ICC-ES Evaluation Report

ESR-2229

Reissued May 2021

This report is subject to renewal May 2023.

www.icc-es.org | (800) 423-6587 | (562) 699-0543 *A Subsidiary of the International Code Council®*

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 40 00—Roofing and Siding Panels

REPORT HOLDER:

FOUR SEASONS BUILDING PRODUCTS, LLC

EVALUATION SUBJECT:

LAMINATED FOAM ROOF AND NPW-I WALL PANELS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012 and 2009 *International Building Code®* (IBC)
- 2018, 2015, 2012 and 2009 *International Residential Code®* (IRC)

Properties evaluated:

- Structural
- Roof classification

2.0 USES

The Four Seasons Building Products, LLC, laminated foam roof panels are used as structural roof panels of patio covers complying with Appendix I of the IBC and Appendix H of the IRC. The NPW-I wall panels are nonload-bearing panels used as the full-height wall and kneewall panels of patio enclosures regulated by Appendix I of the IBC and Appendix H of the IRC.

3.0 DESCRIPTION

3.1 General:

3.1.1 Laminated Foam Roof Panels: The Four Seasons Building Products, LLC, laminated foam roof panels are factory-laminated sandwich panels consisting of aluminum facing on both sides of a foam plastic core. The panels have nominal thicknesses of 3, 3.5, 4 and 6 inches (76, 89, 101 or 152 mm), are 48 inches wide (1219 mm), and have a maximum length of 30 feet (9.1 m). As an option, the panels may include an internal aluminum channel beam, factory-installed parallel to the length of the panel and centered on the panel width. The panels have a tongue-and-groove configuration at the sides.

3.1.2 NPW-I Wall Panels: The NPW-I wall panels are factory-laminated panels consisting of an exterior facing of tempered, prefinished, hardboard; a foam plastic core; and an interior facing of lauan plywood. The panels have square-cut edges and a nominal overall thickness of 2 to 3 inches (51 to 76 mm).

3.2 Material:

3.2.1 Laminated Foam Roof Panels:

3.2.1.1 Panel Core: The core material is either a 1.0 pcf (16.02 kg/m^3) nominal density, Type I or 1.5 pcf (24.0 kg/m^3) nominal density, Type II, expanded polystyrene (EPS) foam plastic board complying with ASTM C578. The board is supplied by the manufacturer identified in the approved quality documentation. The foam plastic has a flame-spread index of 25 or less and a maximum smoke-developed index of 450 when tested in accordance with ASTM E84.

3.2.1.2 Panel Facings: The aluminum facing material of the panels with 1.5 pcf EPS board is 3105-H14 aluminum with a nominal thickness of either 0.024 inch (0.61 mm) or 0.032 inch (0.81 mm), having a minimum base-metal thickness of 0.022 or 0.028 inch (0.56 or 0.71 mm), respectively. The minimum tensile and yield strengths of the panel facings are 25 ksi (172 MPa) and 21.5 ksi (148 MPa), respectively.

The aluminum facing material of the panels with 1.0 pcf EPS board is 3105-H254 aluminum with a nominal thickness of 0.024 inch (0.61 mm), having a minimum base-metal thickness of 0.022 inch (0.56 mm). The minimum tensile and yield strengths of the panel facings are 23.5 ksi (162 MPa) and 19.5 ksi (134 MPa), respectively.

3.2.1.3 Panel Adhesive: The aluminum facings are factory-laminated to the panel core with an adhesive, described in the approved quality documentation that is a Type II, Class 2, adhesive complying with the ICC-ES Acceptance Criteria for Sandwich Panel Adhesives (AC05).

3.2.1.4 Fasteners: Fasteners used to attach the panels to underlying supports must be $^1/_4$-inch-diameter (6.4 mm) nominal screw size, cadmium plated, steel tapping screws installed with a 1-inch-outside-diameter (25.4 mm), cadmium plated steel washer and a neoprene insert. Maximum fastener spacing must be limited to 12 inches (304.8 mm). Length of fastener must be at least 1 inch (25.4 mm) longer than the roof panel thickness. The fastener's allowable pull-through capacity is 70 lbs based on connection test data and a safety factor of 3.0.

