

**VOLUNTARY TEST AND CLASSIFICATION METHOD FOR DRAINED AND
BACK VENTILATED RAIN SCREEN WALL CLADDING SYSTEM OF THE
“DIZAL ARCHITECTURAL ALUMINUM PANEL”
IN ACCORDANCE WITH AAMA 509-14 WALL CLADDING SYSTEM**

Report to:

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19-06-B0208
11 Pages, 1 Appendix

Proposal No.:

19-006-111940 RV1

Date:

April 28, 2020

1.0 INTRODUCTION

Element Materials Technology Inc. was retained to evaluate the "Dizal Architectural Aluminum Panel" rain screen cladding system in accordance with AAMA 509-14, "Voluntary Test and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems" as outlined in Proposal number 19-006-111940 RV1.

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

Client Specimen Description

Dizal Architectural Aluminum Panel
(Equal Panel Scheme / 4 panels)

Element Specimen No.

19-06-B0208-1

2.0 PROCEDURE

Test Description	Test Method
Voluntary Test Method and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems Air Leakage Quantification	AAMA 509-14, Section 5.3 – <i>Referencing ASTM E283-04 (2012)</i>
Voluntary Test Method and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems Air Leakage Measurement	AAMA 509-14, Section 5.7 – <i>Referencing ASTM E283-04 (2012)</i>
Voluntary Test Method and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems Structural Performance	AAMA 509-14, Section 5.8.1 – <i>Referencing ASTM E330-14</i>
Voluntary Test Method and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems Air Leakage Measurement	AAMA 509-14, Section 5.8.2 – <i>Referencing ASTM E283-04 (2012)</i>
Voluntary Test Method and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems Static Water Penetration	AAMA 509-14, Section 5.9.3 – <i>Referencing ASTM E331-00 (2016)</i>
Voluntary Test Method and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems Dynamic Water Penetration	AAMA 509-14, Section 5.9.4 – <i>Referencing AAMA 501.1-17</i>

Note: SI units are the primary units of measure.

2.0 PROCEDURE (CONTINUED)

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 509-14, Section 5.0.

