

ACS COMPOSITE SYSTEMS INC.

TEST REPORT

TEST REPORT ISSUED TO

ACS Composite Systems Inc.
35-7450 Butler Road
Sooke, BC V9Z 1N1
Canada

SPECIFICATION

AAMA 508-14
ASTM E330/E330M-14

EVALUATION PROPERTIES

Pressure Equalization and Uniform Load

PRODUCT SERIES & TYPE

ACS ACP System

REPORT NUMBER

104109354COQ-001A

ISSUE DATE

22-Oct-2019

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TEST REPORT FOR ACS COMPOSITE SYSTEMS INC.

Report No.: 104109354COQ-001A

Date: 22-Oct-2019

CONCLUSION

The ACS ACP System, submitted by ACS Composite Systems Inc., had met the performance requirements as noted in Section 7 of this report when tested in accordance with AAMA 508 and ASTM E330.

Note – This report is not intended as a comprehensive evaluation of the system regarding performance and application to specific buildings.

For INTERTEK B&C:

COMPLETED BY:	David Park	REVIEWED BY:	Jason Komorski
TITLE:	Technician – Building & Construction	TITLE:	Reviewer – Building & Construction
SIGNATURE:		SIGNATURE:	
DATE:	22-Oct-2019	DATE:	22-Oct-2019

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SECTION 2

OBJECTIVE

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for **ACS Composite Systems Inc.** (ACS) on the ACS ACP System. Testing for Pressure Equalization was conducted in accordance with following standard / specification:

- AAMA 508-14, *Voluntary Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems* (AAMA 508)
- ASTM E330/E330M-14 *Standard Test Method for Structural Performance of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference* (ASTM E330)

This evaluation was started on October 10, 2019 and completed on October 11, 2019.

SECTION 3

SAMPLE SELECTION

The client submitted the ACS ACP system to the Evaluation Center on October 10, 2019. Samples were not independently selected for testing. The system/specimen was provided by ACS Composite Systems Inc. located at: 35-7450 Butler Road, Sooke, BC, Canada, V9Z 1N1.

The specimen was installed and as provided by the client. Intertek has not verified the composition, manufacturing techniques, or quality assurance procedures, and accepts no responsibility for any inaccuracies therein.

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SECTION 4

SAMPLE ASSEMBLY AND DESCRIPTION

Series/Model: ACS ACP System

Product Type: Rain Screen Wall Panel System

Overall Size: 96" wide by 96" high

Panel Size: 46-3/4" x 46-3/4" panels

Rain Screen Construction: The test specimen consisted of 4x 46-3/4" x 46-3/4" - 4 mm "Stacbond ACM" panels. A J- track is used along the bottom of the assembly, secured with #10 x 2" wafer head screws, 1x fastener into each stud. The 2x bottom panels have 4x installation clips used along the top of each panel, spaced 4", 18" 28-1/2" and 40" from the outside edge of the panel. The fasteners for the 2x outer clips per panel were secured to the sheathing only. The fasteners for the 2x inner clips per panel were secured through the sheathing and into the studs. The 2x top panels have 4x installation clips used along the top, and 1x along each side. The clips on the side are approximately 4-1/2" from the bottom of the panel. Each aluminum installation clip engages with a track on the panel, and each was secured to the wall assembly with 2x #10 x 2" self-tapping wafer head screws. 2-1/2" wide splines were used between panels, slid into the track of the aluminum frames of each panel, continuous along the vertical joint, and 2x lengths along the horizontal joint.

Test Set-Up: A 96" wide by 96" high steel stud wall was constructed using 16 ga. 2x6 steel studs placed at 16" on center. The wall was then sheathed with 1/2" thick clear poly carbonate sheet. The rain screen panel system was then installed onto the clear polycarbonate in a manner consistent with normal construction procedures for the system. Nominal 2x12 spf was then cladded around the assembly, secured into the steel stud/track using #8x 2-1/2" flat-head screws at approximately 305 mm (12") o.c. The joints and edges of the poly carbonate sheet and test frame were sealed with blue sheathing (Tuck) tape.

A second wall was constructed for Structural Performance testing only. This 96" wide by 96" high wall was constructed using nominal 2x8 #2 or better SPF with the studs placed at 16" on center. The wall was then sheathed with 1/2" SPF sheathing. The wall panel system was then installed in a manner consistent with normal construction procedures for the system.

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SECTION 5

TESTING AND EVALUATION METHODS

AIR LEAKAGE

The Air Leakage tests (Air Infiltration) were conducted in accordance with ASTM E283. The tests were performed using a test pressure of 75 Pa (1.57 psf). As per AAMA 508, air leakage was induced in the system to provide a leakage rate of $0.6 \text{ L/s}\cdot\text{m}^2$.

PRESSURE EQUALIZATION

The Pressure Equalization test was tested in accordance with ASTM E1233 and evaluated to AAMA 508. The test was performed at a specified pressure differential of 240 Pa (5 psf) to 1200 Pa (25 psf) for a minimum of 100 cycles.

