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EVALUATION CENTER
Intertek
8431 Murphy Drive
Middleton, WI 53562

RENDERED TO:
Alucoil North America LLC
1976 Joe Rgers Jr Blvd
Manning, SC 29102

Contact: Robert Walters
Ph: (803)505-6543
rwalters@intrabondusa.com

PRODUCT EVALUATED:
Iarson® by Alucoil® PE 3mm, 4mm and 6mm Aluminum Composite Material

EVALUATION PROPERTY:
ICC-ES AC25, Acceptance Criteria for Metal Composite Materials

Report of Testing of Iarson® by Alucoil® PE 3mm, 4m and 6mm Aluminum Composite Materials, for compliance with the applicable requirements of the following criteria: ICC-ES AC25, Acceptance Criteria for Metal Composite Materials.

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2 Introduction

Intertek has conducted testing for Alucoil North America LLC, on laron® by Alucoil® PE 3mm, 4m and 6mm Aluminum Composite Materials, to test and comply with AC25, Section 3.2.1 Interior Finish , Section 4.1, Section 4.3 Fastener Testing, Section 4.5 Bond Strength Testing, and Section 4.6 Freeze-Thaw Testing. Testing was conducted in accordance with physical performance testing, following the standard methods of ICC-ES AC25, Acceptance Criteria for Metal Composite Materials. This evaluation began August 22, 2012 and was completed September 30, 2012.

3 Test Samples

3.1. SAMPLE SELECTION

Samples were randomly selected on June 19, 2012 by Intertek representative Jim Tressell at the Alucoil® North America, LLC manufacturing facility, located at 1976 Joe Rogers Jr Blvd Manning, SC 29102. Samples were received at the Evaluation Center on June 26, 2012.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

laron® by Alucoil® PE Aluminum Composite Material consists of two 0.5 mm aluminum skins joined together by a black thermoplastic resin polyethylene (PE) core material. Standard widths are 1000, 1270 and 1575 mm. The product is available in lengths from 2000mm to 8000mm. The total thickness in mm of the above products is 3mm, 4mm or 6mm. Product weights are 4.52 kg/m², 5.5 kg/m² and 7.25 kg/m² respectively.

4 Testing and Evaluation Methods

4.1. TEST STANDARD: AC25 Section 4.5 Bond Strength Test/ASTM D1781:

The purpose of this testing is to determine the bond strength retention strength of laron® by Alucoil® PE 4mm Aluminum Composite Material after being exposed to ambient, water submersion, and boiling water submersion.

Procedure and Test Specimen Description:

Six 15 inch x 3 inch specimens were prepared in the front and back sides from the laron® by Alucoil® PE 4mm Aluminum Composite Material for each of the three conditioning procedures detailed in ICC-ES AC25, Section 4.5. The specimens were machined to 1 inch overhang of the outmost facing remaining at one end. Group 1 baseline panels were conditioned at a constant 70°F and 50% relative humidity for 48 hours prior to testing. Group 2 boiled panels were submerged in water at 212°F for 8 hours prior to testing and Gro up 3 water soaked panels were submerged in

water at 70°F for 21 days prior to testing. An Instron Model 5582 - ES Mid #870. (Calibration due on 12/20/12) Universal test machine was fitted with a drum peeling assembly which had been calibrated. The test specimens were mounted between a top clamp and the climbing drum assembly prior to application of tensile load at a uniform crosshead speed of 1.0 inch/minute until 6 inches of the test specimen had been separated.

4.2. TEST STANDARD: AC25 Section 4.6 Freeze-Thaw Test/ASTM D1781:

The purpose of this testing is to determine the bond strength retention strength of larson® by Alucoil® PE 4mm Aluminum Composite Material panels after being exposed to freeze-thaw cycles.

Procedure and Test Description:

Six 15 inch x 3 inch specimens were prepared in the front and back sides from the larson® by Alucoil® PE 4mm Aluminum Composite Material panels. Group 4 freeze thaw panels were machined to 1 inch overhang of the outmost facing remaining at one end and subjected to ten full freeze-thaw cycles per ICC-ES A25 Section 4.6.2. Each had at least 8 hours of air exposure at 120°F and 9 hours of water submersion at 75°F +5 °F and 16 hours air exposure at -20°F prior to testing. Post-exposure cycling peel tests were conducted in accordance with ASTM D1781-98 (2004). Instron Model 5582 - ES Mid #870. (Calibration due on 12/20/12) Universal test machine was fitted with a drum peeling assembly and calibrated. The test specimens were mounted between a top clamp and the climbing drum assembly prior to application of tensile load at a uniform crosshead speed of 1.0 inch/minute until 6 inches of the test specimen had been separated.

4.3. TEST STANDARD: AC25 Section 4.1 Strength Testing ASTM E72:

The test specimen measuring 36 inches by 60 inches was routed 1 inch from each end of the 60 inch dimension and folded at 90 degrees to create standard manufacturer recommended mounting edges. Prior to upright installation in a thermal conditioning chamber the test specimen was preconditioned for 48 hours at standard lab conditions.

Products tested:

larson® by Alucoil® PE 3mm Aluminum Composite Material
larson® by Alucoil® PE 4mm Aluminum Composite Material
larson® by Alucoil® PE 6mm Aluminum Composite Material

All test panels had reinforcement obtained by taking an “I” shaped extruded aluminum reinforcement measuring 1/8 inches thick was attached to the top and bottom returns with 2 clips per end and keeping it 6 inches at each side. Each clip was secured to the return leg with one 1/8” diameter pop rivet and secured to the reinforcement with one 1/8’ diameter pop rivet. Normount V2862, closed cell polyurethane tape, was used to attach one of each of the stiffener’s flanges to the back side of the Aluminum Composite Material panels.

See APPENDIX A for complete installation of the test panels.

The panels were secured to a wood buck with 6 #12 by 1" long self-tapping hex head screw, three at the top and three at the bottom the screw were located 2" from each end and one at the midspan, though the installation clips into the wood buck. All loads where held for 60 seconds and load was applied to the positive and negative direction of the sample. All testing was performed in accordance with the bad method specified in section 11.3 and 12.3 of ASTM E72 as required in Section 4.1.2.1 of AC 25.

See APPENDIX A for complete loads that Intertek tested.

4.4. TEST STANDARD: AC25 Section 4.3 Fasteners Testing:

Allowable strength of fasteners connected to larson® by Alucoil® PE 3mm and 6mm Aluminum Composite Material panels were determined in accordance with Section 4.3 of AC25.

The purpose of this test was to develop allowable loads for fasteners used to attach larson® by Alucoil® PE 3mm and 6mm Aluminum Composite Material panels to structural framing.

4.4.1. Pull-Through Evaluation:

Ten 3 inch squares of the 6mm and 3mm panel specimens were prepared for the pull-through evaluations of each stainless steel 1/8 inch rivets and stainless steel #10 x 1" self-drilling hex head screws. A single fastener was inserted through the center of the test panel prepared with a 0.125 inch diameter predrilled lead hole for rivets and directly into the panel for the self-tapping screws into a pre-drilled C-channel test fixtures. Each test specimen was secured to the test stage of the Instron Model 5582 - ES Mid #870 (calibration due on 12/20/12) and the tensile load was applied to the test sample. The fastener was pulled at a rate of 0.1 inch per minute until failure of the specimen was observed. The ultimate load and failure mode were documented for each and averaged for both test series.

See APPENDIX A for sample prep and sample set up.

4.4.2. Shear Evaluation:

Ten 3 inch squares of the 6mm and 3mm panel specimens were prepared for the shear evaluations of the stainless steel 1/8 inch rivets and stainless steel #10 x 1 inch, self-drilling hex head screws. A 0.125 inch diameter hole was predrilled through the steel plate and test sample at 1 inch from the top and 1-1/2 inch from the side. The self-tapping fastener was then drilled through each predrilled hole resting flush against the exterior face of the test sample. Instron Model 5582 - ES Mid #870 (calibration due on 12/20/12) was used and the tensile load was applied to the specimen at a rate of 0.1 inch per minute until failure of the specimen was observed.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS for ASTM D1781

$r_o =$ 2.465
 $r_l =$ 2.01
 F_o Front Face: 27.56579 lbf
 F_o Back Face: 30.57062 lbf

BASELINE PANELS - Group 1

Specimen	Width (in)	Fp (lb)	Minimum Load (lb)	Maximum Load (lb)	Torque (in-lb/in)	Failure Mode
Panel #1 - Front Face	2.354	181.136	167.165	269.372	29.683	Within Adhesive
Panel #1 - Back Face	2.351	195.789	182.392	313.139	31.975	Within Adhesive
Panel #2 - Front Face	2.353	183.151	172.352	224.300	30.086	Within Adhesive
Panel #2 - Back Face	2.353	193.040	181.410	247.142	31.417	Within Adhesive
Panel #3 - Front Face	2.352	178.493	163.147	213.969	29.197	Within Adhesive
Panel #3 - Back Face	2.353	195.011	183.738	268.539	31.798	Within Adhesive
Average:		187.770			30.693	
Standard Dev:		7.693			1.184	
CoV:		4.10%			3.86%	

