



Listing and Technical Evaluation Report™

Report No: 1808-02



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Strong-R® Structural Insulation

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CSI Designations:

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 Innovative Product Evaluatedⁱ

1.1 Strong-R Structural Insulation

2 Product Description and Materials

2.1 The innovative product evaluated in this report is shown in **Figure 1**.



Figure 1. Strong-R Structural Insulation



- 2.2 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.
- 2.2.1 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 using a 0.113" (2.9 mm) nominal thickness fibrous sheathing board.
- 2.2.2 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).
- 2.3 *Material Availability*
- 2.3.1 *Thickness:*
- 2.3.1.1 Up to 4" (102 mm)
- 2.3.2 *Standard Width:*
- 2.3.2.1 48" (1219 mm)
- 2.3.3 *Standard Lengths:*
- 2.3.3.1 96" (2438 mm)
- 2.3.3.2 108" (2743 mm)
- 2.3.3.3 120" (3048 mm)
- 2.4 As needed, review material properties for design in Section 6 and to regulatory evaluation in Section 8.

3 Definitions

- 3.1 New Materialsⁱⁱ are defined as building materials, equipment, appliances, systems, or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.ⁱⁱⁱ The design strengths and permissible stresses shall be established by tests^{iv} and/or engineering analysis.^v
- 3.2 Duly Authenticated Reports^{vi} and Research Reports^{vii} are test reports and related engineering evaluations, which are written by an approved agency^{viii} and/or an approved source.^{ix}
- 3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).^x
- 3.3 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.
- 3.4 An approved source is "approved" when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.^{xi}
- 3.5 Testing and/or inspections conducted for this Duly Authenticated Report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed Registered Design Professional (RDP).
- 3.5.1 The Center for Building Innovation (CBI) is ANAB^{xii} ISO/IEC 17025 and ISO/IEC 17020 accredited.
- 3.6 The regulatory authority shall enforce^{xiii} the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing^{xiv} stating the nonconformance and the path to its cure.
- 3.7 The regulatory authority shall accept Duly Authenticated Reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.^{xv}



3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.^{xvi} Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.^{xvii}

3.9 Approval equity is a fundamental commercial and legal principle.^{xviii}

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation^{xix}

4.1 Standards

- 4.1.1 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*
- 4.1.2 *ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus*
- 4.1.3 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*
- 4.1.4 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference*
- 4.1.5 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*
- 4.1.6 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
- 4.1.7 *ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*
- 4.1.8 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*
- 4.1.9 *NFPA 285: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*
- 4.1.10 *NFPA 286: Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*

4.2 Structural performance for shear wall assemblies used as lateral force resisting systems in Seismic Design Categories A through F, have been tested and evaluated in accordance with the following standards:

- 4.2.1 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*
- 4.2.2 *ASTM D7989: Standard Practice for Demonstrating Equivalent In-Plane Lateral Seismic Performance to Wood-Frame Shear Walls Sheathed with Wood Structural Panels*
- 4.2.3 *ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction*
- 4.2.4 *ASTM E564: Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings*
- 4.2.5 *ASTM E2126: Standard Test Methods for Cyclic (Reversed) Load Test for Shear Resistance of Vertical Elements of the Lateral Force Resisting Systems for Buildings*
- 4.2.5.1 ASTM D7989 is accepted engineering practice used to establish Seismic Design Coefficients (SDCs). Test data generated by ISO/IEC 17025 approved agencies and/or professional engineers and all associated professional engineering evaluations that use ASTM D7989 as their basis, are defined as intellectual property and/or trade secrets and are also defined as an Independent Design Review (i.e., Listings, certified reports, Duly Authenticated Reports from approved agencies and/or research reports prepared by approved agencies and/or approved sources).



4.3 Regulations

- 4.3.1 IBC – 15, 18, 21: International Building Code®
- 4.3.2 IRC – 15, 18, 21: International Residential Code®
- 4.3.3 IECC – 15, 18, 21: International Energy Conservation Code®
- 4.3.4 FBC-B - 20, 23: Florida Building Code - Building^{xx} (FL 28814)
- 4.3.5 FBC-B - 20, 23: Florida Building Code - Residential^{xx} (FL 28814)

5 Listed^{xxi}

- 5.1 A nationally recognized testing laboratory such as CBI, states that the materials, designs, methods of construction, and/or equipment have met nationally recognized standards and/or have been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 General

- 6.1.1 Strong-R Structural Insulation is used in the following applications:
 - 6.1.1.1 Wall sheathing in buildings constructed in accordance with the IBC and IRC for light-frame steel and wood construction.
 - 6.1.1.2 Structural wall sheathing to provide lateral load resistance (wind and seismic) for braced wall panels used in light-frame construction.
 - 6.1.1.3 Structural wall sheathing to provide resistance to transverse loads for wall assemblies used in light frame construction.
 - 6.1.1.4 Insulating sheathing applied as in-fill to portions of walls that are not designed as braced wall panels or shear walls.
 - 6.1.1.5 Insulated sheathing in accordance with the IRC Section N1102 and IECC Section C402.
 - 6.1.1.6 An approved Water-Resistive Barrier (WRB) in accordance with IBC Section 1403.2^{xxii} and IRC Section R703.2 when installed with approved Construction Tape on all sheathing seams, see Section **6.3.4**.
 - 6.1.1.7 See the manufacturer product information for further details.
 - 6.1.1.8 Where the joints are not taped, a separate WRB shall be installed in accordance with the WRB manufacturer installation instructions.
 - 6.1.1.9 An air barrier material as part of an air barrier assembly in accordance with IRC Section N1102.4 and IECC Section C402 in accordance with the manufacturer installation instructions and this report.
- 6.1.2 Strong-R Structural Insulation contains foam plastics complying with IBC Section 2603 and IRC Section R316.

6.2 Structural Applications

6.2.1 General Provisions:

- 6.2.1.1 Except as otherwise described in this report, Strong-R Structural Insulation shall be installed in accordance with the applicable building codes listed in Section 4 using the provisions set forth herein for light-frame construction.
- 6.2.1.2 Anchorage for in-plane shear shall be provided to transfer the induced shear force into and out of each shear wall.
 - 6.2.1.2.1 For wind design, anchor bolt spacing shall not exceed 6' o.c.
 - 6.2.1.2.2 For seismic design, anchor bolt spacing shall not exceed 4' o.c.



- 6.2.1.3 The maximum aspect ratio for Strong-R Structural Insulation shall be 4:1.
- 6.2.1.4 The minimum full height panel width shall be 24".
- 6.2.1.5 All panel edges shall be supported by framing.
- 6.2.1.6 Fasteners may be countersunk beneath the outer surface of the foam plastic sheathing layer.

6.2.2 Steel-Framed Construction:

- 6.2.2.1 Strong-R Structural Insulation panels used in wall assemblies designed as shear walls:

- 6.2.2.1.1 Are permitted to be designed using the capacities shown in **Table 1**.
- 6.2.2.1.2 Resist lateral wind load forces using the allowable shear loads (in pounds per linear foot) set forth in **Table 1**.
- 6.2.2.1.3 Resist seismic load forces using the seismic allowable unit shear capacities set forth in **Table 2** when seismic design is required in accordance with IBC Section 1613.
 - 6.2.2.1.3.1 The response modification coefficient, R , system overstrength factor, Ω_o , and deflection amplification factor, C_d , indicated in **Table 2** shall be used to determine the base shear, element design forces, and design story drift in accordance with ASCE 7 Chapter 12 and Section 14.5.

- 6.2.2.2 Strong-R Structural Insulation panels have the uplift capacities shown in **Table 3**.

