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## **Technical Evaluation Report**

**TER 1808-04**

**OX-IS® and SI-Strong Structural  
Insulation – Canada – Limit States  
Design**

**Ox Engineered Products, LLC**

**Product:**

**OX-IS® and SI-Strong Structural  
Insulation**

**Issue Date:**

**November 19, 2018**

**Revision Date:**

**June 11, 2021**

**Subject to Renewal:**

**April 1, 2022**

For the most recent version or a sealed copy of this Technical Evaluation Report (TER), visit [drjcertification.org](http://drjcertification.org).



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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 21 00 - Thermal Insulation

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

SECTION: 07 27 00 - Air Barriers

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## 1 PRODUCT EVALUATED<sup>1</sup>

1.1 OX-IS® and SI-Strong Structural Insulation

## 2 APPLICABLE CODES AND STANDARDS<sup>2,3</sup>

### 2.1 Codes

2.1.1 *NBC—10, 15: National Building Code of Canada*

2.1.2 *NECB—17: National Energy Code of Canada for Buildings*

### 2.2 Standards and Referenced Documents

2.2.1 *ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*

2.2.2 *ASTM C557: Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing*

2.2.3 *ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*

2.2.4 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*

2.2.5 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

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<sup>1</sup> For more information, visit [drjcertification.org](http://drjcertification.org) or call us at 608-310-6748.

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

<sup>3</sup> All terms defined in the applicable building codes are italicized.

- 2.2.6 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.2.7 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
- 2.2.8 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*
- 2.2.9 *CAN/ULC-S102: Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies*
- 2.2.10 *CSA O86: Engineering Design in Wood*
- 2.2.11 *CWC: Engineering Guide for Wood Frame Construction*

### 3 PERFORMANCE EVALUATION

#### 3.1 OX-IS® and SI-Strong were evaluated to determine:

- 3.1.1 Structural performance under lateral load conditions for both wind and seismic loading in accordance with *NBC* Division B Subsection 9.23.13 and 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 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).
  - 3.1.2.2 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 uplift loads for wall assemblies used for light-frame wood construction in accordance with *NBC* Division B Article 9.23.3.4.
- 3.1.4 Resistance to transverse loads for wall assemblies used in light-frame wood construction in accordance with *NBC* Division B Subsection 4.1.7.
- 3.1.5 Performance for use as foamed-plastic insulation in accordance with the *NBC* Division B Article 3.1.5.15.
- 3.1.6 Performance for use as foamed-plastic insulation in accordance with *NBC* Division B Article 9.36.2.5 and *NECC* Division B Article 3.2.1.2.
- 3.1.7 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.
- 3.1.8 Performance for use as a water-resistive barrier (WRB) in accordance with *NBC* Division B Note A-5.6.2.1.
- 3.1.9 Performance for surface burning characteristics in accordance with *NBC* Division B Subsection 3.1.12 and Article 9.10.3.2.

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

3.3 Any engineering evaluation conducted for this TER was performed on the dates provided in this TER and within Dr.J's professional scope of work.

