



Listing

A Duly Authenticated Report from an Approved Agency

Report No: 2403-02



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Hold-Down Connections Over OX-IS™ Structural Insulated Sheathing

Trade Secret Report Holder:

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CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 05 23 - Wood, Plastic, and Composite Fastenings

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 Evaluated¹

1.1 OX-IS Structural Insulation

2 Product Description and Materials

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



Figure 1. OX-IS Structural Insulation Sheathing Panel



- 2.2 OX-IS Structural Insulation is a structural insulating sheathing panel consisting of a proprietary fibrous sheathing board laminated to one side of a proprietary rigid foam plastic insulating sheathing panel.
- 2.2.1 The proprietary fibrous sheathing is made of specially treated plies that are pressure-laminated with a water resistant adhesive. A protective polymer layer is applied on both sides. The surface finish consists of a foil facer on one or both sides.
- 2.2.2 The rigid foam plastic insulating sheathing component is a proprietary polyisocyanurate (polyiso) insulation sheathing, which may have facings on one or both sides.
- 2.3 *Material Availability*
- 2.3.1 *Foam Thickness:*
- 2.3.1.1 0.50" (12.7 mm) to 1.0" (25 mm)
- 2.3.2 *Standard Product Width:*
- 2.3.2.1 48" (1,219 mm)
- 2.3.3 *Standard Product Lengths:*
- 2.3.3.1 96" (2,438 mm)
- 2.3.3.2 108" (2,743 mm)
- 2.3.3.3 120" (3,048 mm)
- 2.4 As needed, review material properties for design in **Section 6**.

3 Definitions

- 3.1 New Materials² 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.³ The design strengths and permissible stresses shall be established by tests⁴ and/or engineering analysis.⁵
- 3.2 Duly Authenticated Reports⁶ and Research Reports⁷ are test reports and related engineering evaluations, which are written by an approved agency⁸ and/or an approved source.⁹
- 3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).¹⁰
- 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.¹¹
- 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 ANAB¹² ISO/IEC 17025 and ISO/IEC 17020 accredited.
- 3.6 The regulatory authority shall enforce¹³ 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 writing¹⁴ 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.¹⁵



- 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.¹⁶ Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.¹⁷
- 3.9 Approval equity is a fundamental commercial and legal principle.¹⁸

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation¹⁹

4.1 Standards

- 4.1.1 *ANSI/AWC National Design Specification (NDS)*
- 4.1.2 *ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process*
- 4.1.3 *ASTM F1667: Standard Specification for Driven Fasteners: Nails, Spikes, and Staples*
- 4.1.4 *AWC Technical Report 12 (TR 12) General Dowel Equations for Calculating Lateral Connection Values with Appendix A*

5 Listed²⁰

- 5.1 Equipment, materials, products or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), approved agency (i.e., CBI and DrJ), and/or approved source (i.e., DrJ) or other organization concerned with product evaluation (i.e., DrJ) that maintains periodic inspection (i.e., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 Structural Applications

- 6.1.1 Design capacities for metal connectors over OX-IS Structural Insulation products were evaluated.
- 6.1.2 The metal connectors evaluated in this report are listed below and are described in **Table 1**.
- 6.1.2.1 *Metal Connectors:*
- 6.1.2.1.1 Simpson Strong Tie LTP4
- 6.1.2.1.2 Simpson Strong Tie LTSA24
- 6.1.2.1.3 Simpson Strong Tie LTSA30
- 6.1.2.1.4 Simpson Strong Tie STHD14

Table 1. Product Specification

Product ID	Thickness		ASTM Specification	F _u (ksi)	Fastener	
	Gauge	Inch			Diameter	Quantity
Simpson Strong Tie LTP4	20	0.0335	A653 SS Grade 33	45	0.131"	12
Simpson Strong Tie LTSA24	20	0.0335	A653 SS Grade 50, CL1	65	0.148"	18
Simpson Strong Tie LTSA30	18	0.0445				22
Simpson Strong Tie STHD14	12	0.1026	A653 SS Grade 33	49	0.148"	30

SI: 1 in = 25.4 mm, 1 ksi = 6.895 MPa

6.1.3 The fasteners complying with ASTM F1667, used in the evaluation of this report are listed in **Table 2**.

Table 2. Fastener Specifications

Fastener	Shank Diameter (in)	Length (in)	Bending Yield Strength, F_{yb} , (psi)
8d x 1.5	0.131	1.5	100,000
8d Common	0.131	2.5	100,000
10d 1.5	0.148	1.5	90,000
10d Common	0.148	3.0	90,000

SI: 1 in = 25.4 mm, 1 psi = 6.895 kPa

6.1.4 Allowable loads of the metal connectors installed over 0.50" or 1.0" OX-IS Structural Insulation are provided in **Table 3**.