- 6.2.2.3 Strong-R Structural Insulation panels are permitted to resist transverse wind load forces using the allowable transverse loads (in pounds per linear foot) set forth in **Table 4**.

- 6.2.2.4 Required component and cladding loads to be resisted are found in IBC Section 1609.1.1 and IRC Tables R301.2.1(1),^{xxiii} and adjustment factors, where applicable, in IRC Table R301.2.1(2).^{xxiv}

**Table 1. Strong-R Structural Insulation Allowable Stress Design (ASD) Capacity - Wind**

Stud Type ¹	Structural Sheathing Product	Thickness (in)	Fastener Spacing (edge/field) (in)	Maximum Stud Spacing (in)	Gypsum Wallboard (GWB)	Gypsum Wallboard Fastener Spacing ³ (edge/field)	Allowable Unit Shear Capacity (plf)	Fastener Schedule
Steel	Strong-R Structural Insulation	1 1/4	3/3	24 o.c.	1/2" GWB	8/8	280	See Table Note 4
			3/3			8/12	290	
			3/3			6/12	325	
			3/3	24 o.c.	No GWB ²	-	235	See Table Note 8
			3/3				140	
			3/3				395	See Table Note 6
			3/12				395	
			6/12				195	
			12/12				105	See Table Note 5
		2 1/8	3/3	24 o.c.			395	See Table Note 6
			3/12				395	
			6/12				195	
			12/12				105	See Table Note 5
			3/3				260	See Table Note 7
Wood	Strong-R Structural Insulation	1 1/4	3/12	24 o.c.	No GWB ²	-	640	See Table Note 9
			6/12				320	
		2 1/8	3/12				640	
			6/12				320	

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

- Steel: 20-gauge 50 ksi 3 5/8" metal studs spaced 24" o.c.
Wood: Minimum oven-dry SG: 0.42, Grade: No. 2 spaced 24" o.c.
- Where gypsum wallboard is not installed on the interior face of the wall, the wall shall be constructed with mid-height horizontal brace installed every other cavity space.
- Gypsum attached with minimum #6 type S screws 1 1/4" long with a minimum edge distance of 3/8".
- #8 x 1 5/8" Self Drilling Modified Truss Head Screw (Head flush w/ exterior of foam board)
- #8 x 1 5/8" Self Drilling Modified Truss Head Screw (Head driven through the foam plastic to seat against the backer material)
- #8 x 2 1/2" Self Drilling Modified Truss Head Screw (Head driven through the foam plastic to seat against the backer material)
- #8 x 3" Self Drilling Modified Truss Head Screw (Head flush w/ exterior of foam board)
- 0.100" Diameter x 1 1/2" Length Pins (Bostitch® C4S100 BG)
- Minimum #8 x 1 1/4" Wafer Head Screw (screw shall penetrate a minimum of 1" into the stud and head shall be driven through the foam plastic to seat against the backer material). Fastener edge distance shall be a minimum of 3/8".

**Table 2.** Seismic Allowable Unit Shear Capacity & Seismic Design Coefficients for Strong-R Structural Insulation⁶

Seismic Force Resisting System	Thickness (in)	Gypsum ⁵ Wallboard Fastening Schedule (edge:field) (in)	Max. Stud Spacing (in)	Seismic Allowable Unit Shear ⁷ Capacity (plf)	Apparent Shear Stiffness, G_a (kips/in)	Response Modification Factor, R^8	System Overstrength Factor, Ω_0^9	Deflection Amplification Coefficient, C_d^{10}	Structural System Limitations and Building Height Limit ^{11,12,13} (ft)				
									Seismic Design Category				
									B	C	D	E	F
Light-Frame (cold formed steel) Walls Sheathed with Strong-R Structural Insulation ^{1,3}	1 1/4	No GWB ⁴	24 o.c.	170	9.0	6.5	3.0	4.0	NL	NL	65	65	65
		8:8	24 o.c.	225	14.0	6.5	3.0	4.0	NL	NL	65	65	65
Light-Frame (wood) Walls Sheathed with Strong-R Structural Insulation ²		No GWB ⁴	24 o.c.	200	10.3	2.0	2.5	2.0	NL	NL	35	NP	NP

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 lb/ft = 0.0146 kN/m

- Strong-R Structural Insulation attached with a minimum #8 x 1 5/8" Self-Drilling Modified Truss Head Screw. Fasteners spaced a maximum of 3" o.c. at the panel edges and 3" o.c. in the field. Fastener edge distance shall be a minimum of 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.
- Strong-R Structural Insulation attached with a minimum #8 x 1 1/4" Wafer Head Screw shall penetrate a minimum of 1" into the stud. Fasteners are to be installed spaced a maximum of 6" o.c. at the panel edges and 12" o.c. in the field. Fastener edge distance shall be a minimum of 3/8". Fastener head shall be driven through the foam plastic to seat against the backer material.
- 20-gauge 50 ksi 3/8" metal studs @ 24" o.c.
- Where gypsum wallboard is not installed on the interior face of the wall, the wall shall be constructed with mid-height horizontal brace installed every other cavity space.
- Walls installed with minimum 1/2" Gypsum wallboard attached with minimum #6 type S screws 1 1/4" long. Fasteners shall maintain a minimum edge distance of 3/8".
- All seismic design parameters follow the equivalency as defined in Section 8 of this report.
- The allowable unit shear capacity is calculated using a factor of safety of 2.5 per ASCE 7.
- Response modification coefficient, R , for use throughout ASCE 7. Note: R reduces forces to a strength level, not an allowable stress level.
- The tabulated value of the overstrength factor, Ω_0 , is permitted to be reduced by subtracting one-half (0.5) for structures with flexible diaphragms.
- Deflection amplification factor, C_d , for use with ASCE 7 Sections 12.8.6, 12.8.7, and 12.9.1.2.
- Heights are measured from the base of the structure as defined in ASCE 7 Section 11.2.
- NL = Not Limited
- NP = Not permitted

**Table 3.** Uplift Performance of Strong-R Structural Insulation^{1,2}

Structural Sheathing Product	Allowable Uplift Capacity (plf)	Maximum Stud Spacing (in)	Fastener Spacing
Light-Frame (cold formed steel) walls sheathed with Strong-R Structural Insulation: Single Bottom Plate	220	24 o.c.	#8 x 1 ⁵ / ₈ " Zinc Coated Self Drilling Modified Truss Head Screw, 3" o.c. to perimeter/field
SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m 1. 20-gauge 50 ksi metal studs at 24" o.c maximum. 2. The capacities shown are for the purpose of providing information on the hold-down capacity of the sheathing to the bottom plate connection independent of lateral loading. 3. Where combined shear and uplift loading is needed, consult a professional engineer.			

Table 4. Transverse Load Performance of Strong-R Structural Insulation for Resisting Out-of-Plane Wind Loads

Structural Sheathing Product	Allowable Design Value (psf)	Maximum Stud Spacing (in)	Fastener Schedule
Light-Frame (cold formed steel) walls sheathed with Strong-R Structural Insulation ¹	60	24 o.c.	#8 x 2 ¹ / ₂ " Zinc Coated Self-Drilling Modified Truss Head Screw, 6" o.c. in perimeter and 12" o.c. in field
SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m, 1 psf = 0.0479 kN/m ² 1. 20-gauge 50 ksi metal studs at 24" o.c maximum			

Table 5. Basic Wind Speed (mph) for Strong-R Structural Insulation Used in Exterior Wall Covering Assemblies^{1,2}

Structural Sheathing Product	Allowable Components & Cladding Basic Wind Speed V _{asd} per ASCE 7-05 (mph)	Allowable Components & Cladding Basic Wind Speed V _{ult} per ASCE 7-16 & 7-22 (mph)
	24" o.c. Framing	24" o.c. Framing
Strong-R Structural Insulation	155	200
SI: 1 in = 25.4 mm, 1 mph = 1.61 km/h 1. Allowable wind speeds are based on the following: Enclosed building, Components and Cladding wind loads, Zone 5, Mean roof height 30', Exposure B, 10 sq. ft. effective wind area. See the applicable building code for any adjustment needed for specific building location and configuration. 2. Design wind load capacity shall be in accordance with IBC Section 1609.1.1.		

