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APPROVAL REPORT

APEC 216/218 AND APEC 324 STANDING SEAM PANEL ROOF SYSTEMS AS CLASS 1 PANEL ROOFS

Prepared for:

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Dothan AL 36303

Project ID: 3041849

Class: 4471

Date of Approval: July 8, 2011

Authorized by:

A handwritten signature in black ink, appearing to read "R.P.F.", written over a horizontal line.

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Group Manager, Assistant Vice President

**APEC 216/218 AND APEC 324 STANDING
SEAM PANEL ROOF SYSTEMS
AS CLASS 1 PANEL ROOFS**

from

**AllSouth Pre-Engineered Components, LLC.
985 Technology Drive
Dothan AL 36303**

I INTRODUCTION

- 1.1 AllSouth Pre-Engineered Components, LLC submitted their APEC 216/218 and APEC 324 Standing Seam Panel Roof Systems to determine if they would meet the Approval requirements of the **Standard** listed below.
- 1.2 ASTM E-108-07 spread of flame testing, simulated wind uplift testing, hail damage testing and resistance to foot traffic testing was previously completed under Projects 1D7A7.AM, 3007524, 3004100, 3008065, 3009917 and 3026157 and released to AllSouth Pre-Engineered Components, LLC. A description of those tests and their results are repeated here for informational purposes. See FM Approvals Reports 1D7A7.AM dated December 31, 1998, 3007524 dated October 26, 2000, 3004100 dated May 9, 2000, 3008065 dated November 8, 2000, 3009917 dated August 20, 2001 and 3026157 dated March 6, 2007 for further details. The panels, accessory items, manufacturing processes and production information have been shown to be equal to those items tested under the previously completed projects.
- 1.3 This Report may be reproduced only in its entirety and without modification.
- 1.4 **Standard:**

Title	Class Number	Date
Approval Standard for Class 1 Panel Roofs	4471	March 2010

- 1.5 The tests showed that the APEC 216/218 and APEC 324 Standing Seam Panel Roof Systems, as tested, meet the Approval requirements of the **Standard** listed above for Class1 Panel Roofs.
- 1.6 **Listings:** The results of the review and testing show that the APEC 216/218 and APEC 324 Standing Seam Panel Roof Systems meet the Approval criteria of FM Approvals when installed as specified in the **CONCLUSIONS** of this report. The products will be listed in RoofNav.

II DESCRIPTION

- 2.1 APEC 216/218 roof panels are roll-formed minimum 24 gauge (0.024 in, 0.6 mm thick base metal thickness) AZ55 Galvalume coated steel panels joined together by an interlocking seam and secured to the structure with interlocking panel clips. The panels also come painted with a CERAM-A-STARR 1050 paint system applied over AZ50 Galvalume coating. The panels are produced from Grade 50 steel having a minimum yield strength of 50 ksi (345 N/mm²). The panels are 16 or 18 in. (405 or 455 mm) wide and are manufactured to various lengths. One side of the panel has a 0.10 in. (2.5mm) high rib plus a 1.9 in. (48 mm) high seam, forming a 2.0 in. (50 mm) overall panel height. The other side of the panel has a 0.10 in. (2.5mm) high rib plus a 1.96 in. (50 mm) high seam, forming a 2 1/16 in.

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(52 mm) overall panel height. The higher seam fits over the lower seam, and the adjacent panels are interlocked with an electric roof seaming apparatus. The finished seam includes the panel clips.

