



Farabaugh Engineering and Testing Inc.

Project No. T146-17

Report Date: March 22, 2017

No. Pages: 9 (inclusive)

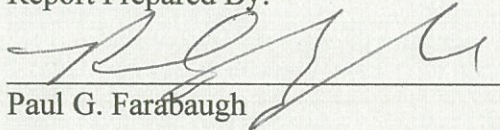
UL 580 / UL1897 UPLIFT RESISTANCE TESTING

**GEORGIA RIB ROOF PANEL
36" WIDE X 29 GA STEEL**

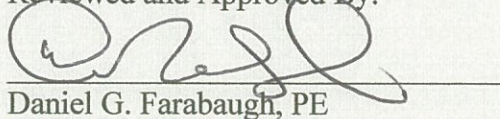
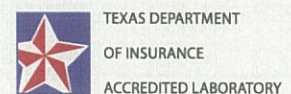
FOR

GEORGIA METALS, INC.
60 INDUSTRIAL BLVD.
NAHUNTA, GA 31553

Report Prepared By:


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Reviewed and Approved By:


Daniel G. Farabaugh, PE

Project No. T146-17

Purpose

This test method covers the evaluation of uplift resistance of roof assemblies per UL 580-06, rev. 2009 and UL 1897-04, rev. 2008 and as provided herein.

Test Specimen

Manufacturer: Georgia Metals, Inc.
60 Industrial Blvd.
Nahunta, GA 31553

Specimen: Georgia Rib Metal Roof Panel, 36" wide (Coverage), 29 ga steel

Substrate: 15/32" Plywood / Ice and Water Shield self adhesive membrane/30# Felt Paper

Testing Apparatus

Test Chamber: The test chamber consist of three sections: a top section to create a uniform vacuum, a center section in which the roof assembly is constructed, and a bottom section to create a uniform positive pressure.

Pressure Chamber: The air pressure in the pressure chamber was measured at five points. Each of four points were located 42" from chamber corners at a 45 degree angle, with the fifth tube located 18" from the center of the air inlet opening. The end of each tube was 7" above the chamber floor. The tubes were connected to a manifold that, in turn was connected to a manometer.

Vacuum Chamber Measurement: The air pressure in the vacuum chamber was measured at five points. Each of four points was located 18" from chamber corners at a 45 degree angle and 8" above the chamber floor. The fifth tube located 12" from the center of the exhaust opening and 6" below the opening. The tubes were connected to a manifold that, in turn was connected to a manometer. The pressure in the vacuum chamber was controlled by an automatic damper. The damper door was moved by means of an air motor hooked to an air line and controlled by pressure switches located in the control console. An additional pressure line from the manifold to pressure switches controlled the automatic damper.

Installation

- The 15/32" plywood was attached to the wood joist supports using 8d ring shank nails at 6" on center around the perimeter and at interior supports.
- A layer of Self Adhering Waterproof Membrane was on top of the plywood sheathing substrate.
- A layer of A layer of 30 lb felt paper was on top of the waterproof membrane.
- The metal roof panels were attached to the wood deck substrate using #10 X 1-1/2" hex head Wood Binder screws with 7/16" dia. seal washer spaced as shown on the attached drawings. The panels were attached to the perimeter of the wood deck using the same wood screws with 7/16" dia. seal washer (8 per panel at panel ends and 6" on center at longitudinal sides).
- A plastic barrier was located between the panels and the underlying substrate.

Test Procedure

- The test assembly was subjected to positive and negative pressures to form an uplift pressure at the values and time duration per UL 580 as shown in the attached table.
- Vertical movement of the assembly during the tests was recorded.
- Subsequent to the completion of Phase 5 of the Class 90 test sequence, the test specimen was subjected to higher static uplift pressures per UL 1897 as shown on the attached table. The positive uplift pressure supplied from below was maintained at 48.5 psf while the negative uplift pressure supplied from above was increased in increments until failure or the desired uplift pressure was obtained.

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TEST #1
UL 580 UPLIFT TEST

Test Date: 3/7/17

Test Specimen: Georgia Rib Metal Roof Panel, 36" wide X 29 ga
Panel to Plywood Fastener Spacing: 1'-6"oc.