WATER PENETRATION RESISTANCE – STATIC

The Static Water Penetration test was tested in accordance with ASTM E331 and evaluated to Section 6.1 of AAMA 508. This test was performed at the specified pressure differential of 730 Pa (15 psf) and a water spray rate of at least 204 L/m^2 per hour (5.0 U.S. gal/ft² per hour). The test was run for fifteen minutes, during which the pressure and water spray were continuously applied.

WATER PENETRATION RESISTANCE – DYNAMIC

The Dynamic Water Penetration test was tested in accordance with AAMA 501.1 and evaluated to Section 6.1 of AAMA 508. The test was performed at the specified wind speed of 120 kph (75 mph) wind, generated using a Wind Generator, and a water spray rate of at least 204 L/m^2 per hour (5.0 U.S. gal/ft² per hour). This test consisted of fifteen minutes, during which the wind and water spray were continuously applied.

STRUCTURAL PERFORMANCE

The Structural Performance testing was conducted in accordance with ASTM E330/E330M-14 *“Standard Test Method for Structural Performance of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference”* (ASTM E330), Procedure A. The test was performed in the negative wind load direction only. After the 10 second preload (50% of the first test load), followed by 1 minute with the pressure released, the full test load was applied for 10 seconds and then released. The test loads had started at 960 Pa (20 psf) and continued upwards in 240 Pa (5 psf) increments until failure. A grid of 32 mm (1-1/4”) diameter holes were drilled through the plywood sheathing, then polyethylene film was applied over top in order to apply a uniform load across the panel system. In order to ensure the maximum load was transferred to the specimen and that the polyethylene film did not prevent movement or failure of the specimen, the polyethylene film was applied loosely with extra folds of material at each corner and at all offsets and recesses.

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Deflection readings were recorded in order to establish deformation on the two panel systems. 7x gauges were set on the test assembly, 4x on the top right panel and 3x on the bottom left panel. The top panel has gauges #1, #2 and #3 in a horizontal line along the bottom of the panel. The bottom left panel has Gauge #4 at the center of the panel, #5 approximately 25 mm (1") from the bottom right corner and Gauge #6 approximately 25 mm (1") from the top right corner. Gauge #7 is at the center of the top right panel. The span between gauges #1 and #3 was 1135 mm (44.7").

DEVIATION FROM STANDARD METHOD

There were no noted deviations from the test standards used in the evaluation reported herein.

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SECTION 6**TEST EQUIPMENT**

Equipment used during testing is listed as follows:

Test	Equipment	Intertek ID#
Air Leakage, Pressure Equalization, Static Water Penetration, Structural	Fenestration Testing Control Unit	60650
	Water Spray Assembly	60651
		60652
	Micro Mule	63170
	Rain Screen Pressure Box	INT00712
	20" Line Gauge	60673
		64928
		64926
		64923
		64920
		64922
		64921
Dynamic Water	Wolf Wind Machine	63339
	Spray Rack	On-Site Spray Rack

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SECTION 7

RESULTS AND OBSERVATIONS

AIR LEAKAGE

Air leakage test data is indicated in the following table:

Test Pressure	75 Pa
Overall Area	5.94 m ² (63.98 ft ²)
Air Leakage	0.6 L/s*m ² (0.12 cfm/ft ²)
No. of 1/8" Holes Drilled	94

PRESSURE EQUALIZATION

During the Pressure Equalization test cycling at a pressure differential from 240 Pa (5 psf) to 1200 Pa (25 psf) for 100 cycles the systems lag times was below the required 0.08 seconds and the differential between the cavities and cyclic wind pressure did not exceed 50% of the maximum test pressure. Refer to Appendix C for a graph on one of the cycles from this test. The tested specimen **met** the performance requirements for Pressure Equalization of AAMA 508.

WATER PENETRATION RESISTANCE – STATIC

During the 15-minute test period, using a pressure differential of 720 Pa (15 psf), there was no water leakage observed through the tested sample. The sample **met** the performance requirements for Static Water Penetration of ASTM E331.

WATER PENETRATION RESISTANCE – DYNAMIC

During the 15-minute test period, using wind speed 120 kph (75 mph), no water leakage was observed through the tested sample. The sample **met** the performance requirements for Dynamic Water Penetration of AAMA 501.1.