- 2.2 APEC 324 roof panels are roll-formed minimum 24 gauge (0.024 in, 0.6 mm thick base metal thickness) AZ55 Galvalume coated steel panels joined together by an interlocking seam and secured to the structure with interlocking panel clips. The panels also come painted with a CERAM-A-STARR 1050 paint system applied over AZ50 Galvalume coating. The panels are produced from Grade 50 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. One side of the panel has a 2 in. (50 mm) high rib plus a 1.0 in. (25 mm) high seam, forming a 3.0 in. (75 mm) overall panel height. The other side of the panel has a matching profile, forming a 3 1/16 in. (75 mm) overall panel height. The higher seam fits over the lower seam, and the adjacent panels are interlocked with an electric roof seaming apparatus. The finished seam includes the panel clips.
- 2.3 APEC 216/218 Panel Clips consist of a 16 gauge (min 0.0586 in., 1.49 mm) steel base with interlocking 22 gauge (min 0.0277 in., 0.70 mm) steel tab. The base and tab are produced from ASTM A446 Grade D, G-90 galvanized steel having a min yield strength of 50 ksi (345 N/mm²). The base is 2 in. (51 mm) wide and the tab is 4-1/4 in. (108 mm) wide. The tab has two notches that keeps the base centered until the clip is secured.
- 2.4 APEC 324 Panel Clips consist of a 0.050 – 0.056 in. (1.27 – 1.42 mm) steel base with a min 0.035 in. (0.89 mm) interlocking steel tab. The base and tab are produced from G-90 galvanized steel having a minimum yield strength of 50 ksi (345 N/mm²). The base is 4.25 in. (108 mm) wide and the tab is 3.0 in. (76 mm) wide. The base is notched to keep the tab centered until the clip is secured.
- 2.5 APEC 324 Perimeter Clip is an 8 in. (203 mm) long version of the standard Panel Clip as described above. The tab portion of the clip that engages the panel is 8 in. (203 mm) long while the base remains the same as the standard panel clip.
- 2.6 ITW Buildex 1/4 -14 Hex Washer Head (HWH) self-drilling fasteners are 1/4 in. (6.4 mm) diameter self-drilling screws with 14 threads per inch, a #3 drive point, with a 5/16 in. (8 mm) Hex Washer Head. The fasteners are made from type 1022 carbon steel. They are used to fasten the clips to the purlins (steel supporting members) and are 1-1/4 to 4 in. (32 to 100 mm) long.
- 2.7 SFS Intec 1/4 -14 Hex Washer Head (HWH) self-drilling fasteners are 1/4 in. (6.4 mm) diameter self-drilling screws with 14 threads per inch, a #2 drive point, with a 5/16 in. (8 mm) Hex Washer Head. The fasteners are made from type 1022 carbon steel. They are used to fasten the clips to the purlins (steel supporting members) and are 1-1/4 to 4 in. (32 to 100 mm) long.
- 2.8 SFS Intec Fastener #12-24 x 1 1/4 IMPAX 45 Hex Washer Head (HWH) self-drilling fasteners are a #12 (0.20 in [5.1 mm]) diameter screw with 24 threads per inch, and a #2 point. The fasteners are made from type 1022 carbon steel coated with a silver “Senti” coating at a dry film thickness (DFT) of 0.08 – 0.12 mils. They are used to fasten the clips to the bar joists (steel supporting members).
- 2.9 Optional insulations include FM Approved insulations as specified in the **CONCLUSIONS** of this report. For constructions that utilize rigid insulations, bearing plates are required.
- 2.10 Bearing plates are 4.0 x 5.0 in. (101 x 125 mm) plates, 22 gauge (0.034 in.; 0.86 mm) thick with pre-punched holes for the fasteners.

III EXAMINATION AND TESTS

- 3.1 The tests conducted were as required by the **Standard** listed in paragraph 1.4 above.
- 3.1.1 All samples were considered to be representative of standard production and were examined and tested as indicated below.
- 3.1.2 All components incorporated into the test samples were selected by FM Approvals personnel. The test samples were prepared by, or under the supervision of, FM Approvals personnel.
- 3.1.3 All data is on file at FM Approvals under Project I.D. # 3041849 along with other documents and correspondence applicable to this program.
- 3.2 FM Approvals 12 by 24 ft (3.7 by 7.3 m) Simulated Wind Uplift Pressure Test
- 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 assembly.
- 3.2.1.1 The simulated wind uplift pressure test utilizes a 12 ft. (3.7 m) long by 24 ft. (7.3 m) wide by 2 in. (50 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.
- 3.2.1.2 A net pressure of 30 psf (1.4 kPa) was applied to the test sample and maintained for 1 minute. The air pressure was increased to 45 psf (2.2 kPa), then 60 psf (2.9 kPa) and held for 1 minute at each increment. Air pressure was increased in increments of 15 psf (0.7 kPa) every minute until failure occurred.
- 3.2.2 Eleven (11) 12 by 24 ft (3.7 by 7.3 m) simulated wind uplift pressure test samples were prepared. The components, sequence of installation and test results were as follows:

Sample No. 1: APEC 216/218 Standing Seam Metal Panel Roof System of 18 in. (455 mm) wide panels of 24 gauge (0.024 in.; 0.6 mm base thickness) AZ50 Galvalume steel produced from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²). The panels were secured to APEC 216/218 panel clips fastened to 16 gauge (0.06 in.; 1.5 mm) thick steel purlins formed from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²) spaced 5 ft (1.5 m) o.c. with two ITW Buildex or SFS Intec ¼ -14 x 1-1/4 in. (32 mm) Hex Washer Head (HWH) self-drilling fasteners at each purlin. Adjacent panels were seamed together along the side laps with an electric seaming tool providing a TripleLok Seam.

Test Result: The sample met the 90 psf (4.3 kPa) minimum FM Approvals requirement for Class 1-90 windstorm classification. The construction failed during the incremental increase from 90 to 105 psf (4.3 to 5.0 kPa). Mode of failure was seam disengagement of clip tab.