BOILED PANELS - Group 2

Specimen	Width (in)	Fp (lb)	Minimum Load (lb)	Maximum Load (lb)	Torque (in-lb/in)	Failure Mode
Panel #1 - Front Face	2.209	177.685	134.460	185.924	30.928	Within Adhesive
Panel #1 - Back Face	2.350	184.595	159.505	212.971	29.822	Within Adhesive
Panel #2 - Front Face	2.352	183.223	172.239	193.291	30.112	Within Adhesive
Panel #2 - Back Face	2.352	187.807	144.733	206.292	30.418	Within Adhesive
Panel #3 - Front Face	2.343	184.472	149.247	193.578	30.470	Within Adhesive
Panel #3 - Back Face	2.346	186.721	171.816	254.207	30.291	Within Adhesive
Average:		184.084			30.340	
Standard Dev:		3.547			0.372	
CoV:		1.93%			1.23%	

WATER SOAKED PANELS - Group 3

Specimen	Width (in)	Fp (lb)	Minimum Load (lb)	Maximum Load (lb)	Torque (in-lb/in)	Failure Mode
Panel #1 - Front Face	2.144	161.972	145.234	317.925	28.524	Within Adhesive
Panel #1 - Back Face*	ERROR	ERROR	ERROR	ERROR	#VALUE!	ERROR
Panel #2 - Front Face	2.136	165.149	149.707	223.180	29.307	Within Adhesive
Panel #2 - Back Face	2.150	169.095	152.716	185.819	29.316	Within Adhesive
Panel #3 - Front Face	2.163	154.733	145.221	152.083	26.750	Within Adhesive
Panel #3 - Back Face	2.154	170.434	148.123	255.223	29.551	Within Adhesive
Average:		164.277			28.690	
Standard Dev:		6.290			1.151	
CoV:		3.83%			4.01%	

* - Sample damaged in process; did not peel.

5.2. RESULTS AND OBSERVATIONS for Freeze-Thaw Test/ASTM D1781

FREEZE THAW PANELS

Specimen	Width (in)	Fp (lb)	Minimum Load (lb)	Maximum Load (lb)	Torque (in-lb/in)	Failure Mode
Panel #1 - Front Face	2.208	183.225	189.839	194.798	32.084	Within Adhesive
Panel #1 - Back Face	2.351	198.803	186.949	207.134	32.559	Within Adhesive
Panel #2 - Front Face	2.354	206.650	187.480	215.958	34.815	Within Adhesive
Panel #2 - Back Face	2.267	206.760	190.784	251.261	35.362	Within Adhesive
Panel #3 - Front Face	2.367	178.134	162.362	258.787	28.949	Within Adhesive
Panel #3 - Back Face	2.386	216.892	204.261	245.238	35.538	Within Adhesive
Average:		198.411			33.185	
Standard Dev:		14.974			2.525	
CoV:		7.55%			7.61%	

5.3. RESULTS AND OBSERVATIONS for Strength Testing ASTM E72

Product: 3mm Iarson® by Alucoil® PE Aluminum Composite Material
Sample: 3mm Positive (1)

Sample #1 Load (PSF)	Top (in) 1	Mid (in) 2	Bottom (in) 3			Sample #1 Load (PSF)	Top (in) 4	Mid (in) 5	Bottom (in) 6		
0	0	0	0	0		0	0	0	0		
-5	0.019	0.138	0.013	0.016	0.122	-5	0.026	0.202	0.016	0.021	0.181
0	0.003	0.003	0.001	0.002	0.001 Set	0	0.002	0.002	0.000	0.001	0.001 Set
-10	0.036	0.257	0.024	0.030	0.227	-10	0.048	0.358	0.029	0.039	0.320
0	0.005	0.004	0.002	0.004	0.001 Set	0	0.002	0.004	0.000	0.001	0.003 Set
-15	0.057	0.397	0.038	0.048	0.350	-15	0.072	0.521	0.044	0.058	0.463
0	0.007	0.008	0.004	0.006	0.003 Set	0	0.004	0.007	0.002	0.003	0.004 Set
-20	0.074	0.519	0.053	0.064	0.456	-20	0.093	0.656	0.057	0.075	0.581
0	0.008	0.010	0.006	0.007	0.003 Set	0	0.004	0.008	0.001	0.003	0.006 Set
-25	0.098	0.675	0.071	0.085	0.591	-25	0.118	0.820	0.072	0.095	0.725
0	0.010	0.017	0.008	0.009	0.008 Set	0	0.007	0.015	0.003	0.005	0.010 Set
-30	0.113	0.773	0.083	0.098	0.675	-30	0.133	0.920	0.081	0.107	0.813
0	0.013	0.021	0.011	0.012	0.009 Set	0	0.008	0.020	0.003	0.006	0.015 Set
-35	0.133	0.892	0.098	0.116	0.777	-35	0.150	1.038	0.091	0.121	0.918
0	0.016	0.027	0.014	0.015	0.012 Set	0	0.009	0.026	0.004	0.007	0.020 Set
-40	0.157	1.039	0.116	0.137	0.903	-40	0.171	1.181	0.105	0.138	1.043
0	0.021	0.034	0.016	0.019	0.016 Set	0	0.010	0.032	0.005	0.008	0.025 Set
-45	0.172	1.125	0.128	0.150	0.975	-45	0.184	1.269	0.112	0.148	1.121
0	0.023	0.038	0.018	0.021	0.018 Set	0	0.012	0.036	0.005	0.009	0.028 Set
-67.50 Sustained Load						-67.50 Sustained Load					

Product: 3mm Iarson® by Alucoil® PE Aluminum Composite Material
Sample: 3mm Positive (2)

Sample #1 Load (PSF)	Top (in) 1	Mid (in) 2	Bottom (in) 3			Sample #1 Load (PSF)	Top (in) 4	Mid (in) 5	Bottom (in) 6		
0	0	0	0	0		0	0	0	0		
-5	0.017	0.142	0.012	0.015	0.128	-5	0.021	0.196	0.014	0.018	0.179
0	0.001	0.001	0.001	0.001	0.000 Set	0	0.001	0.001	0.000	0.001	0.001 Set
-10	0.038	0.294	0.025	0.032	0.263	-10	0.043	0.387	0.031	0.037	0.350
0	0.002	0.003	0.001	0.002	0.002 Set	0	0.000	0.002	0.000	0.000	0.002 Set
-15	0.058	0.435	0.038	0.048	0.387	-15	0.064	0.549	0.045	0.055	0.495
0	0.005	0.006	0.002	0.004	0.003 Set	0	0.003	0.006	0.001	0.002	0.004 Set
-20	0.080	0.586	0.053	0.067	0.520	-20	0.084	0.706	0.059	0.072	0.635
0	0.008	0.011	0.004	0.006	0.005 Set	0	0.002	0.011	0.000	0.001	0.010 Set
-25	0.099	0.714	0.066	0.083	0.632	-25	0.100	0.833	0.070	0.085	0.748
0	0.010	0.015	0.006	0.008	0.007 Set	0	0.003	0.015	0.001	0.002	0.013 Set
-30	0.123	0.870	0.083	0.103	0.767	-30	0.120	0.991	0.084	0.102	0.889
0	0.014	0.024	0.008	0.011	0.013 Set	0	0.007	0.023	0.003	0.005	0.018 Set
-35	0.147	1.026	0.100	0.124	0.903	-35	0.139	1.144	0.097	0.118	1.026
0	0.017	0.028	0.012	0.015	0.014 Set	0	0.008	0.027	0.004	0.006	0.021 Set
-40	0.167	1.148	0.113	0.140	1.008	-40	0.156	1.261	0.108	0.132	1.129
0	0.021	0.036	0.015	0.018	0.018 Set	0	0.011	0.036	0.005	0.008	0.028 Set
-45	0.183	1.247	0.121	0.152	1.095	-45	0.169	1.361	0.117	0.143	1.218
0	0.024	0.040	0.013	0.019	0.022 Set	0	0.012	0.041	0.006	0.009	0.032 Set
-67.50 Sustained Load						-67.50 Sustained Load					

Product: 3mm larson® by Alucoil® PE Aluminum Composite Material												
Sample: 3mm Positive (3)												
Sample #1	Top	Mid	Bottom				Sample #1	Top	Mid	Bottom		
Load (PSF)	(in)	(in)	(in)				Load (PSF)	(in)	(in)	(in)		
	1	2	3					4	5	6		
0	0	0	0				0	0	0	0		
-5	0.015	0.158	0.016	0.016	0.143		-5	0.023	0.215	0.020	0.022	0.194
0	0.001	0.001	0.000	0.001	0.001	0.001 Set	0	0.001	0.000	0.000	0.001	-0.001 Set
-10	0.026	0.266	0.028	0.027	0.239		-10	0.039	0.351	0.033	0.036	0.315
0	0.001	0.003	0.000	0.001	0.003	0.003 Set	0	0.003	0.002	0.001	0.002	0.000 Set
-15	0.041	0.394	0.043	0.042	0.352		-15	0.058	0.502	0.048	0.053	0.449
0	0.002	0.005	0.001	0.002	0.004	0.004 Set	0	0.003	0.004	0.001	0.002	0.002 Set
-20	0.061	0.567	0.063	0.062	0.505		-20	0.082	0.690	0.067	0.075	0.616
0	0.003	0.006	0.002	0.003	0.004	0.004 Set	0	0.004	0.006	0.001	0.003	0.004 Set
-25	0.076	0.691	0.078	0.077	0.614		-25	0.099	0.820	0.080	0.090	0.731
0	0.006	0.011	0.003	0.005	0.007	0.007 Set	0	0.007	0.011	0.002	0.005	0.007 Set
-30	0.093	0.830	0.095	0.094	0.736		-30	0.118	0.965	0.094	0.106	0.859
0	0.009	0.016	0.004	0.007	0.010	0.010 Set	0	0.009	0.015	0.002	0.006	0.010 Set
-35	0.110	0.950	0.110	0.110	0.840		-35	0.134	1.085	0.105	0.120	0.966
0	0.012	0.020	0.005	0.009	0.012	0.012 Set	0	0.011	0.019	0.003	0.007	0.012 Set
-40	0.129	1.085	0.127	0.128	0.957		-40	0.152	1.230	0.119	0.136	1.095
0	0.018	0.027	0.007	0.013	0.015	0.015 Set	0	0.013	0.028	0.004	0.009	0.020 Set
-45	0.145	1.195	0.142	0.144	1.052		-45	0.168	1.351	0.132	0.150	1.201
0	0.021	0.033	0.009	0.015	0.018	0.018 Set	0	0.014	0.034	0.004	0.009	0.025 Set
-67.50 Sustained Load							-67.50 Sustained Load					

