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PERFORMANCE EVALUATION OF CARTER ARCHITECTURAL PANELS, INC. "FLEX CONNECT RAINSCREEN PANEL SYSTEM" IN ACCORDANCE WITH AAMA 508-21 & ASTM E330-14

Report to:	Carter Architectural Panels, Inc. 326 Deerhurst Drive Brampton, ON. L6T 5H9
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Report No.:	26-06-B0105-1 8 Pages, 2 Appendices
Proposal No.:	26-006-866273 RV1
Report Date:	September 15, 2026

1.0 INTRODUCTION

Element was retained to evaluate the "FLEX CONNECT Rainscreen Panel System" in accordance with AAMA 508-21 for pressure equalization behavior and water penetration resistance; and ASTM E330-14 for structural performance as outlined in Proposal Number 26-006-866273 RV1.

Upon construction, the specimen was assigned the following Element Specimen Number:

Client Specimen Description	**Element Specimen No.**
FLEX CONNECT Rainscreen Panel System	26-06-B0105-1

("Cross" Panel Scheme / 4 panels, not individually pressure isolated)

Note: The panels used in the "FLEX CONNECT Rainscreen Panel System" by Carter Architectural Panels, Inc., were "4 mm etalbond®." A complete bill-of-materials and details for the specimen identified above is located in Appendix A. Data Provided by the client and can affect the validity of the results.

2.0 PROCEDURE

Test Method	Test Description
AAMA 508-21, Section 5.5 – *Referencing ASTM E1233 (Modified)*	Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems – Pressure Equalization Behaviour
AAMA 508-21, Section 5.6 – *Referencing ASTM E331*	Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems – Water Penetration Resistance
AAMA 508-21, Section 5.7 – *Referencing AAMA 501.1-05*	Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems – Dynamic Water Test
ASTM E330-14	Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

Note 1: SI units are the primary units of measure.
Note 2: The above methods are included in Element Materials Technology Canada Inc.'s scope of accreditation (ACCREDITATION: (A2LA 6524-01)

Test Wall Section Description & Details:
The back-up test wall section (air / water barrier) was constructed in an Element test frame as per the detail drawing below in accordance with AAMA 508-21, Section 5.0:

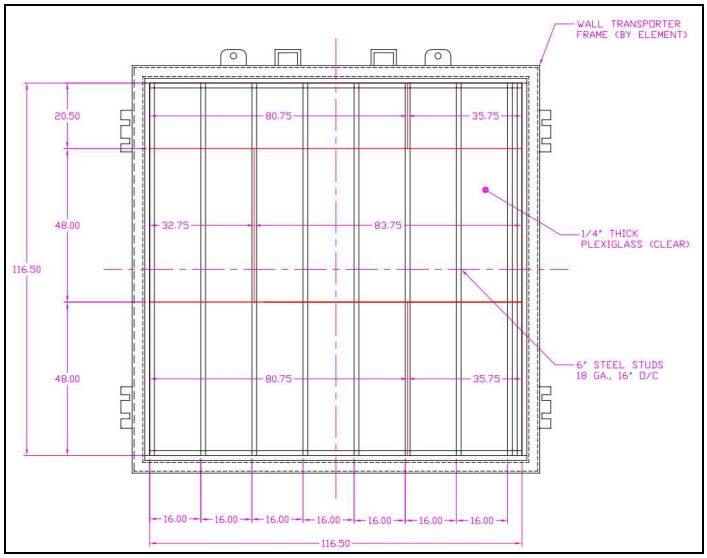


Figure 1 – Back-up Test Wall Framing Construction *(dimensions in inches)*

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 508-21, Section 5.2.2 & Figure 1B, 3 mm *(1/8 in)* diameter holes were introduced equally spaced 150 mm 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·m^2 *(0.12 cfm/ft^2)*.

The application of the cladding system on the test back-up wall was performed by Carter Architectural Panels, Inc. authorized personnel on August 26, 2026. As permitted by AAMA 508-21, 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 508-21, 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 *(5.0 psf)* to 1200 Pa *(25.0 psf)* to 240 Pa *(5.0 psf)* based on a maximum average of three (3) seconds for 100 cycles as per AAMA 508-21.

Upon completion of the pressure equalization behaviour test, the AAMA 508-21, Section 5.6, water penetration test at 300 Pa *(6.27 psf)* for fifteen (15) minutes was conducted.

Upon completion of the static water penetration test as outlined in AAMA 508-21, Section 5.6, dynamic water penetration testing was conducted in accordance with AAMA 508-21, Section 5.7 referencing AAMA 501.1-05.

Lastly, following the dynamic water penetration test, the rainscreen system was subjected to structural performance test loading the system until failure, referencing ASTM E330-14.

3.0 EQUIPMENT

Table 1 – Element Test Equipment

Equipment Description:	Asset No. (MII):	Calibration Due Date:
Manometer	P00205	2026-12-23
Manometer	B12064	2026-11-14
Pressure Transducer	B14767	2026-10-30
Portable Air-Water Test Kit	P00225	2027-01-28
Traceable Temp/RH/Barometer	P00233	2027-05-27
Humidity & Temp Transmitter	B14138	2026-11-25
Spray Rack	B16728	2026-12-08
String Gauge 1	B08611	2027-08-04
String Gauge 2	B16656	2027-08-04
String Gauge 3	B08606	2027-08-04
String Gauge 4	B08597	2027-08-04
String Gauge 5	B08607	2027-08-04
String Gauge 6	B08598	2027-08-04

4.0 RESULTS

Table 2 – Pressure Equalization Behaviour Analysis ASTM E1233/1233M-14 Element Specimen Number: 26-06-B0105-1 *(Test Date: August 31, 2026)*					
Compartment Tested	**Maximum External Gust Pressure of Pulse**	**Maximum Cavity Pressure of Pulse**	**Requirements**		**Comments**
			Pressure Differential	**Maximum Time Shift of Pulse**	
Primary Compartment	1161 Pa *(24.2 psf)*	996 Pa *(20.8 psf)*	Pressure differential on rain screen cladding shall not exceed 50% of maximum wind gust pressure	< 0.08 seconds	**Meets Requirement**

Pressure equalization graph is located in Figure 2 *(Page 4)*

- Air Leakage of Back-Up Wall (air / water barrier): **0.60 L/s•m² *(0.12 cfm/ft²)***
- Ratio of cavity volume to vent area (Upper Panels): **496 m³ / m² *(1629 ft³/ft²)***
- Ratio of cavity volume to vent area (Lower Panels): **496 m³ / m² *(1629 ft³/ft²)***
    - Eight total drain/vent holes
        - Four per horizontal seam, 8 mm (0.31") diameter, two per end, 101.6 mm (4.0") and 152.4 mm (6.0") from the ends.