Class 30 Deflection Measurements

Phase	Time Duration (min.)	Negative Pressure (psf)	Positive Pressure (psf)	#1 (in)	#2 (in)	#3 (in)	#4 (in)
Initial	0	0	0	8	8-1/4	6-9/16	7-11/16
1	5	16.2	0	7-15/16	8	6-1/2	7-1/2
2	5	16.2	13.8	7-15/16	7-13/16	6-1/2	7-5/16
3	60	8.1 – 27.7*	13.8	7-7/8	7-11/16	6-7/16	7-3/16
4	5	24.2	0	7-15/16	7-13/16	6-1/2	7-5/16
5	5	24.2	20.8	7-7/8	7-5/8	6-5/16	7-1/8

Class 60 Deflection Measurements

Phase	Time Duration (min.)	Negative Pressure (psf)	Positive Pressure (psf)	#1 (in)	#2 (in)	#3 (in)	#4 (in)
1	5	32.3	0	7-7/8	7-11/16	6-7/16	7-3/16
2	5	32.3	27.7	7-13/16	7-1/2	6-3/8	7
3	60	16.2 – 55.4*	27.7	7-3/4	7-5/16	6-5/16	6-13/16
4	5	40.4	0	7-13/16	7-1/2	6-3/8	7
5	5	40.4	34.6	7-3/4	7-5/16	6-5/16	6-13/16

Class 90 Deflection Measurements

Phase	Time Duration (min.)	Negative Pressure (psf)	Positive Pressure (psf)	#1 (in)	#2 (in)	#3 (in)	#4 (in)
1	5	48.5	0	7-3/4	7-7/16	6-3/8	6-15/16
2	5	48.5	41.5	7-11/16	7-3/16	6-1/4	6-11/16
3	60	24.2 – 48.5*	41.5	7-11/16	7-3/8	6-1/4	6-11/16
4	5	56.5	0	7-3/4	7-5/16	6-3/8	6-7/8
5	5	56.5	48.5	7-9/16	7	6-3/16	6-9/16

* Oscillation frequency as specified in UL 580.

Results: Upon completion of the above loading, there were no specimen failures.

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TEST #1 (cont.)

UL 1897 UPLIFT TEST

Test Date: 3/7/17

Test Specimen: Georgia Rib Metal Roof Panel, 36" wide X 29 ga

Panel to Plywood Fastener Spacing: 1'-6"oc.

Deflection Measurements

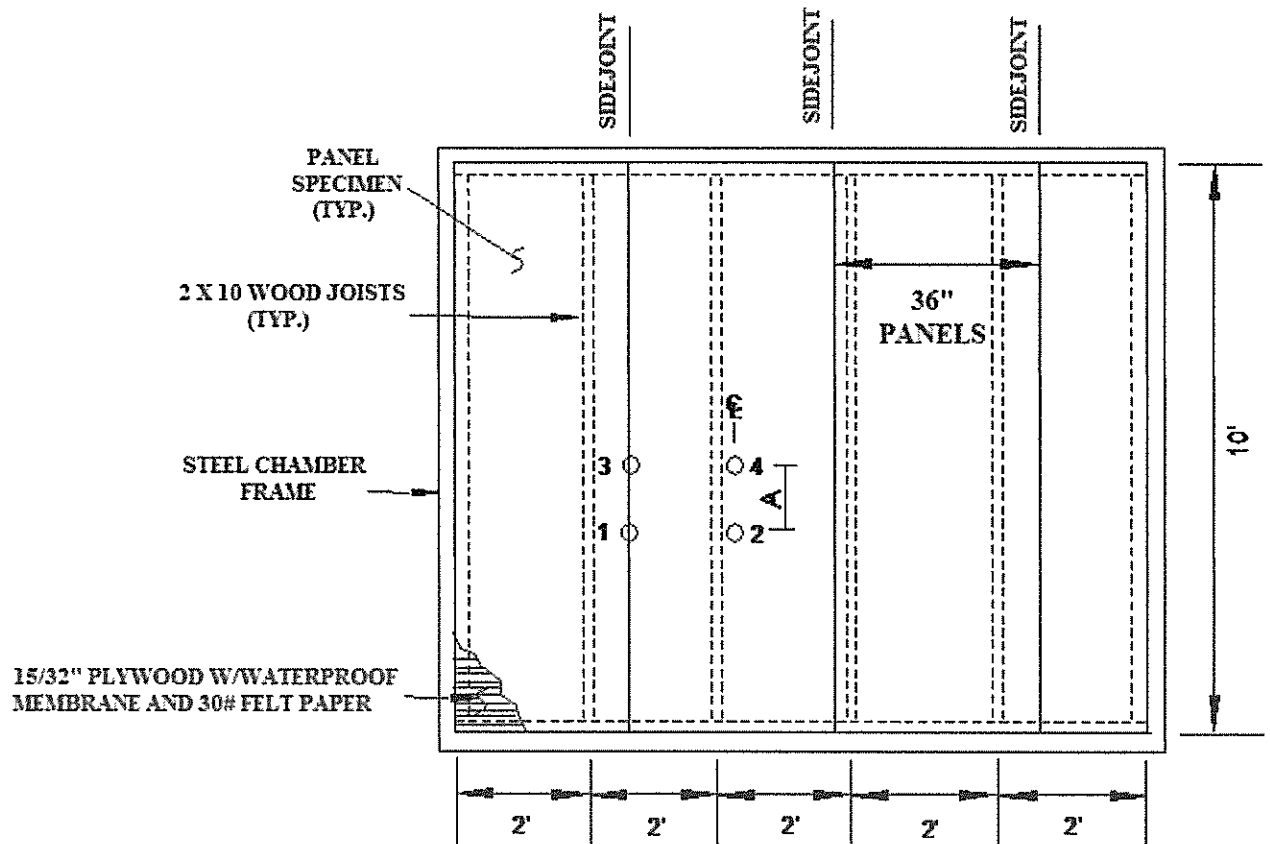
Total Uplift Pressure (psf)	Time Duration (min.)	#1 (in)	#2 (in)	#3 (in)	#4 (in)
0	-	7-7/8	8-7/16	7-1/2	8-1/8
112	1	7-1/2	7-1/4	7-1/8	7-1/16
127	1	7-7/16	7-1/8	7-1/8	7