Sample No. 2: APEC 216/218 Standing Seam Metal Panel Roof System of 18 in. (455 mm) wide panels of 22 gauge (0.027 in.; 0.7 mm base thickness) AZ50 Galvalume steel produced from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²). The panels were secured to APEC 216/218 panel clips fastened to 16 gauge (0.06 in.; 1.5 mm) thick steel purlins formed from Grade 50 steel having a yield strength of 50 ksi

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(345 N/mm²) spaced 2.5 ft (0.76 m) o.c. with two ITW Buildex or SFS Intec ¼ -14 x 1-1/4 in. (32 mm) Hex Washer Head (HWH) self drilling fasteners at each purlin. Adjacent panels were seamed together along the side laps with an electric seaming tool providing a TripleLok Seam.

Test Result: The sample met the 165 psf (7.9 kPa) minimum FM Approvals requirement for Class 1-165 windstorm classification. No failure occurred during testing.

Sample No. 3: (3007254) APEC 324 Standing Seam Metal Panel Roof System of 24 in. (610 mm) wide panels of 24 gauge (0.024 in.; 0.6 mm base thickness) AZ50 Galvalume steel produced from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²). The panels were secured to APEC 324 panel clips fastened to 16 gauge (0.06 in.; 1.5 mm) thick steel purlins formed from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²) spaced 5 ft (1.5 m) o.c. with two ITW Buildex or SFS Intec ¼ -14 x 1-1/4 in. (32 mm) Hex Washer Head (HWH) self-drilling fasteners at each purlin. Each fastener was torqued to 65 psi (4.6 k/cm²). Adjacent panels were seamed together along the side laps with an electric seaming tool providing a TripleLok Seam.

Test Result: The sample met the 60 psf (2.9 kPa) minimum FM Approvals requirement for Class 1-60 windstorm classification. The construction failed during the incremental increase from 60 to 75 psf (2.9 to 3.6 kPa). Mode of failure was seam disengagement from the clip.

Sample No. 4: (3007254) APEC 324 Standing Seam Metal Panel Roof System of 24 in. (610 mm) wide panels of 24 gauge (0.024 in.; 0.6 mm base thickness) AZ50 Galvalume steel produced from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²). The panels were secured to APEC 324 panel clips fastened to 16 gauge (0.06 in.; 1.5 mm) thick steel purlins formed from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²) spaced 4 ft (1.2 m) o.c. with two ITW Buildex or SFS Intec ¼ -14 x 1-1/4 in. (32 mm) Hex Washer Head (HWH) self-drilling fasteners at each purlin. Each fastener was torqued to 65 psi (4.6 k/cm²). Adjacent panels were seamed together along the side laps with an electric seaming tool providing a TripleLok Seam.

Test Result: The sample met the 90 psf (4.3 kPa) minimum FM Approvals requirement for Class 1-90 windstorm classification. The construction failed during the incremental increase from 90 to 105 psf (4.3 to 5.0 kPa). Mode of failure was clip fastener pullout.

Sample No. 5: (3007254) APEC 324 Standing Seam Metal Panel Roof System of 24 in. (610 mm) wide panels of 24 gauge (0.024 in.; 0.6 mm base thickness) AZ50 Galvalume steel produced from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²). The panels were secured to APEC 324 panel clips fastened to 16 gauge (0.06 in.; 1.5 mm) thick steel purlins formed from Grade 50 steel having a yield strength of 50 ksi (345 N/mm²) spaced 2.5 ft (0.76 m) o.c. with two ITW Buildex or SFS Intec ¼ -14 x 1-1/4 in. (32 mm) Hex Washer Head (HWH) self-drilling fasteners at each purlin. Each fastener was torqued to 65 psi (4.6 k/cm²). Adjacent panels were seamed together along the side laps with an electric seaming tool providing a QuadLok Seam.

Test Result: The sample met the 105 psf (5.0 kPa) minimum FM Approvals requirement for Class 1-105 windstorm classification. The construction failed during the incremental increase from 105 to 120 psf (5.0 to 5.7 kPa). Mode of failure was due to permanent panel deformation.

