

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES

Section: 06 12 00—Structural Panels

REPORT HOLDER:

COMPOSITE PANEL SYSTEMS, LLC

EVALUATION SUBJECT:

CPS PANELS, 9 FEET TALL, 7 INCHES OVERALL THICKNESS, FIBERGLASS FACED COMPOSITE WALL PANELS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018 and 2015 *International Building Code*® (IBC)
- 2018 and 2015 *International Residential Code*® (IRC)

Properties evaluated:

- Structural
- Resistance to water penetration when assembled into an exterior wall system

2.0 USES

2.1 General:

CPS Panels are used as structural insulated wall panels capable of resisting transverse and axial loads.

2.2 Construction Types:

CPS Panels shall be considered combustible building elements when determining the Type of Construction in accordance with IBC Chapter 6.

2.3 Fire Resistive Assemblies:

CPS Panels shall not be used as part of a fire-rated assembly unless suitable evidence and details are submitted and approved by the authority having jurisdiction.

3.0 DESCRIPTION

3.1 General:

CPS Panels are factory-assembled, fiberglass-faced structural insulated panels (SIPs) with a preformed polyurethane (PUR) foam core. Pultruded FRP studs are screwed and adhered to the interior surface spaced 16 inches (406 mm) on center. The product is intended for use as load-bearing or non-load-bearing wall panels. The product is available at a nominal 7 inches (178 mm) overall

thickness. The product is manufactured under factory-controlled conditions in a maximum manufactured size of 9 feet (2.74 m) tall and up to 24 feet (7.32 m) in length.

3.2 Materials:

3.2.1 Facing: The facing consists of a proprietary formed-in-place fiberglass system. The interior and exterior facings are connected through the thickness via formed-in-place fiberglass webs spaced nominally 4 inches (102 mm) on center along the length of the product.

3.2.2 Core: The core material is PUR foam conforming to the Type II, Class 3, Grade 2 specification defined in ASTM C1289. The foam core, in CPS Panels up to 7 inches (178 mm) overall thickness, has a flame spread rating not exceeding 75 and a smoke-developed rating not exceeding 450.

3.2.3 Adhesive: Facing materials are adhered to the core material during the facing formation process. The facing formation process is completed in accordance with the in-plant quality system documentation. Stud to facing adhesives have been evaluated for interior use and long duration loads.

3.2.4 Studs: The studs are pultruded 1.5 inches (38 mm) by 3.5 inches (89 mm) hollow tube sections made of glass reinforced polyester. The stud thickness is 0.125 inch (3 mm). The studs are attached to the interior facing of the panel using (3) #10x³/₄ hex head self-drilling screws and a ³/₁₆-inch bead of construction adhesive. The screws are located at mid span and 1 inch (25 mm) from each end of the studs. One-half-inch (13 mm) access holes are drilled through the interior 1¹/₂ inches (38 mm) side of the stud to allow application of the screws. Studs are spaced 16 inches (406 mm) on center along the interior face of the panel.

3.2.5 Material Sources: The facing and core used in the construction of CPS Panels shall be composed only of materials from approved sources as identified in the in-plant quality system documentation.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The scope of this report is limited to evaluation of the SIP component. Panel connections and other details related to incorporation of the panel into the overall structural system of a building are beyond the scope of this report.

4.1.1 Design Approval: Where required by the authority having jurisdiction, structures using CPS 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 qualifications as required by the applicable code and the professional registration laws of the state where the construction is undertaken. Approved construction documents shall be available at all times on the jobsite during installation.

4.1.2 Design Loads: Design loads to be resisted by the SIPs shall be as required under the applicable building code. Loads on the panels shall not exceed the loads noted in this report.

4.1.3 Allowable Loads: Allowable transverse and axial loads for the CPS Panels are provided in Tables 1 and 2. Allowable loads for applicable fasteners installed on CPS Panels shall be calculated using the values on Table 3. For CPS Panels characteristic properties, see Table 4. Calculations demonstrating that the loads applied are less than the allowable loads described in this report shall be submitted to the code official for approval. For loading conditions not specifically addressed herein, structural members designed in accordance with accepted engineering practice shall be provided to meet applicable code requirements.

