

ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

DIVISION:06—WOOD AND PLASTICS
Section:06120—Structural Panels

DIVISION:07—THERMAL AND MOISTURE PROTECTION
Section:07210—Building Insulation
Section:07220—Roof and Deck Insulation

REPORT HOLDER:

AFM CORPORATION
211 RIVER RIDGE CIRCLE, #102
BURNSVILLE, MINNESOTA 55337
www.r-control.com
afm@r-control.com

EVALUATION SUBJECT:

R-CONTROL® EPS BOARDS, R-CONTROL® PERFORM GUARD® EPS BOARDS, R-CONTROL® STRUCTURAL INSULATED PANELS, AND R-CONTROL® FIRERESIST® STRUCTURAL INSULATED PANELS

ADDITIONAL LISTEES:

R-Control® EPS Boards, R-Control® Perform Guard® EPS Boards, R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels:

ACH FOAM TECHNOLOGIES, LLC
BIG SKY INSULATIONS, INC.
BRANCH RIVER PLASTICS, INC.
FLEXIBLE PACKAGING COMPANY
NOARK ENTERPRISES, INC.
TEAM INDUSTRIES, INC.

R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels:

CHAPMAN BUILDING SYSTEMS

R-Control® EPS Boards and R-Control® Perform Guard® EPS Boards:

KNAUF USA POLYSTYRENE INC.
PACIFIC ALLIED PRODUCTS, LTD.
POLY-FOAM INC.
THERMA FOAM, INC.

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2000 *International Building Code*® (IBC)
- 2000 *International Residential Code*® (IRC)
- 2002 *Accumulative Supplement to the International Codes*™
- BOCA® *National Building Code/1999* (BNBC)
- 1999 *Standard Building Code*® (SBC)
- 1997 *Uniform Building Code*™ (UBC)
- 1998 *International One- and Two-Family Dwelling Code*® (I1&2)

Properties evaluated:

R-Control® EPS Boards:

- Surface burning characteristics
- Thermal performance (*R*-values)
- Attic and crawl space installation

R-Control® Perform Guard® EPS Boards:

- Surface burning characteristics
- Termite resistance
- Thermal performance (*R*-values)

R-Control® Structural Insulated Panels:

- Structural
- Fire-resistance-rated assemblies

R-Control® FireResist® Structural Insulated Panel:

- Structural
- Fire-resistance-rated assemblies
- Thermal barrier

2.0 USES

2.1 R-Control® EPS Boards:

R-Control® EPS boards are used as nonstructural insulation in buildings of any construction, and in approved single-ply membrane roof-covering assemblies.

2.2 R-Control® Perform Guard® EPS Boards:

R-Control® Perform Guard® EPS boards are used as the expanded polystyrene (EPS) core material for R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels, and as nonstructural insulation in buildings of any construction. The boards are termite-resistant and are permitted to be installed below grade in accordance with this report.

*Revised November 2006

ES REPORTS™ are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, Inc., express or implied, as to any finding or other matter in this report, or as to any product covered by the report.



ANSI Accredited Program
PRODUCT CERTIFICATION

Page 1 of 15

2.3 R-Control® Structural Insulated Panels:

R-Control® Structural Insulated Panels are used as structural insulated wall, floor and roof panels in buildings of any construction.

2.4 R-Control® FireResist® Structural Insulated Panels:

R-Control® FireResist® Structural Insulated Panels are used as structural insulated wall, floor, and roof panels in buildings of any construction without a thermal barrier.

3.0 DESCRIPTION

3.1 R-Control® EPS Boards:

R-Control® EPS boards are molded, closed-cell, expanded polystyrene boards. The boards are manufactured at minimum densities of 0.90, 1.15, 1.35 and 1.80 pcf (14.4, 18.4, 21.6, 28.8 kg/m³). The designations for each density are Type I, Type VIII, Type II, and Type IX. The products comply with ASTM C 578. See Table 1.

R-Control® EPS boards with a maximum thickness of 6 inches (152.4 mm) have a flame-spread index not exceeding 25 and a smoke-development index not exceeding 450 when tested in accordance with ASTM E 84.

3.2 R-Control® Perform Guard® EPS Boards:

R-Control® Perform Guard EPS boards are molded, closed-cell, expanded polystyrene boards treated for termite resistance. The boards are manufactured at a minimum density of 0.90 pcf (14.4 kg/m³). The products comply with ASTM C 578. The boards include a borate additive in the foam to provide termite resistance. The boards are used as nonstructural insulating sheathing and foundation insulation (as described in Section 4.3), and as core material for R-Control® Structural Insulated Panels (in accordance with Section 3.3 of this report) and R-Control FireResist® Structural Insulated Panels (in accordance with Section 3.4).

R-Control® Perform Guard EPS boards with a maximum thickness of 6 inches (152.4 mm) have a flame-spread index not exceeding 25 and a smoke-development index not exceeding 450 when tested in accordance with ASTM E 84.

3.3 R-Control® Structural Insulated Panels:

R-Control® Structural Insulated Panels are factory-assembled, engineered-wood-faced, structural insulated panels with EPS foam plastic as the core material. The panels are intended for use as load-bearing or nonload-bearing wall, roof, and floor components. The R-Control® Structural Insulated Panels consist of two layers of minimum $7/16$ -inch-thick (11.1 mm) oriented strand board (OSB) facings complying with DOC PS2-92. The EPS core material is minimum 0.95 pcf density (15.22 kg/m³), flame-modified polystyrene foam plastic insulation board, identified as R-Control® Perform Guard® EPS. Panel core thicknesses range from $3\frac{1}{2}$ through $11\frac{1}{4}$ inches (88.9 mm to 285.8 mm). The facing is bonded to the EPS core with high-quality structural-grade adhesive and cured under factory-controlled conditions. The panels vary in width from 4 feet to 8 feet (1.2 m to 2.4 m) and in length from 8 feet to 24 feet (2.4 m to 7.3 m).

3.4 R-Control® FireResist® Structural Insulated Panels:

R-Control® FireResist® Structural Insulated Panels are identical to the R-Control® Structural Insulated Panels described in Section 3.3, except that one face of the OSB board has a minimum 0.060-inch thickness of fiber-reinforced inorganic coating applied to the OSB to provide a 15-minute thermal barrier.

4.0 INSTALLATION

4.1 General:

R-Control® EPS boards, R-Control® Perform Guard® EPS boards, R-Control® Structural Insulated Panels, and R-Control® FireResist® Structural Insulated Panels are

installed in accordance with the manufacturer's published installation instructions and this evaluation report.

The manufacturer's published installation instructions and this report shall be strictly adhered to, and a copy of the instructions shall be available at all times on the jobsite during installation. The installation instructions within this report govern if there are any conflicts between the manufacturer's instructions and this report.

4.2 R-Control® EPS Boards:

4.2.1 General: R-Control® EPS boards shall be attached to supports in a manner which will hold the insulation securely in place.

The boards are permitted to be used as exterior perimeter insulation around concrete slab edges, foundation walls, and crawl spaces, and under flat concrete slab on grade construction. The boards are also permitted to be used as interior wall sheathing and general insulation; as roof insulation when listed as a component of a roof-covering assembly in a current ICC-ES evaluation report; in any EIFS system when listed as a component of the system in a current ICC-ES evaluation report; and in other proprietary wall systems recognized in a current evaluation report.

The EPS boards shall not be used structurally to resist transverse, vertical or in-plane loads. The boards shall not be used as exterior stud wall bracing. Wall bracing shall be provided in accordance with the applicable code.

The EPS boards shall not be used as a nailing base for exterior siding materials. All nailing shall be made through the maximum $1\frac{1}{2}$ -inch-thick (38 mm) sheathing into the wall studs.

In areas where the probability of termite infestation is very heavy and when foam plastic insulation is used with wood construction, the foam plastic shall be installed in accordance with Section R324.4 of the IRC, or Section 2603.3 of the SBC, or Section 323.4 of the I1&2.