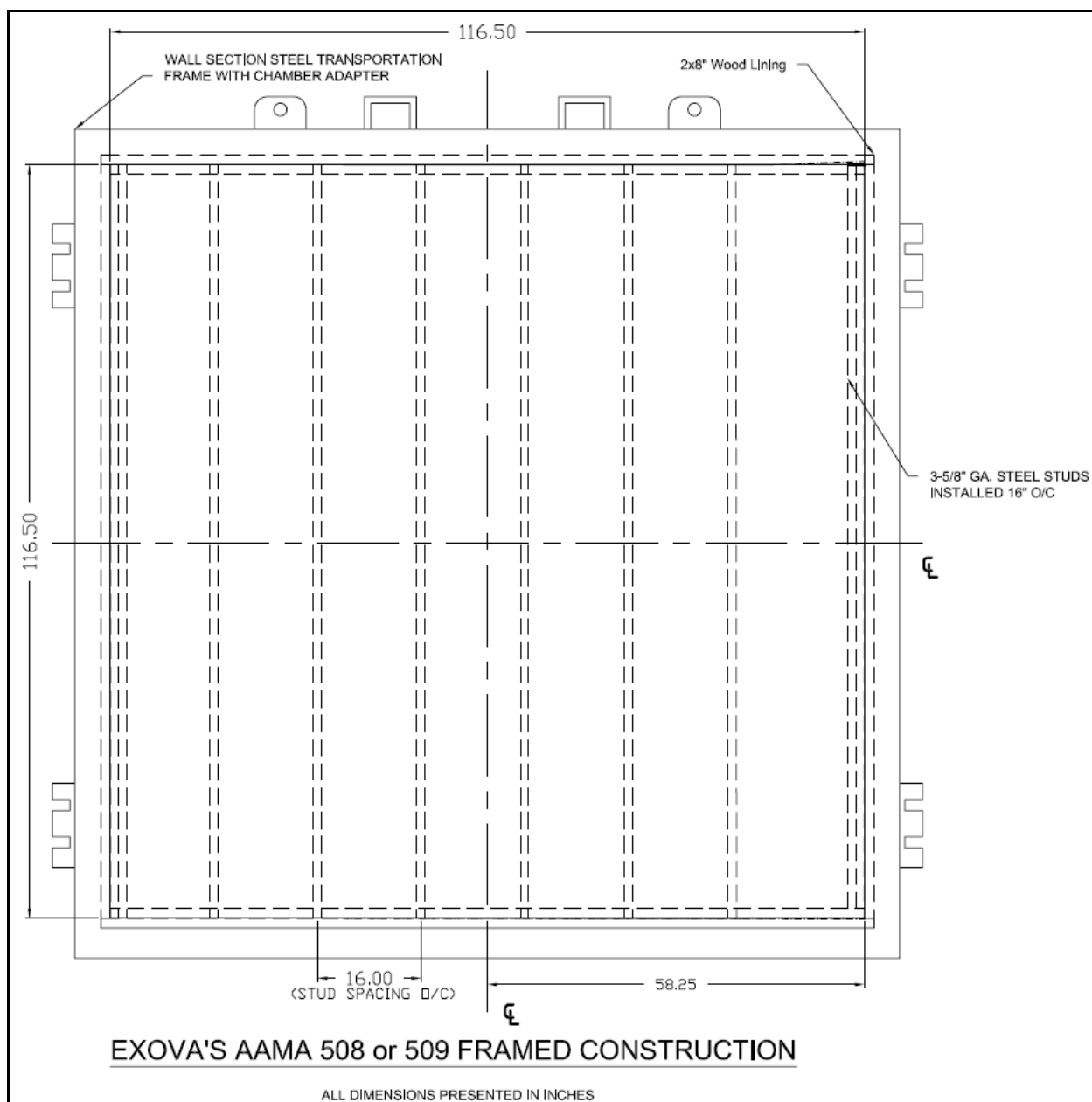


Figure 1 – Back-up Test Wall Framing Construction

2.0 PROCEDURE (CONTINUED)

Upon completion of the back-up wall, the Plexiglas joints and screw-heads were sealed to ensure the assembly was air-tight. The water drainage trough or collection system was installed onto the simulated AWB assembly, and a gate valve was installed in the upper section of the specimen as to not to restrict water drainage during water testing as per AAMA 509-14, Section 5.2.5.

After the air leakage validation for tightness was completed, as prescribed by AAMA 509-14, Section 5.4.1, 3 mm (0.118 inch) diameter holes were introduced equally spaced along the collection trough in order for the air / water barrier to have an air leakage rate of $0.6 \text{ L/s}\cdot\text{m}^2$ (0.12 cfm/ft^2) $\pm 10\%$ at 75 Pa (1.57 psf).

The application of the cladding system on the test back-up wall was performed by Dizal, authorized personnel on March 11, 2020, see Section 3.0 for details. As permitted by AAMA 509-14, 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.

Upon completion of the static air test as outlined in AAMA 509-14, Section 5.6, testing was conducted in accordance with AAMA 509-14, Section 5.7 referencing AAMA 501.1-17 at 300 Pa (6.27 psf) and 577 Pa (12.05 psf).

3.0 TEST PANEL DESCRIPTION AND CONSTRUCTION

The following description and construction was provided by Dizal.

Rain Screen Panel Description: Aluminum composite panels were 4 mm (0.165") thick. The panels were constructed with a 3.2 mm (0.125") thick plastic core and two 0.4 mm (0.015") thick aluminum interior and exterior skins, adhered to the plastic core. The edges of all panels utilized a "J" shaped, aluminum perimeter extrusion, which is adhered to the aluminum composite panel with continuous 3M VHB tape. An "H" shaped aluminum extrusion "stiffener", 20 mm (0.78") wide x 13.55 mm (0.53") thick was adhered to the back of each panel with 3M VHB tape.

Rain Screen Wall Construction Description: The sill utilized a two-piece "starter strip base and finishing cap" along the entire length of the wall, secured to the steel studs with #8 x 1" long Tek screws, spaced 406 mm (16") on center. The bottom panels were slid into the "starter strip" and secured to the steel studs with 609 mm (24") long "double fastening strip" using #8 x 1" long Tek screws, spaced 406 mm (16") on center. The top panels were then slid into the horizontal "double fastening strips" and secured at the head with 1218 mm (48") long "starter strips" using #8 x 1" long Tek screws, spaced 406 mm (16") on center. An aluminum extrusion "screw cover strip" was used in the vertical and horizontal joints to conceal the screws and "double fastening strips".