#### 4 PRODUCT DESCRIPTION AND MATERIALS

4.1 The product evaluated in this TER is shown in Figure 1, Figure 2, and Figure 3.



FIGURE 1. OX-IS® LOGO

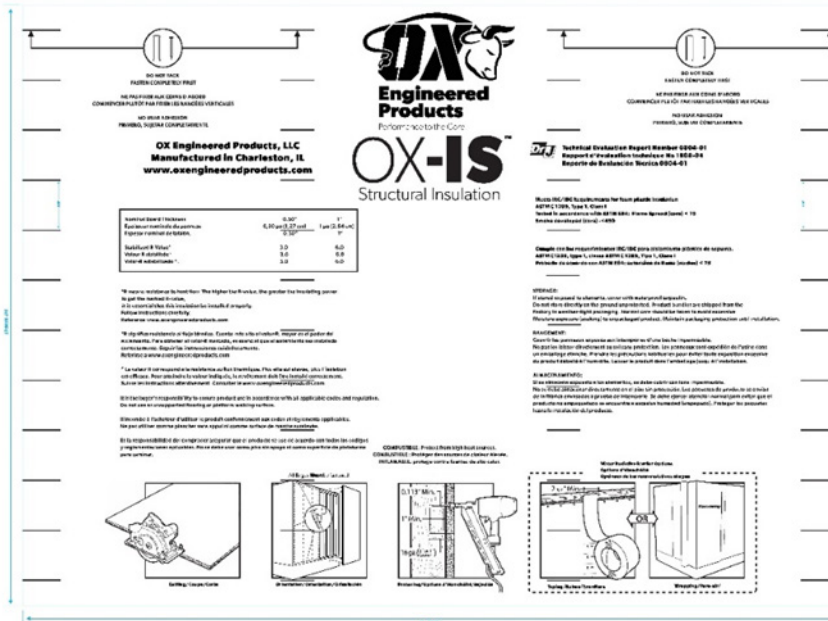


FIGURE 2. OX-IS® STRUCTURAL INSULATION PRODUCT LABEL



FIGURE 3. SI-STRONG STRUCTURAL INSULATION PRODUCT LABEL

- 4.2 OX-IS® and SI-Strong are structural rigid insulation sheathing products consisting of a proprietary fibrous sheathing board laminated to one side of a proprietary rigid foamed-plastic insulation.
  - 4.2.1 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 sides, either using a 2.9 mm (0.113") nominal thickness or a 3.4 mm (0.135") nominal thickness fibrous sheathing board.
  - 4.2.2 The rigid foamed-plastic insulation is a proprietary polyisocyanurate, which can have facings on one or both sides.
- 4.3 *Material Availability*
  - 4.3.1 Thickness: 12.7 mm (0.5"), 19.1 mm (¾"), 25.4 mm (1"), and 38.1 mm (1-½")
  - 4.3.2 Standard product width: 1219 mm (48")
  - 4.3.3 Standard lengths: 2438 mm (96"), 2749 mm (108"), and 3048 mm (120")

## 5 APPLICATIONS

### 5.1 *General*

- 5.1.1 OX-IS® and SI-Strong are Structural Insulated Sheathing (SIS) panels for use in the following applications as:
  - 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 construction.
  - 5.1.1.3 Structural wall sheathing to provide resistance to transverse loads for wall assemblies used in wood 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 9.36.2.5 and *NECC* Division B Article 3.2.1.2.
  - 5.1.1.6 An approved WRB in accordance with *NBC* Division B Note A-5.6.2.1, when installed with approved Construction Tape on all sheathing seams, as in 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 Subsection 9.25.3 and *NECC* Division B Subsection 3.2.4, in accordance with the manufacturer's installation instructions and this TER.
- 5.1.2 OX- IS® and SI-Strong contain foamed 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, OX-IS® and SI-Strong 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 OX-IS® and SI-Strong shall be 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.
  - 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 OX-IS® and SI-Strong 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 blocked with lumber of a minimum thickness of 38 mm (2" nominal).
- 5.2.1.6 Fasteners may be countersunk beneath the outer surface of the foamed-plastic sheathing layer.
- 5.2.1.7 Installation is permitted for single-top-plate (advanced framing method) or double-top-plate applications.
- 5.2.1.8 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 *Performance-Based Wood-Framed Construction:*
  - 5.2.2.1 OX-IS® and SI-Strong 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-O86* for WSP using the capacities shown in Table 1;
    - 5.2.2.1.2 Resist lateral wind load forces using the specified shear strengths set forth in Table 1;
    - 5.2.2.1.3 Resist uplift load forces using the specified uplift loads in Table 3; and
    - 5.2.2.1.4 Resist seismic load forces using the seismic specified shear strengths set forth in Table 2 when seismic design is required in accordance with *NBC* Division B Subsection 4.1.8.
      - 5.2.2.1.4.1 The ductility response modification factor,  $R_d$ , and the over-strength force modification factor,  $R_o$ , indicated in Table 2 shall be used to determine the base shear, element design forces, and design storey drift in accordance with *NBC* Division B Subsection 4.1.8.
  - 5.2.2.2 OX-IS® and SI-Strong panels are permitted to resist transverse wind load forces using the specified transverse resistances set forth in Table 4. Required component-and-cladding loads to be resisted are found in *NBC* Division B Subsection 4.1.7 (Sentence 4.1.7.1.(5)).