3.2.1.5 Channel Beams: The channel beam is a 1-by-3-inch (25.4 mm by 76 mm) extruded aluminum rectangular tube of alloy and temper 6063-T6 with a nominal wall thickness of 0.060 inch (1.52 mm). The channel beam is factory-installed in the panels by creating a slot to insert the channel beam by removing from the core a piece of foam plastic measuring 1.5 inches deep by 3 inches wide (38 by 76 mm). The slot is located $^1/_2$ inch (12.7 mm) from the

interior face of the panel. The channel beam is inserted into the slot and a piece of 1/2-inch-thick (12.7 mm) EPS foam is placed in the gap between the skin and the beam.

3.2.2 NPW-I Wall Panels:

3.2.2.1 Exterior Face: The exterior facing is 1/8-inch-thick (3.2 mm), tempered, prefinished hardboard panels described in the quality documentation.

3.2.2.2 Interior Face: The interior facing is prefinished 1/8- to 1/4-inch-thick (3.2 to 6.4 mm) lauan plywood complying with ANSI/HP-1983. Lauan plywood panels are labeled by the Hardwood Plywood and Veneer Association (HPVA) (TL-224).

3.2.2.3 Core: The panel core is 2- or 3-inch-thick (51 or 76 mm) RMAX TSX 8500, which is a polyisocyanurate foam plastic board recognized in evaluation report ESR-1864.

3.2.2.4 Adhesive: The facings are bonded to the foam plastic core with an adhesive described in the approved quality documentation and complying with AC05, as a Type II, Class 2, adhesive.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 Laminated Foam Roof Panels: For use in allowable stress design, the allowable uniform gravity, downward and upward wind loads for the panels used as roof panels are as set forth in Table 1 for panels with 1.5 pcf EPS core, and Table 2 for panels with 1.0 pcf EPS core. The tabulated loads are the allowable total transverse loads for the roof panels, which require that the connections between panels and supports comply with Section 4.2.1 of this evaluation report, and must be greater than the applied loads determined in accordance with the code, including the load combinations in IBC Section 1605. As permitted by Section 4.2.1 of this evaluation report, panel to support connections may use fasteners described in Section 3.2.1.4, provided an engineering design by a registered design professional is submitted to code official for approval, and the engineering design must consider all applicable limit states, such as pull-over strength as described in Section 3.2.1.4, and screw strength and screw pull-out strength, which are outside the scope of this evaluation report. Use of the panels to resist any other load conditions (such as axial compression or tension forces due to horizontal wind loads or use as a roof diaphragm to resist seismic or horizontal-wind loads) is outside the scope of this report.

4.1.2 NPW-I Wall Panels: The panels have an allowable positive and negative transverse (wind) load of 25 psf (1197 Pa) for panels installed with a 48-inch (1219 mm) horizontal span between supporting patio enclosure mullions or posts. Use of the panels to resist any other load conditions (such as axial compression or tension forces due to gravity and wind loads, or use as a shear wall to resist seismic or horizontal-wind loads) is outside the scope of this report.

4.2 Installation:

4.2.1 Laminated Foam Roof Panels: The panels must be installed as the roof of the patio cover with the panel length continuous in the direction of the roof slope, without transverse joints. The roof panel longitudinal seam must be located a minimum of 23 inches (584 mm) from the inside face of the wall parallel to the panel length. A thermal barrier as specified by the code is not required to be installed in the interior of the patio cover structure. The panels must be installed with a roof slope as indicated in Tables 1 and 2. Supports at each end of the panel span must provide the panels with a minimum 1-inch-wide (25.4 mm) continuous bearing width, to provide support for panels subjected to gravity loads, and upward and downward wind loads. As an alternative to restraining the panels subjected to wind uplift loads, the panels must be fastened using fasteners described in Section 3.2.1.4 and the fastener connection design must comply with requirements in Section 4.1.1 of this report. The installation details must be submitted to the code official for approval.

