 5.3.4. Flashing of penetrations shall comply with the applicable code and must be installed at all sheathing penetrations. Use qualified flashing material such as self-adhered flashing tape meeting AAMA 711 (3M All Weather Flashing Tape 8067 or equivalent). See [Figure 2](#), [Figure 3](#) and [Figure 4](#) for typical penetration flashing details.
- 5.3.5. Flashing Details – Typical Flanged and Unflanged Penetration and Flanged Window

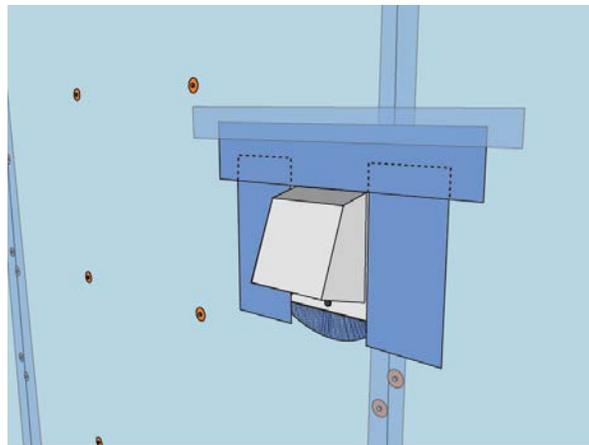
Figure 2: Typical Penetration Flashing Detail – Flanged



STEP 1



STEP 2



STEP 3

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Figure 3: Typical Penetration Flashing Detail – Unflanged

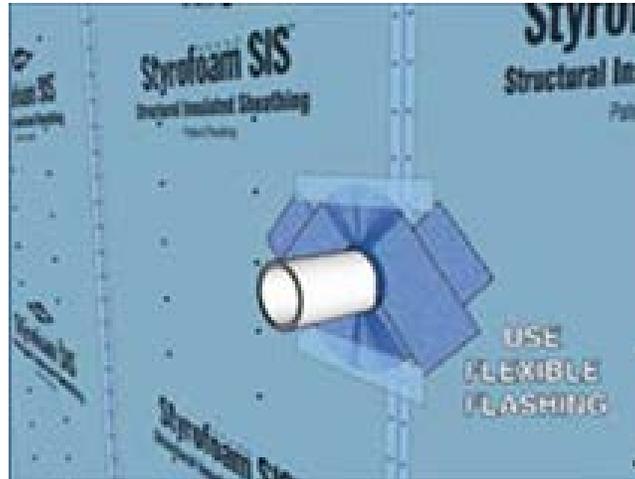
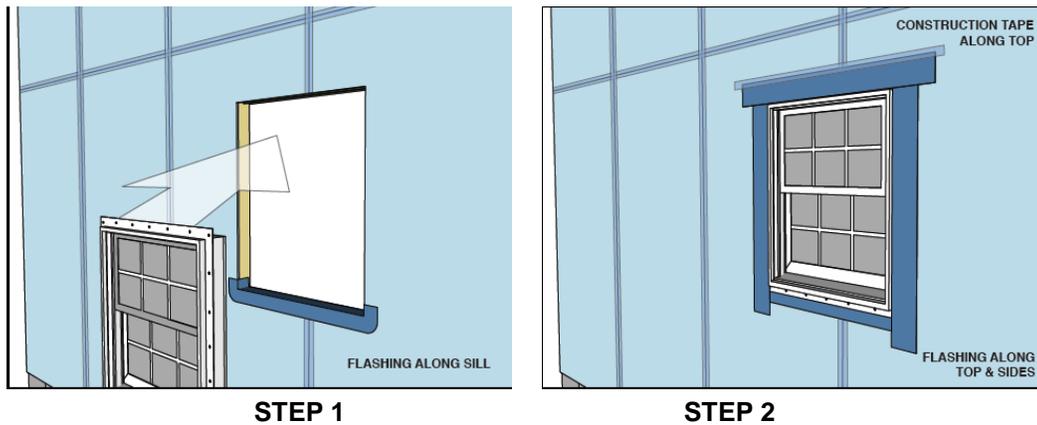


Figure 4: Typical Window Flashing Detail



### 5.4. Thermal Resistance (RSI-Value)

- 5.4.1. Strong R is a foam plastic insulation panel (FPIS) used as thermal insulation in wall, roof and ceiling assemblies.
- 5.4.2. Strong R meets the continuous insulating sheathing requirements complying with the provisions of *NECC* Division B Part 3.
- 5.4.3. Strong R Structural Insulation has the thermal resistance shown in [Table 6](#).

