



CSI: 06 12 00

PRODUCT: Structural Insulated Panels (SIPs)

DIVISION: Wood, Plastics, and Composites

SECTION: Structural Panels

Report Holder**Thermocore Panel Systems****1801 Hancel Parkway****Mooreville, Indiana 46158****Manufacturing Location****Thermocore Panel Systems (NTA Plant #500)****1801 Hancel Parkway****Mooreville, Indiana 46158****1. SUBJECT****1.1 Thermocore Building Panels. Wall and Roof Panels
8 ft to 24 ft long, 4 in. to 8-1/4 in. thick.****2. SCOPE**

NTA, Inc. has evaluated the above product(s) for compliance with the applicable sections of the following codes:

2.1 2012, 2015 International Building Code (IBC)**2.2** 2012, 2015 International Residential Code (IRC)

NTA, Inc. has evaluated the above product(s) in accordance with:

2.3 NTA IM 014 Structural Insulated Panel Evaluation**2.4** NTA IM 036 Quality System Requirements

NTA, Inc. has evaluated the following properties of the above product(s):

2.5 Structural performance under axial, transverse and in-plane shear loads.To obtain the most current NTA NER Report, visit www.ntainc.com/report.**3. USES****3.1 General.** *Thermocore Building Panels* are used as structural insulated wall and roof panels.**3.2 Construction Types.** *Thermocore Building Panels* shall be considered combustible building elements when assessing construction type in accordance with 2012 IBC Chapter 6. (IM 014 NACU1)**3.3 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. (IM 014 ACU14)**4. DESCRIPTION****4.1 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 in., 6-1/2 in. and 8-1/4 in. 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 ft wide and up to 24 ft in length.**4.2 Materials.****4.2.1 Facing.** The facing consists of two single-ply oriented strand board (OSB) facings a minimum of 7/16 in. thick complying with DOC PS 2, Exposure 1, Rated Sheathing with a span index of 24/16 and 2012 IRC Table 613.3.2. Panels shall be manufactured with the facing strength axis oriented parallel to the direction of SIP bending. (IM 014 ACU4)**4.2.2 Core.** The polyurethane core material is minimum 2.2 pcf density which is foamed in place and self-adhering to the facing. 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 2012 IBC Section 2603.3 Exception 4.**4.3 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.**5. DESIGN****5.1 Overall Structural System.** The scope of this report is limited to the 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. (IM 014 NACU3)

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5.2 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. (IM 014 NACU4)

5.3 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. (IM 014 NACU5)

5.4 Allowable Loads. Allowable axial, transverse, and in-plane shear loads are noted in Tables 1 through 4. Maximum and minimum panel heights, spans (IM 014 ACU2) and thicknesses (IM 014 ACU3) 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.

5.5 Concentrated Loads. Axial loads shall be applied to the panel through repetitive members spaced at regular intervals of 24 in. 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. (IM 014 ACU12)

5.6 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. (IM 014 ACU13)

5.7 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 adopted 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. (IM 014 ACU8) Unreinforced openings may exist where

the spans, uniform loads and deflection limits provided in Table 3 meet or exceed the design requirements.

5.8 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. (IM 014 ACU17)

5.9 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, $\Omega_0 = 2.5$; Deflection Amplification Factor, $C_d = 2.0$. (IM 014 ACU16)

6. INSTALLATION

6.1 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. (IM 014 NACU7)

6.2 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 7/16 in. x 1-1/2 in. x 16 gauge staples at 4 in. on-center or an approved equivalent fastener.

6.3 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 7/16 in. x 1-1/2 in. x 16 gauge staples at 4 in. on-center or an approved equivalent fastener.

6.4 Cutting and Notching. No field cutting or routing of the panels shall be permitted except as shown on approved drawings. (IM 014 NACU6)

6.5 Protection from Decay. Panels that rest on exterior foundation walls shall not be located within 8 in. 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. (IM 014 ACU6)

6.6 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. (IM 014 ACU7, ACU22)

6.7 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. (IM 014 NACU9)

6.8 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. (IM 014 NACU2)

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6.9 Voids and Holes

6.9.1 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 in. maximum hole running parallel to the panel span. Voids shall be spaced a minimum of 4 ft. on center, measured perpendicular to the panel span. Two 1/2 in. diameter holes may be substituted for the single 1 in. hole provided they are maintained parallel and within 2 in. of each other. (IM 014 ACU11)

6.9.2 Holes in Panels. Holes may be placed in panels during fabrication at predetermined locations only. Holes shall be limited to 4 in. x 4 in. square. The minimum distance between holes shall not be less than 4 ft. on center measured perpendicular to the panel span and 24 in. 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. (IM 014 ACU15)

6.10 Panel Cladding

6.10.1 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.