Product: 3mm larson® by Alucoil® PE Aluminum Composite Material												
Sample: 3mm negative (4)												
Sample #1	Top	Mid	Bottom				Sample #1	Top	Mid	Bottom		
Load (PSF)	(in)	(in)	(in)				Load (PSF)	(in)	(in)	(in)		
	1	2	3					4	5	6		
0	0	0	0				0	0	0	0		
-5	0.028	0.118	0.009	0.019	0.100		-5	0.025	0.182	0.043	0.182	
0	0.002	0.001	0.000	0.001	0.000	0.000 Set	0	0.003	0.001	0.000	0.001 Set	
-10	0.058	0.232	0.021	0.040	0.193		-10	0.051	0.341	0.080	0.341	
0	0.005	0.004	0.000	0.003	0.002	0.002 Set	0	0.002	0.001	0.001	0.001 Set	
-15	0.092	0.389	0.037	0.085	0.305		-15	0.082	0.514	0.124	0.514	
0	0.007	0.008	0.002	0.005	0.002	0.002 Set	0	0.000	0.005	0.002	0.005 Set	
-20	0.113	0.429	0.048	0.081	0.349		-20	0.101	0.624	0.154	0.624	
0	0.008	0.008	0.004	0.006	0.002	0.002 Set	0	0.002	0.008	0.005	0.008 Set	
-25	0.141	0.579	0.063	0.102	0.477		-25	0.127	0.761	0.188	0.761	
0	0.010	0.012	0.008	0.008	0.004	0.004 Set	0	0.008	0.014	0.007	0.014 Set	
-30	0.188	0.701	0.079	0.124	0.578		-30	0.151	0.896	0.223	0.896	
0	0.012	0.016	0.009	0.011	0.006	0.006 Set	0	0.007	0.018	0.009	0.018 Set	
-35	0.193	0.827	0.095	0.144	0.683		-35	0.178	1.027	0.257	1.027	
0	0.014	0.019	0.012	0.013	0.006	0.006 Set	0	0.011	0.020	0.012	0.020 Set	
-40	0.235	0.987	0.119	0.177	0.810		-40	0.205	1.186	0.300	1.186	
0	0.020	0.028	0.018	0.018	0.008	0.008 Set	0	0.014	0.030	0.018	0.030 Set	
-45	0.252	1.058	0.131	0.192	0.867		-45	0.218	1.255	0.320	1.255	
0	0.024	0.032	0.019	0.022	0.011	0.011 Set	0	0.017	0.035	0.020	0.035 Set	
-50	0.283	1.188	0.158	0.220	0.967		-50	0.242	1.382	0.356	1.382	
0	0.033	0.042	0.024	0.029	0.014	0.014 Set	0	0.022	0.047	0.024	0.047 Set	
-55	0.312	1.304	0.183	0.248	1.057		-55	0.264	1.497	0.390	1.497	
0	0.042	0.053	0.030	0.038	0.017	0.017 Set	0	0.024	0.058	0.030	0.058 Set	
-76 Sustained Load							-76 Sustained Load					

Product: 3mm Iarson® by Alucoil® PE Aluminum Composite Material						Sample: 3mm negative (5)					
Sample #1	Top (in)	Mid (in)	Bottom (in)			Sample #1	Top (in)	Mid (in)	Bottom (in)		
Load (PSF)	1	2	3			Load (PSF)	4	5	6		
0	0.000	0.000	0.000	0.000	0.000 Set	0	0.000	0.000	0.000	0.000	0.000 Set
-10	0.046	0.233	0.020	0.033	0.200	-10	0.054	0.348	0.089	0.072	0.277
0	0.003	0.004	0.001	0.002	0.002 Set	0	0.002	0.005	0.004	0.003	0.002 Set
-20	0.058	0.444	0.046	0.052	0.392	-20	0.106	0.641	0.170	0.138	0.503
0	0.010	0.009	0.003	0.007	0.003 Set	0	0.007	0.014	0.009	0.008	0.006 Set
-30	0.155	0.674	0.077	0.116	0.558	-30	0.155	0.920	0.248	0.202	0.719
0	0.018	0.019	0.005	0.012	0.008 Set	0	0.012	0.026	0.017	0.015	0.012 Set
-40	0.211	0.883	0.106	0.159	0.725	-40	0.196	1.200	0.350	0.273	0.927
0	0.033	0.032	0.008	0.021	0.012 Set	0	0.018	0.041	0.029	0.024	0.018 Set
-50	0.261	1.101	0.139	0.200	0.901	-50	0.235	1.467	0.441	0.338	1.129
0	0.042	0.045	0.015	0.029	0.017 Set	0	0.025	0.062	0.043	0.034	0.028 Set
-75 Sustained Load						-75 Sustained Load					

Product: 3mm Iarson® by Alucoil® PE Aluminum Composite Material						Sample: 3mm negative (6)					
Sample #1	Top (in)	Mid (in)	Bottom (in)			Sample #1	Top (in)	Mid (in)	Bottom (in)		
Load (PSF)	1	2	3			Load (PSF)	4	5	6		
0	0.000	0.000	0.000	0.000	0.000 Set	0	0.000	0.000	0.000	0.000	0.000 Set
-10	0.030	0.156	0.013	0.022	0.135	-10	0.046	0.312	0.068	0.057	0.255
0	0.003	0.001	0.000	0.002	-0.001 Set	0	0.000	0.002	0.004	0.002	0.000 Set
-20	0.069	0.337	0.038	0.054	0.284	-20	0.101	0.633	0.049	0.075	0.558
0	0.006	0.003	0.004	0.005	-0.002 Set	0	0.003	0.010	0.002	0.003	0.008 Set
-30	0.097	0.447	0.055	0.076	0.371	-30	0.135	0.817	0.200	0.168	0.650
0	0.009	0.010	0.007	0.008	0.002 Set	0	0.005	0.016	0.002	0.004	0.013 Set
-40	0.128	0.557	0.072	0.100	0.457	-40	0.173	1.017	0.256	0.215	0.803
0	0.012	0.014	0.010	0.011	0.003 Set	0	0.009	0.025	0.006	0.008	0.018 Set
-50	0.163	0.668	0.090	0.127	0.542	-50	0.213	1.225	0.314	0.264	0.962
0	0.017	0.021	0.013	0.015	0.006 Set	0	0.013	0.038	0.011	0.012	0.026 Set
-60	0.205	0.793	0.113	0.159	0.634	-60	0.256	1.449	0.377	0.317	1.133
0	0.026	0.039	0.019	0.023	0.017 Set	0	0.020	0.063	0.022	0.021	0.042 Set
-75 Sustained Load						-75 Sustained Load					

Product: 4mm Iarson® by Alucoil® PE Aluminum Composite Material						Sample: 4mm Positive (1)					
Sample #1	Top (in)	Mid (in)	Bottom (in)			Sample #1	Top (in)	Mid (in)	Bottom (in)		
Load (PSF)	1	2	3			Load (PSF)	4	5	6		
0	0	0	0			0	0	0	0		
-10	0.036	0.304	0.030	0.033	0.271	-10	0.040	0.353	0.022	0.031	0.322
0	0.003	0.005	0.001	0.002	0.003 Set	0	0.002	0.002	0.001	0.002	0.001 Set
-20	0.079	0.610	0.067	0.073	0.537	-20	0.082	0.679	0.045	0.064	0.616
0	0.008	0.014	0.004	0.006	0.008 Set	0	0.003	0.011	0.000	0.002	0.010 Set
-30	0.120	0.888	0.110	0.115	0.773	-30	0.118	0.958	0.064	0.091	0.867
0	0.014	0.024	0.008	0.011	0.013 Set	0	0.006	0.019	0.000	0.003	0.016 Set
-40	0.164	1.160	0.133	0.149	1.012	-40	0.152	1.224	0.083	0.118	1.107
0	0.022	0.040	0.013	0.018	0.023 Set	0	0.010	0.033	0.001	0.006	0.028 Set
-50	0.211	1.430	0.170	0.191	1.240	-50	0.188	1.492	0.101	0.145	1.348
0	0.033	0.059	0.020	0.027	0.033 Set	0	0.013	0.049	0.001	0.007	0.042 Set
-75 Sustained Load						-75 Sustained Load					