4.1.4 Concentrated Loads: Axial loads shall be applied to the SIP through continuous members such as structural insulated roof or floor panels or repetitive members such as joists, trusses or rafters spaced at regular intervals of 24 inches (610 mm) on center or less. Such members shall be fastened to a rim board or similar member to distribute the load to the SIP. For other loading conditions, reinforcement shall be provided. This reinforcement shall be designed in accordance with accepted engineering practice.

4.1.5 Eccentric and Side Loads: Axial loads shall be applied concentrically to the top of the SIP. Loads shall not be applied eccentrically or through framing attached to one side of the panel (such as balloon framing) except where additional engineering documentation is provided.

4.1.6 Openings:

4.1.6.1 General: Openings in panels shall be reinforced with wood or steel structural elements designed in accordance with accepted engineering practice to resist all loads applied to the opening as required by the adopted code. Details for door and window openings shall be provided to clarify the manner of supporting transverse and axial loads at openings. Such details shall be shown on approved design documents and subject to approval by the local authority having jurisdiction.

4.1.6.2 Exterior Use: When the product serves as the water-resistant exterior wall envelope, window openings are permitted when installed in accordance with the manufacturer's installation instructions, Figure 1 or as determined by a design professional.

4.1.7 Combined Loads. Panels subjected to any combination of transverse and axial loads shall be analyzed utilizing a straight line interaction equation.

4.2 Installation:

4.2.1 General: CPS Panels shall be fabricated, identified and erected in accordance with this report, the approved construction documents and the applicable code. In the event of a conflict between the manufacturer's published installation instructions and this report, this report shall govern. Approved construction documents shall be available at all times on the jobsite during installation.

4.2.2 Splines: CPS Panels are interconnected at the panel edges through the use of a spline. The spline is an H-Profile proprietary component, CPS Panel Connector, supplied by Composite Panel Systems, LLC. The spline shall be secured in place with not less than ¼-inch x 1-inch-long (6 mm x 25 mm) self-drilling unslotted hex washer head screws, spaced 14 inches (356 mm) on center on the interior side of the panel, or an approved equivalent fastener. All joints shall be sealed in accordance with the SIP manufacturer's installation instructions and, when applicable, this report.

4.2.3 Plates: The top plate of the panels shall be dimensional or engineered lumber sized to match the overall thickness of the panel. The plate shall be secured, at minimum, using a Simpson Strong-Tie L70 bracket in the center of the interior surface of each panel bay. Through the bracket, the plate shall be fastened with not less than (4) #10-16 x 1½-inch-long (38 mm) self-drilling unslotted hex washer head screws and the facing shall be fastened with not less than (4) #10-16 x ¾-inch-long (19 mm) self-drilling unslotted hex washer head screws, or approved equivalent fasteners.

A second plate composed of 1⅛ inches (29 mm) minimum thickness dimensional or engineered lumber with a specific gravity of 0.42 sized to match the overall thickness of the panel shall be secured to the first top plate using, at minimum, a single row of 0.131 inch x 3-inch-long (3 mm x 76 mm) nails spaced 24 inches (610 mm) oc. or an approved equivalent fastener. The plates will also be secured to the interior panel facing with a Simpson Strong-Tie H2.5 Hurricane Tie spaced on every other stud [32 inches (813 mm) on center]. Through the Hurricane Tie, each top plate will be fastened with not less than (2) 10-¼ gauge x 1½-inch-long (38 mm) nails and the facing shall be fastened with not less than (3) #10-16 x ¾-inch-long (19 mm) self-drilling unslotted hex washer head screws or approved equivalent fasteners.

The connections above have not been evaluated for load capacity and must be evaluated by a design professional.

4.2.4 Cutting and Notching: No field cutting or routing of the panels shall be permitted except as shown on approved drawings.

