

ICC-ES Evaluation Report

ESR-4782

Reissued March 2024

This report also contains:


Revised June 2024

- LABC Supplement

Subject to renewal March 2025

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<p>DIVISION: 06 00 00— WOOD, PLASTICS AND COMPOSITES</p> <p>Section: 06 12 00— Structural Panels</p>	<p>REPORT HOLDER:</p> <p>BIG SKY INSULATIONS, INC.</p>	<p>EVALUATION SUBJECT:</p> <p>R-CONTROL® STRUCTURAL INSULATED PANELS (SIPs)</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)
- 2018, 2015 and 2012 [International Residential Code® \(IRC\)](#)

For evaluation for compliance with codes adopted by the [Los Angeles Department of Building and Safety \(LADBS\)](#), see [ESR-4782 LABC and LARC Supplement](#).

Properties evaluated:

- Structural
- Thermal barrier
- Fire resistance

2.0 USES

R-Control Structural Insulated Panels (SIPs) are used as load-bearing wall, floor, and roof panels in fire-resistive and non-fire-resistive construction. The SIPs are alternatives to walls, floors, and roofs designed and constructed in accordance with IBC Section 2306; and walls, floors, and roofs installed in accordance with IBC Section 2308 or IRC Sections R502, R602, and R802. When R-Control SIPs are installed under the IRC, an engineered design is required in accordance with IRC Section R301.1.3 and Section 4.1.1 of this report. Use of the panels under 2018 and 2015 IRC Section R610 or 2012 IRC Section R613 is outside scope of this evaluation report.

3.0 DESCRIPTION

3.1 General:

R-Control SIPs are factory-laminated sandwich panels consisting of oriented strand board (OSB) facings with an expanded polystyrene (EPS) foam plastic core. R-Control SIPs vary in width from 4 to 8 feet (1.2 m to 2.4 m) and in length from 8 to 24 feet (2.4 m to 7.2 m).

3.2 Materials:

3.2.1 Expanded Polystyrene: The EPS foam plastic core complies with ASTM C578, Type I. The EPS foam plastic has a flame-spread index not exceeding 25 and a smoke-developed index not exceeding 450 when tested in accordance with ASTM E84. The core is supplied by manufacturers listed in the approved quality documentation. EPS core nominal thickness is 3⁵/₈, 5⁵/₈, 7³/₈, 9³/₈, or 11³/₈ inches (92, 143, 187, 238 and 289 mm).

3.2.2 Facing: The facing material is nominally $7/16$ -inch-thick, Exposure 1 OSB rated sheathing with a $24/16$ span rating, which complies with U.S. DOC PS2 and additional requirements as specified in the approved quality control manual. The OSB facings are continuous for each SIP. The OSB may be Blazeguard FR Deck Panel A, recognized in [ESR-1365](#). The OSB facings are supplied by manufacturers listed in the approved quality documentation.

3.2.3 Adhesive: Adhesives comply with Type II, Class 2, performance requirements set forth in the ICC-ES Acceptance Criteria for Sandwich Panel Adhesives (AC05). The adhesives are supplied by manufacturers listed in the approved quality documentation.

3.2.4 Splines: Splines are identified as surface, block, lumber block, lumber, or I-beam type splines. Spline thickness equals the EPS core thickness of the SIPs to be joined, except for surface splines, which have a thickness of $7/16$ inch (11.1 mm).

Surface splines are 4-inch-wide-by- $7/16$ -inch-thick (102 mm by 11.1 mm) OSB as described in Section 3.2.2.

Block splines consist of two 3-inch-wide-by- $7/16$ -inch-thick (76 mm by 11.1 mm) OSB facings as described in Section 3.2.2, laminated to an EPS core. Block splines are manufactured in depths of $3\frac{1}{2}$, $5\frac{1}{2}$, $7\frac{1}{4}$, $9\frac{1}{4}$, and $11\frac{1}{4}$ inches (89, 133, 184, 235, and 286 mm) as specified in the approved quality control manual.

Lumber block splines consist of two nominally 1-by-4 spruce-pine-fir No. 2 grade or better wood members laminated to an EPS core. Lumber block splines are manufactured in depths of $3\frac{1}{2}$, $5\frac{1}{2}$, $7\frac{1}{4}$, $9\frac{1}{4}$, and $11\frac{1}{4}$ inches (89, 133, 184, 235, and 286 mm) as specified in the approved quality control manual.

Lumber splines consist of solid sawn lumber, nominally 2-by or 4-by spruce-pine-fir No. 2 or better wood members, or, when justified by the structural design professional, equivalent engineered wood material.

I-beam splines are single-web I-joists manufactured in depths of $9\frac{1}{4}$ and $11\frac{1}{4}$ inches (235 and 286 mm) with minimum $1\frac{1}{2}$ -inch-by- $2\frac{1}{2}$ -inch (38 mm by 63.5 mm) laminated veneer lumber flanges, as specified in the approved quality control manual.

3.2.5 R-Control SIP Screws: R-Control SIP screws are used to fasten R-Control SIPs to underlying supports for horizontal diaphragms. R-Control SIP screws are corrosion-resistant steel screws having a minimum shank diameter of 0.188 inch (4.7 mm) and a minimum head diameter of 0.620 inch (15.5 mm). Screws are available in lengths from 3 inches to 18 inches (76.2 mm to 457.2 mm). The thread length for all screws is $2\frac{3}{4}$ inches (70 mm) measured from the tip. R-Control SIP Screws are manufactured as specified in the approved quality control manual.

3.2.6 R-Control Low VOC Do-All-Ply: R-Control Low VOC Do-All-Ply is specified as a sealant during installation of R-Control SIPs. R-Control Do-All-Ply is applied to the splines as indicated in the figures of this report. R-Control Low VOC Do-All-Ply is manufactured as specified in the approved quality control manual. Packaged in 20-ounce (828 ml) sausages, the sealant has a nine-month shelf life.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 R-Control SIP Walls, Floors, and Roofs: R-Control SIPs are limited to the allowable loads and loading conditions indicated in [Tables 3](#) through [9](#) of this report. The allowable loads shown in these tables are the allowable loads of the R-Control SIPs only and do not include consideration of the elements supporting the SIPs, which must be designed, detailed and constructed to comply with the requirements of the IBC or IRC, as applicable.

The seismic-force-resisting system of structures consisting of the panels as shear walls, in whole or in part, must be designed and detailed in accordance with IBC Sections 2305 and 2306.

Where loading conditions result in the panels resisting combined stresses, the sum of the ratios of actual load over allowable load must be less than 1.0.

4.1.2 R-Control SIP Headers: Openings in R-Control SIP walls are limited to sizes, spans and the allowable loads specified in [Table 10](#). Openings not covered by [Table 10](#) must be framed to comply with requirements in the IBC or IRC, as applicable.

4.2 Installation:

4.2.1 General: R-Control SIPs must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the plans and specifications approved by the code official. The manufacturer's published installation instructions and this report must be strictly adhered to, and a copy of the instructions must be available at all times on the jobsite during installation.

Panels must be connected to each other along their edges with splines described in Section 3.2.4. Splines must be connected to the SIPs by fastening through the SIP OSB facing as specified by the applicable tables in this report.

4.2.2 Walls: The SIP core is typically recessed either 1½ inches (38 mm) or 3½ inches (89 mm) from the bottom and top panel edges. The recesses receive either nominally 2-by or 4-by spruce-pine-fir No. 2 or better bottom and top plates in a width matching the core thickness. R-Control Low VOC Do-All-Ply is applied to the plates as indicated in the figures of this report. Bottom and top plates must be fastened to the facings with 8d box nails at 6 inches (152 mm) on center as indicated in the tables, or in an equivalent, approved fashion.

The SIP core is recessed on the vertical sides to receive splines or vertical boundary members. R-Control Low VOC Do-All-Ply is applied to the splines as indicated in the figures of this report.

The SIP may have factory-cut, 1½-inch-diameter (38 mm) wiring chases centered within the core: a horizontal chase at receptacles height, a horizontal chase at switch height, and vertical chases spaced a minimum of 48 inches (1219 mm) from one another.

4.2.3 Floors and Roofs: R-Control SIPs used for floors or roofs are a maximum of 8 feet (2.4 m) wide when joined with surface splines, block splines, or lumber block splines, and are a maximum of 4 feet (1.2 m) wide when joined with other splines described in Section 3.2.4 of this report. The SIP core is recessed to receive splines. R-Control Low VOC Do-All-Ply is applied to the splines as indicated in the figures of this report.

4.2.4 Headers: R-Control SIP headers must be constructed as described in [Table 10](#) and the figures of this report.

4.2.5 SIP Protection:

4.2.5.1 Thermal Barrier at Wall, Roof and Floor: One-half-inch-thick (12.7 mm), regular gypsum wallboard, complying with ASTM C36 or ASTM C1396, must be installed on the interior surface of wall and roof panels, and the bottom side of floor panels having occupied space below the floor panel. The wallboard must be fastened to the face of the panels with minimum 1¼-inch-long (31.7 mm), No. 6, Type W drywall screws spaced in accordance with ASTM C840 for use under the IBC, or Table R702.3.5 of the IRC, using 16-inch-on-center (406.4 mm) framing spacing guidelines. Alternatively, the interior of the R-Control SIP must be Blazeguard FR Deck Panel A in accordance with Section 3.2.2 of this report.

4.2.5.2 Thermal Barrier at Floor Surface: An approved thermal barrier must be installed over the top surface of the floor panels, such as minimum 7/16-inch-thick (76 mm) wood-based structural use sheathing installed in accordance with the applicable code.

4.2.5.3 Roof Exterior: R-Control SIPs must be protected by a roof covering, underlayment, and flashing installed in accordance with the IBC or IRC, as applicable, as indicated for 7/16-inch-thick (11 mm) solidly sheathed decks.

4.2.5.4 Wall Exterior: R-Control SIPs must be protected on the exterior by weather protection consisting of a water-resistive barrier and wall covering as required by the IBC or IRC, as applicable.

4.2.6 Fire-resistance-rated Assemblies:

4.2.6.1 One-hour Limited Load-bearing Wall Assembly: R-Control SIPs with thicknesses of 4½, 6½, or 8¼ inches (114, 165, or 210 mm) are used to construct a one-hour fire-resistance rated wall assembly. The SIP core is recessed 1½ inches (38 mm) from the bottom SIP edge and 1½ inches (38 mm) from the top SIP edge. The recesses receive nominally 2-by spruce-pine-fir No. 2 or better lumber bottom and top plates with a depth to match the core thickness. The plates must be connected to the SIPs by fastening through the SIP OSB facing with 8d box nails spaced 6 inches (152 mm) on center, on each side of the SIP.

The SIP core is recessed on the vertical sides to receive surface or block splines in accordance with Section 3.2.2 of this report. R-Control Low VOC Do-All-Ply is applied to the splines as indicated in the figures of this report. The splines must be connected to the SIPs by fastening through the SIP OSB facing with 1⅝-inch-long (41.3 mm), Type W, self-piercing tapping screws (ASTM C1002) spaced 6 inches (152 mm) on center.