For details of the rain screen panel system, see Appendix A.

4.0 RESULTS

Table 1 – AAMA 509-14, Section 5.4, Referencing ASTM E283-04 (2012) Summarized Air Leakage Results ⁽¹⁾ Element Specimen No.: 19-06-B0208-1 (Test Date: April 6, 2020)	
Test Pressure Differential	Infiltration
75 Pa (1.57 psf)	0.61 L/s m ² (0.12 cfm/ft ²) ⁽²⁾

⁽¹⁾ Thirty-Six (36) 3 mm diameter holes were drilled through the Plexiglas substrate, equally spaced, 6" above the drainage tracks. These penetrations were employed to simulate an air / water resistive barrier sheathing membrane imperfections in general accordance with AAMA 509-14, Section 5.2.2.

Table 2 – AAMA 509-14, Section 5.7 – Referencing ASTM E283-04 (2012) Air Flow Measurement Across Cladding Elements Element Specimen No.: 19-06-B0208-1 (Test Date: April 6, 2020)								
Data	Head	Horizontal (Centre)	Sill	Vertical (Left)	Vertical (Centre)	Vertical (Right)	Sum L/s (cfm)	L/s/m ² (cfm/ft ²)
L/s (cfm)	2.18 (4.63)	2.15 (4.55)	2.43 (5.16)	2.35 (4.98)	2.14 (4.53)	2.15 (4.57)	13.41 (28.42)	2.19 (0.43)
L/s/m (cfm/ft)	0.89 (0.58)	0.90 (0.58)	0.99 (0.64)	0.98 (0.64)	0.89 (0.58)	0.90 (0.58)	Not Required	Not Required

- Air Leakage of Back-Up Wall (air / water barrier): **0.61 L/s m² (0.12 cfm/ft²)**

3.0 RESULTS (CONTIUNED)

Table 3 – AAMA 509-14, Section 5.8.1, Referencing ASTM E330-14 Static Structural Performance (Preload and Design Pressure) Element Specimen Number: 19-06-B0208-1 (April 7, 2020)			
Test	Requirements	Test Results	Comment
Static Structural Performance (Section 5.8)	ASTM E330-14 Preload (Design Pressure x 0.5) +/- 1796 Pa (37.50 psf) ⁽²⁾ No permanent damage	No Permanent Damage Observed	No visual damage or buckling observed
	ASTM E330-14 Design Pressure +/- 3591 Pa (75.00 psf) ⁽²⁾ Report Support Wall Deflection	Stud Length (L) = 2475 mm (97.44 in.) Allowable (L/175) = 14.14 mm (0.56 in.) Vertical Net Deflection at Design Pressure: + 3591 Pa (75.00 psf) = 6.90 mm (0.27 in.) - 3591 Pa (75.00 psf) = - 8.68 mm (-0.34 in.) Horizontal Net Deflection at Design Pressure: + 3591 Pa (75.00 psf) = 11.21 mm (0.44 in.) - 3591 Pa (75.00 psf) = -13.77 mm (0.54 in.) - No Permanent Damage Observed	Meets Requirements L/175

⁽²⁾ 3591 Pa = 76.5 m/s (or 171 mph / 276 km/h). Calculation based on the Ensewiler formula, where $P = 0.613 \cdot V^2$, V is m/s & P is N/m²

Table 4 – AAMA 509-14, Section 5.8.1, Referencing ASTM E330-14 Static Structural Performance (Structural Pressure) Element Specimen Number: 19-06-B0208-1 (April 13, 2020)			
Test	Requirements	Test Results	Comment
Static Structural Performance (Section 5.8)	ASTM E330-14 Structural Test Pressure (1.5 x Design Pressure) +/- 5387 Pa (112.50 psf) ⁽²⁾ - No permanent damage - Report Support Wall Deflection	Vertical Net Deflection at Design Pressure: + 5387 Pa (112.50 psf) = 10.90 mm (0.43 in.) - 5387 Pa (112.50 psf) = - 14.09 mm (-0.55 in.) Horizontal Net Deflection at Design Pressure: + 5387 Pa (112.50 psf) = 18.36 mm (0.72 in.) - 5387 Pa (112.50 psf) = - 22.33 mm (0.88 in.) - No Permanent Damage Observed	No Permanent Damage Observed

