



Evaluation #

200609-I
(Replaces 200041-I)

Safety & Buildings Division
201 West Washington Avenue
P.O. Box 2658
Madison, WI 53701-2658

Wisconsin Building Products Evaluation

Material

Enercept Building Systems
Structural Insulated Panels

Manufacturer

Enercept, Inc.
3100 9th Avenue S.E.
Watertown, South Dakota 57201

SCOPE OF EVALUATION

GENERAL: This report evaluates Enercept, Inc., structural insulated panels for use where combustible construction is permitted.

The **Comm** requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1- and 2-family dwellings**:

- **Structural:** Enercept structural insulated panels were evaluated in accordance with load and material requirements of **s. Comm 21.02(1), (2) and (3)(a)**.
- **Foam Plastic Core Material:** Enercept structural insulated panels were evaluated in accordance with the foam plastic requirements of **s. Comm 21.11(1)**.

The **IBC** requirements below in accordance with the current **Wisconsin Amended ICC Code**:

- **Structural:** Enercept structural insulated panels were evaluated in accordance with load and material requirements of **s. IBC 1603.1 through 1603.2**.
- **Foam Plastic Core Material:** Enercept structural insulated panels were evaluated in accordance with the foam plastic requirements of **s. IBC 2603** and the approved Enercept, Inc., quality control manual.
- **Thermal Barrier:** Enercept structural insulated panels were evaluated in accordance with the foam plastic requirements of **s. IBC 2603.4**.

DESCRIPTION AND USE

General: Enercept structural insulated panels are prefabricated sandwich panels consisting of oriented strand board (OSB) facings and expanded polystyrene (EPS) cores. The panels are allowed for use as bearing and nonbearing walls (standard and curtain), lintels and roof components in accordance with the current **Wisconsin Uniform Dwelling Code for 1- and 2-family dwellings** and **IBC** requirements in accordance with the current **Wisconsin SBD-5863 (R. 10/00)**

Amended ICC Code, respectively. These factory fabricated, field erected panels form the shell framework of structures; typically residential housing units.

Enercept structural insulated panels are also allowed for use as floor panels and basement panels of **1- and 2-family dwellings**.

Enercept structural insulated panel material consists of:

- **Core:** Core material is EPS foam plastic having thickness as noted in this evaluation. The EPS core complies with the Type I requirements of ASTM C578, has a nominal 1.0 pcf (16 kg/m³) density.
- **Facing:** Facing material is 7/16-inch-thick (11.1 mm) OSB in conformance with Exposure 1, 24/16 performance-rated panel requirements specified in United States Voluntary Product Standard PS-2 and the quality control manual.
- **Adhesive:** The OSB facing material is bonded to the EPS core material with Mor-Ad M-647 or M-648 adhesive, manufactured by Rohm and Haas Company. The adhesive also binds the lumber to the EPS in the thermal splines described below in the **Standard Wall Panel** section.
- **Gypsum Wallboard:** Gypsum wallboard must be a minimum of 1/2-inch-thick (12.7 mm), and must comply with ASTM C36.

Enercept structural insulated panels consist of:

- **Standard Wall Panels:** Panels consist of the OSB facing bonded to 5-5/8- or 7 3/8-inch-thick (143 or 187.3 mm) EPS cores. The panels are fabricated in 1- to 4-foot (305 to 1219 mm) widths. See Table 1 for panel heights. The panels are manufactured with full-length panel facings without intermediate joints. The core is recessed 3 inches (76 mm) from the top panel edge, 1-1/2 inches (38 mm) from the bottom, and 1 11/16 inches (42.9 mm) from each panel side. The recesses receive double nominal 2-inch plates at the top, and a single nominal 2-inch sill plate at the bottom; the plates are installed at the jobsite. Top and bottom plates must be spruce-pine-fir No. 2 or better, with the depth of the plates sized to match the EPS core thickness.

A spline is factory-installed along one side of the panel and nailed to the sheathing with 8d common nails spaced at 6 inches (152 mm) on center, unless noted otherwise in this evaluation for shear walls. The spline (thermal spline) consists of two nominal 2-by-4 spruce-pine-fir Standard grade or better wood members adhered to a 2lb. EPS foam core that has a depth permitting the thermal spline depth to match the sandwich panel core thickness.