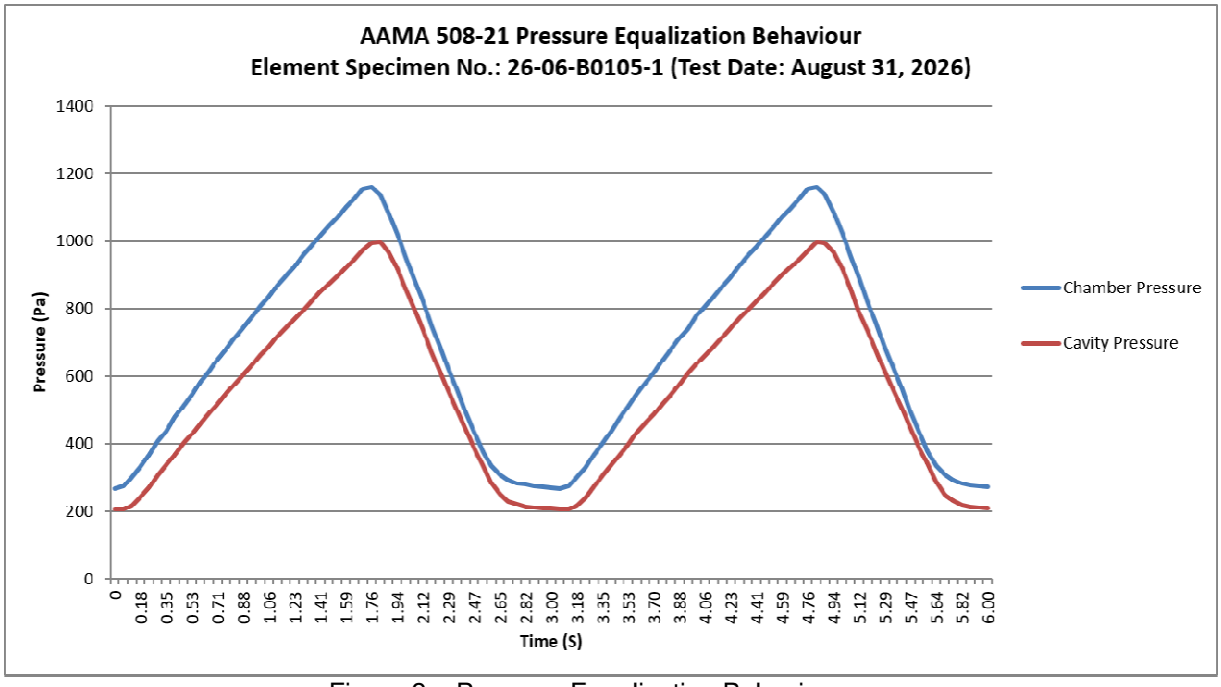


Figure 2 – Pressure Equalization Behaviour

Table 3 – Static Water Penetration Resistance AAMA 508-21, Section 5.6, Referencing ASTM E331-00 (2016) Element Specimen Number: 26-06-B0105-1 *(Test Date: August 31, 2026)*			
Test Pressure	**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. 1.80% of air/water barrier surface area had water misting and / or water droplets.	**Meets Requirement**

Table 4 – Water Penetration Resistance Using Dynamic Pressure AAMA 501.1-05, Section 5.7, Referencing AAMA 501.1-05 Element Specimen Number: 26-06-B0105-1 *(Test Date: September 1, 2026)*			
Test Pressure	**Requirements**	**Test Results**	**Comment**
300 Pa[(2)] *(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. 2.28% of air/water barrier surface area had water misting and / or water droplets. All water that penetrated the exterior rain screen cladding was controlled and drained to the exterior with no continuous streaming observed.	**Meets Requirements**

[(2)] 300 Pa = 22.1 m/s or 80 km/h (49 mph). Calculation based on the Ensewiler formula, where $P = 0.613 \cdot V^2$, V is m/s & P is N/m^2

Outdoor Conditions during Test (September 1, 2026):

Temperature: 26.6 °C
Relative Humidity: 56 % R.H.
Barometric Pressure: 101.1 kPa

Table 5 – Structural Results, Positive Wind Load Direction ASTM E330/E330M-14(2021) – SI & IP Units Element Specimen No.: 26-06-B0105-1 *(Test Date: September 2, 2026)*				
Test Pressure	**Gauge No. and Deflection**			
	1	**2**	**3**	**Net Deflection**
6,700 Pa[(1)] *(140 psf)*	10.2 mm *(0.402 inches)*	26.6 mm *(1.047 inches)*	10.4 mm *(0.409 inches)*	16.3 mm *(0.642 inches)*
Residual Deflection	0.1 mm *(0.003 inches)*	0.5 mm *(0.020 inches)*	0.1 mm *(0.003 inches)*	0.4 mm *(0.016 inches)*

