



Farabaugh Engineering and Testing Inc.

Project No. T215-19

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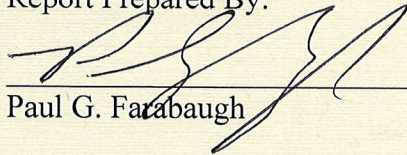
UL 580 / UL1897 UPLIFT RESISTANCE TESTING

MASTERRIB ROOF PANEL 36" WIDE X 29 GA STEEL

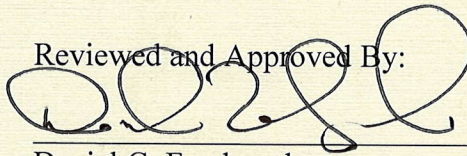
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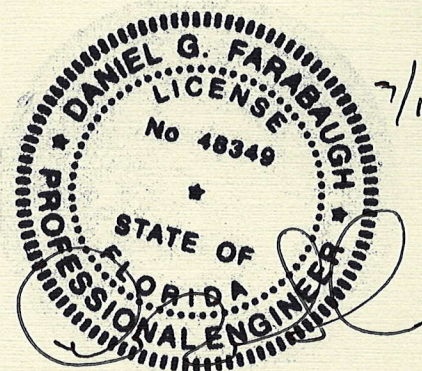
SMITH BUILT
6945 ALBANY HIGHWAY
DAWSON, GA. 39842

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Purpose

This test method covers the evaluation of uplift resistance of roof assemblies per UL 580-06, rev. 2009 and UL 1897-12 and as provided herein.

Test Specimen

Manufacturer: Smith Built
6945 Albany Highway
Dawson, GA. 39842

Specimen: MasterRib Roof Panel, 36" wide (Coverage), 29 ga steel

Substrate: 15/32" Plywood and 1x4 #2 SYP purlins at @ 2'-0" o.c.

Testing Apparatus

Test Chamber: The test chamber consisted 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 2x10 wood joist supports spaced @ 2'-0" using 8d ring shank nails at 6" on center around the perimeter and at interior supports
- On top of the plywood was 1x4 purlins that were attached to the plywood with 8d ring shank nails located at 4" o.c. spacing with a staggered pattern. The purlins were located at 2'-0" on.c The metal roof panels were then attached to the purlins using #9-15 X 1-1/2" HWH sharp point with 1/2" diameter steel seal washer as shown on the fastener pattern attached drawing . The outer perimeter of the assembly was secured with perimeter fastening as required to maintain a periphery seal.
- 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: 7/1/19

Test Specimen: MasterRib Roof Panel, 36" wide X 29 ga steel
Panel fasteners at 1 x 4 purlins spaced at 2'-0" o.c.

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	6	6-11/16	6	6-7/8
1	5	16.2	0	5-15/16	6-9/16	5-15/16	6-5/8
2	5	16.2	13.8	5-7/8	6-3/8	5-7/8	6-3/8
3	60	8.1 – 27.7*	13.8	5-13/16	6-3/16	5-13/16	6-1/4
4	5	24.2	0	5-7/8	6-3/8	5-7/8	6-3/8
5	5	24.2	20.8	5-3/4	6-3/16	5-3/4	6-3/16

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	5-13/16	6-1/4	5-3/4	6-3/16
2	5	32.3	27.7	5-11/16	6	5-11/16	6
3	60	16.2 – 55.4*	27.7	5-9/16	5-13/16	5-1/2	5-13/16
4	5	40.4	0	5-5/8	6	5-9/16	6
5	5	40.4	34.6	5-9/16	5-13/16	5-1/2	5-13/16

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	5-9/16	5-15/16	5-1/2	5-15/16
2	5	48.5	41.5	5-7/16	5-11/16	5-3/8	5-11/16
3	60	24.2 – 48.5*	41.5	5-7/16	5-11/16	5-3/8	5-11/16
4	5	56.5	0	5-9/16	5-7/8	5-1/2	5-7/8
5	5	56.5	48.5	5-5/16	5-1/2	5-3/16	5-1/2

* 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: 7/1/19

Test Specimen: MasterRib Roof Panel, 36" wide X 29 ga steel

Panel fasteners at 1 x 4 purlins spaced at 2'-0" o.c.

