Technical Evaluation Report
TER 1510-04
Ox Engineered Products One & Two
Hour Fire Rated Wall Assemblies

Ox Engineered Products, LLC

Product:
Thermo-Ply® Structural Sheathing, OX-IS® Structural Insulation, SI-Strong Structural Insulation, Strong-R® Structural Insulation, & ISO RED ci® & ISO RED MAX® Polyiso Sheathing

Issue Date:
January 4, 2016
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September 4, 2019
Subject to Renewal:
April 1, 2020
**1. Products Evaluated:**

1.1. Thermo-Ply® Structural Sheathing

1.2. OX-IS® Structural Insulation

1.3. SI-Strong Structural Insulation

1.4. Strong-R® Structural Insulation

1.5. ISO RED ci® Polyiso Sheathing

1.6. ISO RED MAX® Polyiso Sheathing

1.7. For the most recent version of this Technical Evaluation Report (TER), visit drjcertiﬁcation.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjcertiﬁcation.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.

1.8. This TER can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found here) and covered by an IAF MLA Evaluation per the Purpose of the MLA (as an example, see letter to ANSI from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other IAF MLA Signatory Countries and have their products readily approved by authorities having jurisdiction using DrJ's ANSI accreditation.

1.9. Building code regulations require that evaluation reports are provided by an approved agency meeting specific requirements, such as those found in IBC Section 1703. Any agency accredited in accordance with ANSI ISO/IEC 17065 meets this requirement within ANSI’s scope of accreditation. For a list of accredited agencies, visit ANSI’s website. For more information, see drjcertiﬁcation.org.

1.10. Requiring an evaluation report from a specific private company (i.e., ICC-ES, IAPMO, CCMC, DrJ, etc.) can be viewed as discriminatory and is a violation of international, federal, state, provincial and local anti-trust and free trade regulations.
1.11. DrJ’s code compliance work:

1.11.1. Conforms to code language adopted into law by individual states and any relevant consensus based standard such as an ANSI or ASTM standard.

1.11.2. Complies with accepted engineering practice, all professional engineering laws and by providing an engineer’s seal DrJ takes professional responsibility for its specified scope of work.

2. Applicable Codes and Standards:


2.2. 2012, 2015 and 2018 International Residential Code (IRC)

2.3. 2016 California Building Standards Code


2.5. ASTM E2032 – Standard Guide for Extension of Data from Fire Resistance Tests Conducted in Accordance with ASTM E119


3. Performance Evaluation:

3.1. Thermo-Ply®, OX-IS®, SI-Strong, Strong-R®, ISO RED ci®, and ISO RED MAX® were evaluated in accordance with ASTM E119 for the following designs:

3.1.1. Performance of one hour and two hour fire rated wall assemblies using:

3.1.1.1. UL-U364, UL-U397 & UL-V306

3.1.1.2. UL-U356

3.1.1.3. UL-U425 & UL-V454

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

4. Product Description and Materials:

4.1. Thermo-Ply®

4.1.1. Thermo-Ply® is a proprietary foam plastic insulated sheathing (FPIS) product, composed of pressure laminated plies consisting of high-strength cellulosic fibers. These fibers are specially treated to be water resistant and are bonded with a proprietary water resistive adhesive.

4.1.2. Polymer facings are applied on both sides of the sheathing panels. Facings may be aluminum foil or Kraft/polymer/Kraft facing on both sides.

4.2. OX-IS® and SI-Strong

4.2.1. OX-IS® and SI-Strong are structural, rigid FPIS products consisting of a proprietary fibrous sheathing board laminated to one side of a proprietary rigid foam plastic insulation. The 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.

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1 Unless otherwise noted, all references in this code compliant technical evaluation report (TER) are from the 2018 version of the codes and the standards referenced therein, including, but not limited to, ASCE 7, SDPWS and WFCM. This product also complies with the 2000-2015 versions of the IBC and IRC and the standards referenced therein. As required by law, where this TER is not approved, the building official shall respond in writing, stating the reasons this TER was not approved. For variations in state and local codes, if any see Section 8.
4.3. Strong-R®

4.3.1. Strong-R® Structural Insulation is a structural, rigid insulation sheathing product consisting of a proprietary fibrous sheathing board laminated to one side of a proprietary rigid foam plastic insulation.