6.3 Water-Resistive Barrier (WRB)

- 6.3.1 Strong-R Structural Insulation is an approved WRB in accordance with [IBC Section 1403.2^{xxv}](#) and [IRC Section R703.2](#) when installed with 2⁷/₈" OX Commercial SeamTape®, OX ISO RED® WF SeamTape® or OX ISO RED® GF SeamTape®. Flashing tape, such as OX Arctic-Flash® Synthetic Flashing, OX HomeGuard® Flexible Butyl Flashing or OX HomeGuard® RA-plus® Flashing, may be required for effective taping of inside and outside corners. See the manufacturer product information for further details.
- 6.3.2 Strong-R Structural Insulation shall be installed with board joints placed directly over exterior framing spaced a maximum of 24" (610 mm) o.c. The fasteners used to attach the board shall be installed in accordance with Section 9.
- 6.3.3 A separate WRB may also be provided. If a separate WRB method is used, taping of the sheathing joints is not required.

- 6.3.4 Flashing of penetrations shall comply with the applicable code and must be installed at all sheathing penetrations. Use qualified flashing tape, such as OX Arctic-Flash® Synthetic Flashing, OX HomeGuard® Flexible Butyl Flashing or OX HomeGuard® RA-plus® Flashing. See **Figure 2**, **Figure 3** and **Figure 4** for typical penetration flashing details.
- 6.3.5 Flashing Details – Typical Flanged and Unflanged Penetration and Flanged Window:

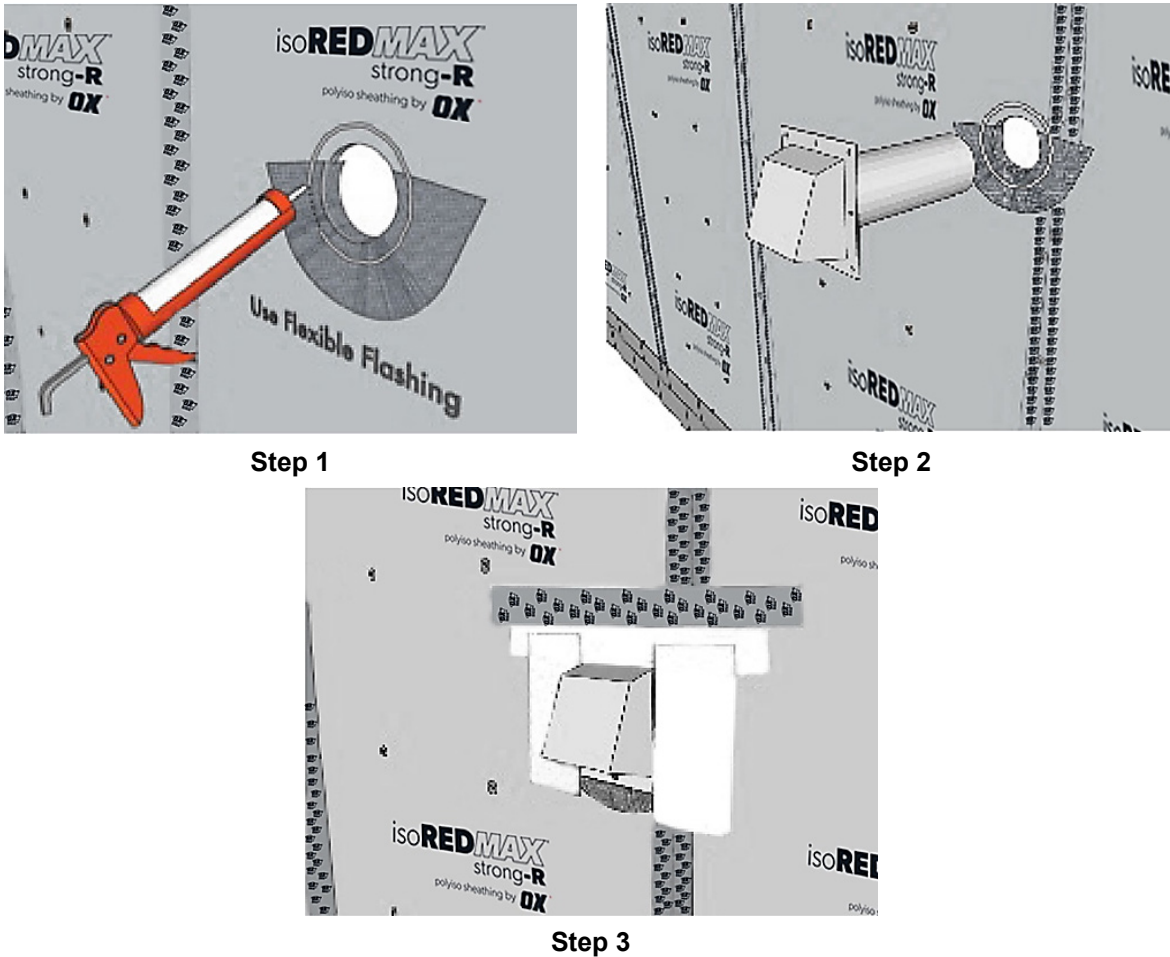


Figure 2. Typical Penetration Flashing Detail – Flanged

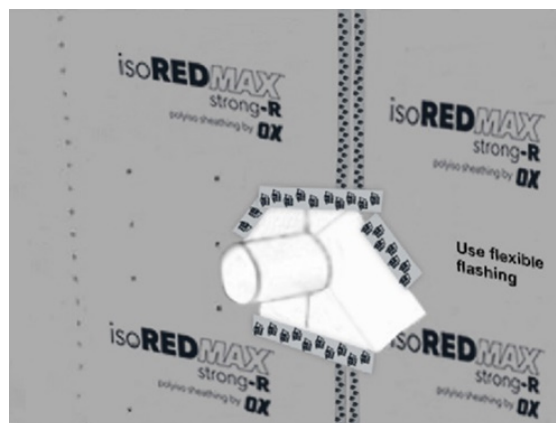
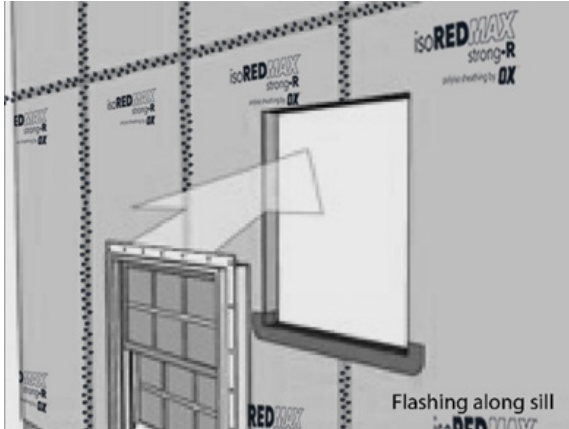
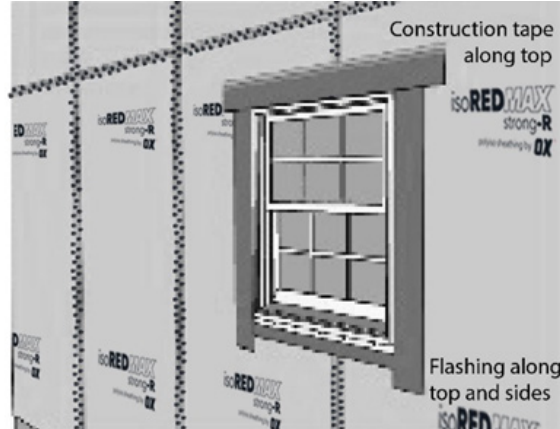


Figure 3. Typical Penetration Flashing Detail – Unflanged



Step 1



Step 2

Figure 4. Typical Window Flashing Detail

6.4 Thermal Resistance (R-Value)

- 6.4.1 Strong-R Structural Insulation is a Foam Plastic Insulated Sheathing (FPIS) panel used as thermal insulation in wall, roof and ceiling assemblies.
- 6.4.2 Strong-R Structural Insulation meets the continuous insulating sheathing requirements complying with the provisions of [IRC Section N1102](#) and [IECC Section C402](#).
- 6.4.3 Strong-R Structural Insulation has the thermal resistance shown in **Table 6**.

