

ICC-ES Evaluation Report

ESR-4525

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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>THERMOCORE PANEL SYSTEMS</p>	<p>EVALUATION SUBJECT:</p> <p>THERMOCORE BUILDING PANELS: WALL AND ROOF PANELS 8 FT. TO 24 FT. LONG, 4 IN. TO 8¹/₄ IN. THICK</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)
- 2021, 2018, 2015 and 2012 [International Residential Code® \(IRC\)](#)

Property evaluated:

Structural

2.0 USES

2.1 General:

Thermocore Building Panels are used as structural insulated wall and roof panels.

2.2 Construction Types:

Thermocore Building Panels shall be considered combustible building elements when assessing construction type in accordance with IBC Chapter 6.

2.3 Fire Resistive Assemblies:

Thermocore Building 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:

Thermocore Building Panels are factory-assembled, engineered-wood-faced, structural insulated panels (SIPs) with polyurethane foam plastic core. The panels are intended for use as load-bearing or non-load bearing wall and roof components. Panels are available in 4-inch (102 mm), 6¹/₂-inch (165 mm) and 8¹/₄-inch (210 mm) overall thicknesses. The panels are custom made to the specifications for each use and are assembled under factory-controlled conditions. The maximum panel size is 8 feet (2.44 m) wide and up to 24 feet (7.32 m) in length.

3.2 Materials:

3.2.1 Facing: The facing consists of two single-ply oriented strand board (OSB) facings a minimum of ⁷/₁₆-inch thick (11.1 mm) complying with DOC PS 2, Exposure 1, Rated Sheathing with a span index of 24/16, 2021 and 2018 IRC Section R610.3 (2015 IRC Table R610.3.2 and 2012 IRC Table R613.3.2). Panels shall be manufactured with the facing strength axis oriented parallel to the direction of SIP bending.

3.2.2 Core: The polyurethane core material is minimum 2.2 lb/ft³ (35.24 kg/m³) density which is foamed in place and self-adhering to the panel facings. The foam plastic core has a self-ignition temperature of 650°F or greater when tested in accordance with ASTM D1929. The foam core has a flame spread rating not exceeding 75 and a smoke-developed rating not exceeding 450 in compliance with IBC Section 2603.3 Exception 4.

3.2.3 Material Sources: The facing and core materials used in the construction of *Thermocore Building 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:

4.1.1 General: The scope of this report is limited to the evaluation of the SIP component. Panel connections and other details related to incorporation of the panels into the overall structural system of a building are outside the scope of this report.

4.1.2 Design Approval: Where required by the authority having jurisdiction, structures using *Thermocore Building 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.

4.1.3 Design Loads: Design loads to be resisted by the SIPs shall be as required under the applicable code. Loadings on the panels shall not exceed the loads noted in this report. Where loading conditions result in several modes of superimposed stressing, the sum of the ratio of actual loads over allowable loads shall not exceed one. 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.

4.1.4 Allowable Loads: Allowable axial, transverse, and in-plane shear loads are noted in [Tables 1 through 4](#). Maximum and minimum panel heights, spans and thicknesses are limited as provided in [Tables 1 through 4](#). Unless otherwise noted, all allowable loads apply to panels joined with surface or block splines. For loading conditions not specifically addressed herein, the specific condition shall be supported by members designed in accordance with accepted engineering practice to meet applicable code requirements.

4.1.5 Concentrated Loads: Axial loads shall be applied to the panel through repetitive members 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 along the top of the panel. For other loading conditions, such as concentrated loads, reinforcement shall be provided. This reinforcement shall be designed in accordance with accepted engineering practice.

4.1.6 Eccentric and Side Loads: Axial loads shall be applied concentrically to the top of the panel. 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.

4.1.7 Openings: Openings in panels shall be reinforced with wood or steel designed in accordance with accepted engineering practice to resist all loads applied to the opening as required by the applicable code. Details for door and window openings shall be provided to clarify the manner of supporting axial, transverse and/or racking shear loads at openings. Such details shall be shown on approved design documents and subject to approval by the local authority having jurisdiction. Unreinforced openings may exist where the spans, uniform loads and deflection limits provided in [Table 3](#) meet or exceed the design requirements.

4.1.8 In-Plane Shear Design: Shear walls shall be sized to resist all code required wind and seismic loads without exceeding the allowable loads provided in [Table 4](#). The maximum panel height-to-width ratio shall be 2:1.

4.1.9 Seismic Design: Use of panels as shear walls (racking shear) is limited to structures in Seismic Design Categories A, B and C. Where panels are used to resist seismic forces, the following factors shall be used for design: Response Modification Coefficient, $R = 2.0$; System Overstrength Factor, $\Omega_o = 2.5$; Deflection Amplification Factor, $C_d = 2.0$.

