

ICC-ES Evaluation Report

ESR-1802*

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 12 00—Structural Panels
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EVALUATION SUBJECT:
KORWALL COMPOSITE SANDWICH PANELS
1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)

Properties evaluated:

- Structural
- Thermal barrier

2.0 USES

Korwall Composite Sandwich Panels are used as structural insulated load-bearing and non-load-bearing wall, floor, and roof panels of buildings of Type V-B construction under the IBC. For use under the IRC, the panels are limited to structures engineered under IRC Section R301.1.3.

3.0 DESCRIPTION
3.1 General:

Korwall Composite Sandwich Panels are factory-laminated sandwich panels consisting of oriented strand board (OSB) facings with an expanded polystyrene (EPS) foam plastic core material. The panels vary in size from 4 feet by 8 feet (1.21 m by 2.4 m) to 8 feet by 32 feet (2.4 m by 9.8 m). Roof and floor panels are designated as KPS-1-7.25 [7.25-inch-thick (184 mm) EPS core with 7/16-inch-thick (11.1 mm) OSB facings, and 8 1/8-inch (206 mm) total thickness], and KPS 1-5.5 [5 1/2-inch-thick (140 mm) EPS core with 7/16-inch-thick (11.1 mm) OSB facings, and 6 3/8-inch (162 mm) total thickness]. Wall panels are designated as KPS 1-3.5 [3 1/2-inch-thick (89 mm) EPS core with 7/16-inch-thick (11.1 mm) OSB facings, and 4 3/8-inch (111 mm) total thickness].

3.2 Materials:

3.2.1 Expanded Polystyrene: The EPS core thicknesses are 3.5, 5.5, and 7.25 inches (88.9 mm, 139.7 mm, and 184.1 mm). The core material is nominally 1.0-pound-per-cubic-foot density (16 kg/m³), Type I, expanded polystyrene board complying with ASTM C 578, and is supplied by manufacturers described in the quality documentation. The foam plastic has a flame-spread index of 75 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 at a thickness of 4 inches

3.2.2 Facings: The facing material of the panels is 7/16-inch-thick (11.1 mm) 24/16 rated sheathing, Exposure 1, OSB complying with U.S. DOC PS2 and as specified in the approved quality documentation.

3.2.3 Adhesive: The facing material is factory-bonded to the EPS core material with a Type II, Class 2, adhesive, as specified in the approved quality documentation.

3.2.4 Splines and Plates: Splines and plates must be solid sawn lumber, Grade 2 or better, spruce-pine-fir (SPF) or better, with a minimum specific gravity of 0.55. The splines and plates must be nominally 2-by-4, 2-by-6, or 2-by-8 for the 4 3/8-inch-thick 6 3/8-inch-thick, and 8 1/8-inch-thick (111.1 mm, 161.9 mm, and 206.4 mm) panels, respectively.

4.0 DESIGN AND INSTALLATION
4.1 Design:

4.1.1 Allowable Loads: Korwall Composite Sandwich Panels must be limited to the loading conditions indicated in Tables 1 and 2 of this report. The tabulated allowable loads are applicable to installations with the spans or heights noted in the tables and shorter spans and heights. Extrapolation is not permitted. The allowable loads shown in these tables are applicable to the Korwall Composite Sandwich Panels, but do not take into consideration the fasteners and the supporting elements for these panels. These components of the structure must conform to the requirements of the applicable code for these items. Combined axial and transverse loads on the wall panels must comply with the following equation:

$$\frac{\text{Actual Transverse Load [psf (kg/m}^2\text{)]}}{\text{Allowable Transverse Load [psf (kg/m}^2\text{)]}} + \frac{\text{Actual Axial Load [plf (kg/m)]}}{\text{Allowable Axial Load [plf (kg/m)]}} \leq 1.0$$

*Revised March 2013

4.1.2 IRC: When panels are installed under the IRC, engineered design is required in accordance with IRC Section R301.1.3.

4.2 Installation:

4.2.1 Walls:

4.2.1.1 General: Korwall panels are connected to each other along the panel edges by inserting lumber splines described in Section 3.2.4 into the core recessed edges of the panel. The lumber must be secured to the panels with minimum No. 16 gage, $\frac{7}{16}$ -inch-crown (11.1 mm), $1\frac{1}{2}$ -inch-long (38 mm) staples placed 4 inches (102mm) on center on both facers of each panel, or using an approved fastening schedule that can be shown by calculations to provide equivalent or higher shear-strength properties. The wall panels are connected to lumber top and bottom plates inserted into the ends of the panels using the same fasteners and fastener spacing as used to attach the panels to the splines.

4.2.1.2 Load-bearing Walls: The axial loading must be uniformly applied along the top of the wall panel and applied to the full panel thickness, using a single top plate. The wall panels must be installed in a manner such that the panel facers are in full contact and sufficiently supported by the underlying structure, and the loads applied to the top of the panel are uniform loads applied to both panel facers.