4.2.5 Below Grade Use: CPS Panels are permitted to be used below grade, provided the exterior facing is continuous and any joints or penetrations are protected in accordance with Figure 2 of this report and the manufacturer's installation instructions. The designer of record is responsible for assessing the applicability of the values in Tables 1 and 2 of this document for maintaining the loading requirements based on the backfill material and the depth of the wall below grade as specified in ASCE 7 Table 3.2-1.

4.2.6 Heat-Producing Fixtures: 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. This limitation shall not be interpreted to prohibit heat-producing elements with suitable protection.

4.2.7 Voids and Holes:

4.2.7.1 Voids in Core: Voids in the core may be placed in the panels during fabrication at predetermined locations only. Voids in the core are only permitted when designed in accordance with Section 4.1.6.

4.2.7.2 Holes in Panels: Holes may be placed in panels during fabrication at predetermined locations only. Holes are only permitted when designed in accordance with section 4.1.6.

4.2.8 Panel Cladding:

4.2.8.1 Exterior Wall Covering: CPS Panels may serve as both the water-resistive barrier and as the weather protection required by the adopted building code when installed in accordance with Figure 1. Exterior facing material meet the requirements of IBC Section 2613.5 Exception 2 when installed in accordance with this report.

4.2.8.2 Interior Finish: CPS Panels are intended for use with an interior finish of a single layer of 1/2 inch (13 mm) Type X Gypsum.

5.0 CONDITIONS OF USE

The CPS Panels described in this report comply with the codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Installation complies with this report and the approved construction documents.
- 5.2 This report applies only to the panel thicknesses specifically listed herein.
- 5.3 In-use panel heights shall not exceed the values listed herein. Extrapolation beyond the values listed herein is not permitted.
- 5.4 The panels are manufactured in the production facilities in Eagle River, Wisconsin and Washington

Court House, Ohio, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Reports of axial load and transverse load tests of panels in accordance with the general guidelines of ASTM E72.
- 6.2 Reports tests in accordance with ASTM E331.
- 6.3 Reports of tests in accordance with ASTM E84.
- 6.4 Reports of tests in accordance with ASTM C1306.
- 6.5 Reports of tests in accordance with ASTM D1037.

7.0 IDENTIFICATION

- 7.1 Each panel must be identified by a stamp or label on the panel that includes the name and address of the report holder (Composite Panel Systems, LLC) and the evaluation report number (ESR-4667).
- 7.2 The report holder’s contact information is the following:

**COMPOSITE PANEL SYSTEMS, LLC
141 SOUTH WILLOW STREET
EAGLE RIVER, WISCONSIN 54521**

TABLE 1—ALLOWABLE UNIFORM TRANSVERSE LOADS (PSF)^{1,3,4}

Panel Length (feet)	7 inches Overall Thickness		
	Deflection Limit ²		
	L/180	L/240	L/360
9 feet CPS Panel (Positive Pressure Loading)	235	175	116
9 feet CPS Panel (Negative Pressure Loading)	200	192	130

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

¹Table values assume a simply supported panel with 2 inches of continuous bearing on facing at supports. Values do not include the dead weight of the panel.

²Deflection limit shall be selected by building designer based on the serviceability requirements of the structure and the requirements of adopted building code. Values are based on loads of short duration only and do not consider the effects of creep.

³Tabulated values are based on the product’s studs oriented parallel to the direction of panel bending.

⁴Permanent loads, such as dead load, shall not exceed 0.50 times the tabulated load.

TABLE 2—ALLOWABLE AXIAL LOADS (PLF)^{1,2,3,4,5}

Lateral Brace Spacing (feet)	7 inches Overall Thickness
9 feet CPS Panel	6246

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

¹Permanent loads, such as dead load, shall not exceed 0.50 times the tabulated load.

²All values are for normal duration and may not be increased for other durations.

³Axial loads shall be applied concentrically to the top of the panel through repetitive members spaced not more than 24 inches on center. Such members shall be fastened to a rim board or similar member to distribute along the top of the product.

⁴The ends of both facings must bear on the supporting foundation or structure to achieve the tabulated axial loads.

⁵Tabulated values are based on the product’s studs oriented parallel to the direction of applied load and facing the interior of the building.