TABLE 1. SPECIFIED SHEAR RESISTANCE FOR LIMIT STATES DESIGN FOR OX-IS® AND SI-STRONG - WIND

Structural Sheathing Product	Sheathing Thickness mm (in)	Fastener Spacing [edge/field] mm (in)	Maximum Stud Spacing mm (in)	Gypsum Wallboard (GWB) <sup>2,6</sup> mm (in)	Gypsum Wallboard Fastener Spacing (edge/field) mm (in)	Specified Shear Strength, kN/m (plf)			
OX-IS® or SI-Strong	12.7 (½)	76/76 (3/3) <sup>1</sup>	406 (16 o.c.)	12.7 (1/2) GWB	203/203 (8/8)	8.5 (580)			
		76/152 (3/6)			406/406 (16/16)	7.1 (490)			
					203/203 (8/8)	406/406 (16/16)	6.9 (470) <sup>(1)</sup>		
						203/203 (8/8)	8.2 (560) <sup>(1)</sup>		
							6.7 (460) <sup>(3)</sup>		
						76/76 (3/3) <sup>1</sup>	610 (24) o.c.	12.7 (1/2) GWB	203/305 (8/12)
			13.5 (925)						
		19.1 (¾)	76/76 (3/3) <sup>1</sup>	406 (16) o.c.	No GWB	-	5.8 (395)		
			76/76 (3/3) <sup>6</sup>	610 (24) o.c.			5.3 (365)		
				76/76 (3/3) <sup>1</sup>			406 (16) o.c.	4.8 (325)	
			76/76 (3/3) <sup>1</sup>	610 (24) o.c.			6.9 (475)		
				76/76 (3/3) <sup>1</sup>			406 (16) o.c.	6.2 (425)	
	25.4 (1)		76/76 (3/3) <sup>1</sup>	406 (16) o.c.			12.7 (1/2) GWB and Thermo-Ply Red <sup>5</sup>	203/203 (8/8)	6.3 (430)
			76/76 (3/3) <sup>1</sup>	610 (24) o.c.					5.7 (390)
			76/76 (3/3) <sup>1</sup>	406 (16) o.c.			12.7 (1/2) GWB	203/203 (8/8)	10.6 (725)
		76/76 (3/3) <sup>1</sup>	9.1 (625)						
		76/76 (3/3) <sup>1</sup>	7.7 (530)						
		76/76 (3/3) <sup>1</sup>	8.7 (595)						
	38.1 (1½)	76/76 (3/3) <sup>1</sup>	406 (16) o.c.	No GWB	-	7.3 (500)			
		76/76 (3/3) <sup>1</sup>	610 (24) o.c.			5.9 (405)			
		76/152 (3/6) <sup>6</sup>	406 (16) o.c.	12.7 (1/2) GWB	203/203 (8/8)	5.3 (365)			
			610 (24) o.c.			8.0 (550)			
		76/152 (3/6) <sup>6</sup>	406 (16) o.c.	12.7 (1/2) GWB	203/203 (8/8)	7.1 (490)			
			610 (24) o.c.						

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

- OX-IS® and SI-Strong attached with a minimum 16-gauge, 25mm (1") crown staples shall penetrate a minimum of 25 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 of 9 mm (¾"). Fastener head shall be in contact with the panel surface. Alternatively, fastener heads are permitted to be overdriven into foam portion of the panel with no reduction in shear capacities.
- Gypsum attached with minimum #6 type W or S screws 32 mm (1¼") long with a minimum edge distance of 10 mm (0.375").
- SIS fastened with a minimum 2.9-mm (0.113") diameter nail.
- 12.7 mm (½") GWB adhered with wall-and-floor adhesive (ASTM C557) and #6 (152 mm x 32 mm (6" x 1¼")) bugle-head, coarse-thread drywall screws, edges blocked.
- Install Thermo-Ply Red on opposite side of wall from the SIS with minimum 16-gauge, 25 mm (1") crown staples fastened 76 mm (3") o.c edge/ 76 mm (3") o.c. field. Separately attach 12.7 mm (½") gypsum over Thermo-Ply Red with minimum #6 type W or S screws 32 mm (1¼") long fastened 203 mm (8") o.c edge/ 203 mm (8") o.c. field.
- OX-IS® and SI-Strong attached with a minimum 60 mm x 2.9 mm (2½" x 0.113) nails shall penetrate a minimum of 25 mm (1") into the stud. Fasteners are to be installed 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 mm (¾"). Fastener head shall be in contact with the panel surface. Alternatively, fastener heads are permitted to be overdriven into foam portion of the panel with no reduction in shear capacities.

**TABLE 2. SPECIFIED SHEAR RESISTANCE FOR LIMIT STATES DESIGN AND SEISMIC DESIGN COEFFICIENTS FOR OX-IS® AND SI-STRONG<sup>1,3</sup>**

Seismic Force Resisting System (SFERS)	Thickness mm (in)	Gypsum <sup>2,9</sup> Wallboard Fastening Schedule mm (in)	Maximum Stud Spacing mm (in)	Specified Shear Strength, kN/m (plf)	Ductility Factor, $R_d^{4,5}$	Overstrength Force Modification Factor, $R_o^5$	Structural System Limitations and Building Height Limit <sup>8</sup> , m (ft)				
							$I_e F_a S_a(0.2)$				$I_e F_a S_a(1.0)$
							< 0.2	$\geq 0.2$ to < 0.35	$\geq 0.35$ to $\leq 0.75$	> 0.75	> 0.3
Light-Frame (Wood) Walls Sheathed with OX-IS® or SI-Strong	12.7 (½)	406/406 (16/16)	406 (16) o.c.	7.1 (490)	2.0	1.7	NL	NL	20 (65.6)	20 (65.6)	20 (65.6)
		203/203 (8/8)		8.5 (580)							
	19.1 (¾)	No GWB	406 (16) o.c.	6.9 (475)	2.0	1.7	NL	NL	20 (65.6)	20 (65.6)	20 (65.6)
			610 (24) o.c.	6.2 (425)							
	25.4 (1)	406/406 (16/16)	406 (16) o.c.	7.7 (530)	2.0	1.7	NL	NL	20 (65.6)	20 (65.6)	20 (65.6)
				203/203 (8/8)							
	25.4 (1)	406/406 (16/16)	610 (24) o.c.	7.3 (500)	2.0	1.7	NL	NL	20 (65.6)	20 (65.6)	20 (65.6)
				203/203 (8/8)							

