

ICC-ES Evaluation Report

ESR-2229

Reissued May 1, 2011

This report is subject to renewal in one year.
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:

METALS USA BUILDING PRODUCTS, L.P.
 2440 ALBRIGHT
 HOUSTON, TEXAS 77017
 (713) 860-4555
www.buildingproductsusa.com

EVALUATION SUBJECT:
LAMINATED FOAM ROOF AND WALL PANELS
1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2009 International Building Code® (IBC)
- 2009 International Residential Code® (IRC)
- 2006 International Building Code® (IBC)
- 2006 International Residential Code® (IRC)

Properties evaluated:

- Structural
- Roof classification

2.0 USES

The Metals USA Building Products, L.P., 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-1 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 Metals USA Building Products, L.P., 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 beam channel, 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-1 Panels: The NPW-1 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 has a nominal density of 1.5 pcf (24.0 kg/m³) and is a Type II, expanded polystyrene (EPS) foam plastic board complying with ASTM C 578. 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 E 84.

3.2.1.2 Panel Facings: The aluminum facing material of the panels 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 ultimate and yield strengths of the panel facings are 25 ksi (172 MPa) and 21.5 ksi (148 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) fasteners installed with a 1-inch-outside-diameter (25.4 mm) washer.

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-1 Panels:

3.2.2.1 Exterior Face: The exterior facing is $\frac{1}{8}$ -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 $\frac{1}{8}$ - to $\frac{1}{4}$ -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. The tabulated loads are the allowable total transverse loads for the roof panels, which must be greater than the applied loads determined in accordance with the code, including the load combinations in IBC Section 1605. 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-1 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) 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 Table 1. 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 3.2.4 and spaced according to Table 1 in this report. The installation details must be submitted to the code official for approval.

4.2.3 Roof Classification: The laminated foam roof panels have a Class B roof classification in accordance with ASTM E 108. The maximum roof slope must not exceed 1:12 (8.3 percent).

4.2.4 NPW-1 Panels: The NPW-1 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 Metals USA Building Products, L.P., laminated foam roof panels and NPW-1 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 Panel connections to the supporting structure must be designed in accordance with the applicable code, prepared by a registered design professional where required by the jurisdiction, where the structure is constructed and submitted to the code official for approval.
- 5.4 The remaining portions of the structure must be designed and constructed in accordance with the applicable code.
- 5.5 Calculations and drawings demonstrating compliance with this report 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.
- 5.6 The panels are manufactured at Buena Park, California, with inspections by CI Professional Services Inc. (AA-656).

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Sandwich Panels (AC04), dated October 2009.
- 6.2 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated February 2011.

7.0 IDENTIFICATION

A label must be affixed to each panel, bearing the company name (Metals USA Building Products, L.P.), the evaluation report number (ESR-2229) and the name of the inspection agency (CI Professional Services, Inc.).