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- Sample No. 6: 0.060 in. (1.52 mm) Z Purlins spaced 5.0 ft. (1.52m) o.c.
(3026157) 24 gage APEC 324 galvalume roof panel 2 ft. (0.61 m) wide (miced at 0.026 in. (0.66 mm) mechanically fastened to the structural supports using a APEC 324 panel clip with modified base (additional hole – 4 total).
Panel clips were fastened to the supports using 3 fasteners per clip.
Two types of fasteners were used: ITW Buildex ¼ - 14 screws and SFS Intec ¼ - 14 screws.
Each clip in a row was fastened with the same type of fastener.
Seams were crimped at each clip using a manual crimping tool. Then seams were seamed with an electric seaming tool. (TripleLok Seam)
- Test Result: The sample met the 90psf (4.3 kPa) minimum FM Approvals requirement for Class 1-90 windstorm classification. The construction failed during the 105 psf (5.0 kPa) load increment due deformation of the panel.
- Sample No. 7: 0.071 in. (1.80 mm) Z Purlins spaced 5.0 ft. (1.52m) o.c.
(3026157) 24 gage APEC 324 galvalume roof panel 2 ft. (0.61 m) wide (miced at 0.0255 in. (0.65 mm) mechanically fastened to the structural supports using an 8 in. (203 mm) APEC 324 perimeter clip with 4 holes.
Panel clips were fastened to the supports using 3 fasteners per clip.
Two types of fasteners were used: ITW Buildex ¼ - 14 screws and SFS Intec ¼ - 14 screws.
Each clip in a row was fastened with the same type of fastener.
Seams were crimped at each clip using a manual crimping tool. Then seams were seamed with a 2 pass electrical seaming tool that creates a closed 180° seam. (QuadLok Seam)
- Test Result: The sample met the 120 psf (5.7 kPa) minimum FM Approvals requirement for Class 1-120 windstorm classification. The construction failed four seconds into the 135 psf (6.5 kPa) load increment due clip separation from the base.
- Sample No. 8: 0.071 in. (1.80 mm) Z Purlins spaced 2.5 ft. (0.76m) o.c.
(3026157) 24 gage APEC 324 galvalume roof panel 2 ft. (0.61 m) wide (miced at 0.026 in. (0.66 mm)) mechanically fastened to the structural supports using an 8 in. (203 mm) APEC 324 perimeter clip with modified base (additional hole – 4 total)
Panel clips were fastened to the supports using 3 fasteners per clip.
Two types of fasteners were used: ITW Buildex ¼ - 14 screws and SFS Intec ¼ - 14 screws.
Each clip in a row was fastened with the same type of fastener.
Seams were crimped at each clip using a manual crimping tool. Then seams were seamed with a 2 pass electrical seaming tool that creates a closed 180° seam. (QuadLok Seam)
- Test Result: The sample met the 165 psf (7.9 kPa) minimum FM Approvals requirement for Class 1-165 windstorm classification. The construction failed during the 180 psf (8.6 kPa) load increment due to panel rupture.
- Sample No. 9: 0.060 in. (1.52 mm) Z Purlins spaced 5.0 ft. (1.52m) o.c.
(3026157) 22 gage APEC 324 galvalume roof panel 2 ft. (0.61 m) wide (miced at 0.032 in. (0.84 mm) mechanically fastened to the structural supports using a APEC 324 panel clip with modified base (additional hole – 4 total).

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Panel clips were fastened to the supports using 3 fasteners per clip.
Two types of fasteners were used: ITW Buildex ¼ - 14 screws and SFS Intec ¼ - 14 screws.
Each clip in a row was fastened with the same type of fastener.
Seams were crimped at each clip using a manual crimping tool. Then seams were seamed with an electric seaming tool. (TripleLok Seam)

Test Result: The sample met the 120 psf (5.7 kPa) minimum FM Approvals requirement for Class 1-120 windstorm classification. The construction failed during the 135 psf (6.5 kPa) load increment due seam opening around the clips.

Sample No. 10: 0.060 in. (1.52 mm) Z Purlins spaced 5.0 ft. (1.52m) o.c.
(3026157) 24 gage APEC 324 galvalume roof panel 2 ft. (0.61 m) wide (miced at 0.026 in. (0.66 mm) mechanically fastened to the structural supports using a APEC 324 panel clip with modified base (additional hole – 4 total).
Panel clips were fastened to the supports using 3 fasteners per clip.
Two types of fasteners were used: ITW Buildex ¼ - 14 screws and SFS Intec ¼ - 14 screws.
Each clip in a row was fastened with the same type of fastener.
Seams were crimped at each clip using a manual crimping tool. Then seams were seamed with a 2 pass electrical seaming tool that creates a closed 180° seam. (QuadLok Seam)

Test Result: The sample met the 105 psf (5.0 kPa) minimum FM Approvals requirement for Class 1-105 windstorm classification. The construction failed 14 seconds into the 120 psf (5.7 kPa) load increment due panel deformation.

Sample No. 11: 0.071 in. (1.80 mm) Z Purlins spaced 2.5 ft. (0.76m) o.c.
(3026157) 22 gage APEC 324 galvalume roof panel 2 ft. (0.61 m) wide (miced at 0.0315 in. (0.80 mm)) mechanically fastened to the structural supports using an 8 in. (203 mm) APEC 324 perimeter clip with modified base (additional hole – 4 total)
Panel clips were fastened to the supports using 3 fasteners per clip.
Two types of fasteners were used: ITW Buildex ¼ - 14 screws and SFS Intec ¼ - 14 screws.
Each clip in a row was fastened with the same type of fastener.
Seams were crimped at each clip using a manual crimping tool. Then seams were seamed with a 2 pass electrical seaming tool that creates a closed 180° seam. (QuadLok Seam)

Test Result: The sample met the 180 psf (8.6 kPa) minimum FM Approvals requirement for Class 1-180 windstorm classification. The construction failed during the 195 psf (9.3 kPa) load increment due to panel rupture

3.3 FM Approvals Resistance to Foot Traffic Test (1D7A7.AM)

3.3.1 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.