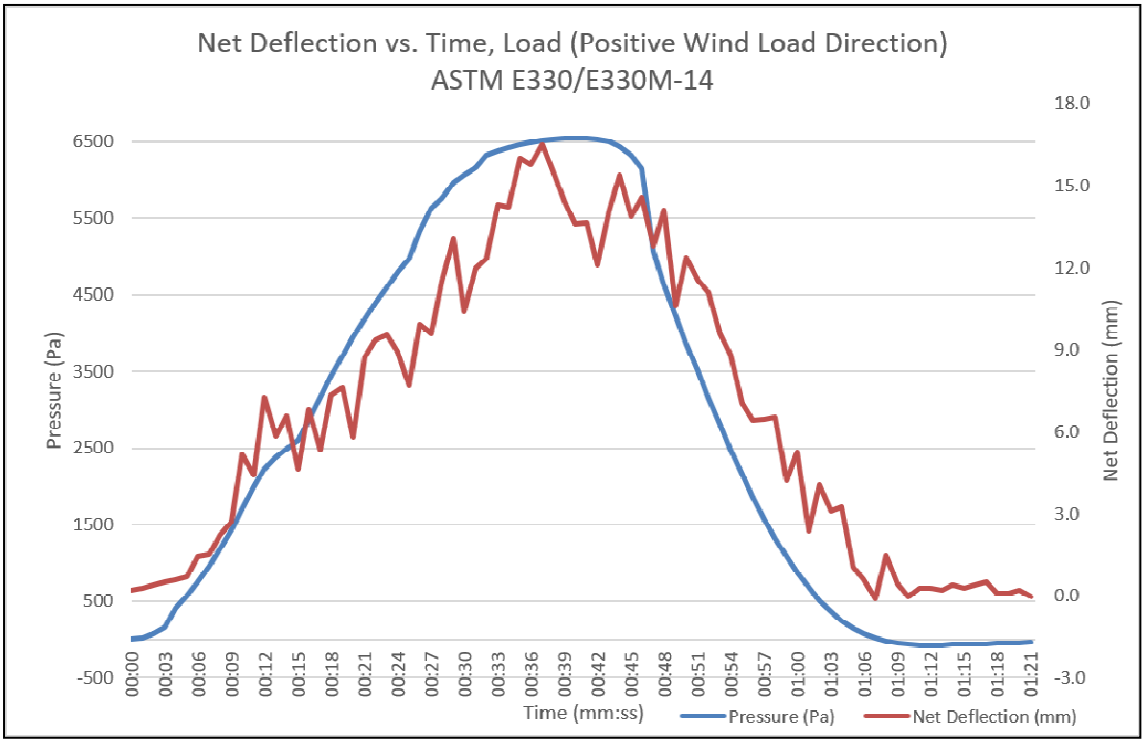


Figure 3 – Net Deflection vs Time, Positive Wind Direction, SI Units

Table 6 – Structural Results, Negative Wind Load Direction ASTM E330/E330M-14(2021) – SI & IP Units Element Specimen No.: 26-06-B0105-1 *(Test Date: September 2, 2026)*				
Test Pressure	**Gauge No. and Deflection**			
	1	**2**	**3**	**Net Deflection**
6,700 Pa[(1)] *(140 psf)*	16.1 mm *(0.634 inches)*	32.7 mm *(1.287 inches)*	17.1 mm *(0.673 inches)*	16.1 mm *(0.634 inches)*
Residual Deflection	4.0 mm *(0.157 inches)*	6.7 mm *(0.264 inches)*	4.2 mm *(0.165 inches)*	2.6 mm *(0.102 inches)*

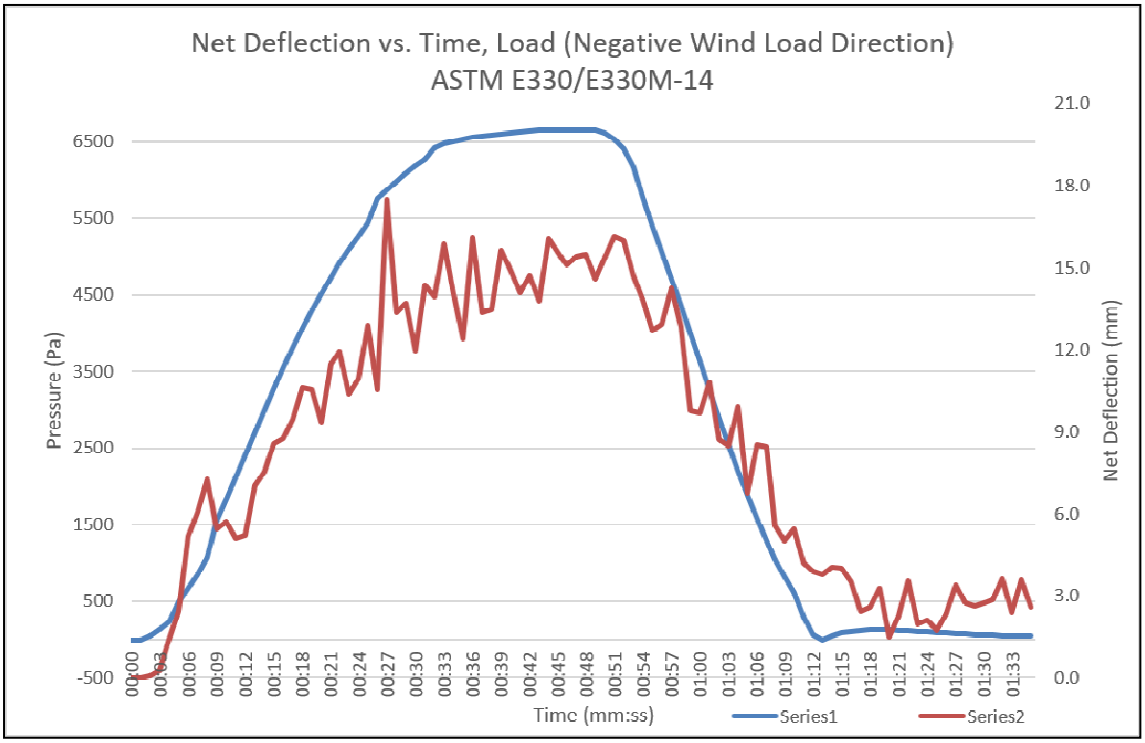


Figure 4 – Net Deflection vs Time, Negative Wind Direction, SI Units

Positive Loading Net Deflection Design Load: (+6700 Pa) = 16.3 mm < *16.4 mm Requirement*
Negative Loading Net Deflection Design Load (-6700 Pa) = 16.1 mm < *16.4 mm Requirement*

Positive Loading Net Deflection Design Load: (+140 psf) = 0.642 inches < *0.647 inch Requirement*
Negative Loading Net Deflection Design Load (-140 psf) = 0.634 inches < *0.647 inch Requirement*

Note: The default deflection limit of the support framing was restricted to L/180 referencing AAMA 508, Section 5.1.2.

