Listing and Technical Evaluation Report™

Report No: 1510-04

Issue Date: January 4, 2016

Revision Date: March 21, 2024

Subject to Renewal: April 1, 2025

OX Engineered Products One and Two-Hour Fire Rated Wall Assemblies

Trade Secret Report Holder:

OX Engineered Products, LLC

Phone: 269-435-2425 Website: www.oxengineeredproducts.com

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

Section: 06 16 13 - Insulated Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 - Thermal Insulation

1 Innovative Products Evaluated[i]

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

2 Product Description and Materials

2.1 *Thermo-Ply*

2.1.1 Thermo-Ply is a proprietary fibrous sheathing board, 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.

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

2.2 *OX-IS and SI-Strong*

2.2.1 OX-IS and SI-Strong are a structural sheathing product consisting of a proprietary fibrous sheathing board laminated to one side of a proprietary rigid, closed-cell polyisocyanurate (polyiso) foam plastic insulating sheathing.

2.2.1.1 The sheathing is made of specially treated plies that are pressure-laminated with a water resistant adhesive.

2.2.1.2 The surface finish consists of a non-reflective facer on one or both sides.

2.3 *Strong-R*

2.3.1 Strong-R Structural Insulation is a structural sheathing product consisting of a proprietary fibrous sheathing board laminated to one side of a proprietary rigid, closed-cell polyiso foam plastic insulating sheathing.

2.3.1.1 The proprietary fibrous sheathing is made of specially treated plies that are pressure-laminated with a water-resistant adhesive.

2.3.1.2 The surface finish consists of a foil facer on one or both sides using a fibrous sheathing board.

2.3.1.3 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.

2.4 *ISO Red Ci*

2.4.1 ISO Red Ci is an ASTM C1289 Type 1, Class 1 compliant rigid polyiso insulation.

2.4.1.1 The closed-cell polyiso foam core is bonded to facers on both sides. The facers are designed with a base foil layer, which is then combined with layers of other material(s).

2.5 *ISO Red Max*

2.5.1 ISO Red Max is an ASTM C1289 Type 1, Class 2 compliant rigid polyiso insulation.

2.5.1.1 The closed-cell polyiso foam core is bonded to facers on both sides. The facers are designed with a base foil layer.

2.6 *Material Availability*

2.6.1 *Thicknesses:*

2.6.1.1 *Thermo-Ply:*

2.6.1.1.1 Standard structural grade (Red): 0.113" (2.9 mm)

2.6.1.1.2 High structural grade (Blue): 0.135" (3.4 mm)

2.6.1.2 *OX-IS and SI-Strong:*

2.6.1.2.1 Range from 0.5" (12.7 mm) up to 1.0" (25.4 mm)

2.6.1.3 *Strong-R:*

2.6.1.3.1 Thicknesses up to 2.0" (51 mm)

2.6.1.4 *ISO Red Ci:*

2.6.1.4.1 Range from 0.5" (12.7 mm) up to 2.0" (51 mm)

2.6.1.5 *ISO Red Max:*

2.6.1.5.1 Thicknesses up to 4.0" (102 mm)

2.7 As needed, review material properties for design in Section **6** and to regulatory evaluation in Section **8**.

3 Definitions

3.1 New Materials[ii] 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 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*

4.1.2 *ASTM E119: Standard Test Methods for Fire Tests of Building Construction and Materials*

4.1.3 *ASTM E2032: Standard Guide for Extension of Data from Fire Resistance Test Conducted in Accordance with ASTM E119*

4.2 *Regulations*

4.2.1 *IBC – 15, 18, 21: International Building Code®*

4.2.2 *IRC – 15, 18, 21: International Residential Code®*

4.2.3 *CBC—19, 22: California Building Code (Title 24, Part 2)*

4.2.4 *CRC—19, 22: California Residential Code (Title 24, Part 2.5)*

5 Listed[xx]

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 The following assemblies are modified UL designs allowing for the use of the listed insulation and sheathing products. The extension of the listings are based on ASTM E119 fire testing of the products, ASTM E2032, and generally accepted engineering.

6.1.1.1 Lateral shear design values, as stated in Report Number 0804-01, Report Number 1004-01, Report Number 1004-02 or Report Number 1004-03 apply where Exterior GWB is installed underneath or on top of OX Structural Sheathing as described in the fire rated assemblies in this report. Additional screws in the GWB are not required to maintain the lateral shear design values.

6.1.2 *Wood – One Hour Fire Rating – Bearing or Non-Load Bearing:*

6.1.2.1 **Table 1**. One-Hour Fire Rating from Interior or Exterior – UL Design No. U364, U397, V306

6.1.3 *Wood – One-Hour Fire Rating – Load Bearing:*

6.1.3.1 **Table 2**. One-Hour Fire Rating from Interior – UL Design No. U341

6.1.3.2 **Table 3**. One-Hour Fire Rating from Interior or Exterior – UL Design No. U354

6.1.3.3 **Table 4**. One-Hour Fire Rating from Interior – Limited Load Bearing – UL Design No. U356

6.1.3.4 **Table 5**. One-Hour Fire Rating from Interior – UL Design No. U356

6.1.3.5 **Table 6**. One-Hour Fire Rating from Interior or Exterior – UL Design No. U356

6.1.4 *Wood – Two-Hour Fire Rating – Load Bearing:*

6.1.4.1 **Table 7**. Two-Hour Fire Rating from Interior – UL Design No. U364, U397, V306

6.1.4.2 **Table 8**. Two-Hour Fire Rating from Interior or Exterior – UL Design No. U364, U397, V306

6.1.4.3 **Table 9**. Two-Hour Fire Rating from Interior – UL Design No. U356

6.1.4.4 **Table 10**. Two-Hour Fire Rating from Interior or Exterior – UL Design No. U356

6.1.4.5 **Table 11**. Two-Hour Fire Rating from Interior or Exterior – UL Design No. U301

6.1.5 *Steel – One-Hour Fire Rating – Load Bearing:*

6.1.5.1 **Table 12**. One-Hour Fire Rating from Interior or Exterior – UL Design No. U425

