CONSTRUCTION MATERIALS

TECHNOLOGIES

LABORATORY TEST REPORT

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

Attention: Adam Mazzella

Product Names:	**SMI 1.5 Mechanical Seam Standing Seam**	**Manufacturer:**	Sheffield Metals International
Project No.:	SHMI-005-02-02	**Source:**	Sheffield Metals International
Date Received:	Dec. 4, 2017	**Date Tested:**	Jan. 15-16, 2018

Purpose: Determine the uplift resistance of SMI 1.5 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 1.5 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 1.5 MS: Min. 0.029" 3105 H24M aluminum alloy (F_y = 22.9 ksi) preformed, 180° mechanical standing seam panels; 16" wide installed coverage; Profile drawing is contained in Appendix B.

Clips: Two-piece galvanized steel clip; 1.75" long x 24 ga. expansion top; 6" long x 18 ga. base. Clip drawing is contained in Appendix B.

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Deck Descriptions:

Insulation: **(Specimen 1 only)**	1" thick polyisocyanurate board, loose-laid over deck
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; tape[1]

[1]It 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 1.5 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.	195	Clip Failure
2	SMI 1.5 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.	180	Clip Failure

Classification:

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

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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	9	NA

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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.) 1	2	3	4	Result
5	0.0	16.2	0.567	0.099	0.718	0.161	PASS
5	13.8	16.2	1.035	0.326	1.263	0.364	PASS
60	13.8	8.1-27.7[1]	0.937	0.283	1.073	0.282	PASS
5	0.0	24.2	0.959	0.274	1.119	0.272	PASS
5	20.8	24.2	1.232	0.356	1.438	0.376	PASS
		Permanent Set	0.084	0.104	0.091	0.068	PASS
Class 60 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.) 1	2	3	4	Result
5	0.0	32.3	1.098	0.317	1.280	0.330	PASS
5	27.7	32.3	1.387	0.487	1.528	0.507	PASS
60	27.7	16.2-55.4[1]	1.066	0.472	1.123	0.479	PASS
5	0.0	40.4	1.063	0.463	1.057	0.475	PASS
5	34.6	40.4	1.373	0.571	1.437	0.567	PASS
		Permanent Set	0.098	0.120	0.115	0.094	PASS
Class 90 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.) 1	2	3	4	Result
5	0.0	48.5	1.197	0.508	1.303	0.529	PASS
5	41.5	48.5	1.390	0.614	1.434	0.569	PASS
60	41.5	24.2-48.5[1]	1.379	0.528	1.417	0.550	PASS
5	0.0	56.5	1.239	0.553	1.340	0.570	PASS
5	48.5	56.5	1.125	0.664	1.477	0.615	PASS
		Permanent Set	0.123	0.156	0.141	0.129	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	1.469	1.705	1.506	0.64	PASS
1	135	1.533	0.742	1.53	0.675	PASS
1	150	1.567	0.771	1.588	0.721	PASS
1	165	1.65	0.815	1.627	0.736	PASS
1	180	1.736	0.867	1.684	0.782	PASS
1	195	2.000	1.000	2.000	0.818	PASS
1	210					FAIL AT 12 SEC

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Specimen No. 2 (UL 580 Load Schedule)

Class 30 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.) 1	2	3	4	Result
5	0.0	16.2	0.512	0.111	0.593	0.166	PASS
5	13.8	16.2	1.036	0.405	1.189	0.390	PASS
60	13.8	8.1-27.7[1]	0.999	0.361	0.997	0.276	PASS
5	0.0	24.2	0.975	0.345	0.976	0.242	PASS
5	20.8	24.2	1.159	0.446	1.280	0.518	PASS
		Permanent Set	0.060	0.012	0.034	0.024	PASS
Class 60 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.) 1	2	3	4	Result
5	0.0	32.3	1.008	0.400	1.058	0.406	PASS
5	27.7	32.3	1.206	0.537	1.313	0.590	PASS
60	27.7	16.2-55.4[1]	1.187	0.524	1.289	0.566	PASS
5	0.0	40.4	1.170	0.505	1.266	0.545	PASS
5	34.6	40.4	1.397	0.690	1.502	0.739	PASS
		Permanent Set	0.088	0.023	0.050	0.045	PASS
Class 90 Loading Sequence (UL 580)							
Duration (min)	Positive Pressure (psf)	Negative Pressure (psf)	Max Deflection Under Load (in.) 1	2	3	4	Result
5	0.0	48.5	1.300	0.537	1.358	0.600	PASS
5	41.5	48.5	1.439	0.663	1.486	0.729	PASS
60	41.5	24.2-48.5[1]	1.428	0.646	1.450	0.667	PASS
5	0.0	56.5	1.416	0.653	1.435	0.657	PASS
5	48.5	56.5	1.544	0.777	1.595	0.800	PASS
		Permanent Set	0.106	0.100	0.122	0.080	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	1.574	0.806	1.646	0.843	PASS
1	135	1.632	0.877	1.725	0.9	PASS
1	150	1.708	0.937	1.735	0.931	PASS
1	165	1.755	1.001	1.802	0.889	PASS
1	180	1.805	1.057	1.834	0.943	PASS
1	210					FAIL AT 8 SEC

ASTM E 8 Tensile Properties for 0.032" Aluminum SMI 1.5 Mechanical Seam Standing Seam

Specimen	Width (in)	Thickness (in)	Gage Length (in)	Yield Strength (ksi)	Tensile Strength (ksi)	Elongation at Break (%)
1	0.475	0.033	2	21.7	25.2	11.9
2	0.476	0.033	2	22.4	25.4	11.1
3	0.476	0.033	2	22.2	25.7	12.1
4	0.476	0.032	2	22.5	26.0	11.8
5	0.476	0.032	2	22.8	25.9	11.5
Average				**22.3**	**25.6**	**11.7**
St.Dev.				**0.4**	**0.3**	**0.4**