4.2.2 Special Use—Attics and Crawl Spaces: R-Control® EPS boards with a 2-inch (50.8 mm) maximum thickness and a 2.0 pcf (32.04 kg/m³) nominal density, and a maximum thickness of 4 inches (102 mm) and a nominal density of 1 pcf (16.02 kg/m³), are permitted to be installed exposed in attics and crawl spaces without the ignition protective coverings listed in Section 2603.4.1.6 of the IBC, Section R318.3 of the IRC, Section 2603.5.1.6 of the SBC, Section 2603.4.1.4 of the NBC, Section 2602.4 (Exception 4) of the UBC, and Section 317.3 of the I1&2, under the following conditions:

- Entry to the attic or crawl space is limited to service of utilities.
- There are no interconnected attic or crawl space areas.
- Air in the attic or crawl space is not circulated to other parts of the building.
- Ventilation of the attic or crawl space is provided in accordance with the applicable code, and combustion air is provided in accordance with the applicable mechanical code.

4.3 R-Control® Perform Guard® EPS:

4.3.1 General: R-Control® Perform Guard® EPS boards shall be attached to supports in a manner which will hold the insulation securely in place. The boards shall be covered on the interior of the building by an approved 15-minute thermal barrier.

The boards are permitted to be used as exterior perimeter insulation around concrete slab edges, foundations walls, and crawl spaces, and under flat concrete slab on grade construction. See Section 4.3.2. The boards are also permitted to be used as interior wall insulation and general insulation; in insulating concrete form systems when listed as

a component of the system in a current ICC-ES evaluation report; in other proprietary wall systems recognized in a current evaluation report; and as the core material for R-Control Structural Insulated Panels and R-Control FireFinish Structural Insulated Panels when installed as noted in Sections 4.4 and 4.5.

R-Control® Perform Guard® EPS shall be installed in combination with Do-All-Ply®.

4.3.2 Special Use—Wood Construction in Areas of Very Heavy Termite Infestation: R-Control Perform Guard® EPS boards are termite-resistant and are not restricted under Section R324.4 of the IRC, Section 2603.3 of the SBC, or Section 323.4 of the I1&2.

4.4 R-Control® Structural Insulated Panels:

Each structure built using R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels shall be designed by a registered design professional. Drawings shall be provided that bear the design professional's registered stamp or seal when application is made for a building permit. Such drawings shall contain specific instructions with regard to connections, erection, and installation of the panels, and shall be available at all times on the jobsite during installation.

For jurisdictions enforcing the IRC, the structural insulated panels shall be designed in accordance with the IBC.

The R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels are connected to each other at the panel edges through the use of splines. The splines are field-coated with Do-All-Ply® adhesive/sealant and fastened with 8d box nails at 6 inches (152.4 mm) on center, or an approved equal.

The top and bottom plates of the panel are dimensional wood plates sized to match the core thickness and installed with Do-All-Ply® and fastened with 8d box nails at 6 inches (152.4 mm) on center, or an approved equal. Do-All-Ply® adhesive/sealant is applied along the base plate prior to the panel placement.

In jurisdictions enforcing the IBC and the IRC, use of the panels as shear walls (racking shear) is limited to structures in Seismic Design Categories A, B and C.

4.4.1 Allowable Structural Loads for Panels: Allowable axial, transverse, racking, header, and diaphragm loads are noted in Tables 2 through 9. For loads greater than those specified in Tables 2 through 7 and Table 9, the specific condition shall be framed by other methods to meet applicable code requirements.

Openings in the wall panels shall be limited to 48 inches (1219 mm) in width and to the allowable loads specified in Table 8. For openings greater than 48 inches (1219 mm), loads shall not exceed the those indicated in the header load design chart or shall be framed to meet current requirements in the applicable code.

4.4.2 Panel Cladding:

4.4.2.1 Roof Covering: The roof covering shall comply with the applicable code. Underlayment and flashing shall be installed in accordance with the applicable code. Roofs with hot-asphalt or hot-coal tar pitch are prohibited.

4.4.2.2 Wall Covering: Panels, at the time of their erection and placement, shall be covered on the exterior by a water-resistive barrier as required by the applicable code. Under Section 2510.6 of the IBC and Section 2506.4 of the UBC, when exterior plaster is applied over wood-based sheathing, the water-resistive barrier shall include two layers of Grade D paper. The exterior of the wall panels shall be covered with an approved exterior wall covering. Installation

methods shall be in accordance with the manufacturer's recommendations subject to approval by the local code official.

4.4.2.3 Interior: Panels shall be covered on the interior of the building by an approved 15-minute thermal barrier.

4.4.3 One-hour Fire-resistance-rated Roof-ceiling Assemblies—R-Control® Structural Insulated Panels: R-Control Structural Insulated Panels, with a minimum 3¹/₂-inch-thick (88.90 mm) EPS core and 7¹/₁₆-inch-thick (11.11 mm) OSB on each face, are permitted to be used as components of the following UL design assemblies:

4.4.3.1 (See Figure 1): Restrained Assembly Rating, 1 Hour; Unrestrained Assembly Rating, 1 Hour:

1. Wood beam: Minimum 4¹/₂-inch-wide-by-9¹/₂-inch-deep (114 mm by 241 mm) wood beam, spaced in accordance with the applicable code.
2. Roof covering: Consisting of hot-mopped or cold-application materials compatible with the AFM R-Control panels that comply with the code as Class A, B or C roof coverings. For hot-mopped applications, a base ply is required.
In lieu of the item described immediately above, a roof covering consisting of a single-ply roofing membrane that is either ballasted, adhered or mechanically attached is permitted under the membrane manufacturer's current ICC-ES evaluation report.
3. AFMR-Control® Panels: Minimum 3¹/₂-inch-thick-core (89 mm) panels, with minimum 7¹/₁₆-inch-thick (11.1 mm) OSB facings.
4. Side plates: Nominal 2-inch-thick wood members, installed in each side joint of the AFM R-Control panels, and fastened through the OSB panels with 8d common nails spaced 8 inches (203 mm) on center.

End plates: Nominal 2-inch-thick wood blocking installed in each end joint, and fastened through the OSB panels with 8d common nails spaced 6 inches (152 mm) on center.

5. Gypsum wallboard: Minimum 5⁸/₈-inch-thick (15.9 mm), 4-foot-wide (1219 mm) panels complying with ASTM C 36-92 (IRC: ASTM C 36-97) as Type X are installed in two layers with the long dimension perpendicular to the wood beams. The inner layer is attached to the panels using 1¹/₄-inch-long (31.7 mm), Type S, buglehead steel screws spaced 8 inches (203 mm) on center along the joints and in rows spaced 16 inches (406 mm) on center, located 1²/₂ inch (12.7 mm) from the edges. The joints of the inner layer of the wallboard must be staggered from the joints of the panels. The outer layer is attached to the panels using 2-inch-long (51 mm), buglehead steel screws spaced 8 inches (203 mm) on center along the edges and located 3⁴/₄ inch (19.1 mm) from the edge, and in rows 12 inches (305 mm) on center in the field. The joints of the outer layer must be staggered from the joints of the inner layer. For beams, two layers of 5⁸/₈-inch (15.9 mm) gypsum wallboard are fastened to the wood beam using 1¹/₄-inch-long (31.8 mm), Type S, buglehead steel screws spaced 8 inches (203 mm) on center, with the outer layer fastened to the wood beam using 2-inch-long (51 mm), Type S, buglehead steel screws.
6. Joint system: Outer wallboard joints are covered with paper tape and joint compound. Screw heads are covered with joint compound.

4.4.3.2 (See Figure 2): Restrained Assembly Rating, 1 Hour; Unrestrained Assembly Rating, 1 Hour:

1. Steel joist: Type 10K1, minimum size, designed, constructed and installed in accordance with the standard

specification for steel joists, K Series, LH Series, DI H Series and Joist Girders, 1994, as referenced in Section 2206 of the IBC, Section 2221 of the UBC, or Section 2205 of the SBC and the BNBC.

- Roof covering: Consisting of hot-mopped or cold-application materials compatible with the AFM R-Control Panels that comply with the applicable code as Class A, B or C coverings. For hot-mopped applications, a base ply is required.

In lieu of the item described immediately above, a roof covering consisting of a single-ply roofing membrane that is either ballasted, adhered or mechanically attached is permitted under the membrane manufacturer's current ICC-ES evaluation report.