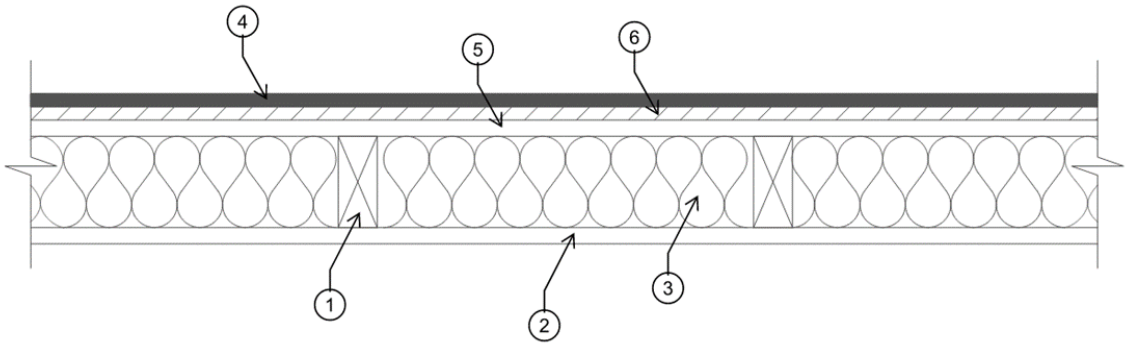
6.1.5.2 **Table 13**. One-Hour Fire Rating from Interior or Exterior – UL Design No. V454

6.1.6 *Steel – Two-Hour Fire Rating – Load Bearing:*

6.1.6.1 **Table 14**. Two-Hour Fire Rating from Interior – UL Design No. U425

6.2 *Wood – One-Hour Fire Rating – Bearing or Non-Load Bearing*

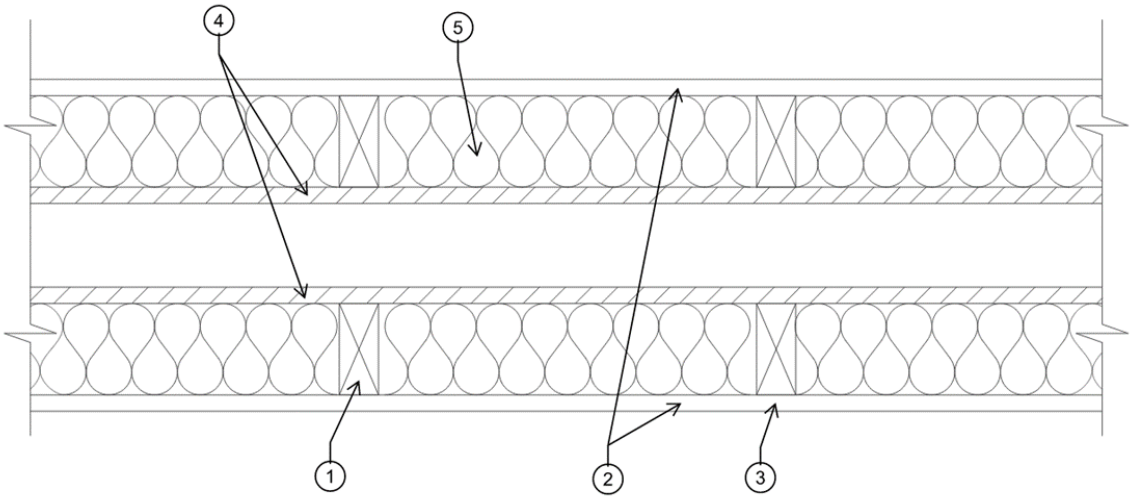
Table 1. One-Hour Fire Rating from Interior or Exterior – UL Design No. U364, U397, V306



1. Wood Studs – nominal 2x4, minimum spacing 16" o.c. (406 mm), maximum spacing 24" o.c. (610 mm)
2. Gypsum Board
   a. Type: X Gypsum Wall Board (GWB), 5/8" (15.9 mm) thick
   b. Oriented: Vertically on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing: 7" (178 mm) o.c. at perimeter edges and field
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: 3 1/2" (89 mm)
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and U356
   a. Siding including Vinyl, Fiber Cement Siding
   b. Molded Plastic – Particle Board Siding
   c. Wood Structural Panel or Lap Siding
   d. Cementitious Stucco
   e. Brick Veneer
   f. Exterior Insulation and Finish System (EIFS)
5. Exterior Gypsum Sheathing
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Oriented: Vertically on exterior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing: 8" (178 mm) o.c. on perimeter edges and field
6. Exterior Sheathing
   a. Thermo-Ply – installed per Report Number 1004-01
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

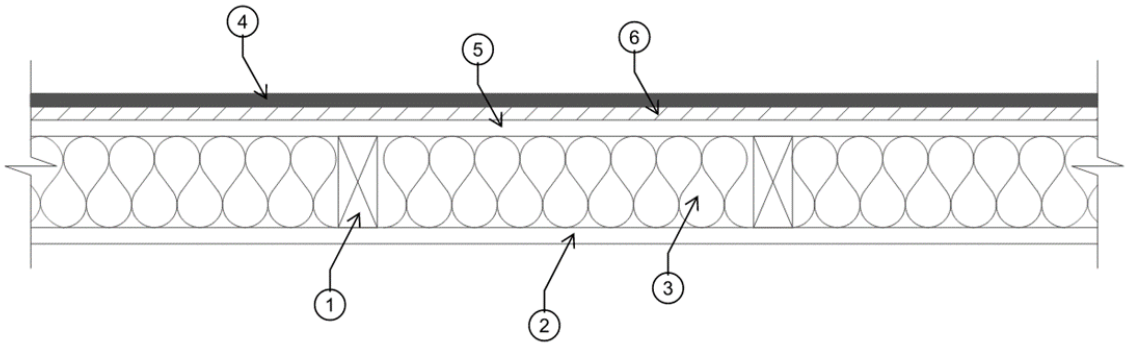
6.3 *Wood – One-Hour Fire Rating – Load Bearing*