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

- OX-IS® and SI-Strong attached with a minimum 16-gauge, 25-mm-crown staples shall penetrate a minimum of 25 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 of 10 mm (0.375"). Fastener head shall be in contact with the panel surface. Alternatively, fastener heads are permitted to be overdriven into foam portion of the panel with no reduction in shear capacities.
- Walls installed with minimum 12.7 mm (½") Gypsum wallboard attached with minimum #6 type W or S screws 32 mm (1¼") long. Fasteners shall maintain a minimum edge distance of 10 mm (0.375").
- All seismic design parameters follow the equivalency as defined in Section 3 of this TER.
- Response modification coefficient,  $R_d$ , for use throughout NBC.
- For combinations of different types of SFERS 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, Article 4.1.8.9.
- Consider the additional system restrictions in Article 4.1.8.10 of NBC Division B.
- Heights are maximum height limits above grade, as defined in NBC Division B Table 4.1.8.9.
- NL = Not Limited
- 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 OX-IS® AND SI-STRONG

Structural Sheathing Product	Specified Uplift Resistance kN/m (lbs/ft)	Maximum Stud Spacing mm (in)	Fastener Schedule
½" OX-IS® or ½" SI-Strong: Single Top Plate	4.5 (310)	406 (16) o.c.	25-mm (1") crown, 32-mm (1 ¼") leg 16-gauge galvanized staples or 3 mm (0.120") x 32 mm (1 ¼") roofing nails, 76 mm (3") o.c.to perimeter/field
1" OX-IS® or 1" SI-Strong: Single Top Plate	5.6 (385)		
1" OX-IS® or 1" SI-Strong: Double Top Plate	11.0 (760)		

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

1. Staple crowns to be installed parallel to grain.
2. The resistances shown are for the purpose of providing information on the hold-down resistance of the sheathing-to-top-plate connection independent of lateral loading. Where combined shear and uplift loading is needed, consult a professional engineer.

TABLE 4. TRANSVERSE LOAD PERFORMANCE OF OX-IS® AND SI-STRONG

Structural Sheathing Product	Transverse Wind Load Resistance	
	Maximum Stud Spacing mm (in)	Hourly 1-in-50 Wind Pressure <sup>2</sup> , kPa
OX-IS® or SI-Strong	610 (24) o.c.	6.5

SI: 25.4 mm = 1 in, 1 MPa = 145 psi

1. Fastener Schedule: 11-mm (7/16") crown, 32-mm (1¼") leg, 16-gauge galvanized staples, 76 mm (3") o.c. at the perimeter, 152 mm (6") o.c. in the field. Staple crowns to be installed parallel to grain.
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 *Steel-Framed Construction*

TABLE 5. SPECIFIED SHEAR STRENGTH FOR OX-IS® AND SI-STRONG ON 20 GAUGE 50 KSI METAL STUDS

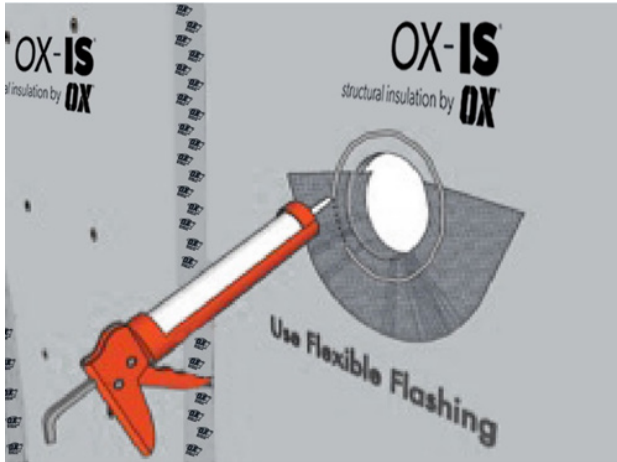
Structural Sheathing Product	Maximum Fastener Spacing (edge:field) mm (in)	Max Stud Spacing, mm (in)	GWB Thickness mm (in)	GWB Fastener Spacing (edge/field)	Specified Shear Strength kN/m (plf)	Structural Sheathing Fastener Schedule
½" OX-IS®, ½" SI-Strong, ½" OX-IS® HS	76/76 (3/3)	610 (24)	No GWB	-	4.7 (320)	Note 4
	76/76 (3/3)		12.7 (1/2) GWB	8/8	7.0 (480)	Note 4
1" OX-IS®, 1" SI-Strong, 1½" OX-IS®, 1½" SI-Strong	76/76 (3/3)		No GWB	-	5.5 (375)	Note 5
	76/76 (3/3)		No GWB	-	3.3 (225)	Note 6
	76/76 (3/3)		No GWB	-	9.2 (630)	Note 4
	76/305 (3/12)		No GWB	-	9.2 (630)	Note 5
	152/305 (6/12)		No GWB	-	4.6 (310)	Note 6
	305/305 (12/12)		No GWB	-	2.5 (170)	Note 7
	76/76 (3/3)		12.7 (1/2) GWB	203/203 (8/8)	6.5 (450)	Note 7
	76/76 (3/3)		12.7 (1/2) GWB	203/305 (8/12)	6.8 (465)	Note 7
	76/76 (3/3)		12.7 (1/2) GWB	152/305 (6/12)	7.6 (520)	Note 7