Table 6: Strong R Structural Insulation Thermal Resistance Properties	
Thickness mm (in)	RSI/R-Value, °K·m²/W (h·ft²·°F/Btu)
51 (2.0)	2.3 (13.0)
32 (1.25)	1.3 (7.5)

For SI: 1" = 25.4 mm, 1 °K·m²/W = 5.678 °F·ft²·h/Btu  
 1. Thermal values are determined using the *ASTM C518* test method at 23.9°C (75°F) mean temperature on material conditioned according to *ASTM C1289* Section 11.1 (Degrees F.ft².h/Btu).

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### 5.5. Air Barrier

- 5.5.1. Strong R meets the requirements of *NECC* Division B Part 3 for use as a component of the air barrier system when installed in accordance with the manufacturer's installation instructions and this TER with all seams, including the top and bottom edges, taped.
- 5.5.2. All penetrations shall be flashed and sealed in accordance with the flashing manufacturer's installation instructions. Self-adhered flashing tape shall meet *AAMA 711* (FortiFlash Butyl or equivalent).
- 5.5.3. Strong R is defined as an air barrier material having an air permeance of less than 0.02 L/m<sup>2</sup>·ft.<sup>2</sup>, in accordance with *NBC* Division B, Article 5.4.1.2.

### 5.6. Surface Burn Characteristics

- 5.6.1. Strong R have the flame spread ratings as shown in [Table 7](#), when tested in accordance with *CAN/ULC-S102* per *NBC* Division B Subsection 3.1.12.

Table 7: Surface Burn Characteristics of Strong R		
Product	Flame Spread	Smoke Developed
Strong R <sup>1</sup>	20	125

<sup>1</sup> = 25.4 mm  
Foam plastic core tested in accordance with *CAN/ULC S-102*, with maximum foam thickness of 102 mm (4").

### 5.7. Thermal Barrier

- 5.7.1. Installation shall be fully protected from the interior of the building by an approved thermal barrier as required by *NBC* Division B Article 3.1.5.15.

### 5.8. Non-Structural Applications

- 5.8.1. Where other means of wall bracing are provided, or are not required, and an approved exterior wall covering capable of separately resisting loads perpendicular to the face of the walls is installed over the sheathing, Strong R Structural Insulation may be installed in accordance with [Section 6.6](#).

## 6. Installation:

### 6.1. General

- 6.1.1. Installation shall comply with the manufacturer's installation instructions and this TER. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.

### 6.2. Orientation

- 6.2.1. Strong R Structural Insulation may be installed vertically or horizontally over studs, with framing not less than 20 ga. 50 ksi 92 mm (3-5/8") and spaced a maximum of 610 mm (24") o.c.
- 6.2.2. Sheathing joints must be butted at framing members, and all panel edges shall be blocked. A single row of fasteners must be applied to each panel edge into the stud or blocking below. Do not tack product to framing, but fasten each panel completely after fastening begins.

### 6.3. Attachment

#### 6.3.1. Strong R Structural Insulation

- 6.3.1.1. Minimum #8 x 41 mm (1-5/8") self-drilling modified truss head screw or 2.5 mm (0.100") diameter x 38 mm (1-1/2") length pins (Bostitch® C4S100 BG).
- 6.3.1.2. Fastener spacing shall be a maximum of 76 mm (3") o.c. along the edge and 76 mm (3") o.c. in the field or as required in [Section 5](#) for the application selected.

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### 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 as follows:

6.3.2.1.1. #6 x 32 mm (1¼") Type S screws.

6.3.2.1.2. Fastener spacing shall be as shown in [Section 5](#).

### 6.4. Treatment of Joints

6.4.1. Strong R Structural Insulation sheathing joints must be butted at framing members, and a single row of fasteners must be applied to each panel edge into the stud below.

### 6.5. Window Treatments

6.5.1. Strong R Structural Insulation 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.

### 6.6. Non-Structural Applications

6.6.1. Install panels with minimum #8 x 41 mm (1-5/8") self-drilling modified truss head screw or 2.5 mm (0.100") diameter x 38 mm (1-½") length pins (Bostitch® C4S100 BG).

6.6.2. The fastener spacing shall be 76 mm (12") o.c. along the top, bottom and vertical panel edges and 76 mm (12") o.c. in the field. Do not tack product to framing, but fasten each panel completely after fastening begins.

