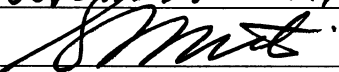


APPROVAL REPORT

APPROVAL TESTING OF IP SEAM 3, MIGHTI RIB PBR, AND PRESTIGE STANDING/LAP SEAM METAL ROOF SYSTEMS AS CLASS 1 PANEL ROOFS

Prepared for:

**FABRAL METAL WALL AND ROOF SYSTEMS
2217 DUTCH GOLD DRIVE
LANCASTER, PA 17601**

Project ID: 3029242
Class: 4471
Date of Approval: November 19, 2007
Authorized by: 
George A. Smith, Director
Assistant Vice President

**APPROVAL TESTING OF IP SEAM 3, MIGHTI RIB PBR, AND PRESTIGE
STANDING/LAP SEAM METAL ROOF SYSTEMS AS CLASS 1 PANEL ROOFS
from**

**FABRAL METAL WALL AND ROOF SYSTEMS
2217 DUTCH GOLD DRIVE
LANCASTER, PA 17601**

I INTRODUCTION

- 1.1 Fabral Metal Wall and Roof Systems submitted their IP Seam 3, Mighti Rib PBR, and Prestige Standing/Lap Seam Metal Roof Systems to determine if they meet the Approval requirements of FM Approvals Standard 4471 (1995) for Class 1 panel roofs.
- 1.2 All testing was performed in previous programs sponsored by others, and the data was released for use by Fabral Metal Wall and Roof Systems. See J.I. 3B2A6.AM dated January 28, 1998; J.I. 3000525 dated September 2, 1999; and Project I.D. 3011717 dated October 22, 2002 for details. A description of the tests and their results is repeated here for informational purposes.
- 1.3 This Report may be reproduced only in its entirety and without modification.
- 1.4 Standard:

| Title | Class Number | Date |
|---------------------|--------------|-------------|
| Class 1 Panel Roofs | 4471 | August 1995 |

- 1.5 Tests show that the IP Seam 3, Mighti Rib PBR, and Prestige Standing/Lap Seam Metal Roof Systems, as tested, meet the Approval requirements of the Standard listed above for Class 1 Panel Roofs.
- 1.6 Listings: The tested constructions meet the FM Approval criteria when installed as specified in the CONCLUSIONS of this report and when Approval is effective, will be listed in RoofNav.

II DESCRIPTION

- 2.1 Fabral Metal Wall and Roof Systems IP Seam 3 roof systems consist of the IP Seam 3 standing seam roof panels, the IP Seam 3 Clip Assembly (Low or High) or IP Seam 3 Reinforced Clip Assembly (Low or High), and associated components. The clips in the IP Seam 3 roof systems are secured directly to the supporting members (purlins). The IP Seam 3 roof systems may also incorporate a liner panel (Long Span profile or Multi-Rib profile) which is secured to the supporting members and the clips are secured through the liner panel into the supporting members.