- AFM R-Control Panels: Minimum 3¹/₂-inch-thick-core (89 mm) panels with minimum 7¹/₁₆-inch-thick (11.1 mm) OSB facings.
- Spline: Nominal 4-inch-wide-by-7¹/₁₆-inch-thick OSB spline installed between the AFM R-Control panels in accordance with spline detail SIP-102 shown in Table 4.

End plates: Nominal 2-inch-wide wood blocking installed in each end joint and fastened through the OSB panel with 8d common nails spaced 6 inches (152 mm) on center.

- Metal lath: Diamond mesh, 3¹/₈-inch (9.5 mm) expanded galvanized steel lath weighing 3.4 pounds per square yard (1.3 kg/m²), complying with Section 2505.3 of the UBC (IBC/IRC: ASTM C 847-97). The lath is secured to one side of the joist using No. 20 SWG steel tie wire located at the mid height of every other web member. Additional lath is installed on the bottom surface of building units and secured by means of 1-inch-wide-by-1¹/₂-inch-long (25.4 mm by 38 mm) staples spaced 7 inches (178 mm) on center.
- Spray-applied fire-resistive materials: The material is Type DC-F, recognized in ICC-ES reports ER-1244 and 9423E. Type DC-F is prepared and applied to wetted surfaces of steel joists, to the bottom surfaces of the AFM R-Control Panels, and to metal lath, all of which are made free of dirt, oil or loose scale by spraying with water, to achieve a minimum 2¹/₄-inch (57 mm) thickness. The specified fiber density requires a minimum individual fiber density of 11 pcf (176 kg/m³). For areas in which the fiber density is between 10 and 11 pcf (160 and 176 kg/m³), the fiber thickness must be increased in accordance with the following formula:

$$\text{Thickness, inch} = \frac{11(\text{Design Thickness, inch})}{(\text{Actual Fiber Density, pcf})}$$

$$\text{For SI: Thickness, mm} = \frac{176(\text{Design Thickness, mm})}{(\text{Actual Fiber Density} \frac{\text{kg}}{\text{m}^3})}$$

Fiber density must not be less than 10 pcf (160 kg/m³). For method of density determination, refer to UBC Standard 7-6, or Section 1704.11 of the IBC, or Section 1705.12 of the BNBC, or Section 1709 of the SBC. Other installation and inspection requirements are described in ICC-ES reports ER-1244 and 9423E.

4.4.4 Fire-resistance Wall Assemblies—R-Control® Structural Insulated Panels:

4.4.4.1 One-hour Fire-resistance-rated Bearing Wall Assembly: R-Control Structural Insulated Panels with

minimum 3¹/₂- to maximum 5¹/₂-inch (88.90 mm to 139.7 mm) EPS core and 7¹/₁₆-inch-thick (11.1 mm) OSB facings are installed with top and bottom plates attached to the OSB facings with 12d common nails spaced 12 inches (304.8 mm) on center. The panels are covered with two layers of 5¹/₈-inch-thick (15.88 mm), Type X gypsum wallboard on each face. Where the panels are exposed to the exterior, the exterior side shall have 5¹/₈-inch-thick (15.9 mm), Type X, water-resistant core gypsum sheathing complying with ASTM C 79, instead of the gypsum wallboard. The gypsum wallboard is installed vertically, with all joints staggered 16 inches (406.4 mm) on center. The first layer of gypsum is secured with 1¹/₈-inch-long (41.28 mm) and the second with 2-inch-long (50.8 mm), bugle head self-tapping screws, each spaced 12 inches (304.8 mm) on center along the perimeter and 24 inches (609.6 mm) on center in the field. The joints are taped and the nails are covered with joint compound. The wall is limited to 9 feet (2.70 m) in height and a maximum superimposed allowable bearing load of 1,800 plf (26 269.02 N/m).

4.4.4.2 One-hour Fire-resistive-rated Bearing Wall:

One-hour fire-resistive-rated with a 5¹/₂-inch (139.7 mm) EPS core and 7¹/₁₆-inch (11.11 mm) OSB skins. The EPS core is recessed 1¹/₂ inches (38.1 mm) along the edges of the panels (along the bottom and both sides), and 3 inches (76.2 mm) along the top, to allow for the installation of nominal 2-by-6 wood studs (No. 2 hem-fir), bottom plate, studs and double top plates. Double studs are assembled together with 16d coated sinker nails, spaced 24 inches (609.6 mm) on center and staggered along the stud length. The double studs are installed in the recesses between adjoining panels and secured to the OSB with 6d common nails, spaced 6 inches (152.4 mm) on center, after the surfaces have been caulked, with R-Control Structural Building Panel Seal Latex All-Purpose Caulk, to be in contact with the EPS core. A gap of 1¹/₈ inch (3.18 mm) is left between adjoining edges of the OSB panel facers. The single bottom plate is secured to the OSB with 6d common nails spaced 6 inches (152 mm) on center, and to each wood stud with two 16d coated sinker nails, after the surfaces have been caulked, with R-Control Structural Building Panel Seal Latex All-Purpose Caulk, to be in contact with the EPS core. The first top plate is secured to each stud with two 16d coated sinker nails, after the surfaces have been caulked, with R-Control Structural Building Panel Seal Latex All-Purpose Caulk, to be in contact with the EPS core. The second top plate is installed over the first and secured to the OSB with 6d common nails spaced 6 inches (152.4 mm) on center, and to the first top plate with 16d coated sinker nails, spaced 16 inches (406.4 mm) on center, and staggered along the top plate length.

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

The panels are covered with one layer of 5¹/₈-inch (15.88 mm) Standard Gypsum Co. Type SG-C gypsum fire-rated wallboard on each face, and secured to the OSB with PC cupped-head drywall nails, 1⁵/₈ inches (41.28 mm) long, spaced 8 inches (203.2 mm) on center along the perimeter of the wallboard and 12 inches (304.8 mm) on center vertically and 16 inches (406.4 mm) on center horizontally in the field of the board. The joints of the wallboard are treated with joint compound and paper tape. The nails are covered with joint compound. The wall is limited to 10 feet (3 m) in height and a superimposed allowable bearing load of 2,200 plf (32 107N/m).

4.5 R-Control FireResist® Structural Insulated Panels:

R-Control FireResist Structural Insulated Panels are permitted to be installed in the same manner as the R-Control

Structural Insulated Panels. (See Section 4.4.) When the inorganic coating is oriented to the interior of the building, the R-Control FireResist Structural Insulated Panels do not require a supplemental thermal barrier.

R-Control FireResist Structural Insulated Panels use R-Control Perform Guard EPS as the termite-resistant core material. See Section 4.3.

5.0 CONDITIONS OF USE

The R-Control® EPS Boards, R-Control® Perform Guard® EPS Boards, R-Control® Structural Insulated Panels, and R-Control® FireResist® Structural Insulated Panels as described in this report comply with or are suitable alternates to what is specified in the codes specifically listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 R-Control® EPS Boards, R-Control® Perform Guard® EPS Boards, and R-Control® Structural Insulated Panels shall be fully protected from the interior of the building by an approved 15-minute thermal barrier, except for:
 - R-Control® EPS Boards as permitted in Section 4.2.2 of this report.
 - R-Control® FireResist® Structural Insulated Panels as permitted in Section 4.5 of this report.
- 5.2 When R-Control® EPS Boards are used with wood construction, see Section 4.2 of this report.
- 5.3 R-Control® EPS Boards and R-Control® Perform Guard® EPS Boards shall not be used as structural sheathing. Walls on which the boards are applied shall be braced in accordance with the applicable code.
- 5.4 When R-Control® EPS boards and R-Control® Perform Guard® EPS Boards are used in Type I, II, III or IV (noncombustible) construction, the boards shall be installed in accordance with a separate, current evaluation report or the installation shall be justified to the satisfaction of the building official.
- 5.5 R-Control® EPS Boards and R-Control® Perform Guard® EPS Boards shall not be used as nailing bases for exterior siding materials.
- 5.6 Each structure built using R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels shall be designed by a registered design professional. Construction documents, including engineering calculations and drawings providing floor plans, window details, door details, and connector details, shall be submitted to the code official when application is made for a permit. The individual preparing such documents shall possess the necessary credentials regarding competency and qualifications as required by the applicable code and the professional registration laws of the state where the construction is undertaken. These documents are not covered by this report.
- 5.7 Design loads to be resisted by R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels shall be determined based on the design loads in the applicable code. Loadings on the panels shall not exceed those noted in this report. Calculations demonstrating that the loads applied to the panels are less than the allowable loads described in this report shall be submitted to the code official for approval.
- 5.8 R-Control® Structural Insulated Panels, R-Control® EPS Boards, R-Control® FireResist® Structural Insulated Panels and R-Control® Perform Guard® EPS Boards shall be used only on buildings of combustible construction.