The SIPs must be covered with two layers of 5/8-inch-thick (15.9 mm) Type X gypsum wallboard, complying with ASTM C1396, on each side. Where the panels are exposed to the exterior, the exterior layers of gypsum boards must be 5/8-inch-thick (15.9 mm), Type X gypsum sheathing complying with ASTM C1396. The vertical joints of the first layer of gypsum board must be offset a minimum of 16 inches (406 mm) from the spline joint. The first layer of gypsum board must be fastened to the panel facing with 1⅝-inch-long (41.28 mm), Type W, self-piercing tapping screws complying with ASTM C1002, spaced 24 inches (610 mm) on center vertically and 16 inches (406 mm) on center horizontally. The second layer of gypsum board must be installed with 2-inch-

long (50.8 mm), Type W, self-piercing tapping screws complying with ASTM C1002, spaced 12 inches (305 mm) on center vertically, in rows offset 12 inches (305 mm) from screws securing the first layer of gypsum board, and 16 inches (406 mm) on center horizontally, in rows offset 8 inches (203 mm) from screws securing the first layer of gypsum board. The vertical joints in the second layer of gypsum board must be offset a minimum of 16 inches (406 mm) from vertical joints of the first layer of gypsum board.

Exposed gypsum board joints must be covered with joint tape and joint compound and the exposed screw heads covered with joint compound in accordance with ASTM C840.

This fire-resistance-rated wall assembly is limited to 9 feet (2.7 m) in height and a maximum superimposed allowable axial compression load of 1,800 plf (26 kN/m).

4.2.6.2 One-hour Limited Load-bearing Wall Assembly: R-Control SIPs with a 6¹/₂- or 8¹/₄-inch thickness (165 or 210 mm) may be used to construct a one-hour fire-resistance-rated wall assembly. The SIPs have a maximum width of 4 feet (2.4 m). The SIP core is recessed 1¹/₂ inches (38 mm) from the bottom panel edge and 3 inches (76 mm) from the top panel edge. The recesses receive nominally 2-by-6 or 2-by-8 wood plates with a minimum 0.43 specific gravity, such as hem-fir, Grade No. 2. The SIP core is recessed 1¹/₂ inches (38 mm) on the vertical sides to receive nominally 2-by-6 or 2-by-8 wood splines.

The bottom plate must be connected to the SIPS by fastening through the SIP OSB facing with 8d box nails spaced 6 inches (152 mm) on center, on each side of the SIP. Two nominally 2-by-6 or 2-by-8 wood splines must be fastened together with 16d coated sinker nails, spaced 24 inches (609.6 mm) on center and staggered. R-Control Low VOC Do-All-Ply is applied to the splines as indicated in the figures of this report. The 2-by-6 or 2-by-8 wood splines must be connected to the SIPS by fastening through the SIP OSB facing with 8d box nails, spaced 6 inches (152 mm) on center.

The top plate must be two nominally 2-by-6 or 2-by-8 wood plates fastened together with 16d coated sinker nails, spaced 16 inches (406.4 mm) on center and staggered. R-Control Low VOC Do-All-Ply is applied to the splines as indicated in the figures of this report. The top plate must be connected to the SIPS by fastening through the SIP OSB facing with 8d box nails spaced 6 inches (152 mm) on center placed through the SIP facing.

Electrical chases, 1¹/₂ inches (38.1 mm) in diameter, are permitted to be located horizontally in the core of the SIP, 16 inches (406.4 mm) and 45 inches (1142 mm) above the bottom of the wall.

The SIP must be covered with one layer of 5/8-inch-thick (15.88 mm) Temple-Inland Type TG-C gypsum board applied vertically on each side and fastened with phosphate-coated, cupped-head drywall nails, 1⁵/₈ inches (41.28 mm) long, spaced 8 inches (203 mm) on center along the perimeter of the wallboard and 12 inches (305 mm) on center vertically and 16 inches (406.4 mm) on center horizontally in the field of the board. The exposed joints of the gypsum board must be covered with joint tape and compound, and the exposed nails must be covered with joint compound in accordance with ASTM C840.

The fire-resistance-rated wall assembly is limited to 10 feet (3 m) in height and a superimposed allowable axial compression load of 2,200 plf (32 kN/m).

4.2.6.3 One-hour Roof-ceiling Assembly: The one-hour fire-resistance-rated roof-ceiling assembly must comply with the following requirements.

1. Structural wood beams must be a minimum of 4¹/₂ inches wide by 9¹/₂ inches deep (114 mm by 241 mm) and must be spaced in accordance with the IBC or IRC, as applicable.
2. The roof covering material must comply with the IBC. The roof construction must comply as a Class A, B or C roof assembly.
3. R-Control SIPs must be 4¹/₂ inches to 12¹/₄ inches (114 mm to 286 mm) thick.
4. R-Control SIPs must be connected with nominally 2-inch lumber splines installed in the recessed core. The lumber depth must be sized to match the core and must be connected to the SIP by fastening through the OSB facing with 8d common nails spaced 6 inches (152 mm) on center.
5. Each exposed SIP edge must be covered with nominally 2-inch wood blocking installed in the recessed core and connected to the SIP by fastening through the OSB facing with 8d common nails spaced 6 inches (152 mm) on center.
6. Minimum 5/8-inch-thick (15.9 mm) gypsum board complying with ASTM C1396 must be installed in two layers on the underside of the SIPs and wood beams. The gypsum board's long dimension must be installed perpendicular to the wood beams. The first layer must be connected using 1¹/₄-inch-long (31.7 mm), Type S, bugle-head steel screws complying with ASTM C1002, spaced 8 inches (203 mm) on

center along the joints and in rows spaced 16 inches (406 mm) on center in the field. The joints of the first layer of gypsum board must be staggered from the joints of the SIPs. The second layer of gypsum board must be fastened using 2-inch-long (51 mm), bugle-head, Type W, self-piercing steel screws complying with ASTM C1002, spaced 8 inches (203 mm) on center along the board edges and in rows 12 inches (305 mm) on center in the field. The joints of the gypsum board second layer must be staggered from the joints of the gypsum board first layer.

7. Exposed gypsum board joints must be covered with paper tape and joint compound. Screw heads must be covered with joint compound in accordance with ASTM C840.

4.3 Special Inspections:

4.3.1 Where R-Control SIP shear walls are installed in buildings in IBC Seismic Design Categories C, D, E and F; Seismic Design Categories C, D₀, D₁, D₂ and E for townhouses under the IRC; or Seismic Design Categories D₀, D₁, D₂ and E for detached one- and two-family dwellings under the IRC, periodic inspections of the fastening and anchoring of the shear wall assembly within the seismic-force-resisting system must be provided. Inspection must include connections of the assemblies to drag struts and hold-downs, in accordance with 2018 and 2015 IBC Section 1705.11.1 or 1705.12.2, or 2012 IBC Section 1705.10.1 or 1705.11.2, unless these are exempted by IBC Section 1704.1.

5.0 CONDITIONS OF USE:

The R-Control SIPs as described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The SIPs are fabricated, identified, and erected in accordance with this report and the manufacturer's published installation instructions. If there is a conflict between this report and the manufacturer's instructions, the more restrictive governs.
- 5.2 Design loads to be resisted by the SIPs must be determined in accordance with the IBC or IRC, as applicable, and must not exceed the allowable loads noted in this report.
- 5.3 All construction documents specifying the SIPs must comply with the design limitations of this report. Design calculations and details for the specific applications must be furnished to the code official, verifying compliance with this report and applicable codes. Connections and attachments of the SIPs are outside the scope of this report and must be addressed in the design calculations and details. The transfer of vertical and lateral loads from the roof or floor diaphragm into the shear wall and from the shear wall to the foundation must be addressed in the calculations. When R-Control SIP shear walls are used in buildings that are more than one story tall, calculations and details must be submitted to the code official showing the load path for the transfer of lateral and overturning forces from the upper-story shear walls to the foundation. The documents must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4 R-Control SIPs and other wood elements must be installed as set forth in 2018 and 2015 IBC Section 2304.12.1; or 2012 IBC Section 2304.11.2; 2018, 2015, or 2012 IRC Section R317.1.
- 5.5 R-Control SIPs with thicknesses of 10¼ and 12¼ inches (260 and 311 mm) must be used only as roof or floor panels.
- 5.6 R-Control SIPs may be used as one-hour fire resistance-rated assemblies when constructed in accordance with Section 4.2.6.
- 5.7 The SIPs must be limited to use in buildings of Type V construction.
- 5.8 Wood-based materials, including SIP facings, must be protected from decay and termite damage in accordance with 2018 and 2015 IBC Sections 2304.12.1.2 and 2304.12.1.5; or 2012 IBC Sections 2304.11.2.2 and 2304.11.2.6; or 2018, 2015 and 2012 IRC Sections R317 and R318, as applicable.
- 5.9 When used as shear walls, the SIPs are recognized for use in Seismic Design Categories as provided for in [Table 4](#) of this report. Use of the panels as shear walls for buildings in Seismic Design Categories D through F, in combination with other types of lateral-force-resisting systems, is outside the scope of this report.
- 5.10 The SIPs and their attachments are subject to inspection by the code official prior to covering with an approved water-resistive barrier or approved roof covering.
- 5.11 Shear walls constructed of SIPs, used in buildings in Seismic Design Categories C through F, must be subject to special inspection in accordance with Section 4.3.2.

- 5.12 Justification must be submitted to the code official demonstrating that the R-Control SIPs with the roof covering comply as a Class A, B or C roof assembly as required by IBC Sections 1505 and 2603.6 or IRC Section R902.
- 5.13 Use of the panels in occupancies that require concentrated floor live loads under IBC Section 1607.4 is outside scope of this report.
- 5.14 The SIPs are manufactured by the listees noted in this report, at the locations specified in [Table 1](#), under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the [ICC-ES Acceptance Criteria for Sandwich Panels \(AC04\)](#), dated June 2019, including Appendix A of AC04.
- 6.2 Reports of fire-resistance tests of wall and roof-ceiling assemblies in accordance with ASTM E119.
- 6.3 Report of room corner tests in accordance with UL 1715.
- 6.4 Reports of diaphragm load tests in accordance with ASTM E455.
- 6.5 Reports of cyclic racking shear load testing in accordance with Appendix A of AC04.

7.0 IDENTIFICATION

- 7.1 Each R-Control SIP is marked with the report holder's name (Big Sky Insulations, Inc.); plant identification number (see [Table 1](#)); the product name (R-Control® SIPs); and the evaluation report number (ESR-4782).
- 7.2 R-Control SIPs with a Blazeguard FR Deckpanel A facer are also identified according to evaluation report [ESR-1365](#).
- 7.3 I-beam splines are labeled with the words “for use with R-Control SIPs (ESR-4782).”
- 7.4 R-Control SIP Screws are labeled with the words “for use with R-Control SIPs (ESR-4782).”
- 7.5 The report holder’s contact information is the following:

BIG SKY INSULATIONS, INC.
POST OFFICE BOX 838
15 ARDEN DRIVE
BELGRADE, MONTANA 59714
www.bigskycontrol.com

TABLE 1—MANUFACTURING LOCATIONS

LISTEE	LOCATION	PLANT ID NO.
Big Sky Insulations, Inc.	15 Arden Drive Belgrade, Montana 59714	BSI-1

TABLE 2—R-CONTROL SIP Weight (psf)

SIP Thickness (in.)	4 ¹ / ₂	6 ¹ / ₂	8 ¹ / ₄	10 ¹ / ₄	12 ¹ / ₄
Weight (psf)	3.2	3.4	3.6	3.8	4.0

For SI: 1 inch = 25.4 mm, 1 psf = 4.8 kg/m².

TABLE 3—ALLOWABLE AXIAL LOAD FOR R-CONTROL SIP WALLS^{1,2,3,4,5,6} (plf) (See Detail SIP-101c)

SIP HEIGHT (ft.)	4½ INCH THICK	6½ INCH THICK	8¼ INCH THICK
8 WAB ⁷	2,300	2,400	2,400
8	2,750	4,000	4,000
10	2,500	3,500	3,500
12	2,000	3,000	3,000
14	-	2,750	2,750
16	-	2,500	2,500

For **SI**: 1 inch = 25.4 mm, 1 ft. = 304.8 mm, 1 plf = 1.49 kg/m.