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STRUCTURAL PERFORMANCE

After the test loads were released, the sample was inspected and there was found to be no permanent deformation or structural distress in the assembly. The assembly had **met** the performance requirements of ASTM E330 at the load specified in the table below:

Table 1. ACS ACP Panel Test Results							
	Gauges (mm)						
Load (psf)	1	2	3	4	5	6	7
5 -Preload	N/A	N/A	N/A	N/A	N/A	N/A	N/A
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.90	1.39	0.19	9.61	0.21	0.95	9.25
0	0.05	0.05	0.00	0.10	0.00	0.00	0.05
15	1.46	1.99	0.41	12.46	0.49	1.59	12.07
0	0.15	0.15	0.00	0.20	0.00	0.10	0.20
20	2.10	2.58	0.69	14.94	0.71	2.43	14.47
0	0.25	0.20	0.00	0.30	0.00	0.15	0.25
25	2.71	3.12	0.94	17.14	0.98	3.28	16.64
0	0.30	0.25	0.00	0.40	0.05	0.20	0.45
30	3.36	3.63	1.17	19.09	1.23	3.98	18.52
0	0.30	0.30	0.05	0.60	0.05	0.25	0.55
35	4.10	4.18	1.38	21.03	1.57	4.85	20.40
0	0.40	0.30	0.05	0.90	0.05	0.30	0.80
40	4.75	4.61	1.60	22.71	1.84	5.52	21.91
0	0.40	0.35	0.10	1.10	0.05	0.35	1.00
45	5.45	5.18	1.82	24.32	2.10	6.47	23.63
0	0.45	0.50	0.10	1.35	0.10	0.50	1.20
50	6.28	5.80	2.09	26.27	2.50	7.41	25.38
0	0.55	0.60	0.00	1.70	0.10	0.60	1.50
60	N/A	N/A	N/A	N/A	N/A	N/A	N/A
70	N/A	N/A	N/A	N/A	N/A	N/A	N/A
80	N/A	N/A	N/A	N/A	N/A	N/A	N/A
90	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ultimate Load	93 psf						

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SECTION 8

CONCLUSION

The ACS ACP System, submitted by ACS Composite Systems Inc., had met the performance requirements as noted in Section 7 of this report when tested in accordance with AAMA 508 and ASTM E330.

Note – This report is not intended as a comprehensive evaluation of the system regarding performance and application to specific buildings.

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SECTION 9

APPENDIX A: PHOTOGRAPHS

(4 Pages)

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ACS ACP Rain Screen Panel System

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Test Setup – Uniform Load - E330

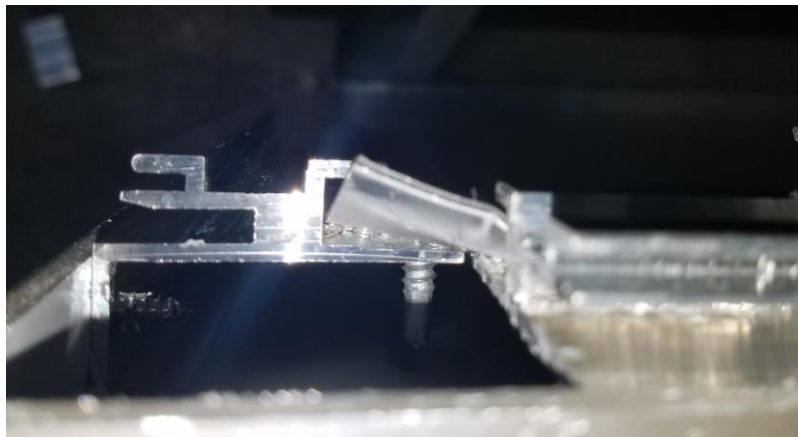


Test Setup – Dynamic Water - AAMA 501.1

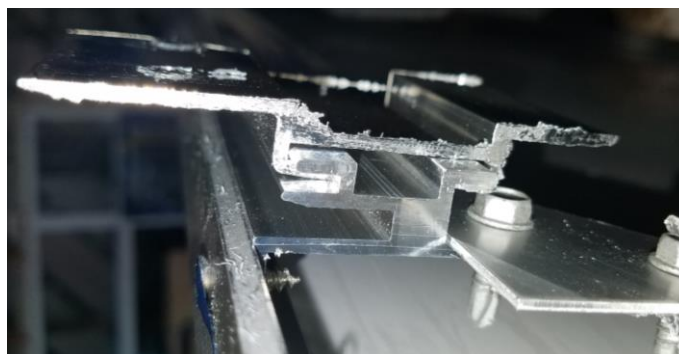
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Panel frame and corner bracket



Panel corner bracket bent along the 45° angle



Installation clip and panel frame profile

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Installation Photo – Top installation clip



