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# ICC-ES Report

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# ESR-3373

Reissued 06/2017  
This report is subject to renewal 06/2019.

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES

SECTION: 06 12 00—STRUCTURAL PANELS

SECTION: 06 16 00—SHEATHING

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00—THERMAL INSULATION

SECTION: 07 25 00—WATER-RESISTIVE BARRIERS/WEATHER BARRIERS

SECTION: 07 27 00—AIR BARRIERS

### REPORT HOLDER:

## HUBER ENGINEERED WOODS, LLC

ONE RESOURCE SQUARE  
10925 DAVID TAYLOR DRIVE, SUITE 300  
CHARLOTTE, NORTH CAROLINA 28262

### EVALUATION SUBJECT:

## ZIP SYSTEM® R-SHEATHING (INSULATING SHEATHING)



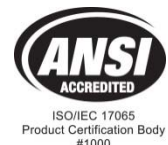
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# ICC-ES Evaluation Report

**ESR-3373**

Reissued June 2017

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**DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES**

**Section: 06 12 00—Structural Panels**

**Section: 06 16 00—Sheathing**

**DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION**

**Section: 07 21 00—Thermal Insulation**

**Section: 07 25 00—Water-Resistive Barriers/Weather Barriers**

**Section: 07 27 00—Air Barriers**

**REPORT HOLDER:**

**HUBER ENGINEERED WOODS, LLC  
ONE RESOURCE SQUARE  
10925 DAVID TAYLOR DRIVE, SUITE 300  
CHARLOTTE, NORTH CAROLINA 28262  
(800) 933-9220**

[www.huberwood.com](http://www.huberwood.com)

**EVALUATION SUBJECT:**

**ZIP SYSTEM® R-SHEATHING (INSULATING SHEATHING)**

**1.0 EVALUATION SCOPE**

**Compliance with the following codes:**

- 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2015, 2012 and 2009 *International Residential Code*® (IRC)
- 2015, 2012 and 2009 *International Energy Conservation Code*® (IECC)

**Properties evaluated:**

- Structural
- Thermal resistance
- Air leakage
- Weather resistance

**2.0 USES**

ZIP System® R-Sheathing panels are used as combination wall sheathing and continuous insulation in conventional light wood-framed walls of Type V construction (IBC) and dwellings constructed in accordance with the IRC. R-Sheathing is used to resist transverse loads in accordance with the PS-2 span rating shown on the panels. The panels are used to satisfy the continuous insulation and insulated sheathing allowances of 2015 IRC

Table N1102.1.2, 2012 IRC Table N1102.1.1 or 2009 IRC Table N1102.1.2 and 2015 IECC Tables R402.1.2 and C402.1.3, 2012 IECC Tables R402.1.1 and C402.2, or 2009 IECC Tables 402.1.1 and 502.2(1), as applicable. When installed with ZIP System™ Flexible Flashing seam tape, R-Sheathing may be used as an alternative to the water-resistive barrier required by IBC Section 1404.2 and IRC Section R703, and to address air leakage in the building envelope as required by Sections R402.4 and C402.5 of the 2015 IECC, Sections R402.4 and C402.4 of the 2012 IECC or Sections 402.4.1 and 502.4.3 of the 2009 IECC.

ZIP System R-Sheathing panels may be used as intermittent wall bracing panels within designated braced wall lines in accordance with Section 4.5, and as shear wall panels in accordance with Section 4.6, of this report.

**3.0 DESCRIPTION**

ZIP System® R-Sheathing is an insulated sheathing made by combining <sup>7</sup>/<sub>16</sub>-inch-thick ZIP System® Wall Sheathing recognized in [ESR-1474](#) with a layer of maximum 2-inch-thick (25.4 mm) rigid foam plastic insulation laminated to its interior face using polyvinyl alcohol (PVA) adhesive. The ZIP System® Wall Sheathing is OSB complying with U.S. DOC PS 2 for wood structural panels as Exposure 1 with a 24/0, 24/16, or Wall 24 span rating, and is overlaid on the exterior side with a Grade D water-resistive barrier. The rigid foam plastic insulation is Rboard® recognized in [ESR-1375](#) which complies with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12). The foam plastic insulation boards have a nominal density of 2.0 pcf, compressive strength of 20 psi (138 kPa), vapor permeance of less than 1.0 perm, a flame-spread index of 75 or less and a smoke-developed index of 450 or less. The ZIP System® R-Sheathing panels are nominally 4 feet wide by 8, 9, 10, 11 or 12 feet long and have a square-finished-edge or machined-edge profile.