FM APPROVALS
Project ID: 3029242

- 2.1.1 IP Seam 3 roof panels are roll-formed 22 ga. (0.0285 in., 0.72 mm) or 24 ga. (0.023 in., 0.58 mm) galvalume coated or painted galvalume steel panels joined together by an interlocking seam and secured to the structure with an interlocking clip. The panels are produced from steel having a minimum yield strength of 50 ksi (345 N/mm²). The panels are 24 in. (610 mm) wide and are manufactured to various lengths. Each side of the panel has a 3 in. (76 mm) high vertical seam. The adjacent panels are interlocked with a roof seaming apparatus. The finished seam includes the IP Seam 3 Clip Assembly (Low or High) or IP Seam 3 Reinforced Clip Assembly (Low or High), and associated components.
- 2.1.2 IP Seam 3 (Low or High) clips consist of a steel base with an interlocking sliding steel tab. A 0.8 mm (0.031 in.) thick riveted tab (2 rivets) slides along the tab sliding slot, and is centered with a plastic centering pin (rivet). The clip base is produced from 2.6 mm (12 ga. – 0.104 in.) thick G90 galvanized steel having a minimum yield strength of 345 N/mm² (50 ksi). The clip base is 150 mm (6 in.) long with a 30 mm (1.19 in.) wide bottom, 90° to vertical, having 4 predrilled 6.4 mm (1/4 in.) diameter holes. The clip base is 56 or 90 mm (2-3/16 or 3-3/16 in.) high (Low or High, respectively). The clip tab is attached to the clip base sliding slot with two rivets. The clip tab is produced from 0.8 mm (0.031 in.) thick G-90 galvanized steel having a minimum yield strength of 345 N/mm² (50 ksi). The top of the tab is 100 mm (4 in.) wide and is formed to fit between the adjacent panel side laps. The base of the clip is secured to steel purlins.
- 2.1.3 IP Seam 3 (Reinforced) (Low or High) clips consist of a steel base with an interlocking sliding steel tab. A 0.8 mm (0.031 in.) thick riveted tab (2 rivets) slides along the tab sliding slot, and is centered with a plastic centering pin (rivet). The clip base is produced from 2.6 mm (12 ga. – 0.104 in.) thick G90 galvanized steel having a minimum yield strength of 345 N/mm² (50 ksi). The clip base is 150 mm (6 in.) long with a 30 mm (1.19 in.) wide bottom, 90° to vertical, and has 4 predrilled 6.4 mm (1/4 in.) diameter holes. The clip base is 56 or 90 mm (2-3/16 or 3-3/16 in.) high (Low or High, respectively). The clip tab is attached to the clip base sliding slot with two rivets. The clip tab is produced from 0.8 mm (0.031 in.) thick G-90 galvanized steel having a minimum yield strength of 345 N/mm² (50 ksi). The top of the tab is 100 mm (4 in.) wide and is formed to fit between the adjacent panel side laps. The base of the clip is secured to steel purlins. The clip assembly has an angled reinforcing plate that rests on top of the clip base and has a slot for the clip tab. The plate is 150 mm (6 in.) long, 1.5 mm (16 ga. – 0.06 in.) thick, and 115 mm (4.5 in.) wide, and is angled to match the panel sidelaps.
- 2.1.3 The clips are secured to the supporting members with Atlas or ITW Buildex #12-14x1-1/4, #12-24x1-1/4, or #12-24x1-1/2 fasteners.
- 2.1.4 Where indicated, the fasteners for securing the panel side laps to the IP Seam 3 (Reinforced) Clip reinforcing plate are Atlas or ITW Buildex #14x1 with EPDM washer fasteners.
- 2.2 Fabral Metal Wall and Roof Systems Prestige roof systems consist of the Prestige lap seam roof panels which overlap adjacent panels forming a lap seam. The Prestige roof systems may also incorporate a liner panel (Mighti Rib profile or U Panel profile) which is secured to the supporting members and the panels are secured through the liner panel into the supporting members.