Installation Photo – Starter J-Track

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SECTION 10

APPENDIX B: DRAWINGS

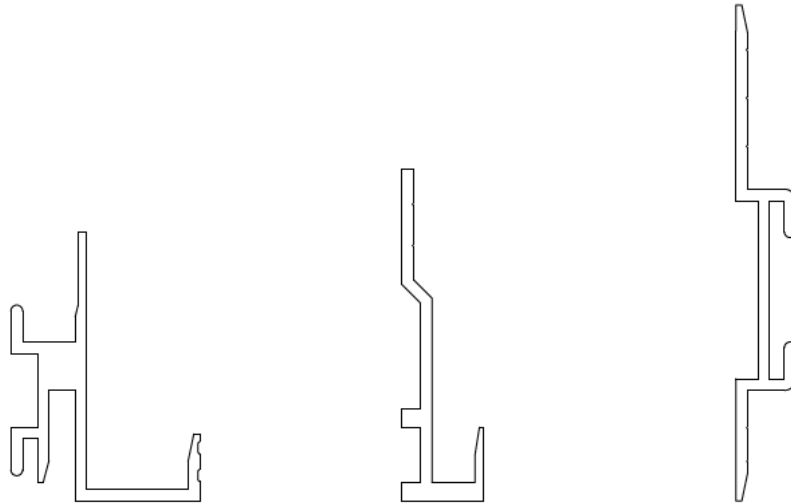
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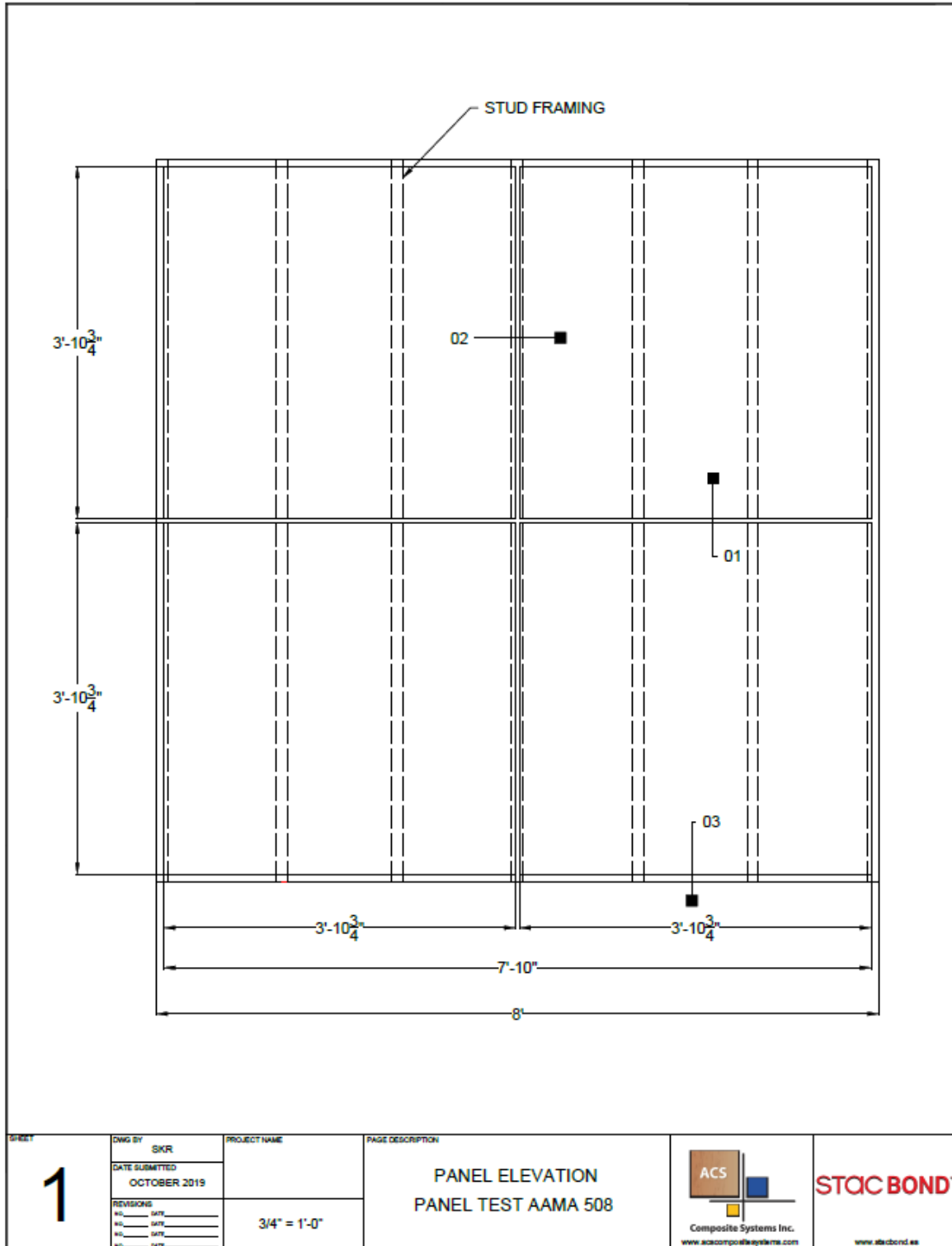
ACP SYSTEMS - 1