Results:

Maximum Total Uplift Pressure (sustained for 1 min.) = 127 psf

Maximum Total Uplift Test Pressure = 142.1 psf (Panel to plywood fasteners pulled out of plywood substrate.)

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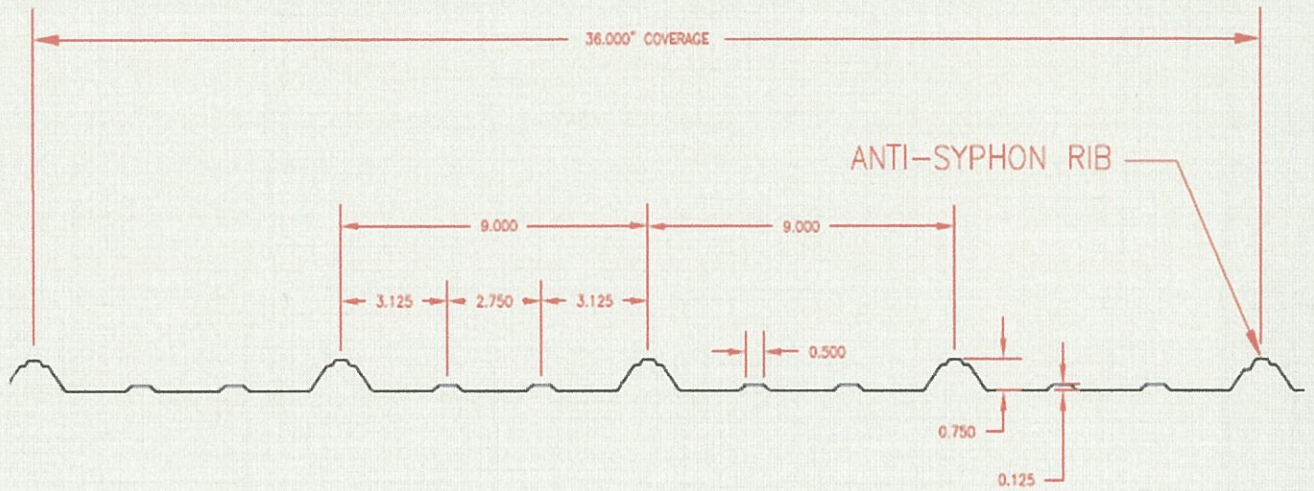


PLAN VIEW

NOTE: DEFLECTION POINT 1
AT FASTENER
A = FASTENER SPACING/2

○ - DEFLECTION POINT

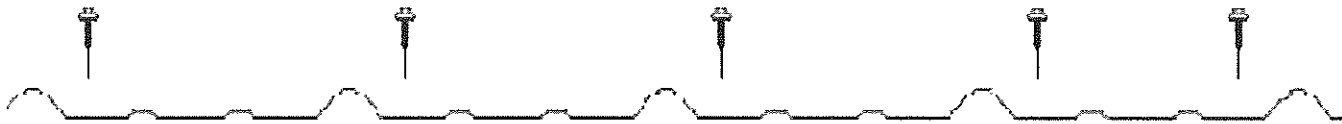
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PANEL DETAIL



FASTENING DETAIL AT
FIXED END SUPPORT



FASTENING DETAIL AT
INTERIOR SUPPORTS

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TENSILE TEST REPORT

Client: Georgia Metals, Inc.
60 Industrial Blvd.
Nahunta, GA 31553

Test Date: March 22, 2017

Test Method: ASTM A370-10

Material Description: Georgia Rib Roof Panel, 36" wide, 29 ga. steel

Sample No.	Width (in)	Thickness (in)	Yield Load (lb)	Max. Load (lb)	0.2% Offset Yield Strength (psi)	Tensile Strength (psi)	Elongation (% in 2 inches)
0047-17	0.506	0.014	785.5	817.1	110,881	115,342	1.17

Equipment Used: Tensile Machine #QT7-061196-020
Caliper #1074379
Extensometer #10311744D
Micrometer #110596927