5.9 R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels fabricated with EPS foam cores with thicknesses of 7¹/₄, 9¹/₄ and 11¹/₄ inches (184.15, 234.95 and 285.75 mm) are used only as roof panels.

5.10 In jurisdictions that have adopted the SBC, the I1&2, and the IRC, when use is in areas of very heavy termite infestation, the bottom of R-Control® Structural Insulated Panels and R-Control FireResist® Structural Insulated Panels shall not be less than 6 inches (153 mm) above finish grade, and the panels shall not be installed below grade or in contact with earth. See Section 2603.3 of the SBC, Section 323.1 of the I1&2, and Section R324.4 of the IRC.

5.11 R-Control EPS Boards, R-Control Perform Guard® EPS Boards, R-Control® Structural Insulated Panels and R-Control Fire Resist® Structural Insulated Panels shall not be used as an integral part of a fire-rated assembly unless test reports substantiating their performance are submitted to the code official when application is made for a permit. R-Control® Structural Insulated Panels and R-Control FireResist® Structural Insulated Panels are permitted to be used in fire-resistive assemblies when installation is as described in Sections 4.4.3 and 4.4.4 of this report.

5.12 Heat-producing fixtures shall not be installed in the panels unless protected by a method approved by the code official or documented in test reports prepared by an approved testing laboratory. This limitation shall not be interpreted to prohibit heat-producing elements with suitable protection.

5.13 In jurisdictions enforcing the IBC and the IRC, use of the panels as shear walls (racking shear) is limited to structures in Seismic Design Categories A, B and C.

5.14 The products are manufactured by the listees at the locations specified in Table 10 under a quality control program with inspections by Underwriters Laboratories Inc. (AA-668).

6.0 EVIDENCE SUBMITTED

6.1 R-Control® EPS Boards:

Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2006; and a test report on crawl space comparative fire testing with independent engineering analysis.

6.2 R-Control® Perform Guard® EPS Boards:

Data in accordance with the ICC-ES Evaluation Guideline for Termite-resistant Foam Plastics (EG239), dated November 2003; and the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2006.

6.3 R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels:

Data in accordance with the ICC-ES Acceptance Criteria for Sandwich Panels (AC04), dated May 2006; and reports of tests in accordance with UBC Standards 7-1 and 26-3, ASTM E 119 and UL 1715.

7.0 IDENTIFICATION

Each of AFM Corporation's R-Control® EPS Boards and R-Control® Perform Guard® EPS Boards, as described in this report, is marked with the report holder's name (AFM) and the plant ID number; the product type; the name or logo of the inspection agency (Underwriters Laboratories Inc.); and the evaluation report number (ESR-1006). Additionally, an inspection agency certificate, including the flame-spread index, the smoke-developed index, and the thermal-

resistance *R*-value, is provided with each shipment of insulation boards.

Each structural insulated panel, as described in this report, is marked with the report holder's name (AFM) and plant ID number; the product name (R-Control® Structural Insulated Panels or R-Control® FireResist® Structural Insulated Panels);

the name or logo of the inspection agency (Underwriters Laboratories Inc.); and the evaluation report number (ESR-1006). Additionally, an inspection agency certificate, including the flame-spread and smoke-developed indices of the foam plastic panel core, is provided with each shipment of panels.

All AFM plants producing EPS Boards will display the following on each board

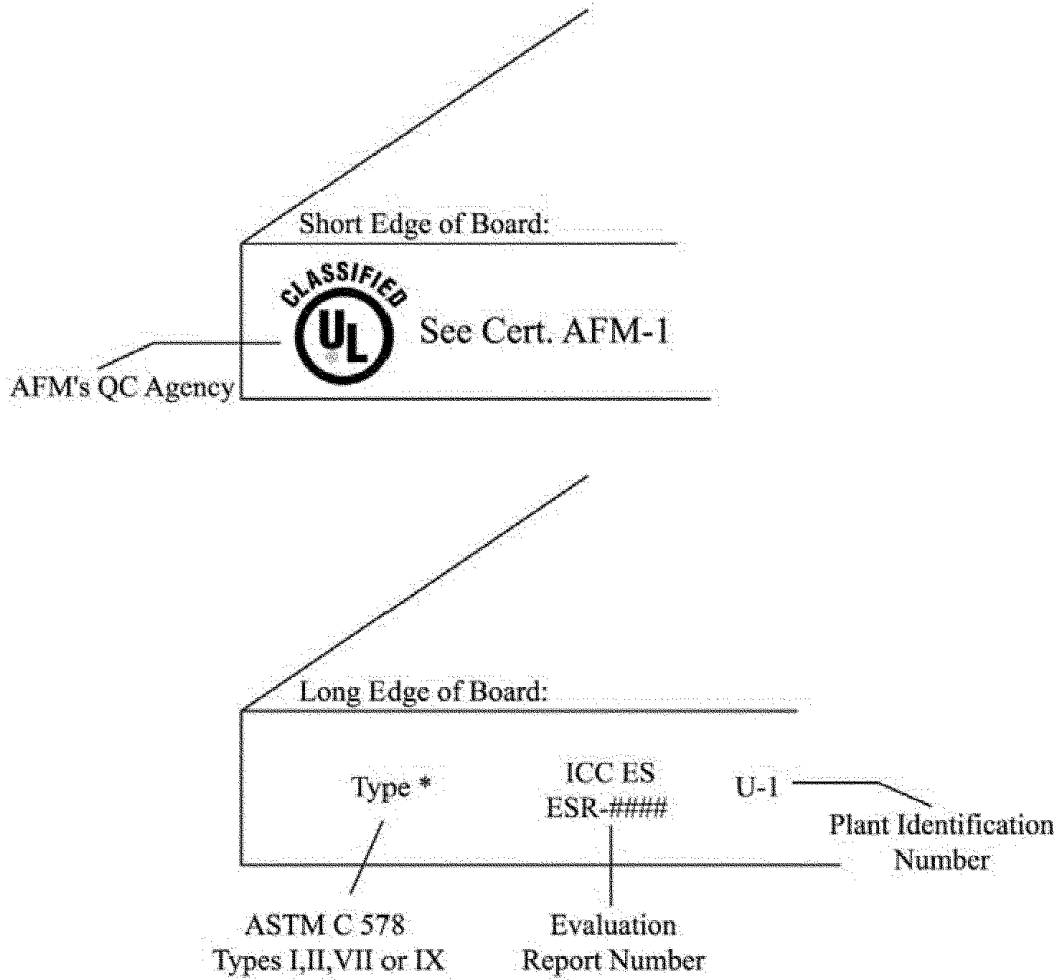


TABLE 1—PHYSICAL PROPERTIES

PROPERTY	TYPE I	TYPE VIII	TYPE II	TYPE IX
Density, min., lb/ft ³ (kg/m ³)	0.90 (15)	1.15 (18)	1.35 (22)	1.80 (29)
Thermal Resistance, min., per 1.0 in. thickness 75°F.-ft ² -h/Btu ("K-m ² /W)	3.60 (0.63)	3.80 (0.67)	4.00 (0.70)	4.20 (0.74)
Compressive strength @ 10% def., min. psi (kPa)	10.0 (69)	13.0 (90)	15.0 (104)	25.0 (173)
Flexural strength min., psi (kPa)	25.0 (173)	30.0 (208)	35.0 (240)	50.0 (345)
Water vapor permeance of 1.0 in. thickness max., perm	5.0	3.5	3.5	2.0
Water absorption by total immersion, max., volume %	4.0	3.0	3.0	2.0

WALL—UNITY EQUATION

This equation is used to determine design suitability. The equation takes into account the ultimate load for a panel subjected to both axial and transverse (bending) conditions:

$$\frac{\text{design axial load}}{\text{allowable axial load}} + \frac{\text{design transverse load}}{\text{allowable transverse load}} \leq 1$$

(See Load Design Table 2)

(See Load Design Table 4)

TABLE 2—WALL AXIAL LOADING^{1,2,3,4,5}
(See Detail SIP-101)

R-CONTROL® STRUCTURAL INSULATED PANELS			
	Panel Height	⁷ / ₁₆ ® OSB Thickness	
		EPS Core Thickness	
		3 ¹ / ₂ -inch Core	5 ¹ / ₂ -inch Core
Axial Load ¹ (plf)	8' - 0"	2,750	4,000
	10' - 0"	2,500	3,500
	12' - 0"	2,000	3,000
	14' - 0"	—	2,750
	16' - 0"	—	2,500

For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 47.9 Pa, 1 plf = 14.59 N/m.
N/A = not applicable.

