

# ACRO ALUMINUM INC. TEST REPORT

# **TEST REPORT ISSUED TO**

Acro Aluminum Inc. 5430 – 275 Street Langley, BC V4W 3X7 Canada

STANDARDS / SPECIFICATIONS

ASTM E283, ASTM E331, ASTM E547, ASTM E330, AAMA 920

PRODUCT SERIES & TYPE Aluminum Outswing Entrance Door

# **EVALUATION PROPERTIES**

Air Leakage, Static Water Penetration Resistance, Cyclic Water Penetration Resistance, Uniform Load and Operational Performance Cycling

REPORT NUMBER 105640976COQ-001Arev1

**TEST DATE** 11/20/23 - 12/08/23

ORIGINAL ISSUE DATE 02/14/24

**REVISION DATE** 05/06/24

**PAGES** 24

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# TEST REPORT FOR ACRO ALUMINUM INC.

Report No.: 105640976COQ-001Arev1 Date: 05/06/24

# SECTION 1

#### SCOPE

Intertek Building & Construction (B&C) was contracted by Acro Aluminum Inc. to perform testing on a 1070 mm (42.1") x 2210 mm (87.0") Aluminum Outswing Entrance Door System in accordance with the following standard/specifications:

- ASTM E283/E283M-19 "Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen" (ASTM E283)
- ASTM E331-00(2023) "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference" (ASTM E331)
- ASTM E547-00(2016) "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference" (ASTM E547)
- ASTM E330/E330M-14(2021) "Standard Test Method for Structural Performance of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference" (ASTM E330)
- AAMA 910-22 "Voluntary "Life Cycle" Specification and Test Methods for AW Class Architectural Windows and Doors" (AAMA 910)

Testing was conducted at the Intertek test facility in Coquitlam, BC. This evaluation was started on November 20, 2023 and completed on December 8, 2023.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

#### For INTERTEK B&C: David Park **COMPLETED BY:** Jason Komorski **REVIEWED BY:** Technician – Building Reviewer - Building TITLE: TITLE: Products Products **SIGNATURE: SIGNATURE:** ala la and the second s 05/06/24 **REVISION DATE:** 05/06/24 **REVISION DATE:**

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#### **SECTION 2**

#### SUMMARY OF TEST RESULTS

A summary of results are as indicated in the table below:

Evaluation Property	Results
Air Leakage Resistance @ 75 Pa (1.6 psf)	1.23 L/s*m <sup>2</sup> , 0.24 cfm/ft <sup>2</sup>
Static Water Penetration Resistance	0 Pa (0.0 psf)
Cyclic Water Penetration Resistance	180 Pa (3.8 psf)
Uniform Load – Deflection	1200 Pa (25.1 psf)
Uniform Load – Structural	1800 Pa (37.6 psf)
Operating/Cycling-Slam Test Performance	Pass @ 50,000 cycles

Details of the tested results can be found in Section 7 of this report.

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#### **SECTION 3**

#### TEST METHOD(S)

The specimen was tested and evaluated in accordance with the following:

- **ASTM E283/E283M-19,** Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
- **ASTM E331-00(2023),** Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
- **ASTM E547-00(2016),** Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference
- ASTM E330/E330M-14(2021), Standard Test Method for Structural Performance of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
- **AAMA 920-22,** Voluntary "Life Cycle" Specification and Test Methods for AW Class Architectural Windows and Doors

# SECTION 4

#### EQUIPMENT

ASSET #	DESCRIPTION	CAL DUE DATE
60650	Fenestration Control Unit	05/13/24
60651	Water Spray Assembly	05/13/24
64917	20" Line Gauge	02/29/24
64918	20" Line Gauge	02/29/24
64921	20" Line Gauge	02/29/24
P60623	Digital Stop Watch	09/19/24

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#### SECTION 5

#### TEST PROCEDURE

#### AIR LEAKAGE RESISTANCE

The Air Leakage Resistance test was performed in accordance with ASTM E283/E283M-19, *"Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen"*. Testing was performed in the infiltration direction only, using a test pressure of 75 Pa (1.57 psf). The maximum air leakage rate was calculated and compared to the allowable air leakage.

# STATIC WATER PENETRATION RESISTANCE

A Static Water Penetration Resistance test was performed in accordance with ASTM E331-00(2023) "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference" (ASTM E331) and evaluated in accordance to CSA A440S1-19 "Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-17, North American Fenestration Standard/Specification for windows, doors, and skylights" (A440S1-19). The test was performed using the specified pressure differential and a water spray rate of at least 204 L/m<sup>2</sup> per hour (5.0 U.S. gal/ft<sup>2</sup> per hour). The duration of the test was 15-minutes, during which both the uniform static air pressure and the water spray was continuously applied.

