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**PERFORMANCE EVALUATION OF THE CARTER ARCHITECTURAL PANELS INC.,
“FUSION™ DRILLFREE™ PANEL SYSTEM”
IN ACCORDANCE WITH AAMA 508-07 FOR
PRESSURE EQUALIZATION BEHAVIOR & WATER PENETRATION RESISTANCE**

Report to:	Carter Architectural Panels Inc. 221 E. Willis Road “A” Unit 18 Chandler, AZ 85286
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Report No.:	16-06-M0171-4 5 Pages, 3 Appendices
Proposal No.:	16-006-438721
Date:	July 3, 2016

1.0 INTRODUCTION

At the request of Carter Architectural Panels Inc., Exova was retained to evaluate the "FUSION™ DRILLFREE™ Panel System" exterior wall panel system in accordance with AAMA 508-07 for pressure equalization behavior and water penetration resistance as outlined in Proposal number 16-006-414789.

Upon receipt, the specimen was assigned the following Exova Specimen Number:

<u>Client Specimen Description</u> FUSION™ DRILLFREE™ Panel System (Equal Panel Scheme / 6 panels, not individually pressure isolated)	<u>Exova Specimen No.</u> 12-06-M0325-B
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Note: The ACM used in the "FUSION™ DRILLFREE™ Panel System" by Carter Architectural Panel Inc., is "Iarson by ALUCOIL" formerly known as "Intrabond." A complete bill-of-materials and details for the specimen identified above is located in Appendix A.

2.0 PROCEDURE

Test Description	Test Method
Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems – Pressure Equalization Behaviour	AAMA 508-07, Section 5.5 – Referencing ASTM E1233 (Modified)
Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems – Water Penetration Resistance	AAMA 508-07, Section 5.6 – Referencing ASTM E331

Note: SI units are the primary units of measure.

Test Wall Section Description & Details:

The back-up test wall section (air / water barrier) was constructed in an Exova test frame as per the detail drawing below in accordance with AAMA 508-07, Section 5.0:

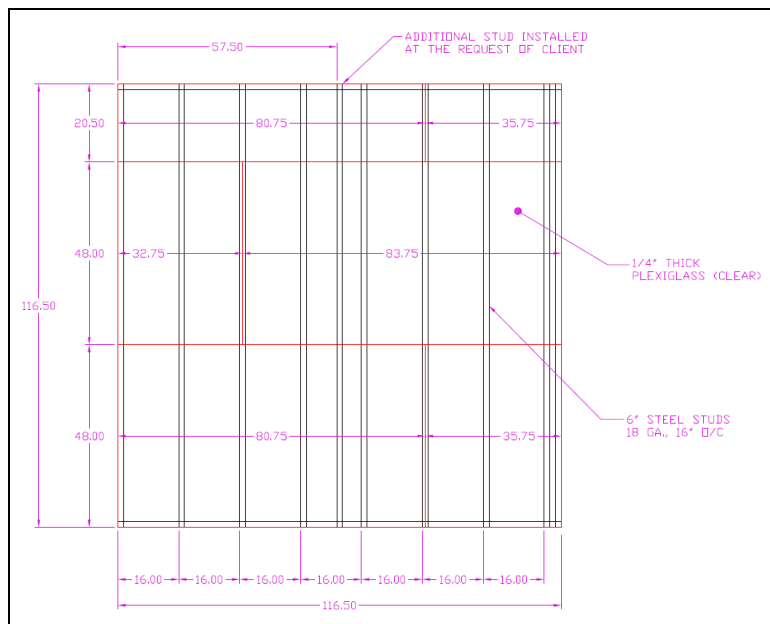


Figure 1 – Back-up Test Wall Framing Construction

Upon completion of the back-up wall, the Plexiglas joints and screw-heads were sealed to ensure the assembly was air-tight. After the air leakage validation for tightness was completed, as prescribed by AAMA 508-07, Section 5.2.2 & Figure 1A, three (3) mm diameter holes were introduced equally spaced 150 mm (5.90 inches) above horizontal seams and above the base of the mock-up in order for the air / water barrier to have an air leakage rate of 0.6 L/s·m² (0.12 CFM/ft²).