¹See detail SIP-101c, as shown in [Figure 1](#).

²Tabulated allowable axial load is the maximum uniform load (pounds per linear foot) applied concentrically to the full thickness of the SIPs, including facings, to the top. Eccentric axial loading to one face of the SIP is outside the scope of this report. The base of the SIPs must be fully bearing, including facings, on structural supports.

³Tabulated allowable axial load is based on a SIP with a maximum height to width ratio of 4:1.

⁴For fire-resistance-rated wall assemblies, axial load limitations in Section 4.2.6 must be observed.

⁵For combined loading, the requirements in Section 4.1 must be applied.

⁶The maximum allowable axial load is limited to 71 percent of the reported allowable axial load when used as shear walls.

⁷Tabulated values for 8 foot high weak axis bearing (WAB) are applicable to SIPs installed with the strong axis of the OSB facings perpendicular to the SIP height.

TABLE 4—ALLOWABLE LATERAL IN-PLANE RACKING SHEAR LOAD FOR SHEAR WALL ASSEMBLIES CONSISTING OF R-CONTROL SIPs JOINED WITH SPLINES^{1,2,3,4}

SPLINE TYPE ⁵	Bottom Plate	Top Plate	End Posts	NAIL TYPE ⁶ (Length x Shank Dia. x Head Dia., in.)	NAIL SPACING	ALLOWABLE LOADS ⁴ (plf)
SURFACE or BLOCK ^{7,8,9}	Single 2-by	Single 2-by	Double 2-by or Single 4-by	8d box (2½" x 0.113" Φ x 0.281" Φ)	Single row at 6" o.c.	335 plf
4X LUMBER ^{7,8}	Single 4-by	Single 4-by	Double 2-by or Single 4-by	8d cooler (2¾" x 0.113" Φ x 0.281" Φ)	Two staggered rows, 6" o.c. (12" o.c. each row).	360 plf
LUMBER BLOCK ⁷	Single 4-by	Single 4-by	Double 2-by or Single 4-by	8d cooler (2¾" x 0.113" Φ x 0.281" Φ)	Two staggered rows, 4" o.c. (8" o.c. each row).	540 plf
4X LUMBER ⁷	Single 4-by	Single 4-by	Double 2-by or Single 4-by	8d cooler (2¾" x 0.113" Φ x 0.281" Φ)	Two staggered rows, 4" o.c. (8" o.c. each row).	540 plf
4X LUMBER ⁷	Single 4-by	Single 4-by	Double 2-by or Single 4-by	8d cooler (2¾" x 0.113" Φ x 0.281" Φ)	Two staggered rows, 3" o.c. (6" o.c. each row).	720 plf
4X LUMBER ⁷	Single 4-by	Single 4-by	Double 2-by or Single 4-by	8d cooler (2¾" x 0.113" Φ x 0.281" Φ)	Two staggered rows, 2" o.c. (4" o.c. each row).	920 plf

For **SI**: 1 inch = 25.4 mm, 1 plf = 14.59 N/m.

¹See details SIP- 101c, SIP101f, SIP-102, SIP-102k, and SIP-102m, as shown in [Figures 1, 2, 3, 7](#) and [8](#), respectively. Framing lumber must be minimum Spruce-pine-fir No. 2 or better.

²End posts and splines must be framed to provide full end bearing in accordance with IBC Section 2304.9.7. OSB facings must be fully bearing on structural supports. A hold-down device must be attached to the vertical studs at each end of the shear wall assembly. Installation of the hold-down devices must be in accordance with the hold-down device manufacturer's instructions and as designed by the registered design professional.

³Top-of-wall horizontal in-plane drift (deflection) of R-Control SIP shear wall assemblies is 1/8 inch at the tabulated allowable lateral load.

⁴The tabulated allowable racking shear loads are for panels installed with the strong axis of the OSB panel facings parallel to the wall height.

⁵Splines must be as described in Section 3.2.4 of this report.

⁶The minimum fastener edge distance is ¾-inch. Nails shall be installed on both sides of spline joint, bottom plate, top plate, and vertical boundary members (end posts) of the SIP shearwall. Nails must comply with ASTM F1667 and have a minimum bending yield strength of 100 ksi (689 MPa). For nails installed into the shearwall perimeter (top plate, bottom plate and end posts), the first row of nails must be ¾-inch from the sandwich panel edges and the second row must be 1½ inches from the first row. For nails installed into the vertical splines, the rows of nails must be installed as shown in [Figure 7](#) of this report.

⁷This installation is recognized for use in Seismic Design Categories A through C. The maximum shear wall height-to-width ratio is 2:1.

⁸This installation configuration is also recognized for use as both load-bearing and nonload-bearing shearwalls in Seismic Design Categories D, E and F with the seismic design coefficients of R = 6.5, Ω_o = 3.0, and C_d = 4.0 under the following provisions:

- a. The maximum shear wall height-to-width ratio is 1:1.
- b. The shear walls are supported by a rigid support, such as a concrete foundation.
- c. The wall panels must be installed in a manner such that both facings of the wall panels are equally and uniformly restrained at the top and bottom of the panels. The member, element or structure supporting the shear wall and the vertical restraint provided to the facers of the SIPs at the top and bottom of the wall panel must be designed and detailed by a registered design professional.
- d. When used as load-bearing panels, the allowable axial load must be determined in accordance with [Table 3](#) of this report.

⁹The following provisions must be considered when R-Control SIPs are used as both load-bearing and nonload-bearing shear walls panels in Seismic Design Categories A, B, C, D, E and F with the seismic design coefficients of R = 6.5, Ω_o = 3.0, and C_d = 4.0 and have a maximum shear wall height-to-length ratio of 3.5:1:

- a. The maximum shear wall height is 96 inches. Wall heights greater than 96 inches are outside the scope of this report.
- b. The shear walls are supported by a rigid support, such as a concrete foundation.
- c. The shear walls must be installed in a manner such that both facings of the shear wall panels are equally and uniformly restrained at the top and bottom of the shear wall panels. The member, element or structure supporting the shear wall panels and the vertical restraint provided to the facers of the SIPs at the top and bottom of the shear wall panels must be designed and detailed by a registered design professional.
- d. No splines permitted in shear wall assembly.

TABLE 5—ALLOWABLE TRANSVERSE LOAD FOR R-CONTROL SIP WALLS WITH SURFACE, BLOCK, OR LUMBER BLOCK SPLINES^{1,2,3,4} (psf)

SIP THICKNESS (in.)	DEFLECTION LIMITS ⁵	SIP HEIGHT (ft.)					
		8	8 WAB ⁶	10	12	14	16
4 ¹ / ₂	L _{/360}	30	30	22	17	—	—
	L _{/240}	46	40	33	25	—	—
	L _{/180}	56	40	45	34	—	—
	Strength	56	40	45	38		
6 ¹ / ₂	L _{/360}	48	40	36	28	22	18
	L _{/240}	56	40	45	38	32	27
	L _{/180}	56	40	45	38	32	28
	Strength	56	40	45	38	32	28
8 ¹ / ₄	L _{/360}	56	40	45	38	32	25
	L _{/240}	56	40	45	38	32	28
	L _{/180}	56	40	45	38	32	28
	Strength	56	40	45	38	32	28

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 4.88 kg/m²

¹See details SIP-101c, SIP-102, SIP-102g, and SIP-102m, as shown in [Figures 1, 3, 6](#) and [8](#), respectively.

²At panel ends, each OSB facing must be fastened to solid lumber sills and plates (minimum specific gravity of 0.42) end with 0.113 inch diameter by 2.5 inch long (8d box) nails spaced at 6 inches on center on both faces of the panels. The sills and plates must be connected to structural supports. Connection specifications, design and installation must be in accordance with the IBC and applicable ESRs.

³Tabulated values are uniformly applied loads and are based on the strong-axis of the facing material oriented parallel to the span direction, except as stated in footnote 6.

⁴Values apply to short duration seismic or wind loads only.

⁵Deflection limit must be selected by building designer based on the serviceability (deflection) requirements of the structure (IBC Section 1604.3).

⁶Tabulated values for 8 foot high weak axis bearing (WAB) are applicable to SIPs installed with the strong axis of the OSB facings perpendicular to the SIP height.

TABLE 6—ALLOWABLE TRANSVERSE LOAD FOR R-CONTROL SIP FLOORS AND ROOFS WITH SURFACE, BLOCK, OR LUMBER BLOCK SPLINES^{1,2,3,4,5,6,7} (psf)

SIP THICKNESS (in.)	DEFLECTION LIMITS ⁴	SIP SPAN (ft.)				
		4	6	8	10	12
4 ¹ / ₂	L _{/360}	69	44	30	22	—
	L _{/240}	104	65	46	33	—
	L _{/180}	127	85	61	45	—
	Strength	127	85	61	45	—
6 ¹ / ₂	L _{/360}	105	67	48	36	—
	L _{/240}	131	88	66	53	—
	L _{/180}	131	88	66	53	—
	Strength	131	88	66	53	—
8 ¹ / ₄	L _{/360}	135	88	63	48	38
	L _{/240}	135	90	68	54	45
	L _{/180}	135	90	68	54	45
	Strength	135	90	68	54	45
10 ¹ / ₄	L _{/360}	140	92	69	55	46
	L _{/240}	140	92	69	55	46
	L _{/180}	140	92	69	55	46
	Strength	140	92	69	55	46
12 ¹ / ₄	L _{/360}	138	92	69	55	46
	L _{/240}	138	92	69	55	46
	L _{/180}	138	92	69	55	46
	Strength	138	92	69	55	46

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 4.88 kg/m².

¹See details SIP-102, SIP-102g, or SIP-102m, as shown in [Figures 3, 6](#) and [8](#), respectively.

²SIPs must be single span, simply supported and have a minimum 1¹/₂-inch wide continuous bearing support at each end.

³Tabulated allowable transverse load is the maximum load (pounds per square foot) applied uniformly.

⁴The tabulated allowable transverse load is the lesser of the allowable load based on the applicable serviceability (deflection) limit (IBC Section 1604.3) or the strength limit (IBC Section 1604.2) using a factor of safety of three.

⁵Roofs must be designed to support a 300 lb. concentrated load according to IBC Section 1607.4 when the roof has access to maintenance workers.

⁶Values do not include dead weight of panels. Permanent loads, such as dead load, must not exceed 0.5 of the tabulated load.

⁷Tabulated values for 8 foot spans are applicable to SIPs installed with the strong axis of the OSB facings parallel or perpendicular to the SIP span.

TABLE 7—ALLOWABLE TRANSVERSE LOAD FOR R-CONTROL SIP, FLOORS AND ROOFS WITH DOUBLE 2x WOOD MEMBER SPLINES^{1,2,3,4,5,6} (psf)

SIP THICKNESS (in.)	LIMITS	PANEL SPAN (ft.)							
		10	12	14	16	18	20	22	24
6 1/2	L _{/360}	53	40	30	24	19	15	—	—
	L _{/240}	79	59	45	35	28	22	—	—
	L _{/180}	105	79	60	47	37	30	—	—
	Strength	105	88	75	66	59	51	—	—
8 1/4	L _{/360}	89	65	48	37	28	22	—	—
	L _{/240}	109	91	72	55	42	33	—	—
	L _{/180}	109	91	78	68	57	44	—	—
	Strength	109	91	78	68	60	54	—	—
10 1/4	L _{/360}	150	111	84	65	51	41	33	27
	L _{/240}	174	145	124	98	77	61	49	40
	L _{/180}	174	145	124	109	87	82	66	54
	Strength	174	145	124	109	87	87	79	73
12 1/4	L _{/360}	177	148	115	89	70	56	45	37
	L _{/240}	177	148	127	111	99	84	68	55
	L _{/180}	177	148	127	111	99	89	81	74
	Strength	177	148	127	111	99	89	81	74

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 4.88 kg/m.

