



CERTIFICATION



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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:

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Subject to Renewal:

April 1, 2021

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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

1 PRODUCT EVALUATED¹

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

2 APPLICABLE CODES AND STANDARDS^{2,3}

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*

¹ Building codes require data from valid certification, evaluation, and qualification reports be obtained from accredited third-party organizations. An accredited certifying organization (a type of accredited third-party organization) is a certification body that performs "certification of a product, process, or system." An accredited third-party organization is accomplished via accreditation using ISO/IEC 17065 evaluation procedures meeting code requirements of independence, accredited testing, and professional personnel. DrJ is an ISO/IEC 17065 [ANSI-Accredited Product Certification Body](#) – [Accreditation #1131](#).

Through ANSI accreditation, DrJ certification can be used to obtain product approval in any country that is an [IAF MLA Signatory](#), such as Canada, and covered by an [IAF MLA Evaluation](#) per the [Purpose of the MLA](#) – "certified once, accepted everywhere." Manufacturers can go to jurisdictions in any IAF MLA Signatory Country and have their products readily approved by *authorities having jurisdiction* using DrJ's ANSI accreditation. For more information about DrJ's accreditation, refer to this [letter](#) from the Standards Council of Canada (SCC).

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, see drjcertification.org.

² 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 (e.g., *CAN/CSA*, *CAN/ULC*). Where this TER is not approved, the AHJ shall respond in writing stating the reasons this TER was not approved. For any variations in provincial, territorial, and local codes, see Section 8.

³ All terms defined in the applicable building codes are italicized.

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 E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*
- 2.2.3 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*
- 2.2.4 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.2.5 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.2.6 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
- 2.2.7 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*
- 2.2.8 *CAN/ULC-S102: Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies*
- 2.2.9 *CSA O86: Engineering Design in Wood*
- 2.2.10 *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 DrJ'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