The application of the cladding system on the test back-up wall was performed by Carter Fabricating Inc. authorized personnel in April, 2013. As permitted by AAMA 508-07, Note 5, the perimeter of the specimen was sealed to the fixture that the wall section was constructed into. No drainage/vent holes or critical areas of the specimen that would be affected by water infiltration / drainage or differential pressure were obstructed.

Using the procedure outlined in AAMA 508-07, Section 5.5, the pressure cycling tests were conducted as specified in ASTM E1233. However, ASTM E1233 was modified to incorporate a positive pressure from 240 Pa (5.01 PSF) to 1200 Pa (25.06 PSF) to 240 Pa (5.01 PSF) based on a maximum average of three seconds for 100 cycles as per AAMA 508-07.

Upon completion of the pressure equalization behavior test, the AAMA 508-07, Section 5.6, water penetration test at 300 Pa (6.26 PSF) for fifteen minutes was conducted.

Test Date: May 3rd, 2013

3.0 RESULTS

Table 1 – Pressure Equalization Behavior Analysis Exova Specimen Number: 12-06-M0325-B					
Compartment Tested	Maximum External Gust Pressure of Pulse	Maximum Cavity Pressure of Pulse	Requirements		Comments
			Pressure Differential	Maximum Time Shift of Pulse	
Primary Compartment	1159 Pa (24.20 PSF)	983 Pa (20.53 PSF)	Pressure differential on rain screen cladding shall not exceed 50% of maximum wind gust pressure	< 0.08 seconds	Meets Requirement

Pressure equalization graphs are located in Figures 2 (Page 4)

- Air Leakage of Back-Up Wall (air / water barrier): **0.59 L/s m² (0.12 CFM/ft²)**
- Ratio of cavity volume to vent area: **399 m³ / m² · (1313 ft³ / ft²)**