#### CYCLIC WATER PENETRATION RESISTANCE

A four-cycle Water Penetration Resistance test was performed in accordance with ASTM E547-00(2016) "Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference" (ASTM E547) and evaluated in accordance to CSA A440S1-19 "Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-17, North American Fenestration Standard/Specification for windows, doors, and skylights" (A440S1-19). The test was performed using the specified pressure differential and a water spray rate of at least 204 L/m<sup>2</sup> per hour (5.0 U.S. gal/ft<sup>2</sup> per hour). Each cycle consisted of five minutes with the pressure applied and one minute with the pressure released, during which the water spray was continuously applied.

#### UNIFORM LOAD DEFLECTION

The Uniform Load Deflection tests were 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 tests were performed in both the positive and negative directions. After a 10 second preload (50% of the test load), followed by 1 minute with the pressure released, the tests were conducted at the specified test pressure for a period of 10 seconds. Deflections were measured at the mid-span and at the ends. The end deflections were averaged and subtracted from the mid-span deflection (to eliminate deflections caused by movement at the ends of the structural supporting members). Polyethylene film was used during the positive wind pressure sequences.

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#### UNIFORM LOAD STRUCTURAL

The Uniform Load Structural tests were 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. After a 10 second preload (50% of test load), followed by 1 minute with the pressure released, the sample was subjected to a Uniform Load Structural test using a specified test pressure for a time of 10 seconds. The test was performed in both the positive and negative directions. After the test loads were released, the permanent deflections were recorded and the specimen was inspected for failure or permanent deformation of any part of the system that would cause any operational malfunction. Polyethylene film was used during the positive wind pressure sequences.

#### **OPERATIONAL/CYCLING PERFORMANCE**

The Operational/Cycling Performance Test was performed in accordance with AAMA 920-22. During and upon completion of the test, the specimen was inspected periodically for operation, damage and deformation of the unit. The specimen was cycled 50,000 times where 1 cycle was the action of opening and then closing.

#### **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 SPECIMEN DESCRIPTION**

Manufacturer Information	Acro Aluminum Inc. 5430 – 275 Street Langley, BC V4W 3X7 Canada
Model Name	Aluminum Outswing Entrance Door
Installation	<ul> <li>Test Buck: 2x6, #2 &amp; better spf, box w/ 2x12, #2 &amp; better spf, cladding, butt joints secured with 2x #8 x 3" deck screws. The 2x12 clad was also butt jointed together with 4x #8 x 3" deck screws and secured to the 2x6 with #8 x 3" flat head screws at least at every 305 mm (12").</li> <li>Specimen to Buck: <ul> <li>Head and Jambs – Aluminum 'L' angle with peel and stick membrane on the exterior side. The main profile of the head and jamb butted up to the interior side of the angle while a pressure plate was used on the exterior side to effectively clamp the profile to the angle. A length of polystyrene, cut to size, was used as a spacer. The pressure plate was secured in place using 1/4" x 3/4" pan-head stainless steel bolts spaced approximately every 229 mm (9") o.c.</li> <li>Sill – The sill plate was in 2 parts. The main sill profile was secured using 3x #10 x 1-1/2" flat-head screws.</li> </ul> </li> <li>Silicone was used to seal all screw heads and the joints of the test buck as well as the rough opening of the buck on the interior and exterior sides of the head and jambs. The sill joint to the jambs and the interior edge to the buck was sealed.</li> </ul>
Size	<ul> <li>Overall Size:</li> <li>Width: 1070 mm (42.1")</li> <li>Height: 2210 mm (87.0")</li> </ul>
Frame	<ul> <li>Material: Aluminum with thermal break</li> <li>Corners: Butted and mechanically fastened at the head</li> <li>Reinforcement: None.</li> <li>The head and jamb profiles were assembled together in 4 parts. The main rectangular tubing with a thermal break to the screw chase track for the pressure plate. An extruded aluminum clamp rail for the pressure plate, secured to the main profile using closed cell foam tape and #8 x 1-1/2" pan-head stainless steel self-taping screws, with 5x along the jambs spaced approximately every 330 mm (13") to 432 mm (17") o.c. apart and 3x along the head, one at each end and at mid-span. A snap-in plastic cover was used for the 'inside' surface of the rail which allowed for a 2-part snap-in extruded aluminum stop for the operable panel. The plastic cover along the hinge jamb was also secured in place using 9x #8 x 3" flat-head screws.</li> </ul>