3.3.1.1 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.

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

3.3.2 One sample was prepared. The components and sequence of installation were as follows:

Sample No. 1: APEC 216/218 Standing Seam Metal Roof Panel with seam was placed over supports with a 5 ft. (1.5 m) span.

3.3.3 No damage to the sample roof panel or panel seam described in 3.3.2 above was observed after the test.

3.4 FM Approvals Simulated Hail Damage Test (3008065)

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

3.4.2 For severe hail damage tests, a 1 ¾ in. (49 mm) diameter steel ball weighing 0.79 lbs (0.359 kg) was dropped on the test sample from a 17 ft 9 ½ in. (5.42 m) height through a 3 ¾ 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 weatherproof membrane. 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 the panel roof panel shall not be punctured and the coating shall not show any signs of chipping, peeling, cracking or crazing.

3.4.4 One (1) 2 x 4 ft. (0.6 x 1.2 m) sample was prepared. The components and sequence of installation were as follow

Sample No.1: APEC 324 Standing Seam Metal Roof Panels of 24 gauge (0.24 in.; 610 mm) thick base metal thickness with CERAM-A-STARR 1050 paint over the AZ50 galvalume coating mechanically secured to a 3/8 in. (9.5 mm) plywood deck.

Test Results: The test sample met Class SH hail resistance.

3.5 Comparative Tensile Pull-Out Tests (3009917)

3.5.1 Tensile pull-out tests were conducted with various fastener/supporting member (purlins and bar joist) combinations to determine the comparative performance of the fasteners in resisting pull-out from the supporting members. The results were compared and used along with the results of simulated wind uplift tests as the basis for waiving simulated wind uplift pressure testing of the alternate fastener/supporting member combinations.

3.5.1.1 Tests were conducted using a Tinius Olsen tensile machine. Each sample fastener was installed into the supporting member sample. The fastener was held in the upper stationary jaws of the tester and the supporting member sample was attached to the moving head. Force was exerted in a direct line parallel to the shank of the fastener at a crosshead speed of 2 in./min (51 mm/min) until failure occurred

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3.5.2 Nine (9) samples (three for each fastener/supporting member combination) were prepared.

3.5.3 The results (average of three) of the tensile pull-out tests were as follows:

<u>Fastener/Supporting Member</u>	<u>lbf (N)</u>
SFS Intec IMPAX 1/4- 14 x 1-1/4 Hex Washer Head (HWH) screws/0.063 in. (1.6 mm) thick steel purlins having a nominal yield strength of 50 KSI (345N/mm ²)	762 (171)
ITW Buildex 1/4- 14 x 1-1/4 Hex Washer Head (HWH) screws/0.063 in. (1.6 mm) thick steel purlins having a nominal yield strength of 50 KSI (345N/mm ²)	942 (212)
SFS Intec #12-24 x 1-1/4 Hex Washer Head (HWH) screws/1/8 in. (3.2 mm) thick steel top cord angles having a nominal yield strength of 50 KSI (345N/mm ²)	1165 (262)

3.5.4 The results (average of three) of the tensile pull-out tests indicate that the SFS Intec #12-24 x 1-1/4 Hex Washer Head (HWH) fastener may be used to secure the panel clips to the steel supporting members (bar joists) with 1/8 to 1/2 in. (3.2×13 mm) thick steel top cord angles having a nominal yield strength of 50 KSI (345N/mm²) as described in the conclusions of this report.

3.6 Drivability Tests (3009917)

3.6.1 Drivability tests were conducted with various fastener/supporting member (purlins and bar joists) combinations to determine if the fastener could penetrate the steel deck and the supporting member. The fastener was satisfactorily driven through the sheets of steel decking and steel substrates.

3.6.2 One sample (three for each fastener/supporting member combination) was prepared.

3.6.3 The results (average of three) of the drivability tests were as follows:

<u>Fastener/Supporting Member</u>	<u>Results</u>
SFS Intec #12-24 x 1-1/4 secure through 4 layers of 18 ga. (0.0474 in. [1.20 mm]) thick Gr. E steel deck/ 1/2 in. (13 mm) thick steel top cord angles having a nominal yield strength of 50 ksi (345N/mm). Total deck and substrate thickness was 0.69 in. (15.5 mm).	Satisfactory

3.7 Comparative Clip-Fastener Pull Tests (3026157)

3.7.1 Tensile pull-out tests were conducted with various clip/fastener combinations to determine the comparative performance of each clip/fastener combination pulling out of a 16 gauge purlin and 0.125 in. (3.175 mm) joist material. The results were compared and used along with the results of simulated wind uplift pressure testing in order to extend Approval to alternate fastener/clip/substrate combinations.