4.2.2 Roof Classification: The laminated foam roof panels have a Class B roof classification in accordance with ASTM E108. The maximum roof slope must not exceed 1:12 (8.3 percent). For recognition under the IRC as a nonclassified roof covering the maximum roof slope limitation is not applicable.

4.2.3 NPW-I Wall Panels: The NPW-I wall panels must be installed vertically between vertical mullions or posts spaced a maximum of 48 inches (1210 mm) on center that provide panels with a minimum 2-inch wide (51 mm) bearing support to the panels for wind loads. All panel edges must be protected from the weather with aluminum extrusions or metal flashing.

5.0 CONDITIONS OF USE

The Four Seasons Building Products, LLC, laminated foam roof panels and NPW-I wall 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 Panel fabrication, identification and installation must comply with this report and the manufacturer's published installation instructions. In the event of conflicts between this report and the manufacturer's published instructions, this report governs.

5.2 The panels are limited to use in patio covers regulated under Appendix I of the IBC and Appendix H of the IRC.

5.3 Design loads must not exceed the allowable loads set forth in this evaluation report.

5.4 As permitted by Section 4.2.1 of this evaluation report, panel to support connections may use fasteners described in Section 3.2.1.4, provided an engineering design by a registered design professional is submitted to code official for approval, and the engineering design must consider all applicable limit states, such as pull-over strength as described in Section 3.2.1.4, and screw strength and screw pull-out strength, which are outside the scope of this evaluation report.

5.5 Panel connections to the supporting structure must be designed in accordance with the applicable code and this evaluation report, and must be submitted to the code official for approval. Panel connection details must be prepared by a registered design professional where required by the jurisdiction in which the structure is to be constructed.

5.6 The remaining portions of the structure must be designed and constructed in accordance with the applicable code.

5.7 Calculations and drawings demonstrating compliance with this evaluation report and the applicable code must be submitted to the code official for approval. The calculations and drawings must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.8 The wall and roof panels are manufactured at Buena Park, California, with inspections by ICC-ES.

Roof panels are also manufactured in Groveland, Florida, with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Sandwich Panels (AC04), dated June 2019.

Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2015 (editorially revised October 2017).

7.0 IDENTIFICATION

7.1 A label must be affixed to each panel, bearing the company name (Four Seasons Building Products, LLC), address (Buena Park, California or Groveland, Florida), product name/type (Insulated Foam Roof Panel or NPW-I Wall panel, as applicable), product component description for Insulated Foam Roof Panels (such as 1.0 pcf EPS – 0.024 inch facer), and the evaluation report number (ESR-2229).

7.2 The report holder's contact information is the following:

FOUR SEASONS BUILDING PRODUCTS, LLC
5005 VETERANS MEMORIAL HIGHWAY
HOLBROOK, NEW YORK 11741
(800) 457-9959
www.fourseasonsbuildingproducts.com

TABLE 1—ALLOWABLE SPANS FOR ROOF PANELS WITH 1.5 PCF EPS CORE[(1)(2)(3)(4)(5)(7)(9)]