**4.0 INSTALLATION**

**4.1 General:**

ZIP System® R-Sheathing panels must be installed over wood-framed walls with minimum nominally “2-by” framing spaced at a maximum of 24 inches (406 mm) on center. In accordance with the manufacturer’s published installation instructions, it is recommended that the square edges of the panels be installed with a gap between adjacent panels and that the panels be separated from dissimilar materials. ZIP System® R-Sheathing panels may be installed vertically or horizontally. When use is in the construction of braced wall panels in accordance with Section 4.5, or as wood shear walls in accordance with

Section 4.6, all joints and panel edges must be backed by framing.

When the panels are used as wall bracing panels or shearwall panels, fastening must be as described in Tables 1 or Table 2. ZIP System® R-Sheathing panels that are not used for structural bracing or shearwalls must be installed with minimum 8d common nails (or equivalent) at a maximum spacing of 6 inches on center on panel edges and 12 inches on center in the field. Nails must have a minimum 1-inch embedment into framing.

#### 4.2 Water-resistive Barrier:

To qualify as a water-resistive barrier, ZIP System® R-Sheathing panels must be installed with the polymer-modified sheet overlay facing the exterior and all panel seams must be sufficiently sealed with ZIP System™ Flexible Flashing Tape in accordance with [ESR-1474](#). All overlay surfaces must be dry and free of sawdust and dirt prior to application of the ZIP System™ seam tape. The seam tape must extend a minimum of 1 inch (25.4 mm) past the panel edge T-joint intersections and must be centered, within 1/2 inch (12.7 mm), over the middle of panel seams. The tape must be pressed firmly to adhere to the surfaces and seal the seams. Wrinkles in the ZIP System™ seam tape are acceptable unless they create a leak path to the panel seam.

Flashing complying with the applicable code must be installed at the perimeter of door and window assemblies, penetrations and terminations of exterior wall assemblies, exterior wall intersections with roofs, chimneys, porches, decks, balconies, and similar projections, and at built-in gutters and similar locations where moisture could enter the wall. An adhesive-backed flashing tape that complies with the ICC-ES Acceptance Criteria for Flashing Materials (AC148) must be installed to seal all ZIP System® R-Sheathing flashing joints. Penetration items must be sealed to the panels. The adhesive-backed flashing tape must be installed in accordance with the manufacturer's published installation instructions.

#### 4.3 Air Barrier:

ZIP System® R-Sheathing fastened to maximum 24-inch-on-center (610 mm) wood wall framing, using 8d nails spaced at 6 inches (152 mm) around panel edges and at 12 inches (305 mm) in the field, leaving a 1/8-inch (3.18 mm) gap between panels, forms an air barrier assembly when the gaps between panels and the perimeter of penetrations are sealed with ZIP System™ seam tape recognized in [ESR-2227](#). The assembly has demonstrated a maximum air leakage of 0.0072 cfm/ft<sup>2</sup> [0.037 L/(s•m<sup>2</sup>)] infiltration and 0.0023 cfm/ft<sup>2</sup> [0.012 L/(s•m<sup>2</sup>)] exfiltration at a pressure differential of 1.57 psf (75 Pa).

#### 4.4 Thermal Resistance:

ZIP System® R-Sheathing panels have nominal thermal resistance in accordance with the R-Sheathing Type shown in Tables 1 or 2.