Product: 4mm Iarson® by Alucoil® PE Aluminum Composite Material												
Sample: 4mm Positive (2)												
Sample #1	Top	Mid	Bottom				Sample #1	Top	Mid	Bottom		
Load (PSF)	(in)	(in)	(in)				Load (PSF)	(in)	(in)	(in)		
	1	2	3					4	5	6		
0	0	0	0				0	0	0	0		
-10	0.036	0.304	0.030	0.033	0.271		-10	0.040	0.353	0.022	0.031	0.322
0	0.003	0.005	0.001	0.002	0.003	Set	0	0.002	0.002	0.001	0.002	0.001
-20	0.079	0.610	0.067	0.073	0.537		-20	0.082	0.679	0.045	0.064	0.616
0	0.008	0.014	0.004	0.006	0.008	Set	0	0.003	0.011	0.000	0.002	0.010
-30	0.120	0.888	0.110	0.115	0.773		-30	0.118	0.958	0.064	0.091	0.867
0	0.014	0.024	0.008	0.011	0.013	Set	0	0.006	0.019	0.000	0.003	0.016
-40	0.164	1.160	0.133	0.149	1.012		-40	0.152	1.224	0.083	0.118	1.107
0	0.022	0.040	0.013	0.018	0.023	Set	0	0.010	0.033	0.001	0.006	0.028
-50	0.211	1.430	0.170	0.191	1.240		-50	0.188	1.492	0.101	0.145	1.348
0	0.033	0.059	0.020	0.027	0.033	Set	0	0.013	0.049	0.001	0.007	0.042
-75 Sustained Load							-75 Sustained Load					

Product: 4mm Iarson® by Alucoil® PE Aluminum Composite Material												
Sample: 4mm Positive (3)												
Sample #1	Top	Mid	Bottom				Sample #1	Top	Mid	Bottom		
Load (PSF)	(in)	(in)	(in)				Load (PSF)	(in)	(in)	(in)		
	1	2	3					4	5	6		
0	0	0	0				0	0	0	0		
-10	0.050	0.306	0.030	0.040	0.266		-10	0.049	0.385	0.025	0.037	0.348
0	0.007	0.007	0.003	0.005	0.002	Set	0	0.004	0.005	0.000	0.002	0.003
-20	0.093	0.530	0.055	0.074	0.456		-20	0.085	0.644	0.044	0.065	0.580
0	0.013	0.015	0.008	0.011	0.005	Set	0	0.007	0.012	0.000	0.004	0.009
-30	0.109	0.808	0.087	0.098	0.710		-30	0.120	0.948	0.066	0.093	0.855
0	0.009	0.026	0.012	0.011	0.016	Set	0	0.010	0.024	0.002	0.006	0.018
-40	0.114	1.022	0.113	0.114	0.909		-40	0.157	1.165	0.082	0.120	1.046
0	0.015	0.039	0.017	0.016	0.023	Set	0	0.015	0.036	0.004	0.010	0.027
-50	0.152	1.276	0.144	0.148	1.128		-50	0.201	1.424	0.101	0.151	1.273
0	0.024	0.054	0.021	0.023	0.032	Set	0	0.017	0.049	0.005	0.011	0.038
-75 Sustained Load							-75 Sustained Load					

Product: 4mm Iarson® by Alucoil® PE Aluminum Composite Material												
Sample: 4mm negative (4)												
Sample #1	Top	Mid	Bottom				Sample #1	Top	Mid	Bottom		
Load (PSF)	(in)	(in)	(in)				Load (PSF)	(in)	(in)	(in)		
	1	2	3					4	5	6		
0	0.000	0.000	0.000	0.000	0.000	Set	0	0.000	0.000	0.000	0.000	0.000
-10	0.052	0.267	0.030	0.041	0.226		-10	0.055	0.341	0.078	0.067	0.275
0	0.005	0.004	0.003	0.004	0.000	Set	0	0.001	0.004	0.002	0.002	0.003
-20	0.099	0.483	0.063	0.081	0.402		-20	0.099	0.594	0.142	0.121	0.474
0	0.010	0.012	0.011	0.011	0.002	Set	0	0.005	0.013	0.007	0.006	0.007
-30	0.150	0.689	0.114	0.132	0.557		-30	0.146	0.842	0.208	0.177	0.665
0	0.015	0.024	0.024	0.020	0.005	Set	0	0.009	0.021	0.012	0.010	0.011
-40	0.204	0.931	0.161	0.183	0.749		-40	0.209	1.070	0.270	0.240	0.831
0	0.024	0.038	0.040	0.032	0.006	Set	0	0.025	0.038	0.020	0.023	0.016
-50	0.255	1.156	0.204	0.230	0.927		-50	0.256	1.307	0.334	0.295	1.012
0	0.032	0.055	0.059	0.046	0.010	Set	0	0.032	0.053	0.030	0.031	0.022
-60	0	0.000	0.000	0.000	0.000		-60	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	Set	0	0.000	0	0.000	0.000	0.000

-58 At Approx -58 Failure at all 3 bottom mounting clips

Product: 4mm larson® by Alucoil® PE Aluminum Composite Material													
Sample: 4mm negative (5)													
Sample #1	Top	Mid	Bottom				Sample #1	Top	Mid	Bottom			
Load (PSF)	(in)	(in)	(in)				Load (PSF)	(in)	(in)	(in)			
	1	2	3					4	5	6			
0	0.000	0.000	0.000	0.000	0.000	Set	0	0.000	0.000	0.000	0.000	0.000	Set
-10	0.046	0.201	0.020	0.033	0.168		-10	0.039	0.283	0.070	0.055	0.229	
0	0.008	0.005	0.002	0.005	0.000	Set	0	0.001	0.003	0.001	0.001	0.002	Set
-20	0.103	0.447	0.053	0.078	0.369		-20	0.089	0.598	0.154	0.122	0.477	
0	0.012	0.011	0.008	0.010	0.001	Set	0	0.004	0.011	0.006	0.005	0.006	Set
-30	0.146	0.651	0.079	0.113	0.539		-30	0.126	0.823	0.215	0.171	0.653	
0	0.016	0.016	0.014	0.015	0.001	Set	0	0.008	0.018	0.010	0.009	0.009	Set
-40	0.196	0.868	0.107	0.152	0.717		-40	0.167	1.062	0.253	0.210	0.852	
0	0.020	0.023	0.011	0.015	0.008	Set	0	0.012	0.026	0.016	0.014	0.012	Set
-50	0.258	1.089	0.135	0.197	0.893		-50	0.209	1.288	0.344	0.277	1.012	
0	0.034	0.036	0.024	0.029	0.007	Set	0	0.018	0.040	0.025	0.022	0.019	Set
-60	0.318	1.346	0.170	0.244	1.102		-60	0.258	1.547	0.421	0.340	1.208	
0	0.043	0.052	0.000	0.022	0.031	Set	0	0.028	0.061	0.038	0.033	0.028	Set

-75 Sustained Load

Product: 4mm larson® by Alucoil® PE Aluminum Composite Material													
Sample: 4mm negative (6)													
Sample #1	Top	Mid	Bottom				Sample #1	Top	Mid	Bottom			
Load (PSF)	(in)	(in)	(in)				Load (PSF)	(in)	(in)	(in)			
	1	2	3					4	5	6			
0	0.000	0.000	0.000	0.000	0.000	Set	0	0.000	0.000	0.000	0.000	0.000	Set
-10	0.040	0.220	0.047	0.044	0.177		-10	0.045	0.302	0.083	0.064	0.238	
0	0.003	0.004	0.003	0.003	0.001	Set	0	0.001	0.004	0.001	0.001	0.003	Set
-20	0.092	0.459	0.093	0.093	0.367		-20	0.093	0.595	0.163	0.128	0.467	
0	0.008	0.010	0.007	0.008	0.003	Set	0	0.006	0.013	0.008	0.007	0.006	Set
-30	0.150	0.720	0.139	0.145	0.576		-30	0.145	0.809	0.244	0.195	0.615	
0	0.012	0.016	0.011	0.012	0.005	Set	0	0.010	0.022	0.014	0.012	0.010	Set
-40	0.193	0.906	0.172	0.183	0.724		-40	0.185	1.094	0.300	0.243	0.852	
0	0.015	0.020	0.014	0.015	0.006	Set	0	0.013	0.029	0.020	0.017	0.013	Set
-50	0.252	1.115	0.207	0.230	0.886		-50	0.238	1.321	0.366	0.302	1.019	
0	0.022	0.032	0.021	0.022	0.011	Set	0	0.026	0.047	0.034	0.030	0.017	Set
-60	0	0.000	0.000	0.000	0.000		-60	0.000	0.000	0.000	0.000	0.000	
0	0.000	0.000	0.000	0.000	0.000	Set	0	0.000	0.000	0.000	0.000	0.000	Set

-75 Sustained Load

Product: 6mm larson® by Alucoil® PE Aluminum Composite Material													
Sample: 6mm Positive (1)													
Sample #1	Top	Mid	Bottom				Sample #1	Top	Mid	Bottom			
Load (PSF)	(in)	(in)	(in)				Load (PSF)	(in)	(in)	(in)			
	1	2	3					4	5	6			
0	0	0	0				0	0	0	0	0	0	
-10	0.030	0.256	0.022	0.026	0.230		-10	0.033	0.281	0.019	0.026	0.255	
0	0.003	0.001	0.011	0.007	-0.006	Set	0	0.001	0.000	0.000	0.001	-0.001	Set
-20	0.065	0.509	0.059	0.062	0.447		-20	0.068	0.561	0.040	0.054	0.507	
0	0.002	0.005	0.008	0.005	0.000	Set	0	0.004	0.008	0.002	0.003	0.005	Set
-30	0.097	0.730	0.084	0.091	0.640		-30	0.098	0.804	0.059	0.079	0.726	
0	0.001	0.014	0.013	0.007	0.007	Set	0	0.006	0.014	0.004	0.005	0.009	Set
-40	0.131	0.947	0.111	0.121	0.826		-40	0.128	1.040	0.076	0.102	0.938	
0	0.007	0.023	0.017	0.012	0.011	Set	0	0.008	0.022	0.006	0.007	0.015	Set
-50	0.163	1.153	0.136	0.150	1.004		-50	0.156	1.258	0.092	0.124	1.134	
0	0.005	0.029	0.018	0.012	0.018	Set	0	0.010	0.032	0.008	0.009	0.023	Set
-60	0.198	1.383	0.165	0.182	1.202		-60	0.188	1.496	0.110	0.149	1.347	
0	0.017	0.050	0.028	0.023	0.028	Set	0	0.014	0.048	0.013	0.014	0.035	Set