Table 6. Strong-R Structural Insulation Thermal Resistance Properties¹

Thickness (in)	R-Value (°F·ft ² ·hr/Btu)
1 ¹ / ₄	7.5
2 ¹ / ₈	13.0

SI: 1 in = 25.4 mm

1. Thermal values are determined using the ASTM C518 test method at 75°F mean temperature on material conditioned according to ASTM C1289 Section 11.1 (°F·ft²·hr/Btu).

6.5 Air Barrier

- 6.5.1 Wall and ceiling assemblies constructed with Strong-R Structural Insulation are used to meet air barrier requirements in accordance with [IECC Section C402](#).
- 6.5.2 All penetrations shall be flashed and sealed in accordance with the flashing manufacturer installation instructions. Self-adhered flashing tape shall meet AAMA 711 (FortiFlash® Butyl or equivalent).
- 6.5.3 Strong-R Structural Insulation is defined as an air barrier material having an air permeance of less than 0.02 L/(s·m²) [0.004 cfm/ft²], in accordance with [IECC Section C402](#).



6.6 Surface Burn Characteristics

- 6.6.1** Strong-R Structural Insulation has the flame spread and smoke developed ratings as shown in **Table 7**, when tested in accordance with ASTM E84 per IBC Section 2603.3 and IRC Section R316.3.

Table 7. Fire Performance of Strong-R Structural Insulation

Product	Flame Spread Index	Smoke Developed Index	Classification
Strong-R Structural Insulation ¹	< 25	< 450	Class A
1. Foam plastic core tested in accordance with ASTM E84, with maximum foam thickness of 4".			

6.7 Thermal Barrier

- 6.7.1** Strong-R Structural Insulation boards with a maximum thickness of 4" were tested in accordance with NFPA 286 and have met the acceptance criteria of IBC Section 803.1.1.1^{xxvi} for use on walls only or ceilings only without a thermal barrier, in accordance with IBC Section 2603.4 and IBC Section 2603.5.2.

6.8 Non-Structural Applications

- 6.8.1** 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 **9.3.6**.

6.9 Vertical and Lateral Fire Propagation

- 6.9.1** Strong-R Structural Insulation was tested to assess performance with regard to vertical and lateral fire propagation in accordance with NFPA 285 and IBC Section 2603.5.5.
- 6.9.2** Engineering analysis has also been conducted to assess substitution of other products within the approved wall assemblies.
- 6.9.3** The wall assemblies listed in **Table 8** and **Table 9** are approved for use in buildings of Type I-IV construction.

Table 8. Approved NFPA 285 Wall Assemblies – Brick Cladding^{1,2}

Wall Component	Materials
Base Wall System Use either 1, 2, 3, or 4 NOTE: May use 4 optionally when FRTW framing is allowed by code.	1. Cast Concrete Wall 2. Concrete Masonry Wall 3. 20-gauge (min.) 3 ⁵ / ₈ " (min.) steel studs spaced 24" o.c. (max) a. 1 layer – 5 ⁸ / ₈ " thick Type X gypsum wallboard on interior b. Lateral bracing every 4' 4. Where allowed in Types I-IV construction, FRTW (Fire Retardant Treated Wood) studs complying with <u>IBC Section 2303.2</u> , minimum nominal 2x4 spaced at a maximum 16" o.c. a. 5 ⁸ / ₈ " (min.) Type X gypsum wallboard interior b. Wall braced at mid-height and fire-stopped at top and bottom
Fire-Stopping in Stud Cavities at Floor Lines Use 2 with FRTW framing.	1. Any approved 4 pcf mineral fiber based safing insulation in each stud cavity at floor line – safing thickness must match stud cavity depth. 2. Solid FRTW fire blocking at floor line when Base Wall System, Item 4 is used.



Table 8. Approved NFPA 285 Wall Assemblies – Brick Cladding^{1,2}

Wall Component	Materials
Cavity Insulation Use any option 1-13.	<ol style="list-style-type: none"> None 1½" (min.) BASF Wallite™ 2 pcf SPF (or equivalent) up to full cavity fill 1½" (min.) Premium Spray Products Foamsulate 20 up to full cavity fill Any noncombustible insulation per ASTM E136 Any mineral fiber (Batt or board type Class A ASTM E84 faced or unfaced) Any fiberglass (Batt type Class A ASTM E84 faced or unfaced) Icynene Classic, Classic Plus, Classic Ultra or Classic Ultra Select; MD-R-210; MD-C-200; or Proseal. Partial cavity fill with a max. air space of 2" or full cavity fill not exceeding 7⅝". Use with ½" exterior gypsum sheathing (min.). NCFI Polyurethanes, full cavity depth or less of InsulBloc, InsulStar, InsulStar Plus or ThermalStop™ closed cell (2.0 lb/ft³) spray polyurethane foam applied using sheathing as substrate and covering the width of the cavity. Use with ½" exterior gypsum sheathing (min.). SWD Urethane Quik-Shield 112 SPF applied using ⅝" Type X sheathing as substrate. Air gap must not exceed 2½". Demilec Sealection 500 or HeatLok Soy 200, up to full cavity fill. Use with ⅝" Type X exterior gypsum sheathing. Accella Polyurethane Bayseal® OC and OCX or Bayseal® CC, up to full cavity fill using minimum ½" exterior gypsum sheathing. Lapolla™ Foam-Lok™ FL 2000 with ⅝" Type X exterior sheathing in 3⅝" studs (max.) Any cavity insulation that has been tested per ASTM E1354 (at a min. of 20 kw/m² heat flux) and shown by analysis to be of equivalent or lesser flammability (based on T_{ign}, Pk. HRR)³ than the foam tested in Item 2 or 3 above.
Exterior Sheathing Use either 1, 2, or 3 (with limitations noted in Cavity Insulation Allowances) NOTE: Exterior FRTW sheathing or gypsum wallboard is optional for Base Walls 1 and 2.	<ol style="list-style-type: none"> None (only with cavity insulations 1,2,4,5, or 6) Minimum ½" exterior gypsum sheathing (unless ⅝" Type X exterior sheathing is otherwise specified with cavity insulations). ½" (min.) FRTW structural panels complying with IBC Section 2303.2 and installed in accordance with the code requirements for Types I-IV construction.
Water-Resistive Barrier Over Base Wall Use either 1, 2, or 3 NOTE: Item 3 applies only when exterior gypsum sheathing is used.	<ol style="list-style-type: none"> None WRB's over Steel Framing: <ol style="list-style-type: none"> Kingspan GreenGuard® Max Building Wrap Dupont Tyvek (Various per ESR 2375) Dow Weathermate™ Dow Weathermate™ Plus OX ThermoPly WRBs over Exterior Gypsum Sheathing: <ol style="list-style-type: none"> Henry Air Bloc 32MR Henry Foilskin Henry MetalClad CCW 705 FR-A Kingspan GreenGuard® Max Building Wrap Dupont Tyvek (various per ESR-2375) Dow Weathermate™ Dow Weathermate™ Plus Any WRB that has been tested per ASTM E1354 (at a min. of 20 kw/m² heat flux) and shown by analysis to be of equivalent or lesser flammability (based on T_{ign}, Pk. HRR)³ than the exterior insulation foam core or baseline Item 3a above.