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

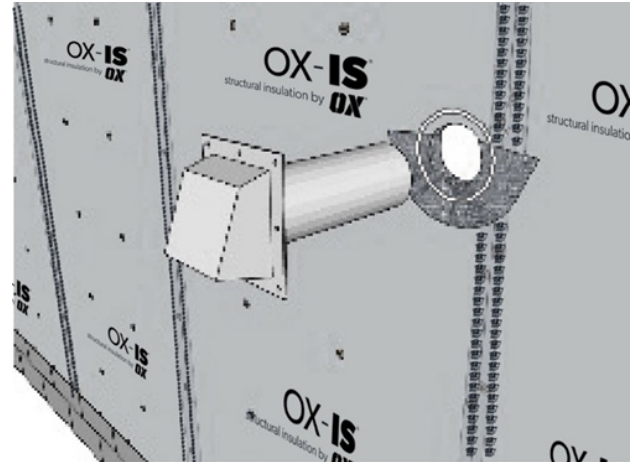
- Steel studs shall be minimum 20 ga. 50ksi steel studs spaced at 24" o.c.
- Gypsum attached with a minimum #6 type S screws 1¼" long with a minimum edge distance of 3/8".
- Where gypsum wallboard is not installed on the interior face of the wall, the wall shall be constructed with mid-height horizontal bracing installed every other cavity space.
- #8 x 1 self-drilling screws with modified truss head, driven flush with exterior of foam board
- #8 x 2 self-drilling screws with modified truss head, driven flush with exterior of foam board
- 0.100" diameter x 1.5" long pins
- #8 x 2 self-drilling screws with modified truss head, driven through foam plastic to seat against the backer material

5.3 *Water-Resistive Barrier (WRB)*

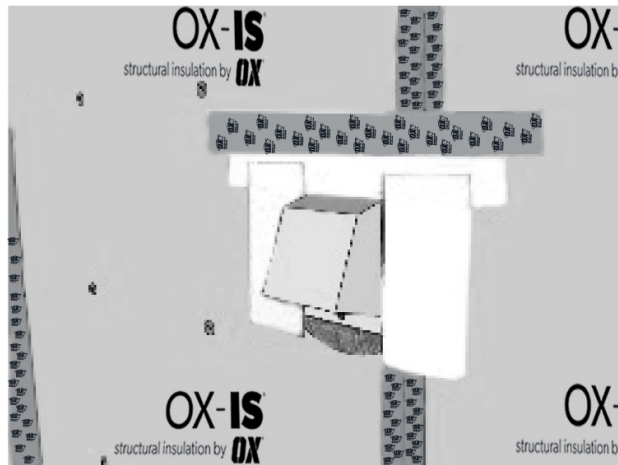
- OX-IS® and SI-Strong may be used as a WRB as prescribed in *NBC* Division B Note A-5.6.2.1 when installed on exterior walls as described in this section.
- OX-IS® and SI-Strong shall be installed with board joints placed directly over exterior framing spaced a maximum of 610 mm (24") o.c. The fasteners used to attach the board shall be installed in accordance with Table 2 through Table 4 and Section 6 as applicable.
- All seams and joints between boards shall be sealed with an approved construction tape in accordance with Section 6. Approved construction tape includes 27/8" OX Seam Tape. Flashing tape may be required for effective taping of inside and outside corners.
- A separate WRB may also be provided. If a separate WRB method is used, overlapping or taping of the sheathing joints is not required.
- Flashing of penetrations shall comply with the applicable code and must be installed at all sheathing penetrations. Use qualified flashing tape, such as Arctic Flash Synthetic Flashing, Flexible Butyl Flashing, or Home Guard RA-Plus Flashing. See Figure 4, Figure 5, and Figure 6 for typical penetration flashing details.
- Flashing Details – Typical Flanged and Unflanged Penetrations and Window