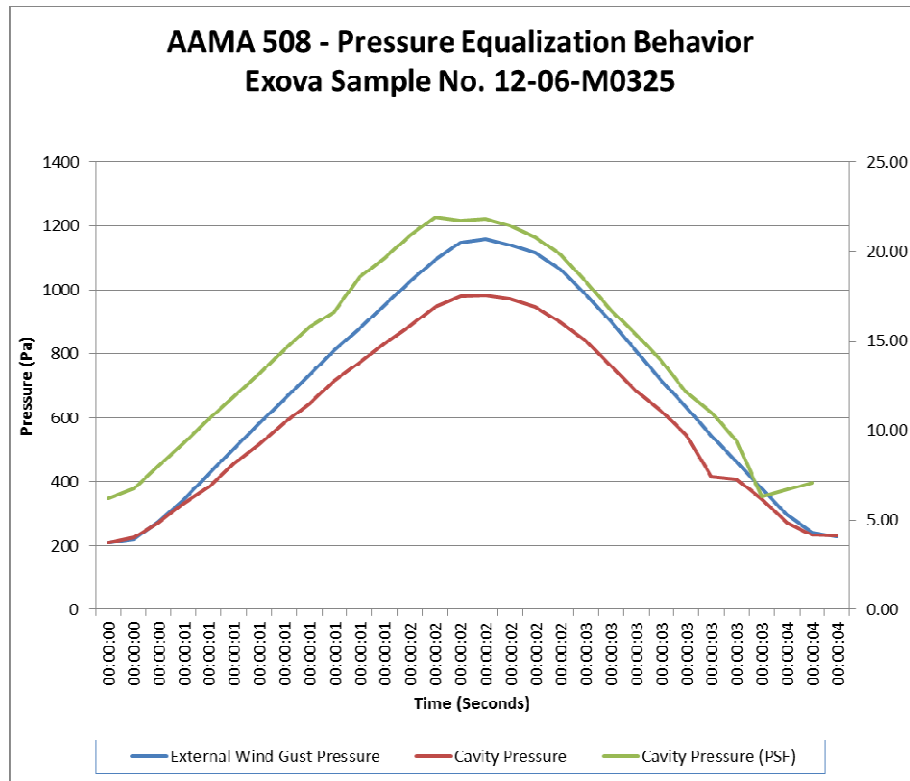


Figure 2 – Pressure Equalization Behavior

Table 2 – Water Penetration Resistance AAMA 508-07, Section 5.6, Referencing ASTM E331-00(2009) Exova Specimen Number: 12-06-M0325-B			
Test Pressure (Pa)	Requirements	Results	Comments
300 Pa (6.24 PSF) (15-Minutes)	All water that penetrates the exterior rain screen cladding shall be controlled and drained to the exterior. All water that contacts the air / water barrier shall be visually observed and recorded: a) Water mist or droplets on the air/water barrier surface; and/or b) Water in continuous stream on the air/water barrier surface. Failure shall be defined as water mist or water droplets appearing in excess of 5% of the air/water barrier surface, or continuous streaming at any location on the air/water barrier.	Water mist and/or droplets were observed. No continuous streaming was observed. 3.14 % of air/water barrier surface area had water misting and / or water droplets.	Meets Requirement

Table 3 – Support Wall Deflection Measurements Exova Specimen Number: 12-06-M0325-B			
Test	Requirements	Test Results	Comment
Uniform Load Deflection (Clause 5.1.2)	<p>ASTM E1233 Modified: +/- 1,200 Pa (25.06 PSF)</p> <p>Requirements: - No permanent damage - Report Support Wall Deflection</p>	<p>Stud Length (L) = 2,950 mm (116.142 inches) Allowable (L/180) = 16.4 mm (0.645 inches)</p> <p>Net Deflection at Design Pressure: + 1,242 Pa (25.93 PSF) = -2.4 mm (0.094 inches)</p> <p>- 1,287 Pa (26.88 PSF) = 2.1 mm (0.083 inches)</p> <p>- No Permanent Damage Observed</p>	<p>Meets Requirements</p> <p>L/180</p>

4.0 SYSTEM MODIFICATIONS

No modifications were made to the system as shown respectively in Appendix A.

5.0 DISCUSSION

The Carter Architectural Panels Inc. "FUSION™ DRILLFREE™ Panel System" (Exova Specimen No.: 12-06-M0325-B) identified in this report met the requirements of AAMA 508-07 for cavity pressure differential, time shift of pulse and water penetration. The system has a cavity volume to vent area ratio of 399 m³/m² (1,313 ft³/ft²) with four (4) 0.375" diameter vent holes per panel.

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

Note: This report is reissued in the name of Carter Architectural Panels Inc., through written authorization from Carter Fabricating Inc. to whom the original report was rendered. The original tested specimen was manufactured and assembled by Carter Fabricating Inc. as outlined in Exova Report No.: 12-06-M0325-B, Revision 2 (dated: 2015 August 18).

6.0 REVISION HISTORY

<u>Date:</u>	<u>Revision:</u>	<u>Comments:</u>
2016-July-3	Original Document	N/A

Reported by:

Authorized by:


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Operations & Technical Manager, Products Division
Product Testing Division