#### 4.5 Braced Wall Panels in Accordance with the 2015, 2012, and 2009 IRC:

ZIP System® R-Sheathing panels are recognized for use in intermittent braced wall panel construction in accordance with IRC Section R602.10.2 when installed in accordance with Table 1. The panels are recognized as equivalent to wood structural panels used in Bracing Method WSP and may be used with amounts of bracing (lengths) specified in 2015 and 2012 IRC Table R602.10.3(1) and 2009 IRC Table R602.10.1.2(1), entitled "Bracing Requirements Based on Wind Speed." The minimum effective braced

wall panel length must be 48 inches (1219 mm) for wall heights up to 10 feet (3048 mm), 4 feet 5 inches (1346 mm) for walls not exceeding 11 feet (3352 mm) in height, and 4 feet 10 inches (1473 mm) for walls not exceeding 12 feet (3658 mm) in height. For prescriptive wall bracing under this section (Section 4.5), 2015 and 2012 IRC recognition is limited to use in areas where wind design is not required per IRC Section R301.2.1.1 and in Seismic Design Categories (SDC) A, B, and C (excluding townhouses in SDC C); use of sheathing in other conditions is outside the scope of this report. For prescriptive wall bracing under this section (Section 4.5), 2009 IRC recognition is limited to use in areas where the design wind speed is less than 110 mph and in Seismic Design Categories A, B, and C (excluding townhouses in SDC C); use of the sheathing in other conditions is outside the scope of this report. Holes and notches in wood framing are permitted in accordance with IRC Section R602.6.

#### 4.6 Wood Framed Shear Walls in accordance with the 2015, 2012, and 2009 IBC and IRC:

ZIP System® R-Sheathing panels may be used in the construction of wood shear walls when the design is in accordance with Table 2 and 2015, 2012, or 2009 IBC Sections 2305 and 2306, as applicable. The Allowable Shear Capacity values in Table 2 must be used in lieu of the values shown in the code. Under this section (Section 4.6), recognition is limited to resisting in-plane wind loads and to use in Seismic Design Categories (SDC) A, B, and C, with earthquake load resistance determined using the maximum values of  $R = 2.0$ ,  $\Omega_0 = 2.5$ , and  $C_d = 2.0$ . Holes and notches in the framing are permitted in accordance with the applicable code, code-referenced documents, and engineered design.

Shearwalls using ZIP System® R-Sheathing panels installed in accordance with this report may be used under the 2015, 2012, and 2009 IRC when an engineered design is submitted in accordance with 2015, 2012, and 2009 IRC Section R301.1.3, as applicable.

### 5.0 CONDITIONS OF USE

The ZIP System® R-Sheathing 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 The ZIP System® R-Sheathing panels must be manufactured, identified and installed in accordance with this report and the manufacturer's published installation instructions. In the event of a conflict between the instructions and this report, this report governs.
- 5.2 When required by the code official, this evaluation report and the manufacturer's published installation instructions must be submitted at the time of permit application.
- 5.3 Walls sheathed with the panels must not be used to resist in-plane horizontal loads from concrete or masonry walls.
- 5.4 The ZIP System® R-Sheathing panels must be covered with a code-complying exterior wall covering or one that is recognized in a current ICC-ES evaluation report.
- 5.5 Siding installed over R-Sheathing must be installed in accordance with code and with the siding manufacturer's recommendations. Siding installers must account for any extra fastener length required to attach siding through the foam backed panel and into framing.