Table 2. One-Hour Fire Rating from Interior – UL Design No. U341



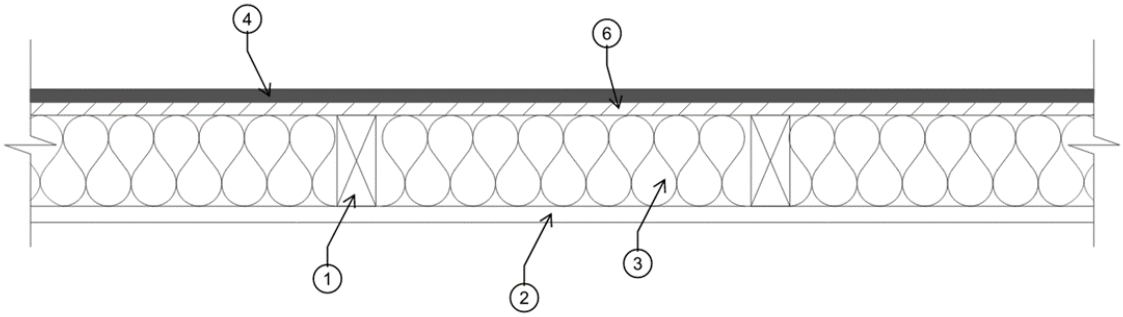
1. Wood Studs – nominal 2x4, maximum spacing 24" o.c. (610 mm), two rows
2. Gypsum Board
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically or horizontally on each side
   c. Fastener: GWB to studs using 1 7/8" (48 mm) 6d cement coated nails or #6 bugle head drywall screws
   d. Fastener Spacing: 7" (178 mm) o.c. at perimeter edges and field
3. Joints – gypsum joints must be finished with joint compound and tape; fastener heads must be covered with joint compound
4. Sheathing – (optional) septum may be sheathed 1/2" OX-IS structural insulation panels, installed per Report Number 0804-01
5. Cavity Insulation – not required where sheathing is used on both halves of wall
   a. Type: Glass or mineral fiber batt insulation
   b. Thickness: 3 1/2" (89 mm) max – used in each row of studs

Table 3. One-Hour Fire Rating from Interior or Exterior – UL Design No. U354



1. Wood Studs – nominal 2x4, maximum spacing 16" o.c. (406 mm), nominal 2x6 maximum spacing 24" o.c. (610 mm)
2. Gypsum Board
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically or horizontally on interior side
   c. Joints: Centered over studs. Joints must be finished with joint compound and tape. Fastener heads must be covered with joint compound.
   d. Fastener: GWB to studs using 1 7/8" (48 mm) 6d cement coated nails or #6 bugle head drywall screws
   e. Fastener Spacing: 7" (178 mm) o.c. at perimeter edges and field
3. Cavity Insulation
   a. 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 installation instructions and U356
   a. Aluminum Siding: 0.019" min. thick painted aluminum meeting American Architectural Manufacturers Association (AAMA) 1402
   b. Steel Siding: 0.017" min. thick (17 GSG gauge) painted steel
   c. Vinyl siding: 0.035" min. thick UL Classified exterior plastic siding (Molded Plastic)
   d. Wood siding: 0.313" min. thick lumber, plywood, or OSB based siding
   e. Hardboard siding: 1/4" min. thick hardboard UL Classified exterior hardboard siding
   f. Fiber cement siding: 1/4" min. thick fiber-cement based siding
   g. Stone: 2.0" min (natural stone) or 1 1/2" min (cast artificial) thick stone
   h. Brick Veneer: 2.0" min thick brick units, fastened over foam plastic sheathing to wood studs with metal ties
   i. Concrete Masonry Veneer: 2.0" min thick concrete masonry units, fastened over foam plastic sheathing to wood studs with metal ties
   j. Stucco: Portland cement type – 3/4" min thickness. Metal lath or mesh base fastened over foam plastic sheathing to wood studs.
   k. One-Coat Stucco: 3/8" minimum thickness. Wire fabric lath fastened over foam plastic sheathing to wood studs.
   l. 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
   a. Type: X GWB 5/8" (15.9 mm) thick (paper or glass matt facers, square or tapered edges)
   b. Orientation: Vertically or horizontally on exterior side
   c. Joints: Centered over studs staggered from back layer
   d. Fastener: GWB to studs using 1 7/8" (48 mm) 6d cement coated nails or #6 bugle head screws
   e. Fastener Spacing: 7" (178 mm) o.c. on perimeter edges and field
6. Exterior Sheathing
   a. Thermo-Ply – installed per Report Number 1004-01
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

Table 4. One-Hour Fire Rating from Interior – Limited Load Bearing – UL Design No. U356



This wall assembly is restricted to fifty-five percent (55%) of the allowable load. 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).

Alternately, when wood structural panels are attached directly to studs on the exterior side of the wall, the load is not restricted. In this case, the thickness of the ISO Red Ci may also be increased to 2". The wood structural panels must be minimum 7/16 in. thick, 4' wide wood structural panels, min grade "C-D" or "Sheathing", installed with long dimension of sheet (strength axis) or face grain of plywood parallel with or perpendicular to studs. Vertical joints centered on studs. Horizontal joints backed with nom 2x4 wood blocking. Attached to studs on exterior side of wall with 6d cement coated box nails spaced 6" o.c. at perimeter of panels and 12" o.c. along interior studs.

1. Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c.
2. Gypsum Board
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing: 7" (178 mm) o.c. on perimeter edges and field
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: 3 1/2" (89 mm)
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and U356
   a. Vinyl Siding with a flame spread of 20 or less
   b. Particle Board Siding
   c. Wood Structural Panel or Lap Siding complying with PS1 or APA PRP-108
   d. Cementitious Stucco – Portland cement or synthetic stucco with self-furring lath or base coat. Minimum thickness 3/8 to 3/4" depending on the system.
   e. Brick Veneer – Nominal 4" thick. Brick veneer fastened with corrugated metal wall ties attached over sheathing to wood studs with 8d nail per tie. Ties spaced not more than each sixth course of brick and max 32" o.c. horizontally. 1" air space provided between brick veneer and sheathing.
   f. Exterior Insulation and Finish System (EIFS) – Nom 1" foamed plastic insulation attached over sheathing and finished with coating system, Portland cement, or synthetic stucco systems, in accordance with manufacturer instructions.
   g. Aluminum or steel siding attached over sheathing to studs
   h. Fiber cement siding

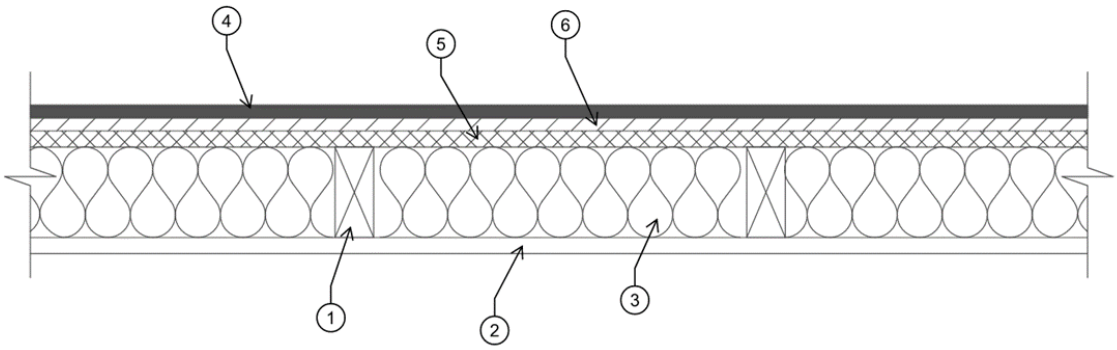
Table 4. One-Hour Fire Rating from Interior – Limited Load Bearing – UL Design No. U356

i. Stone veneer with mortar bonded to a lath, scratch coat and water resistant barrier applied to sheathing, installed in accordance with the manufacturer installation instructions.