FM APPROVALS
Project ID: 3029242

- 2.2.1 Prestige roof panels are roll-formed 22 ga. (0.0285 in., 0.72 mm) or 24 ga. (0.023 in., 0.58 mm) galvalume coated or painted galvalume steel panels which overlap adjacent panels forming a lap seam. The panels are produced from steel having a min yield strength of 50 ksi (345 N/mm²). The panels have a 16 in. (406 mm) or a 12 in. (305 mm) coverage width and are manufactured to various lengths. The 16 in. (406 mm) wide panels have three (3) ¾ in. (19 mm) wide by 1/64 in. (0.4 mm) high minor ribs spaced 4 in. (100 mm) o.c., while the 12 in. (305 mm) wide panels have two (2) ¾ in. (19 mm) wide by 1/64 in. (0.4 mm) high minor ribs spaced 4 in. (100 mm) o.c. Interlocked panels form a 2 in. (50 mm) high vertical seam.
- 2.2.2 The Prestige Expansion Clips consist of the main clip body produced from 0.26 in. (6.6 mm) thick Armco Type 2 Aluminized Gainex Steel having a min yield strength of 48 ksi (331 MPa). The clip base is 3 in. (76 mm) long with a 1.5 in. (38 mm) wide bottom, 90° to vertical, having a 0.218 in. (5.5 mm) wide slot, 2.135 in. (54 mm) long. The base rises up 2.3 in. (58 mm), 3.0 in. (78 mm), 3.3 in. (84 mm), or 4.1 in. (103 mm). The top of the clip is rolled 90° in the direction opposite that of the base. This horizontal leg is 0.81 in. (20 mm) long with two rows of 1/8 in. (3.2 mm) dia. holes. The holes are 0.375 in. (10 mm) o.c. in the rows offset 0.375 in. (10 mm) between rows. At the outer edge of this horizontal leg there is a 90° downward bend that extends for 0.52 in. (13 mm) with a 0.26 in. (6.6 mm) inward return.
- 2.2.3 The Prestige Expansion Clips may be provided with a Reinforcing Plate. The U-shaped reinforcing plate is produced from 0.126 in. (3.2 mm) thick G90 galvanized steel having a min yield strength of 50 ksi (345 MPa). The reinforcing plate is 3 in. (76 mm) long and 1.5 in. (38 mm) wide, and has two ¼ in. (6.4 mm) dia. holes that correspond to the clip base fastener holes. The top section is bent over the bottom section forming the U-shape. The gap between the top and bottom is 0.262 in. (6.7 mm) and the top has a 0.53 in. (13.5 mm) wide depression that rests on the upper surface of the bottom portion of the plate. The top of the clip is formed to fit between adjacent panel side laps.
- 2.2.4 The clips are secured to the supporting members with Atlas or ITW Buildex #12-14x1-1/4, #12-24x1-1/4, or #12-24x1-1/2 fasteners.
- 2.3 Fabral Metal Wall and Roof Systems Mighty Rib PBR roof systems consist of the Mighty Rib PBR lap seam roof panels which overlap adjacent panels forming a lap seam. The Mighty Rib PBR roof systems may also incorporate a liner panel (Mighti Rib profile or U Panel profile) which is secured to the supporting members and the panels are secured through the liner panel into the supporting members.
- 2.3.1 Mighty Rib PBR roof panels are roll-formed 24 ga. (0.023 in., 0.58 mm) or 26 ga. (0.018 in., 0.46 mm) galvalume coated or painted galvalume steel panels which overlap adjacent panels forming a lap seam. The panels are produced from steel having a min yield strength of 80 ksi (552 N/mm²). The panels have a 36 in. (914 mm) coverage width and are manufactured to various lengths. The panels have 3-1/2 in. (89 mm) wide by 1-3/16 in. (30 mm) high major ribs spaced 12 in. (305 mm) o.c., and 1-3/16 in. (30 mm) wide by 3/32 in. (2 mm) high minor ribs spaced 3-1/2 in. (89 mm) o.c.
- 2.3.2 Panels are secured to the supporting members with exposed Atlas or ITW Buildex #12-14x1-1/4, #12-24x1-1/4, or #12-24x1-1/2 fasteners with EPDM Washer fasteners to the supporting members.
- 2.3.3 The fasteners for securing the panel side laps are ITW Buildex #12-7/8 with EPDM washer or Atlas #12-7/8 with EPDM washer.

FM APPROVALS
Project ID: 3029242

- 2.4 Vinyl, reinforced vinyl, or aluminum faced glass fiber blanket insulation, max 150 mm (6 in.) thick roof insulation may be placed between the roof panels and the supporting members.
- 2.5 Mighty Rib PBR liner panels are roll-formed 26 ga. (0.018 in., 0.46 mm) galvalume coated or painted galvalume steel panels which overlap adjacent panels forming a lap seam. The panels are produced from steel having a min yield strength of 36 ksi (248 N/mm²). The panels have a 36 in. (914 mm) coverage width and are manufactured to various lengths.
- 2.6 U Panel liner panels are roll-formed 26 ga. (0.018 in., 0.46 mm) galvalume coated or painted galvalume steel panels which overlap adjacent panels forming a lap seam. The panels are produced from steel having a min yield strength of 36 ksi (248 N/mm²). The panels have a 36 in. (914 mm) coverage width and are manufactured to various lengths.
- 2.7 The proprietary design drawings and materials specifications are on file at FM Approvals.