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Operable	Material: Aluminum
Panel	Corners: Butted and mechanically fastened
	Reinforcement: None.
	Panel Size:
	• Width: 903 mm (35.6")
	<ul> <li>Height: 2118 mm (83.4")</li> </ul>
	• A snap and slide in cover was used on the interior and exterior sides of the profile.
	The cover snaps into a number of plastic mounting blocks that slide within the profile;
	3x blocks for the top and bottom rails per side; 8x blocks for the stiles per side.
Locks and	• Single handle approximately 1105 mm (43-1/2") o.c. up from the bottom of the lock
Hardware	stile.
	• Single deadbolt lock hook with the keeper slot approximately 800 mm (31-1/2") o.c.
	up from the bottom of the lock jamp.
	<ul> <li>Full length ninge, secured in place using 19x, into the panel and jamb, 6 mm x 3/4" flat head scrows (with painted heads);</li> </ul>
	hat-field screws (with painted fields). hat = 10.2  y cots of pairs at the ten and better and of the bings 22 mm (1.1/4") from
	• In 3X sets of pairs at the top and bottom ends of the ninge, 32 mm (1-1/4) from the ends and 82 mm $(2 \cdot 1/4^{\circ})$ apart
	<ul> <li>Between the top and bottom pairs in a zig-zag pattern approximately 203 mm</li> </ul>
	(8") to 254 mm (10") o c apart
Drainage	• 3x drain holes, 8 mm (5/16") diameter, into through the sill approximately 51 mm
	(2") o.c. from the lock jamb, 102 mm (4") o.c. from the hinge jamb and at the mid-
	span between the 2. Notches were cut into the test buck to provide a drainage
	channel for these 3 drain holes.
	• Glazing cavity drains out through a notch cut into the bottom rail at the corners.
Weather-strip	<ul> <li>The frame has an exterior bulb gasket along the head and jambs.</li> </ul>
	• An EPDM gasket was used around the perimeter to cap the sides of the panel. The
	gasket covers the full depth of the panel with a fin along both the interior and exterior
	edge. Along the hinge side, the interior fin was trimmed off to allow the hinge to sit
	flush. Along the top and bottom rail, the gasket was also secured with 2x #8 x 1-1/2"
	flat-head screws
	• Face mounted to the bottom edge of the door panel was an EPDM gasket held in
	place with an auminum partitlat was secured with $9x \# 8x 5/8$ pan-nead stainless steel self-taping screws that were spaced approximately even 102 mm $(4'')$ of The
	sieer sen-iaping screws that were spaced approximately every 102 mm (4) 0.C. The mounting har was seal to the door papel with silicope
	<ul> <li>A compression gasket was used along both length edges of the pressure plate.</li> </ul>
	length of gasket was also used for the screw chase on the frame

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Glazing	<ul> <li>IGU specification:</li> <li>6 mm / 6 mm clear tempered lites with 13 mm spacer bar</li> <li>Overall thickness, 25 mm (~1")</li> <li>Laid-in, exterior glazed on top of a glazing gasket on the panel profile.</li> <li>Glazing Blocks: 4x sets of rubber setting blocks of various thicknesses, 1x on each side.</li> <li>Glazing Stops: Aluminum snap and slide cover with push-in gasket.</li> </ul>
Drawings	• A copy of the drawing package supplied by Baywest Glazing Systems Inc. is included in Section 10 of this report.

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#### **SECTION 7**

#### TEST RESULTS

#### AIR LEAKAGE RESISTANCE

Air test data is indicated in the following table:

Property	Area m <sup>2</sup> (ft <sup>2</sup> )	Infiltration Rate L/s*m <sup>2</sup> (cfm/ft <sup>2</sup> )
Overall Assembly	2.37 (25.45)	1.23 (0.24)

The overall system met the Air Leakage performance requirements as reported above when tested to ASTM E283.

#### STATIC WATER PENETRATION RESISTANCE

During the 15-minute test period, using a pressure differential of 0 Pa (0.0 psf), there was no water leakage observed. The system met the 0 Pa (0.0 psf) Static Water Penetration Resistance performance requirements when tested to ASTM E331 and evaluated using the evaluation criteria of A440S1-19.

#### CYCLIC WATER PENETRATION RESISTANCE

During the 24-minute test period, using a pressure differential of 180 Pa (3.8 psf), there was no water leakage observed. The system met the 180 Pa (3.8 psf) Cyclic Water Penetration Resistance performance requirements when tested to ASTM E547 and evaluated using the evaluation criteria of A440S1-19.