4.2.2 Floors: The panels must be installed over supports that provide the panels with a continuous bearing width of 1.5 inches (38 mm) at each end of the panel span. The design of the installation details must be substantiated to the satisfaction of the building official.

4.2.3 Roofs: The minimum roof slope is 3:12 (25 percent). The panels must be installed over supports that provide the panels with a continuous bearing width of 1.5 inches (38 mm) at each end of the panel span. The design of the installation details must be substantiated to the satisfaction of the building official.

4.2.4 Wall Openings: Wall openings for doors and windows must be framed with conventional materials, designed in accordance with the applicable code to the satisfaction of the code official.

4.2.5 Thermal Barriers:

4.2.5.1 Wall, Ceiling and Roof Panels: A layer of one-half-inch-thick (12.7 mm), regular gypsum wallboard complying with ASTM C 36 or ASTM C 1396 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 5d wallboard nails, or minimum $1\frac{1}{4}$ -inch-long (32 mm), No. 6, Type S or Type W drywall screws spaced in accordance with ASTM C 840 under the IBC, or Table R702.3.5 of the IRC, using 16-inch-on-center (406 mm) framing spacing guidelines.

4.2.5.2 Floor Panels: An approved thermal barrier, such as $\frac{19}{32}$ -inch-thick (15.1 mm) plywood, must separate the top of the floor panels from the interior of the building. The thermal barrier must be attached to the panel facing in accordance with the code.

4.2.6 Panel Cladding:

4.2.6.1 Roof Covering: Roof panels must be covered with a roof covering complying with Chapter 15 of the IBC, including IBC Section 2603.6, or IRC Section R901. Underlayment and flashing must be installed in accordance with the applicable code or evaluation report. Roofs with hot-asphalt or hot-coal tar pitch are prohibited.

4.2.6.2 Exterior Wall Covering: The exterior face of wall panels is required to be covered with a wall covering complying with the applicable code or recognized in a current ICC-ES evaluation report. A water-resistive barrier must be installed over the panels in accordance with IBC Section 1404.2 or IRC Section R703.2 prior to application of the wall covering. Where portland cement plaster is used, compliance with IBC Section 2510.6 or IRC Section R703.6.3 is necessary. All exterior panel joints must be sealed with a compatible acrylic latex caulk. Flashing must be installed in accordance with the applicable code.

5.0 CONDITIONS OF USE

The Korwall Composite Sandwich Panels 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** Korwall Composite Sandwich Panels are fabricated, identified and erected in accordance with this report and the manufacturer's published installation instructions. In the event of conflict between the manufacturer's published installation instructions and this report, this report governs.
- 5.2** Design loads to be resisted by the panels must be determined in accordance with the applicable code, and must not exceed the allowable panel loads noted in this report.
- 5.3** Each structure built using Korwall Composite Sandwich Panels must have construction documents prepared by qualified professionals delivered with the Korwall Composite Sandwich Panels, demonstrating compliance with this report. The documents must include floor plans, roof plans, ceiling plans or other plans where Korwall Composite Sandwich Panels are used, and connection details, window opening details, door opening details and engineering calculations. The design calculations and details must be prepared or certified by design professionals where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4** All roof-to-wall and wall-to-floor construction joint details must be designed such that gravity loads are applied to the wall panels as a uniform concentric axial load over the entire wall panel thickness.
- 5.5** Panels with openings must comply with Section 4.2.4 of this report.
- 5.6** Korwall Composite Sandwich Panels must be installed a minimum of 6 inches (203 mm) above finish grade, and the panels must not be installed below grade or in contact with earth. Where the probability of termite infestation is defined as "very heavy" by the code official, the foam plastic must be installed in accordance with IBC Section 2603.8 or IRC Section R320.5.
- 5.7** The panels are limited to use in buildings of Type V-B construction. The floor panels are limited to residential occupancy.
- 5.8** When used as shear walls, the panels are recognized for use in Seismic Design Categories A, B, and C.
- 5.9** The panels and their attachments must be inspected by the code official prior to their being covered with an approved water-resistive barrier, roof covering, or gypsum wallboard.
- 5.10** For installations of the Korwall Industries sandwich panels as roof panels, justification must be submitted to the code official demonstrating that the panels with the roof covering comply as a Class A, B, or C roof assembly, as required by IBC Section 2603.6, with

the classification complying with the minimum classification requirements for the building.

5.11 The panels are fabricated in Arlington, Texas, under a quality control program with inspections by PFS Corporation (AA-652).

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Sandwich Panels (AC04), dated October 2011.

7.0 IDENTIFICATION

Each Korwall Composite Sandwich Panel is identified by a stamp or label on the panel that includes the product panel number, the name and address of the manufacturer (Korwall Industries, Inc.), the evaluation report number (ESR-1802), and the label of the inspection agency (PFS Corporation).

TABLE 1—ALLOWABLE LOADS FOR WALL PANELS

PANEL	LOAD CONDITION	MAXIMUM SPAN HEIGHT (feet)	ALLOWABLE LOAD
KPS 1-3.5 (wall panel)	Transverse	8	24 psf
	Axial	12	877 lb/ft
	Racking shear	8 ¹	180 lb/ft

For SI: 1 foot = 304.8 mm, 1 psf = 0.0479 kPa.