(1) 6,700 Pa = 105.1 m/s or 378.2 km/h *(235 mph)*.
Calculation based on the Ensewiler formula, where $P = 0.613 \cdot V^2$, V is m/s & P is N/m²
(2) AAMA 508-21, Section 5.8 states: "When testing the actual air/water barrier for a project specific system, perform static structural performance test ASTM E330 at 0.5, 1.0 and 1.5 times the specified positive and negative design pressures".

Note: Deflection measurement (gauge) locations employed during structural loading are shown below.

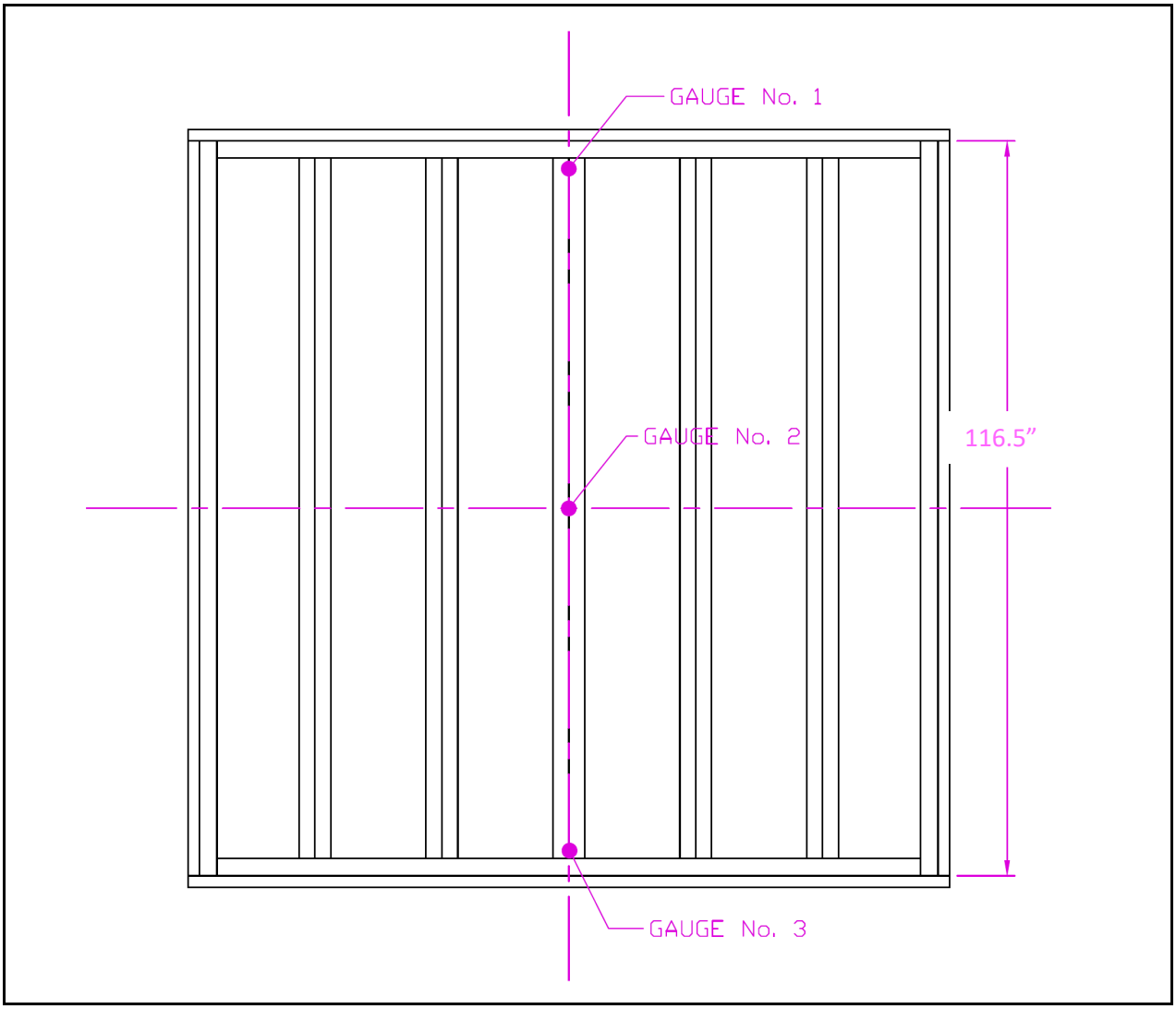


Figure 5 – Deflection Gauge Loactions

Table No. 7 - Summarized Structural Results ASTM E330/E330M-14(2021) – SI & IP Units Element Specimen No.: 26-06-B0105-1 *(Test Date: September 2, 2026)*	
Test Pressure Sustained/Achieved	**Comments**
+ 6,700 Pa[(1)] *(140 psf)*	Cladding System did not disengage from wall assembly. Structural framing members remained intact.
- 6,700 Pa[(1)] *(140 psf)*	Cladding System did not disengage from wall assembly. Structural framing members remained intact.

[(1)] 6,700 Pa = 105.1 m/s or 378.2 km/h *(235 mph)*.
Load Calculation based on the Ensewiler formula, where $P = 0.613 \cdot V^2$, V is m/s & P is N/m²

*Note: Design loads are building and location specific. Please refer to architect or design engineer for specific building load requirements.

Structural Testing to Failure *(beyond AAMA 508-21 test method scope)*:

At the request of Carter Architectural Panels Inc., structural testing to failure in the negative wind load direction was requested. The testing outlined in this section was not for a project specific condition, and a target design pressure was not specified. Structural testing of the rainscreen system was conducted in general accordance with ASTM E330-14(2021) and negative differential pressure was gradually applied to the exterior face of the wall assembly until failure.