STEP 1



STEP 2



STEP 3

FIGURE 4. TYPICAL PENETRATION FLASHING DETAIL – FLANGED

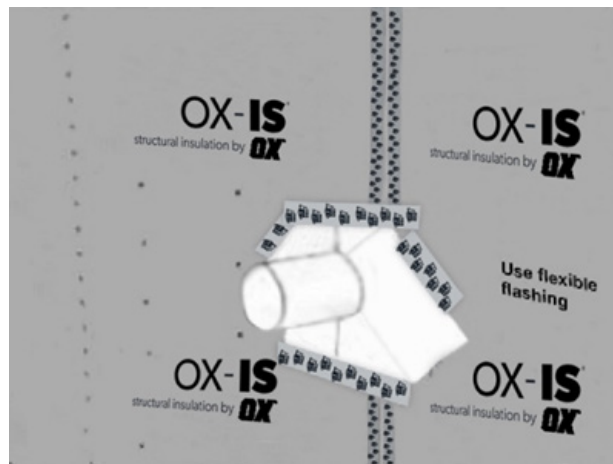


FIGURE 5. TYPICAL PENETRATION FLASHING DETAIL – UNFLANGED

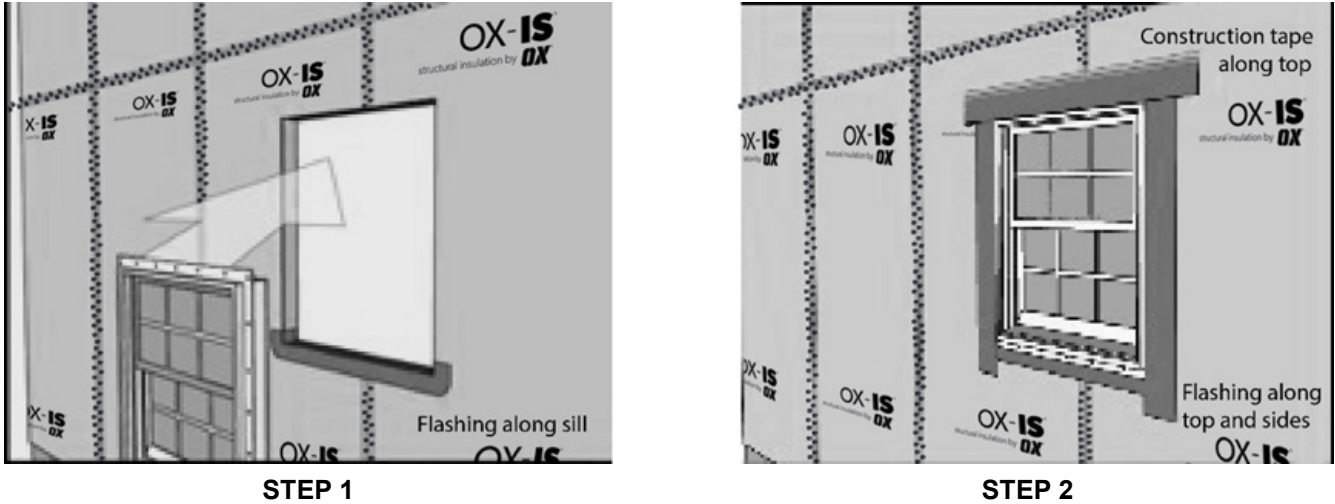


FIGURE 6. TYPICAL WINDOW FLASHING DETAIL

5.4 Thermal Resistance (RSI- and R-Values)

- 5.4.1 OX-IS® and SI-Strong meet the continuous insulated sheathing requirements complying with the provisions of NECC Division B Part 3.
- 5.4.2 OX-IS® and SI-Strong have the thermal resistances shown in Table 6.

TABLE 6. OX-IS® AND SI-STRONG THERMAL RESISTANCE PROPERTIES

Thickness	RSI/R-Value, m <sup>2</sup> K/W (h <sup>2</sup> ft <sup>2</sup> °F/Btu)
½" OX-IS® or SI-Strong	0.53 (3.0)
¾" OX-IS® or SI-Strong	0.70 (4.0)
1" OX-IS® or SI-Strong	1.06 (6.0)
1½" OX-IS® or SI-Strong	1.58 (9.0)
SI: 25.4 mm = 1 in, 1 m <sup>2</sup> K/W = 5.678 hr <sup>2</sup> ft <sup>2</sup> °F/Btu	

5.5 Air Barrier

- 5.5.1 OX-IS® and SI-Strong meet the requirements of NECC Division B Part 3 for use as a component of the air barrier when installed in accordance with the manufacturer’s installation instructions and this TER with all seams, including the top and bottom edges, taped (Table 7).