-90 Sustained Load

-90 Sustained Load

Product: 6mm Iarson® by Alucoil® PE Aluminum Composite Material
Sample: 6mm negative (5)

Sample #1 Load (PSF)	Top (in) 1	Mid (in) 2	Bottom (in) 3			Sample #1 Load (PSF)	Top (in) 4	Mid (in) 5	Bottom (in) 6		
0	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000
-10	0.035	0.185	0.023	0.029	0.156	-10	0.040	0.228	0.049	0.045	0.184
0	0.001	0.001	0.001	0.001	0.000	0	0.003	0.003	0.003	0.003	0.000
-20	0.082	0.404	0.054	0.068	0.336	-20	0.089	0.488	0.107	0.098	0.390
0	0.003	0.004	0.003	0.003	0.001	0	0.005	0.008	0.004	0.005	0.004
-30	0.126	0.596	0.082	0.104	0.492	-30	0.131	0.704	0.158	0.145	0.560
0	0.006	0.010	0.006	0.006	0.004	0	0.007	0.013	0.007	0.007	0.006
-40	0.173	0.800	0.115	0.144	0.656	-40	0.176	0.928	0.211	0.194	0.735
0	0.011	0.016	0.011	0.011	0.005	0	0.010	0.020	0.010	0.010	0.010
-50	0.229	1.018	0.150	0.190	0.829	-50	0.221	1.147	0.265	0.243	0.904
0	0.017	0.025	0.016	0.017	0.009	0	0.014	0.030	0.018	0.016	0.014
-60	0.295	1.266	0.191	0.243	1.023	-60	0.277	1.401	0.330	0.304	1.098
0	0.027	0.040	0.024	0.026	0.015	0	0.020	0.044	0.026	0.023	0.021

-90 Sustained Load

Product: 6mm Iarson® by Alucoil® PE Aluminum Composite Material
Sample: 6mm negative (6)

Sample #1 Load (PSF)	Top (in) 1	Mid (in) 2	Bottom (in) 3			Sample #1 Load (PSF)	Top (in) 4	Mid (in) 5	Bottom (in) 6		
0	0.000	0.000	0.000	0.000	0.000	0	0.000	0.000	0.000	0.000	0.000
-10	0.040	0.201	0.027	0.034	0.168	-10	0.047	0.247	0.053	0.050	0.197
0	0.003	0.002	0.001	0.002	0.000	0	0.003	0.003	0.001	0.002	0.001
-20	0.081	0.385	0.054	0.068	0.318	-20	0.091	0.464	0.102	0.097	0.368
0	0.007	0.006	0.004	0.006	0.001	0	0.006	0.008	0.003	0.005	0.004
-30	0.131	0.607	0.088	0.110	0.498	-30	0.145	0.720	0.163	0.154	0.566
0	0.011	0.010	0.006	0.009	0.002	0	0.010	0.013	0.008	0.009	0.004
-40	0.181	0.828	0.123	0.152	0.676	-40	0.197	0.963	0.221	0.209	0.754
0	0.017	0.019	0.011	0.014	0.005	0	0.014	0.023	0.015	0.015	0.009
-50	0.230	1.033	0.156	0.193	0.840	-50	0.244	1.171	0.272	0.258	0.913
0	0.024	0.029	0.017	0.021	0.009	0	0.020	0.033	0.022	0.021	0.012
-60	0.294	1.290	0.199	0.247	1.044	-60	0.306	1.439	0.337	0.322	1.118
0	0.035	0.043	0.024	0.030	0.014	0	0.030	0.050	0.033	0.032	0.019

-90 Sustained Load

5.4. RESULTS AND OBSERVATIONS for 4.3 Fasteners Testing:

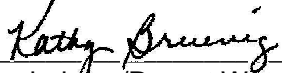
Product Type	Test Type	Fastener Type	Maximum Load(lbf)	Failure Mode
PE 6mm	Pull Through	1/8" Pop Rivet	361.88	Pull Through
PE 3mm	Pull Through	#12 1" Self-Tapping Screw	425.88	Pull Through
PE 3mm	Pull Through	1/8" Pop Rivet	305.75	Pull Through
PE 6mm	Pull Through	#12 1" Self-Tapping Screw	567.89	Pull Through
PE 3mm	Shear Test	1/8" Pop Rivet	356.57	Pull Through
PE 3mm	Shear Test	#12 1" Self-Tapping Screw	740.51	Pull Through
PE 6mm	Shear Test	#12 1" Self-Tapping Screw	844.25	Pull Through
PE 6mm	Shear Test	1/8" Pop Rivet	467.52	Pull Through

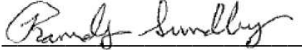
6 Conclusion

Intertek has conducted testing for Alucoil North America LLC, on Larson® by Alucoil® PE 3mm, 4mm and 6mm Aluminum Composite Materials, to test and comply with AC25, Section 3.2.1 Interior Finish, Section 4.1, Section 4.3 Fastener Testing, Section 4.5 Bond Strength Testing, and Section 4.6 Freeze-Thaw Testing. Testing was conducted in accordance with physical performance testing, following the standard methods of ICC-ES AC25, Acceptance Criteria for Metal Composite Materials. This evaluation began August 22, 2012 and was completed September 30, 2012.

The conclusions of this test report may be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK

Reported by: 
Technician/Report Writer Name
Title, Department

Tested by: 
Randy Sundby
Engineer, Construction Products

Reviewed by: 
Rick Curkeet, PE
Chief Engineer, Intertek



Alucoil North America LLC
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APPENDIX A

<Assemble Drawing & Photo's>

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1.0	Initial release	9/20/2012	DLW
1.1	Changed description of Pop. 9916. Added additional separator line type (3) and 997	9/20/2012	DLW
2.0	Changed Company Name. Updated form and Test to reflect both of 9916 and 9917	07/11/2012	ROD
3.0	Change of length of 912 SS and separator line head name to 1.0' 912 SS from 1.25' 912	10/01/2012	ROD

Alucoil® North America, LLC

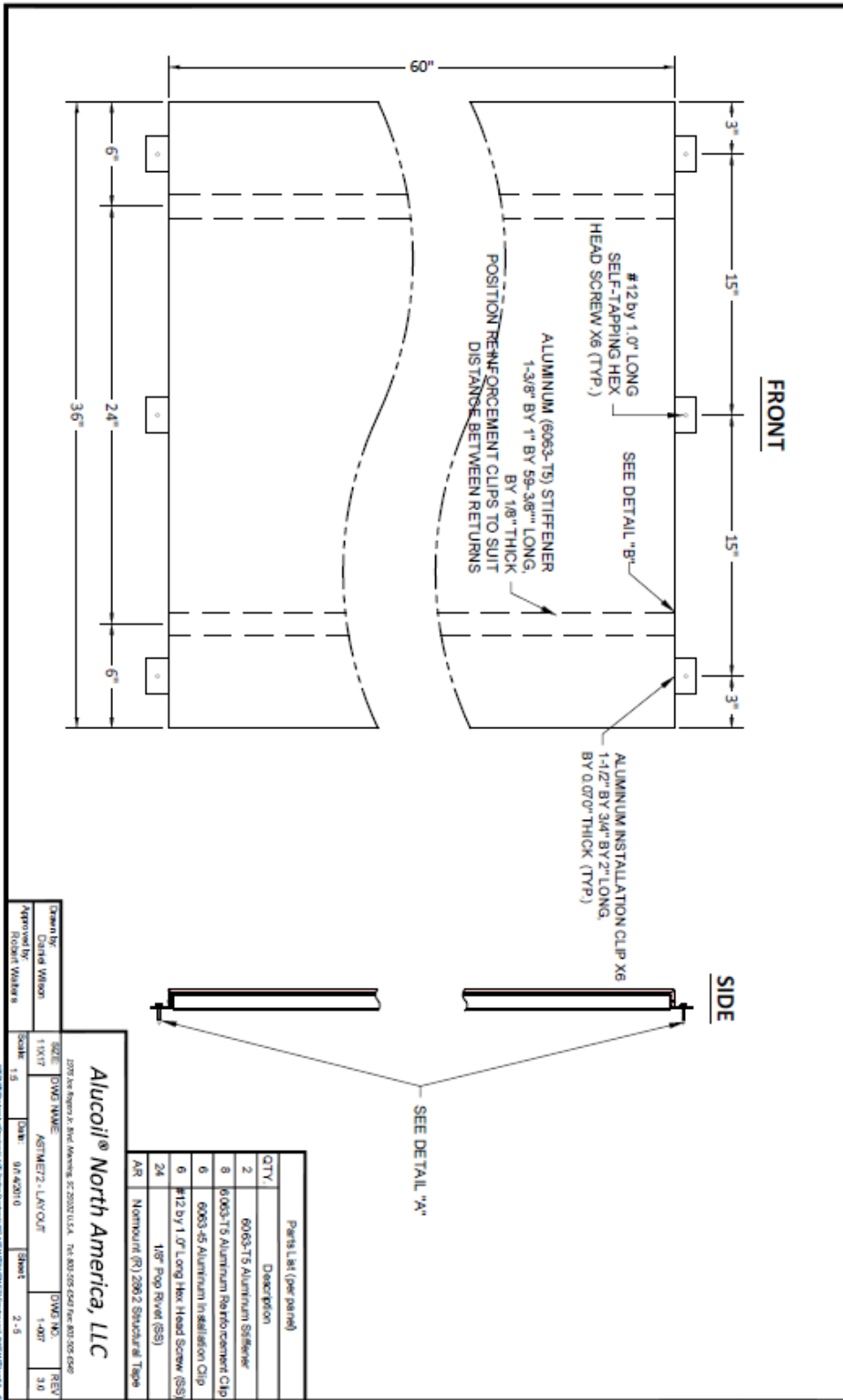
1976 Joe Rogers Jr. Blvd. Manning, SC 29102 U.S.A. Tel: 803-505-6543 Fax: 803-505-6549