TABLE 1—ALLOWABLE PANEL SPANS

PANEL DESCRIPTION			Load Type	ALLOWABLE PANEL SPANS (1)(2)(3)(4)(6)											
Nominal Core Thickness (inches)	Nominal Facer Thickness (inches)	Optional Channel Beam (5)		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) (4)	
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"	7'-10"	n/a
			Snow			12'-7"	11'-7"	10'-10"	10'-10"	10'-2"	9'-8"	9'-2"	8'-7"	7'-10"	1/2" / foot
			Fastener Spacing	8"	6"	4"	4"	3"	3"	2"	2"	2"	2"	2"	
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"	7'-6"	n/a
			Snow			12'-6"	11'-6"	10'-6"	9'-9"	9'-2"	8'-8"	8'-2"	7'-6"	7'-6"	1/2" / foot
			Fastener Spacing	8"	6"	4"	4"	3"	3"	2"	2"	2"	2"	2"	
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"	9'-4"	n/a
			Snow			14'-0"	12'-11"	12'-1"	11'-5"	10'-9"	10'-2"	9'-8"	9'-2"	9'-2"	1/2" / foot
			Fastener Spacing	7"	5"	4"	3"	3"	3"	2"	2"	2"	2"	2"	
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"	9'-4"	n/a
			Snow			13'-10"	12'-6"	11'-5"	10'-7"	9'-11"	9'-5"	8'-11"	8'-6"	8'-6"	1/2" / foot
			Fastener Spacing	7"	5"	4"	3"	3"	2"	2"	2"	2"	2"	2"	
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"	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"	10'-5"	n/a
			Snow			15'-1"	13'-8"	12'-7"	11'-8"	10'-11"	10'-4"	9'-9"	9'-4"	9'-4"	1/2" / foot
			Fastener Spacing	7"	5"	4"	3"	3"	2"	2"	2"	2"	2"	2"	
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"	9'-8"	n/a
			Snow			14'-1"	12'-8"	11'-7"	10'-9"	10'-1"	9'-6"	9'-1"	8'-8"	8'-8"	1/2" / foot
			Fastener Spacing	7"	5"	4"	3"	3"	2"	2"	2"	2"	2"	2"	
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"	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"	12'-6"	n/a
			Snow			18'-3"	16'-5"	15'-0"	14'-0"	13'-1"	12'-4"	11'-9"	11'-3"	11'-3"	3/8" / foot
			Fastener Spacing	6"	4"	3"	2"	2"	2"	2"	2"	1"	1"	1"	
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"	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"	11'-6"	n/a
			Snow			16'-9"	15'-1"	13'-10"	12'-10"	12'-1"	11'-5"	10'-10"	10'-4"	10'-4"	3/8" / foot
			Fastener Spacing	6"	4"	3"	2"	2"	2"	2"	2"	1"	1"	1"	
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"	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"	9'-7"	n/a
			Snow			13'-9"	12'-8"	11'-10"	11'-2"	10'-7"	10'-1"	9'-8"	9'-3"	9'-3"	1/2" / foot
			Fastener Spacing	7"	5"	4"	3"	3"	3"	2"	2"	2"	2"	2"	
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"	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"	9'-4"	n/a
			Snow			13'-6"	12'-6"	11'-7"	10'-11"	10'-4"	9'-10"	9'-5"	9'-0"	9'-0"	1/2" / foot
			Fastener Spacing	7"	5"	4"	3"	3"	2"	2"	2"	2"	2"	2"	
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"	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"	10'-10"	n/a
			Snow			15'-6"	14'-3"	13'-4"	12'-7"	11'-11"	11'-4"	10'-11"	10'-5"	10'-5"	1/2" / foot
			Fastener Spacing	6"	5"	4"	3"	3"	2"	2"	2"	2"	2"	2"	
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"	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"	10'-6"	n/a
			Snow			15'-3"	14'-0"	13'-1"	12'-4"	11'-8"	11'-1"	10'-8"	10'-2"	10'-2"	1/2" / foot
			Fastener Spacing	6"	5"	4"	3"	3"	2"	2"	2"	2"	2"	2"	
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"	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"	11'-6"	n/a
			Snow			16'-7"	15'-3"	14'-3"	13'-5"	12'-9"	12'-2"	11'-8"	11'-2"	11'-2"	1/2" / foot
			Fastener Spacing	6"	4"	3"	3"	2"	2"	2"	2"	2"	2"	1"	1"
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"	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"	11'-3"	n/a
			Snow			16'-3"	15'-0"	13'-10"	12'-10"	12'-0"	11'-4"	10'-10"	10'-4"	10'-4"	1/2" / foot
			Fastener Spacing	6"	4"	3"	3"	2"	2"	2"	2"	2"	2"	1"	1"
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"	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"	14'-10"	n/a
			Snow			21'-6"	19'-4"	17'-9"	16'-6"	15'-6"	14'-7"	13'-11"	13'-3"	13'-3"	1/2" / foot
			Fastener Spacing	6"	4"	3"	2"	2"	2"	1"	1"	1"	1"	1"	
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"	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"	13'-8"	n/a
			Snow			19'-9"	17'-9"	16'-4"	15'-2"	14'-3"	13'-5"	12'-9"	12'-3"	12'-3"	3/8" / foot
			Fastener Spacing	6"	4"	3"	2"	2"	2"	1"	1"	1"	1"	1"	

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

Table 1 Footnotes

¹Roof Panels are limited for use with a patio enclosure as defined in Appendix Chapter I of the 2009 International Building Code and Appendix Chapter H of the 2009 International Residential Code.

- The Applied Pressure for Design (column headings) shown in the table is an “equivalent” uniform load. The spans are based on single span, simply supported installations. 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.

- Unless otherwise noted, the maximum eave projection of the roof system is 24-inches.

²Panel Spans are based on a maximum temperature differential between the two panel skins of 10 degrees Fahrenheit.

³Tabulated fastener spacings are for fasteners attaching to panel supports.

⁴Minimum 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.

⁵Consideration 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.

⁶The tabulated panel spans are also applicable when panels are subject to maintenance live load of 300 pounds, as defined in Table 1607.1 of the IBC.