3.7.1.1 Tests were conducted using a Tinius Olsen tensile machine. Each sample clip was fastened into a 16 gauge purlin sample with either 3 ITW Buildex ¼ - 14 screws or 3 SFS Intec ¼ - 14 screws. Each sample clip was also fastened into the alternate 0.125 in. (3.175 mm) thick joist material with 2 SFS

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Intec #12-24 HWH fasteners. The clip was held in the upper stationary jaws of the tester and the substrate material was clamped to the lower moving head. Force was exerted in a direct line parallel to the tab of the clip at a crosshead speed of 2 in./min (51 mm/min) until failure occurred.

- 3.7.2 Eighteen (18) samples (three for each fastener/clip/substrate combination shown below) were prepared. The results (average of three) of the pull test were as follows:

<u>Sample Set No.</u>	<u>Fastener</u>	<u>Clip</u>	<u>Substrate</u>	<u>Lbf (N)</u>
1	3 ITW Buildex ¼ - 14	Std. APEC 324	16 ga. Purlin	1201.77 (5345.48)
2	3 SFS Intec ¼ - 14	Std. APEC 324	16 ga. Purlin	1207.4 (5370.53)
3	2 SFS Intec #12-24 HWH	Std. APEC 324	16 ga. Purlin	1208.81 (5376.79)
4	3 ITW Buildex ¼ - 14	8 in. APEC 324	1/8 in. joist	1174.72 (5225.14)
5	3 SFS Intec ¼ - 14	8 in. APEC 324	1/8 in. joist	1198.71 (5331.95)
6	2 SFS Intec #12-24 HWH	8 in. APEC 324	1/8 in. joist	1208.65 (5376.08)

IV MARKING

- 4.1 The manufacturer shall mark each individual roof panel (or each pallet of bundle of panels), each package of clips, and each package of screws with at least one label containing, at a minimum, the manufacturer's name and product trade name. In addition, each package or container must be marked with the Approval mark of FM Approval.
- 4.2 Markings denoting Approval by FM Approvals 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 Approval by FM Approvals. Such conditions and limitations must be included in all references to Approval by FM Approvals.

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 AllSouth Pre-Engineered Components, LLC manufacturing locations in Dothan, AL and Logansport, IN 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 document describes the APEC 216/218 and APEC 324 Standing Seam Metal Roof Systems and is filed under Project I.D 3041849.

Document	Issue or Revision	Description
Facilities and Procedures Audit Manual	March 2011	AllSouth Pre-Engineered Components Dothan, AL
Facilities and Procedures Audit Manual	March 2011	AllSouth Pre-Engineered Components Logansport, IN

IX CONCLUSIONS

- 9.1 The results indicate that the APEC 216/218 and APEC 324 Standing Seam Metal Roof Panel Systems meets the FM Approvals Standard 4471 requirements when used in the manner as stated below:
- 9.2 Constructions 9.2.1, 9.2.2 and 9.2.3 are listed from Project 3007254. Approvals are extended to include FM Approved polyisocyanurate roof insulation as shown in constructions 9.2.4, 9.2.5 and 9.2.6, based on Project 3009917. Constructions 9.2.7 thru 9.2.20 are listed from Project 3009917 and 3026157. Constructions 9.2.21 and 9.2.22 are listed from Project 1D7A7.AM.
- 9.2.1 Minimum 0.059 in. (1.50 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.5 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide panels, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 – SFS Intec or ITW Buildex 1/4-14×1-1/4 Hex Washer Head (HWH) self-drilling fasteners at each standing seam. Adjacent panels are seamed together along the side laps with an electric seaming tool with a TripleLok Seam. Meets Class 1-60.
- 9.2.2 Minimum 0.059 in. (1.50 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 4 ft (1.2 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide panels, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 – SFS Intec or ITW Buildex 1/4-14×1-1/4 Hex Washer Head (HWH) self-drilling fasteners at each standing seam. Adjacent panels are seamed together along the side laps with an electric seaming tool with a TripleLok Seam. Meets Class 1-90.
- 9.2.3 Minimum 0.059 in. [1.50 mm] steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed max 2.5 ft (0.76 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation

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(facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide panels, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 – SFS Intec or ITW Buildex 1/4-14×1-1/4 Hex Washer Head (HWH) self-drilling fasteners at each standing seam. Adjacent panels are seamed Together along the side laps with an electric seaming tool (QuadLock™ seam). Meets Class 1-105.