4.3.1.1. The proprietary fibrous sheathing is made of specially treated plies that are pressure-laminated with a water-resistant adhesive. The surface finish consists of a facer on one or both side using a fibrous sheathing board.

4.3.1.2. The rigid foam plastic insulation is a Class A proprietary polyisocyanurate, which can have facings on one or both sides. The facers are designed with a base foil layer.

4.4. ISO RED ci®

4.4.1. ISO RED ci® is a Type 1, Class 1 Dual Faced Rigid Cellular Polyisocyanurate Insulation Board product as defined in ASTM C1289.

4.4.2. ISO RED ci® consists of a proprietary Polyisocyanurate rigid board, with facers on both sides. The facers are designed with a base foil layer which is then combined with layers of other material(s).

4.5. ISO RED MAX®

4.5.1. ISO RED MAX® is a Type 1, Class 2 Dual Faced Rigid Cellular Polyisocyanurate Insulation Board product as defined in ASTM C1289.

4.5.2. ISO RED MAX® consists of a proprietary Polyisocyanurate rigid board with facers on both sides. The facers are designed with a base foil layer.

4.6. Material Availability

4.6.1. Thicknesses:

4.6.1.1. Thermo-Ply® – standard structural grade (Red), 0.113" (2.9 mm); and high structural grade (Blue), 0.135" (3.4 mm).

4.6.1.2. OX-IS® and SI-Strong – range from 0.5" (12.7 mm) up to 1.0" (25.4 mm).

4.6.1.3. Strong-R® – thicknesses up to 2.0" (102 mm).

4.6.1.4. ISO RED ci® – range from 0.5" (12.7 mm) up to 2.0" (51 mm).

4.6.1.5. ISO RED MAX® – thicknesses up to 4.0" (102 mm).

4.6.2. The standard widths include 48" (1219 mm) and 48³/₄" (1238 mm).

4.6.3. The standard lengths include 96" (2438 mm), 108" (2743 mm) and 120" (3048 mm).
5. Applications:

5.1. Wood – One Hour Fire Rating – Non-Load Bearing

5.1.1. One Hour Fire Rating from Interior or Exterior using Assembly 1 – UL Design No. U364, U397 & V306 (Figure 1)

(1) Wood Studs – nominal 2x4, minimum spacing 16” o.c. (406 mm), maximum spacing 24” o.c. (6010 mm).

(2) Gypsum Board
   - Type: X GWB, 5/8” (15.9 mm) thick
   - Oriented: vertically on interior side
   - Joints: centered over studs and staggered 1 stud cavity on opposite side of stud
   - Fastener: GWB to studs using 17/8” (48 mm) 6d nails or No. 6 Type W screws
   - Fastener Space: 7” (178 mm) o.c. at perimeter edges and field

(3) Cavity Insulation
   - Type: Glass fiber or mineral wool
   - R-value: R-13
   - Minimum Thickness: 3 1/2” (89 mm)

(4) Exterior Cladding – in accordance with the manufacturer’s installation instructions and U356
   - Siding including vinyl, fiber cement siding
   - Molded Plastic – Particle Board Siding
   - Wood Structural Panel or Lap Siding
   - Cementitious Stucco
   - Brick Veneer
   - Exterior Insulation and Finish System (EIFS)

(5) Exterior Gypsum Sheathing
   - Type: X GWB 5/8” (15.9 mm) thick
   - Oriented: vertically on exterior side
   - Joints: centered over studs and staggered 1 stud cavity on opposite side of stud
   - Fastener: GWB to studs using 17/8” (48 mm) 6d nails or No. 6 Type W screws
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Fastener Spacing: 7" (178 mm) o.c. on perimeter edges and field