j. Cementitious Backer Units – 1/2" or 5/8" min. 32" wide – applied vertically or horizontally with vertical joints centered over studs. Fasten to studs and runners with cement board screws of adequate length to penetrate stud by a minimum 3/4", spaced a max of 8" o.c. Horizontal joints need not be backed by framing. When Cementitious Backer Units are used, the rating is applicable with exposure on either face. Cementitious Backer Units are used as substrate for exterior finishes such as ceramic tile, slate, marble, natural stone, manufactured stone, thin brick, Portland cement or synthetic stucco.

5. Exterior Gypsum Sheathing – not used
6. Sheathing – when the following are considered as bracing for the studs, the load is restricted to fifty-five percent (55%) of the allowable load:
   a. Thermo-Ply – installed per Report Number 1004-01
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02
   d. ISO Red Ci up to 1" (25.4 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

Table 5. One-Hour Fire Rating from Interior – UL Design No. U356



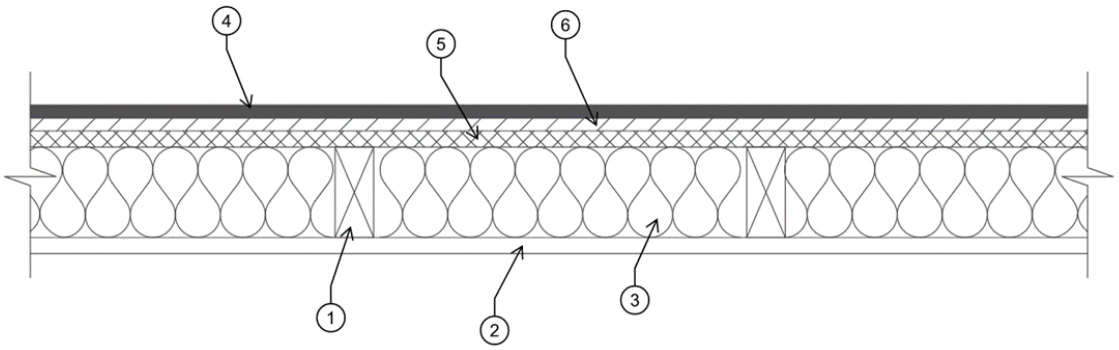
1. Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c.
2. Gypsum Board
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing: 7" (178 mm) o.c. on perimeter edges and field
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: 3 1/2" (89 mm)
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and U356
   a. Vinyl Siding with a flame spread of 20 or less
   b. Particle Board Siding
   c. Wood Structural Panel or Lap Siding complying with PS1 or APA PRP-108
   d. Cementitious Stucco – Portland cement or synthetic stucco with self-furring lath or base coat. Minimum thickness 3/8" to 3/4" depending on the system.
   e. Brick Veneer – Nominal 4" thick. Brick veneer fastened with corrugated metal wall ties attached over sheathing to wood studs with 8d nail per tie. Ties spaced not more than each sixth course of brick and max 32" on-center horizontally. 1" air space provided between brick veneer and sheathing.

Table 4. One-Hour Fire Rating from Interior – Limited Load Bearing – UL Design No. U356

f. Exterior Insulation and Finish System (EIFS) – Nominal 1" foam plastic insulation attached over sheathing and finished with coating system, Portland cement, or synthetic stucco systems, in accordance with manufacturer instructions.
g. Aluminum or steel siding attached over sheathing to studs
h. Fiber cement siding
i. Stone veneer with mortar bonded to a lath, scratch coat and water resistant barrier applied to sheathing, installed in accordance with the manufacturer installation instructions.
j. Cementitious Backer Units – $^{1}/_{2}$" or $^{5}/_{8}$", min. 32" wide – Applied vertically or horizontally with vertical joints centered over studs. Fasten to studs and runners with cement board screws of adequate length to penetrate stud by a minimum $^{3}/_{4}$", spaced a max of 8" o.c. Horizontal joints need not be backed by framing. When Cementitious Backer Units are used, the rating is applicable with exposure on either face. Cementitious Backer Units are used as substrate for exterior finishes such as ceramic tile, slate, marble, natural stone, manufactured stone, thin brick, Portland cement or synthetic stucco.

5. Wood Structural Panel – $^{7}/_{16}$" Nominal Thickness – Install with vertical joints over studs. Horizontal joints must be backed by nominal 2x4 wood blocking attached with 6d cement coated box nails spaced 6" o.c. along the perimeter of the panels and 12" o.c. along the interior studs.
6. Sheathing
   a. Thermo-Ply – installed per Report Number 1004-01
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

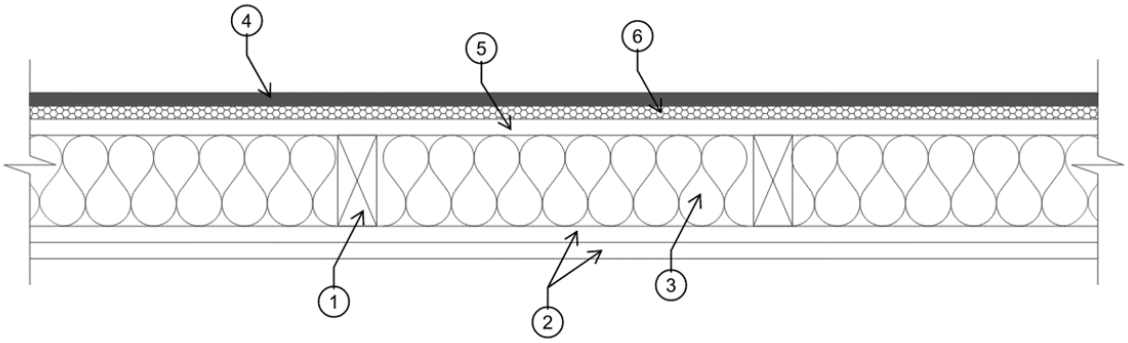
Table 6. One-Hour Fire Rating from Interior or Exterior – UL Design No. U356



1. Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c.
2. Gypsum Board
   a. Type: X GWB $^{5}/_{8}$" (15.9 mm) thick
   b. Orientation: Vertically on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener: GWB to studs using $1^{7}/_{8}$" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing: 7" (178 mm) o.c. on perimeter edges and field
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: $3^{1}/_{2}$" (89 mm)
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and U356
   a. Brick Veneer
5. Exterior Sheathing – Wood Structural Panel – $^{7}/_{16}$" Nominal Thickness. Install with vertical joints over studs. Horizontal joints must be backed by nominal 2x4 wood blocking attached with 6d cement coated box nails spaced 6 inches on center along the perimeter of the panels and 12" on center along the interior studs.
6. Sheathing
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

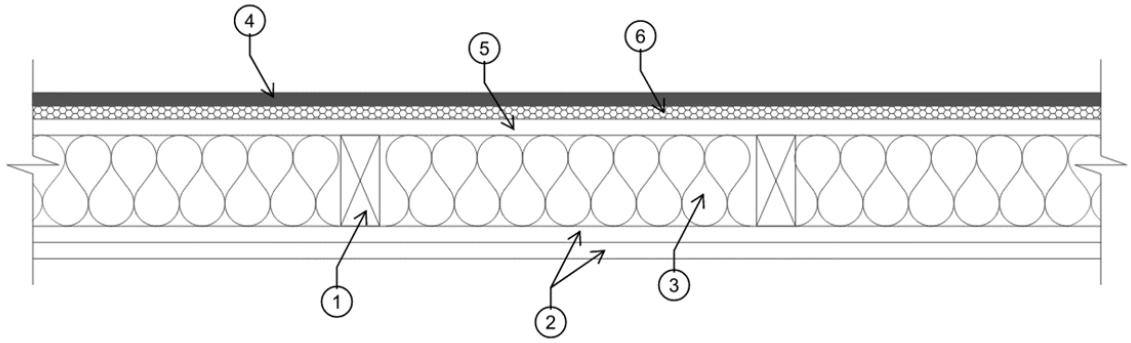
6.4 *Wood – Two-Hour Fire Rating – Load Bearing*

Table 7. Two-Hour Fire Rating from Interior – UL Design No. U364, U397, V306



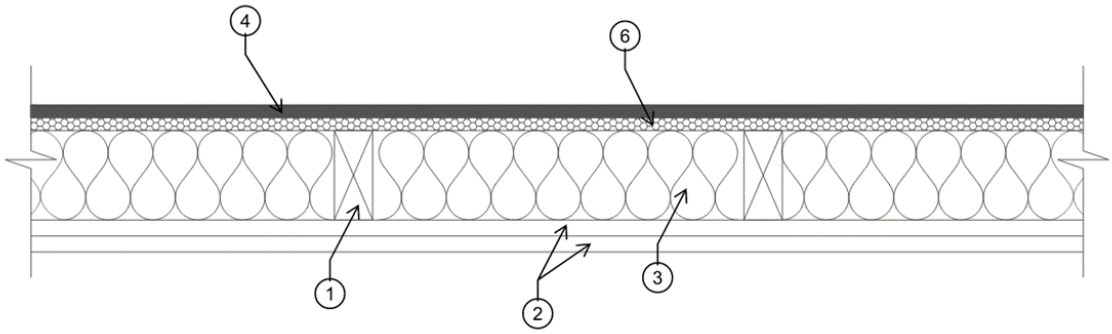
1. Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c., maximum spaced 24" (610 mm) o.c.
2. Gypsum Board – requires two GWB layers
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener Interior Layer: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing, Interior Layer: 7" (178 mm) o.c. on perimeter edges and field
   f. Fastener Secondary Layer: Use 2 3/8" (61 mm) 8d nails or screws
   g. Fastener Spacing, Secondary Layer: 8" (203 mm) o.c.
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: 3 1/2" (89 mm)
   d. Option: BASF spray polyurethane foam insulation is allowed per U397.
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and U356
   a. Siding including Vinyl, Fiber Cement Siding
   b. Molded Plastic – Particle Board Siding
   c. Wood Structural Panel or Lap Siding
   d. Cementitious Stucco
   e. Brick Veneer
   f. Exterior Insulation and Finish System (EIFS)
5. Exterior Gypsum Sheathing
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on exterior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing: 8" (178 mm) o.c. on perimeter edges and field
6. Exterior Insulation
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

Table 8. Two-Hour Fire Rating from Interior or Exterior – UL Design No. U364, U397, V306



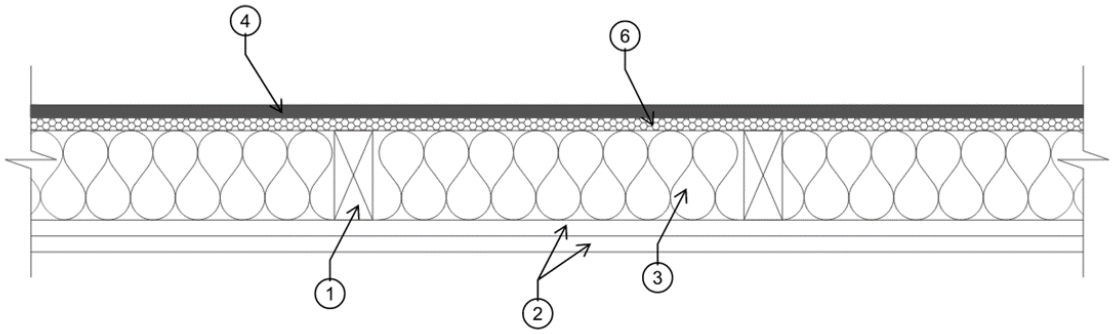
1. Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c., maximum spaced 24" (610 mm) o.c.
2. Gypsum Board – requires two GWB layers
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener Interior Layer: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing, Interior Layer: 7" (178 mm) o.c. on perimeter edges and field
   f. Fastener Secondary Layer: Use 2 3/8" (61 mm) 8d nails or screws
   g. Fastener Spacing, Secondary Layer: 8" (203 mm) o.c.
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: 3 1/2" (89 mm)
   d. Option: BASF spray polyurethane foam insulation is allowed per U397.
4. Exterior Cladding – brick veneer installed in accordance with the manufacturer installation instructions and U356
5. Exterior Gypsum Sheathing
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on exterior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing: 8" (178 mm) o.c. on perimeter edges and field
6. Exterior Insulation
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