Table 8 – Client Specific (Requested) Testing Test to Failure in the Negative Wind Load Direction ASTM E330-14(21) Element Specimen Number: 26-06-B0105-1 *(Test Date: September 2, 2026))*	
Maximum Pressure Achieved	**Comments**
6,906 Pa[(3)]	Cladding System did not disengage from wall assembly. However, a large portion of the plexiglass fractured and detached from the assembly.
144.2 psf	

[(3)] 6,906 Pa = 106.6 m/s or 383.9 km/h (239 mph).
Load Calculation based on the Ensewiler formula, where $P = 0.613 \cdot V^2$, V is m/s & P is N/m²

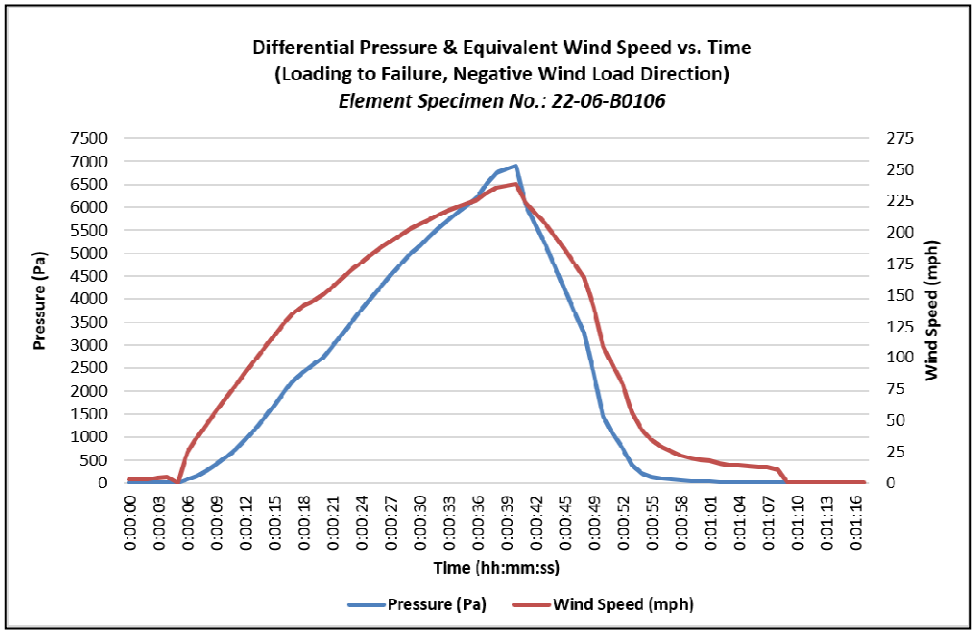


Figure 9 – Differential Pressure & Equivalent Wind Speed vs. Time *(during testing to failure)*

4.0 SYSTEM MODIFICATIONS

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

5.0 DISCUSSION

The "FLEX CONNECT Rainscreen Panel System" identified in this report met the requirements of AAMA 508-21 for cavity pressure differential, time shift of pulse, water penetration, and structural overload performance of 6,700 Pa *(140 psf).*

The system contained a cavity volume to vent area ratio of 496 m^3 / m^2 *(1629 ft^3/ft^2)* for the upper panels and 496 m^3 / m^2 *(1629 ft^3/ft^2)* for the lower panels with a total of eight drain/vent holes; four per horizontal seam, 8 mm (*0.31 in*) diameter, two per end, 101.6 mm (*4.0 in*) and 152.4 mm (*6.0 in*) from the ends.

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

6.0 REPORT REVISION HISTORY

Revision:	**Date:**	**Comments:**
Original Document	September 15, 2026	N/A

Reported by:

Emmanuel Siapno
Senior Testing Technician
Building Science Division
P: 289-888-4880

Reviewed by:

Scott Hallam, B.Eng
Building Systems Manager
Building Science Division
P: 416-577-3668

APPENDIX A

Specimen Bill of Materials and Detailed Drawing

(5 Pages)