- **Curtain Wall Panels:** The curtain wall panels are fabricated and installed similarly to the standard wall panels described in the section above. The panels are used as curtain walls and are nonbearing panels.
- **Roof Panels:** The roof panels are 4 feet (1219 mm) wide and consist of OSB facings and EPS core. See Table 2 for EPS core thickness and panel lengths. The panels are manufactured with full-length panel facings, without intermediate joints. The foam plastic core is recessed 1 1/2 inches (38 mm) along transverse panel edges, and 11/16 inches (17.5 mm) along both longitudinal panel edges. A solid-sawn lumber spline is factory-installed along one of the two longitudinal panel edges, with the panel facings attached to the spline with 8d common nails spaced at 6 inches (152 mm) on center. The splines are No. 2 spruce-pine-fir with a 2-inch nominal thickness with a depth to match the panel core thickness.
- **Lintels:** The lintels are fabricated in a manner similar to the fabrication of the Standard Wall Panels. The lintels have an EPS core thickness of 5 5/8 inches (143 mm), and are 13 3/4 inches (349 mm) deep. The maximum span is 6 feet (1829 mm). A factory-installed 2-by-6 bottom plate is nailed to the lintel facings with 8d common nails spaced at 3 inches (152 mm) on center. A 9 1/4-inch-long (235 mm) vertical thermal spline is factory-installed and nailed to the facings at both ends of the lintel.
- **Miscellaneous:** All wall panels include a 1-inch-diameter (25.4 mm) horizontal channel in the panel core, located 16 inches (406 mm) above the bottom of the panel, for electrical wiring. Vertical passageways in the panel core are installed along one edge of wall panels when panels are adjacent to exterior doors or countertop windows, for electrical outlets. An additional horizontal passageway is located 44 inches (1118 mm) above the floor when panels are adjacent to countertops. Electrical, plumbing and mechanical systems are not a part of this evaluation.

Enercept structural insulated panels shall be installed as follows:

Standard wall and curtain wall panels are installed on conventional wood floors, or concrete slabs on grade, with foundations that comply with the applicable code. Vertical edges of wall panels are connected to adjacent panels with 8d common nails spaced at 6 inches (152 mm) on center on both panel faces, unless noted otherwise in this evaluation for shear walls. Panel facings are attached to the sill plate and top plate of wall panels with 8d common nails spaced at 6 inches (152 mm) on center on both panel faces, unless noted otherwise in this evaluation for shear walls. Top plates are fastened to each 2-by-4 member in the thermal spline with two 16d common nails. The factory-installed thermal splines are located in the leading edge of the panels, and are toe-nailed to the sill plate with two 16d common nails prior to nailing to the adjacent panels. The entire thickness of axially loaded wall panels shall be supported by structural elements.

Lintels at door and window openings are installed with each end supported by the spline in adjacent wall panels. The lintels are nailed to the top plate with 8d common nails spaced at 3 inches (76 mm) on center. The top plate must be continuous across the lintel.

Roof panels must have continuous spans between wall panels and support beams. Panels must have supports that provide the panel with a minimum bearing length of 3 inches (76 mm). All connections must be designed based on applied loads. Adjacent tongue-and-groove roof panels are connected into shared factory-installed, nominal 2-inch-wide, No. 2 spruce-pine-fir wood members with 8d common nails spaced at 6 inches (152 mm) on center. Nominal 2-inch-wide, spruce-pine-fir, solid-sawn lumber end plates with a depth to match the panel core thickness shall be field-installed into the recessed ends of panels. The panel skins shall be attached to these end plates with 8d common nails spaced at 6 inches (152 mm) on center.

Connections: Refer to Enercept, Inc., Construction Guide. The roof-to-wall and floor-to-wall details must be designed to apply the roof and floor loads to the entire wall panel width, including the sandwich panel facings.

Thermal Barrier: Gypsum wallboard is used as a thermal barrier, and must be attached to all walls and ceilings of the building interior. When used in wall panels, the gypsum wallboard type, thickness and installation must comply with the **One-hour, Limited Load Bearing, Fire-resistive Wall Assembly** described in this evaluation, or, minimum ½-inch-thick (12.7 mm) gypsum board must be fastened to the wall panel facings with 1 ½-inch (38 mm) buglehead wallboard screws spaced at 14 inches (356 mm) on center horizontally and 16 inches (406 mm) on center vertically. The gypsum wallboard is fastened to the ceiling of the roof panels with screws identical to those used on the wall panels; the screws are spaced at 12 inches (305 mm) on center each way.

TESTS AND RESULTS

The EPS core has a smoke-developed rating of less than 450 and a flame-spread rating of not more than 75 when tested in the maximum thickness intended for use in accordance with ASTM E-84.

Structural tests were conducted in accordance with ASTM E-72, ASTM C297 and ASTM D905.

A room fire test was conducted in accordance with Underwriters Laboratories, Inc., Subject 1715 (R11482 (N) Classification with regard to flame propagation and damageability under specified room fire conditions only).