Table 8. Approved NFPA 285 Wall Assemblies – Brick Cladding^{1,2}

Wall Component	Materials
Exterior Insulation	Up to 4" thick OX Strong-R Structural Insulation, consisting of a single panel or multiple thinner panels
WRB Over Exterior Insulation Use either 1 or 2	<ol style="list-style-type: none"> 1. Aluminum construction tape as tested (or equivalent), max. 6" wide over staggered insulation joints 2. For use with all Exterior Cladding options as written below: <ol style="list-style-type: none"> a. Henry Foilskin b. Henry MetalClad c. CCW 705 FR-A d. Kingspan GreenGuard® Max Building Wrap e. Dupont Tyvek (various per ESR-2375) f. Dow Weathermate™ g. Dow Weathermate™ Plus h. Any WRB that has been tested per ASTM E1354 (at a min. of 20 kw/m² heat flux) and shown by analysis to be of equivalent or lesser flammability (based on T_{ign}, Pk. HRR)³ than those listed above.
Exterior Cladding Use 1 through 6 NOTE: Masonry cladding items 2-6 do not employ an air gap or open joints.	<ol style="list-style-type: none"> 1. Brick – Nominal 4" clay brick or veneer with max. 2" air gap behind the brick. Brick ties/anchors 24" o.c. (max.). 2. Stucco – Minimum 3/4" thick exterior cement plaster and lath with approved WRB over insulation. 3. Limestone – Minimum 2" thick, using any standard non-open joint installation technique such as shiplap. 4. Natural Stone Veneer – Minimum 2" thick, using any standard non-open joint installation technique. 5. Terracotta Cladding – Minimum 1 1/4" thick (solid or equivalent by weight), using any standard non-open joint installation technique such as shiplap. 6. Cast Artificial Stone – Minimum 1 1/2" thick, complying with ICC-ES AC51 installed using any standard non-joint installation technique such as shiplap.
<p>SI: 1 in = 25.4 mm</p> <ol style="list-style-type: none"> 1. The assemblies' combinations created herein and the various substitutions of products are based on testing and professional thermal engineering analysis by Priest & Associates Consulting, LLC. 2. Acceptance criteria for ASTM E1354 testing have not been well established in the referenced building codes and foam sheathing related sections. The criteria stated here for substitution of products is based on testing and professional thermal engineering analysis by Priest & Associates. 3. T_{ign} is the time to ignition from the start of the test until the sheathing ignites. Pk. HRR is the peak heat release rate during the test. 	



Table 9. Approved NFPA 285 Wall Assemblies – ACM Cladding^{1,2}

Wall Component	Materials
Base Wall System Use either 1, 2, 3, or 4. NOTE: May use 4 optionally when FRTW framing is allowed by code	<ol style="list-style-type: none"> 1. Cast Concrete Wall 2. Concrete Masonry Wall 3. 20-gauge (min.) 3⁵/₈" (min.) steel studs spaced 24" o.c. (max) <ol style="list-style-type: none"> a. 1 layer – 5/8"-thick Type X gypsum wallboard on interior b. Lateral bracing every 4' 4. Where allowed in Types I-IV construction, FRTW (Fire Retardant Treated Wood) studs complying with IBC Section 2303.2, minimum nominal 2x4 spaced at a maximum 16" o.c. <ol style="list-style-type: none"> a. 5/8" (min.) Type X gypsum wallboard interior b. Wall braced at mid-height and fire-stopped at top and bottom
Fire-Stopping in Stud Cavities at Floor Lines Use either 1 or 2. As an option, use 2 with FRTW framing.	<ol style="list-style-type: none"> 1. Any approved 4 pcf mineral fiber based safing insulation in each stud cavity at floor line – safing thickness must match stud cavity depth. 2. Solid FRTW fire blocking at floor line when Base Wall System, Item 4 is used.
Cavity Insulation Use any option 1-13.	<ol style="list-style-type: none"> 1. None 2. 1¹/₂" (min.) BASF Wallite™ 2 pcf SPF (or equivalent) up to full cavity fill. 3. 1¹/₂" (min.) Premium Spray Products Foamsulate 20 up to full cavity fill. 4. Any noncombustible insulation per ASTM E136. 5. Any mineral fiber (Batt or board type Class A ASTM E84 faced or unfaced). 6. Any fiberglass (Batt type Class A ASTM E84 faced or unfaced). 7. Icynene Classic, Classic Plus, Classic Ultra or Classic Ultra Select; MD-R-210; MD-C-200; or Proseal. Partial cavity fill with a max air space of 2" or full cavity fill not exceeding 7⁵/₈". Use with 1/2" exterior gypsum sheathing (min.). 8. NCFI Polyurethanes, full cavity depth or less of InsulBloc, InsulStar, InsulStar Plus or ThermalStop™ closed cell (2.0 lb/ft³) spray polyurethane foam applied using sheathing as substrate and covering the width of the cavity. Use with 1/2" exterior gypsum sheathing (min.). 9. SWD Urethane Quik-Shield 112 spray polyurethane foam applied using 5/8" Type X sheathing as substrate. Air gap must not exceed 2¹/₂". 10. Demilec Sealection 500 or HeatLok Soy 200, up to full cavity fill. Use with 5/8" Type X exterior gypsum sheathing. 11. Accella Polyurethane Bayseal® OC and OCX or Bayseal® CC, up to full cavity fill using minimum 1/2" exterior gypsum sheathing. 12. Lapolla™ Foam-Lok™ FL 2000 with 5/8" Type X exterior sheathing in 3⁵/₈" studs (max.) 13. Any cavity insulation that has been tested per ASTM E1354 (at a min. of 20 kw/m² heat flux) and shown by analysis to be of equivalent or lesser flammability (based on T_{ign}, Pk. HRR)³ than the foam tested in Item 2 or 3 above.
Exterior Sheathing Use either 1 or 2. NOTE: Exterior FRTW sheathing or gypsum wallboard is optional for Base Walls 1 and 2.	<ol style="list-style-type: none"> 1. Minimum 1/2" exterior gypsum sheathing (5/8" Type X exterior gypsum sheathing required when SPF in cavity). 2. 1/2" (min.) FRTW structural panels complying with IBC Section 2303.2 and installed in accordance with the code requirements for Types I-IV construction.