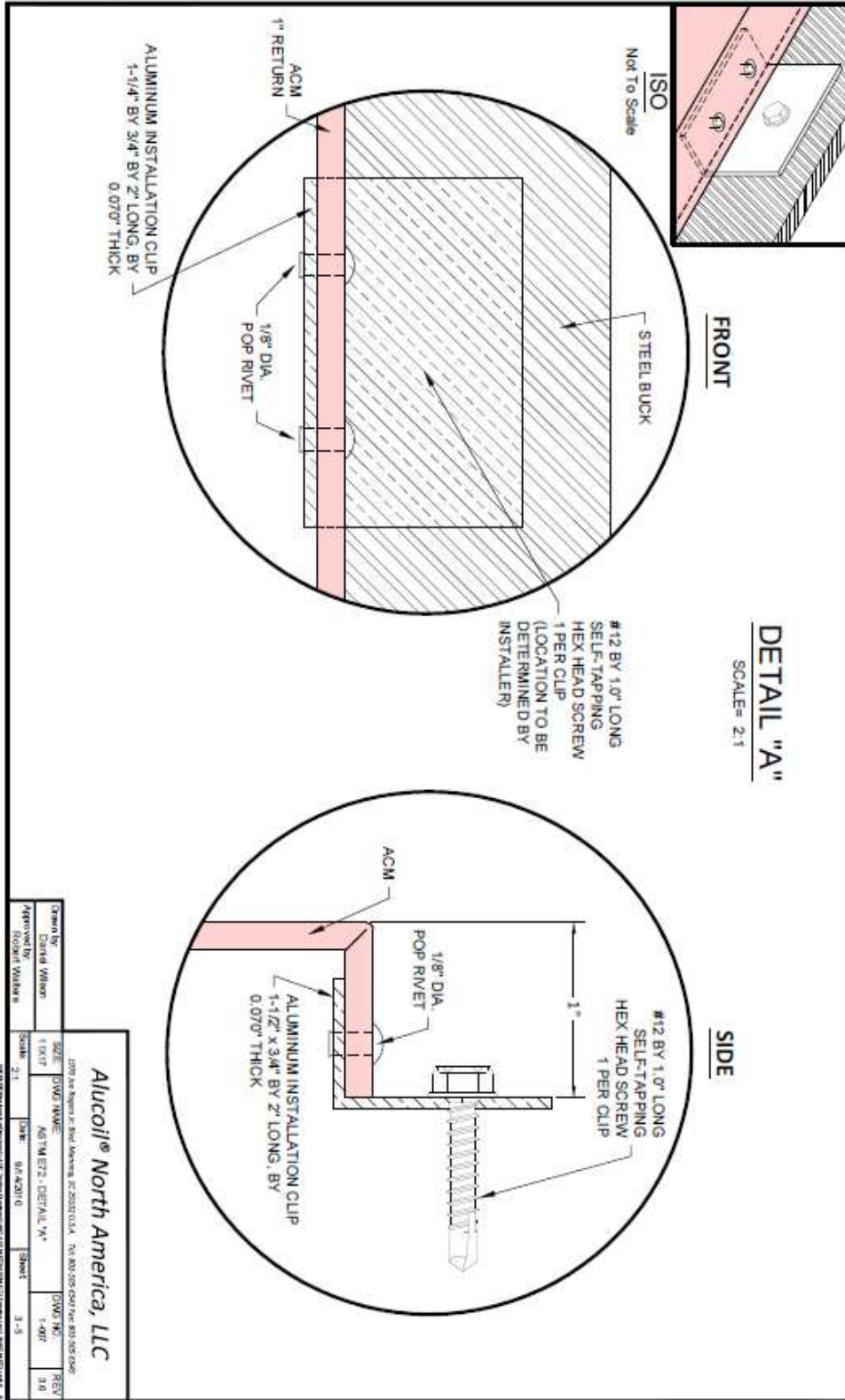
ASTM E72

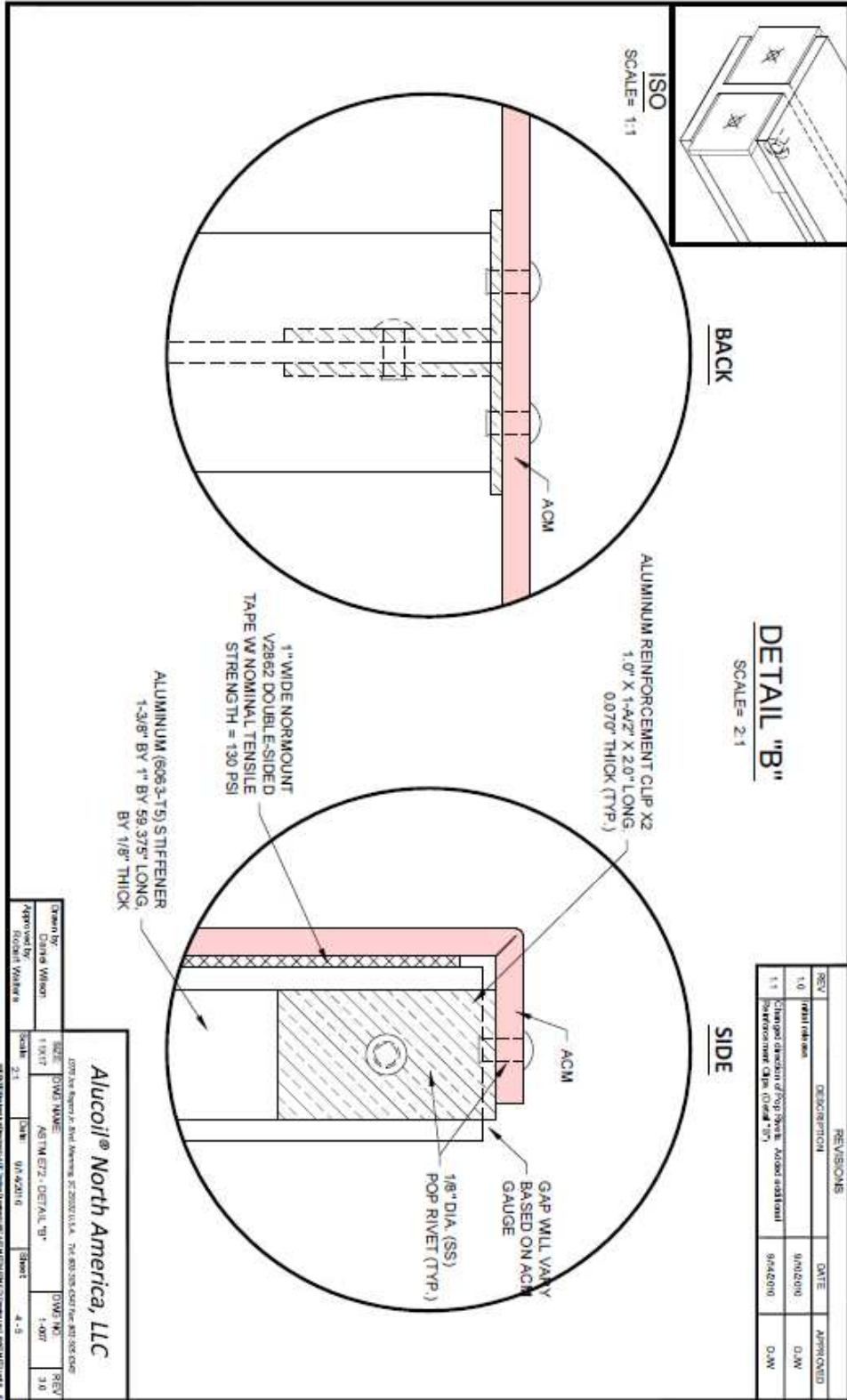
Created By	David Wilson	SIZE	1000'	DATE	09/14/2012	DATE	1-007	REV	3.0
Approved By	Robert Walker	SCALE	N/A	DATE	09/14/2012	DATE	1-007	REV	3.0