PANEL DESCRIPTION				APPLIED PRESSURE FOR DESIGN										
Nominal Core Thickness (inches)	Nominal Facer Thickness (inches)	Optional Channel Beam[(8)]	Load Type	10 psf	15 psf	20 psf	25 psf	30 psf	35 psf	40 psf	45 psf	50 psf	55 psf	Min. Panel Slope (per ft of projection)[(6)]
3	0.024	No	Live	16'-8"		13'-1"								3/8" / foot
			Wind (Upward)	17'-9"	15'-2"	13'-6"	12'-4"	11'-6"	10'-9"	10'-2"	9'-8"	8'-11"	8'-1"	n/a
			Wind (Downward)	16'-8"	14'-6"	13'-1"	12'-0"	11'-2"	10'-6"	10'-0"	9'-6"	8'-7"	7'-10"	n/a
			Snow			12'-7"	11'-7"	10'-10"	10'-2"	9'-8"	9'-2"	8'-7"	7'-10"	1/2" / foot
3	0.024	Yes	Live	16'-8"		13'-1"								3/8" / foot
			Wind (Upward)	17'-6"	14'-11"	13'-3"	12'-1"	10'-7"	9'-0"	7'-11"	7'-0"	6'-3"	5'-8"	n/a
			Wind (Downward)	16'-8"	14'-6"	13'-1"	12'-0"	11'-2"	10'-5"	9'-10"	9'-2"	8'-3"	7'-6"	n/a
			Snow			12'-6"	11'-6"	10'-6"	9'-9"	9'-2"	8'-8"	8'-2"	7'-6"	1/2" / foot
3.5	0.024	No	Live	18'-5"		14'-6"								3/8" / foot
			Wind (Upward)	19'-8"	16'-10"	15'-0"	13'-9"	12'-10"	12'-0"	11'-5"	10'-10"	10'-4"	9'-8"	n/a
			Wind (Downward)	18'-5"	16'-1"	14'-6"	13'-5"	12'-6"	11'-9"	11'-2"	10'-8"	10'-3"	9'-4"	n/a
			Snow			14'-0"	12'-11"	12'-1"	11'-5"	10'-9"	10'-2"	9'-8"	9'-2"	1/2" / foot
3.5	0.024	Yes	Live	18'-2"		14'-4"								3/8" / foot
			Wind (Upward)	19'-6"	16'-8"	14'-11"	13'-4"	12'-2"	11'-2"	9'-9"	8'-8"	7'-9"	7'-1"	n/a
			Wind (Downward)	18'-2"	15'-11"	14'-4"	13'-2"	12'-4"	11'-7"	11'-0"	10'-6"	10'-0"	9'-4"	n/a
			Snow			13'-10"	12'-6"	11'-5"	10'-7"	9'-11"	9'-5"	8'-11"	8'-6"	1/2" / foot
4	0.024	No	Live	19'-10"		15'-8"								3/8" / foot
			Wind (Upward)	21'-4"	18'-2"	16'-3"	14'-10"	13'-9"	12'-11"	12'-3"	11'-7"	11'-1"	10'-8"	n/a
			Wind (Downward)	19'-10"	17'-4"	15'-8"	14'-5"	13'-5"	12'-8"	12'-0"	11'-5"	10'-11"	10'-5"	n/a
			Snow			15'-1"	13'-8"	12'-7"	11'-8"	10'-11"	10'-4"	9'-9"	9'-4"	1/2" / foot
4	0.024	Yes	Live	19'-7"		15'-5"								3/8" / foot
			Wind (Upward)	21'-2"	17'-6"	15'-1"	13'-5"	12'-3"	11'-3"	10'-6"	9'-11"	8'-11"	8'-1"	n/a
			Wind (Downward)	19'-7"	17'-1"	15'-5"	14'-2"	13'-0"	12'-1"	11'-4"	10'-8"	10'-2"	9'-8"	n/a
			Snow			14'-1"	12'-8"	11'-7"	10'-9"	10'-1"	9'-6"	9'-1"	8'-8"	1/2" / foot
6	0.024	No	Live	23'-0"		20'-4"								1/4" / foot
			Wind (Upward)	23'-0"	23'-0"	21'-7"	19'-2"	17'-6"	16'-2"	15'-1"	14'-2"	13'-5"	12'-10"	n/a
			Wind (Downward)	23'-0"	23'-0"	20'-4"	18'-4"	16'-10"	15'-7"	14'-8"	13'-10"	13'-2"	12'-6"	n/a
			Snow			18'-3"	16'-5"	15'-0"	14'-0"	13'-1"	12'-4"	11'-9"	11'-3"	3/8" / foot
6	0.024	Yes	Live	23'-0"		18'-9"								1/4" / foot
			Wind (Upward)	23'-0"	20'-3"	17'-5"	15'-6"	14'-1"	13'-0"	12'-2"	11'-5"	10'-10"	10'-4"	n/a
			Wind (Downward)	23'-0"	21'-4"	18'-9"	16'-10"	15'-6"	14'-4"	13'-6"	12'-9"	12'-1"	11'-6"	n/a