ARCHITECTURAL TESTING FOR AAMA 508 CERTIFICATION

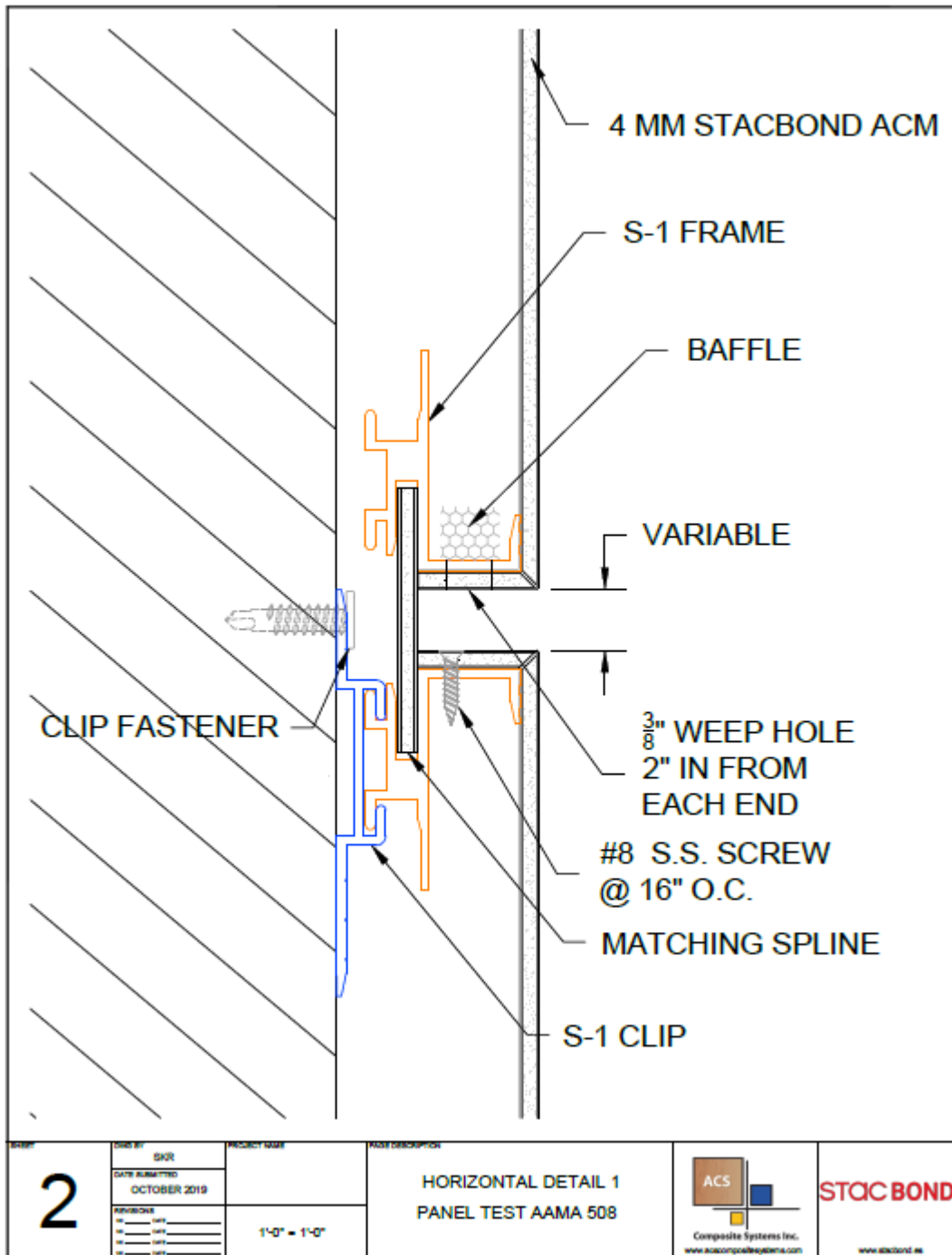


SHEET 0	DWG BY SKR	PROJECT NAME	PAGE DESCRIPTION ACP SYSTEMS - 1 PROFILES	 Composite Systems Inc. www.acscompositesystems.com	 STACBOND www.stacbond.es
	DATE SUBMITTED OCTOBER 2019				
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	NO. _____ DATE _____				