6.10.2 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. (IM 014 ACU9) The exterior facing of the SIP wall shall be covered with weather protection as required by the adopted building code or other approved materials. (IM 014 ACU10)

6.11 Interior Wall Covering. The SIP panel foam plastic core shall be separated from the interior of the building by an approved thermal barrier of 1/2 in. gypsum wallboard or equivalent thermal barrier where required by 2012 IBC 2603.

7. CONDITIONS OF USE

Thermocore Building Panels as described in this report comply with the codes listed in Section 2 above, subject to the following conditions:

7.1 Installation complies with this report and the approved construction documents.

7.2 This report applies only to the panel thicknesses specifically listed herein. (IM 014 ACU3)

7.3 In use panel heights/spans shall not exceed the values listed herein. Extrapolation beyond the values listed herein is not permitted. (IM 014 ACU2)

7.4 The panels are manufactured in the production facilities noted in this report. (IM 014 NACU8)

8. EVIDENCE SUBMITTED

NTA, Inc. has examined the following evidence to evaluate this product:

8.1 Review of plant quality assurance manual in accordance with NTA IM 036.

8.2 Plant certification inspection of manufacturer's production facilities, test procedures, frequency and quality control sampling methods, test equipment and equipment calibration procedures, test records, dates and causes of failures when applicable in accordance with NTA IM 036.

8.3 Qualification test data in accordance with NTA IM 014 Standard Evaluation Plan 01 (IM 014 SEP 01)

8.4 Periodic quality assurance audits of the production facilities.

8.5 Periodic verification testing in accordance with NTA, Inc. NTA IM 014.

Evaluation evidence and data are on file with NTA, Inc. NTA, Inc. is accredited by the International Accreditation Service (IAS) as follows:

ISO 17020 Inspection Agency (AA-682)

ISO 17025 Testing Laboratory (TL-259)

ISO 17065 Product Certification Agency (PCA-102)

The scope of accreditation related to testing, inspection or product certification pertain only to the test methods and/or standard referenced therein. Design parameters and the application of building code requirements, such as special inspection, have not been reviewed by IAS and are not covered in the accreditation. Product evaluations are performed under the direct supervision of Professional Engineers licensed in all jurisdictions within the United States as required by the building code and state engineering board rules.

9. FINDINGS

All products referenced herein are manufactured under an in-plant Quality Assurance program to ensure that the production quality meets or exceeds the requirements of the codes noted herein and the criteria as established by NTA, Inc. Furthermore, product must comply with the conditions of this report.

This report is subject to annual review.

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10. IDENTIFICATION

Each eligible product shall be permanently marked to provide the following information:

10.1 The NTA, Inc. certification mark, either

10.1.1 NTA's NER No. TPS082604-13, or

10.1.2 NTA's NER No. NER-1023

10.2 In-plant quality assurance stamp;

10.3 Identifier for production facility;

10.4 Project or batch number.



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Table 1: Allowable Uniform Transverse Loads (psf)^{1, 3}

Panel Length (ft)	4 in. Thick SIP			6-1/2 in. Thick SIP			8-1/4 in. 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

¹Table values assume a simply supported panel with 1.5 in. 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 in. and 6-1/2 in. thickness 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 (ft)	4 in. Thick SIP						6-1/2 in. 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	--	--	--

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.

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Table 3: Allowable Header Loads^{1,2} (Dead + Live)

Span ⁴ (ft)	4 in. Thick SIPs – 12 in. 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

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 Shear Strength (Pounds per Foot) for SIP Shear Walls (Wind and Seismic Loads in Seismic Design Categories A, B and C)^{1,3}

Spline Type ³	Nominal Min. SIP Thickness (in.)	Minimum Facing Connections ^{2,4}			Shear Strength (plf)
		Chord ²	Plate ²	Spline ³	
Block or Surface Spline	4	0.131"x 3" nails, 6 in. oc	0.131"x 3" nails, 6 in. oc	7/16" x 1-1/2" x 16 Ga. staples 4 in. oc	237

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.

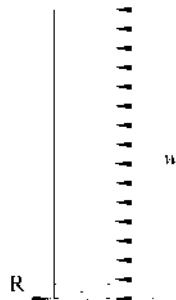


Figure 1: Zero Bearing Support

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