4.2 Installation:

4.2.1 General: *Thermocore Building Panels* shall be fabricated, identified, and installed 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: *Thermocore Building Panels* are connected to each other at the panel edges through the use of a tongue-and-groove spline arrangement. The connection is secured in place by the field application of $\frac{7}{16}$ -inch x $1\frac{1}{2}$ -inch x 16-gauge (11.1 mm x 38.1 mm) staples at 4 inches (102 mm) on-center or an approved equivalent fastener.

4.2.3 Plates: The top and bottom plates of the panels shall be dimensional or engineered lumber sized to match the core thickness of the panel. The plates shall be secured in place using $\frac{7}{16}$ -inch x $1\frac{1}{2}$ -inch x 16-gauge (11.1 mm x 38.1 mm) staples at 4 inches (102 mm) on-center or an approved equivalent fastener.

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 Protection from Decay: Panels that rest on exterior foundation walls shall not be located within 8 inches (203 mm) from exposed earth. Panels supported by concrete or masonry that is in direct contact with earth shall be protected from the concrete or masonry by a moisture barrier.

4.2.6 Protection from Termites: In areas subject to damage from termites, panels shall be protected from termites using an approved method. Panels shall not be installed below grade or in contact with earth.

4.2.7 Heat-Producing Fixtures: Heat-producing fixtures shall not be installed in 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.

4.2.8 Plumbing Installation: Plumbing and waste lines may extend at right angles through the wall panels but are not permitted vertically within the core. Lines shall not interrupt splines or panel plates unless approved by the local authority having jurisdiction.

4.2.9 Voids and Holes:

4.2.9.1 Voids in Core: Voids may be provided in the panel core during fabrication at predetermined locations only. Voids shall be limited to a single 1-inch (25.4 mm) maximum hole running parallel to the panel span. Voids shall be spaced a minimum of 4 feet (1.22 m) on center, measured perpendicular to the panel span. Two $\frac{1}{2}$ -inch-diameter (12.7 mm) holes may be substituted for the single 1-inch (25.4 mm) hole provided they are maintained parallel and within 2 inches (50.8 mm) of each other.

4.2.9.2 Holes in Panels: Holes may be placed in panels during fabrication at predetermined locations only. Holes shall be limited to 4 inches x 4 inches (102 mm x 102 mm) square. The minimum distance between holes shall not be less than 4 feet (1.22 m) on center measured perpendicular to the panel span and 24 inches (610 mm) on center measured parallel to the panel span. Not more than three holes shall be provided in a single line of holes parallel to the panel span. The holes may intersect voids permitted elsewhere in this report.

4.2.10 Panel Cladding:

4.2.10.1 Roof Covering: The roof covering shall comply with the applicable codes. Underlayment and flashing shall be installed in accordance with the applicable codes. All roofing materials must be installed in accordance with the manufacturer's installation instructions. Roofs with hot-asphalt or hot-coal tar pitch are prohibited.

4.2.10.2 Exterior Wall Covering: Panels shall be covered on the exterior by a water-resistive barrier as required by the applicable code. The water-resistive barrier shall be attached with flashing in such a manner as to provide a continuous water-resistive barrier behind the exterior wall veneer. The exterior facing of the SIP wall shall be covered with weather protection as required by the adopted building code or other approved materials.

4.2.10.3 Interior Wall Covering: The SIP panel foam plastic core shall be separated from the interior of the building by an approved thermal barrier of $\frac{1}{2}$ inch (12.7 mm) gypsum wallboard or equivalent thermal barrier where required by IBC Section 2603.

5.0 CONDITIONS OF USE:

Thermocore Building Panels as 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/spans 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 Mooresville, Indiana, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Reports of axial load, transverse load, and in-plane racking shear tests of panels in accordance with the general guidelines of ASTM E72.

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4525) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, the *Thermocore Building Panels* are identified with the in-plant quality assurance stamp, company name (Thermocore Panel Systems) and project or batch number.
- 7.3 The report holder’s contact information is the following:

THERMOCORE PANEL SYSTEMS
1801 HANCEL PARKWAY
MOORESVILLE, INDIANA 46158
(317)831-8888
www.thermocore.com

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

Panel Length (feet)	4-inch-thick SIP			6 1/2-inch-thick SIP			8 1/4-inch-thick SIP		
	Deflection Limit ²			Deflection Limit ²			Deflection Limit ²		
	L/180	L/240	L/360	L/180	L/240	L/360	L/180	L/240	L/360
8	57.9	43.6	29.2	93.5	87.4	57.1	113.0	113.0	81.0
10	55.8	42.0	28.2	85.5	84.3	55.1	107.2	107.2	79.7
12	51.9	39.1	26.2	75.7	75.7	51.4	100.1	100.1	77.4
14	45.6	34.3	23.0	64.1	64.1	45.3	91.7	91.7	73.6
16	35.9	27.0	18.1	50.7	50.7	36.0	82.0	82.0	67.7
18	21.8	16.4	10.9	35.5	33.9	22.4	71.1	71.1	59.2
19.5	7.6	5.7	3.8	16.3	12.8	8.8	58.8	58.8	47.3
22	--	--	--	--	--	--	45.3	45.3	31.2
24	--	--	--	--	--	--	20.4	15.0	10.1

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 psf = 0.0479 kPa.