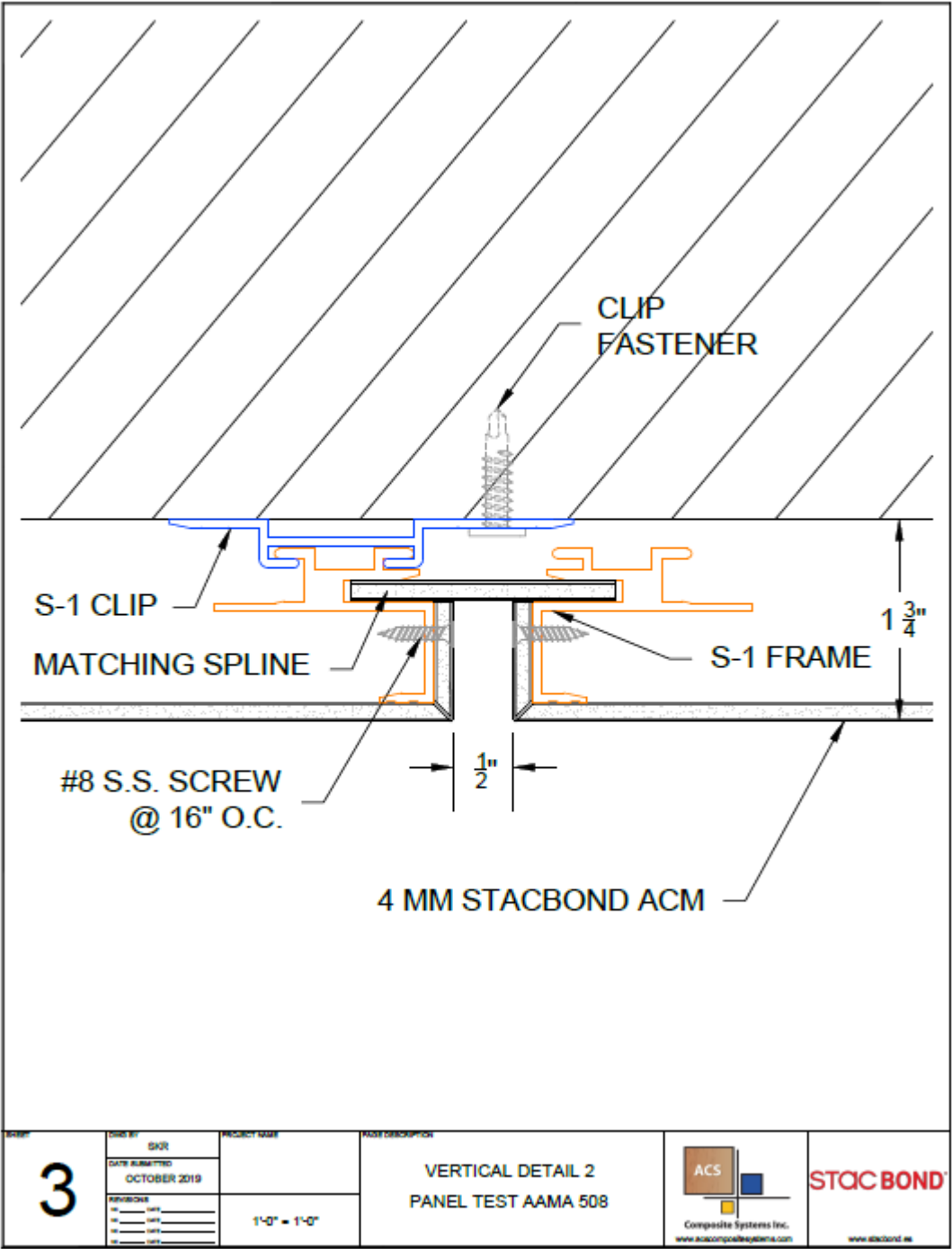
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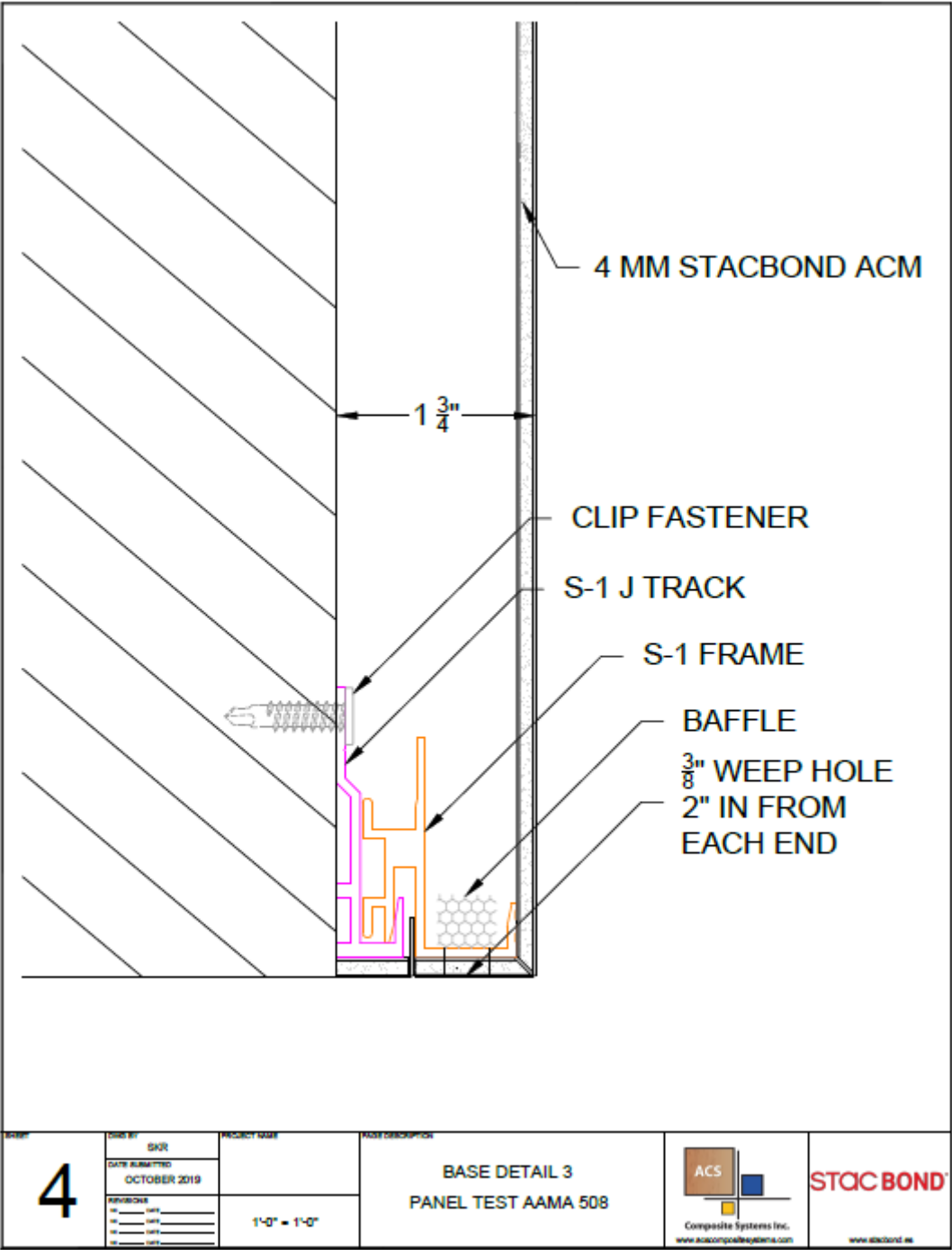