Fire test of building construction and materials was conducted on the Enercept structural insulated panels (wall and roof), in accordance with ASTM E119 as follows:

OSB Panel Wall with Type X Gypsum Wallboard Facing and EPS Foam Core
Project Number 153-105934, February 8, 2000
By Omega Point Laboratories, William E. Fritch P.E. #55296

One-hour, Limited Load Bearing, Fire Resistance Wall Assembly:

Enercept Standard Wall Panels, as described in the **DESCRIPTION AND USE** section with 5 1/2-inch-thick (140 mm) cores, with two layers of 5/8-inch-thick (15.9 mm), Type X gypsum board field-installed on both sides, are a one-hour fire-resistive assembly. Splines used at longitudinal edges of the Enercept panels must be the Enercept thermal splines. Both layers of gypsum board must be installed vertically. The vertical joints of the base layer of gypsum board must be offset a minimum of 24 inches (406 mm) from the vertical joints of the Enercept panel. The base layer is attached to the osb facing with No. 6, 1-5/8 inch long (41.3 mm), self-tapping, buglehead wallboard screws spaced 12 inches (305 mm) on center, horizontally and vertically. The face layer of gypsum board must be installed with the board joints offset 24 inches (406 mm) from base-layer joints. The face layer is attached with No. 6, 2 inch long (51 mm), self-tapping, buglehead wallboard screws spaced 12 inches (305 mm) on center, vertically and horizontally, with the screws offset 6 inches (152 mm) from the screws in the base layer.

The maximum wall height is 8 feet (2438 mm), and the allowable axial load is 2000 pounds per foot (29.2 kN/m).

OSB Panel Wall with Type X Gypsum Wallboard Facing and EPS Foam Core

Project Number 15345-105935, February 13, 2000

By Omega Point Laboratories, William E. Fritch P.E. #55296

One-hour, Limited Load Bearing, Fire Resistance Roof-Ceiling Assembly:

Enercept Standard Wall Panels, as described in the **DESCRIPTION AND USE** section with a 7-3/8-inch-thick (187 mm) core, with two layers 5/8-inch-thick (15.9 mm), Type X gypsum board field-installed on the interior (bottom) face, are an unrestrained one-hour, limited-load, fire-resistive roof-ceiling assembly. Based on the tested conditions and the 80 psf (3.83 kN/m²) allowable transverse load shown in Table 2 of this evaluation for roof panels with a 12 foot (3658 mm) span, the total transverse load must not exceed 36 percent of the allowable transverse loads of Table 2. Splines used at longitudinal edges of the Enercept panels must be solid-sawn lumber splines. Both layers of gypsum board must be installed with the long dimension of the wallboard parallel to the long dimension of the Enercept panels. The longitudinal joints of the base layer of gypsum wallboard must be offset a minimum of 24 inches (610 mm) from the longitudinal joints of the Enercept panel. The base layer is attached to the OSB facing with No. 6, 1-5/8 inch long (41.3 mm), self-tapping, buglehead wallboard screws spaced 12 inches (305 mm) on center, vertically and horizontally. The face layer of gypsum board must be installed with the board joints offset 24 inches (406 mm) from base-layer joints. The face layer is attached with No. 6, 2 inch long (51 mm), self-tapping, buglehead wallboard screws spaced 12 inches (305 mm) on center, vertically and horizontally, with the screws offset 6 inches (152 mm) from the screws in the base layer.

Allowable Loads for the standard wall and curtain wall panels are as specified in Table 1. Allowable loads for the roof panels are specified in Table 2. **Structural calculations justifying load-transfer connections must be provided to the building official for approval.**

Table 1-WALL PANEL AND CURTAIN WALL PANEL ALLOWABLE LOADS¹

TYPE OF LOADING	PANEL HEIGHT (feet)	ALLOWABLE LOADS	
		Axial Load (pounds per lineal foot)	Transverse Load (pounds per square foot)
Transverse	8	----	50
	10	----	40
	12	----	33
	14	----	29
	16	----	23
Axial	8	2200 ²	----
Racking Shear ³	----	181 ^{4,5}	----
		292 ^{6,7}	----

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

¹The panel core thickness is either 5-5/8 or 7 3/8 inches.

²Maximum concentrated load from nominal 2-inch-wide joists spaced at 16 inches on center bearing on one or both panel skins is 700 and 850 pounds, respectively.

³Design consideration must be given to uplift forces on the shear wall.

⁴The racking shear load is based on a maximum shear wall height-to-length ratio of 2:1.