APPENDIX A

Specimen Bill of Materials and Drawings

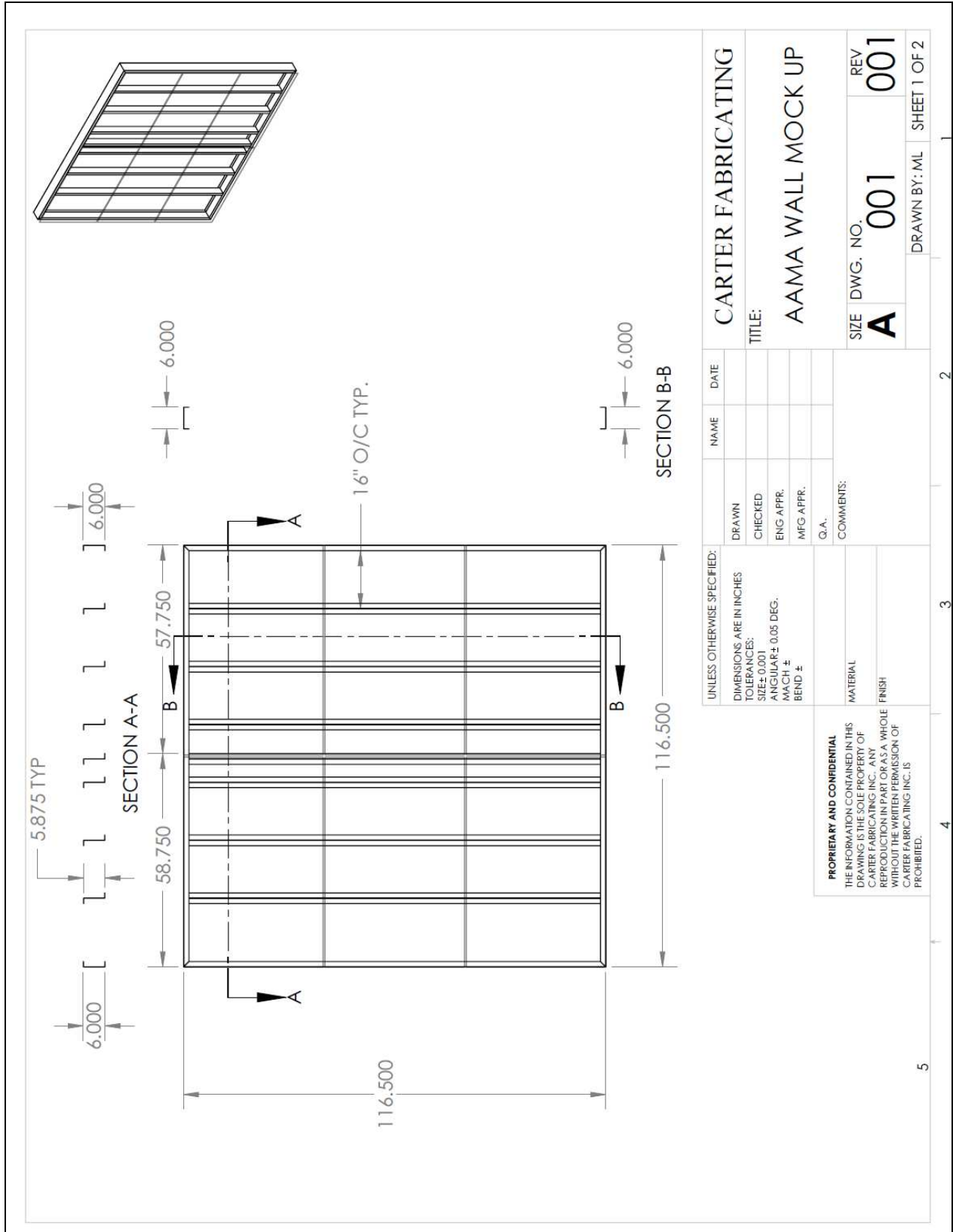
(3 Pages)

Bill of Materials

(As provided by Carter Fabricating Inc.)

- 6 Panels of “FUSION™ DRILLFREE™ Panel System”. Each panel size of 38.375 in x 57.75 inch
- Each panel consist of 4mm Larson ACM
- 16 rivets total per panel, 3/16” structural aluminum design) spaced on 16” centers
- 4 weep holes @ 0.375” on 16” centers with foam bug screen backing
- Perimeter extrusion around the entire perimeter (6061 T6 aluminum custom profile)
- 3” Mid-clips (mounting clips 6061 T6 Aluminum, custom profile) each screwed to the perimeter extrusion on 24 inch centers maximum with a # ¼”-20-1” screw and then affixed to the substrate or Z-Girt (18 GA G-90 galvanized metal) using the same style of fastener
- 2” wide filler strip material (4mm Larson ACM) used to cover the panel joints, cut as required.
- Extruded aluminum starter strip (6061 T6 aluminum custom profile) at the base and one side of the panel wall.

Note: The ACM used in the “FUSION™ DRILLFREE™ Panel System”, is “larson by ALUCOIL” (Formerly known as “Intrabond”) manufactured in Manning, South Carolina, USA. The larson® Aluminum Composite Material (ACM) utilized is a fully tested and certified, architectural wall cladding material available in both polyethylene (PE) and fire retardant (FR) core panels.



UNLESS OTHERWISE SPECIFIED:		CARTER FABRICATING	
DRAWN	CHECKED	NAME	DATE
DIMENSIONS ARE IN INCHES			
TOLERANCES:			
SIZE ± 0.001	ANGULAR ± 0.05 DEG.		
MACH ±	MFG APPR.		
BEND ±	Q.A.		
COMMENTS:		TITLE:	
		AAMA WALL MOCK UP	
MATERIAL		SIZE	DWG. NO.
FINISH		A	001
		REV	001
		DRAWN BY: ML	SHEET 1 OF 2

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