¹See detail SIP-102d, as shown in [Figure 5](#).

²Double 2x lumber splines must be continuous full length minimum spruce-pine-fir, minimum No. 2 grade, except the lumber must be Douglas fir-larch, minimum No. 2 grade, for 12 1/4 inch thick SIPs for all spans and 10 1/4-inch-thick SIP panels spanning greater than 22 ft.

³SIPs must be single span, simply supported and have a minimum 1 1/2-inch wide continuous bearing support at each end.

⁴Tabulated allowable transverse load is the maximum load (pounds per square foot) applied uniformly.

⁵The tabulated allowable transverse load is the lesser of the allowable load based on the applicable serviceability (deflection) limit (IBC Section 1604.3) or the strength limit (IBC Section 1604.2) using a factor of safety of 3.

⁶Roofs must be designed to support a 300 lb. concentrated load according to IBC Section 1607.4 when the roof has access to maintenance workers.

TABLE 8—ALLOWABLE TRANSVERSE LOAD FOR R-CONTROL SIP, FLOORS AND ROOFS WITH I-BEAM SPLINES^{1,2,3,4,5,6} (psf)

SIP THICKNESS (in.)	LIMITS	SIP SPAN (ft.)							
		10	12	14	16	18	20	22	24
10 1/4	L _{/360}	118	98	73	55	42	33	26	21
	L _{/240}	118	98	84	74	63	49	39	31
	L _{/180}	118	98	84	74	65	59	49	41
	Strength	118	98	84	74	65	59	49	42
12 1/4	L _{/360}	131	109	87	69	55	45	37	30
	L _{/240}	131	109	93	82	72	65	55	46
	L _{/180}	131	109	93	82	72	65	57	48
	Strength	131	109	93	82	72	65	57	48

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 4.88 kg/m².

¹See detail SIP-102b, as shown in [Figure 4](#).

²I-beam splines must be continuous full length.

³SIPs must be single span, simply supported and have a minimum 1 1/2-inch wide continuous bearing support at each end.

⁴Tabulated allowable transverse load is the maximum load (pounds per square foot) applied uniformly.

⁵The tabulated allowable transverse load is the lesser of the allowable load based on the applicable serviceability (deflection) limit (IBC Section 1604.3) or the strength limit (IBC Section 1604.2) using a factor of safety of three.

⁶Roofs must be designed to support a 300 lb. concentrated load according to IBC Section 1607.4 when the roof has access to maintenance workers.

TABLE 9—ALLOWABLE SHEAR LOAD FOR R-CONTROL SIPs ROOF AND FLOOR PANEL DIAPHRAGM ASSEMBLIES WITH SUPPORT FRAMING OF DOUGLAS FIR–LARCH OR SOUTHERN PINE FOR WIND OR SEISMIC LOADING^{1,2,3,4,5,6}

SIP THICKNESS (in.)	FASTENER SPACING (in.)				MAXIMUM ASSEMBLY LENGTH (ft.) AND ASPECT RATIO	ALLOWABLE STRENGTH (plf)	APPARENT SHEAR STIFFNESS, G _a , (lbf/in.)
	Boundaries ³		Splines ⁴	Panels to Supports Parallel to Shear ⁵			
	R-Control Screws	8d Box Nails	8d Box Nails	R-Control Screws			
6 ¹ / ₂ to 12 ¹ / ₄	6	3 @ top and bottom	3, in two rows each side of joint and staggered	12	36, 3:1	500	12,900
6 ¹ / ₂ to 12 ¹ / ₄	4	3 @ top and bottom	3, in two rows each side of joint and staggered	12	36, 3:1	750	9,500
6 ¹ / ₂ to 12 ¹ / ₄ ⁶	3	3 @ top and bottom	3, in two rows each side of joint and staggered	12	24, 3:1	850	35,100

For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 plf = 14.6 N/m, 1 lbf/in = 0.175 N/mm, 1 psi = 6895 Pa.

¹See details SIP-139, SIP-140, and SIP-141, as shown in [Figures 13, 14](#) and [15](#), respectively.

²Deflections at mid-span of a simply supported diaphragm must be computed in accordance with the following equation:

$$\delta = \frac{5vL^3}{8EAW} + \frac{0.25 vL}{1,000G_a} + \frac{\Sigma(x\Delta_c)}{2W}$$

where:

E = Modulus of elasticity of diaphragm chords, psi (Pa)

A = Area of chord cross-section, in.², (mm²)

G_a = Apparent diaphragm shear stiffness from nail slip and panel shear deformation, lbf/in. (N/mm)

L = Diaphragm length, ft. (m)

v = Induced unit shear in diaphragm, lbf/ft (N/m)

W = Diaphragm width, ft. (m)

x = Distance from chord splice to nearest support, in. (mm)

Δ_c = Diaphragm chord splice slip at the induced unit shear in diaphragm, in. (mm)

δ = Maximum mid-span diaphragm deflection determined by elastic analysis, in. (mm)

³Diaphragm boundary elements must consist of full-depth, solid-sawn lumber, 2-inch minimum nominal width, minimum specific gravity of 0.50, inserted in SIP core, continuous across panel joints. Additionally, the diaphragm boundary elements must be supported by a continuous lumber member having a minimum 4-inch nominal width and minimum 3-inch nominal depth, minimum specific gravity of 0.50, and must be secured to the support member with the R-Control screws at the tabulated spacing and a minimum 1¹/₈ inch penetration into the receiving member.

⁴Nails connect SIP facings at joints perpendicular to shear to 7¹/₁₆-in. x 4-in. OSB surface splines located under top face at all panel edges, at the tabulated spacing.

⁵Panel edges parallel to applied shear shall be supported with solid-sawn lumber, 4-inch minimum nominal width, and minimum specific gravity of 0.50, secured with screws as tabulated above.

⁶SIP ends perpendicular to spans must be staggered from adjacent panels.

TABLE 10—ALLOWABLE VERTICAL LOAD FOR R-CONTROL SIP HEADERS^{1,2,3,4,5,6,7} (plf)

SIP HEADER DEPTH (in.)	LIMITS	HEADER SPAN (ft.)		
		4	6	8
12	L _{/480}	524	319	218
	L _{/360}	703	374	248
	L _{/240}	708	374	248
	Strength	708	374	248
18	L _{/480}	762	466	351
	L _{/360}	773	466	351
	L _{/240}	773	466	351
	Strength	773	466	351
24	L _{/480}	837	577	455
	L _{/360}	837	577	455
	L _{/240}	837	577	455
	Strength	837	577	455

For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 plf = 14.59 N/m.

¹See details SIP-112, SIP-113 and SIP-114, as shown in [Figures 9, 10](#) and [11](#), respectively.

²Tabulated allowable load is the maximum load (pounds per square foot) applied uniformly.

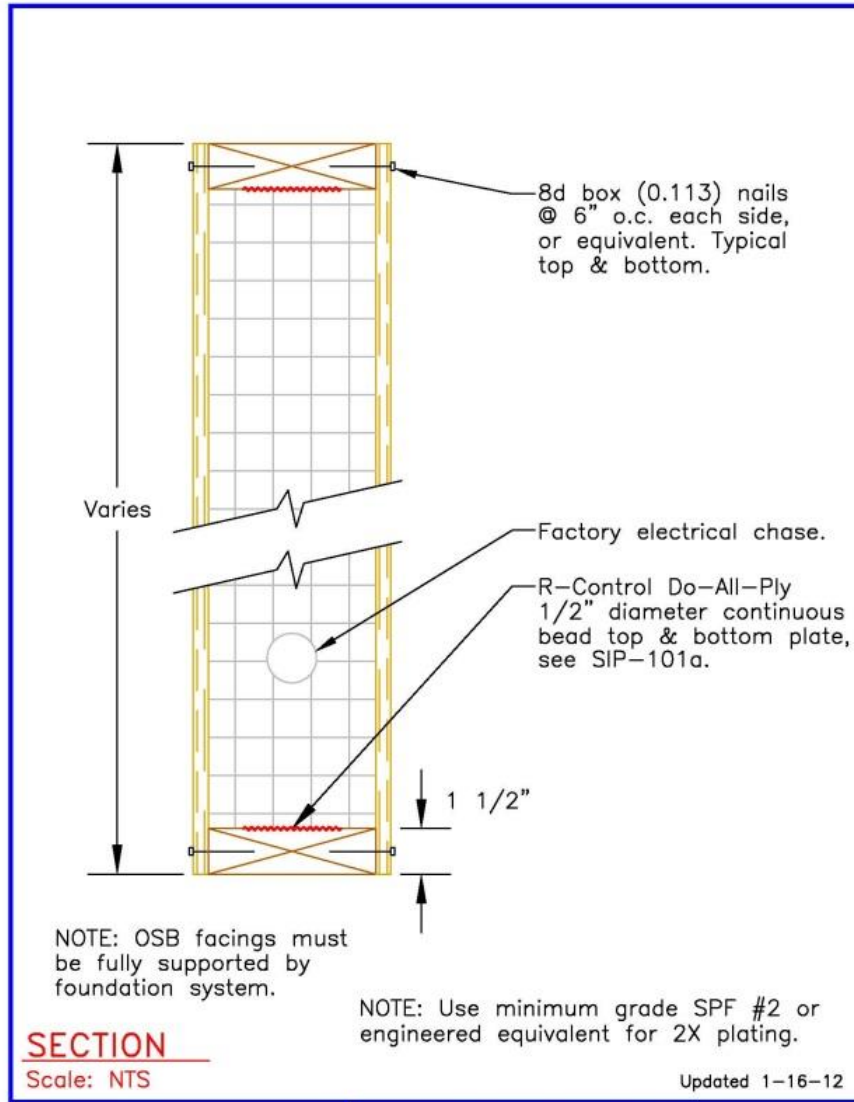
³Headers are permitted to have splines at supported ends. Alternatively, the header may be continuous without splines.

⁴Top and bottom plates must have a minimum assigned specific gravity of 0.50, such as Douglas fir–larch, and minimum No. 2 grade. The nominally 2-inch-thick wood top plate must have a width equal to the SIP core thickness and be recessed into the pre-cut channel in the top of the header.

⁵Concentrated loads superimposed on SIP wall headers must be supported by conventional construction methods or by other methods designed and constructed to support the governing load combination defined in IBC Section 1605.3 without exceeding the appropriate specified allowable stresses for the materials of construction.