Table 9. Approved NFPA 285 Wall Assemblies – ACM Cladding^{1,2}

Wall Component	Materials
Water-Resistive Barrier Over Base Wall Use any item 1-8.	<ol style="list-style-type: none"> None Any WRB that has been tested per ASTM E1354 (at a min. of 20 kw/m²) and shown by analysis to be of equivalent or lesser flammability (based on T_{ign}, Pk. HRR)³ than the exterior insulation foam core or baseline Item 3 below. Henry Air Bloc 32MR Kingspan GreenGuard® Max Building Wrap Dupont Tyvek (Various per ESR-2375) Dow Weathermate™ Dow Weathermate™ Plus WRBs over Exterior Sheathing: <ol style="list-style-type: none"> Henry Foilskin Henry MetalClad CCW 705 FR-A Kingspan GreenGuard® Max Building Wrap Dupont Tyvek (various per ESR-2375) Dow Weathermate™ Dow Weathermate™ Plus
Exterior Insulation	Up to 4" thick OX Strong-R Structural Insulation, consisting of a single panel or multiple thinner panels
WRB Over Exterior Insulation Use any item 1-5.	<ol style="list-style-type: none"> None Aluminum construction tape as tested (or equivalent), max. 6" wide over staggered insulation joints Henry Foilskin Henry MetalClad CCW 705 FR-A
Exterior Cladding Use any item 1-11.	<ol style="list-style-type: none"> Brick – Nominal 4" clay brick or veneer with max. 2" air gap behind the brick. Brick ties/anchors 24" o.c. (max.). Stucco – Minimum 3/4" thick exterior cement plaster and lath with an optional secondary water resistive barrier between the exterior insulation and lath. The secondary barrier shall not be full coverage asphalt or self-adhered butyl membrane. Limestone – Minimum 2" thick, using any standard installation technique. Natural Stone Veneer – Minimum 2" thick, using any standard installation technique. Cast Artificial Stone – Minimum 1 1/2" thick, complying with ICC-ES AC51 installed using any standard installation technique. Terracotta Cladding – Minimum 1 1/4" thick, using any standard installation technique. Any MCM, ACM (aluminum, steel, copper, zinc) (w/ 1 1/2" ± 1/2" air gap) that has successfully passed NFPA 285 using any standard installation technique. Uninsulated sheet metal building panels including aluminum, steel, or copper, using any standard installation technique. Uninsulated Fiber-cement siding, using any standard installation technique. Stone/Aluminum honeycomb composite building panels that have passed NFPA 285 or equivalent (StoneLite Wall Panels by Stone Panels – ESR-1500). Autoclaved-aerated-concrete (AAC) panels that have successfully passed NFPA 285 using any standard installation technique.



Table 9. Approved NFPA 285 Wall Assemblies – ACM Cladding^{1,2}

Wall Component	Materials
<p>SI: 1 in = 25.4 mm</p> <p>1. The assemblies' combinations created herein and the various substitutions of products are based on testing and professional thermal engineering analysis by Priest & Associates Consulting, LLC.</p> <p>2. Acceptance criteria for ASTM E1354 testing have not been well established in the referenced building codes and foam sheathing related sections. The criteria stated here for substitution of products is based on testing and professional thermal engineering analysis by Priest & Associates.</p> <p>3. T_{ign} is the time to ignition from the start of the test until the sheathing ignites. Pk. HRR is the peak heat release rate during the test.</p>	

- 6.10 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science, and fire science.

7 Certified Performance^{xxvii}

- 7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.^{xxviii}
- 7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.^{xxix}

8 Regulatory Evaluation and Accepted Engineering Practice

- 8.1 Strong-R Structural Insulation complies with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:
- 8.1.1 Lateral force resisting systems for use in both wind and seismic applications follow the performance-based provisions of [IBC Section 2306.1](#), [IBC Section 2306.3](#), and/or [SDPWS Section 4.3](#) for light-frame wood wall assemblies.
- 8.1.2 Structural performance under lateral load conditions (wind and seismic) for use as an alternative to the provisions of [IRC Section R603.9](#).
- 8.1.2.1 **Table 2** provides Seismic Design Coefficients (SDC) that conform to the requirements in ASCE 7 Section 12.2.1 and Table 12.2-1 for design of wall assemblies in buildings that require seismic design in accordance with ASCE 7 (i.e., all seismic design categories).
- 8.1.2.2 The basis for equivalency testing is outlined in Section 12.2.1.1 of ASCE 7:^{xxx}

Use of seismic force-resisting systems not contained in Table 12.2-1 shall be permitted contingent on submittal to and approval by the Authority Having Jurisdiction and independent structural design review of an accompanying set of design criteria and substantiating analytical and test data. The design criteria shall specify any limitations on system use, including Seismic Design Category and height; required procedures for designing the system's components and connections; required detailing; and the values of the response modification coefficient, R ; overstrength factor Ω_0 ; and deflection amplification factor, C_d .

- 8.1.2.3 The SDC evaluation uses the approach found in documentation entitled "[Establishing Seismic Equivalency for Proprietary Prefabricated Shear Panels](#)" and "[Seismic Design Coefficients: How they are determined for light-frame components](#)" using code-defined accepted engineering procedures, experience, and technical judgment.



- 8.1.3 Resistance to uplift loads for wall assemblies used for light-frame cold-formed steel and wood construction in accordance with [IBC Section 1609](#) and [IRC Section R301.2.1](#).
- 8.1.4 Resistance to transverse loads for wall assemblies used in light-frame cold-formed steel and wood construction in accordance with [IBC Section 1609.1.1](#).
- 8.1.5 Performance for use as foam plastic insulation in accordance with [IBC Section 2603](#) and [IRC Section R316](#).
- 8.1.6 Performance for use as insulated sheathing in accordance with [IRC Sections N1102.1](#), [IRC Section N1102.2](#) and [IECC Section C402.1](#).
- 8.1.7 Performance for use as an air barrier in accordance with the [IECC Section C402.5.1.3](#).^{xxxi}
- 8.1.8 Performance for use as a WRB in accordance with the [IBC Section 1403.2](#)^{xxxii} and [IRC Section R703.2](#).
- 8.1.9 Performance for use without a thermal barrier in accordance with NFPA 286 and the acceptance criteria of [IBC Section 803.1.2](#).
- 8.1.10 Performance for vertical and lateral fire propagation in accordance with NFPA 285 and [IBC Section 2603.5.5](#).
- 8.2 Any building code, regulation, and/or accepted engineering evaluations (i.e., research reports, [Duly Authenticated Reports](#), etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an [ISO/IEC 17065 accredited certification body](#) and a professional engineering company operated by [RDP/approved sources](#). DrJ is qualified^{xxxiii} to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.
- 8.3 Engineering evaluations are conducted with DrJ's ANAB [accredited ICS code scope](#) of expertise, which are also its areas of professional engineering competence.
- 8.4 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

- 9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report and the applicable building code.
- 9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.
- 9.3 *Installation Procedure*
 - 9.3.1 *General:*
 - 9.3.1.1 Installation shall comply with the manufacturer installation instructions and this report. In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.
 - 9.3.2 *Orientation:*
 - 9.3.2.1 Strong-R Structural Insulation may be installed vertically or horizontally over studs, with framing not less than 20-gauge 50 ksi 3⁵/₈" and spaced a maximum of 24" o.c. (610 mm) or wood framing that has a nominal thickness of not less than 2" (51 mm) and spaced a maximum of 24" o.c. (610 mm).
 - 9.3.2.2 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.



9.3.3 Attachment:

9.3.3.1 Strong-R Structural Insulation:

- 9.3.3.1.1 Minimum #8 x 1⁵/₈" self-drilling modified truss head screw or 0.100" diameter x 1¹/₂" length pins (Bostitch® C4S100 BG) for steel studs.
 - 9.3.3.1.1.1 Fastener spacing shall be a maximum of 12" o.c. (305 mm) along the edge and 12" o.c. in the field or as required in Section 6 for the application selected.
- 9.3.3.1.2 Minimum #8 x 1¹/₄" Wafer Head Screw for wood studs.
 - 9.3.3.1.2.1 Fasteners shall penetrate a minimum of 1" into the stud. Fasteners are to be installed spaced a maximum of 6" o.c. (152 mm) at the panel edges and 12" o.c. (305 mm) in the field. Fastener edge distance shall be a minimum of 3/₈" (9.5 mm). Fastener head shall be driven through the foam plastic to seat against the backer material.