III EXAMINATIONS AND TESTS

- 3.1 Tests conducted were as required by the Standard described in Paragraph 1.4. Examination included simulated wind uplift pressure testing, resistance to foot traffic testing, ASTM E108 spread of flame testing, and hail damage testing.
 - 3.1.2 All data is on file at FM Approvals under Project ID 3029242 along with other documents and correspondence applicable to this program.
- 3.2 FM Approvals 12 x 24 ft (3.7 x 7.3 m) Simulated Wind Uplift Pressure Tests
 - 3.2.1 Tests were conducted using the FM Approvals Uplift Pressure Test Apparatus to evaluate the ability of the above deck components of the roofing system to resist a minimum simulated wind uplift pressure of 60 psf (2.9 kPa) without failure of the assemblies.
 - 3.2.2 The simulated wind uplift pressure tests utilized a 24 ft. (7.3 m) long by 12 ft. (3.7 m) wide by 8 in. (200 mm) deep steel pressure vessel arranged to apply air pressure at pre-established standard rates to the underside of the test sample which formed the top of the pressure vessel. The vessel was pressurized with compressed air.
 - 3.2.3 A net pressure of 30 psf (1.4 kPa) was applied to the test samples and maintained for 1 minute. The pressure was increased to 45 psf (2.2 kPa), then to 60 psf (2.9 kPa) and held for 1 minute at each increment. The pressure was increased in increments of 15 psf (0.7 kPa) every minute until failure occurred.
 - 3.2.4 Seventeen 12 x 24 ft. (3.7 x 7.3 m) test samples were prepared. The components, sequence of installation and test results were as follows:

Sample No. 1: IP Seam 3 galvalume panels, 24 gauge (0.024 in.; 0.61 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

FM APPROVALS
Project ID: 3029242

- Test Result:** The test sample met the FM Approvals requirements for Class 1-60 windstorm classification. The construction failed during incremental pressure increase to 75 psf (3.6 kPa) due to the clip tabs slipping out of the rolled standing seam.
- Sample No. 2:** (3011717) IP Seam 3 galvalume panels, 24 gauge (0.024 in.; 0.61 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 (Reinforced) clips that were fastened to 14 gauge (0.071 in.; 1.8 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #1/4-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool. Subsequent to seaming, the panels were then side fastened to the clip reinforcing plates by applying an Atlas 14x1 with EPDM washer on each side of the major rib.
- Test Result:** The test sample met the FM Approvals requirements for Class 1-120 windstorm classification. The construction failed during incremental pressure increase to 135 psf (6.5 kPa) due to the clip tabs pulling over the fastener heads.
- Sample No. 3:** (3011717) IP Seam 3 galvalume panels, 24 gauge (0.024 in.; 0.61 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 (Reinforced) clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #1/4-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool. Subsequent to seaming, the panels were then side fastened to the clip reinforcing plates by applying an Atlas 14x1 with EPDM washer on each side of the major rib.
- Test Result:** The test sample met the FM Approvals requirements for Class 1-90 windstorm classification. The construction failed during incremental pressure increase to 105 psf (5.0 kPa) due to clip fastener pull out from the purlins.
- Sample No. 4:** (3000525) IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 clips that were fastened to 12 gauge (0.105 in.; 2.7 mm) thick steel purlins spaced 7 ft (2100 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.
- Test Result:** The test sample met the FM Approvals requirements for Class 1-75 windstorm classification.
- Sample No. 5:** (3000525) IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with three Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.
- Test Result:** The test sample met the FM Approvals requirements for Class 1-90 windstorm classification.
- Sample No. 6:** (3B2A6.AM) IP Seam 3 galvalume panels, 24 gauge (0.024 in.; 0.61 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 3 ft 4 in. (1016 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

FM APPROVALS
Project ID: 3029242

Test Result: The test sample met the FM Approvals requirements for Class 1-60 windstorm classification.