⁽²⁾ 5387 Pa = 93.7 m/s (or 210 mph / 337 km/h). Calculation based on the Ensewiler formula, where $P = 0.613 \cdot V^2$, V is m/s & P is N/m²

3.0 RESULTS (CONTIUNED)

Table 5 – AAMA 509-14, Section 5.8.2 – Referencing ASTM E283-04 (2012) Air Flow Measurement Across Cladding Elements (Post ASTM E330-14) Element Specimen No.: 19-06-B0208-1 (Test Date: April 7, 2020)								
Data	Head	Horizontal (Centre)	Sill	Vertical (Left)	Vertical (Centre)	Vertical (Right)	Sum L/s (cfm)	L/s/m ² (cfm/ft ²)
L/s (cfm)	2.4 (5.09)	2.51 (5.31)	2.92 (6.18)	2.75 (5.82)	2.48 (5.26)	2.42 (5.13)	15.48 (32.80)	2.53 (0.50)
L/s/m (cfm/ft)	0.98 (0.63)	1.05 (0.68)	1.19 (0.77)	1.15 (0.74)	1.04 (0.67)	1.01 (0.65)	Not Required	Not Required

Table 6 – AAMA 509-14, Section 5.9.3, Referencing ASTM E331-00 (2016) Water Penetration Resistance Element Specimen Number: 19-06-B0208-1 (Test Date: April 8, 2020)			
Test	Requirements	Results	Comments
Various Test Pressure (15-minutes each)	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.	Test #1 300 Pa (6.27 psf) Water mist and/or droplets was observed. Some continuous streaming was observed. Water penetrating through the air / water barrier was collected and measured, see table below.	Meets Requirement
		Test #2 577 Pa (12.05 psf) Water mist and/or droplets was observed. Some continuous streaming was observed. Water penetrating through the air / water barrier was collected and measured, see table below.	Meets Requirement

Table 7 – AAMA 509-14, Section 5.9.3 – Referencing ASTM E331-00 (2016) Water Collected Off / Through the AWB Element Specimen No.: 19-06-B0208-1 (Test Date: April 8, 2020)							
Data	300 Pa (6.27 psf) Static	577 Pa (12.05 psf) Static	300 Pa (6.27 psf) Dynamic	577 Pa (12.05 psf) Dynamic	TTL mL (oz.)	Sum mL/m ² (oz./ft ²)	Average mL/m ² (oz./ft ²)
Liquid mL (oz.)	413 (14.57)	598 (21.09)	196 (6.91)	310 (10.93)	1517 (53.51)	Not Required	Not Required
ml/m2 (oz./ft ²)	67 (0.22)	98 (0.32)	32 (0.10)	51 (0.17)	Not Required	248 (0.81)	62 (0.20)