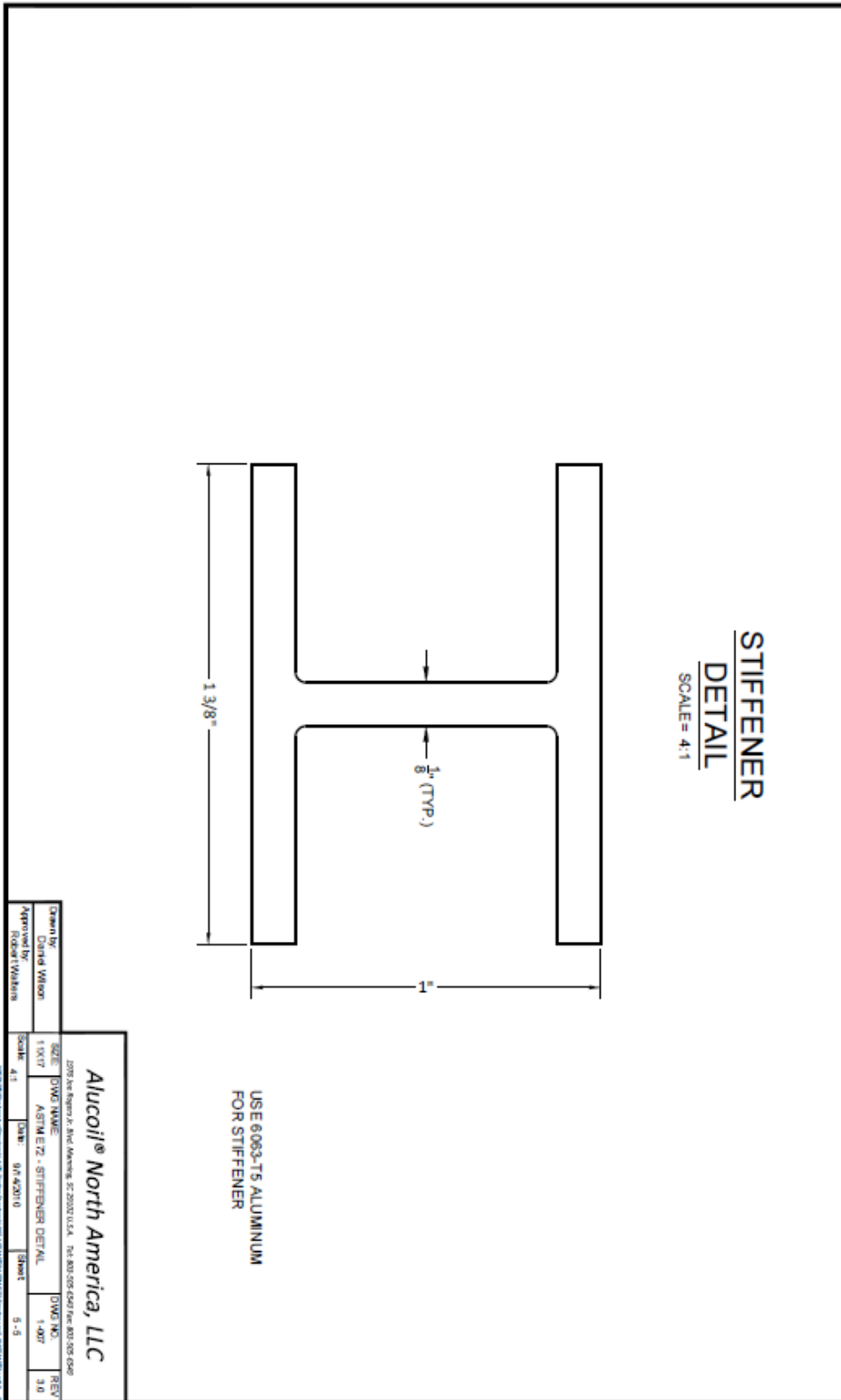
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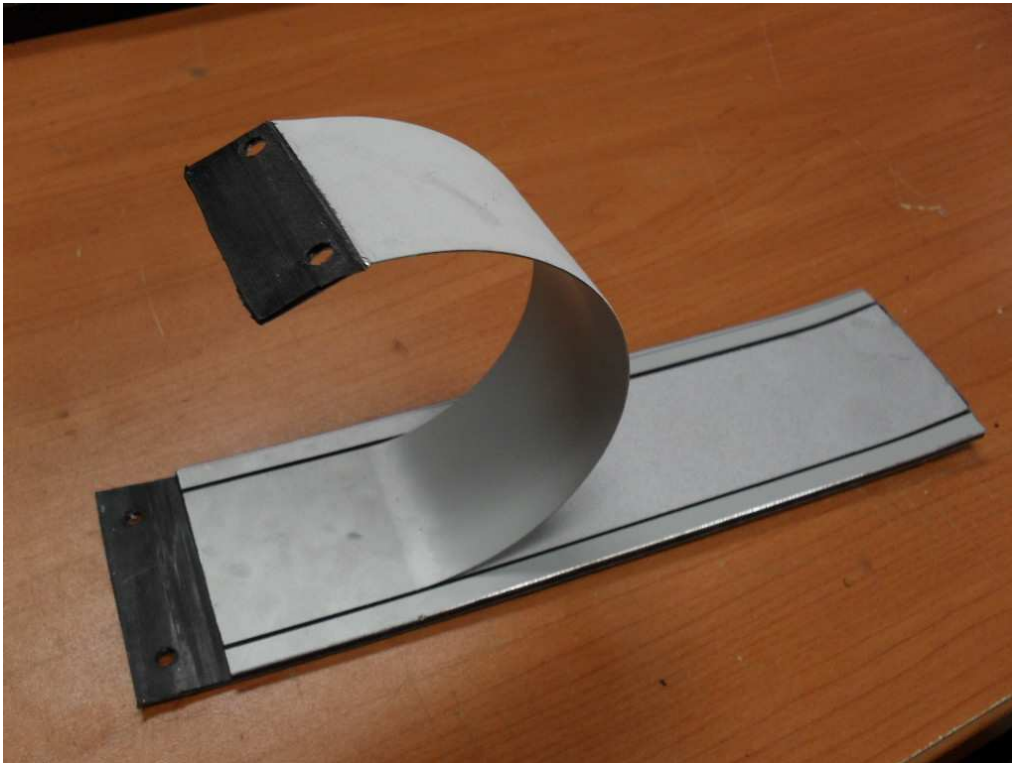
<p>Notes:</p> <p>Layout:</p> <p>Detail "A":</p> <p>Detail "B":</p>	<p>Table of Contents:</p> <p>Notes:</p> <ol style="list-style-type: none"> For all specimens, the sample sizes are to be 36" wide by 60" high. Test requires 6 samples. 3 tested to positive and 3 to negative pressure. The top and bottom edges will utilize a 90 degree bend and 1" return formed by routing the back surface of ACM. Aluminum (6063-T5) Stiffeners measuring 1-3/8" by 1" by 59.375" long, by 1/8" thick, shall be placed 6" in from each non-returned side with Normount (R) 2862 Double-Sided Tape. (This will be done at testing facility). Stiffener length has been selected for for 3mm, 4mm and 6mm thick ACM. Adjust reinforcement clips to accommodate variance in length. All Stiffeners shall be secured to ACM using (4) Aluminum Reinforcement Clips measuring 1-1/4" x 3/4" x 11/16" long, which will be attached to top and bottom edge of panels utilizing a 1/8" diameter pop rivet to secure to stiffener and a 1/8" diameter pop rivet to secure to panel. Aluminum Installation Clips measuring 1-1/2" by 3/4" by 2" long, by 0.070" thick shall be used along the top and bottom edges, located 3" from each side and one at mid-span. Each clip shall be secured to ACM using two 1/8" diameter pop rivets. All samples shall be secured to a steel buck along the top and bottom with six #12 by 1.0" long self-tapping hex head screws, one through each installation clip into steel buck. 														
<p>Sheet 1</p> <p>Sheet 2</p> <p>Sheet 3</p> <p>Sheet 4</p>	<p>Notes:</p> <ol style="list-style-type: none"> For all specimens, the sample sizes are to be 36" wide by 60" high. Test requires 6 samples. 3 tested to positive and 3 to negative pressure. The top and bottom edges will utilize a 90 degree bend and 1" return formed by routing the back surface of ACM. Aluminum (6063-T5) Stiffeners measuring 1-3/8" by 1" by 59.375" long, by 1/8" thick, shall be placed 6" in from each non-returned side with Normount (R) 2862 Double-Sided Tape. (This will be done at testing facility). Stiffener length has been selected for for 3mm, 4mm and 6mm thick ACM. Adjust reinforcement clips to accommodate variance in length. All Stiffeners shall be secured to ACM using (4) Aluminum Reinforcement Clips measuring 1-1/4" x 3/4" x 11/16" long, which will be attached to top and bottom edge of panels utilizing a 1/8" diameter pop rivet to secure to stiffener and a 1/8" diameter pop rivet to secure to panel. Aluminum Installation Clips measuring 1-1/2" by 3/4" by 2" long, by 0.070" thick shall be used along the top and bottom edges, located 3" from each side and one at mid-span. Each clip shall be secured to ACM using two 1/8" diameter pop rivets. All samples shall be secured to a steel buck along the top and bottom with six #12 by 1.0" long self-tapping hex head screws, one through each installation clip into steel buck. 														
<p style="text-align: center;">Parts List (Total : Panel x6)</p> <table border="1"> <thead> <tr> <th>QTY.</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>12</td> <td>6063-T5 Aluminum Stiffener</td> </tr> <tr> <td>48</td> <td>6063-T5 Aluminum Reinforcement Clip</td> </tr> <tr> <td>36</td> <td>6063-T5 Aluminum Installation Clip</td> </tr> <tr> <td>36</td> <td>#12 by 1.0" Long Hex Head Screw (SS)</td> </tr> <tr> <td>144</td> <td>1/8" Pop Rivet (SS)</td> </tr> <tr> <td>AR</td> <td>Normount (R) 2862 Structural Tape</td> </tr> </tbody> </table>		QTY.	Description	12	6063-T5 Aluminum Stiffener	48	6063-T5 Aluminum Reinforcement Clip	36	6063-T5 Aluminum Installation Clip	36	#12 by 1.0" Long Hex Head Screw (SS)	144	1/8" Pop Rivet (SS)	AR	Normount (R) 2862 Structural Tape
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<p style="text-align: center;">Alucoil® North America, LLC</p> <p style="text-align: center;"><small>2007 Oak Ridge Dr. New Martins, SC 29552 USA Tel: 803.592.6267 Fax: 803.592.6268</small></p> <table border="1"> <tr> <td>Drawn By David Wilson</td> <td>Scale 1:100</td> <td>Date 09/18/2010</td> <td>Sheet 1-6</td> </tr> <tr> <td>Approved By Robert Walker</td> <td>Scale N/A</td> <td>Date</td> <td>Sheet</td> </tr> </table>		Drawn By David Wilson	Scale 1:100	Date 09/18/2010	Sheet 1-6	Approved By Robert Walker	Scale N/A	Date	Sheet						
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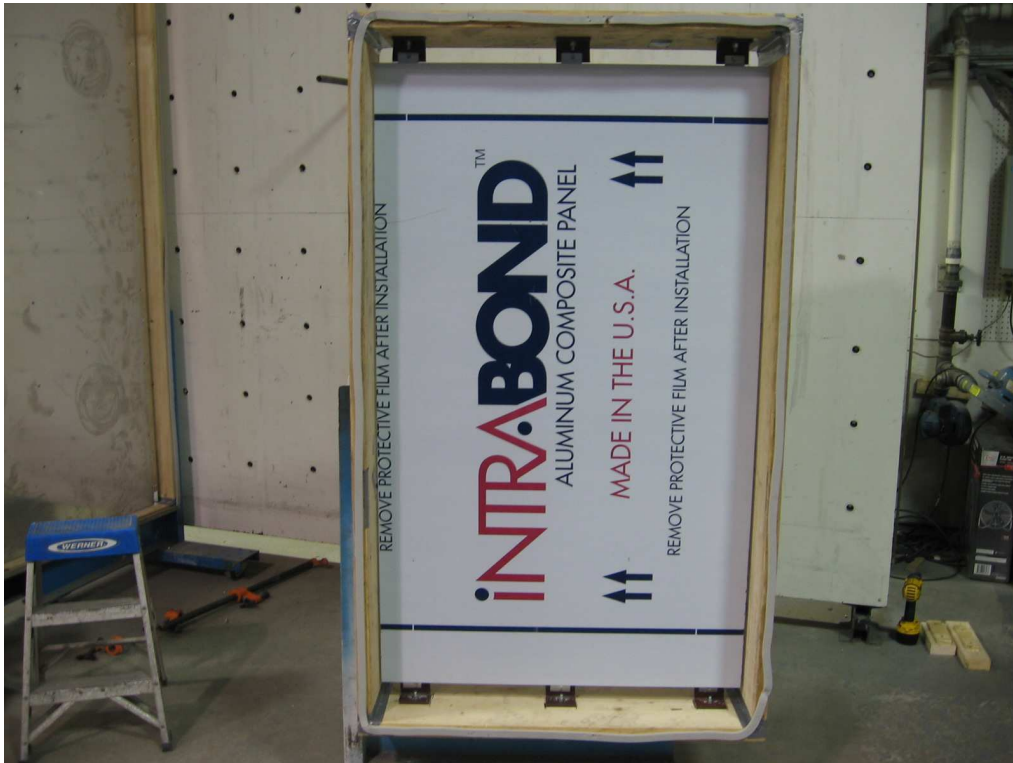