Sample No. 7: (3B2A6.AM) IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 2 ft 6 in. (762 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-120 windstorm classification.

Sample No. 8: (3B2A6.AM) IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 3 ft 4 in. (1016 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-90 windstorm classification.

Sample No. 9: (3B2A6.AM) IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, were secured to IP Seam 3 clips that were fastened to 13 gauge (0.09 in.; 2.3 mm) thick steel purlins spaced 5 ft 3/16 in. (1530 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-75 windstorm classification.

Sample No. 10: (3000525) Mighti Rib PBR galvalume panels, 26 gauge (0.018 in.; 0.46 mm) thick and 36 in. (914 mm) wide, were through fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with Atlas #12-14x1-1/4 HWH self-drilling fasteners with EPDM washer applied on each side of every major rib resulting in fasteners 7 in. (178 mm) o.c. in the flat and 5 in. (127 mm) o.c. right and left of the major rib. Major ribs are 12 in. (305 mm) o.c. The panel overlaps were through fastened with Atlas #12x7/8 HWH self-drilling fasteners with EPDM washer applied 18 in. (457 mm) o.c.

Test Result: The test sample met the FM Approvals requirements for Class 1-150 windstorm classification.

Sample No. 11: (3000525) Prestige galvalume panels, 24 gauge (0.023 in.; 0.58 mm) thick and 16 in. (406 mm) wide, were secured to Prestige Expansion Clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-60 windstorm classification.

FM APPROVALS
Project ID: 3029242

Sample No. 12: Prestige galvalume panels, 24 gauge (0.023 in.; 0.58 mm) thick and 16 in. (406 mm) wide, were secured to Prestige Expansion Clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 2 ft 6 in. (762 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-120 windstorm classification.

Sample No. 13: Prestige galvalume panels, 24 gauge (0.023 in.; 0.58 mm) thick and 16 in. (406 mm) wide, were secured to Prestige Expansion Clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 3 ft 4 in. (1016 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-90 windstorm classification.

Sample No. 14: Prestige galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 16 in. (406 mm) wide, were secured to Prestige Expansion Clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-75 windstorm classification.

Sample No. 15: Prestige galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 16 in. (406 mm) wide, were secured to Prestige Expansion Clips that were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 2 ft 6 in. (762 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-165 windstorm classification.

Sample No. 16: Prestige galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 16 in. (406 mm) wide, were secured to Prestige Expansion Clips with Prestige Reinforcing Plates. The clips were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-120 windstorm classification.

FM APPROVALS
Project ID: 3029242

Sample No. 17: Prestige galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 16 in. (406 (3000525) mm) wide, were secured to Prestige Expansion Clips with Prestige Reinforcing Plates. The clips were fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 2 ft 6 in. (762 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels were seamed together along side laps with an electric seaming tool.

Test Result: The test sample met the FM Approvals requirements for Class 1-180 windstorm classification.

3.3 ASTM E108 Spread of Flame Tests

3.3.1 The fire tests from above the roof cover were conducted in accordance with ASTM E108 Spread of Flame Tests.

3.3.2 Sample size was 3-1/3 x 8 ft. (1.0 x 2.4 m).

3.3.3 The wind velocity over the top of the standard panel was adjusted to 12 ± 0.5 mph (5.3 ± 0.2 m/s).

3.3.4 Flame exposure: The flame was adjusted to $1400 \pm 50^\circ\text{F}$ ($760 \pm 28^\circ\text{C}$) for the Class A tests. The flame temperature was measured by a thermocouple located 1 in. (25.4 mm) above the surface of the standard panel and 1/2 in. (13 mm) toward the flame source from the lower edge of the standard panel. The flame was applied to each test panel for 10 minutes.