3.0 RESULTS (CONTIUNED)

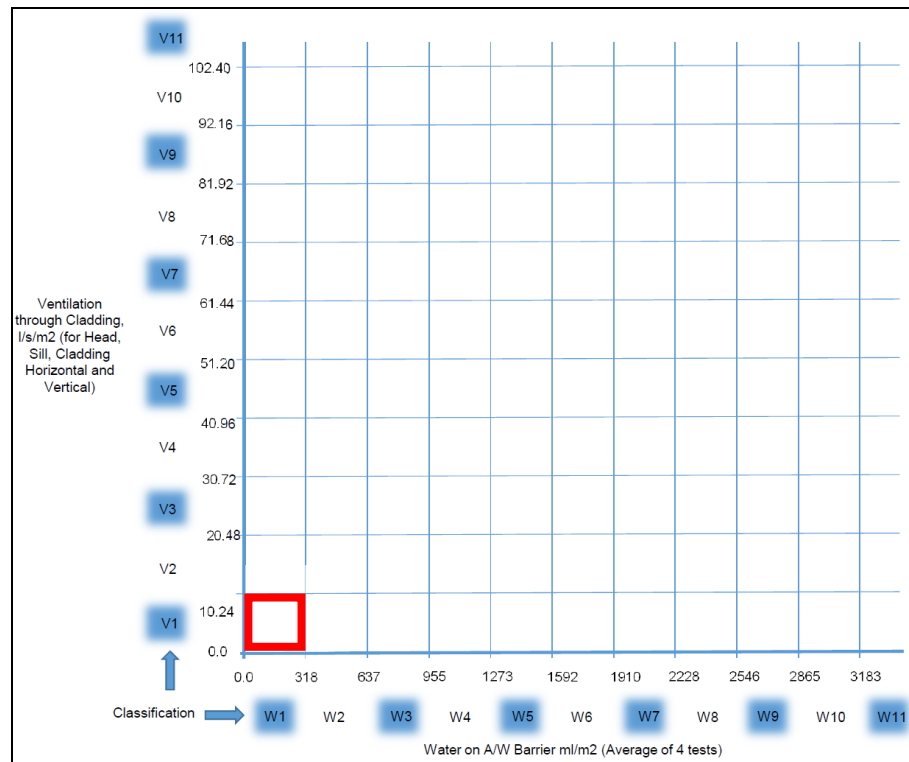


Figure 2: Classification System for D&BV Wall Cladding Systems
Static Test Pressure at 300 and 577 Pa (6.27 and 12.00 psf) - (SI Units Shown)

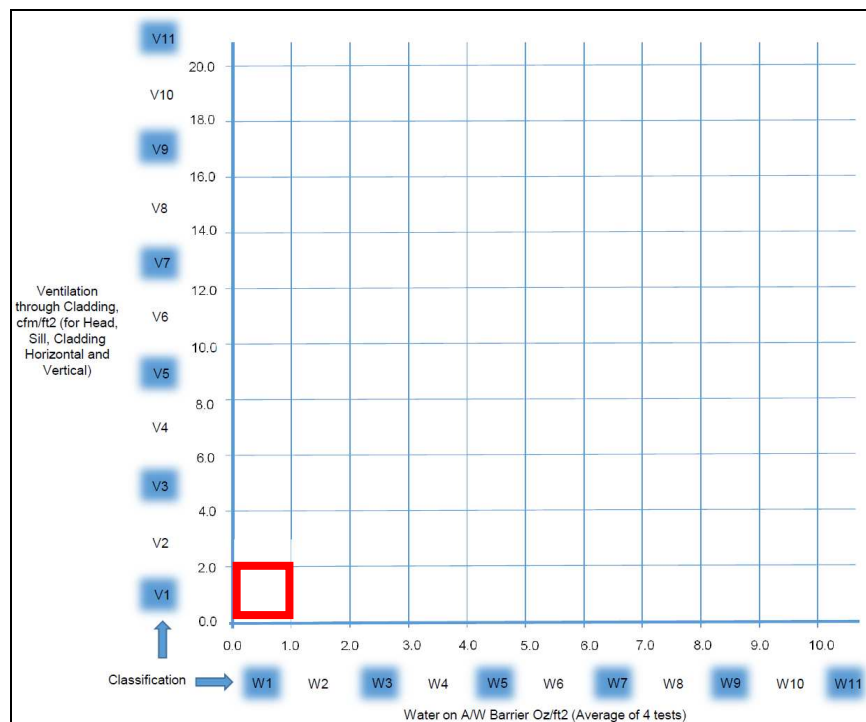


Figure 3: Classification System for D&BV Wall Cladding Systems
Static Test Pressure at 300 and 577 Pa (6.27 and 12.00 psf) - (IP Units Shown)

3.0 RESULTS (CONTIUNED)

Table 8 – AAMA 509-14, Section 5.9.4, Referencing AAMA 501.1-17 Dynamic Water Penetration test Element Specimen Number: 19-06-B0208-1 (Test Date: April 9, 2020)			
Test Pressure	Requirements	Test Results	Comment
300 Pa ⁽²⁾ (12.05 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.	Water mist and/or droplets were observed. All water that penetrated the exterior rain screen cladding was controlled and drained to the exterior with some continuous streaming observed.	Meets Requirements
577 Pa ⁽³⁾ (12.05 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.	Water mist and/or droplets were observed. All water that penetrated the exterior rain screen cladding was controlled and drained to the exterior with some continuous streaming observed.	Meets Requirements