(6) Exterior Sheathing

As installed per TER No. 1004-01: Thermo-Ply®
As installed per TER No. 0804-01: up to 1" (25.4 mm) thickness of OX-IS® or SI-Strong
As installed per TER No. 1808-02: up to 2" (51 mm) thickness of Strong-R®
As installed per TER No. 1306-02: up to 2" (51 mm) of ISO RED ci® or up to 4" (102 mm) of ISO RED MAX®

5.2. Wood – One Hour Fire Rating – Load Bearing

5.2.1. One Hour Fire Rating from Interior or Exterior using Assembly 1 – UL Design No. U354 (Figure 2)

![Figure 2: One Hour Rated Assembly 1 Using UL Design No. U354](image)

(1) Wood Studs – nominal 2x4, maximum spacing 16" o.c. (406 mm), nominal 2x6 maximum spacing 24" o.c. (6010 mm).

(2) Gypsum Board

Type: X GWB 5/8" (15.9 mm) thick
Oriented: vertically or horizontally on interior side
Joints: centered over studs. Joints must be finished with joint compound and tape. Fastener heads must be covered with joint compound.
Fastener: GWB to studs using 17/8" (48 mm) 6d cement coated nails or No. 6 bugle head drywall screws
Fastener Space: 7" (178 mm) o.c. at perimeter edges and field

(3) Cavity Insulation

Type: any UL classified glass fiber batt, mineral wool or sprayed cellulosic fiber. Cavity insulation is required.

(4) Exterior Cladding – installed in accordance with the manufacturer's installation instructions and U356

Aluminum Siding: 0.019 in min. thick painted aluminum meeting AAMA 1402.
Steel Siding: 0.017 in min. thick (no. 17 GSG gauge) painted steel.
Vinyl siding: 0.035 in min. thick. UL Classified exterior plastic siding (Molded Plastic).
Wood siding: 0.313 in min. thick lumber, plywood or OSB based siding.
Hardboard siding: 0.250 in. min. thick hardboard UL Classified exterior hardboard siding.
Fiber cement siding: 0.250 in. min. thick fiber-cement based siding.

Stone: 2.0 in. min (natural stone) or 1.5 min (cast artificial) thick stone.

Brick Veneer: 2.0 in. min thick brick units. Fastened over foam plastic sheathing to wood studs with metal ties.

Concrete Masonry Veneer: 2.0 in. min thick concrete masonry units. Fastened over foam plastic sheathing to wood studs with metal ties.

Stucco: Portland cement type — 0.750 in. min thickness. Metal lath or mesh base fastened over foam plastic sheathing to wood studs.

One-Coat Stucco: 0.375 in. minimum thickness. Wire fabric lath fastened over foam plastic sheathing to wood studs.

Exterior Insulation and Finish System (EIFS): Base coat with reinforcing mesh applied over foam plastic sheathing (Quik-R Wall Insulation) followed by finish coat. Type Quik-R Sheathing (Item 6) must be used for this exterior wall covering.

(5) Exterior Gypsum Sheathing
Type: X GWB 5/6" (15.9 mm) thick (paper or glass matt facers, square or tapered edges)
Oriented: vertically or horizontally on exterior side
Joints: centered over studs staggered from back layer
Fastener: GWB to studs using 1⅛" (48 mm) 6d cement coated nails or No. 6 bugle head screws
Fastener Spacing: 7" (178 mm) o.c. on perimeter edges and field

(6) Exterior Sheathing
As installed per TER No. 1004-01: Thermo-Ply®
As installed per TER No. 0804-01: up to 1" (25.4 mm) thickness of OX-IS® or SI-Strong
As installed per TER No. 1808-02: up to 2" (51 mm) thickness of Strong-R®
As installed per TER No. 1306-02: up to 2" (51 mm) of ISO RED ci® or up to 4" (102 mm) of ISO RED MAX®

5.2.2. One Hour Fire Rating from Interior using Assembly 2 – UL Design No. U356 (Figure 3)
(1) Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c.