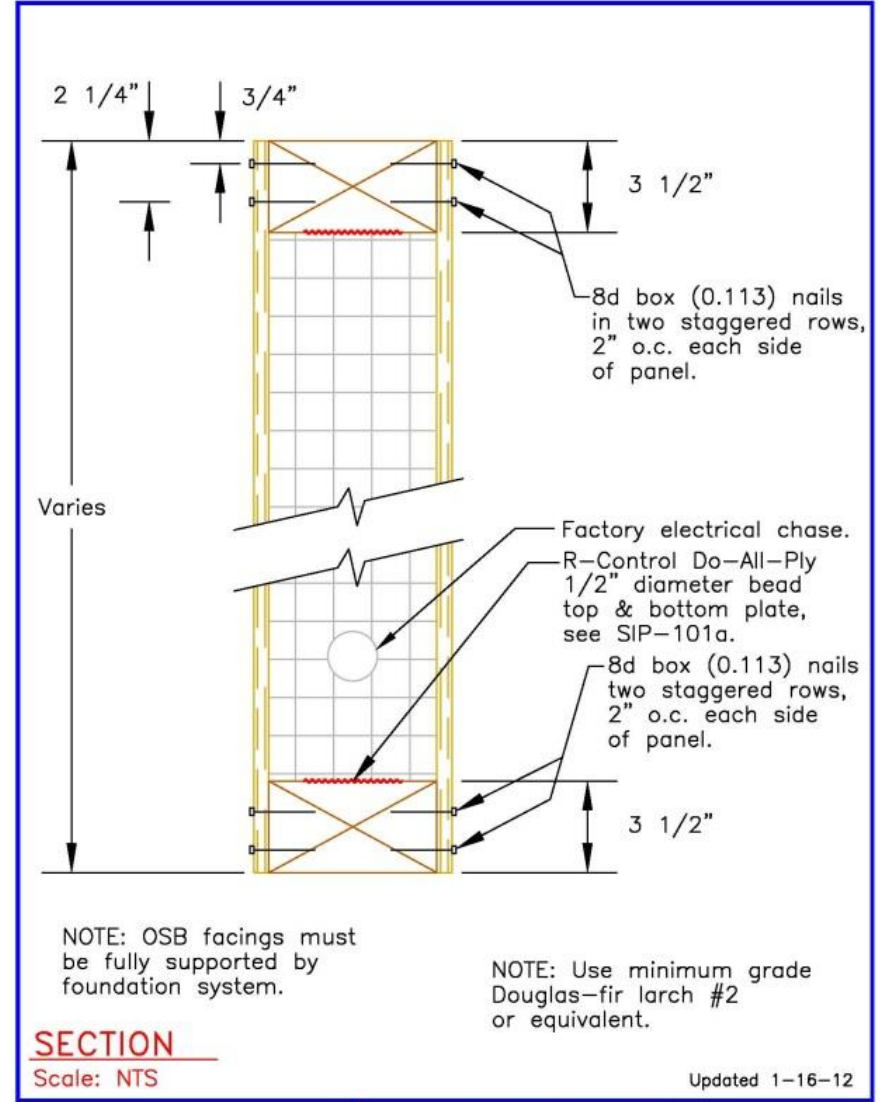
⁶The tabulated allowable vertical load is the lesser of the allowable load based on the applicable serviceability (deflection) limit (IBC Section 1604.3) or the strength limit (IBC Section 1604.2) using a factor of safety of three.

⁷Vertical members supporting each end of the SIP headers must be designed for the tributary vertical (gravity) and transverse (wind) loads carried by SIP headers.



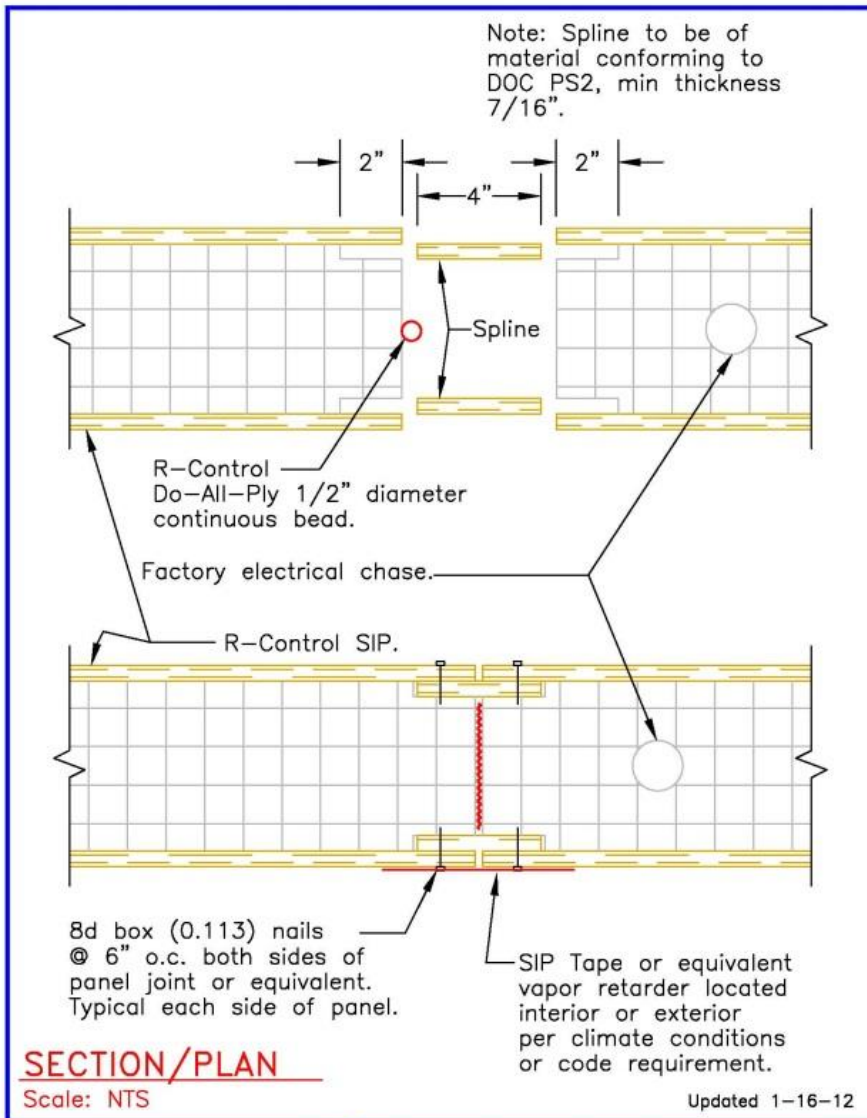
R-Control® SIP	
TITLE: Plate Connections	NO. SIP-101c

FIGURE 1



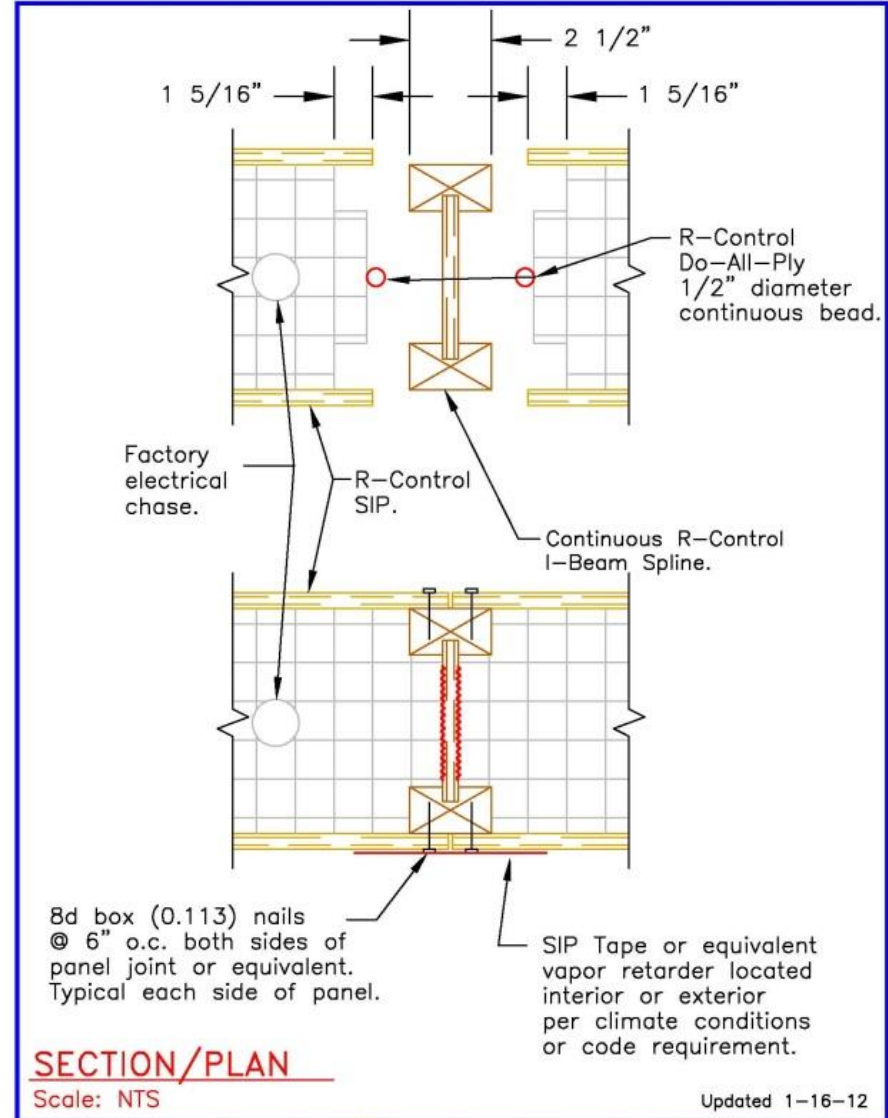
R-Control® SIP	
TITLE: High Load Shear Wall 4X Plate Connections	NO. SIP-101f

FIGURE 2



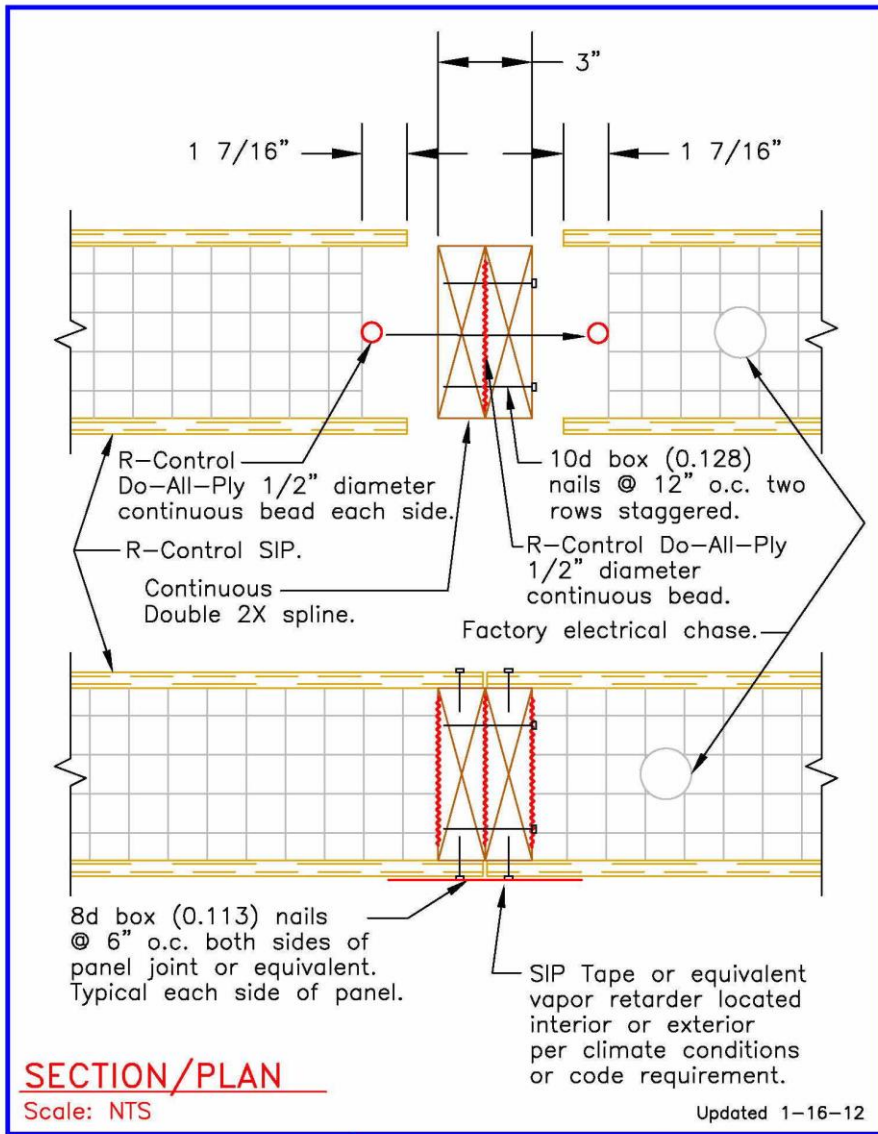
R-Control® SIP	
TITLE: Spline Connection Surface Spline	NO. SIP-102