3.3.5 During and after the application of the flame, each panel was observed for the distance of maximum flame spread, glowing brands and other damage.

3.3.6 Two 3-1/3 x 8 ft. (1.0 x 2.4 m) test samples were prepared. The components and sequence of installation were as follows:

Sample No. 1: 1/2 in. (12 mm) plywood
(3B2A6.AM) IP Seam 3 Standing Seam panels of 24 gauge (0.023 in.; 0.58 mm) steel with Kynar 500 coating
Fiberglass batt insulation and vinyl vapor retarder

Test Result: The test sample met Class A at 5 in 12 slope with a max flame spread of 26 in. (0.66 m).

Sample No. 2: Same as Sample #1.
(3B2A6.AM)

Test Result: The test sample met Class A at 5 in 12 slope with a max flame spread of 22 in. (0.56 m).

3.3.7 Ignition of panel, deck exposure, flying brands, and significant lateral flame spread were not observed during the tests.

FM APPROVALS
Project ID: 3029242

3.4 FM Approvals Simulated Hail Damage Tests

3.4.1 Tests were conducted using the FM Approvals Simulated Hail Damage Test Apparatus to evaluate the ability of the roof covers to withstand a hailstorm without damage to the membrane.

3.4.2 For the severe hail damage tests, a 1¾ in. (49 mm) diameter steel ball weighing 0.79 lbs. (0.359 kg) was dropped on the test sample from a 17 ft 9½ in. (5.42 m) height through a 3¾ in. (0.86 m) length of PVC pipe with a 2 in. (51 mm) inside diameter. This procedure was repeated several times on various sections of the sample. After each drop the sample was inspected for damage to the roof panel. Following initial testing, the sample was conditioned (weathered) for 1000 hours in the FM Approvals Ultraviolet Weatherometer. The initial procedure was then repeated on the conditioned sample.

3.4.3 After each drop the sample is inspected and there must be no evidence of splitting, delamination or rupture of the roof panel.

3.4.4 One 2 x 4 ft. (0.6 x 1.2 m) sample was prepared. The components and sequence of installation were as follows:

Sample No.1: IP Seam 3 Standing Seam panels of 24 gauge (0.023 in.; 0.58 mm) thick steel (3B2A6.AM) with Kynar 500 coating.

3.4.5 No damage to the roof panel described in 3.4.4 above was observed after each drop of the simulated hail impactor before or after conditioning (weathering).

3.5 FM Approvals Resistance to Foot Traffic Tests

3.5.1 Tests were conducted using the FM Approvals Resistance to Foot Traffic Test Apparatus to evaluate the ability of the roof cover/insulation combinations to resist simulated foot traffic without damage.

3.5.1.1 A 3 in. (76 mm) square steel plate with rounded corners was placed at the approximate center (midspan) of the center test panel adjacent to the panel side lap. A 200 lb. (91 kg) load was imposed on the plate and then removed. This cycle was repeated four additional times. The sample roof panels and panel side laps were inspected for damage after the last cycle.

3.5.1.2 There must be no puncture of the roof panel and no separation or disengagement of the panel side or end laps.

3.5.2 Sample No.1: The simulated wind uplift pressure test sample No. 9 described in 3.2.4 above was (3B2A6.AM) used for the resistance to foot traffic tests.

3.5.3 No damage to the sample roof panels or panel side seams of test sample No. 9 described in 3.2.4 above was observed after the tests.

FM APPROVALS
Project ID: 3029242

IV MARKING

- 4.1 The manufacturer shall mark each individual roof panel (or each pallet or bundle of panels), each package of clips, and each package of screws with at least one label containing, at minimum, the manufacturer's name and product trade name. In addition, each package or container must be marked with the Approval Mark of FM Approvals.
- 4.2 Markings denoting FM Approval shall be applied by the manufacturer only within and on the premises of manufacturing locations that are under the FM Approvals Facilities and Procedures Audit program.
- 4.3 The manufacturer agrees that use of the FM Approvals name or Approval Mark is subject to the conditions and limitations of the FM Approval. Such conditions and limitations must be included in all references to FM Approval.