⁽²⁾ 300 Pa = 22.1 m/s (or 50 mph / 79 km/h). Calculation based on the Enswiler formula, where $P = 0.613 \cdot V^2$, V is m/s & P is N/m²

⁽³⁾ 577 Pa = 30.7 m/s (or 69 mph / 110 km/h). Calculation based on the Enswiler formula, where $P = 0.613 \cdot V^2$, V is m/s & P is N/m²

3.0 RESULTS (CONTIUNED)

Outdoor Conditions during Test:

Temperature: 8.5 °C (47.3 °F)
Relative Humidity: 81% R.H.
Barometric Pressure: 99.6 kPa (29.4 inHg)



Figure 5 – AAMA 501.1, Dynamic Water Penetration Test

4.0 SYSTEM MODIFICATIONS

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

5.0 DISCUSSION

The Dizal, "Dizal Architectural Aluminum Panel" (*Element Specimen No. 19-06-B0208-1*) identified in this report met the requirement of an overall V1 (Ventilation through cladding) and W1 (Water on Cladding) rating.

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

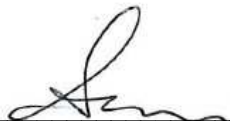
7.0 REVISION HISTORY

Report No:
19-06-B0208


Date:
April 28, 2020

Description of Revisions:
Original Document

Reported & Authorized by:


Allan Lawrence, Ext. 11212
Supervisor, Building Science
Building Science Division

Reviewed by:


Jordan Church, B. Tech., Ext. 11546
Ops. Manager, Building Science & Fire Testing
Technical Manager, Building Systems
Building Science Division

This report and service are covered under Element Materials Technology Inc.'s. Standard Terms and Conditions of Contract which may be found on our company's website www.element.com, or by calling 1-866-263-9268.

APPENDIX A

Mock-Up Rain Screen Drawings and Product Information

(4 Pages)