FIGURE 3



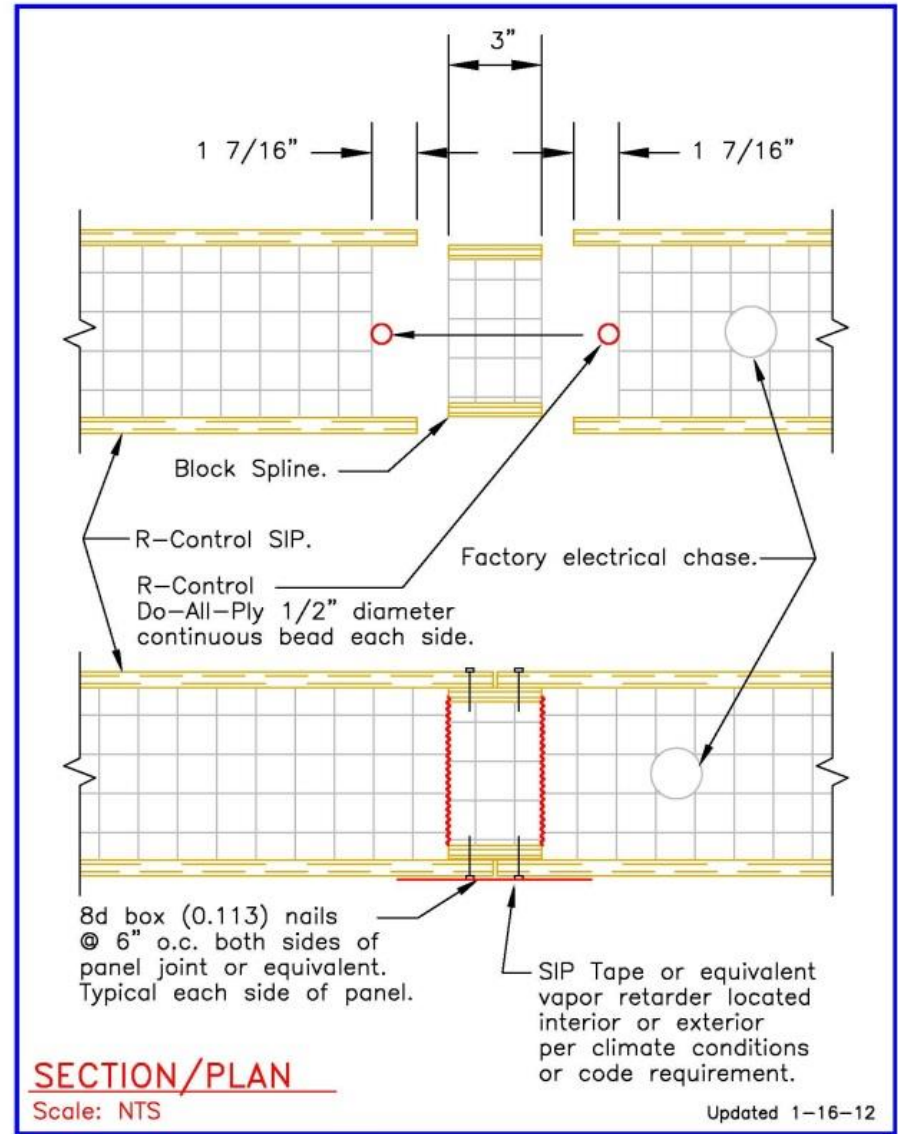
R-Control® SIP	
TITLE: Spline Connection I-Beam Spline	NO. SIP-102b

FIGURE 4



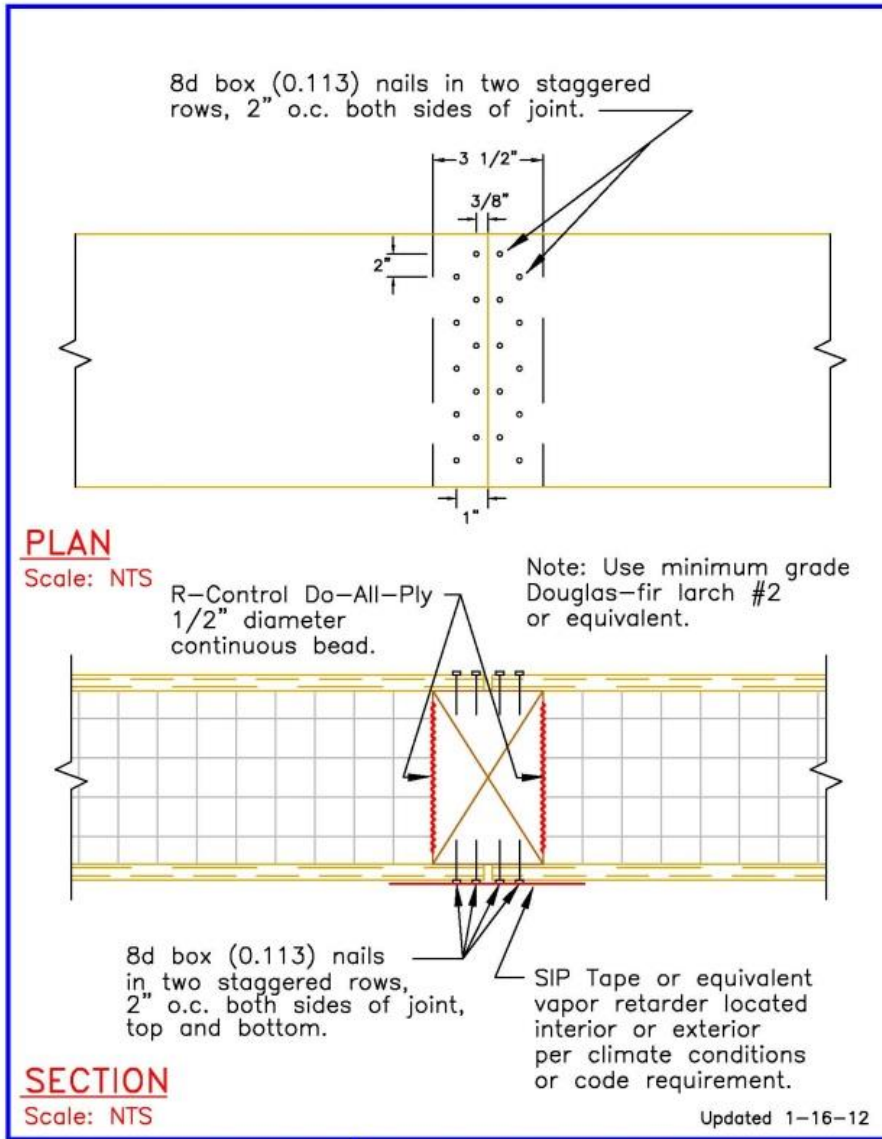
R-Control® SIP	
TITLE: Spline Connection Double 2X	NO. SIP-102d

FIGURE 5



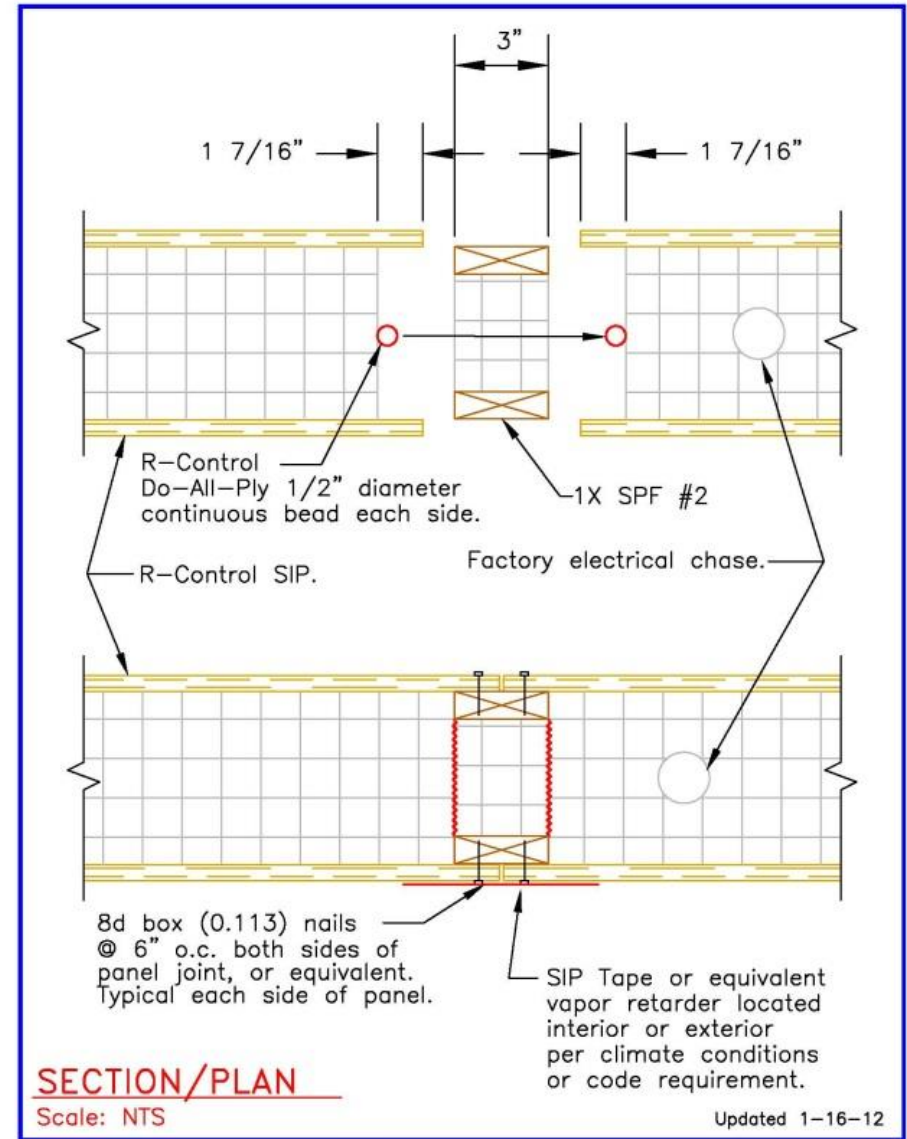
R-Control® SIP	
TITLE: Spline Connection Block Spline	NO. SIP-102g