Table 9. Two-Hour Fire Rating from Interior – UL Design No. U356



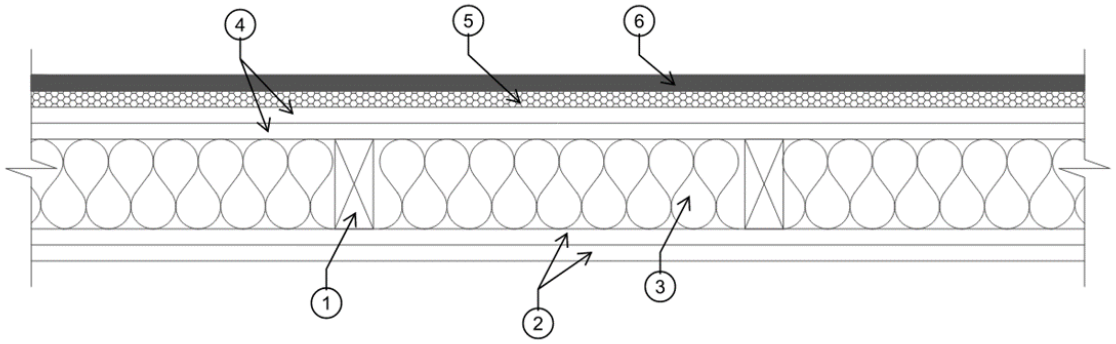
1. Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c.
2. Gypsum Board – requires two GWB layers
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener Interior Layer: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing, Interior Layer: 7" (178 mm) o.c. on perimeter edges and field
   f. Fastener Secondary Layer: Use 2 3/8" (61 mm) 8d nails or screws
   g. Fastener Spacing, Secondary Layer: 8" (203 mm) o.c.
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: 3 1/2" (89 mm)
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and U356
   a. Siding including Vinyl, Fiber Cement Siding
   b. Molded Plastic – Particle Board Siding
   c. Wood Structural Panel or Lap Siding
   d. Cementitious Stucco
   e. Brick Veneer
   f. Exterior Insulation and Finish System (EIFS)
5. Exterior Gypsum Sheathing – not used
6. Exterior Insulation – when the following are considered as bracing for the studs, the load is restricted to fifty-five percent (55%) of the allowable load.
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

Table 10. Two-Hour Fire Rating from Interior or Exterior – UL Design No. U356



1. Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c.
2. Gypsum Board – requires two GWB layers
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener Interior Layer: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Space Interior Layer: 7" (178 mm) o.c. on perimeter edges and field
   f. Fastener Secondary Layer: Use 2 3/8" (61 mm) 8d nails or screws, 8" (203 mm) o.c.
   g. Fastener Space Secondary Layer: 8" (203 mm) o.c.
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: 3 1/2" (89 mm)
4. Exterior Cladding – Brick veneer installed in accordance with the manufacturer installation instructions and U356
5. Exterior Gypsum Sheathing – not used
6. Exterior Insulation – when the following are considered as bracing for the studs, the load is restricted to fifty-five percent (55%) of the allowable load:
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

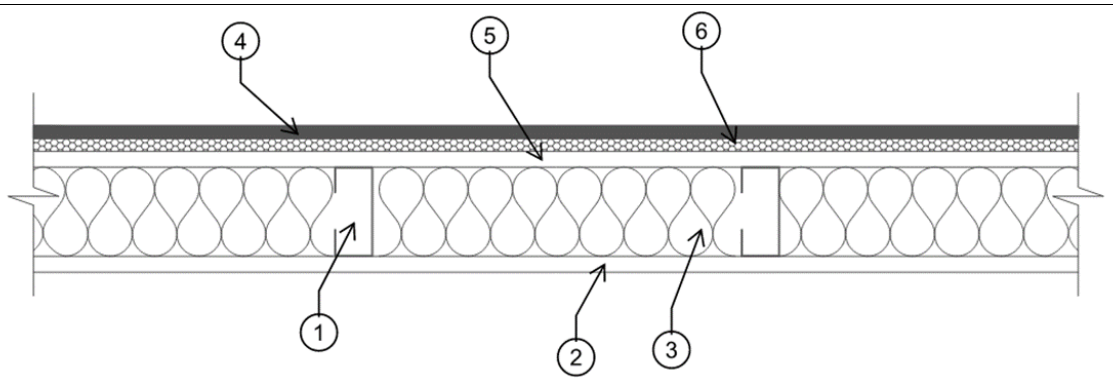
Table 11. Two-Hour Fire Rating from Interior or Exterior – UL Design No. U301



1. Wood Studs – nominal 2x4, minimum spaced 16" (406 mm) o.c.
2. Gypsum Board – requires two GWB layers
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically or horizontally on interior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud
   d. Fastener Interior Layer: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing, Interior Layer: 6" (152 mm) o.c. on GWB edges and at intermediate studs
   f. Fastener Face Layer: Use 2 3/8" (61 mm) 8d nails or screws
   g. Fastener Spacing, Face Layer: 8" (203 mm) o.c. on perimeter and field
3. Cavity Insulation
   a. Type: Glass fiber or mineral wool
   b. R-value: R-13
   c. Minimum Thickness: 3 1/2" (89 mm)
   d. Option(s): various Spray Polyurethane Foams (SPF) are allowed; SES, or equivalent spray foam, is allowed per U301.
4. Exterior Gypsum Sheathing – 2 layers
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically or horizontally on exterior side
   c. Joints: Centered over studs and staggered 1 stud cavity on opposite side of stud and interior GWB joints
   d. Fastener Interior Layer: GWB to studs using 1 7/8" (48 mm) 6d nails or #6 Type W screws
   e. Fastener Spacing: 6" (152 mm) o.c. on GWB edges and at intermediate studs
   f. Fastener Face Layer: Use 2 3/8" (61 mm) 8d nails or screws
   g. Fastener Spacing, Face Layer: 8" (203 mm) o.c. on perimeter and field
5. Exterior Insulation
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.
6. Exterior Cladding – any code-approved exterior cladding may be used.