TABLE 7. OX-IS® AND SI-STRONG AIR BARRIER PROPERTIES

Test Method	Value
ASTM E2178	< 0.02 (L/s.m <sup>2</sup> ) <sup>1</sup>
1. Liter per second per square meter.	

5.6 Thermal Barrier Requirements – Attic, Crawlspace, or Other Uninhabitable Space Applications

- 5.6.1 Installation shall be fully protected from the interior of the building by an approved 15-minute thermal barrier or ignition barrier as required by NBC Division B Article 9.10.17.10.

5.7 Fire Safety Performance

5.7.1 Surface Burn Characteristics:

5.7.1.1 OX-IS® and SI-Strong have the flame-spread ratings as shown in Table 8, when tested in accordance with CAN/ULC-S102 per NBC Division B Subsection 3.1.12 and Article 9.10.3.2.

TABLE 8. SURFACE BURN CHARACTERISTICS OF OX-IS® AND SI-STRONG

Products	Flame Spread	Smoke Developed
OX-IS® and SI-Strong <sup>1</sup>	60	35
SI: 25.4 mm = 1 in 1. Foam portion only tested in accordance with CAN/ULC-S102, with maximum foam thickness of 2".		

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, OX-IS® and SI-Strong may be installed in accordance with Section 6.2.6.

6 INSTALLATION

6.1 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 Installation Procedure

6.2.1 General

- 6.2.1.1 Fasteners shall be installed with a nominal edge distance of 9 mm (0.35") for gypsum.
- 6.2.1.2 Where used, always fasten staples with the crown parallel to the framing member.
- 6.2.1.3 Where hold-down straps are used, install structural sheathing first, remove foam at strap’s location, then install the strap over the face of the structural sheathing backer and attach per the manufacturer’s installation instructions.

6.2.2 Orientation

- 6.2.2.1 OX-IS® and SI-Strong may be installed vertically or horizontally over studs, with framing that has a thickness of not less than 38 mm (nominal 2") and spaced a maximum of 610 mm (24") o.c.
- 6.2.2.2 Sheathing joints must be butted at framing members, and all panel edges must be blocked. A single row of fasteners must be applied to each panel edge into the stud or blocking below. Each panel must be completely fastened once fastening begins, not simply tacked.

6.2.3 Attachment

6.2.3.1 OX-IS® and SI-Strong Structural Insulation

- 6.2.3.1.1 Minimum 25-mm (1") crown by 32-mm (1¼") leg, 16-gauge staples with a 25 mm (1") minimum embedment into the stud unless otherwise stated in Section 5.
- 6.2.3.1.2 Fastener spacing shall be a maximum of 76 mm (3") o.c. along the edge and 76 mm (3") o.c. in the field unless otherwise permitted in Section 5.

6.2.3.2 Gypsum Wallboard

- 6.2.3.2.1 For NBC Division B Part 9 applications, gypsum nail fasteners shall be spaced a maximum of 152 mm (6") o.c. on vertical wall supports and 305 mm (12") o.c. along intermediate supports.
- 6.2.3.2.2 For NBC Division B Part 9 applications, gypsum screw fasteners shall be spaced a maximum of 152 mm (6") o.c. on vertical wall supports and 305 mm (12") o.c. along intermediate supports.
- 6.2.3.2.3 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") spaced as shown in Section 5.

#### 6.2.4 *Treatment of Joints*

- 6.2.4.1 OX-IS® and SI-Strong 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, with the staple crowns parallel to framing.

#### 6.2.5 *Window Treatments*

- 6.2.5.1 OX-IS® and SI-Strong 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.

#### 6.2.6 *Non-Structural Applications*

- 6.2.6.1 Install panels with nails that have a minimum shank diameter of 2.9 mm (0.113") and a 25 mm (1") minimum stud embedment or 16-gauge 11 mm ( $7/16$ ") crown staples and a 25 mm (1") minimum stud embedment.
- 6.2.6.2 The fastener spacing shall be 152 mm (6") o.c. along the top, bottom and vertical panel edges and 305 mm (12") o.c. in the field. Each panel shall be completely fastened once fastening begins, not simply tacked.

## 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 Lateral load testing and data for determining comparative equivalency for use as an alternative material, in accordance with *ASTM E72, E564, and E2126*
- 7.1.2 Transverse load testing in accordance with *ASTM E330*
- 7.1.3 Test reports and data for determining use as a WRB material, in accordance with *ASTM E331*
- 7.1.4 Test reports and data for determining use as a component of an air barrier, in accordance with *ASTM E2178*
- 7.1.5 Test reports and data for determining surface burning characteristics in accordance with *CAN/ULC S102*
- 7.1.6 Test reports and data for determining comparative equivalency for use as an alternative material in accordance with *NBC Division A Section 1.2*
- 7.2 Manufacturer installation recommendations for structural sheathing on exterior walls
- 7.3 Quality Control Manual in accordance with a third-party quality control program with inspections conducted by an approved agency.
- 7.4 Information contained herein is the result of testing and/or data analysis by sources which 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.
- 7.5 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 providers of the codes and standards are legally responsible for their content. DrJ analysis may use code adopted provisions as a control sample. A control sample versus a test sample establishes a product as being equivalent to that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Where the accuracy of the provisions provided herein is reliant upon the published properties of materials, DrJ relies upon the grade mark, grade stamp, mill certificate, and/or test data provided by material suppliers to be minimum properties. DrJ analysis relies upon these properties to be accurate.