V REMARKS

The securement of the roof system must be enhanced at the building corners and perimeter as outlined in FM Global Property Loss Prevention Data Sheet 1-31.

VI FACILITIES AND PROCEDURES AUDITS

The Fabral Metal Wall and Roof Systems manufacturing locations in Grapevine, TX; Itasca, IL; Logansport, IN; and Ashland, OH are subject to periodic audit inspections to determine that the quality and uniformity of the materials have been maintained and will provide the same level of performance as originally Approved. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report.

VII MANUFACTURER'S RESPONSIBILITIES

- 7.1 To assure compliance with his procedures in the field, the manufacturer shall supply to the roofer such necessary instruction or assistance required to produce the desired performance achieved in the tests.
- 7.2 The manufacturer shall notify FM Approvals of any planned change in the Approved product, prior to general sale or distribution, using Form 797, Approved Product Revision Report.

VIII DOCUMENTATION

The following documents describe the IP Seam 3, Mighti Rib PBR, and Prestige Standing/Lap Seam Metal Roof Systems and are filed under J.I. 3029242.

| Document | Issue or Revision | Description |
|---|-------------------|-----------------------------|
| FM Approvals Facilities and Procedures Audit Manual | Latest | Quality Control Information |

FM APPROVALS
Project ID: 3029242

IX CONCLUSIONS

- 9.1 The test results as described above indicate that the Fabral Metal Wall and Roof Systems Standing Seam Metal Panel Roof Systems meet the FM Approvals Standard 4471 requirements when installed as summarized below:
- 9.1.1 1-180 Windstorm Classification: Prestige galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 16 in. (406 mm) wide, are secured to Prestige Expansion Clips with Prestige Reinforcing Plates. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 2 ft 6 in. (762 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.2 1-165 Windstorm Classification: Prestige galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 16 in. (406 mm) wide, are secured to Prestige Expansion Clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 2 ft 6 in. (762 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.3 1-150 Windstorm Classification: Mighti Rib PBR galvalume panels, 26 gauge (0.018 in.; 0.46 mm) thick and 36 in. (914 mm) wide, are through fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with Atlas #12-14x1-1/4 HWH self-drilling fasteners with EPDM washer applied on each side of every major rib resulting in fasteners 7 in. (178 mm) o.c. in the flat and 5 in. (127 mm) o.c. right and left of the major rib. Major ribs are 12 in. (305 mm) o.c. The panel overlaps are through fastened with Atlas #12x7/8 HWH self-drilling fasteners with EPDM washer applied 18 in. (457 mm) o.c.
- 9.1.4 1-120 Windstorm Classification: IP Seam 3 galvalume panels, 24 gauge (0.024 in.; 0.61 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 (Reinforced) clips. The clips are fastened to 14 gauge (0.071 in.; 1.8 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #1/4-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool. Subsequent to seaming, the panels are then side fastened to the clip reinforcing plates by applying an Atlas 14x1 with EPDM washer on each side of the major rib.
- 9.1.5 1-120 Windstorm Classification: IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 2 ft 6 in. (762 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.6 1-120 Windstorm Classification: Prestige galvalume panels, 24 gauge (0.023 in.; 0.58 mm) thick and 16 in. (406 mm) wide, are secured to Prestige Expansion Clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 2 ft 6 in. (762 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.7 1-120 Windstorm Classification: Prestige galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 16 in. (406 mm) wide, are secured to Prestige Expansion Clips with Prestige Reinforcing Plates. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.