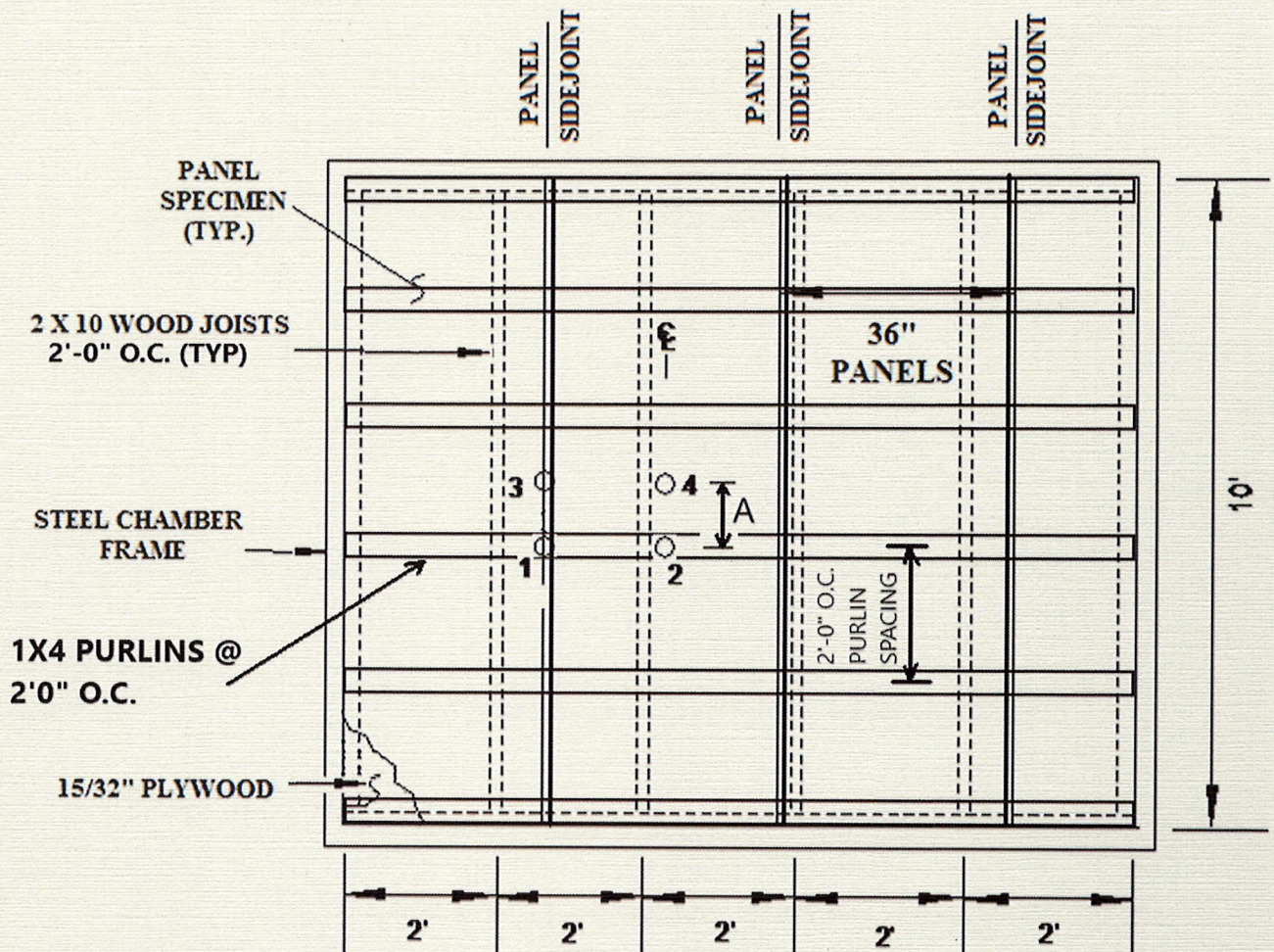
Deflection Measurements

Total Uplift Pressure (psf)	Time Duration (min.)	#1 (in)	#2 (in)	#3 (in)	#4 (in)
112	1	5-1/4	5-1/2	5	5-7/16
127	1	5-1/16	5-3/8	4-7/8	5-5/16
142	1	5	5-5/16	4-3/4	5-1/4
157	1	4-7/8	5-1/4	4-5/8	5-1/16

Results:

Maximum Total Uplift Pressure (sustained for 1 min.) = 157 psf

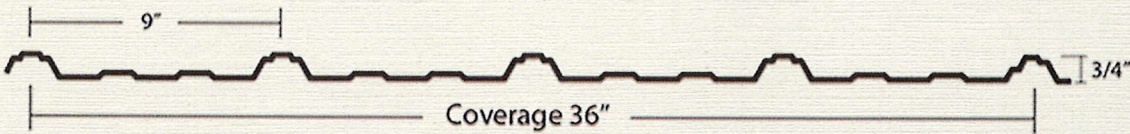
Maximum Total Uplift Test Pressure = 157.3 psf (Panel lap disengagement.)



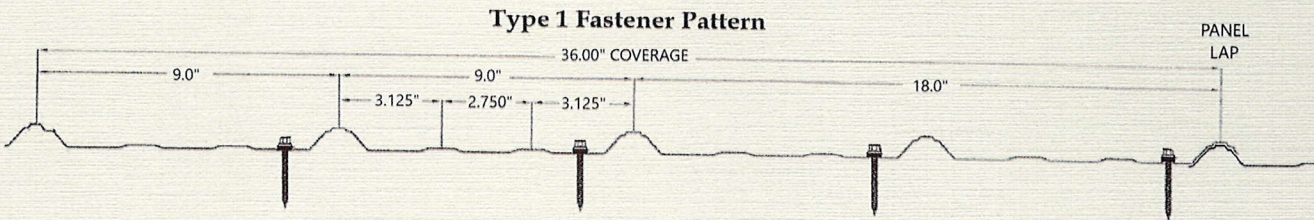
**NOTE: DEFLECTION POINT 1
AT FASTENER
A = FASTENER SPACING/2**

PLAN VIEW

○ - DEFLECTION POINT



PANEL DETAIL



FASTENING DETAIL AT
PURLIN SUPPORTS @ 2'0" O.C.

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TENSILE TEST REPORT

Client: Smith Built
6945 Albany Highway
Dawson, GA. 39842

Test Date: July 15, 2019

Test Method: ASTM A370-10

Material Description: MasterRib 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)
19060	0.504	0.014	710.4	725.0	100,680	102,755	0.85

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