FIGURE 6



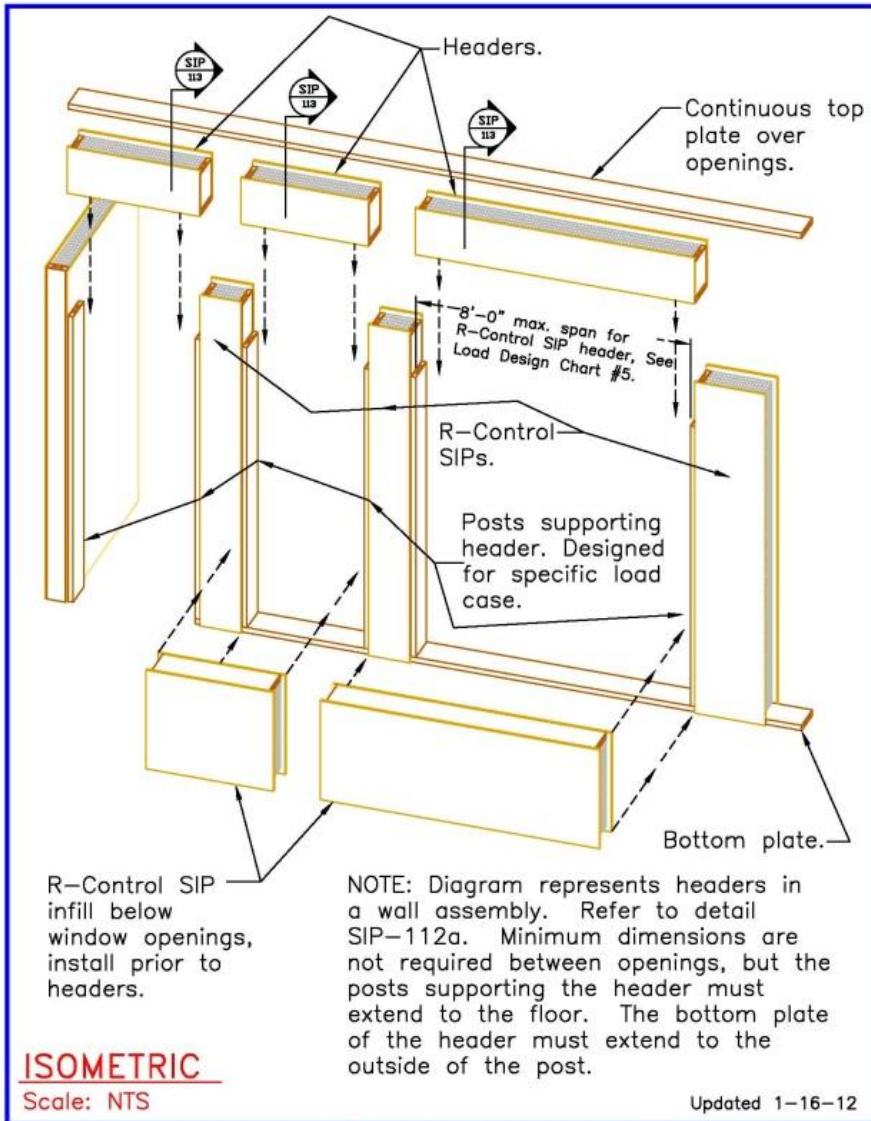
R-Control® SIP	
TITLE: Spline Connection 4X - 2" o.c.	NO. SIP-102k

FIGURE 7



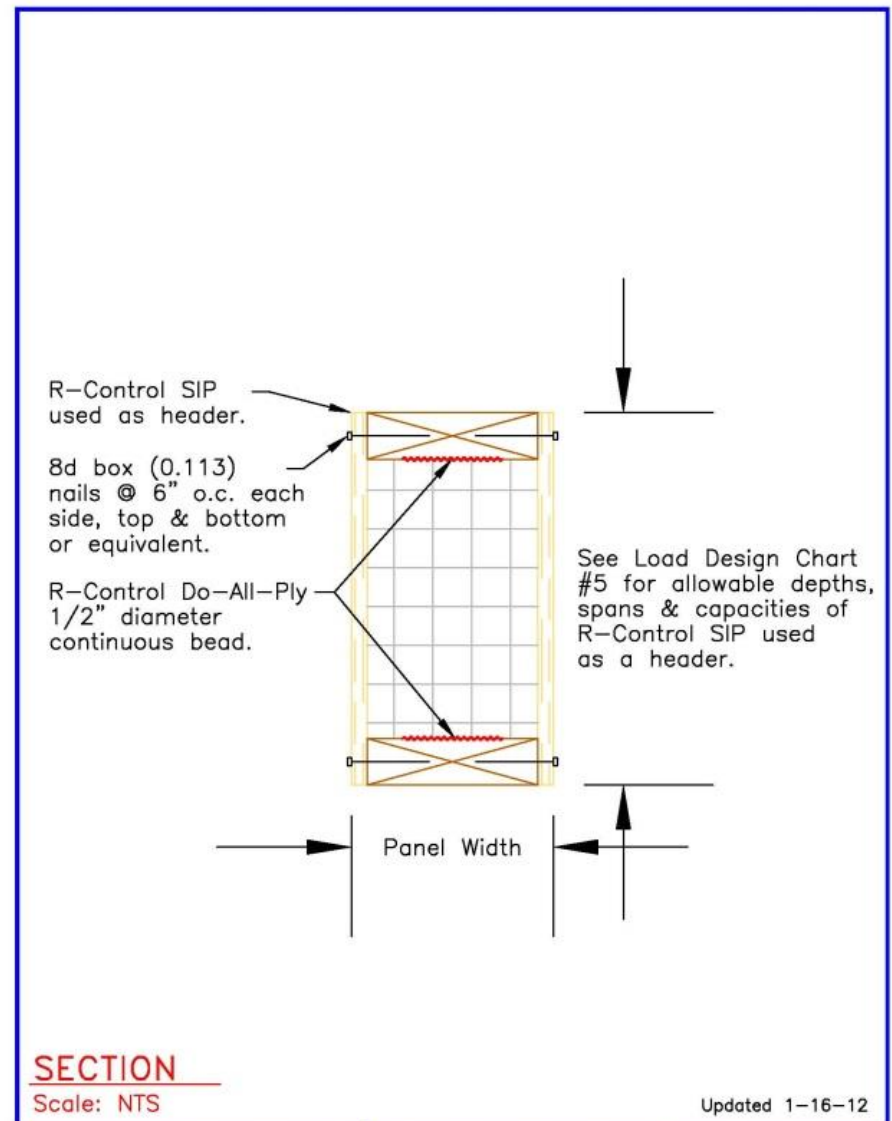
R-Control® SIP	
TITLE: Spline Connection 1X Lumber Block	NO. SIP-102m

FIGURE 8



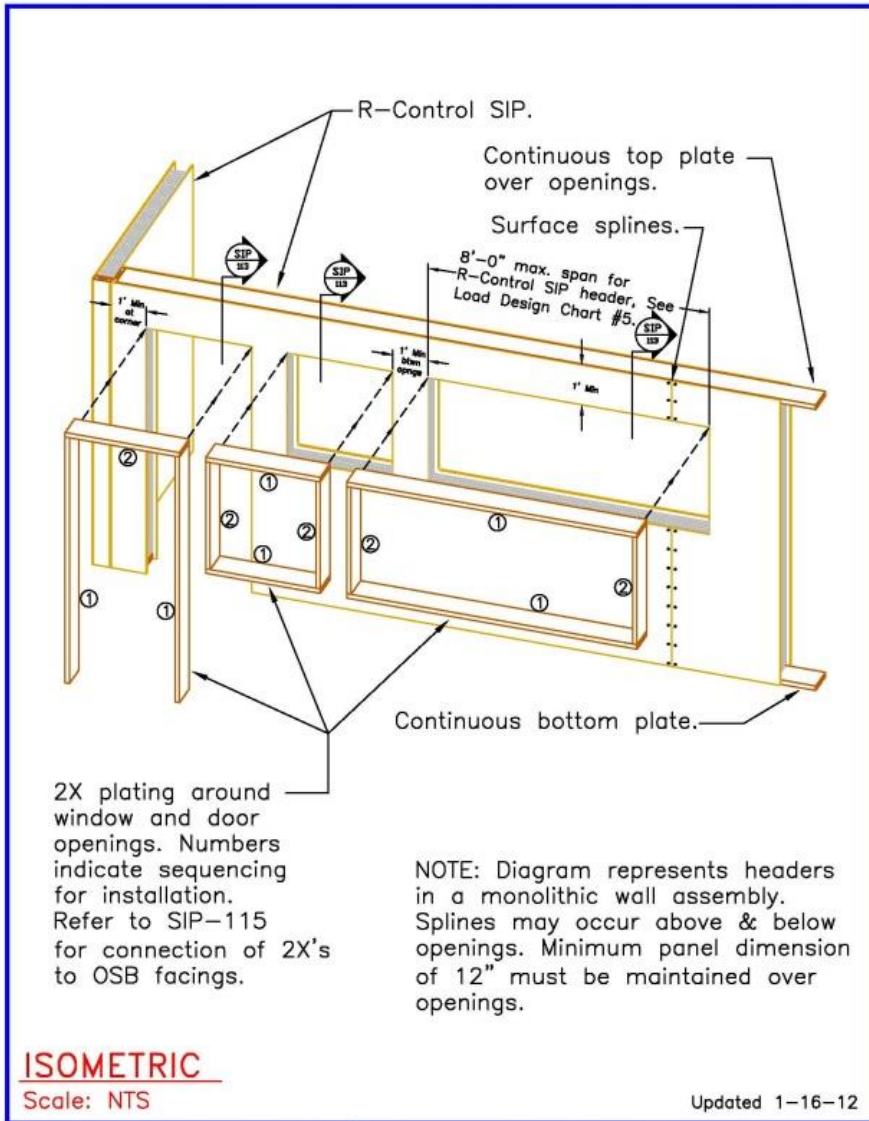
R-Control [®] SIP	
TITLE: Headers	NO. SIP-112

FIGURE 9



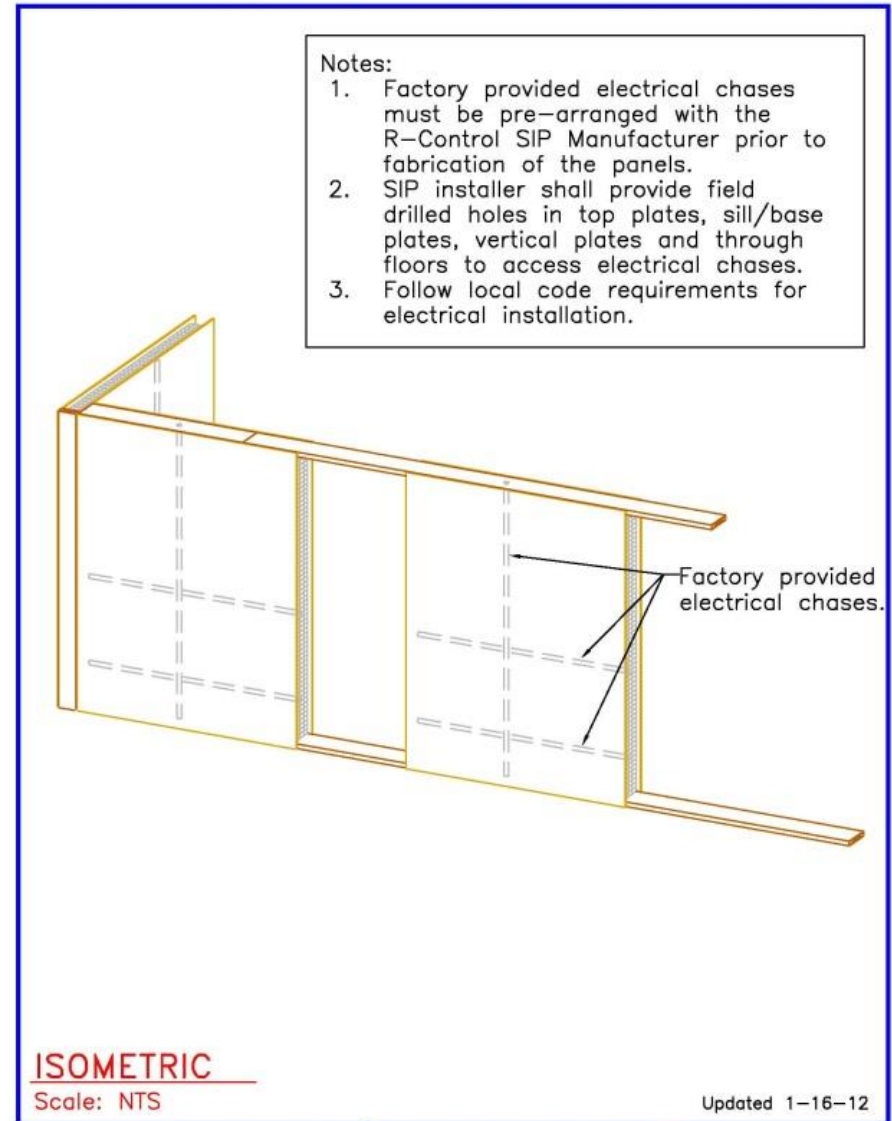
R-Control [®] SIP	
TITLE: SIP Header Plates	NO. SIP-113