(2) Gypsum Board
   Type: X GWB 5/8" (15.9 mm) thick
   Oriented: vertically on interior side
   Joints: centered over studs and staggered 1 stud cavity on opposite side of stud
   Fastener: GWB to studs using 1 7/8" (48 mm) 6d nails or No. 6 Type W screws
   Fastener Space: 7" (178 mm) o.c. on perimeter edges and field

(3) Cavity Insulation
   Type: glass fiber or mineral wool
   R-value: R-13
   Minimum Thickness: 3 1/2" (89 mm)

(4) Exterior Cladding – installed in accordance with the manufacturer's installation instructions and U356
   Siding including vinyl, fiber cement siding
   Molded Plastic – Particle Board Siding
   Wood Structural Panel or Lap Siding
   Cementitious Stucco
   Brick Veneer
   Exterior Insulation and Finish System (EIFS)

(5) Exterior Gypsum Sheathing – not used

(6) Sheathing – when nominal 1 1/2" (12.7 mm) wood structural panels are fastened directly to studs, the axial
load is not restricted.
   As installed per TER No. 1004-01: Thermo-Ply®
   As installed per TER No. 0804-01: up to 1" (25.4 mm) thickness of OX-IS® or SI-Strong
   As installed per TER No. 1808-02: up to 2" (51 mm) thickness of Strong-R®
   As installed per TER No. 1306-02: up to 2" (51 mm) of ISO RED ci® or up to 4" (102 mm) of ISO RED
   MAX®

5.2.3. One Hour Fire Rating from Interior or Exterior using Assembly 2 – UL Design No. U356

5.2.3.1. Assembled as shown in Figure 3 using brick veneer as exterior cladding.

5.3. Wood – One Hour Fire Rating – Limited Load Bearing

5.3.1. One Hour Fire Rating from Interior using Assembly 2 – UL Design No. U356

5.3.1.1. Assembled as shown in Figure 3. The wall assembly was loaded to 55% of the allowable load. A
superimposed load of 1,800 lbs. per stud was applied to the assembly at the start of the test and
was maintained throughout the test. This superimposed load imposed a stress of 342.9 psi,
compression parallel to grain.

5.3.1.2. This results in a wall assembly permitted to be built as follows:
   8' wall heights can be loaded to a maximum of 1,800 lbs. per stud (1,350 plf).
   9' wall heights can be loaded to a maximum of 1,180 lbs. per stud (885 plf).
   The test was unsymmetrical with the fire side of the wall being external to the 5/8" Type X GWB.

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2 Testing conducted by the Building Research Laboratory at Ohio State University by Dr. Richard Bletzacker of Richard W. Bletzacker & Associates Inc in accordance with ASTM E119
(1) Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c.

(2) Gypsum Board
   Type: Georgia-Pacific Firestop Type X GWB 5/8" (15.9 mm) thick OR Gold Bond® Fire-Shield® Type X GWB 5/8" (15.9 mm) thick
   Oriented: vertically on interior side
   Joints: centered over studs
   Fastener: GWB to studs using 2"-long 121/2 ga annular ringed GWB nails with 19/64"-diameter heads and long diamond points
   Fastener Space: 6" (152 mm) o.c. on perimeter edges and 12" (305 mm) o.c. on intermediate studs

(3) Cavity Insulation
   Type: glass fiber
   R-value: R-13
   Minimum thickness: 35/8" (92 mm)

(4) Exterior Cladding – installed in accordance with the manufacturer's installation instructions and U356
   19/32"-thick by 4'-wide by 8'-long plywood panel siding OR
   0.024"-thick unbacked aluminum lap siding

(5) Exterior Gypsum Sheathing – not used

(6) Sheathing
   Proprietary laminated fibrous board sheathing, the same structural sheathing component of OX-IS® and SI-Strong, fiber-based board faced on both sides
   Thickness: minimum of 0.113" thick
   Oriented: vertically with butt joints over studs
   Fastener: attached to unexposed side of the studs and plates with 11/4"-long 11 ga galvanized roofing nails with 7/16"-diameter heads and diamond points
   Fastener Space: 3" (76 mm) o.c. around the perimeter of each sheet and 6" (152 mm) o.c. on the intermediate studs

5.4. **Wood – Two Hour Fire Rating**

5.4.1. **Two Hour Fire Rating from Interior using Assembly 1 – UL Design No. U364, U397 & V306 (Figure 4)**
(1) Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c., maximum spaced 24" (610 mm) o.c.