- ¹Maximum allowable axial load is limited to the loads tabulated for axial condition alone.
- ²Ultimate failure load divided by a safety factor of 3.0.
- ³For fire-resistive assemblies, see Section 4.4.4 for axial loading.
- ⁴Values based on a maximum height-to-width ratio of 3¹/₂:1.
- ⁵See plate connection detail SIP-101.

TABLE 3—SHEAR LOADING
(See Detail SIP-101)

R-CONTROL® STRUCTURAL INSULATED PANELS			
	Panel Height	⁷ / ₁₆ -inch OSB Thickness	
		EPS Core Thickness	
		3 ¹ / ₂ -inch Core	5 ¹ / ₂ -inch Core
Racking Shear	N/A	335 plf	335 plf

¹Vertical boundaries (shear walls) require double studs.

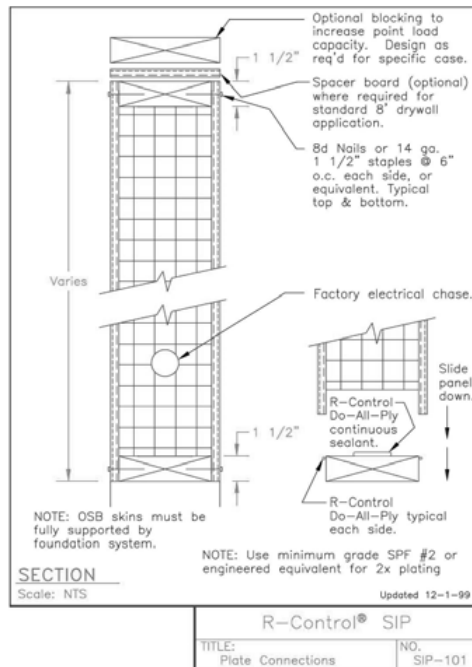


TABLE 4—TRANSVERSE LOADING (psf)^{2,3,4}
 (See Details SIP-102 and SIP-102g)

R-CONTROL® STRUCTURAL PANELS																
Roof and Wall or Floor Panel Span		7/16-inch OSB Thickness														
		EPS Core Thickness														
		3 1/2-inch Core			5 1/2-inch Core			7 1/4-inch Core			9 1/2-inch Core			11 1/4-inch Core		
Deflection	L/360	L/240	L/180	L/360	L/240	L/180	L/360	L/240	L/180	L/360	L/240	L/180	L/360	L/240	L/180	
T r a n s v e r s e L o a d (psf)	4' - 0"	65	80 ¹	80 ¹	89	122 ¹	122 ¹	92	136 ¹	136 ¹	107	136 ¹	136 ¹	104	136 ¹	136 ¹
	6' - 0"	40	53 ¹	58	81 ¹	81 ¹	64	96 ¹	96 ¹	75	96 ¹	96 ¹	96 ¹	73	96 ¹	96 ¹
	8' - 0"	28	40 ¹	40 ¹	42	61 ¹	61 ¹	51 ¹	76 ¹	76 ¹	61	76 ¹	76 ¹	60	76 ¹	76 ¹
	10' - 0"	20	30	32 ¹	32	48	49 ¹	44	64 ¹	64 ¹	54 ¹	64 ¹	64 ¹	55	64 ¹	64 ¹
	12' - 0"	15	22	27 ¹	26	38	41 ¹	40	56 ¹	56 ¹	51	56 ¹	56 ¹	55	56 ¹	56 ¹

For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 47.88 Pa.
 NP = not permitted

- ¹Limited to ultimate failure load divided by a safety factor of 3.0.
- ²Floor panels limited to Group R Occupancies.
- ³Wall panels have 7 1/2-inch maximum core thickness.
- ⁴See surface spline detail SIP-102 and SIP-102g.

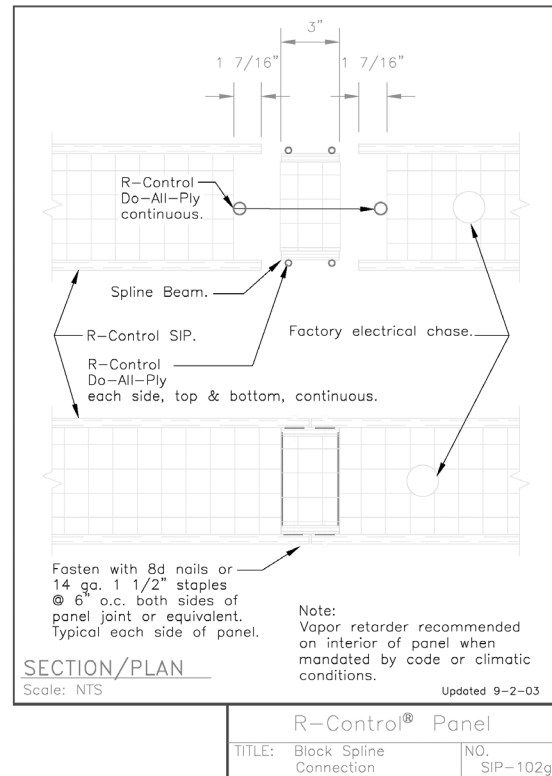
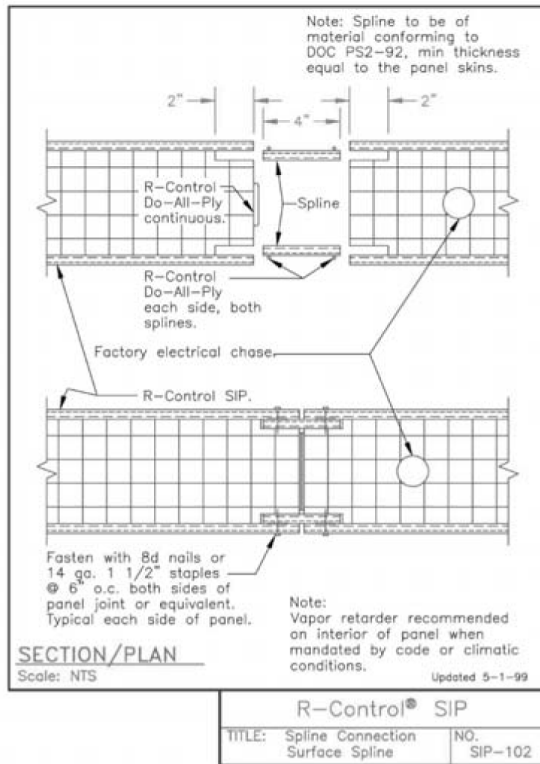


TABLE 5—TRANSVERSE LOAD^{2,3,4}
 (See Details SIP-102d and SIP-108)

R-CONTROL® STRUCTURAL INSULATED PANELS													
Roof, Wall or Floor Panel Span		⁷ / ₁₆ -inch OSB Thickness											
		EPS Core Thickness											
		5 ¹ / ₂ -inch Core			7 ¹ / ₄ -inch Core			9 ¹ / ₄ -inch Core			11 ¹ / ₄ -inch Core		
Deflection		L/360	L/240	L/180	L/360	L/240	L/180	L/360	L/240	L/180	L/360	L/240	L/180
T r a n s v e r s e L o a d (psf)	10' - 0"	53	79	105 ¹	89	109 ¹	109 ¹	150	174 ¹	174 ¹	177 ¹	177 ¹	177 ¹
	12' - 0"	40	59	79	65	91 ¹	91 ¹	111	145 ¹	145 ¹	148 ¹	148 ¹	148 ¹
	14' - 0"	30	45	60	48	72	78 ¹	84	124 ¹	124 ¹	115	127 ¹	127 ¹
	16' - 0"	24	35	47	37	55	68 ¹	65	98	109	89	111	111 ¹
	18' - 0"	19	28	37	28	42	57	51	77	97 ¹	70	99 ¹	99 ¹
	20' - 0"	15	22	30	22	33	44	41	61	82	56	84	89 ¹
	22' - 0"	NP	NP	NP	NP	NP	NP	33	49	66	45	68	81 ¹
	24' - 0"	NP	NP	NP	NP	NP	NP	27	40	54	37	55	74

For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 47.9 Pa.
 NP = not permitted

¹Limited to ultimate failure load divided by a safety factor of 3.0.