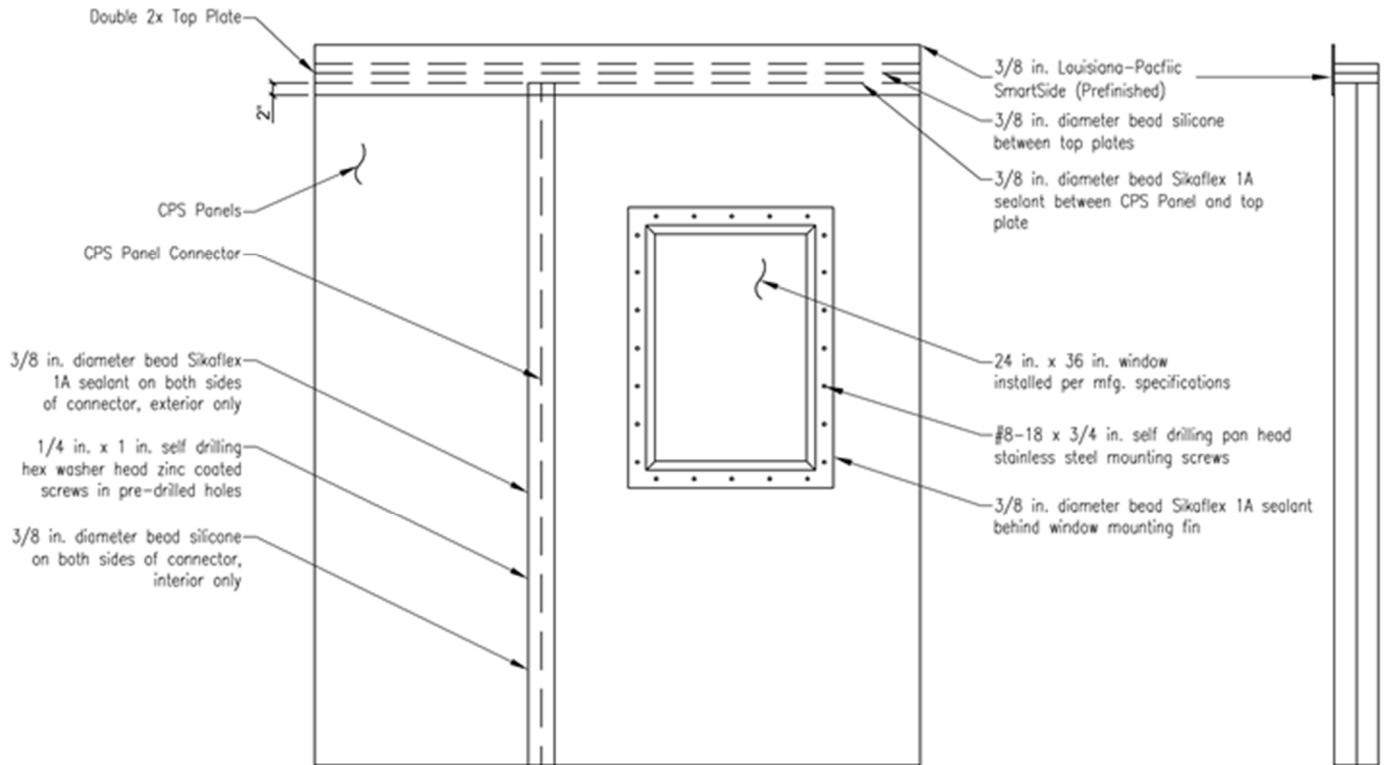


FIGURE 1—EXTERIOR USE WALL ASSEMBLY CONSTRUCTION DETAILS

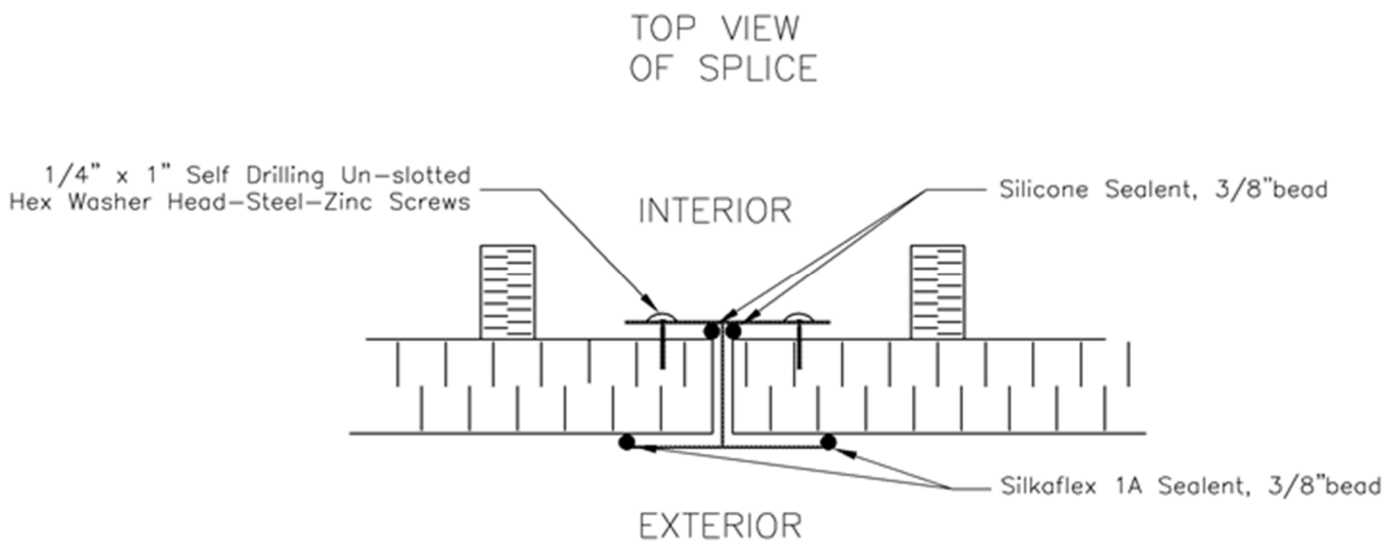


FIGURE 2—BELOW GRADE USE JOINT PROTECTION DETAILS

TABLE 3—FASTENER PERFORMANCE

Fastener	Property	Value² (lbf)
#6 x 1-5/8-inches Drywall Screw In stud material	Lateral Shear Capacity ¹ Machine Direction ⁴	201
	Lateral Shear Capacity ¹ Cross Machine Direction ⁴	168
	Withdrawal Capacity	150
#10-16 x 2-1/2 inches self-drilling unslotted hex washer head screw Interior or Exterior Facing Material	Lateral Shear Capacity ¹ Machine Direction ⁴	570
	Lateral Shear Capacity ¹ Cross Machine Direction ⁴	510
	Withdrawal Capacity	65
	Head Pull Through Capacity	428
#4 Rebar (1/2-inch diameter)	Lateral Shear Capacity Machine Direction ^{3, 4}	654

¹ Fastener installed 1 inch from edge of board

² Characteristic test value (5th percentile with 75% confidence). It is the responsibility of the designer of record to use an appropriate factor of safety.

³ Lateral shear capacity of rebar represents one layer of fiberglass facing material in the vertical direction for use in uplift calculations. The lateral shear resistance value is applicable in the surface of the pultruded stud. A Minimum edge distance of 1-inch is required.

⁴ With respect to CPS panels, Machine direction is the height of the wall, parallel to the studs while cross machine direction is perpendicular to the height and studs.

TABLE 4—CPS PANEL CHARACTERISTIC PROPERTIES^{1, 2}

Property	Interior Facing	Exterior Facing
Tensile Strength, F_t (psi)	10,736	10,880
Elastic Modulus (Tension), E_t (lb/in. width)	482,849	352,597

¹ All properties are based on a minimum panel width of 24 inches and direction of load parallel to the height of the wall panel.

² Tensile Strength shown is based on the characteristic test value (5th percentile with 75% confidence). Elastic modulus is the average tested result. It is the responsibility of the designer of record to use an appropriate factor of safety.