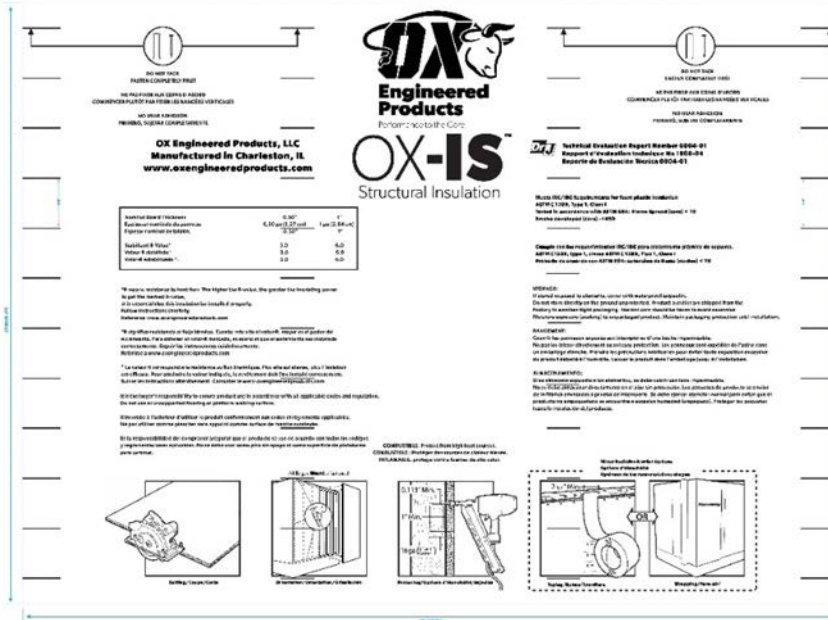


FIGURE 2. OX-IS® STRUCTURAL INSULATION PRODUCT LABEL



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 (1½")
 - 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 (See 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) ^{2,6} 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) ¹	406 (16 o.c.)	12.7 (1/2) GWB	203/203 (8/8)	8.5 (580)
					406/406 (16/16)	7.1 (490)
		76/152 (3/6)			203/203 (8/8)	8.2 (560) ¹
						6.7 (460) ³
		76/76 (3/3) ¹	610 (24) o.c.	12.7 (1/2) GWB	203/305 (8/12)	7.4 (505)
					13.5 (925)	
		76/76 (3/3) ¹	406 (16) o.c.	No GWB		5.8 (395)
						610 (24) o.c.
	19.1 (¾)	76/76 (3/3) ⁶	406 (16) o.c.	No GWB		5.3 (365)
						610 (24) o.c.
		76/76 (3/3) ¹	406 (16) o.c.	No GWB		6.9 (475)
						610 (24) o.c.
	25.4 (1)	76/76 (3/3) ¹	406 (16) o.c.	No GWB		6.3 (430)
						610 (24) o.c.
		76/76 (3/3) ¹	610 (24) o.c.	12.7 (1/2) GWB and Thermo-Ply Red ⁵	203/203 (8/8)	10.6 (725)
						12.7 (1/2) GWB
		406/406 (16/16)	7.7 (530)			
		203/203 (8/8)	8.7 (595)			
	406/406 (16/16)	7.3 (500)				
	38.1 (1½)	76/76 (3/3) ¹	406 (16) o.c.	No GWB		5.9 (405)
610 (24) o.c.						5.3 (365)
76/152 (3/6) ⁶		406 (16) o.c.	12.7 (1/2) GWB	203/203 (8/8)	8.0 (550)	
					610 (24) o.c.	7.1 (490)

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^{1,3}

Seismic Force Resisting System (SFRS)	Thickness mm (in)	Gypsum ^{2,9} 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 ⁸ , m (ft)				
							$I_E F_a S_a(0.2)$				$I_E F_a S_a(1.0)$
							< 0.2	≥ 0.2 to < 0.35	≥ 0.35 to ≤ 0.75	> 0.75	> 0.3
Light-Frame (Wood) Walls Sheathed with 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 SFRS acting in the same direction in the same story, $R_d R_o$ shall be taken as the lowest value of $R_d R_o$ corresponding to these systems. See *NBC* Division B, 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 (¾") 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 ² , 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. FACTORED SHEAR RESISTANCES FOR OX-IS® AND SI-STRONG ON 20 GAUGE 50 KSI METAL STUDS

Structural Sheathing Product	Thickness, mm (in)	Framing Condition ² , mm (in)	Maximum Stud ¹ Spacing, mm (in)	Factored Shear Resistance, kN/m (plf)			
				0.100 Pins ³ 76 mm (3") o.c. edges 152 mm (6") o.c. in field	0.100 Pins ³ 76 mm (3") o.c. edges 76 mm (3") o.c. in field	#8 Screws ⁴ 76 mm (3") o.c. edges 152 mm (6") o.c. in field	#8 Screws ⁴ 76 mm (3") o.c. edges 76 mm (3") o.c. in field
OX-IS® or SI-Strong	12.7 (½)	No GWB	610 (24) o.c.	NT ⁶	NT ⁶	7.0 (480)	NT ⁶
		15.9 (5/8) GWB Fasten 203/305 (8/12) ⁵		5.7 (390)	6.9 (470)	NT ⁶	8.9 (610)
		15.9 (5/8) GWB Fasten 152/305 (6/12) ⁴		7.9 (555)	NT ⁶	11.2 (770)	NT ⁶
	25.4 (1)	6.5 (450)		6.7 (455)	NT ⁶	10.9 (745)	

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

1. 20 gauge 50 ksi 89 mm (3.5") metal studs @ 610 mm (24") o.c. Mid-height horizontal brace installed every other cavity space.
2. *NBC* Table 9.23.13.6 requires 15.9 mm (5/8") thick gypsum with framing 610 mm (24") o.c.
3. AeroSmith 2359 2.5-mm (0.100") diameter pins.
4. No. 8-18 x 1¼ Phillips modified truss-head self-drilling screws. 152 mm (6") at the edges and 305 mm (12") in the field.
5. No. 6-20 x 1¼ Phillips Bugle D/W SDS self-drilling screws. 203 mm (8") at the edges and 305 mm (12") in the field.
6. NT = Not Tested

5.3 Water-Resistive Barrier (WRB)

- 5.3.1 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.
- 5.3.2 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.
- 5.3.3 All seams and joints between boards shall be sealed with an approved construction tape in accordance with Section 6. Approved construction tape includes 63-mm (2-½") wide construction tape by 3M (8087) or Venture (1585-P2). 102-mm (4") wide self-adhered flashing tape meeting *AAMA 711* (3M All Weather Flashing Tape 8067 or equivalent) with release liner may be required for effective taping of inside and outside corners.
- 5.3.4 A separate WRB may also be provided. If a separate WRB method is used, overlapping or taping of the sheathing joints is not required.
- 5.3.5 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 4, Figure 5, and Figure 6 for typical penetration flashing details.
- 5.3.6 Flashing Details – Typical Flanged and Unflanged Penetrations and Window