¹Minimum shear wall length is 8 feet.

TABLE 2—ALLOWABLE LOADS FOR ROOF OR FLOOR PANELS^{1,2}

PANEL	LOAD CONDITION	MAXIMUM SPAN (feet)	ALLOWABLE LOAD (psf)		
			L/180	L/240	L/360
KPS 1-5.5 (roof /floor panel)	Transverse	16	22	17	12
KPS 1-7.25 (roof /floor panel)	Transverse	20	24	18	12

For SI: 1 foot = 304.8 mm, 1 psf = 0.0479 kPa.

¹Minimum bearing width at each end of panel is 1.5 inches.

²Roof panels subject to maintenance worker concentrated live loads, defined in Table 1607.1 of the IBC, must not exceed a superimposed dead load of 3.2 psf for the KPS 1-5.5, and 6.75 psf for the KPS 1-7.2.5.

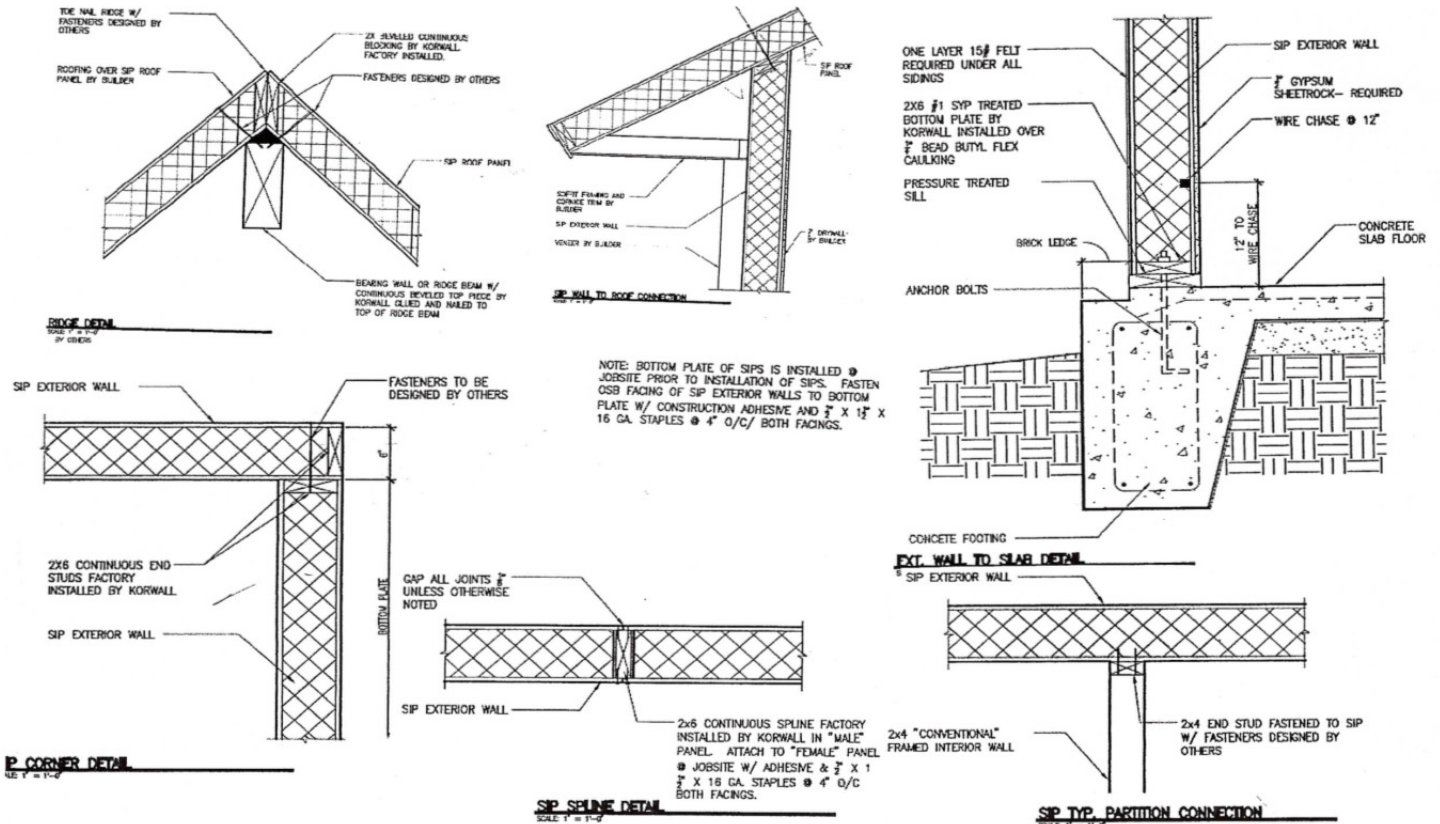


FIGURE 1