element

CARTER
ARCHITECTURAL PANELS INC

FLEX
CONNECT
FIELD-FABRICATED ACM + PLATE PANEL SYSTEM

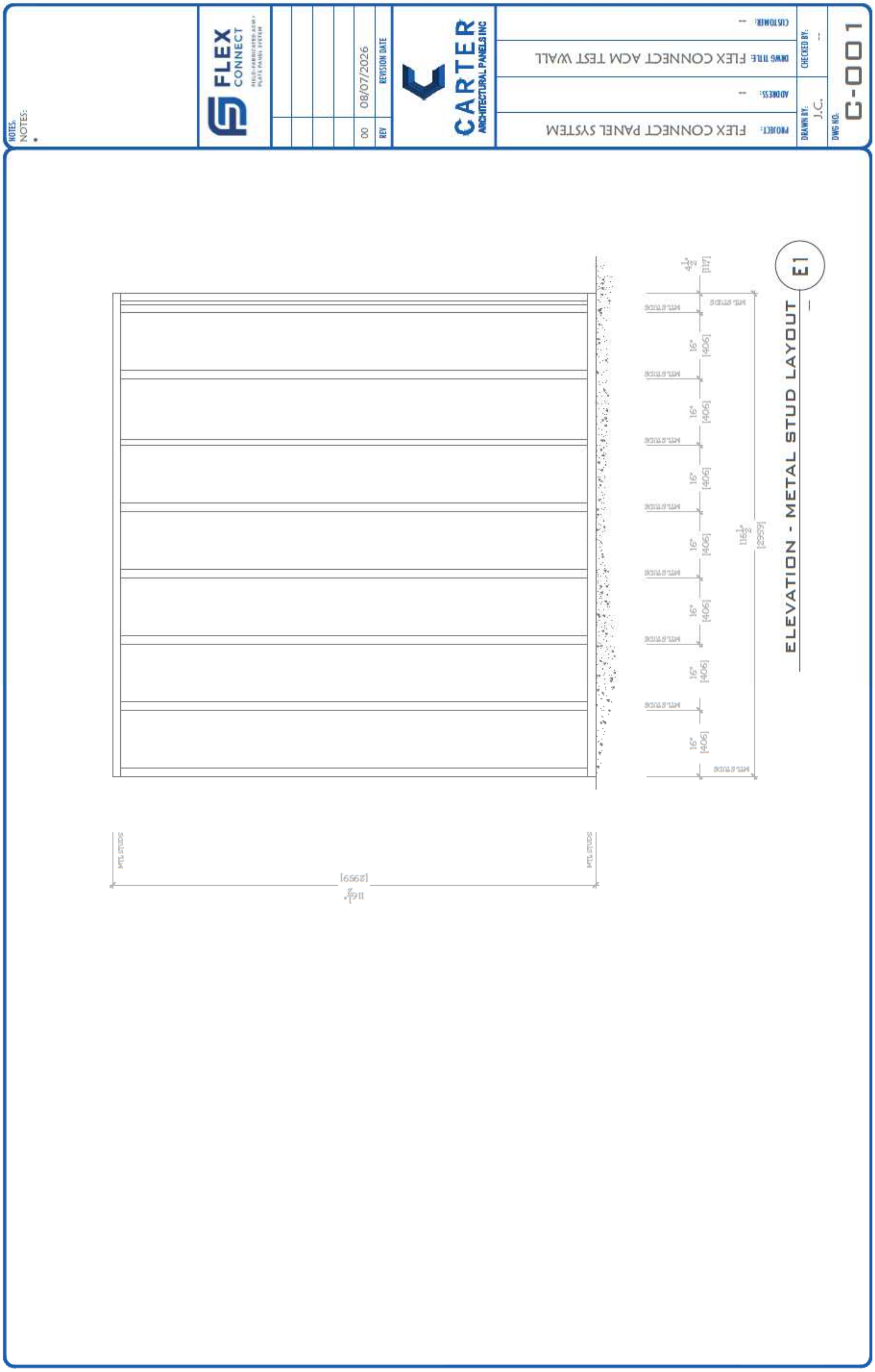
4MM etalbond® with FLEX Connect Attachment System ASTM and AAMA Test Wall B.O.M

Sub Framing for Base Wall:

2 Pcs .100" Carter Shadow Extruded 6063 T5 Black Aluminum 1" J- Bars @ 116.5"
7 Pcs .100" Carter Shadow Extruded 6063 T5 Black Aluminum 1" Hat- Bars @ 116.5"
#12 x 1" HWH, SS Screws 16" O.C
4 Pcs 6063-T6 FLEX Starter Extrusion @ 116.5"

Panel Assemblies:

4 Pcs etalbond® 4MM FR Core ACM 57.5" x 57.5"
3 Pcs 6063-T6 FLEX Stiffener 56.5" L x 16" O/C (x 4 Panels Total)
Carter- 1/16" Thick x 1.25" Wide Structural Stiffener Tape on back of Stiffeners.
4 Pcs 6063-T6 FLEX Perimeter Extrusion @ 57.5" (x 4 Panels Total)
4 Pcs .060" 1.75" x 1.75" FLEX Corner Bracket (x 4 Panels Total)
8 Pcs FLEX Corner Bracket Rivet 3/16" x .250" (x 4 Panels Total)
1 ¼" Bead Tremco Spectrum 2 Sealant inside each FLEX Perimeter to receive ACM
3 Weep Holes 5/16" x 16.5" O.C in base of Panel (x 4 Panels Total)
3 Pcs ½" x ½" Bug Filter Block (x 4 Panels Total)
25Pcs #12 x 1" HWH, SS Screws 16" O.C (x 4 Panels Total)
6 Pcs etalbond® 4MM FR Core ACM Spline 1" W x 116.5" L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FLEX CONNECT
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REV
08/07/2026
REVISION DATE
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ARCHITECTURAL PANELS INC
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ADDRESS: --
PROJECT: FLEX CONNECT PANEL SYSTEM
DRAWN BY: J.C.
CHECKED BY: --
DWG NO: C-001
ELEVATION - METAL STUD LAYOUT
E1
16" [406]
[2959]

NOTES:
NOTES:
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FLEX CONNECT

REV	REVISION DATE
00	08/07/2026

CARTER ARCHITECTURAL PANELS INC

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DRAWN BY: J.C.
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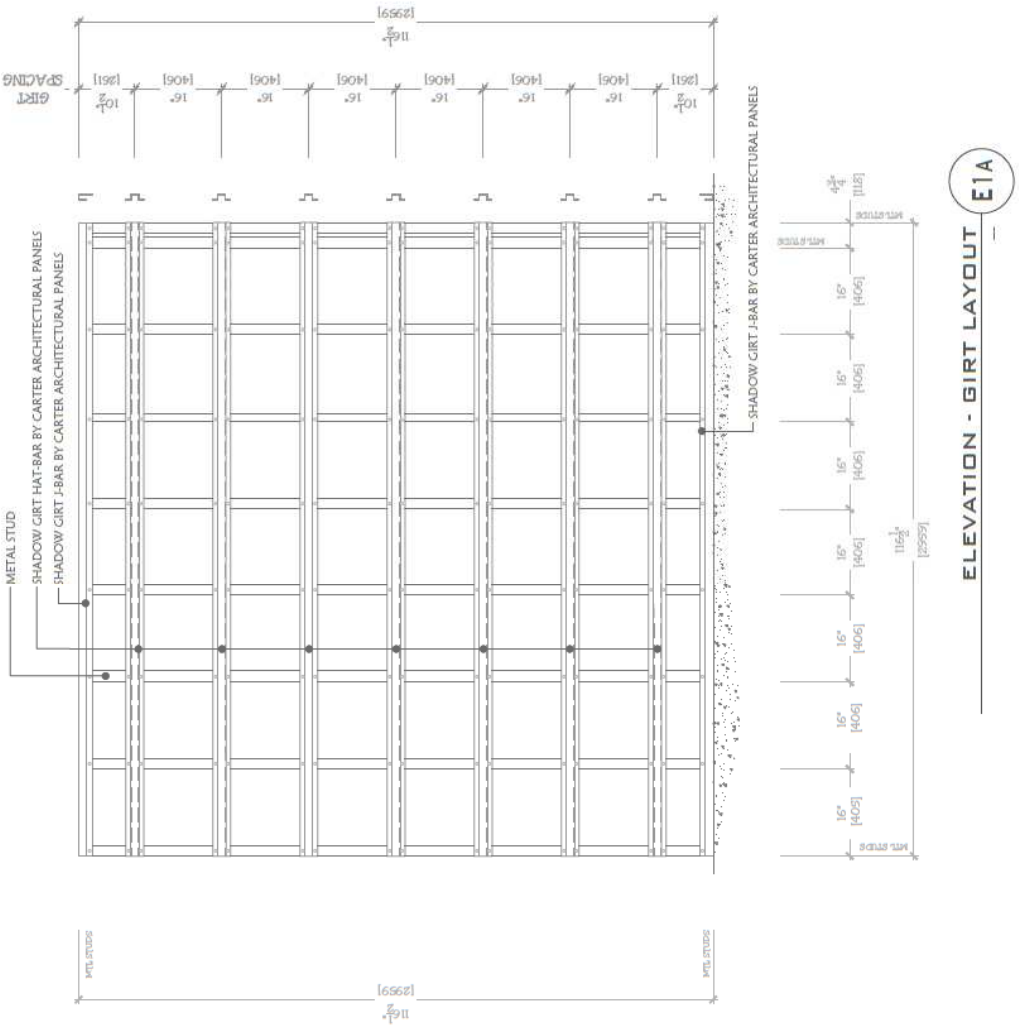