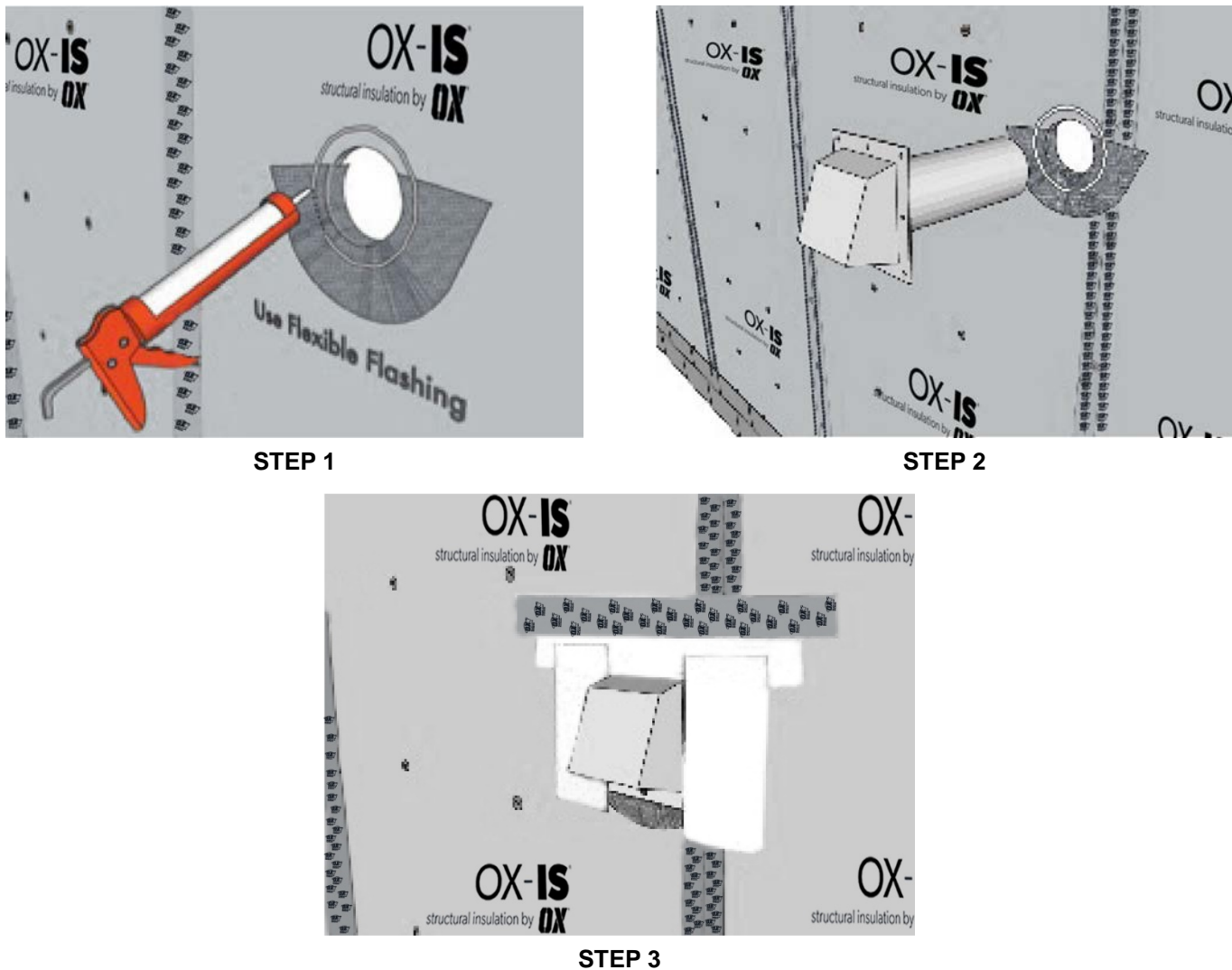


FIGURE 4. TYPICAL PENETRATION FLASHING DETAIL – FLANGED

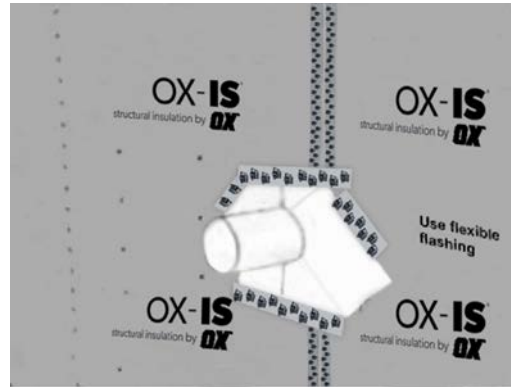
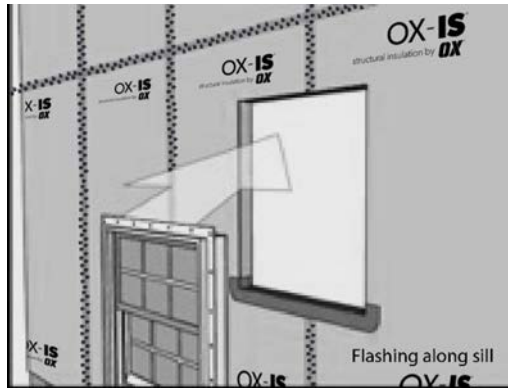
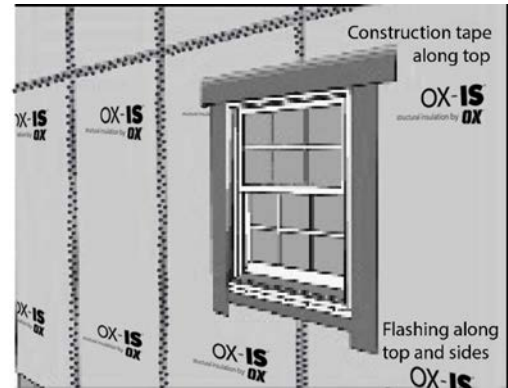


FIGURE 5. TYPICAL PENETRATION FLASHING DETAIL – UNFLANGED



STEP 1



STEP 2

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 ² K/W (h*ft ² *°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 m²K/W = 5.678 hr*ft²*°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 (see Table 7).

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

Test Method	Value
ASTM E2178	< 0.02 (L/s.m ²) ¹
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 ¹	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.

6.2.2 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 General

6.2.3.1.1 Fasteners shall be installed with a nominal edge distance of 9 mm (0.35") for gypsum.

6.2.3.1.2 Where used, always fasten staples with the crown parallel to the framing member.

6.2.3.2 OX-IS® and SI-Strong Structural Insulation

6.2.3.2.1 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.

- 6.2.3.2.2 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.
- 6.2.3.3 *Gypsum Wallboard*
 - 6.2.3.3.1 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.
 - 6.2.3.3.2 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.
 - 6.2.3.3.3 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 TEST ENGINEERING SUBSTANTIATING DATA

- 7.1 Lateral load testing and data for determining comparative equivalency for use as an alternative material, in accordance with *ASTM E72*, *E564*, and *E2126*
- 7.2 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 characteristics 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 Some information contained herein is the result of testing and/or data analysis by other sources which conform to *NBC* Volume I commentary on Conformity Assessment and relevant professional engineering law. DrJ relies on accurate data from these sources to perform engineering analysis. DrJ has reviewed and found the data provided by other professional sources to be credible.
- 7.10 Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *NBC*, *NECB*, *CAN/CSA*). 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, and concrete), DrJ relies upon the grade mark, stamp, and/or design values provided by raw material suppliers to be accurate and conforming to the mechanical properties defined in the relevant material standard.

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 *NBC* Article 1.2.1.1. states:
- 1.2.1.1. **Compliance with this Code**
 - 1) Compliance with this Code shall be achieved by
 - a) complying with the applicable acceptable solutions in Division B (see 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 *NBC* Division C Section 2.3 includes additional guidance for *alternative solutions*.
- 8.4 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 evaluation, they are listed here.
- 8.4.1 No known variations

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* 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*).
- 9.7 At a minimum, this product shall be installed per Section 6 of this TER.
- 9.8 This product is manufactured under a third-party quality control program with quality control inspections established by the governing legislation of the adopting province or territory, as described in *NBC* Volume 1 commentary on Conformity Assessment.
- 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. Therefore, the TER shall be reviewed for code compliance by the AHJ for acceptance.
- 9.10 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 AHJ's inspection, and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

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.

11 REVIEW SCHEDULE

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