(2) Gypsum Board – requires two GWB layers
   - Type: X GWB 5/8" (15.9 mm) thick
   - Oriented: vertically on interior side
   - Joints: centered over studs and staggered 1 stud cavity on opposite side of stud
   - Fastener Interior Layer: GWB to studs using 17/8" (48 mm) 6d nails or No. 6 Type W screws
   - Fastener Space Interior Layer: 7" (178 mm) o.c. on perimeter edges and field
   - Fastener Secondary Layer: using 23/8" (61 mm) 8d nails or screws, 8" (203 mm) o.c.
   - Fastener Space Secondary Layer: 8" (203 mm) o.c.

(3) Cavity Insulation
   - Type: glass fiber or mineral wool
   - R-value: R-13
   - Minimum Thickness: 3½" (89 mm)

(4) Exterior Cladding – installed in accordance with the manufacturer’s installation instructions and U356
   - Siding including vinyl, fiber cement siding
   - Molded Plastic – Particle Board Siding
   - Wood Structural Panel or Lap Siding
   - Cementitious Stucco
   - Brick Veneer
   - Exterior Insulation and Finish System (EIFS)

(5) Exterior Gypsum Sheathing
   - Type: X GWB 5/8" (15.9 mm) thick
   - Oriented: vertically on exterior side
   - Joints: centered over studs and staggered 1 stud cavity on opposite side of stud
   - Fastener: GWB to studs using 17/8" (48 mm) 6d nails or No. 6 Type W screws
   - Fastener Space: 7" (178 mm) o.c. on perimeter edges and field

(6) Exterior Insulation
   - As installed per TER No. 1004-01: Thermo-Ply®
   - As installed per TER No. 0804-01: up to 1" (25.4 mm) thickness of OX-IS® or SI-Strong
   - As installed per TER No. 1808-02: up to 2" (51 mm) thickness of Strong-R®
   - As installed per TER No. 1306-02: up to 2" (51 mm) of ISO RED ci® or up to 4" (102 mm) of ISO RED MAX®
5.4.2. Two Hour Fire Rating from Interior or Exterior using Assembly 1 – UL Design No. U364, U397 & V306

5.4.2.1. Assembled as shown in Figure 4 using brick veneer as exterior cladding.

5.4.3. Two Hour Fire Rating from Interior using Assembly 2 – UL Design No. U356 (Figure 5)

Figure 5: Two Hour Fire Rated Assembly 2 Using UL Design No. U356

(1) Wood Studs – nominal 2x4, minimum spaced 16” (406 mm) o.c.

(2) Gypsum Board – requires two GWB layers
   Type: X GWB 5/8” (15.9 mm) thick
   Oriented: vertically on interior side
   Joints: centered over studs and staggered 1 stud cavity on opposite side of stud
   Fastener Interior Layer: GWB to studs using 17/8” (48 mm) 6d nails or No. 6 Type W screws
   Fastener Space Interior Layer: 7” (178 mm) o.c. on perimeter edges and field
   Fastener Secondary Layer: using 23/8” (61 mm) 8d nails or screws, 8” (203 mm) o.c.
   Fastener Space Secondary Layer: 8” (203 mm) o.c.

(3) Cavity Insulation
   Type: glass fiber or mineral wool
   R-value: R-13
   Minimum Thickness: 3½” (89 mm)

(4) Exterior Cladding – installed in accordance with the manufacturer's installation instructions and U356
   Siding including vinyl, fiber cement siding
   Molded Plastic – Particle Board Siding
   Wood Structural Panel or Lap Siding
   Cementitious Stucco
   Brick Veneer
   Exterior Insulation and Finish System (EIFS)

(5) Exterior Gypsum Sheathing – not used
(6) Exterior Insulation

As installed per TER No. 1004-01: Thermo-Ply®
As installed per TER No. 0804-01: up to 1" (25.4 mm) thickness of OX-IS® or SI-Strong
As installed per TER No. 1808-02: up to 2" (51 mm) thickness of Strong-R®
As installed per TER No. 1306-02: up to 2" (51 mm) of ISO RED ci® or up to 4" (102 mm) of ISO RED MAX®

