

SHEFFIELD METALS TEST REPORT

SCOPE OF WORK

UL 580 UPLIFT RESISTANCE TESTING OF 24 GA STEEL 1.5" MECHANICAL SEAM ROOF PANELS
OVER 3-PLY PLYWOOD

REPORT NUMBER

N5466.03-450-44 R0

TEST DATE(S)

05/27/22

ISSUE DATE

09/14/22

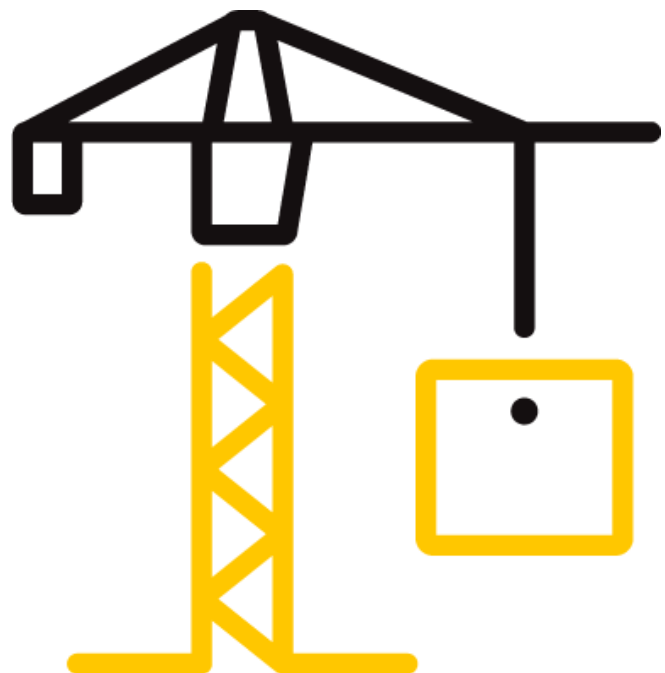
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RT-R-AMER-Test-2958 (07/16/21)

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TEST REPORT FOR SHEFFIELD METALS

Report No.: N5466.03-450-44 R0

Date: 09/14/22

REPORT ISSUED TO

SHEFFIELD METALS

5467 Evergreen Parkway
Sheffield Village, OH 44054

SECTION 1

SCOPE

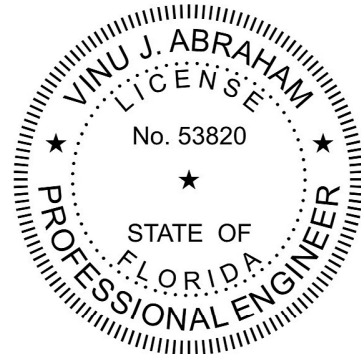
Architectural Testing, Inc. (an Intertek company), dba Intertek Building & Construction (B&C) was contracted by Sheffield Metals to perform testing in accordance with UL 580, *Standard for Safety, Tests for Uplift Resistance of Roof Assemblies*, on their 24 Ga Steel 1.5" Mechanical Seam Roof Panels. Results obtained are tested values and were secured by using the designated test method(s). Uplift testing was conducted at the Intertek B&C test facility in West Palm Beach, FL. Tensile testing was conducted at Intertek B&C test facility in York, PA.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends four years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period. Unless differently required, Intertek reports apply the "Simple Acceptance" rule, also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.


SECTION 2


SUMMARY OF TEST RESULTS

Product Type: Metal Roof Panels
Series/Model: 1.5" Mechanical Seam
Ultimate Test Load Achieved: -142.0 psf



For INTERTEK B&C:

COMPLETED BY:	Melissa Nuttall
TITLE:	Project Manager
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DATE:	09/14/22

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DATE:	09/14/22

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SECTION 3

TEST METHOD(S)

The specimens were evaluated in accordance with the following:

UL 580, *Standard for Safety, Tests for Uplift Resistance of Roof Assemblies*, Underwriters Laboratories, Inc. (Fifth Edition November 2, 2006, revised through July 9, 2009).

ASTM A370-21, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

The specimens were evaluated in general accordance with the following:

UL 1897, *Uplift Tests for Roof Covering Systems*, Underwriters Laboratories, Inc. (Seventh Edition September 23, 2015).

SECTION 4

MATERIAL SOURCE/INSTALLATION

Test specimens were provided by the client. Representative samples of the test specimen(s) will be retained by Intertek B&C for a minimum of four years from the test completion date.

Installation of the tested product was performed by the client.

SECTION 5

EQUIPMENT

Cycling and Static Load Mechanism: Computer controlled centrifugal blowers with electronic pressure measuring device.

Deflection Measuring Device: Linear Transducers

SECTION 6

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Veron Wickham	Intertek B&C

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TEST PROCEDURE

This test evaluates the comparative resistance of roof assemblies to positive and negative pressures by simulating the effects of wind gusts by use of oscillating exterior pressure and constant interior pressures. One assembly was tested per UL 580 at each class rating. (Reference Chart No. 1 for test pressures and load durations.) The measurements were taken via linear transducers.

TEST PHASE	DURATION minutes	NEGATIVE PRESSURE		POSITIVE PRESSURE	
		POUNDS PER SQUARE FOOT psf (kPa)	INCHES OF WATER inches (mm)	POUNDS PER SQUARE FOOT psf (kPa)	INCHES OF WATER inches (mm)
Class 30					
1	5	16.2 (0.79)	3.1 (79)	0.0 (0.00)	0.0 (0)
2	5	16.2 (0.79)	3.1 (79)	13.8 (0.66)	2.7 (69)
3	60	8.1 - 27.7 (0.39 - 1.33)	1.5 - 5.3 (38 - 135)	13.8 (0.66)	2.7 (69)
4	5	24.2 (1.16)	4.7 (119)	0.0 (0.00)	0.0 (0)
5	5	24.2 (1.16)	4.7 (119)	20.8 (1.00)	4.0 (102)
Class 60					
1	5	32.3 (1.55)	6.2 (157)	0.0 (0.00)	0.0 (0)
2	5	32.3 (1.55)	6.2 (157)	27.7 (1.33)	5.3 (135)
3	60	16.2 - 55.4 (0.79 - 2.66)	3.1 - 10.7 (79 - 272)	27.7 (1.33)	5.3 (135)
4	5	40.4 (1.94)	7.8 (198)	0.0 (0.00)	0.0 (0)
5	5	40.4 (1.94)	7.8 (198)	34.6 (1.66)	6.7 (170)
Class 90 (maximum combined uplift pressure of 105 psf)					
1	5	48.5 (2.33)	9.3 (236)	0.0 (0.00)	0.0 (0)
2	5	48.5 (2.33)	9.3 (236)	41.5 (1.99)	8.0 (203)
3	60	24.2 - 48.5 (1.16 - 2.33)	4.7 - 9.3 (119 - 236)	41.5 (1.99)	8.0 (203)
4	5	56.5 (2.71)	10.9 (277)	0.0 (0.00)	0.0 (0)
5	5	56.5 (2.71)	10.9 (277)	48.5 (2.33)	9.3 (236)

**Chart No. 1
UL 580 Load Table Test Pressures**

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SECTION 8

TEST SPECIMEN DESCRIPTION

Product Type: Metal Roof Panels

Series/Model: 1.5" Mechanical Seam

Product Size:

OVERALL AREA:	WIDTH		HEIGHT	
	millimeters	inches	millimeters	inches
9.3 m ² (100.0 ft ²)				
Overall Size	3048	120	3048	120
Panel Size	406	16	3048	120

Test Deck Construction:

The 10' 0" wide by 10' 0" long by 1' 3" deep test frame was fabricated from C15 by 33.9 steel channels. The test frame utilized six joists constructed from Southern Yellow Pine 2 x 12 lumber located on two sides of the test frame and spaced 24" on center. The joists were secured to the test frame using two 1/2" x 3" long bolts with washers and nuts through an 8" long, 2" by 4" by 1/8" steel angle with pre-drilled fastener locations. The steel angles were welded to the test frame 24" on center. Southern Yellow Pine 2 x 12 lumber was utilized as cross members. The cross members were located at the midspan of the joists and secured to the joists using two #8 X 3" long Torx flat head screws at each end. 1/2" (15/32" min) thick 3-ply plywood sheathing was utilized on the top of the test deck. The plywood was secured using 8d coated ring shank nails spaced 6" on center.

Roof System:

COMPONENTS	DETAILS	ATTACHMENT METHOD
30# Asphalt saturated organic felt paper	A single layer was used with a 5" overlap between adjacent sheets.	The felt was secured with #10 x 1" pancake head screws with 32 Ga tin caps at each corner.
Clip	The 1-5/8" high x 2" long were constructed from 24 Ga galvanized steel.	The clips were spaced 18" on center and attached using two #10 x 1" pancake head screws.
1-1/2" 90° Mechanical Seam Panels	The panels were constructed from 24 Ga steel and had a 16" coverage width. Six full and two partial width panels were tested.	The male leg of the panels were secured with clips spaced 18" on center. The female leg of the panels was placed over the male leg of the panel and mechanically seamed 90°. The perimeter was secured with #10 x 1" pancake head screws spaced 2" on center. One of same screws was used 1" from each end of the panels through the seams.

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SECTION 9

UPLIFT TEST RESULTS

The temperature during testing was 87°F. The results are tabulated as follows.

TEST TITLE	OBSERVATIONS	DEFLECTION MEASUREMENTS	RESULTS
Class 30, Phases 1-5	No visible damage to system	Reference Table No. 1	PASSED
Class 60, Phases 1-5	No visible damage to system	Reference Table No. 1	PASSED
Class 90, Phases 1-5	No visible damage to system	Reference Table No. 1	PASSED
Supplemental Loads -112 psf to -142 psf	No visible damage to system	Reference Table No. 2	PASSED
Supplemental Loads -152 psf	Fastener pulled out of ply	Reference Table No. 2	FAILED

Notes:

Reference Chart No. 1 for test pressures and load durations.

Reference Sketch No. 1 for location of deflection measurement devices.

A loose fitting, pleated 2-mil plastic film was utilized to assist in obtaining uniform pressure on the roof system. The plastic film was located between the moisture barrier and the roof panels to facilitate testing. In our opinion, this did not influence test results.

Supplemental loads per UL 1897 started at -112 psf total load.

SECTION 10

TENSILE TEST RESULTS

The test specimens were evaluated in accordance with the most recent revision of ASTM A370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*. The tensile coupons were machined from the metal members to the dimensions of the sheet-type 0.5" wide specimen given in Figure 3 of ASTM A370.

Test Method:	ASTM A370		
Orientation:	Longitudinal		
Specimen No.	Yield Strength @ 0.2% Offset (ksi)	Tensile Strength (ksi)	Elongation in 2" (%)
1	55.8	58.4	16.0
2	53.5	56.3	22.6
3	56.1	59.2	21.8
Average	55.1	58.0	20.1

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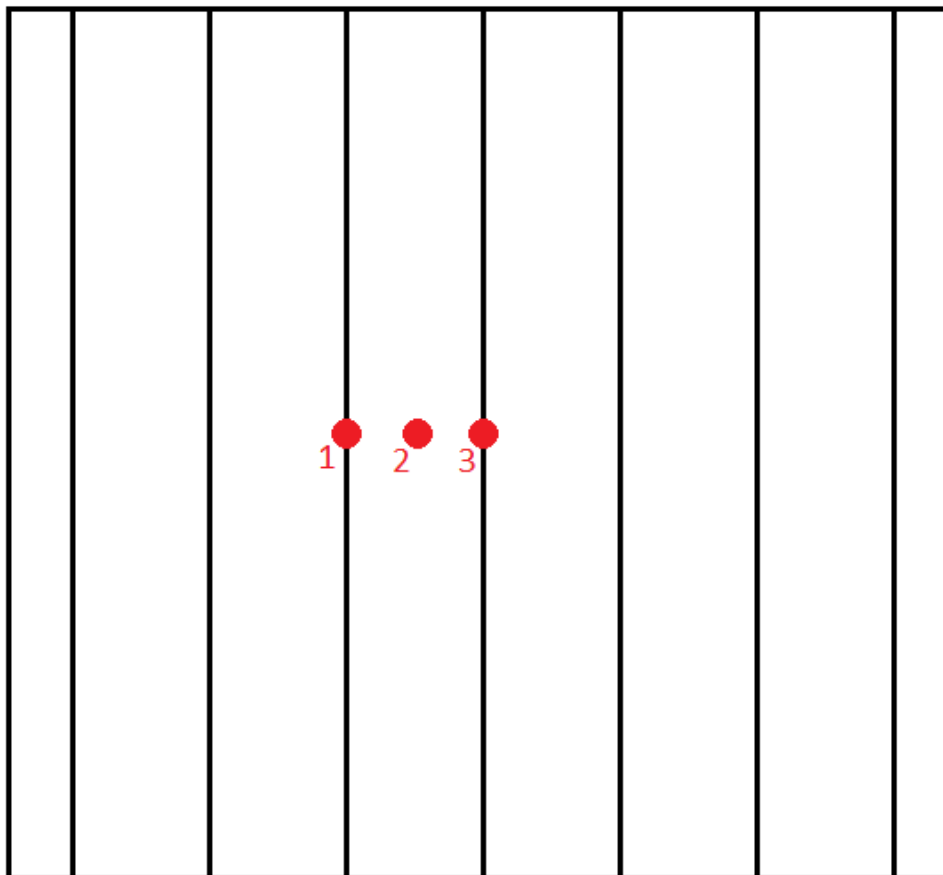
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SECTION 11 CONCLUSION

The product tested per UL 580 and UL 1897 achieved an ultimate test load of -142.0 psf.

SECTION 12 SKETCH(ES)



Sketch No. 1
Deflection Measurement Device Locations

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SECTION 13

TABLES

CLASS	PHASE	DEFLECTION MEASUREMENTS (inches)		
		INDICATOR		
		#1	#2	#3
30	1	0.07	0.73	0.11
	2	0.16	1.17	0.18
	3 Minimum	0.15	1.10	0.19
	3 Maximum	0.20	1.32	0.23
	4	0.15	1.07	0.17
	5	0.24	1.48	0.25
	Final (0.0 psf)	0.05	0.05	0.05
60	1	0.20	1.28	0.22
	2	0.33	1.76	0.34
	3 Minimum	0.35	1.76	0.39
	3 Maximum	0.44	2.00	0.44
	4	0.32	1.58	0.34
	5	0.46	2.04	0.45
	Final (0.0 psf)	0.11	0.12	0.11
90	1	0.37	1.73	0.36
	2	0.52	2.22	0.52
	3 Minimum	0.49	2.12	0.50
	3 Maximum	0.52	2.20	0.53
	4	0.43	1.91	0.42
	5	0.60	2.43	0.61
	Final (0.0 psf)	0.15	0.15	0.16

Table No. 1
Deflection Measurements

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VACUUM (psf)	UPLIFT (psf)	LOAD (psf)	SUPPLEMENTAL DEFLECTION MEASUREMENTS (inches)		
			INDICATOR		
			#1	#2	#3
-63.5	-48.5	-112.0	0.65	2.59	0.68
-72.5	-48.5	-122.0	0.68	2.73	0.77
-83.5	-48.5	-132.0	0.73	2.90	0.85
-93.5	-48.5	-142.0	0.77	3.02	0.93
-103.5	-48.5	-152.0	Failed		

Table No. 2
Supplemental Deflection Measurements

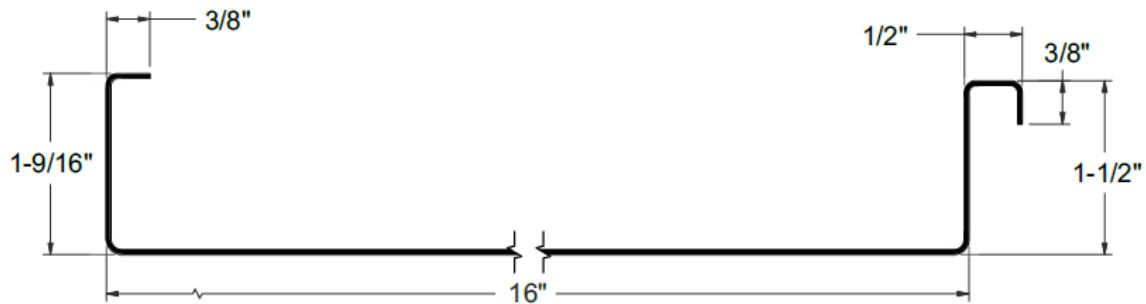
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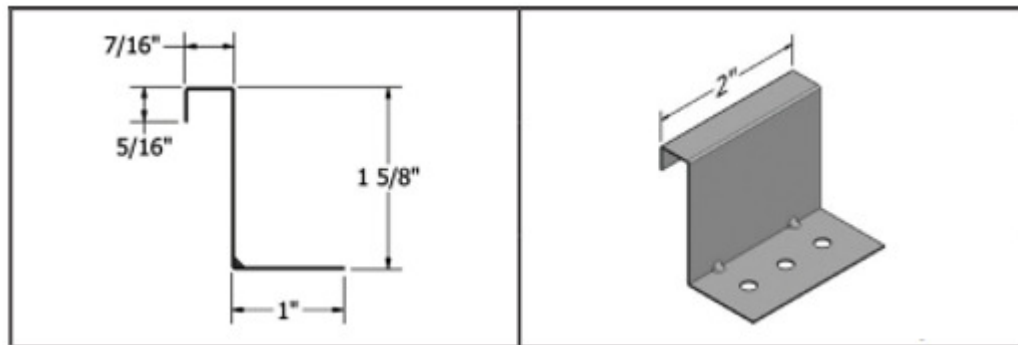
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SECTION 14 DRAWINGS

The test specimen drawings have been reviewed by Intertek B&C and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.



Drawing No. 1
Panel Profile



Drawing No. 2
Clip Details



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SECTION 15

REVISION LOG

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