9.3.3.2 Gypsum Wallboard:

- 9.3.3.2.1 Where required, gypsum wallboard shall be a minimum 1/2" thickness and shall be attached as follows:
 - 9.3.3.2.1.1 #6 x 11/4" Type S screws.
 - 9.3.3.2.1.2 Fastener spacing shall be as shown in Section 6.

9.3.4 Treatment of Joints:

- 9.3.4.1 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.
- 9.3.4.2 If Strong-R Structural Insulation is being used as a WRB, joints must be taped as specified in Section 6.3.1. If a separate WRB method is used, taping of the sheathing joints is not required.

9.3.5 Window Treatments:

- 9.3.5.1 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 installation instructions.

9.3.6 Non-Structural Applications:

- 9.3.6.1 Install panels with minimum #8 x 1⁵/₈" self-drilling modified truss head screw or 0.100" diameter x 1¹/₂" length pins (Bostitch® C4S100 BG).
- 9.3.6.2 The fastener spacing shall be 12" o.c. along the top, bottom, and vertical panel edges and 12" o.c. in the field. Do not tack product to framing, but fasten each panel completely after fastening begins.

10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

- 10.1.1 Lateral load testing and data in accordance with ASTM E564 and E2126
- 10.1.2 Transverse load testing in accordance with ASTM E330
- 10.1.3 Use as a WRB material testing in accordance with ASTM E331
- 10.1.4 Use as an air barrier component testing in accordance with ASTM E2178
- 10.1.5 Surface burning characteristics testing in accordance with ASTM E84
- 10.1.6 Use in attics and crawlspaces without a thermal barrier or ignition barrier testing in accordance with NFPA 286
- 10.1.7 Vertical and lateral fire propagation properties testing in accordance with NFPA 285



- 10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.
- 10.3 Where pertinent, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.
- 10.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or Duly Authenticated Reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this Duly Authenticated Report, may be dependent upon published design properties by others.
- 10.5 Testing and engineering analysis: The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.^{xxxiv}
- 10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Strong-R Structural Insulation on the DrJ Certification website.

11 Findings

- 11.1 As outlined in Section 6, Strong-R Structural Insulation has performance characteristics that were tested and/or meet applicable regulations and is suitable for use pursuant to its specified purpose.
- 11.2 When used and installed in accordance with this Duly Authenticated Report and the manufacturer installation instructions, Strong-R Structural Insulation shall be approved for the following applications:
- 11.2.1 Lateral load resistance due to wind and seismic loads carried by shear walls.
 - 11.2.2 Transverse load resistance due to components and cladding pressures on building surfaces.
 - 11.2.3 Performance of the foam plastic component for conformance to IBC Section 2603 and IRC Section R316.
 - 11.2.4 Performance for use as insulating sheathing in accordance with IRC Section N1102.1, IRC Section N1102.2 and IECC Section C402.
 - 11.2.5 Performance for use as a WRB in accordance with IBC Section 1404.2 and IRC Section R703.2.
 - 11.2.6 Performance for use as an air barrier in accordance with IRC Section N1102.4 and IECC Section C402.
- 11.3 Unless exempt by state statute, when Strong-R Structural Insulation is to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.
- 11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from OX Engineered Products, LLC.
- 11.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10^{xxxv} are similar) in pertinent part states:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.



- 11.6 **Approved:**^{xxxvi} Building regulations require that the building official shall accept Duly Authenticated Reports.^{xxxvii}
- 11.6.1 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited.
- 11.6.2 An approved source is “approved” when an RDP is properly licensed to transact engineering commerce.
- 11.6.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.
- 11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.
- 11.8 Through the IAF Multilateral Agreements (MLA), this Duly Authenticated Report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 Duly Authenticated Reports are equivalent.^{xxxviii}

12 Conditions of Use

- 12.1 Material properties shall not fall outside the boundaries defined in Section 6.
- 12.2 As defined in Section 6, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.
- 12.3 As listed herein, Strong-R Structural Insulation shall not be used:
- 12.3.1 Walls shall not be used to resist horizontal loads from concrete and masonry walls.
- 12.3.2 Strong-R Structural Insulation shall not be used as a nailing base.
- 12.4 Except as provided in Section 6.7, this product shall be fully protected from the interior of the building by an approved 15-minute thermal barrier where required by the applicable code.
- 12.5 In areas where the probability of termite infestation is very heavy, in accordance with IBC Section 2603.8 or IRC Section R318.4, the product must not be placed on exterior walls located within 6" (152 mm) of the ground.
- 12.6 Allowable shear loads shall not exceed values in **Table 1** for wind loads and **Table 2** for seismic loads.
- 12.7 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.
- 12.8 Strong-R Structural Insulation is manufactured under a quality control program with quality control inspections in accordance with IBC Section 110.3.10,^{xxxix} IBC Section 110.4, and IRC Section R109.2.
- 12.9 When installed as a wall sheathing but not installed per structural requirements, light-framed walls shall be braced by other means.
- 12.10 When used as a WRB, installation shall be in accordance with Section 6.3.
- 12.11 When used in accordance with the IBC in high wind areas, special inspections shall comply with IBC Section 1705.12.^{xl}
- 12.12 When used in accordance with the IBC in Seismic Design Categories C, D, E, or F, special inspections shall comply with IBC Section 1705.13.^{xli}



- 12.13 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
- 12.13.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.
 - 12.13.2 This report and the installation instructions shall be submitted at the time of permit application.
 - 12.13.3 This innovative product has an internal quality control program and a third-party quality assurance program.
 - 12.13.4 At a minimum, this innovative product shall be installed per Section 9 of this report.
 - 12.13.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.
 - 12.13.6 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4, and IRC Section R109.2.
 - 12.13.7 The application of this innovative product in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.
- 12.14 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *"the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11,"* all of IBC Section 104, and IBC Section 105.4.
- 12.15 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).
- 12.16 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

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

14 Review Schedule

- 14.1 This report is subject to periodic review and revision. For the latest version, visit drjcertification.org.
- 14.2 For information on the status of this report, please contact [DrJ Certification](#).

15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

- 15.1 Strong-R Structural Insulation is included in this report published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services. This report states either that the material, product, or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.



Appendix A

1 Legislation that Authorizes AHJ Approval

- 1.1 **Fair Competition:** State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies, and/or methods of construction that:
 - 1.1.1 Advance innovation,
 - 1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and
 - 1.1.3 Benefit consumers through lower prices, better quality, and greater choice.
- 1.2 **Adopted Legislation:** The following local, state, and federal regulations affirmatively authorize this innovative product to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:
 - 1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies, and/or methods of construction. The goal is to “*protect economic freedom and opportunity by promoting free and fair competition in the marketplace.*”
 - 1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies, and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.
 - 1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),^{xlii} where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years^{xliii} and/or a \$5,000,000 fine or 3 times the value of^{xliiv} the Intellectual Property (IP) and Trade Secrets (TS).
 - 1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, Duly Authenticated Reports, and/or research reports prepared by approved agencies and/or approved sources.
 - 1.2.4 For new materials^{xliv} that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.
 - 1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.^{xlvi}
 - 1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation have been violated by an individual registered PE.
 - 1.2.7 The AHJ shall accept Duly Authenticated Reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.^{xlvii}



- 1.3 **Approved^{xlviii} by Los Angeles:** The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.^{xlix} The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept Duly Authenticated Reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.^l
- 1.4 **Approved by Chicago:** The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly, and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).
- 1.5 **Approved by New York City:** The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed^{li} an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement^{lii} (i.e., ANAB, International Accreditation Forum [IAF], etc.).
- 1.6 **Approved by Florida:** Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation by:
- 1.6.1 A certification mark or listing of an approved certification agency,
 - 1.6.2 A test report from an approved testing laboratory,
 - 1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or
 - 1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.
 - 1.6.5 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods:
 - 1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,
 - 1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,
 - 1.6.5.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,