5.4.4. Two Hour Fire Rating from Interior or Exterior using Assembly 2 – UL Design No. U356.

5.4.4.1. Assembled as shown in Figure 5 using brick veneer for exterior cladding.

5.5. Steel – One Hour Fire Rating – Load Bearing

5.5.1. One Hour Fire Rating from Interior or Exterior using Assembly 1 – UL Design No. U425 (Figure 6)

Figure 6: One Hour Rated Assembly 1 Using UL Design No. U425

(1) Steel Studs – minimum 20 ga, maximum spaced 24" (610 mm) o.c.
(2) Interior Gypsum Board – 1 Layer – 1 hour (100% of design load)
   Type: X GWB 5/8" (15.9 mm) thick
   Oriented: vertically on interior side
   Joints: centered over studs
   Fastener: GWB to studs using Type S-12 1" (25.4 mm) self-tapping bugle head sheet steel screws
   Fastener Space: 12" (178 mm) o.c. on perimeter edges and field
(3) Cavity Insulation
   Type: any UL-classified glass fiber batt, mineral wool or sprayed cellulosic fiber
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(4) Exterior Cladding – installed in accordance with the manufacturer's installation instructions and U425
   - Siding including aluminum, steel, brick or stucco
   - Cementitious Backer Units
   - Fiber-Cement Siding
   - Molded Plastic
   - Wood Structural Panel or Lap Siding
   - Building Units (Cellular Glass Blocks)

(5) Exterior Gypsum Sheathing
   - Type: X GWB $\frac{5}{8}''$ (15.9 mm) thick
   - Oriented: vertically on exterior side
   - Joints: centered over studs staggered from back layer
   - Fastener: GWB to studs using Type S-12 1" (25.4 mm) self-tapping bugle head sheet steel screws
   - Fastener Space: 12" (178 mm) o.c. along studs and tracks

(6) Exterior Insulation
   - As installed per TER No. 1004-01: Thermo-Ply®
   - As installed per TER No. 0804-01: up to 1" (25.4 mm) thickness of OX-IS® or SI-Strong
   - As installed per TER No. 1808-02: up to 2" (51 mm) thickness of Strong-R®
   - As installed per TER No. 1306-02: up to 2" (51 mm) of ISO RED ci® or up to 4" (102 mm) of ISO RED MAX®

5.5.2. One Hour Fire Rating from Either Side using Assembly 2 – UL Design No. V454 (Figure 7)

Figure 7: One Hour Rated Assembly 2 Using UL Design No. V454
(1) Steel Studs – minimum 20 ga., spaced maximum 24" (610 mm) o.c.

(2) Interior Gypsum Board
   Type: X GWB 5/8" (15.9 mm) thick
   Oriented: vertically on interior side
   Joints: centered over studs staggered from exterior gypsum sheathing joints
   Fastener: GWB to studs using Type S 1" (25.4 mm) self-drilling, self-tapping steel screws
   Fastener Space: 8" (203 mm) o.c. on perimeter edges and 12" (305 mm) o.c. in the field

(3) Cavity Insulation
   Type: any UL-classified glass fiber batt, mineral wool or sprayed cellulose fiber or proprietary spray polyurethane foam (SPF) allowed in V454. See listing for full details.

(4) Exterior Cladding – installed in accordance with the manufacturer's installation instructions and V454
   Siding including aluminum, steel, vinyl, wood, hard board, fiber-cement, stone, brick veneer, concrete or masonry veneer, stucco, one-coat stucco, Exterior Insulation and Finish System (EIFS), metal panel, or wall and partition facing and accessories.