- 5.6** Where foam plastic is used in areas where the probability of termite infestation is “very heavy,” safeguards must be followed in accordance with the protection against subterranean termite provisions in Chapter 26 of the IBC or Chapter 3 of the IRC, as applicable.
- 5.7** Fire-resistance-rated construction is outside the scope of this report.
- 5.8** Under the 2015 IBC, special inspection must be provided in accordance with IBC Sections 1704.3 and 1705.11 for sheathing installed in shear walls on buildings in Exposure B locations where  $V_{ASD}$  is 120 mph (53.6 m/s) or greater and in Exposures C and D locations where  $V_{ASD}$  is 110 mph (49.2 m/s) or greater. Under the 2012 IBC, special inspection must be provided in accordance with IBC Sections 1704.3 and 1705.10 for sheathing installed in shear walls on buildings in Exposure B locations where  $V_{ASD}$  is 120 mph (53.6 m/s) or greater and in Exposures C and D locations where  $V_{ASD}$  is 110 mph (49.2 m/s) or greater. Under the 2009 IBC, special inspection must be provided in accordance with IBC Sections 1705.1, 1705.2 and 1705.4 for sheathing installed in shear walls on buildings in Exposure B locations where the basic wind speed is 120 mph (53.6 m/s) or greater and in Exposures C and D locations where the basic wind speed is 110 mph (49.2 m/s) or greater. A statement of special inspections complying with 2015 or 2012 IBC Section 1704.3 or 2009 IBC Section 1705 (as applicable) must be provided to the code official (this includes addressing requirements in 2015 IBC Sections 1704.3.3 and 1705.11 or 2012 IBC Sections 1704.3.3 and 1705.10 or 2009 IBC Sections 1705.4.1 and 1705.4.2, as applicable).
- 5.9** Cutting openings and penetrations in designated braced wall panels is not permitted.
- 5.10** Gypsum wallboard is required to be installed on the side of the wall opposite the proprietary sheathing in accordance with 2015 and 2012 IRC Section R602.10.4.3 and 2009 IRC Section R602.10.2.1.
- 5.11** Use of ZIP System® R-Sheathing panels to resist combined wind uplift and shear must be approved by the code official.

**5.12** ZIP System® R-Sheathing panels are laminated at facilities located in Camp Hill, Pennsylvania, Diboll, Texas, Crystal Hill, Virginia, Broken Bow, Oklahoma, East Moline, Illinois, and Northglenn, Colorado under a quality-control program with inspections provided by ICC-ES.

## **6.0 EVIDENCE SUBMITTED**

- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Water-resistive Membranes Factory-bonded to Wood-based Structural Sheathing, Used as Water-resistive Barriers (AC310), dated May 2008 (editorially revised, August 2015).
- 6.2** For recognition under the 2015, 2012 and 2009 IBC and IRC for use in shear walls, data in accordance with the ICC-ES Acceptance Criteria for Proprietary Sheathing Jobsite-attached to Wood Light-frame Wall Construction Used as Shear Walls (AC269.2), dated October 2013 (editorially revised, February 2016).
- 6.3** For recognition under the 2015, 2012, and 2009 IRC for use as an alternative to prescriptive intermittent braced wall panels, data in accordance with the ICC-ES Acceptance Criteria for Proprietary Sheathing Attached to Wood Light-frame Wall Construction Used as Braced Wall Panels under the IRC (AC269.1), dated March 2017.
- 6.4** Air leakage data in accordance with ASTM E2357.

## **7.0 IDENTIFICATION**

Each ZIP System® R-Sheathing panel described in this report must bear a label that includes the manufacturer's name (Huber Engineered Woods, LLC) and address, the product name, the R-Sheathing type, the date of manufacture or a tracking number, the manufacturing plant identifier, and the evaluation report number (ESR-3373).

**PRESCRIPTIVE METHOD (INTERMITTENT WALL BRACING)**

**TABLE 1—FASTENING REQUIREMENTS FOR ZIP SYSTEM® R-SHEATHING WITH FRAMING OF DOUGLAS FIR-LARCH FOR WIND OR SEISMIC LOADING UNDER THE 2015, 2012, AND 2009 IRC (WSP METHOD)**

R-SHEATHING TYPE <sup>3</sup> (R-Value of foam)	FRAMING <sup>4</sup>		FASTENING REQUIREMENT		
	Nominal Stud Size (min.)	Maximum Stud Spacing (inches)	Fastener Specifications <sup>2</sup>	Edge/Field Spacing (inches)	Minimum Penetration into Framing (inches)
R-3	2-by-4	24	0.131-inch shank nails	<sup>4</sup> / <sub>12</sub>	1.5
R-3	2-by-4	16	16ga staples, <sup>7</sup> / <sub>16</sub> -inch crown, 2-inch length	<sup>3</sup> / <sub>6</sub>	1.0
R-6	2-by-4	24	0.131-inch shank nails	<sup>4</sup> / <sub>12</sub>	1.5
			15ga staples, <sup>7</sup> / <sub>16</sub> -inch crown, 2.5-inch length	<sup>3</sup> / <sub>6</sub>	1.0
R-9	2-by-4	24	0.131-inch shank nails	<sup>3</sup> / <sub>12</sub>	1.5
R-12	2-by-4	24	0.131-inch shank nails	<sup>3</sup> / <sub>12</sub>	1.5