- 1.6.5.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or
- 1.6.5.5 A statewide product approval issued by the Florida Building Commission.
- 1.6.6 The [Florida Department of Business and Professional Regulation \(DBPR\)](#) website provides a listing of companies certified as a [Product Evaluation Agency](#) (i.e., EVLMiami 13692), a [Product Certification Agency](#) (i.e., CER10642), and as a [Florida Registered Engineer](#) (i.e., ANE13741).
- 1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA]):** A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation [553.842](#) and [553.8425](#).
- 1.8 **Approved by New Jersey:** Pursuant to the 2018 Building Code of New Jersey in [IBC Section 1707.1 General](#),^{liii} it states: *“In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from [approved agencies](#) in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)”*.^{liv} Furthermore N.J.A.C 5:23-3.7 states: *“Municipal approvals of alternative materials, equipment, or methods of construction.”*
 - 1.8.1 **Approvals:** Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability, and safety of those conforming with the requirements of the regulations.
 - 1.8.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.
 - 1.8.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.
 - 1.8.2 The [New Jersey Department of Community Affairs](#) has confirmed that technical evaluation reports, from any accredited entity listed by [ANAB](#), meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide *“reports of engineering findings.”*
- 1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards:** Pursuant to Title 24, Subtitle B, Chapter XX, [Part 3282.14](#)^{lv} and [Part 3280](#),^{lvi} the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:
 - 1.9.1 *“All construction methods shall be in conformance with accepted engineering practices.”*
 - 1.9.2 *“The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.”*
 - 1.9.3 *“The design stresses of all materials shall conform to accepted engineering practice.”*



- 1.10 Approval by US, Local and State Jurisdictions in General:** In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:
- 1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.^{lvii}
 - 1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept Duly Authenticated Reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.^{lviii}
 - 1.10.2.1 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.
 - 1.10.2.2 An approved source is “approved” when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.^{lix}
 - 1.10.3 The design strengths and permissible stresses of any structural material...shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.^{lx}
- 1.11 Approval by International Jurisdictions:** The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:
- 1.11.1 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.
 - 1.11.2 **Approved:** The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services, and/or methods of construction.
 - 1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.^{lxi}
 - 1.11.4 Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.^{lxii}
- 1.12 Approval equity is a fundamental commercial and legal principle.^{lxiii}



Issue Date: December 10, 2020
Subject to Renewal: April 1, 2025

FBC Supplement to Report Number 1808-02

REPORT HOLDER: OX Engineered Products, LLC

1 Evaluation Subject

- 1.1 Strong-R Structural Insulation

2 Purpose and Scope

- 2.1 Purpose
 - 2.1.1 The purpose of this Report Supplement is to show Strong-R Structural Insulation, recognized in Report Number 1808-02, has also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.
- 2.2 *Applicable Code Editions*
 - 2.2.1 *FBC-B—20, 23: Florida Building Code – Building (FL 28814)*
 - 2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL 28814)*

3 Conclusions

- 3.1 Strong-R Structural Insulation, described in Report Number 1808-02, complies with the FBC-B and FBC-R and is subject to the conditions of use described in this supplement.
- 3.2 Where there are variations between the IBC and IRC and the FBC-B and FBC-R applicable to this report, they are listed here:
 - 3.2.1 FBC-B Section 104.4 and Section 110.4 are reserved.
 - 3.2.2 FBC-R Section R104 and Section R109 are reserved.
 - 3.2.3 FBC-B Section 803.1.1 replaces IBC Section 803.1.2.
 - 3.2.4 FBC-B Section 803.1.2.1 replaces IBC Section 803.1.1.1.
 - 3.2.5 FBC-B Section 1404.2 replaces IBC Section 1403.2.
 - 3.2.6 FBC-B Section 1609.1.1 replaces IBC Section 1609.1.1.
 - 3.2.7 FBC-B Section 2303.2 replaces IBC Section 2303.2.
 - 3.2.8 FBC-B Section 2603.8 replaces IBC Section 2603.8.
 - 3.2.9 FBC-R Section R301.2.1 replaces IRC Section R301.2.1.
 - 3.2.10 FBC-R Section R316.3 replaces IRC Section R316.3.
 - 3.2.11 FBC-R Section R318.8 replaces IRC Section R318.4.
 - 3.2.12 FBC-R Section R603 replaces IRC Section R603.
 - 3.2.13 FBC-R Section R703.2 replaces IRC Section R703.2.
 - 3.2.14 FBC-R Chapter 11 replaces IRC Chapter 11.



4 Conditions of Use

- 4.1 Strong-R Structural Insulation, described in Report Number 1808-02, must comply with all of the following conditions:
 - 4.1.1 All applicable sections in Report Number 1808-02.
 - 4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.



Notes

- For more information, visit www.dprcertification.org or call us at 608-310-6748.
- <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702>
- Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review <https://www.justice.gov/atr/mission> and <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>
- <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706>:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as
- The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice.
- <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706>:~:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice
- <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies
- <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>
- https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency
- https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source
- <https://www.law.cornell.edu/uscode/text/18/1832> (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of \$5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a [public records act](#). To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: [Intellectual Property and Trade Secrets](#).
- <https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional> AND <https://apassociation.org/list-of-engineering-boards-in-each-state-archive/>
- <https://www.cbtest.com/accreditation/>
- <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104>:~:text=to%20enforce%20the%20provisions%20of%20this%20code
- <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1>:~:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore
- <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11
- <https://iaf.nu/en/about-iaf-mla/#>:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope
- True for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- <https://www.justice.gov/crt/deprivation-rights-under-color-law> AND <https://www.justice.gov/atr/mission>
- Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.
- All references to the FBC-B and FBC-R are the same as the 2021 IBC and 2021 IRC unless otherwise noted in the Florida Supplement at the end of this report.
- <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280>(Listed%20or%20certified); <https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed> AND <https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled>
- 2015 IBC Section 1404.2
- 2018 IRC Table R301.2(2)
- 2018 IRC Table R301.2(3)
- 2015 IBC Section 1404.2
- 2015 IBC Section 803.1.2.1
- <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4>
- <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#>:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades
- <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#>:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur
- 2010 ASCE 7 Section 12.2.1
- 2018 IECC Section C402.5.1.2.1



- 2015 IBC Section 1404.2
- Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.
- See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.
- 2018 IFC Section 104.9
- Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.
- <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>
- Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- 2018 IBC Section 110.3.9 and 2015 IBC Section 110.3.8
- 2018 IBC Section 1705.11
- 2018 IBC Section 1705.12
- <http://www.drjengineering.org/AppendixC> AND <https://www.drjcertification.org/cornell-2016-protection-trade-secrets>
- <https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years>
- <https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided>
- <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2>
- IBC 2021, Section 1706.1 Conformance to Standards
- IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General
- See Section 11 for the distilled building code definition of **Approved**
- Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES
- <https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1>
- New York City, The Rules of the City of New York, § 101-07 Approved Agencies
- New York City, The Rules of the City of New York, § 101-07 Approved Agencies
- <https://up.codes/viewer/new-jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1>
- <https://www.nj.gov/dca/divisions/codes/codreg/ucc.html>
- <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14>
- <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280>
- IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.
- IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.
- <https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional> AND <https://apassociation.org/list-of-engineering-boards-in-each-state-archive/>
- IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.
- <https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope>
- True for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- <https://www.justice.gov/crt/deprivation-rights-under-color-law> AND <https://www.justice.gov/atr/mission>