(5) Exterior Gypsum Sheathing – Type: X GWB 5/8" (15.9 mm) thick
   Oriented: vertically on exterior side
   Joints: centered over studs staggered from interior GWB
   Fastener: GWB to studs using Type S 1" (25.4 mm) self-drilling, self-tapping steel screws
   Fastener Space: 8" (203 mm) o.c. on perimeter edges and 12" (305 mm) o.c. in the field

(6) Exterior Insulation
   As installed per TER No. 1004-01: Thermo-Ply®
   As installed per TER No. 0804-01: up to 1" (25.4 mm) thickness of OX-IS® or SI-Strong
   As installed per TER No. 1808-02: up to 2" (51 mm) thickness of Strong-R®
   As installed per TER No. 1306-02: up to 2" (51 mm) of ISO RED ci® or up to 4" (102 mm) of ISO RED MAX®
5.6. Steel – Two Hour Fire Rating – Load Bearing

5.6.1. Two Hour Fire Rating from the Interior using Assembly 1 – UL Design No. U425 (Figure 8)

![Figure 8: Two Hour Rated Assembly 2 Using UL Design No. U425](image)

(1) Steel Studs – minimum 20 ga., spaced 24” (610 mm) o.c. maximum

(2) Interior Gypsum Board

- 2 Layers – 2 hours (80% of design load)
- Type: X GWB 5/8” (15.9 mm) thick
- Oriented: vertically on interior side
- Joints: centered over studs and staggered 1 stud cavity between layers
- Fastener: GWB to studs using Type S-12 x 1" (25.4 mm) self-tapping bugle head sheet steel screws in first layer, Type S-12 x 1-5/8" self-tapping bugle head sheet steel screws in second layer.
- Fastener Space: 12” (178 mm) o.c. on perimeter edges and field.

(3) Cavity Insulation

- Type: any UL-classified glass fiber batt, mineral wool or sprayed cellulosic fiber

(4) Exterior Cladding – installed in accordance with the manufacturer's installation instructions and UL-U425

- Siding including aluminum, steel, brick or stucco
- Cementitious Backer Units
- Fiber-Cement Siding
- Molded Plastic
- Wood Structural Panel or Lap Siding
- Building Units (Cellular Glass Blocks)

(5) Exterior Gypsum Sheathing

- Type: X GWB 5/8" (15.9 mm) thick
- Oriented: vertically on exterior side
- Joints: centered over studs staggered from back layer
- Fastener: GWB to studs using Type S-12 1" (25.4 mm) self-tapping bugle head sheet steel screws
6. Installation:

6.1. Refer to the manufacturer’s installation instructions in addition to this TER for complete details and requirements. In the event of a conflict between the manufacturer’s installation instructions and this TER, the more restrictive shall govern.

6.2. Insulation boards shall be installed horizontally with sheathing edges bearing directly on framing members and edges of abutting panels in moderate contact with each other.

6.3. Install cladding materials in accordance with the cladding manufacturer’s installation instructions.

6.4. One and Two Hour Fire Rated Wall Assemblies:

6.4.1. The one hour rated wall assembly shall be constructed as described in Section 5.1.

6.4.2. The two hour rated wall assembly shall be constructed as described in Section 5.4.

6.4.3. Specifications as defined in the UL Directory (e.g., UL assembly U356 or U364)

6.4.4. Thermo-Ply® shall be installed per TER No. 1004-01.

6.4.5. OX-IS® and SI-Strong shall be installed per TER No. 0804-01.

6.4.5.1. Up to 1” (25.4 mm) thickness.

6.4.6. Strong-R® shall be installed per TER No. 1808-02.

6.4.6.1. Up to 2” (51 mm) thickness.

6.4.7. ISO RED ci® or ISO RED MAX® shall be installed per TER No. 1306-02.

6.4.7.1. ISO RED ci® up to 2” (51 mm) thickness.

6.4.7.2. ISO RED MAX® up to 4” (102 mm) thickness.

7. Test and Engineering Substantiating Data:


7.2. Evaluation and analysis of ASTM E119 testing conducted by the Building Research Laboratory at Ohio State University by Dr. Richard Bletzacker of Richard W. Bletzacker & Associates, Inc.

7.3. Engineering evaluation of equivalent design for one or two hour fire rated wall assemblies in accordance of ASTM E2032-09 by Priest & Associates Consulting.