			Snow			16'-9"	15'-1"	13'-10"	12'-10"	12'-1"	11'-5"	10'-10"	10'-4"	3/8" / foot
3	0.032	No	Live	18'-3"		14'-4"								3/8" / foot
			Wind (Upward)	19'-8"	16'-9"	14'-11"	13'-8"	12'-8"	11'-10"	11'-2"	10'-8"	10'-2"	9'-9"	n/a
			Wind (Downward)	18'-3"	15'-11"	14'-4"	13'-3"	12'-4"	11'-7"	11'-0"	10'-5"	10'-0"	9'-7"	n/a
			Snow			13'-9"	12'-8"	11'-10"	11'-2"	10'-7"	10'-1"	9'-8"	9'-3"	1/2" / foot
3	0.032	Yes	Live	18'-1"		14'-2"								3/8" / foot
			Wind (Upward)	19'-6"	16'-7"	14'-9"	13'-6"	12'-6"	11'-8"	11'-0"	10'-5"	9'-6"	8'-7"	n/a
			Wind (Downward)	18'-1"	15'-9"	14'-2"	13'-0"	12'-1"	11'-4"	10'-9"	10'-2"	9'-9"	9'-4"	n/a
			Snow			13'-6"	12'-6"	11'-7"	10'-11"	10'-4"	9'-10"	9'-5"	9'-0"	1/2" / foot
3.5	0.032	No	Live	20'-6"		16'-2"								3/8" / foot
			Wind (Upward)	22'-1"	18'-10"	16'-10"	15'-4"	14'-3"	13'-4"	12'-8"	12'-0"	11'-6"	11'-0"	n/a
			Wind (Downward)	20'-6"	17'-10"	16'-2"	14'-10"	13'-10"	13'-0"	12'-4"	11'-9"	11'-3"	10'-10"	n/a
			Snow			15'-6"	14'-3"	13'-4"	12'-7"	11'-11"	11'-4"	10'-11"	10'-5"	1/2" / foot
3.5	0.032	Yes	Live	20'-3"		15'-11"								3/8" / foot
			Wind (Upward)	22'-0"	18'-8"	16'-8"	15'-2"	14'-1"	13'-2"	12'-5"	11'-9"	10'-10"	9'-10"	n/a
			Wind (Downward)	20'-3"	17'-8"	15'-11"	14'-7"	13'-7"	12'-9"	12'-1"	11'-6"	11'-0"	10'-6"	n/a
			Snow			15'-3"	14'-0"	13'-1"	12'-4"	11'-8"	11'-1"	10'-8"	10'-2"	1/2" / foot
4	0.032	No	Live	21'-10"		17'-3"								3/8" / foot
			Wind (Upward)	23'-0"	20'-2"	18'-0"	16'-5"	15'-3"	14'-3"	13'-6"	12'-10"	12'-3"	11'-9"	n/a
			Wind (Downward)	21'-10"	19'-1"	17'-3"	15'-10"	14'-9"	13'-11"	13'-2"	12'-7"	12'-0"	11'-6"	n/a
			Snow			16'-7"	15'-3"	14'-3"	13'-5"	12'-9"	12'-2"	11'-8"	11'-2"	1/2" / foot
4	0.032	Yes	Live	21'-7"		16'-11"								3/8" / foot
			Wind (Upward)	23'-0"	20'-0"	17'-10"	16'-1"	14'-7"	13'-6"	12'-7"	11'-10"	11'-3"	10'-9"	n/a
			Wind (Downward)	21'-7"	18'-10"	16'-11"	15'-7"	14'-6"	13'-8"	12'-11"	12'-3"	11'-9"	11'-3"	n/a
			Snow			16'-3"	15'-0"	13'-10"	12'-10"	12'-0"	11'-4"	10'-10"	10'-4"	1/2" / foot
6	0.032	No	Live	23'-0"		22'-8"								3/8" / foot
			Wind (Upward)	23'-0"	23'-0"	23'-0"	21'-9"	20'-1"	18'-10"	17'-10"	16'-10"	15'-11"	15'-2"	n/a
			Wind (Downward)	23'-0"	23'-0"	22'-8"	20'-10"	19'-5"	18'-3"	17'-4"	16'-4"	15'-6"	14'-10"	n/a
			Snow			21'-6"	19'-4"	17'-9"	16'-6"	15'-6"	14'-7"	13'-11"	13'-3"	1/2" / foot
6	0.032	Yes	Live	23'-0"		22'-1"								1/4" / foot
			Wind (Upward)	23'-0"	23'-0"	20'-8"	18'-5"	16'-9"	15'-5"	14'-5"	13'-7"	12'-10"	12'-3"	n/a
			Wind (Downward)	23'-0"	23'-0"	22'-1"	19'-11"	18'-3"	17'-0"	15'-11"	15'-0"	14'-4"	13'-8"	n/a
			Snow			19'-9"	17'-9"	16'-4"	15'-2"	14'-3"	13'-5"	12'-9"	12'-3"	3/8" / foot