¹Table values assume a simply supported panel with 1.5 inches of continuous bearing on facing at supports (Cv = 1.0) with solid wood plates at bearing locations. Values do not include the dead weight of the panel. For wall panel capacities (4 inch and 6 1/2-inch-thick panels only) utilizing a zero bearing configuration (Figure 1), the allowable load shall be determined using Cv = 0.66.

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 effects of creep.

³Permanent loads, such as dead load, shall not exceed 0.50 times the tabulated load.

TABLE 2—ALLOWABLE COMBINED AXIAL AND TRANSVERSE LOADS^{1, 2, 3, 4}

Panel Length (feet)	4 Inch Thick SIP						6 1/2 Inch Thick SIP					
	Uniform Transverse Load (psf)											
	5	10	20	30	40	50	5	10	20	30	40	50
	Allowable Axial Load (plf)											
8	2693	2693	2661	2196	1730	1265	4505	4505	4505	4505	4079	3597
10	2693	2693	2459	2007	1555	1103	4505	4505	4505	4268	3760	3251
12	2523	2523	2195	1749	1304	858	4345	4345	4345	3887	3339	2790
14	2315	2305	1851	1398	944	491	4149	4149	4002	3390	2778	2167
16	1747	1543	1136	728	321	--	3919	3806	3145	2485	1824	1163
18	1321	1046	498	--	--	--	3350	3262	2389	1517	644	--
19.5	747	23	--	--	--	--	3091	2165	313	--	--	--

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 psf = 0.0479 kPa; 1 plf = 14.6 N/m.

¹Allowable axial tension loads shall not exceed the allowable compression loads above. Loads may be interpolated to determine the allowable load under transverse loads or spans bounded by those provided. Deflections due to transverse loads are limited to L/180. All values are for normal duration and may not be increased for other durations. For applications requiring eccentric loads or loads applied to the face of the panel, contact the manufacturer for design assistance.

²Permanent loads, such as dead load, shall not exceed 0.50 times the tabulated load.

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 the load along the top of the SIP.

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

TABLE 3—ALLOWABLE HEADER LOADS (DEAD + LIVE)^{1, 2}

Span ⁴ (feet)	4 Inch Thick SIPs – 12 Inch Depth Header ³		
	Deflection Limit		
	L/180	L/240	L/360
	Uniform Header Loads (plf)		
4.0	1354	1354	1268
4.5	1262	1262	1229
5.0	1158	1158	1158
5.5	1044	1044	1044
6.0	919	919	919
6.5	784	784	784
7.0	673	673	637
7.5	479	479	479

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 plf = 14.6 N/m.

¹Vertical loads only. Lateral loads on header and opening shall be resisted by engineered framing provided around opening. Jack/jamb studs shall be provided on each side of each opening to transfer loads into the supporting structure.

²Permanent loads, such as dead load, shall not exceed 0.50 times the tabulated value.

³Typical panel with single top and bottom plate installed at header location.

⁴For longer spans, engineered header members and support columns shall be built into the panel as determined by the designer of record.

TABLE 4—ALLOWABLE IN-PLANE RACKING SHEAR STRENGTH FOR SIP SHEAR WALLS (WIND AND SEISMIC LOADS IN SEISMIC DESIGN CATEGORIES A, B AND C)¹

Spline Type ³	Nominal Minimum SIP Thickness (inches)	Minimum Facing Connections ⁴			Allowable Shear Load (plf)
		Chord ^{2,3}	Plate ²	Spline ³	
Block or Surface Spline	4	0.131"x 3" nails, 6" on center	0.131"x 3" nails, 6" on center	⁷ / ₁₆ " x 1 ¹ / ₂ " x 16 Ga. staples 4" on center	237

For **SI**: 1 inch = 25.4 mm; 1 plf = 14.6 N/m.

¹Maximum shear wall dimension ratio 2:1 (height:width) for resisting wind or seismic loads.

²Chords, hold downs and connection to other structural elements must be designed by a registered design professional in accordance with accepted engineering practice.

³Spline type at interior panel-to-panel joints only. Solid chord members are required at each end of each shear wall segment.

⁴Required connections must be made on each side of the panel. Dimensional or engineered lumber shall have an equivalent specific gravity of 0.42 or greater.

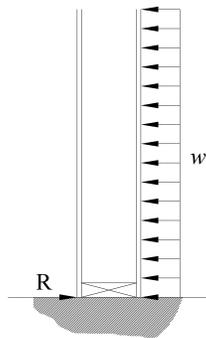


FIGURE 1—ZERO BEARING SUPPORT