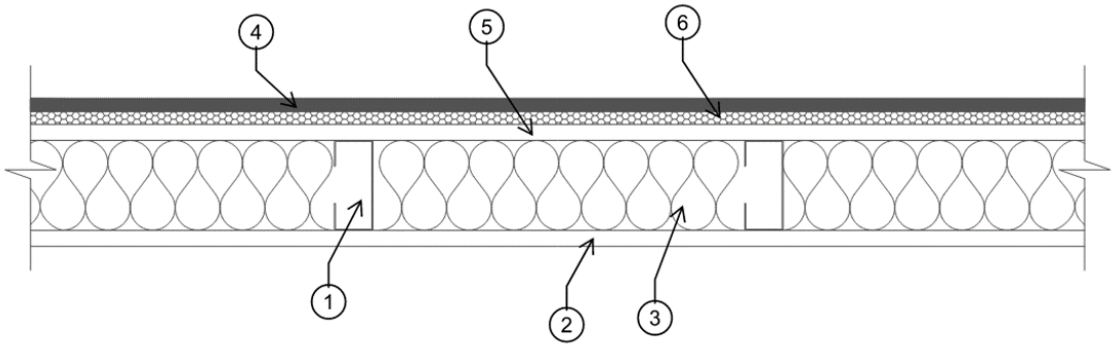
6.5 *Steel – One-Hour Fire Rating – Load Bearing*

Table 12. One-Hour Fire Rating from Interior or Exterior – UL Design No. U425



1. Steel Studs – minimum 20-gauge, maximum spaced 24" (610 mm) o.c.
2. Interior Gypsum Board – 1 Layer – 1 hour (100% of design load)
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Oriented: Vertically on interior side
   c. Joints: Centered over studs
   d. Fastener: GWB to studs using Type S-12 1" (25.4 mm) self-tapping bugle head sheet steel screws
   e. Fastener Spacing: 12" (178 mm) o.c. on perimeter edges and field
3. Cavity Insulation
   a. Type: Any UL-classified glass fiber batt, mineral wool or sprayed cellulosic fiber
   b. Exterior Cladding installed in accordance with the manufacturer installation instructions and U425
   c. Siding including aluminum, steel, brick or stucco
   d. Cementitious Backer Units
   e. Fiber-Cement Siding
   f. Molded Plastic
   g. Wood Structural Panel or Lap Siding
   h. Building Units (Cellular Glass Blocks)
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and U425
   a. Siding including aluminum, steel, brick or stucco
   b. Cementitious Backer Units
   c. Fiber-Cement Siding
   d. Molded Plastic
   e. Wood Structural Panel or Lap Siding
   f. Building Units (Cellular Glass Blocks)
5. Exterior Gypsum Sheathing
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Oriented: Vertically on exterior side
   c. Joints: Centered over studs staggered from back layer
   d. Fastener: GWB to studs using Type S-12 1" (25.4 mm) self-tapping bugle head sheet steel screws
   e. Fastener Spacing: 12" (178 mm) o.c. along studs and tracks
6. Exterior Insulation
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

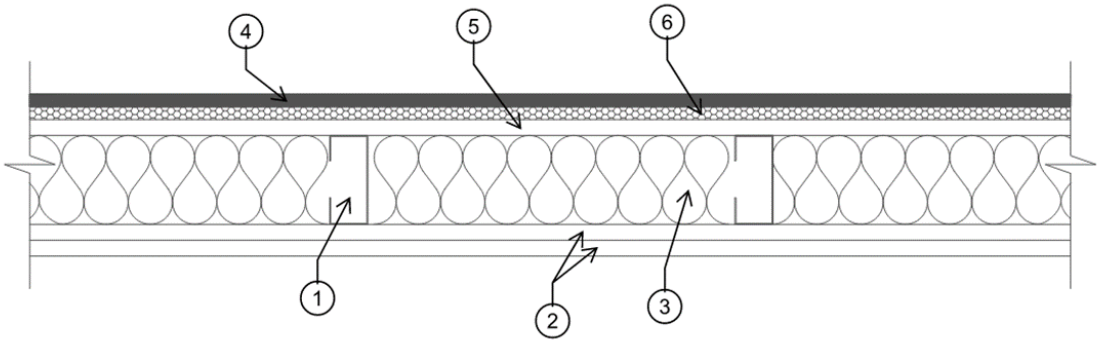
Table 13. One-Hour Fire Rating from Interior or Exterior – UL Design No. V454



1. Steel Studs – minimum 20-gauge spaced maximum 24" (610 mm) o.c.
2. Interior Gypsum Board
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Orientation: Vertically on interior side
   c. Joints: Centered over studs staggered from exterior gypsum sheathing joints
   d. Fastener: GWB to studs using Type S 1" (25.4 mm) self-drilling, self-tapping steel screws
   e. Fastener Spacing: 8" (203 mm) o.c. on perimeter edges and 12" (305 mm) o.c. in the field
3. Cavity Insulation
   a. Type: any UL-classified glass fiber batt, mineral wool or sprayed cellulosic fiber or proprietary SPF allowed in V454. See listing for full details.
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and V454.
   a. 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
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Oriented: Vertically on exterior side
   c. Joints: Centered over studs staggered from interior GWB
   d. Fastener: GWB to studs using Type S 1" (25.4 mm) self-drilling, self-tapping steel screws
   e. Fastener Spacing: 8" (203 mm) o.c. on perimeter edges and 12" (305 mm) o.c. in the field
6. Exterior Insulation
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

6.6 *Steel – Two-Hour Fire Rating – Load Bearing*

Table 14. Two-Hour Fire Rating from Interior – UL Design No. U425



1. Steel Studs – minimum 20-gauge, spaced 24" (610 mm) o.c. maximum
2. Interior Gypsum Board
   a. 2 Layers – 2 hours (80% of design load)
   b. Type: X GWB 5/8" (15.9 mm) thick
   c. Oriented: Vertically on interior side
   d. Joints: Centered over studs and staggered 1 stud cavity between layers
   e. 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
   f. Fastener Spacing: 12" (178 mm) o.c. on perimeter edges and field
3. Cavity Insulation
   a. Type: Any UL-classified glass fiber batt, mineral wool or sprayed cellulosic fiber
4. Exterior Cladding – installed in accordance with the manufacturer installation instructions and 425
   a. Siding including aluminum, steel, brick or stucco
   b. Cementitious Backer Units
   c. Fiber-Cement Siding
   d. Molded Plastic
   e. Wood Structural Panel or Lap Siding
   f. Building Units (Cellular Glass Blocks)
5. Exterior Gypsum Sheathing
   a. Type: X GWB 5/8" (15.9 mm) thick
   b. Oriented: Vertically on exterior side
   c. Joints: Centered over studs staggered from back layer
   d. Fastener: GWB to studs using Type S-12 1" (25.4 mm) self-tapping bugle head sheet steel screws
   e. Fastener Spacing: 12" (178 mm) o.c. along studs and tracks
6. Exterior Insulation
   a. Thermo-Ply – installed per Report Number 1004-01.
   b. OX-IS or SI-Strong up to 1" (25.4 mm) thick – installed per Report Number 0804-01.
   c. Strong-R up to 2" (51 mm) thick – installed per Report Number 1808-02.
   d. ISO Red Ci up to 2" (51 mm) thick or ISO Red Max up to 4" (102 mm) thick – installed per Report Number 1306-02.