#### **UNIFORM LOAD – DEFLECTION & STRUCTURAL**

Uniform Load Structural data: Mullion span, L = 2116 mm (83.31") Deflection limit, L/175 = N/A \*Residual deflection limit, L\*0.4% = 8.46 mm (0.33")

Test Dressure					
Pa (psf)	Pos	sitive	Neg	ative	Compliance
	Deflection	Residual	Deflection	Residual	
1200 (25.1)	1.67 (0.07)	0.44 (0.02)	17.84 (0.70)	0.55 (0.02)	Dass
1800 (37.6)	n/a	0.90 (0.04)	n/a	0.53 (0.02)	rdss

\*Note – Residual deflection limit was based on NAFS Class R/LC requirements

After the test loads were released, the specimen was inspected and there was found to be no failure or permanent deformation of any part of the window system that would cause any operational malfunction. The system met the Uniform Load performance requirements at design pressure of 1200 Pa (25.1 psf) when tested to ASTM E330.

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#### **OPERATION/CYCLING PERFORMANCE**

Number of Cycles	Cycles per Minute
50,000	21

At the completion of the test, there was found to be no failure or permanent deformation that would impair the operation of the system. The specimen met the Operational / Cycling Performance requirements at 50,000 cycles when tested to AAMA 920.

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# **SECTION 8**

#### CONCLUSION

The test specimen met the specified performance requirements as described in Section 7.

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# SECTION 9

#### **PHOTOGRAPHS**



Photo No. 1 & 2 Outswing Side-hinged Entrance Door – Exterior, left; Interior, right



Photo No. 3 Frame Assembly Profile

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Photo No. 4 Panel Profile



Photo No. 5 Panel Cover



Photo No. 6 Pressure Plate

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Photo No. 7 Pressure Plate Cover



Photo No. 8 Exterior Side Mounting Block for Panel Cover



Photo No. 9 Interior Side Mounting Block for Panel Cover

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Photo No. 10 Handle



Photo No. 11 & 12 Hook Lock, left; Keeper Slot, right

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Photo No. 13 Full Length Hinge



Photo No. 14 Sill Drainage

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Photo No. 15 Head and Jamb Frame Weather-strip



Photo No. 16 Panel Side Profile Cap Weather-strip



Photo No. 17 Panel Bottom, Face Mounted Weather-strip

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Photo No. 18 Glazing Gasket



Pressure Plate Gasket

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# SECTION 10 DRAWINGS

The drawings for the Aluminum Outswing Entrance Door, as provided by the client, have been reviewed by Intertek B&C and are representative of the sample reported herein. Sample construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.

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		5430 275 STREET LANGLEY BC	OWNER	ARCHITECT		CLIENT		PROJECT			ENGINEER STAMP			Date : Apr. 11th, 2022	Scale : Drawing By : Revision No :
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					ΓE			N ICATIONS IONS AILS		SURFACE#2 GE SPACER Argon 90%/Air 10%					

ALUMINUMI	OWNER	ARCHITECT	CLIENT		PROJECT				ENGINEER STAMP				Date : Apr. 11th, 2022	Scale : Drawing By : Revision No :	2	PAGE
				PERFORMANCE NOTES												
	Request	300 Medium STILE		DRAWING INDEX	UESCRIPTION TITLE PAGE (SPECIFICATIONS FRAMING ELEVATIONS CONNECTION DETAILS	GLAZING SCHEDULE	- 6mm Cardinal 270/ LOW-E #2 SURFACE#2 - 102 Dual soal Block WABM EDGE SDACEB Arron 00%/Air 10%	ris daaleed dakk waxwi suuch of actin Augul aulahi ula 6mm Clear								
	ctural test	OKEN DOOR			3 PAGES		÷ ت	OL OVERALL								
	Air/Water/Stru	ACRO THERMALLY BRO		RIALS	2.5" X.5" BACK SECTION DOUBLE GLAZED	T INFORMATION		M.FLASHING	NE: HEAD/JAMB PROTECTO WRAP PW 100/40 O SEAL 45 (FOIL FACED)	REMSIL 200	DOOR HARDWARF					
				FRAMING MATER	177E 3000 SERIES CURTAIN WALL	TYPICAL PROJEC	BLACK ANO.	0.040 PRE-FINISHED ALUN	PEEL AND STICK MEMBRAN SILL LOCATION: PROTECTO	DYMONIC FC, DOW CWS, TR	TYPES	DOR SERIES MEDIUM STILE = 4", BOTTOM RAIL = 4")				
				CHINE	BAYWEST GLAZING		ALUMINUM FINISHES	SILL FLASHING	MEMBRANE	CAULKING	DOOR	CRO ALUMINUM THERMAL DC				

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# **SECTION 11**

# **REVISION LOG**

<b>REVISION #</b>	DATE	SECTION	REVISION
0	02/14/24	N/A	Original Report Issue
			Air leakage section of the summary table changed to reflect the air
	05/06/24	2	leakage rate
1		5	Air leakage description corrected to reflect for Infiltration only
		7	Air leakage table was corrected to reflect the correct data