## 7. Test and Engineering Substantiating Data:

7.1. Lateral load testing and data in accordance with *ASTM E564* and *E2126*.

7.2. Transverse load testing in accordance with *ASTM E330*.

7.3. Test reports and data for determining use as a WRB material, in accordance with *ASTM E331*.

7.4. Test reports and data for determining use as a component of an air barrier, in accordance with *ASTM E2178*.

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

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

7.7. Manufacturer installation recommendations for structural sheathing on exterior walls.

7.8. Quality Control Manual in accordance with a third-party quality control program with inspections conducted by an approved agency.

7.9. 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.

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

7.11. 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.

7.12. 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.

7.13. DrJ's responsibility for data provided by approved sources conforms with relevant professional engineering law.

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7.14. Where appropriate, DrJ's analysis is based on values that 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, Strong R Structural Insulation complies with, or is a suitable alternative to, the applicable sections of the codes listed in [Section 2](#) for the following applications.

8.1.1. Lateral load resistance due to wind and seismic loads carried by shear walls.

8.1.2. Transverse load resistance due to components and cladding pressures on building surfaces.

8.1.3. Performance of the foamed plastic component for conformance to *NBC* Division B Article 3.1.5.15.

8.1.4. Performance for use as foamed plastic insulating sheathing in accordance with *NBC* Division B Article 3.1.5.15.

8.1.5. Performance for use as a WRB in accordance with *NBC* Division B Article 5.6.2.1.

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

8.2. *NBC* Division A, Article 1.2.1.1 states:

#### Compliance with this Code

1) Compliance with this Code shall be achieved by

a) Complying with the applicable acceptable solutions in Division B (see Note A-1.2.1.1(1)(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 Note A-1.2.1.1(1)(b)).

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. This product has been evaluated with the codes listed in [Section 2](#), and is compliant with all known provincial and local building codes. Where there are known variations in state or local codes that are applicable to this evaluation, they are listed here:

8.3.1. No known variations

8.4. *NBC* Division C Section 2.3 includes additional guidance for Alternative Solutions.

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 Board of Professional Engineers, when signed and sealed.

### 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 TER 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.

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- 9.3.1. This report and the installation instructions shall be available to the jurisdiction in which the project is to be constructed.
  - 9.3.2. Strong R shall not be used to resist horizontal loads from concrete and masonry walls.
  - 9.3.3. Strong R Structural Insulation shall not be used as a nailing base.
  - 9.3.4. This product shall be fully protected from the interior of the building by an approved thermal barrier.
  - 9.3.5. In areas where termites are known to occur and foundations are insulated or otherwise finished in a manner that could conceal a termite infestation, in accordance with *NBC* Division B Article 9.3.2.9, a metal or plastic barrier shall be installed through the insulation to control the passage of termites behind or through the insulation.
  - 9.3.6. Allowable shear loads shall not exceed values in [Table 1](#) and [Table 5](#) for wind loads and [Table 2](#) and [Table 6](#) for seismic loads.
  - 9.3.7. Specified uplift loads shall not exceed values in [Table 3](#).
  - 9.3.8. 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.
  - 9.3.9. Strong R Structural Insulation are manufactured under a 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.
- 9.4. When installed as a wall sheathing but not installed per structural requirements, light-framed walls shall be braced by other means.
- 9.5. When used as a WRB, installation shall be in accordance with [Section 5.2](#).
- 9.6. Design
- 9.6.1. Building Designer Responsibility
    - 9.6.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer (e.g., Owner, Registered Design Professional, etc.) for the Building and shall be in accordance with *NBC* Division C Sentence 2.2.4.3.(1).
    - 9.6.1.2. 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 A-2.2.6.2.(1).
  - 9.6.2. Construction Documents
    - 9.6.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.
- 9.7. Responsibilities
- 9.7.1. 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.
  - 9.7.2. DrJ TERs provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated sections.
  - 9.7.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.
  - 9.7.4. 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.
  - 9.7.5. 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.

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### 10. Identification:

- 10.1.** All Strong R Structural Insulation boards described in this TER are identified by a label on the board or packaging material bearing the manufacturer's name, product name, label of the third-party inspection agency, and other information to confirm code compliance.
- 10.2.** Additional technical information can be found at [oxengineeredproducts.com](http://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](http://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](#)