6.7 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[xxi]

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.[xxii]

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.[xxiii]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 Thermo-Ply Structural Sheathing, OX-IS Structural Insulation, SI-Strong Structural Insulation, Strong-R Structural Insulation, ISO Red Ci Polyiso Sheathing and ISO Red Max Polyiso Sheathing comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Thermo-Ply Structural Sheathing, OX-IS Structural Insulation, SI-Strong Structural Insulation, Strong-R Structural Insulation, ISO Red Ci Polyiso Sheathing and ISO Red Max Polyiso Sheathing were evaluated in accordance with ASTM E119 for the following designs:

8.1.1.1 Performance of one-hour and two-hour fire rated wall assemblies using:

8.1.1.1.1 UL-U364, UL-U397, and UL-V306

8.1.1.1.2 UL-U341

8.1.1.1.3 UL-U354

8.1.1.1.4 UL-U356

8.1.1.1.5 UL-U425 and UL-V454

8.1.1.1.6 UL-U301

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[xxiv] 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 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.

9.3.2 Install cladding materials in accordance with the cladding manufacturer installation instructions.

9.3.3 *One and Two-Hour Fire Rated Wall Assemblies:*

9.3.3.1 The one-hour rated wall assembly shall be constructed as described in Section **6.2**, Section **6.3** and Section **6.5**.

9.3.3.2 The two-hour rated wall assembly shall be constructed as described in Section **6.4** and Section **6.6**.

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

9.3.3.4 Thermo-Ply shall be installed per Report Number 1004-01.

9.3.3.5 OX-IS and SI-Strong shall be installed per Report Number 0804-01.

9.3.3.5.1 Up to 1" (25.4 mm) thickness.

9.3.3.6 Strong-R shall be installed per Report Number 1808-02.

9.3.3.6.1 Up to 2" (51 mm) thickness.

9.3.3.7 ISO Red Ci or ISO Red Max shall be installed per Report Number 1306-02.

9.3.3.7.1 ISO Red Ci up to 2" (51 mm) thickness.

9.3.3.7.2 ISO Red Max up to 4" (102 mm) thickness.

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 Fire rating performance testing in accordance with ASTM E119

10.1.2 Engineering evaluation of equivalent design for one or two-hour fire rated wall assemblies in accordance with ASTM E2032

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.[xxv]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Thermo-Ply Structural Sheathing, OX-IS Structural Insulation, SI-Strong Structural Insulation, Strong-R Structural Insulation, ISO Red Ci Polyiso Sheathing and ISO Red Max Polyiso Sheathing on the DrJ Certification website.

11 Findings

11.1 As outlined in Section **6**, Thermo-Ply Structural Sheathing, OX-IS Structural Insulation, SI-Strong Structural Insulation, Strong-R Structural Insulation, ISO Red Ci Polyiso Sheathing and ISO Red Max Polyiso Sheathing have performance characteristics that were tested and/or meet applicable regulations and are 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, Thermo-Ply Structural Sheathing, OX-IS Structural Insulation, SI-Strong Structural Insulation, Strong-R Structural Insulation, ISO Red Ci Polyiso Sheathing and ISO Red Max Polyiso Sheathing shall be approved for the following applications:

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

11.3 Unless exempt by state statute, when Thermo-Ply Structural Sheathing, OX-IS Structural Insulation, SI-Strong Structural Insulation, Strong-R Structural Insulation, ISO Red Ci Polyiso Sheathing and ISO Red Max Polyiso Sheathing are 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[xxvi] 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**:[xxvii] Building regulations require that the building official shall accept Duly Authenticated Reports.[xxviii]

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.[xxix]

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 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:

12.3.1 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.

12.3.2 This report and the installation instructions shall be submitted at the time of permit application.

12.3.3 These innovative products have an internal quality control program and a third-party quality assurance program.

12.3.4 At a minimum, these innovative products shall be installed per Section **9** of this report.

12.3.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.

12.3.6 These innovative products have 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.

12.3.7 The application of these innovative products 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.

12.4 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.

12.5 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).

12.6 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 products listed in Section **1.1** through Section **1.6** are 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 Thermo-Ply Structural Sheathing, OX-IS Structural Insulation, SI-Strong Structural Insulation, Strong-R Structural Insulation, ISO Red Ci Polyiso Sheathing and ISO Red Max Polyiso Sheathing are 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 these innovative products 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),[xxx] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years[xxxi] and/or a $5,000,000 fine or 3 times the value of[xxxii] 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[xxxiii] 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.[xxxiv]

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.[xxxv]

1.3 **Approved**[xxxvi] **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.[xxxvii] 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.[xxxviii]

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[xxxix] 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[xl] (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,[xli] 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)*".[xlii] 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[xliii] and Part 3280,[xliv] 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.[xlv]

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.[xlvi]

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.[xlvii]

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.[xlviii]

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.[xlix]

1.11.4 Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.[l]

1.12 Approval equity is a fundamental commercial and legal principle.[li]

Notes

[i] For more information, visit drjcertification.org or call us at 608-310-6748.

[ii] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702

[iii] 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

[iv] 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

[v] 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

[vi] 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

[vii] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2

[viii] https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency

[ix] https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source

[x] 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.

[xi] 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/

[xii] https://www.cbitest.com/accreditation/

[xiii] https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104:~:text=to%20enforce%20the%20provisions%20of%20this%20code

[xiv] 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

[xv] 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

[xvi] 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

[xvii] True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[xviii] https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

[xix] 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.

[xx] 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#listed AND https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled

[xxi] https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4

[xxii] 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

[xxiii] 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

[xxiv] 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.

[xxv] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

[xxvi] 2018 IFC Section 104.9

[xxvii] 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.

[xxviii] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1

[xxix] Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

xxx http://www.drjengineering.org/AppendixC AND https://www.drjcertification.org/cornell-2016-protection-trade-secrets

xxxi https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years

xxxii https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided

xxxiii https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2

xxxiv IBC 2021, Section 1706.1 Conformance to Standards

xxxv IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

xxxvi See Section 11 for the distilled building code definition of **Approved**

xxxvii Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

xxxviii https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

xxxix New York City, The Rules of the City of New York, § 101-07 Approved Agencies

xl New York City, The Rules of the City of New York, § 101-07 Approved Agencies

xli https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

xlii https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

xliii https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

xliv https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

xlv IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.

xlvi IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.

xlvii 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/

xlviii IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.

xlix 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

l True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

li https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission