



CONSTRUCTION MATERIALS

TECHNOLOGIES

LABORATORY TEST REPORT

Report for: Sheffield Metals International
5467 Evergreen Parkway
Sheffield Village, OH 44054

Attention: Adam Mazzella

Product Names:	SMI 2.0 Mechanical Seam Standing Seam	Manufacturer:	Sheffield Metals International
Project No.:	SHMI-002-02-02	Source:	Sheffield Metals International
Date Received:	Nov. 14, 2017	Date Tested:	Jan. 9 & 13, 2018

Purpose: Determine the uplift resistance of SMI 2.0 Mechanical Seam Standing Seam panels in accordance with **UL 580-06 Test for Uplift Resistance of Roof Assemblies** and **UL 1897-04 & -12 Uplift Tests for Roof Covering Systems**.

Test Methods: Testing was completed as described in UL 580-06 *Test for Uplift Resistance of Roof Assemblies* and UL 1897-04 & -12 *Uplift Tests for Roof Covering Systems*. Specimens were tested to the loading schedule as described in UL 580, and where applicable, incrementally loaded in accordance with UL 1897 until failure.

Sampling: SMI 2.0 Mechanical Seam Standing Seam panels, clips and fasteners were supplied by Sheffield Metals International. All other materials were provided by PRI Construction Materials Technologies LLC and purchased through local distribution.

Panel Description: SMI 2.0" MS: Min. 0.038" 3105 H22 aluminum alloy ($F_y = 17.6$ ksi) preformed, 180° mechanical standing seam panels; 16" wide installed coverage; Profile drawing is contained in Appendix B.

Clips: Two-piece galvanized steel clip; 2.5" long x 22 ga. expansion top; 6" long x 18 ga. base. Clip drawing is contained in Appendix B.

SHMI-002-02-02.2

PRI-CMT Accreditations: AAMA; CRRC; IAS; LA-DBS; Miami-Dade; State of Florida; UL

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Deck Descriptions: Insulation: 1" thick polyisocyanurate board, loose-laid over deck
(Specimen 1 only)

Deck: 22 ga. Type B steel deck attached to ASTM A36 structural steel supports (0.25" thick top flange) spaced 5-ft o.c. with #12-24 HWH, DP5 screws at each flute. Deck laps stitched 18" o.c. with 1/4" x 7/8" HWH screws

Specimen Sealing: Polyethylene film placed under the metal roof panels; tape¹

¹It is the judgment of the test engineer that the film and tape used to seal the specimen against air leakage did not influence the results of the test.

Results:

Test data are contained in Appendix A. Installation details are shown in Appendix B. Photographs of specimens after testing are contained in Appendix C.

Table 1. Summary of Test Results

Specimen No.	Panel	Attachment	Passing Uplift Pressure (psf)	Failure Mode
1	SMI 2.0 Mechanical Seam Standing Seam	Clips and bering plates spaced 18" o.c and secured to deck with two (2) #14-13 x 3" PH, DP1 screws per clip. Perimeter secured 6" o.c. with #14-13 x 3" PH, DP1 screws.	150	Clip Failure
2	SMI 2.0 Mechanical Seam Standing Seam	Clips spaced 18" o.c and secured to deck with two (2) #14-13 x 3" PH, DP1 screws per clip. Perimeter secured 6" o.c. with #14-13 x 3" PH, DP1 screws.	150	Clip Failure

Classification:

Specimen No. 1 and No. 2 installed as described herein meets **Class 90** requirements.

SHMI-002-02-02.2

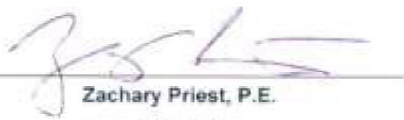
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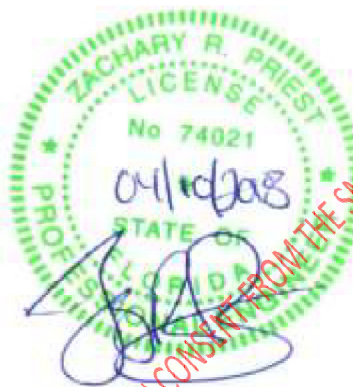
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Statement of Attestation:

Testing was conducted in accordance with **UL 580-06 Test for Uplift Resistance of Roof Assemblies** and **UL 1897-04 & -12 Uplift Tests for Roof Covering Systems**. The test results and interpretations presented herein are representative of the materials supplied by the client.

Signed: _____


Zachary Priest, P.E.
Director



Report Issue History:

Issue #	Date	Pages	Revision Description (if applicable)
Original	02/12/2018	10	NA
Rev 1	03/06/2018	10	Updated data tables
Rev 2	04/10/2018	10	Updated clip information

SHMI-002-02-02.2

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Specimen No. 1 (UL 580 Load Schedule)

Class 30 Loading Sequence (UL 580)								
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result	
			1	2	3	4		
5	0.0	16.2	0.153	0.078	0.085	0.330	PASS	
5	13.8	16.2	0.511	0.295	0.343	0.809	PASS	
60	13.8	8.1-27.7 ¹	0.674	0.496	0.459	0.844	PASS	
5	0.0	24.2	0.610	0.412	0.386	0.797	PASS	
5	20.8	24.2	0.984	0.623	0.647	1.258	PASS	
		Permanent Set	0.353	0.361	0.277	0.444	PASS	
Class 60 Loading Sequence (UL 580)								
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result	
			1	2	3	4		
5	0.0	32.3	0.794	0.526	0.525	1.029	PASS	
5	27.7	32.3	1.218	0.725	0.790	1.515	PASS	
60	27.7	16.2-55.4 ¹	1.323	0.748	0.806	1.349	PASS	
5	0.0	40.4	1.153	0.704	0.765	1.275	PASS	
5	34.6	40.4	1.480	0.849	0.985	1.659	PASS	
		Permanent Set	0.401	0.392	0.292	0.460	PASS	
Class 90 Loading Sequence (UL 580)								
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result	
			1	2	3	4		
5	0.0	48.5	1.173	0.712	0.773	1.314	PASS	
5	41.5	48.5	1.501	0.908	1.082	1.668	PASS	
60	41.5	24.2-48.5 ¹	1.309	0.833	1.002	1.504	PASS	
5	0.0	56.5	1.233	0.795	0.952	1.429	PASS	
5	48.5	56.5	1.501	0.959	1.112	1.669	PASS	
		Permanent Set	0.435	0.454	0.307	0.485	PASS	
Notes: 1) Oscillation frequency is 10±2 sec per cycle								

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Specimen No. 1 (UL 1897 Load Schedule)

Ultimate Loading Sequence (UL 1897)						
Duration (min)	Combine Test Pressure (psf)	Max Deflection Under Load (in.)				Result
		1	2	3	4	
1	120	1.498	1.093	1.332	1.669	PASS
1	135	1.558	1.341	1.577	1.715	PASS
1	150	1.622	1.443	1.636	1.78	PASS
1	165					FAIL AT 0 SEC

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Specimen No. 2 (UL 580 Load Schedule)

Class 30 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)		Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	16.2	0.148	0.088	0.078	0.164	PASS
5	13.8	16.2	0.384	0.299	0.223	0.629	PASS
60	13.8	8.1-27.7 ¹	0.542	0.421	0.407	0.707	PASS
5	0.0	24.2	0.494	0.330	0.401	0.640	PASS
5	20.8	24.2	0.815	0.516	0.620	0.968	PASS
Permanent Set			0.379	0.250	0.345	0.328	PASS
Class 60 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	32.3	0.723	0.444	0.603	0.867	PASS
5	27.7	32.3	1.135	0.638	0.819	1.401	PASS
60	27.7	16.2-55.4 ¹	1.213	0.704	0.874	1.406	PASS
5	0.0	40.4	1.075	0.628	0.800	1.134	PASS
5	34.6	40.4	1.384	0.815	0.999	1.620	PASS
Permanent Set			0.426	0.287	0.377	0.439	PASS
Class 90 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.)				Result
			1	2	3	4	
5	0.0	48.5	1.112	0.652	0.837	1.268	PASS
5	41.5	48.5	1.449	0.884	1.089	1.676	PASS
60	41.5	24.2-48.5 ¹	1.477	0.924	1.163	1.692	PASS
5	0.0	56.5	1.318	0.759	0.919	1.374	PASS
5	48.5	56.5	1.698	1.047	1.208	1.799	PASS
Permanent Set			0.449	0.306	0.435	0.646	PASS
Notes: 1) Oscillation frequency is 10±2 sec per cycle							