ELEVATION - GIRT LAYOUT E1A

NOTES:
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FLEX CONNECT

REV	REVISION DATE
00	08/07/2026

CARTER ARCHITECTURAL PANELS INC

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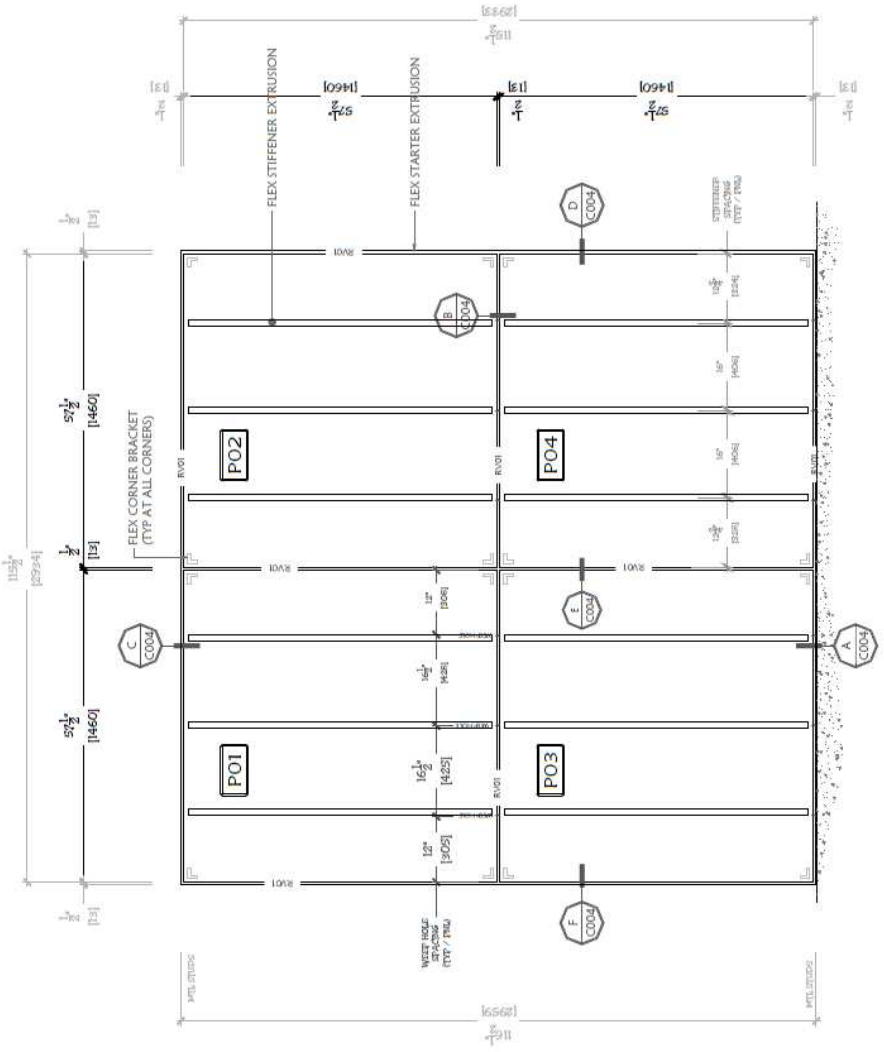
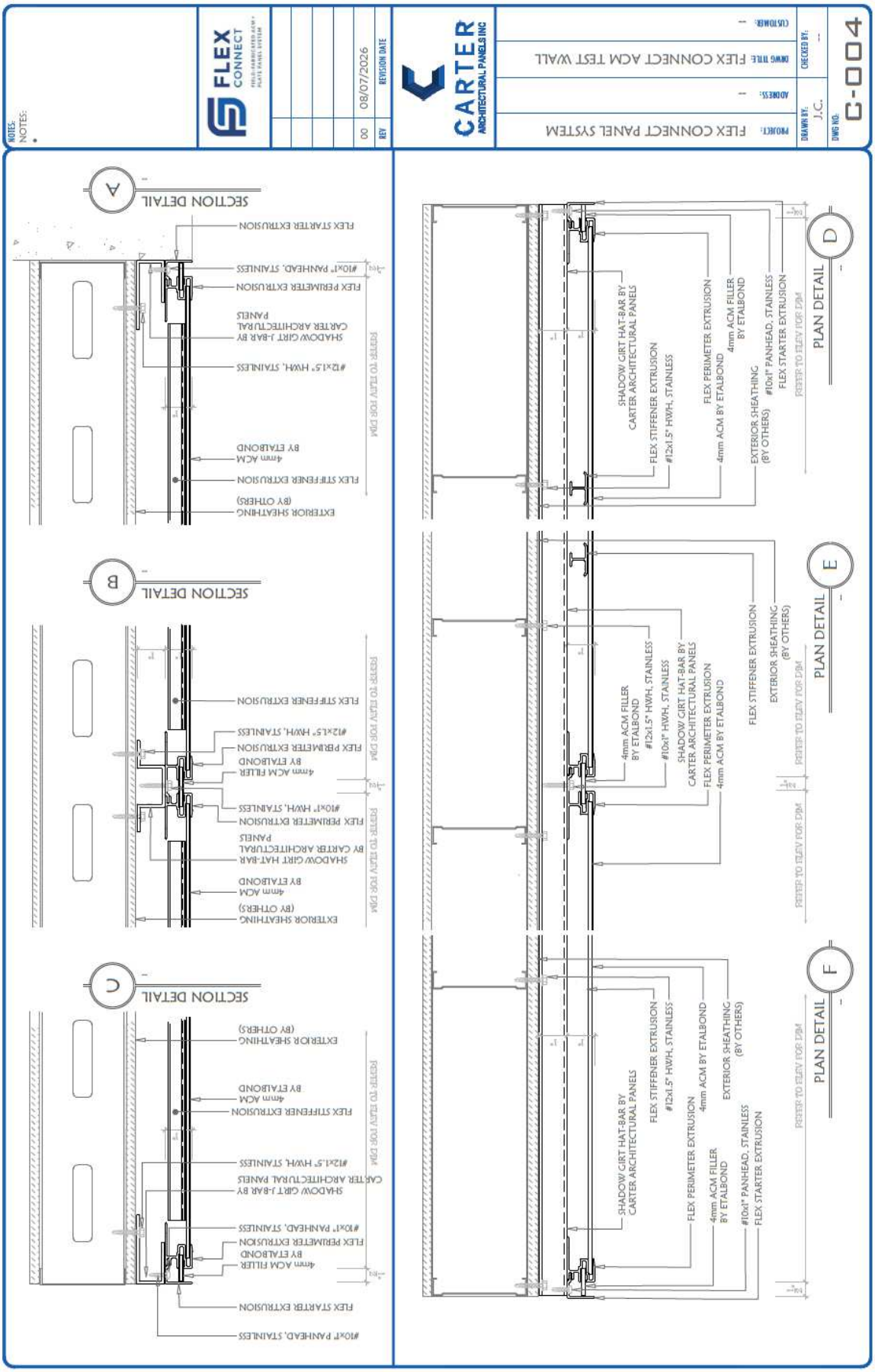
CUSTOMER: –
DRAWN BY: J.C.
CHECKED BY: –
DWG NO. C-003