- 9.2.4 Minimum 0.059 in. (1.50 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.5 m) on center. Minimum 22 ga FM Approved steel (min 33 ksi [228 MPa]) deck secured to the structural steel as indicated in the listing for the steel deck for Class 60 windstorm classification. Optional 1 to 4 in. (25 to 100 mm) FM Approved polyisocyanurate roof insulation loose laid over deck. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide panels, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 – SFS Intec or ITW Buildex 1/4-14×1-1/4 Hex Washer Head (HWH) self-drilling fasteners at each standing seam. Adjacent panels are seamed together along the side laps with an electric seaming tool with a TripleLok Seam. Meets Class 1-60.
- 9.2.5 Minimum 0.059 in. (1.50 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 4 ft (1.2 m) on center. Minimum 22 ga FM Approved steel (min 33 ksi [228 MPa]) deck secured to the structural steel as indicated in the listing for the steel deck for Class 90 windstorm classification. Optional 1 to 4 in. (25 to 100 mm) FM Approved polyisocyanurate roof insulation loose laid over deck. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide panels, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 – SFS Intec or ITW Buildex 1/4-14×1-1/4 Hex Washer Head (HWH) self-drilling fasteners at each standing seam. Adjacent panels are seamed together along the side laps with an electric seaming tool with a TripleLok Seam. Meets Class 1-90.
- 9.2.6 Minimum 0.059 in. [1.50 mm] steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed max 2.5 ft (0.76 m) on center. Minimum 22 ga FM Approved steel (min 33 ksi [228 MPa]) deck secured to the structural steel as indicated in the listing for the steel deck for Class 105 windstorm classification. Optional 1 to 4 in. (25 to 100 mm) FM Approved polyisocyanurate roof insulation loose laid over deck. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide panels, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 – SFS Intec 1/4-14×1-1/4 Hex Washer Head (HWH) self drilling fasteners at each standing seam. Adjacent panels are seamed together along the side laps with an electric seaming tool (QuadLock™ seam). Meets Class 1-105.
- 9.2.7 Steel supporting members (bar joists) with 1/8 to 1/2 in. (3.2×13 mm) thick top cord thickness, Grade 50 steel having a min yield strength of 50 ksi (345 N/mm²) are maximum 5 ft (1.5 m) on center. Same roof insulation, roof panels, clips and steel deck as described in 9.2.1 or 9.2.3 above secured to each supporting member, through insulation and steel deck, if present, with 2 – SFS Intec. #12-24x1-1/4 Hex Washer Head (HWH) self-drilling fasteners per clip. Adjacent panels are seamed together along the side laps with an electric seaming tool with a TripleLok Seam. Meets Class 1-60.
- 9.2.8 Steel supporting members (bar joists) with 1/8 to 1/2 in. (3.2×13 mm) thick top cord thickness, Grade 50

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steel having a min yield strength of 50 ksi (345 N/mm²) are maximum 4 ft (1.2 m) on center. Same roof insulation, roof panels, clips and steel deck as described in 9.2.2 or 9.2.4 above secured to each supporting member, through insulation and steel deck, if present, with 2 –SFS Intec. #12-24x1-1/4 Hex Washer Head (HWH) self-drilling fasteners per clip. Adjacent panels are seamed together along the side laps with an electric seaming tool with a TripleLok Seam. Meets Class 1-90.

- 9.2.9 Minimum 0.059 in. (1.50 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.52 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 3 – ITW Buildex 1/4 – 14 screw fasteners or SFS Intec 1/4 – 14 screw fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with a TripleLok Seam. Meets Class 1-90.
- 9.2.10 Minimum 0.059 in. (1.50 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.52 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 3 – ITW Buildex 1/4 – 14 screw fasteners or SFS Intec 1/4 – 14 screw fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a QuadLok Seam. Meets Class 1-105.
- 9.2.11 Minimum 0.059 in. (1.50 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.52 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 22 ga. (0.030 in. [0.76 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 3 – ITW Buildex 1/4 – 14 screw fasteners or SFS Intec 1/4 – 14 screw fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a TripleLok Seam. Meets Class 1-120.
- 9.2.12 Minimum 0.071 in. (1.80 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.52 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Perimeter Clip and 3 – ITW Buildex 1/4 – 14 screw fasteners or SFS Intec 1/4 – 14 screw fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a Quadlok Seam. Meets Class 1-120.
- 9.2.13 Minimum 0.071 in. (1.80 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 2.5 ft (0.76 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side

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- down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Perimeter Clip and 3 – ITW Buildex 1/4 – 14 screw fasteners or SFS Intec 1/4 – 14 screw fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a QuadLok Seam. Meets Class 1-165.
- 9.2.14 Minimum 0.071 in. (1.80 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 2.5 ft (0.76 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 22 ga. (0.030 in. [0.76 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Perimeter Clip and 3 – ITW Buildex 1/4 – 14 screw fasteners or SFS Intec 1/4 – 14 screw fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a QuadLok Seam. Meets Class 1-180.
- 9.2.15 Minimum 0.125 in. (3.175 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.52 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 SFS Intec #12 – 24 HWH fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a TripleLok Seam. Meets Class 1-90.
- 9.2.16 Minimum 0.125 in. (3.175 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.52 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 SFS Intec #12 – 24 HWH fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a QuadLok Seam. Meets Class 1-105.
- 9.2.17 Minimum 0.125 in. (3.175 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.52 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 22 ga. (0.030 in. [0.76 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Panel Clip and 2 SFS Intec #12 – 24 HWH fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a TripleLok Seam. Meets Class 1-120.
- 9.2.18 Minimum 0.125 in. (3.175 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 5 ft (1.52 m) on center. Optional Thermax Insulation Board, Thermax

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Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Perimeter Clip and 2 SFS Intec #12 – 24 HWH fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a QuadLok Seam. Meets Class 1-120.