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Specimen No. 2 (UL 1897 Load Schedule)

Ultimate Loading Sequence (UL 1897)						
Duration (min)	Combine Test Pressure (psf)	Max Deflection Under Load (in.)				Result
		1	2	3	4	
1	120	1.753	1.27	1.288	1.827	PASS
1	135	1.808	1.43	1.39	1.864	PASS
1	150	1.863	1.581	1.485	1.912	PASS
1	165					FAIL AT 9 SEC

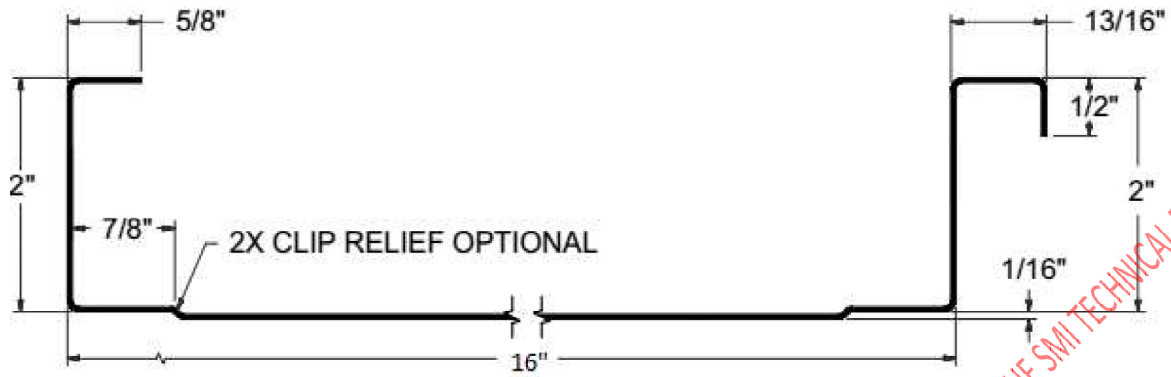
ASTM E 8 Tensile Properties for SMI 2.0" Mechanical Seam Standing Seam

Specimen	Width (in)	Thickness (in)	Gage Length (in)	Yield Strength (ksi)	Tensile Strength (ksi)	Elongation at Break (%)
1	0.476	0.040	2	18.7	24.5	13.9
2	0.476	0.041	2	19.5	24.0	14.0
3	0.475	0.041	2	19.5	23.8	13.2
5	0.475	0.043	2	17.6	19.6	13.1
Average				18.8	23.9	13.5
St.Dev.				0.9	2.8	0.4

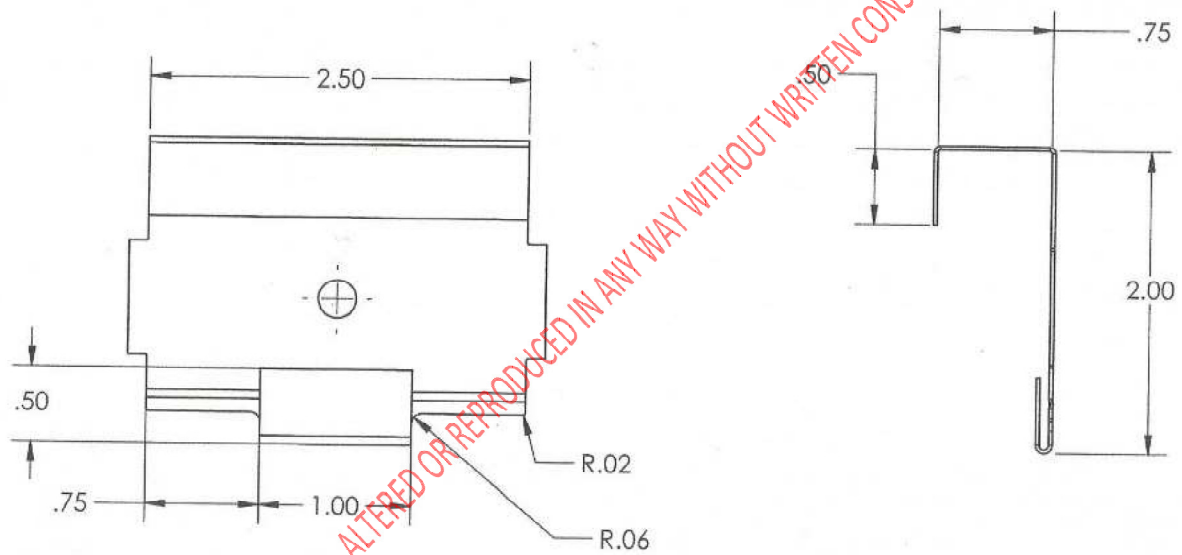
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SMI 2.0 Mechanical Seam Standing Seam Panel Profile