FIGURE 10



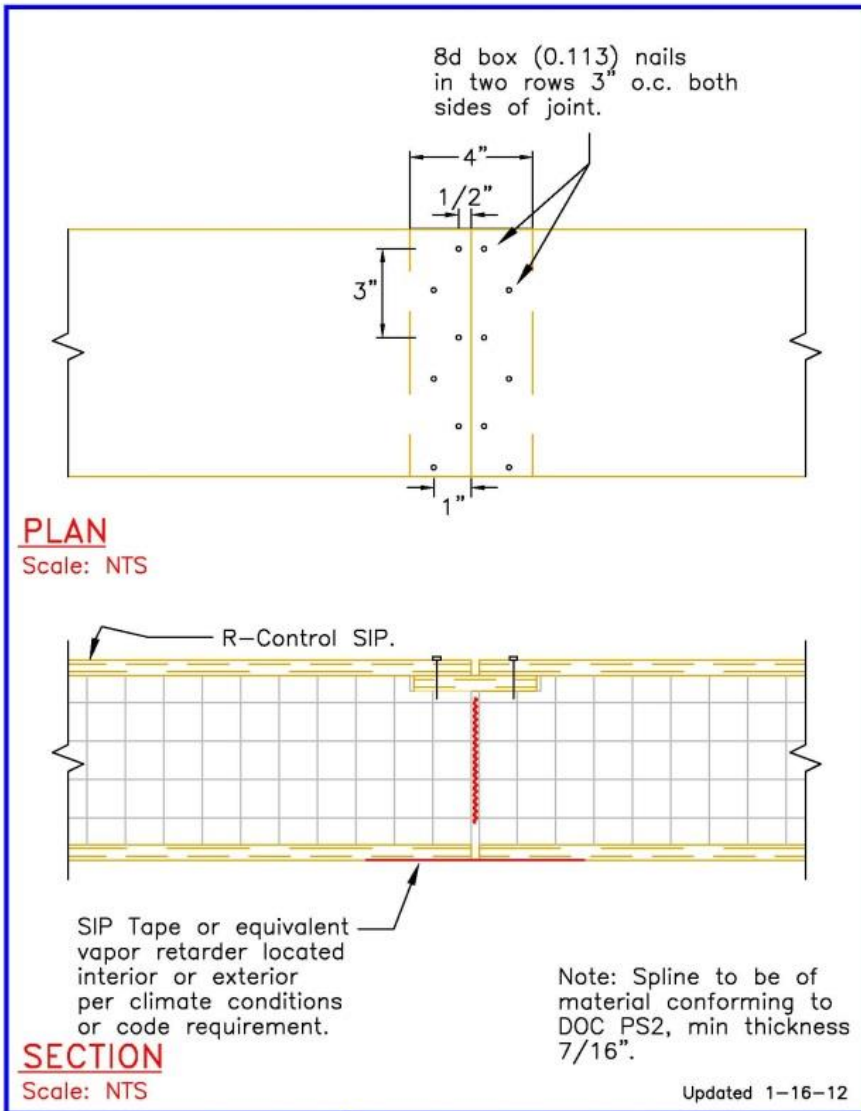
R-Control[®] SIP	
TITLE: SIP Header	NO. SIP-114

FIGURE 11



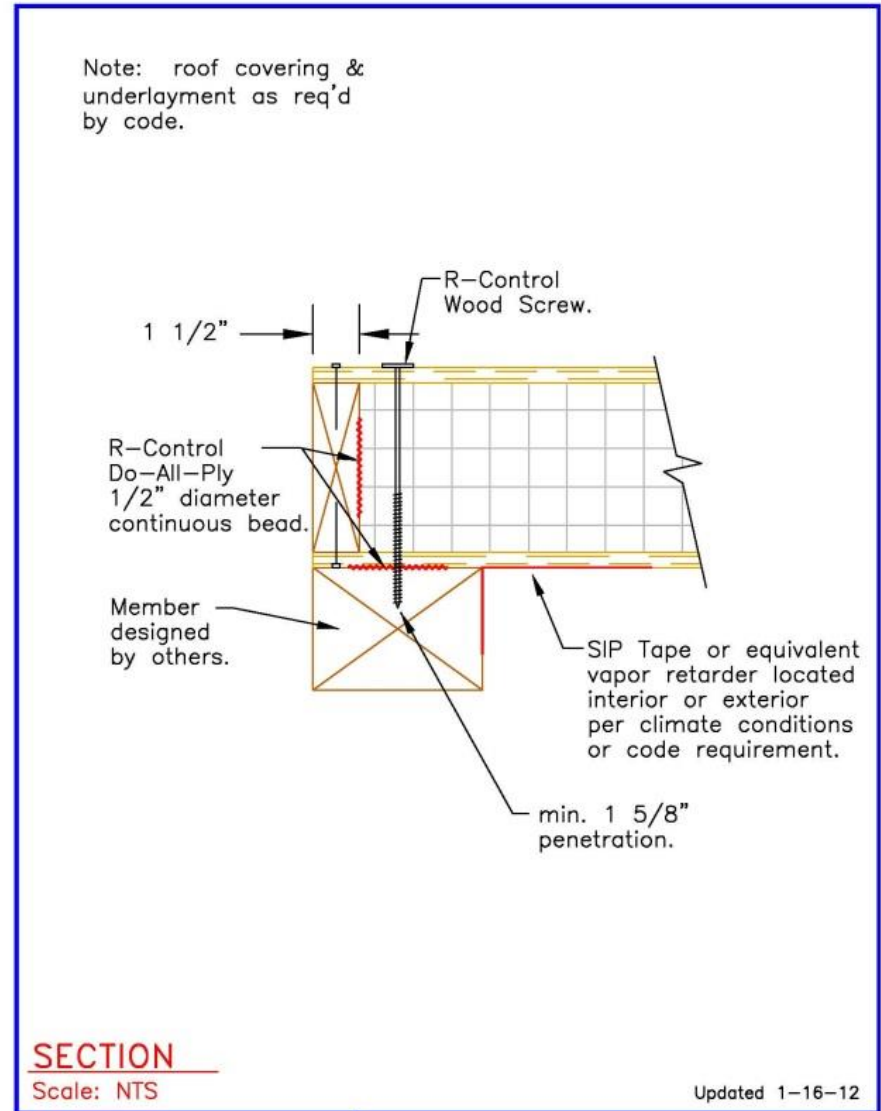
R-Control[®] SIP	
TITLE: Chase - Locations In SIP	NO. SIP-129

FIGURE 12



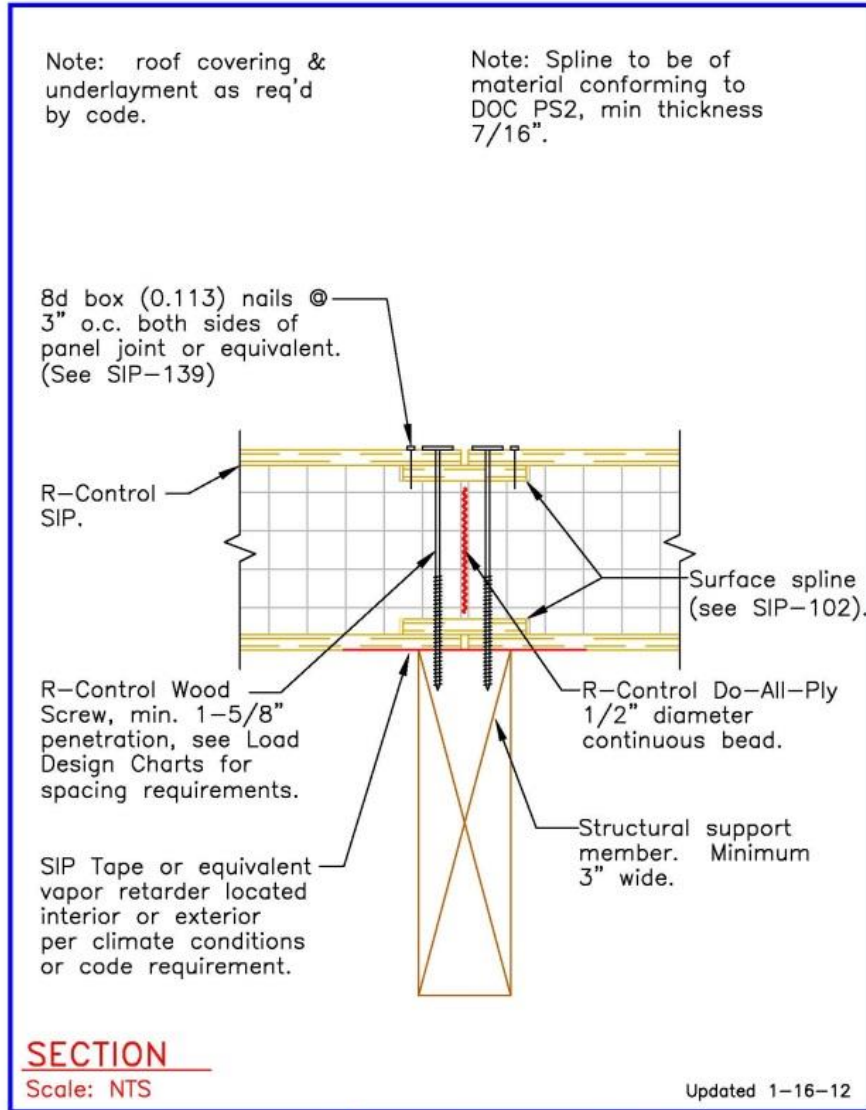
R-Control® SIP	
TITLE: Diaphragm Connection - Top Spline Only	NO. SIP-139

FIGURE 13



R-Control® SIP	
TITLE: Diaphragm Connection - Support Member	NO. SIP-140

FIGURE 14



R-Control® SIP	
TITLE: Diaphragm Connection - Intermediate support	NO. SIP-141

FIGURE 15

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 12 00—Structural Panels

REPORT HOLDER:**BIG SKY INSULATIONS, INC****EVALUATION SUBJECT:****R-CONTROL® STRUCTURAL INSULATED PANELS (SIPs)****1.0 REPORT PURPOSE AND SCOPE****Purpose:**

The purpose of this evaluation report supplement is to indicate that R-Control® Structural Insulated Panels (SIPs), described in ICC-ES evaluation report [ESR-4782](#), have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2020 *City of Los Angeles Building Code* (LABC)
- 2020 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The R-Control® Structural Insulated Panels (SIPs), described in Sections 2.0 through 7.0 of the evaluation report [ESR-4782](#), comply with the LABC Chapters 7, 23 and 26, and the LARC, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The R-Control® Structural Insulated Panels (SIPs), described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-4782](#).
- The design, installation, conditions of use and identification are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-4782](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16, and 17, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

This supplement expires concurrently with the evaluation report, reissued March 2024 and revised June 2024.