²Roof, wall and floor panels are framed with continuous doubled nominal 2-inch lumber in the spanning direction, spaced 4 feet on center, and single nominal 2-inch lumber at panel ends. Lumber is minimum spruce-fire No. 2 grade. Panels below heavy line require Douglas fir-larch, No. 2 grade lumber.

³Top facing thickness for floor panels is ³/₄ inch, minimum. As an option, minimum ⁷/₁₆-inch top facing may be overlaid with a minimum ⁷/₁₆-inch finish flooring perpendicular to the panels.

⁴See details SIP-102d and SIP-108.

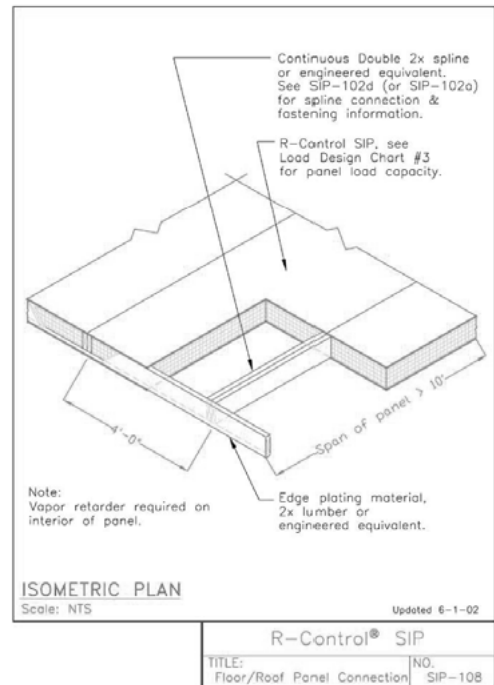
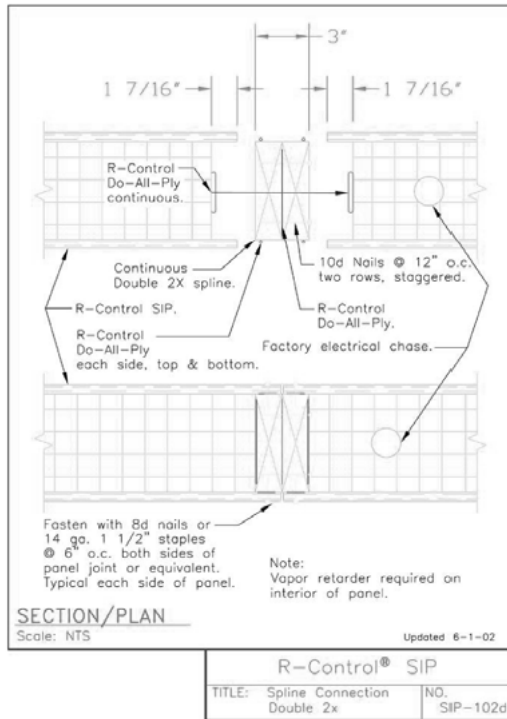


TABLE 6—TRANSVERSE LOADING^{2,3,4,5}
 (See Details SIP-102b and SIP-108a)

R-CONTROL® STRUCTURAL INSULATED PANELS										
Roof or Floor Panel Span		7/16-inch OSB Thickness								
		EPS Core Thickness								
		7 1/4-inch Core			9 1/4-inch Core			11 1/4-inch Core		
Deflection		L/360	L/240	L/180	L/360	L/240	L/180	L/360	L/240	L/180
T r a n s v e r s e L o a d (psf)	10' - 0"	81 ¹	81 ¹	81 ¹	118 ¹	118 ¹	118 ¹	131 ¹	131 ¹	131 ¹
	12' - 0"	63	68 ¹	68 ¹	98 ¹	98 ¹	98 ¹	109	109 ¹	109 ¹
	14' - 0"	49	58 ¹	58 ¹	73	84 ¹	84 ¹	87	93 ¹	93 ¹
	16' - 0"	38	51 ¹	51 ¹	55	74 ¹	74 ¹	69	82 ¹	82 ¹
	18' - 0"	30	45 ¹	45 ¹	42	63	65 ¹	55	72	72
	20' - 0"	24	37	40 ¹	33	49	59 ¹	45	65	65
	22' - 0"	NP	NP	NP	26	39	49 ¹	37	55	57 ¹
	24' - 0"	NP	NP	NP	21	31	41	30	46	48 ¹

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 47.9 Pa.
 NP = not permitted.

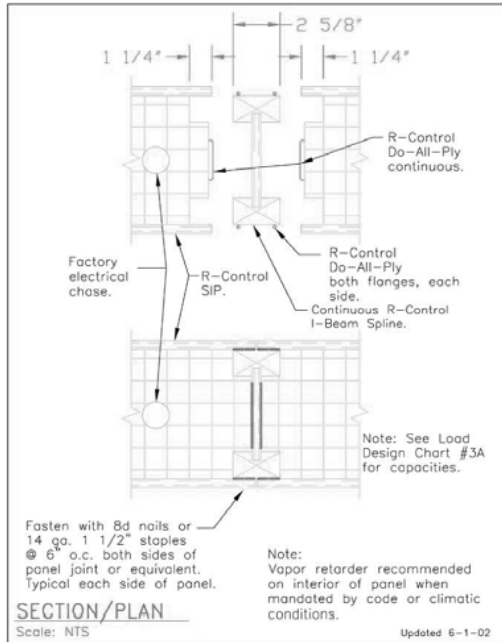
¹Limited to ultimate failure load divided by a safety factor of 3.0.

²Panels require continuous wood I-beams installed in the spanning direction spaced 4 feet on center.

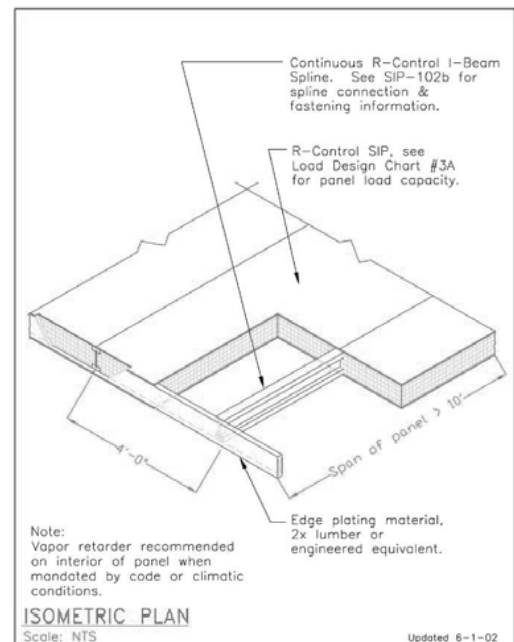
³Top facing thickness for floor panels in minimum 3/4 inch. As an option, the minimum 6/16-inch-thick top facing may be overlaid with minimum 7/16-inch-thick finish flooring perpendicular to the panels.

⁴Wood I-joist is SWI-T-34 recognized in ICC-ES legacy report PFC-4801.

⁵See details SIP-102b and SIP-108a.