- 9.2.19 Minimum 0.125 in. (3.175 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 2.5 ft (0.76 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 24 ga. (0.0232 in. [0.59 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Perimeter Clip and 2 SFS Intec #12 – 24 HWH fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a QuadLok Seam. Meets Class 1-165.
- 9.2.20 Minimum 0.125 in. (3.175 mm) steel supporting members, Gr. 50 steel having a min yield strength of 50 ksi (345 N/mm²) installed maximum 2.5 ft (0.76 m) on center. Optional Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation (facer side down) may be loose laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 324 standing seam roof panels, 24 in. (610 mm) wide, min 22 ga. (0.030 in. [0.76 mm] thick base metal thickness) AZ55 Galvalume steel produced from Gr. 50 steel having a yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members and secured to each steel supporting member with one APEC 324 Perimeter Clip and 2 SFS Intec #12 – 24 HWH fasteners at each standing seam. Adjacent panels are crimped at each clip using a manual crimping tool. Then all seams are seamed together with an electric seaming tool with a QuadLok Seam. Meets Class 1-180.
- 9.2.21 Minimum 16 gauge (0.060 in.; 1.5 mm) base metal thickness steel supporting members having a minimum yield strength of 50 ksi (345 N/mm²) installed max 5 ft (1.5 m) o.c. Optional max 3 in. (75 mm) thick Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation board (facer side down) may be loose-laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 216/218 Standing seam roof panels, max 18 in. (455 mm) wide, min. 24 gauge (0.024 in., [0.6 mm] thick base metal thickness), AZ55 coated steel produced from Gr. 50 steel having a minimum yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members are secured with APEC 216/218 Panel Clips. The clips are secured to each supporting member with two SFS Intec or ITW Buildex ¼ - 14 x 1-1/4 – 4 in. (32 -100 mm) Hex Washer Head (HWH) self drilling fasteners per clip. Adjacent panels are seamed together with a TripleLok side lap seam. The TripleLok seam is produced with an electric seaming tool. Meets Class 1-90.
- 9.2.22 Minimum 16 gauge (0.060 in.; 1.5 mm) base metal thickness steel supporting members having a minimum yield strength of 50 ksi (345 N/mm²) installed max 2.5 ft (0.76 m) o.c. Optional max 3 in. (75 mm) thick Thermax Insulation Board, Thermax Metal Building Board, Thermax Plus Liner Board or FM Approved faced glass fiber insulation board (facer side down) may be loose-laid over steel supporting members. Bearing plates are required for rigid insulation boards. APEC 216/218 Standing Seam roof panels, max 18 in. (455 mm) wide, min. 22 gauge (0.027 in. [0.7 mm] base metal thickness), AZ55 coated steel produced from Gr. 50 steel having a minimum yield strength of 50 ksi (345 N/mm²) installed perpendicular to steel supporting members are secured with APEC 216/218 Panel Clips. The clips are secured to each supporting member with two SFS Intec or ITW Buildex ¼ -

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14 x 1-1/4 – 4 in. (32 -100 mm) Hex Washer Head (HWH) self drilling fasteners per clip. Adjacent panels are seamed together with a TripleLok side lap seam. The TripleLok seam is produced with an electric seaming tool. Meets Class 1-165.

- 9.2 AllSouth Pre-Engineered Components, LLC APEC 216/218 and APEC 324 Standing Seam Metal Roof Panel Systems meet Class 1-SH hail damage requirements.
- 9.3 AllSouth Pre-Engineered Components, LLC APEC 216/218 and APEC 324 Standing Seam Metal Roof Panel Systems meet Class 1A Fire Classification when installed at a maximum roof slope of 5 in 12 (42%)
- 9.4 Since a duly signed Master Agreement is on file for this customer, Approval is effective as of the date of this report.
- 9.5 Continued Approval will depend upon satisfactory field experience and periodic Facilities and Procedures Audits.

TESTING SUPERVISED BY:

None

PROJECT DATA RECORD:

Project I.D. # 3041849

ORIGINAL TEST DATA:

PDR for Project I.D. # 1D7A7.AM, #3007524,
#3008065, #3009917 & #3026157

REPORT BY:

REPORT REVIEWED BY:



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Phillip J. Smith, P.E.
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