⁵The OSB facing material on each face of the panels must be attached to the connection posts (vertical splines) and the top and bottom plates with 8d common nails spaced at 6 inches on center, maximum.

⁶The racking shear load is based on a maximum shear wall height-to-length ratio of 1:1.

⁷The OSB facing material on each face of the panels must be attached to the connection posts (vertical splines) and the top and bottom plates with 8d common nails spaced at 3 inches on center, maximum.

TABLE 2-ROOF PANEL ALLOWABLE TRANSVERSE LOADS (plf)¹

PANEL SPAN (feet)	PANEL CORE THICKNESS (inches)							
	5 5/8		7 3/8		9 3/8		11 3/8	
	L/180	L/240	L/180	L/240	L/180	L/240	L/180	L/240
8	86	86	117	117	143	143	174	174
10	69	62	94	91	120	120	140	140
12	55	43	78	65	101	91	116	116

14	40	30	59	47	79	68	98	89
16	29	22	45	36	60	52	75	68
18	22	----	35	27	47	40	59	54
20	----	----	27	21	38	32	47	43
22	----	----	22	----	31	26	39	35
24	----	----	----	----	26	21	33	29

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

¹Each end of the roof panels shall be continuously supported with supports that provide a minimum bearing length of 3 ½ inches.

LIMITATIONS OF APPROVAL

General: The Enercept Building System may be used wherever combustible non-rated construction is allowed.

Design calculations for each building shall be submitted to the enforcement authority that has jurisdiction demonstrating that the allowable loads specified below are not exceeded.

Roof Panels: Enercept roof panels must be protected by a roof covering complying with s. **Comm 21.27(3)** of the current **Wisconsin Uniform Dwelling Code for 1- and 2-family dwellings**, and **IBC Chapter 15**, respectively. Roofs with hot-asphalt or hot-coal-tar pitch require mechanical attachment of a base ply prior to roof covering application. Fasteners must have sufficient length to penetrate through the top facing of the panel. The underlayment and flashing shall be installed in accordance with the applicable code.

Wall Panels: Enercept wall panels shall be covered with an approved exterior wall covering. The wall covering may be any recognized in the applicable code. A weather-resistive barrier or water-resistive barrier over the exterior panel face is required in accordance with s. **Comm 21.24(3)** and s. **Comm 22.22** of the current **Wisconsin Uniform Dwelling Code for 1- and 2-family dwellings**, and s. **IBC 1404** of current **Wisconsin Amended ICC Code**, respectively. Where Portland cement plaster is used, compliance with s. **IBC 2510.6** is necessary. All panel joints shall be sealed with a compatible latex caulk.

Identification: Panels bear the initials SP (for standard wall panels), CP (for curtain wall panel), LP (for lintel panel), or RP (for roof panel), based on the intended use. The panels also bear, on the face of each panel, the evaluation (200609-I); the Enercept, Inc., name and address; and the name of the quality control agency (RADCO), and other general requirements of s. **Comm 20.09 (4)** of the current **Wisconsin Uniform Dwelling Code for 1- and 2-family dwellings**, and s. **Comm 61.30** of current **Wisconsin Amended ICC Code** must be indicated on each plan submittal.

A thermal barrier shall be installed to separate the interior of the building from the foam plastic insulating core material in accordance with s. **Comm 21.11 (1)** and s. **IBC 2603.4** respectively.

Foundations constructed with the Enercept Building System shall be in compliance with the backfill and drainage requirements of s. **Comm 21.18** and s. **IBC 1803.2**.

Approved cables such as nonmetallic sheathed cable shall be permitted to be installed in chases within the panels providing there is at least 1-1/2-inches from the face of the panel to the edge of the wiring hole. Where it is necessary to cut grooves or slats in the panel, the 1-1/2-inches shall be maintained from the face of the panel to the nearest edge of the cable when the cable is placed against the back of the chase. If the 1-1/2-inches cannot be maintained, a steel sleeve or plate not less than 1/16-inch in thickness shall be used to protect the cables. Since there is nothing within the panel to secure the cable to, it will not be required to secure the cable within 12-inches of the box, nor every 4-1/2 feet.

This approval IS NOT for a specific building, but rather an approval of the building design concept.

Structures built using the Enercept Building System shall be constructed in accordance with this approval and the manufacturer's specifications.

Reference: ES LEGACY REPORT NO. PFC-4246

This approval will be valid through December 31, 2011, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The product approval is applicable to projects approved under the current edition of the applicable codes. This approval may be void for project approvals

made under future applicable editions. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:

Approval Date: August 25, 2006

By: _____

Lee E. Finley, Jr.
Product & Material Review
Integrated Services Bureau

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