ELEVATION - PANEL LAYOUT E1B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FLEX CONNECT
REV
00
REVISION DATE
08/07/2026
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ARCHITECTURAL PANELS INC
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ADDRESS: –
DRWG TITLE: FLEX CONNECT ACM TEST WALL
CUSTOMER: –
DRAWN BY: J.C.
CHECKED BY: –
DWG NO: C-004
SECTION DETAIL A
FLEX STARTER EXTRUSION
#10x1" PANHEAD, STAINLESS
FLEX PERIMETER EXTRUSION
SHADOW GIRT J-BAR BY CARTER ARCHITECTURAL PANELS
#12x1.5" HWH, STAINLESS
REFER TO ELEV FOR DIM
4mm ACM BY ETALBOND
FLEX STIFFENER EXTRUSION
EXTERIOR SHEATHING (BY OTHERS)
SECTION DETAIL B
FLEX STIFFENER EXTRUSION
#12x1.5" HWH, STAINLESS
FLEX PERIMETER EXTRUSION
4mm ACM FILLER BY ETALBOND
#10x1" HWH, STAINLESS
SHADOW GIRT HAT-BAR BY CARTER ARCHITECTURAL PANELS
4mm ACM BY ETALBOND
EXTERIOR SHEATHING (BY OTHERS)
SECTION DETAIL C
EXTERIOR SHEATHING (BY OTHERS)
4mm ACM BY ETALBOND
FLEX STIFFENER EXTRUSION
#12x1.5" HWH, STAINLESS
SHADOW GIRT J-BAR BY CARTER ARCHITECTURAL PANELS
#10x1" PANHEAD, STAINLESS
FLEX PERIMETER EXTRUSION
4mm ACM FILLER BY ETALBOND
FLEX STARTER EXTRUSION
#10x1" PANHEAD, STAINLESS
PLAN DETAIL D
SHADOW GIRT HAT-BAR BY CARTER ARCHITECTURAL PANELS
FLEX STIFFENER EXTRUSION
#12x1.5" HWH, STAINLESS
FLEX PERIMETER EXTRUSION
4mm ACM BY ETALBOND
4mm ACM FILLER BY ETALBOND
EXTERIOR SHEATHING (BY OTHERS)
#10x1" PANHEAD, STAINLESS
FLEX STARTER EXTRUSION
REFER TO ELEV FOR DIM
PLAN DETAIL E
4mm ACM FILLER BY ETALBOND
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SHADOW GIRT HAT-BAR BY CARTER ARCHITECTURAL PANELS
FLEX PERIMETER EXTRUSION
4mm ACM BY ETALBOND
FLEX STIFFENER EXTRUSION
EXTERIOR SHEATHING (BY OTHERS)
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4mm ACM FILLER BY ETALBOND
EXTERIOR SHEATHING (BY OTHERS)
#10x1" PANHEAD, STAINLESS
FLEX STARTER EXTRUSION
REFER TO ELEV FOR DIM

APPENDIX B

Photographs of Rain Screen System

(1 Page)

Figure B1 – Test Specimen (Exterior View)

Figure B2 – Test Specimen (Interior View)