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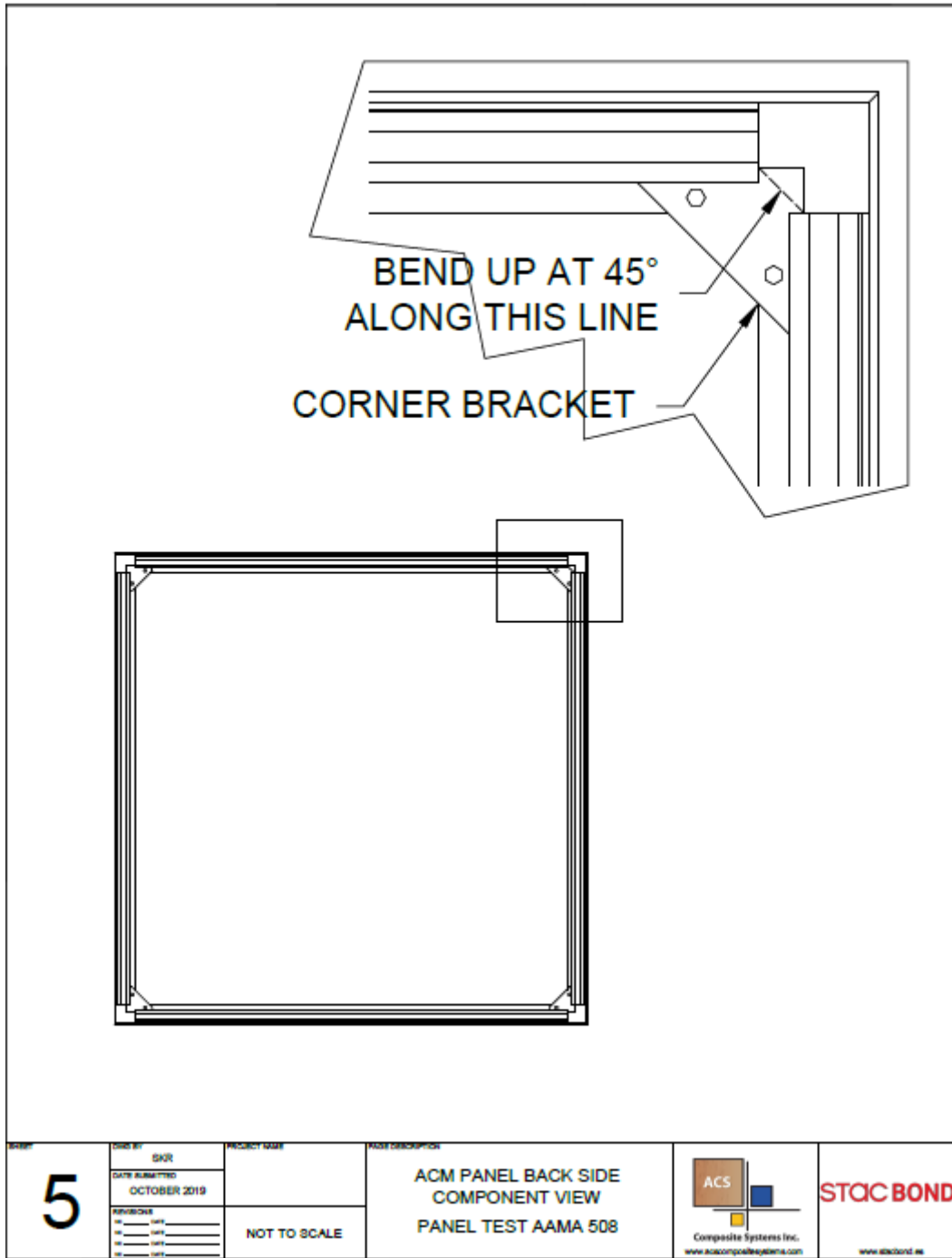
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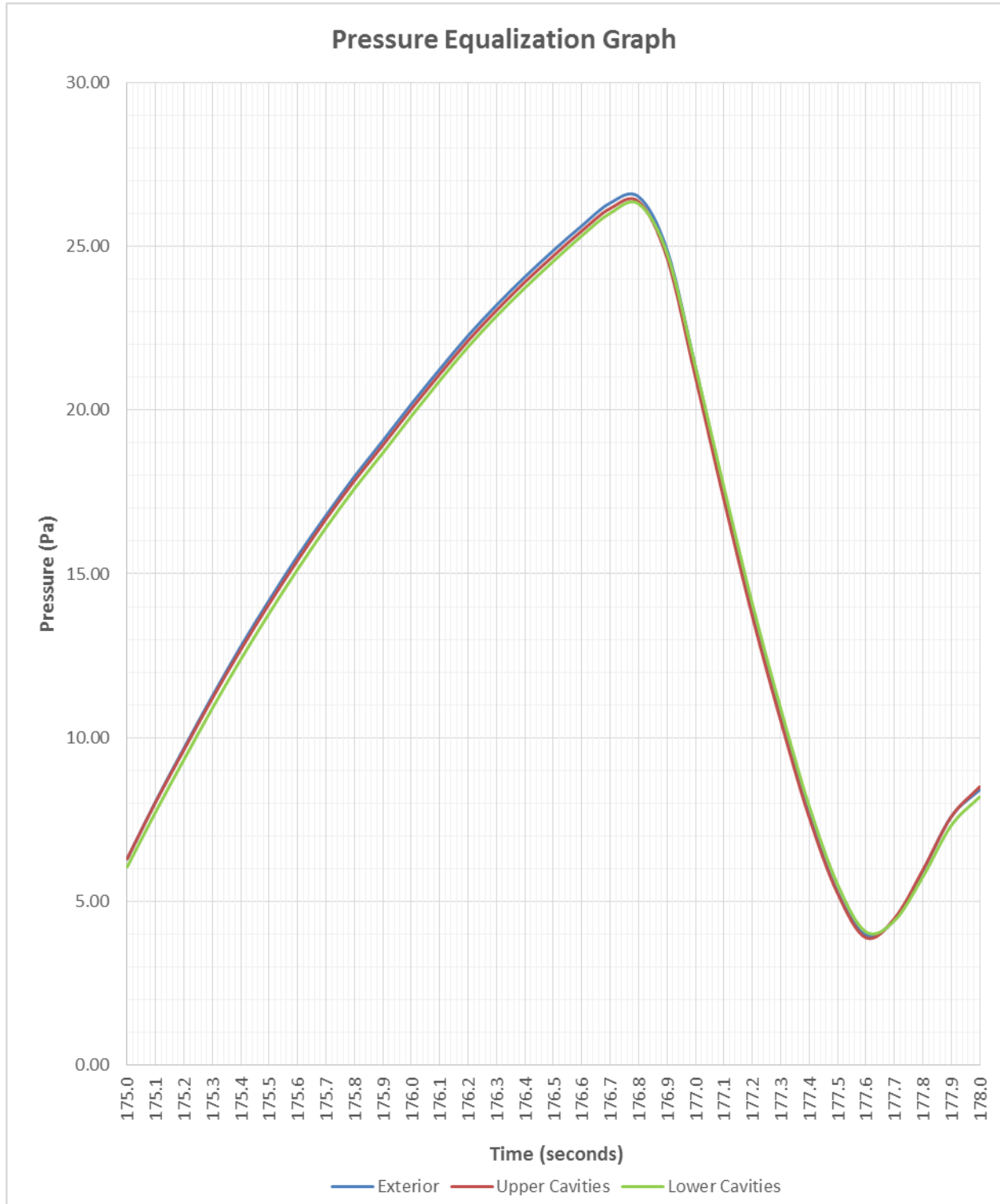
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SECTION 11

APPENDIX C: PRESSURE EQUALIZATION GRAPH

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SECTION 12

APPENDIX D: REVISION TABLE

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Revision Table				
Date	Section	Description	Technician	Reviewer
22-Oct-2019	---	Original Issue Date	---	---