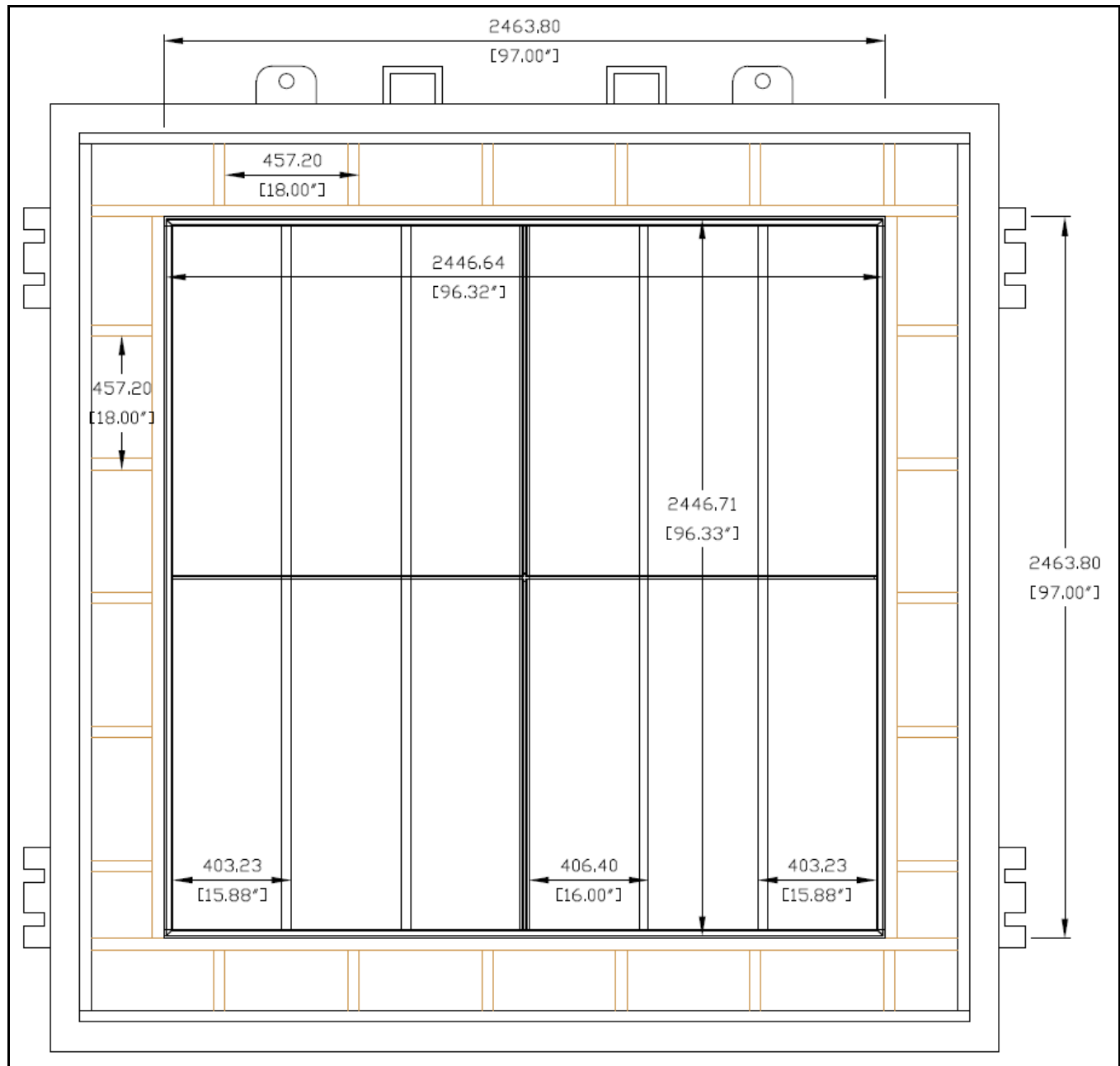


Figure A1 – Drawing of rain screen panels installed into test frame.

HIGH DEFINITION PRINTING

ALUMINUM

Highly resistant commercial grade, fire-resistant aluminum. Exceptional strength to weight ratio, perfect for all types of applications, interior and exterior.

PRIMER COAT

Specially formulated primer coat assures optimal adhesion between ACM panels and digital inkjet print.

HD PRINTING

A high-definition digital inkjet printer is used to print images of a wide range of scanned textures and outstanding color variations.

Z-CLEAR

A protective clear coat is applied to provide long-term protection against UV rays and fading.



TESTS & CERTIFICATIONS*

- . ASTM E84 - Fire Resistance
- . ASTM G155 - UV Resistance
- . ASTM E283 - Static air infiltration
- . ASTM E330 - Structural performance
- . ASTM D6578 - Graffiti Resistance
- . ASTM D3359 - Adhesion Testing

- . ASTM E331 - Static water contacting AWB
- . AAMA 501.1 - Dynamic Water infiltration test
- . AAMA 509 - Rain Screen Performance
- . ASTM D4060 - Abrasion Resistance
- . LEED V4

* visit our website at www.dizal.com for more information

PARTS AND ACCESSORIES

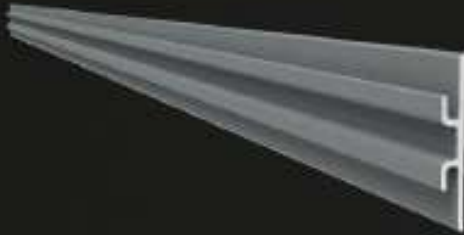
STARTER STRIP AND FINISHING PART



- Two-part aluminum extrusion snapped together to hide screws.
- Color matching aluminum extrusion and joint.
- Innovative starter strip and finishing part creating unrivalled aesthetics.



DOUBLE FASTENING STRIP



- Double-sided insertion rail allows for a fast and easy installation.
- Symmetrical part can be used in any direction.
- Predetermined joint spacing of 3/8" (9,5 cm) between panels.

SCREW COVER STRIP



- Aluminum extrusion painted to match joint color
- Symmetrical part can be used in any direction.



DIZAL