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



R-Control® SIP
 TITLE: Floor/Roof Panel Connection NO. SIP-108a

TABLE 7—TRANSVERSE LOADING^{2,3,4}
 (See Details SIP-102c and SIP-108b)

R-CONTROL® STRUCTURAL INSULATED PANELS													
Roof or Floor Panel Span		⁷ / ₁₆ -inch OSB Thickness											
		EPS Core Thickness											
		5 ¹ / ₂ -inch Core			7 ¹ / ₄ -inch Core			9 ¹ / ₄ -inch Core			11 ¹ / ₄ -inch Core		
Deflection		L/360	L/240	L/180	L/360	L/240	L/180	L/360	L/240	L/180	L/360	L/240	L/180
T r a n s v e r s e L o a d (psf)	10' - 0"	76	114	132 ¹	101	151	158 ¹	117	138 ¹	138 ¹	149 ¹	149 ¹	149 ¹
	12' - 0"	57	79	96 ¹	72	109	132 ¹	88	115 ¹	115 ¹	124 ¹	124 ¹	124 ¹
	14' - 0"	38	57	70 ¹	54	80	107 ¹	68	98 ¹	98 ¹	106 ¹	106 ¹	106 ¹
	16' - 0"	28	42	54 ¹	40	61	81	53	80	86 ¹	76	93 ¹	93 ¹
	18' - 0"	21	32	42	31	47	62	42	64	64 ¹	64	83	83
	20' - 0"	16	24	32	24	36	49	34	51	52 ¹	50	74 ¹	74 ¹
	22' - 0"	NP	NP	NP	NP	NP	NP	28	42	43 ¹	40	60	62
	24' - 0"	NP	NP	NP	NP	NP	NP	23	34	36 ¹	33	49	52 ¹

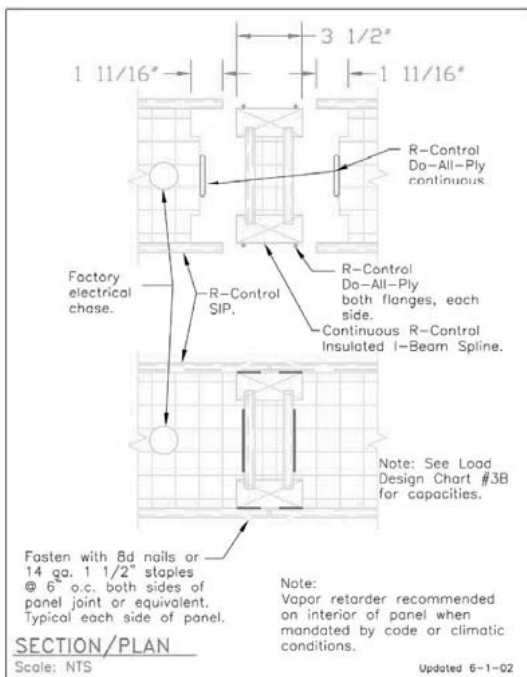
For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 47.9 Pa.
 NP = not permitted

¹Limited to ultimate failure load divided by a safety factor of 3.0.

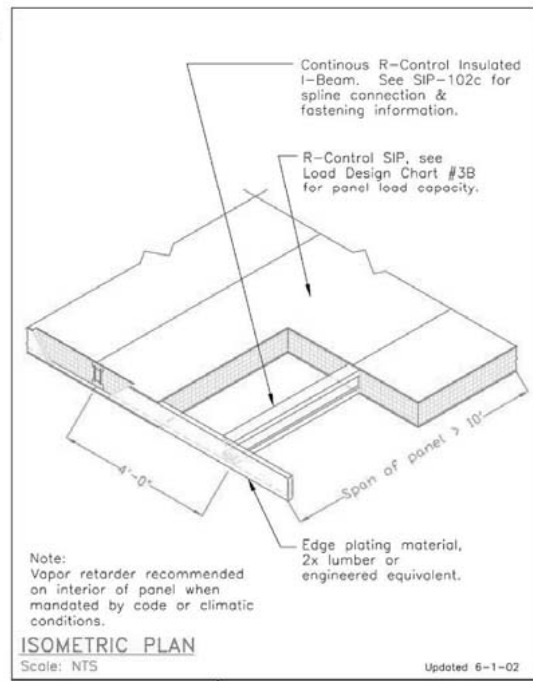
²Panels require continuous insulated spline beams installed in the spanning direction spaced 4 feet on center.

³Top facing thickness for floor panels is ³/₄ inch, minimum. As an option, the minimum ⁷/₁₆-inch-thick top facing may be overlaid with minimum ⁷/₁₆-inch-thick finish flooring perpendicular to the panels.

⁴See details SIP-102c and SIP-108b.



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



R-Control® SIP
 TITLE: Floor/Roof Panel Connection NO. SIP-108b

TABLE 8—WALL-HEADER LOADING
(See Details SIP-112 and SIP-114)

R-CONTROL® STRUCTURAL INSULATED PANELS ^{2,3,4,5}										
Header Span		Header Depth								
		12 inches			18 inches			24 inches		
Deflection		L/480	L/360	L/240	L/480	L/360	L/240	L/480	L/360	L/240
L o a d (plf)	4' - 0"	524	703	708 ¹	762	773 ¹	773 ¹	837 ¹	837 ¹	837 ¹
	6' - 0"	319	374 ¹	374 ¹	466 ¹	466 ¹	466 ¹	557 ¹	557 ¹	557 ¹
	8' - 0"	218	248 ¹	248 ¹	351 ¹	351 ¹	351 ¹	455 ¹	455 ¹	455 ¹

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

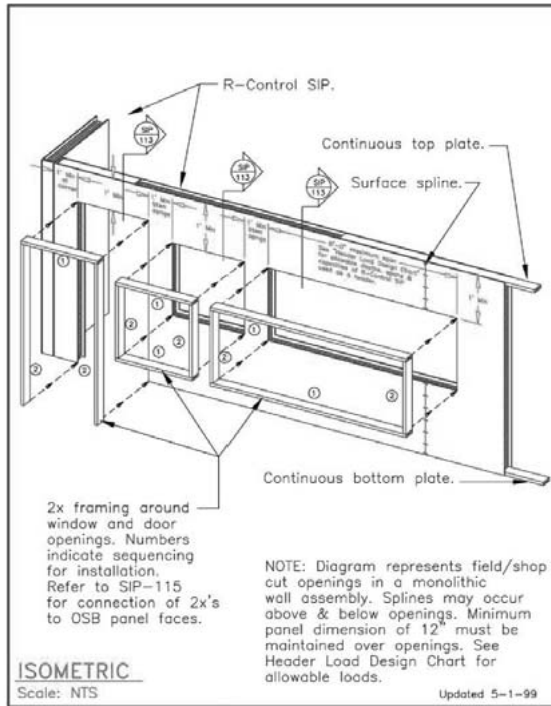
¹Limited to ultimate failure load divided by a safety factor of 3.0.

²See details SIP-112 and SIP-114.

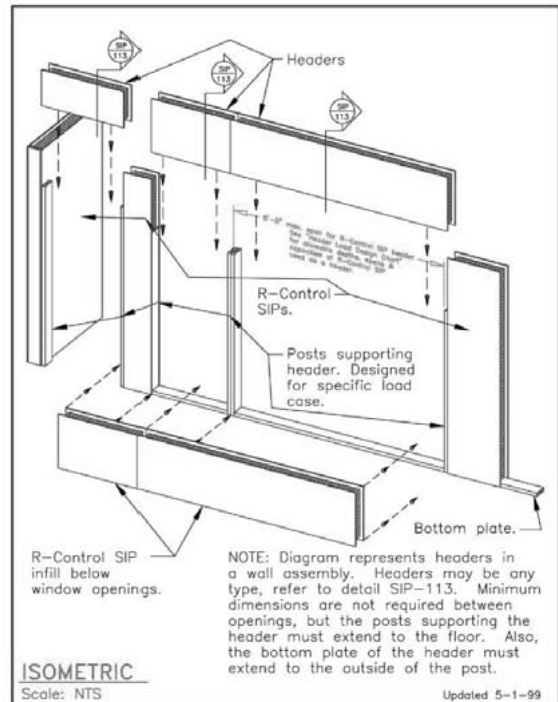
³Supports and connections shall be designed for each installation.

⁴Top and bottom plates shall be Douglas fir No. 2.

⁵See details SIP-112 and SIP-114.