FM APPROVALS
Project ID: 3029242

- 9.1.8 1-90 Windstorm Classification: IP Seam 3 galvalume panels, 24 gauge (0.024 in.; 0.61 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 (Reinforced) clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #1/4-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool. Subsequent to seaming, the panels are then side fastened to the clip reinforcing plates by applying an Atlas 14x1 with EPDM washer on each side of the major rib.
- 9.1.9 1-90 Windstorm Classification: IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with three Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.10 1-90 Windstorm Classification: IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 3 ft 4 in. (1016 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.11 1-90 Windstorm Classification: Prestige galvalume panels, 24 gauge (0.023 in.; 0.58 mm) thick and 16 in. (406 mm) wide, are secured to Prestige Expansion Clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 3 ft 4 in. (1016 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.12 1-75 Windstorm Classification: IP Seam 3 galvalume panels, 24 gauge (0.024 in.; 0.61 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.13 1-75 Windstorm Classification: IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 clips. The clips are fastened to 12 gauge (0.105 in.; 2.7 mm) thick steel purlins spaced 7 ft (2100 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.14 1-75 Windstorm Classification: IP Seam 3 galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 clips. The clips are fastened to 13 gauge (0.09 in.; 2.3 mm) thick steel purlins spaced 5 ft 3/16 in. (1530 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.15 1-75 Windstorm Classification: Prestige galvalume panels, 22 gauge (0.030 in.; 0.76 mm) thick and 16 in. (406 mm) wide, are secured to Prestige Expansion Clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.

FM APPROVALS
Project ID: 3029242

- 9.1.16 1-60 Windstorm Classification: IP Seam 3 galvalume panels, 24 gauge (0.024 in.; 0.61 mm) thick and 24 in. (610 mm) wide, are secured to IP Seam 3 clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 3 ft 4 in. (1016 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.1.17 1-60 Windstorm Classification: Prestige galvalume panels, 24 gauge (0.023 in.; 0.58 mm) thick and 16 in. (406 mm) wide, are secured to Prestige Expansion Clips. The clips are fastened to 16 gauge (0.060 in.; 1.5 mm) thick steel purlins spaced 5 ft (1524 mm) o.c. with two Atlas #12-14x1-1/4 HWH self-drilling fasteners at each purlin. Adjacent panels are seamed together along side laps with an electric seaming tool.
- 9.2 The above assemblies may also include insulation, liner panels, and sub-purlins as follows:
 - 9.2.1 Glass fiber blanket insulation, 75 to 150 mm (3 to 6 in.) thick placed between the roof panels and the supporting members, or between the roof panels and the liner panels.
 - 9.2.2 Fabral Metal Wall and Roof Systems Mighti Rib or U Panel liner panel applied over the supporting members and secured. Fabral Metal Wall and Roof Systems IP Seam 3, Mighti Rib PBR, and Prestige Standing/Lap Seam Metal Roof Systems installed as above with panel or clip fasteners installed through the liner panels into the purlins.
- 9.3 Fabral Metal Wall and Roof Systems IP Seam 3, Mighti Rib PBR, and Prestige Standing/Lap Seam Metal Roof Systems meet Class 1-SH hail damage requirements.
- 9.4 Fabral Metal Wall and Roof Systems IP Seam 3, Mighti Rib PBR, and Prestige Standing/Lap Seam Metal Roof Systems meet Class 1A Fire Classification when installed at a maximum roof slope of 5 in 12 (42%).
- 9.5 Tests show that the tested roof constructions in and of themselves would not create a need for automatic sprinklers.
- 9.6 Since a duly signed Master Agreement is on file for this customer, Approval is effective as of the date of this report.

FM APPROVALS
Project ID: 3029242

9.7 Continued Approval will depend upon satisfactory field experience and periodic Facilities and Procedures Audits.

TESTING SUPERVISED BY:

Mark D. Tyrol

PROJECT DATA RECORD:


Project ID 3029242

ORIGINAL TEST DATA:

PDR for Project ID's 3B2A6.AM, 3000525, 3011717

REPORT BY:

REPORT REVIEWED BY:



M. D. Tyrol, P.E.
Senior Engineer
Materials Group

L. N. D'Angelo
Technical Team Manager
Materials Group