7.5. DrJ Technical Evaluation Report, TER No. 0804-01 flame spread and smoke developed ratings in accordance with ASTM E84.


7.8. The product(s) evaluated by this TER fall within the scope of one or more of the model, state or local building codes for building construction. The testing and/or substantiating data used in this TER is limited to buildings, structures, building elements, construction materials and civil engineering related specifically to buildings.
Technical Evaluation Report (TER)

7.9. The provisions of model, state or local building codes for building construction do not intend to prevent the installation of any material or to prohibit any design or method of construction. Alternatives shall use consensus standards, performance-based design methods or other engineering mechanics based means of compliance. This TER assesses compliance with defined standards, accepted engineering analysis, performance-based design methods, etc. in the context of the pertinent building code requirements.

7.10. Some information contained herein is the result of testing and/or data analysis by other sources, which DrJ relies on to be accurate, as it undertakes its engineering analysis.

7.11. DrJ has reviewed and found the data provided by other professional sources are credible. The information in this TER conforms to DrJ’s procedure for acceptance of data from approved sources.

7.12. DrJ’s responsibility for data provided by approved sources conforms to IBC Section 1703 and any relevant professional engineering law.

7.13. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through codes and standards (e.g., IRC, WFCM, IBC, SDPWS, NDS®, ACI®, AISI, PS-20, PS-2, etc.). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g., lumber, steel, concrete, etc.), DrJ relies upon grade/properties provided by the raw material supplier to be accurate and conforming to the mechanical properties defined in the relevant material standard.

8. Findings:

8.1. When installed in accordance with the manufacturer's installation instructions and this TER, Thermo-Ply®, OX-IS®, SI-Strong, Strong-R®, ISO RED ci®, and ISO RED MAX® complies with, or is a suitable alternative to, the applicable sections of the codes listed in Section 2 for the following applications:

8.1.1. As a component element of one and two hour fire rated wall assemblies as described in Section 6.

8.2. Thermo-Ply®, OX-IS®, SI-Strong, Strong-R®, ISO RED ci® and ISO RED MAX® are approved for use in the wall assemblies listed in Section 5 when installed as described in Section 6.

8.3. IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.9 are similar) 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, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in 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.

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

8.4.1. No known variations

8.5. This TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its criteria for all testing and engineering analysis. DrJ’s professional engineering work falls under the jurisdiction of each state Board of Professional Engineers, when signed and sealed.

9. Conditions of Use:

9.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this report and the installation instructions shall be submitted at the time of permit application.

9.2. Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the code official for review and approval.

9.3. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the Building Designer (e.g., Owner, Registered Design Professional, etc.).
9.4. Design

9.4.1. Building Designer Responsibility

9.4.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer for the Building and shall be in accordance with IBC Section 107 and IRC Section R106.

9.4.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with IBC Section 1603 and IRC Section R301.

9.4.2. Construction Documents

9.4.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.

9.5. Responsibilities

9.5.1. The information contained herein is a product, material, detail, design and/or application TER evaluated in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering practice, experience and technical judgment.

9.5.2. DrJ TERs provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated sections.

9.5.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.

9.5.4. This product is manufactured under a third-party quality control program in accordance with and IBC Section 104.4 and 110.4 and IRC Section R104.4 and R109.2.

9.5.5. The actual design, suitability and use of this TER, for any particular building, is the responsibility of the Owner or the Owner's authorized agent, and the TER shall be reviewed for code compliance by the Building Official.

9.5.6. The use of this TER is dependent on the manufacturer’s in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer’s instructions, the Building Official’s inspection and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

10. Identification:

10.1. All Ox Engineered Products, FPIS boards described in this TER are identified by a label on the board or packaging material bearing the manufacturer’s name, product name, TER number, and other information to confirm code compliance.

10.2. Additional technical information can be found at oxengineeredproducts.com.

11. Review Schedule:

11.1. This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjcertification.org.

11.2. For information on the current status of this TER, contact DrJ Certification.

- Mission, Belief and Independence
- Product Evaluation Policies
- Product Approval – Building Code, Administrative Law and P.E. Law