Table 3. Allowable Loads for Specified Metal Connectors Installed over OX-IS Structural Insulation

OX-IS Structural Insulation (Foam Thickness)	Metal Connector	Fastener Diameter (in)	Minimum Fastener Length (in)	Quantity	Allowable Load ¹ (lb)
0.5"	LTP4 ²	0.131	1.5	12	300
1.0"			2.5		165
0.5"	LTSA24 ²	0.148	1.5	18	585
1.0"			3.0		325
0.5"	LTSA30 ²	0.148	1.5	22	720
1.0"			3.0		400
0.5"	STHD14	0.148	1.5	30	2,555
1.0"			3.0		1,480

SI: 1 in = 25.4 mm, 1 ksi = 6.895 MPa

1. Load duration for wind/earthquake load ($C_D = 1.6$) have been applied. No further increase allowed. Reduce where other loads govern.

2. Use half of the fasteners in each member being connected to achieve the listed loads in **Table 3**.

6.1.5 Design capacities in **Table 3** shall apply to wood-framed walls constructed with a lumber species that has a published specific gravity of 0.50 or higher.

6.1.5.1 Approved Structural Composite Lumber (SCL) with a published equivalent specific gravity of 0.50 or higher may also be permitted. Refer to SCL manufacturer for more information.

6.2 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 Performance²¹

- 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.²²
- 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.²³

8 Installation

- 8.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report and the applicable building code.
- 8.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.
- 8.3 *General*
 - 8.3.1 OX-IS Structural Insulation may be installed vertically or horizontally over studs with framing members that has a minimum nominal thickness of 2" (51 mm) and spaced a maximum of 24" o.c. (610 mm).
 - 8.3.2 The metal connectors specified in this report shall be installed in accordance with manufacturer installation instructions, this report and the applicable building code.
 - 8.3.2.1 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.

9 Substantiating Data

- 9.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
 - 9.1.1 Lateral load calculations in accordance with AWC TR12 performed by DrJ Engineering, LLC
- 9.2 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.
- 9.3 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.
- 9.4 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.
- 9.5 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.²⁴
- 9.6 Where additional condition of use and/or regulatory compliance information is required, please search for OX-IS Structural Insulation on the DrJ Certification website.



10 Findings

- 10.1 As outlined in **Section 6**, OX-IS Structural Insulation has performance characteristics that were tested and/or meet applicable regulations and is suitable for use pursuant to its specified purpose.
- 10.2 When used and installed in accordance with this Duly Authenticated Report and the manufacturer installation instructions, OX-IS Structural Insulation shall be approved for the following applications:
- 10.2.1 To transfer loads shown **Table 3** from one structural element to other load resisting elements.
- 10.2.1.1 The LTP4 connector transfers shear force from the wood top plate to the wood rim joist or blocking members.
- 10.2.1.2 The LSTA24 and LSTA30 connector transfer tensile loads between two structural elements
- 10.2.1.3 The STHD14 hold-downs are used to connect vertical light-frame construction members to concrete foundations or foundation walls and to resist tensile loads induced by wind or seismic activity.
- 10.3 Unless exempt by state statute, when OX-IS 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.
- 10.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Amrize Building Envelope, LLC.
- 10.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10²⁵ 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.
- 10.6 **Approved:**²⁶ Building regulations require that the building official shall accept Duly Authenticated Reports.²⁷
- 10.6.1 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited.
- 10.6.2 An approved source is “approved” when an RDP is properly licensed to transact engineering commerce.
- 10.6.3 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.
- 10.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.
- 10.8 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.²⁸



11 Conditions of Use

- 11.1 Material properties shall not fall outside the boundaries defined in **Section 6**.
- 11.2 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.
- 11.3 As listed herein, applications of the specified metal connectors in this report and OX-IS Structural Insulation shall be subjected to the following conditions:
 - 11.3.1 Installation of the metal connectors and OX-IS Structural Insulation shall be in accordance with this report and the manufacturer installation instructions.
 - 11.3.2 Adjustment factors specified in NDS Table 11.3.1 and the pertinent building codes shall be applied, where applicable.
 - 11.3.3 Loads shall not exceed those in **Table 3**.
 - 11.3.4 Fastener size and length shall be in accordance with **Table 2** and **Table 3**.
 - 11.3.4.1 Fasteners with identical shank diameter, but long lengths may be permitted. Loads will remain unchanged.
 - 11.3.5 Wood structural framing members shall have a minimum published specific gravity of 0.50.
 - 11.3.6 When installed on fire-treated or preservative-treated lumber, the appropriate adjustment factors set forth by the FRT lumber manufacturer or PPT lumber manufacturer shall be applied to the allowable loads in **Table 3**.
- 11.4 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:
 - 11.4.1 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.
 - 11.4.2 This report and the installation instructions shall be submitted at the time of permit application.
 - 11.4.3 This innovative product has an internal quality control program and a third-party quality assurance program.
 - 11.4.4 At a minimum, this innovative product shall be installed per **Section 8** of this report.
 - 11.4.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.
 - 11.4.6 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.
 - 11.4.7 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.
- 11.5 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.*
- 11.6 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).
- 11.7 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.



12 Identification

- 12.1 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.
- 12.2 Additional technical information can be found at www.oxengineeredproducts.com.

13 Review Schedule

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



Notes

For more information, visit www.drjcertification.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.cbiteest.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.eu/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.

<https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2>(Listed%20or%20certified); <https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled>

<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

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.