For SI: 1 inch = 25.4 mm

<sup>1</sup>All fasteners must be located a minimum of <sup>3</sup>/<sub>8</sub> inch from panel edges.

<sup>2</sup>Fasteners must be common nails or equivalent, or staples, of a type generally used to attach wood sheathing.

<sup>3</sup>Type R-12 R-Sheathing panels have a foam plastic insulation thickness of 2.0 inch. Type R-9 R-Sheathing panels have a foam plastic insulation thickness of 1.5 inch. Type R-6 R-Sheathing panels have a foam plastic insulation thickness of 1.0 inch. Type R-3 R-Sheathing panels have a foam plastic insulation thickness of 0.5 inch.

<sup>4</sup>All panel edges must be backed by framing.

**ENGINEERED METHOD (SHEARWALL PANELS)**

**TABLE 2—FASTENING REQUIREMENTS AND ALLOWABLE SHEAR CAPACITY FOR ZIP SYSTEM® R-SHEATHING WITH FRAMING OF DOUGLAS FIR-LARCH<sup>2</sup> FOR WIND OR SEISMIC LOADING UNDER THE 2015, 2012 AND 2009 IBC**

R-SHEATHING TYPE <sup>4</sup> (R-Value of foam)	FRAMING		FASTENING REQUIREMENT			ALLOWABLE SHEAR CAPACITY <sup>5,6,7</sup> (plf)
	Nominal Stud Size (min.)	Maximum Stud Spacing (inches)	Fastener Specifications <sup>3</sup>	Edge/Field Spacing (inches)	Minimum Penetration into Framing (inches)	
R-3	2-by-4	24	0.131-inch shank nails	<sup>4</sup> / <sub>12</sub>	1.5	245
R-3	2-by-4	24	0.131-inch shank nails	<sup>3</sup> / <sub>12</sub>	1.5	280
R-3	2-by-4	16	16ga staples, <sup>7</sup> / <sub>16</sub> -inch crown, 2-inch length	<sup>3</sup> / <sub>6</sub>	1.0	210
R-6	2-by-4	24	0.131-inch shank nails	<sup>4</sup> / <sub>12</sub>	1.5	230
R-6	2-by-4	24	0.131-inch shank nails	<sup>3</sup> / <sub>12</sub>	1.5	255
R-9	2-by-4	24	0.131-inch shank nails	<sup>3</sup> / <sub>12</sub>	1.5	240
R-12	2-by-4	24	0.131-inch shank nails	<sup>3</sup> / <sub>12</sub>	1.5	215

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

<sup>1</sup>All fasteners must be located a minimum of <sup>3</sup>/<sub>8</sub> inch from panel edges.

<sup>2</sup>For framing of other species, the shear value above must be multiplied by the Specific Gravity Adjustment Factor = [1 - (0.50 - SG)], where SG is the specific gravity of the framing lumber in accordance with the AWC NDS. This adjustment factor must not be greater than 1.

<sup>3</sup>Fasteners must be common nails or equivalent, or staples, of a type generally used to attach wood sheathing.

<sup>4</sup>Type R-6 R-Sheathing panels have a foam plastic insulation thickness of 1.0 inch. Type R-3 R-Sheathing panels have a foam plastic insulation thickness of 0.5 inch.

<sup>5</sup>The maximum height-to-width aspect ratio of shear walls is 2:1.

<sup>6</sup>The allowable shear capacity may be increased by 40% for wind in Allowable Stress Design in accordance with Section 2306.3 of the 2015, 2012 and 2009 IBC.

<sup>7</sup>All panel edges must be backed by framing.