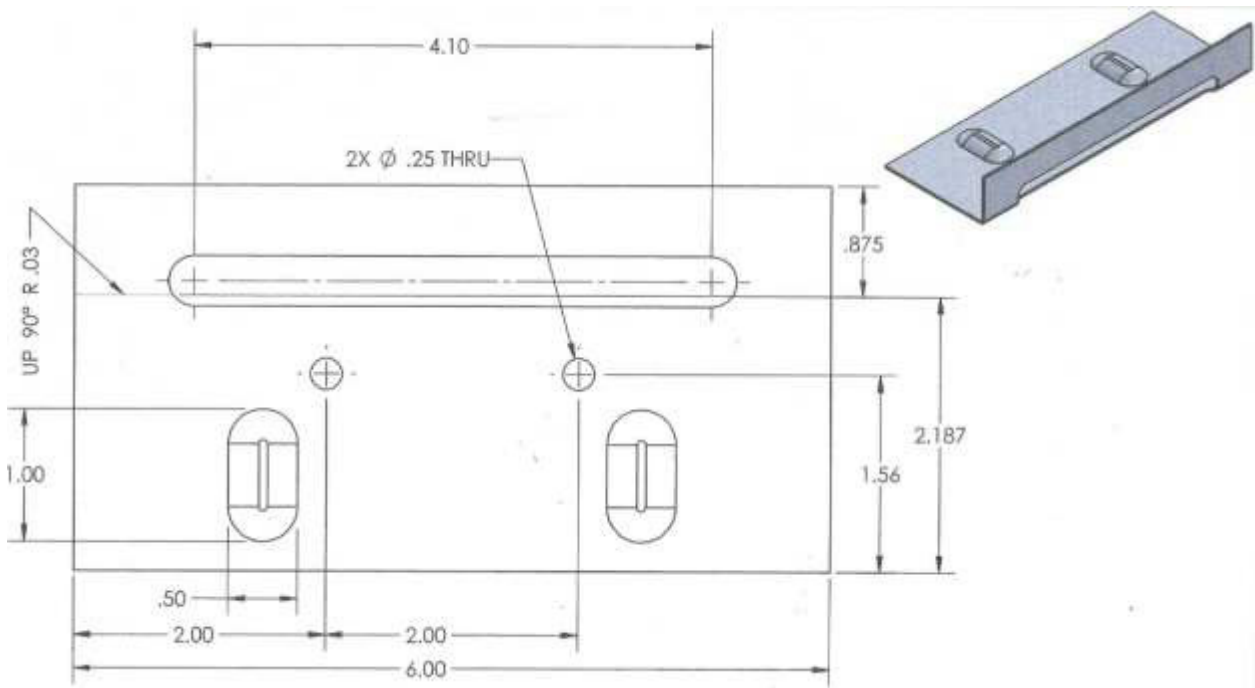


SMI 2.0 MS Articulating Expansion Top

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SMI 2.0" MS Clip Base (18 ga. galvanized steel)

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Specimen No. 1 Photograph – After Testing



Specimen No. 2 Photograph – After Testing

END OF REPORT

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