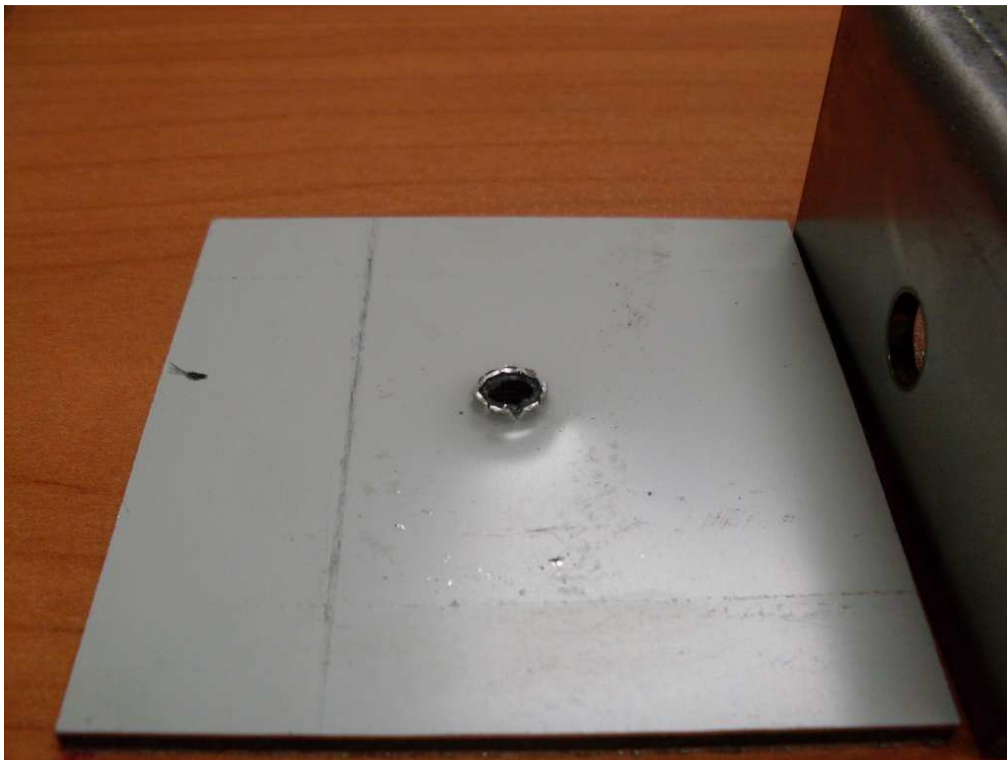


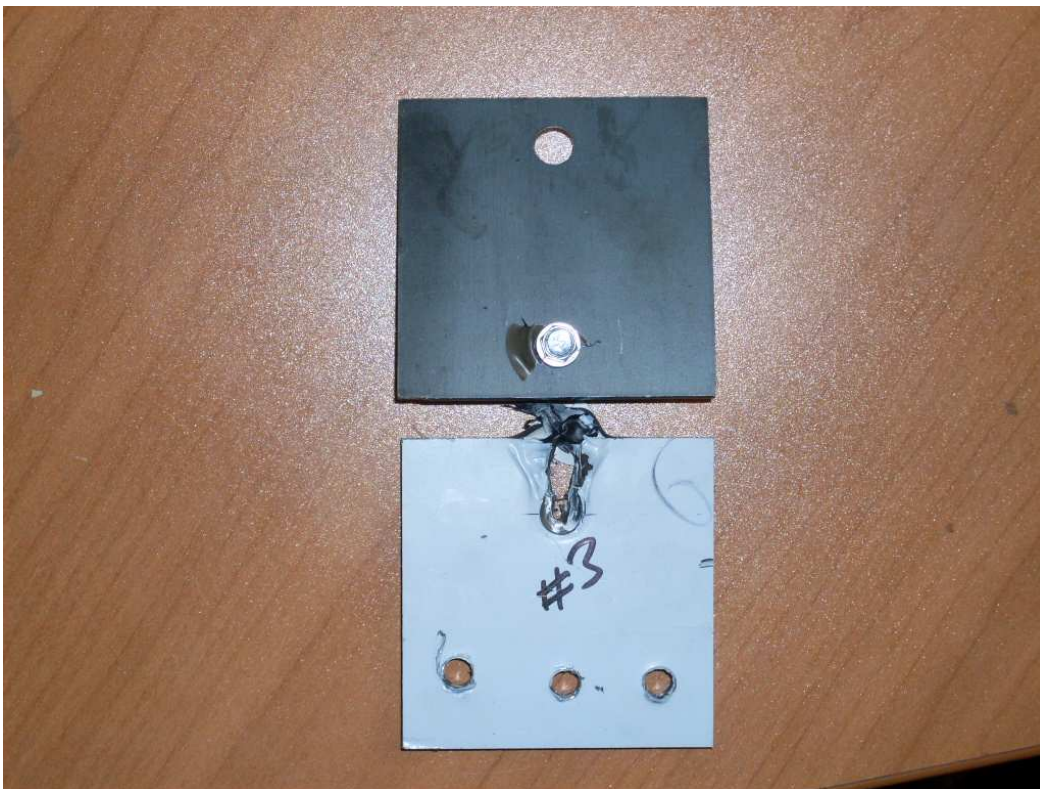














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REVISION SUMMARY

DATE	SUMMARY
October 15, 2012	Initial report
October 16, 2012	Per Clients Request