For **SI**: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 psf = 47.9 Pa.

(Table 1 Notes continued on next page)

Table 1 Notes:

(1)Roof Panels are limited for use with a patio enclosure as defined in Appendix Chapter I of the *International Building Code*® (IBC) and Appendix Chapter H of the *International Residential Code*® (IRC).

(2)The Applied Pressure for Design (column headings) shown in the table is an "equivalent" uniform load. Consideration shall be given to load combinations presented in the Code and site specific conditions such as drifting and sliding snow. After determination of the applied pressure, the allowable panel span is determined for each load type using the greatest calculated pressure for all load combinations which include the specific load type. This process is repeated for each of the four (4) load types. The minimum allowable span calculated for each of the 4 load types shall be the "Allowable Span" used for the proposed application.

(3)Unless otherwise noted, the maximum eave projection of the roof system is 24 inches.

(4)Panel Spans are based on a maximum temperature differential between the two panel skins of 10 degrees in Fahrenheit.

(5)Panel to support connections must conform to Sections 4.1.1 and 4.2.1 of this evaluation report.

(6)Minimum panel slopes are based on panel deflection only. Increased slopes will be required where panel accessories, such as mullions or flashing, can increase ponding caused by irregularities in the water flow path.

(7)The spans are based on single span, simply supported installations.

(8)Consideration has been given to the addition of one (1) ceiling fan per 4'-wide panel with a maximum fan weight of 50 pounds. Therefore, the allowable loads provided above are in addition to the weight of the ceiling fan.

(9)The tabulated panel spans are also applicable when panels are subject to maintenance live load of 300 pounds, which must not be combined with the uniform live load, as prescribed in IBC Section 1607.4 and Table 1607.1.

TABLE 2—ALLOWABLE SPANS FOR ROOF PANELS WITH 1.0 PCF EPS CORE(1)(2)(3)(4) (5)(7)(9)

PANEL DESCRIPTION			0.024" SKIN – 3" THICK, 1.0 PCF EPS CORE - 0.024" SKIN - WITHOUT FAN BEAM										
				Applied Pressure for Design (psf)									Minimum Panel Slope (Per Foot of Projection)(6)
Nominal Core Thickness (inches)	Nominal Facer Thickness (inches)	Optional Channel Beam(8)	Loading Type	10	15	20	25	30	35	40	45	50	55	
3	0.024	No	Live	16'-5"		12'-5"								3/8" / foot
			Wind (Upward)	17'-5"	14'-7"	12'-10"	11'-6"	10'-6"	9'-9"	8'-9"	7'-9"	6'-11"	6'-4"	n/a
			Wind (Downward)	16'-5"	14'-0"	12'-5"	11'-2"	10'-3"	9'-6"	8'-5"	7'-6"	6'-9"	6'-2"	n/a
			Snow			11'-10"	10'-8"	9'-9"	9'-0"	8'-5"	7'-6"	6'-9"	6'-2"	1/2" / foot

For **SI**: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 psf = 47.9 Pa.

Refer to Table 1 for Notes.