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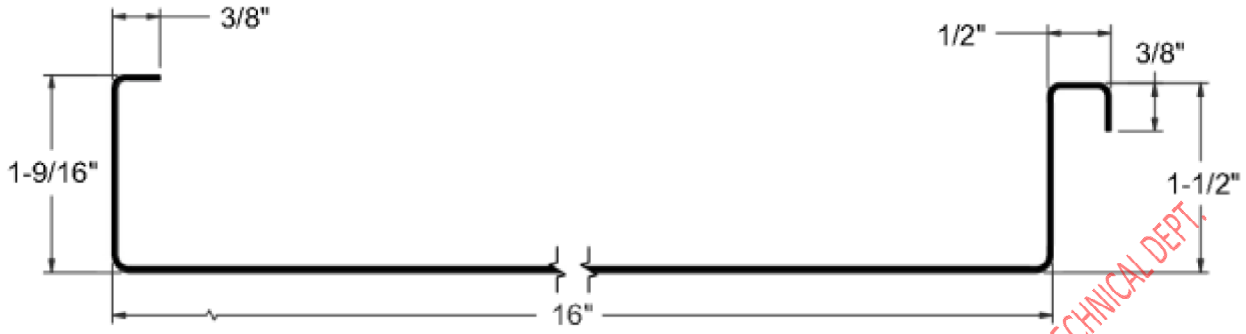
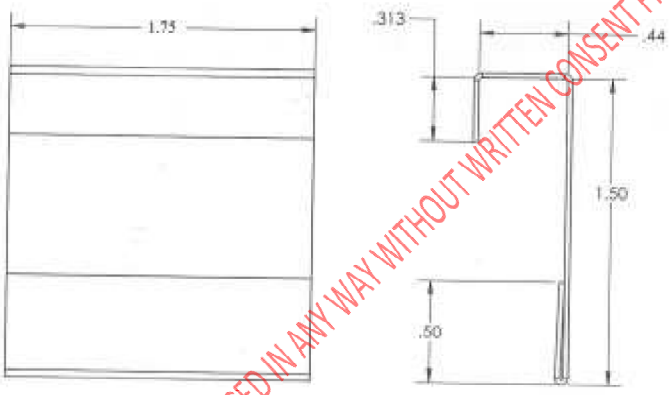
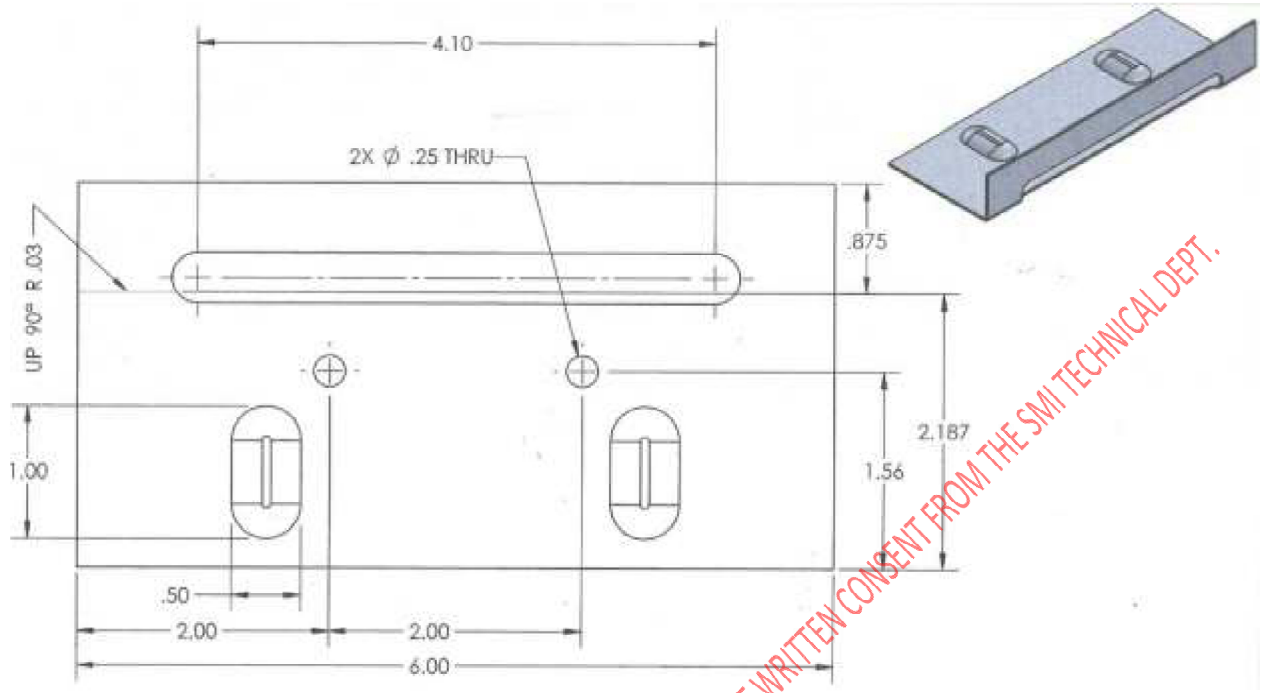


SMI 1.5 Mechanical Seam Standing Seam Panel Profile



SMI 1.5 MS Articulating Expansion Top (Top component of Clip; 24 ga. galv. steel)



SMI 1.5 MS Clip Base (18 ga. galvanized steel)

Specimen No. 1 Photograph – After Testing

Specimen No. 2 Photograph – After Testing

END OF REPORT