## 8 FINDINGS

- 8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the product(s) listed in Section 1.1 are approved for the following:
- 8.1.1 Lateral (in-plane) load resistance due to wind and seismic loads carried by shear walls and braced wall bands
  - 8.1.2 Resistance to uplift loads in single- and double-top-plate applications
  - 8.1.3 Transverse (perpendicular-to-plane) load resistance due to components-and-cladding pressures on building surfaces
  - 8.1.4 Performance of the foamed-plastic component for conformance to *NBC* Division B Article 3.1.5.15
  - 8.1.5 Performance for use as foamed-plastic insulating sheathing in accordance with *NBC* Division B Article 9.36.2.5
  - 8.1.6 Performance for use as a WRB in accordance with *NBC* Division B Note A-5.6.2.1
  - 8.1.7 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
  - 8.1.8 Surface burning characteristics in accordance with *NBC* Division B Subsection 3.1.12 and Article 9.10.3.2
- 8.2 This product has 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.
- 8.2.1 No known variations
- 8.3 *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 or service meets a requirement...Certification bodies publish lists of certified products and companies.

### Evaluation

An evaluation is a written opinion by an independent professional organization that a product will perform its intended function in a building. 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...Several organizations, including the Canadian Construction Materials Centre (CCMC), offer such evaluation services.

- 8.4 Valid *evaluations* are obtained from *independent professional organizations*, which include but are not limited to ISO/IEC 17065 accredited evaluation services and professional engineers.<sup>4</sup>
- 8.5 ISO/IEC 17065 accreditation bodies, including but not limited to SCC and ANAB, confirm that product certification bodies have the expertise to provide *evaluation* services within their scope of accreditation. All SCC and ANAB product certification bodies meet *NBC* requirements to offer *evaluation* services for *alternative solutions*.<sup>5</sup>
- 8.5.1 DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131 and employs professional engineers.<sup>6</sup>

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<sup>4</sup> *NBC* Division C Article 2.2.1.2

<sup>5</sup> *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.

<sup>6</sup> 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."

- 8.6 Product certification organizations, accredited by the SCC and ANAB, are defined as equivalent *evaluation* services:
- 8.6.1 The [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."
  - 8.6.2 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."<sup>7</sup>
- 8.7 Building official approval of a licensed professional engineer is performed by verifying the professional engineer and/or their business entity are listed by the [licensing board](#) of the relevant jurisdiction.

## 9 CONDITIONS OF USE

- 9.1 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed.
- 9.1.1 This TER and the installation instructions shall be available to the jurisdiction in which the project is to be constructed.
  - 9.1.2 Walls shall not be used to resist horizontal loads from concrete and masonry walls.
  - 9.1.3 OX-IS® and SI-Strong shall not be used as a nailing base.
  - 9.1.4 This product shall be fully protected from the interior of the building by an approved 15-minute thermal barrier.
  - 9.1.5 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.
  - 9.1.6 Specified shear strengths shall not exceed values in Table 1 for wind loads and Table 2 for seismic loads.
  - 9.1.7 Specified uplift loads shall not exceed values in Table 3.
  - 9.1.8 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.
  - 9.1.9 OX-IS® and SI-Strong are 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.
- 9.2 When installed as a wall sheathing but not installed per structural requirements, light-framed walls shall be braced by other means.
- 9.3 When used as a WRB, installation shall be in accordance with Section 5.3.
- 9.4 Where required by the *authority having jurisdiction* (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.
- 9.5 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.6 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*).

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<sup>7</sup> 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."



- 9.7 At a minimum, this product shall be installed per Section 6 of this TER.
- 9.8 This product has an internal quality control program and a third-party quality assurance program in accordance with ISO/IEC 17065 certification procedures.
- 9.9 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.
- 9.10 This TER 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.
- 9.11 The implementation of this TER for this product is dependent on the design, quality control, third-party quality assurance, proper implementation of installation instructions, inspections, and any other code or regulatory requirements that may apply.

## 10 IDENTIFICATION

- 10.1 The product(s) listed in Section 1.1 are 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 [oxengineeredproducts.com](http://oxengineeredproducts.com).

## 11 REVIEW SCHEDULE

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