R-Control® SIP
TITLE: SIP used as Header (surface spline condition) NO. SIP-114



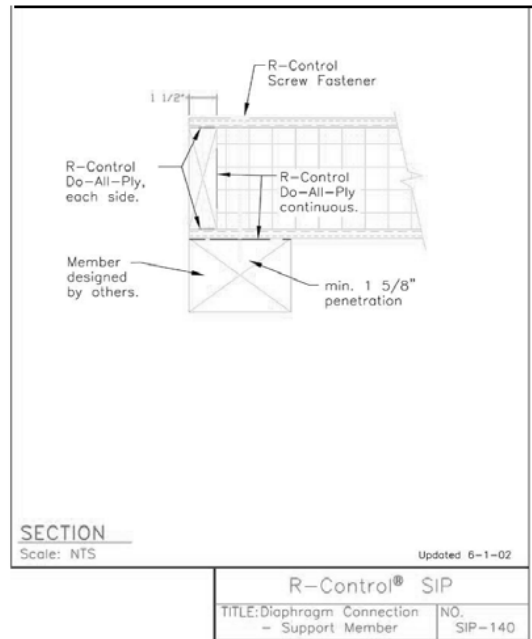
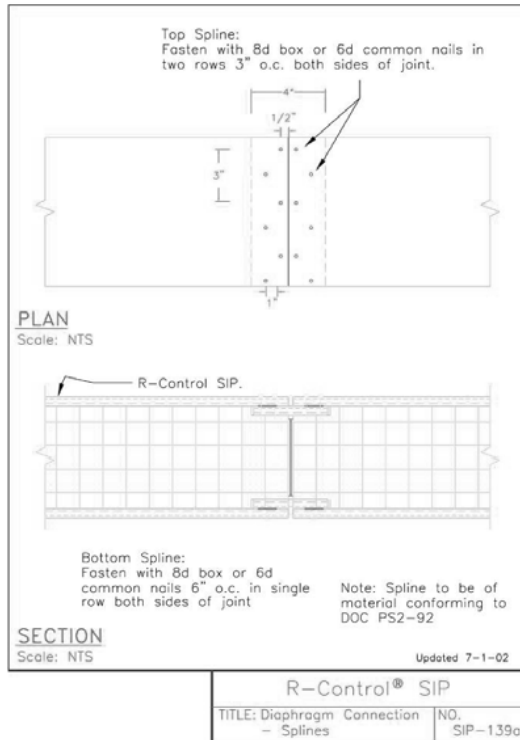
R-Control® SIP
TITLE: Headers NO. SIP-112

TABLE 9—ROOF/FLOOR-DIAPHRAGM LOADING²
 (See connection details SIP-139a, SIP-140 and SIP-141)

R-CONTROL® STRUCTURAL INSULATED PANELS			
7/16-inch OSB Thickness	Spacing of R-Control Screw Fasteners at supported edges (minimum 1 5/8 inch penetration)		
	3 inches	4 inches	6 inches
	Spacing of spline fasteners (8d box or 6d common) at unsupported edges—top side of panel only—two staggered rows of fasteners on each side of joint.		
	3 inches	3 inches	3 inches
	850 plf ¹	750 plf ¹	500 plf ¹

¹Spline is 7/16-inch OSB × 4.

²See details SIP-139a, SIP-140, and SIP-141.



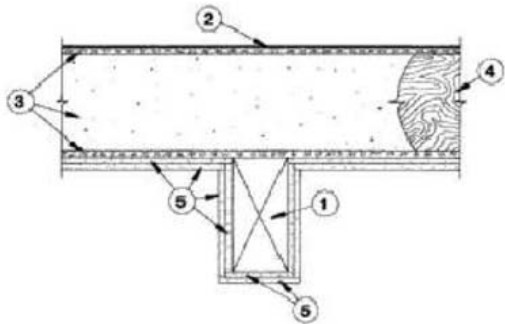
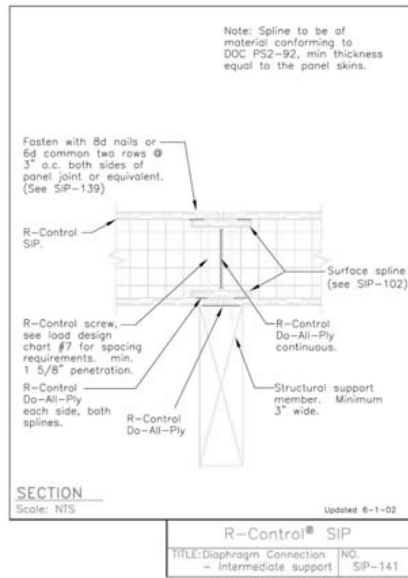


FIGURE 1
 Restrained Assembly Rating - 1 hour
 Unrestrained Assembly Rating - 1 hour

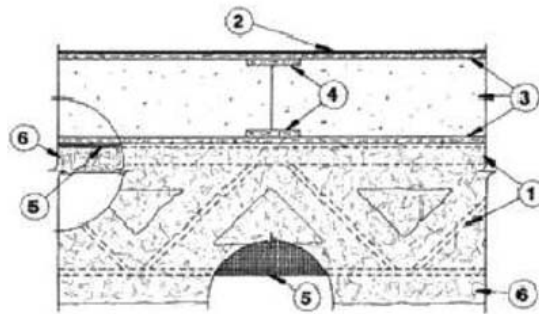


FIGURE 2
 Restrained Assembly Rating - 1 hour
 Unrestrained Assembly Rating - 1 hour

Refer to Section 4.4.3 for installation instructions

TABLE 10—MANUFACTURING LOCATIONS

LISTEE	LOCATION	PLANT ID NO.	PRODUCTS ^{1,2}
ACH Foam Technologies, LLC	5250 North Sherman Street Denver, Colorado 80216	U-1	EPS, SIP
ACH Foam Technologies, LLC	111 West Fireclay Avenue Murray, Utah 84107	U-2	EPS
ACH Foam Technologies, LLC	920 Kleppe Lane Sparks, Nevada 89431	U-53	EPS, SIP
ACH Foam Technologies, LLC	2731 White Sulphur Road Gainesville, Georgia 30503	U-4	EPS, SIP
ACH Foam Technologies, LLC	4001 Kaw Drive Kansas City, Kansas 66102	U-8	EPS
ACH Foam Technologies, LLC	1418 Cow Palace Road Newton, Kansas 67114	U-41	EPS
ACH Foam Technologies, LLC	90 Trowbridge Drive Fond Du Lac, Wisconsin 54936-0669	U-37	EPS
ACH Foam Technologies, LLC	809 East 15 th Street Washington, Iowa 52353	U-55	EPS
ACH Foam Technologies, LLC	3751 Sunset Avenue Waukegan, Illinois 60087	U-57	EPS, SIP
ACH Foam Technologies, LLC	Maquiladoras #331 Int A y B Tijuana, Baja California Mexico	U-60	EPS
Big Sky Insulations, Inc.	15 Arden Drive Belgrade, Montana 59714	U-30	EPS, SIP
Branch River Plastics, Inc.	15 Thurber Boulevard Smithfield, Rhode Island 02917	U-6	EPS, SIP
Chapman Building Systems	5275 Highway 27 East Kerryville, Texas 78028	U-25A	SIP
Flexible Packaging Company	Bayamon Gardens Station, Bayamon Puerto Rico 00985	U-10	EPS, SIP
Knauf USA Polystyrene Inc.	2725 Henkle Drive Lebanon, Ohio 45036	U-58	EPS
Noark Enterprises, Inc.	10101 Highway 70 East North Little Rock, Arkansas 72117	U-24	EPS, SIP
Pacific Allied Products, Ltd.	91-110 Kaomi Loop Kapolei, Hawaii 96707	U-17	EPS
Poly-Foam, Inc.	116 Pine Street South Lester Prairie, Minnesota 55354	U-22	EPS
Team Industries, Inc.	326 McGhee Road Winchester, Virginia 22603	U-14	EPS, SIP
Team Industries, Inc.	4580 Airwest Drive SE Grand Rapids, Michigan 49512	U-12	EPS, SIP
Therma Foam, Inc.	2324 Franklin Drive Forth Worth, Texas 76106	U-25	EPS

¹EPS products include R-Control® EPS Boards and R-Control® Perform Guard® EPS Boards.

²SIP products include R-Control® Structural Insulated Panels and R-Control® FireResist® Structural Insulated Panels.