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PERFORMANCE EVALUATION OF

FIXED WINDOW "5400 HTP SERIES CURTAIN WALL"

FOR WINDSPEC INC.

IN ACCORDANCE WITH:

AAMA/WDMA/CSA 101/I.S.2/A440-11 AND A440S1-17

Report to:	Windspec Inc. 1310 Creditstone Road Concord, Ontario, Canada L4K 5T7
Attention:	Oren Anava
Telephone: Fax: Email:	905-738-8311 905-738-6188 oren@windspec.com
Report No.:	21-06-B0016-1N 6 Pages, 1 Appendix
Proposal No.:	20-006-187117 RV2
Report Date:	May 18, 2021

Product Manufacturer:	Windspec Inc.
Product Type:	Fixed Window
Product Series/Model:	5300 HTP Series Curtain Wall
Primary Product Designator:	**Class AW – PG4800 – Size tested 1530 x 2520 mm – Fixed window** **Class AW – PG100 – Size tested 60.24 in x 99.21 in – FW**
Secondary Product Designator:	
Positive Design Pressure:	4800 Pa (100.25 psf)
Negative Design Pressure:	4800 Pa (100.25 psf)
Water Penetration Resistance:	720 Pa (15.04 psf)
Air Infiltration/Exfiltration:	Canadian Fixed Level
Test Completion Date:	March 16, 2021
Report Number:	21-06-B0016-1N

1.0 INTRODUCTION

At the request of Windspec Inc., Element Materials Technology Inc. was retained to evaluate the physical performance of a Fixed Window identified as "5400 HTP Series Curtain Wall", in accordance with AAMA/WDMA/CSA 101/I.S.2/A440-11 Standard, "NAFS – North American Fenestration Standard/Specification for windows, doors, and skylights" and A440S1-17 Canadian Supplement, as outlined in proposal number 20-006-187117 RV2

Note: The results reported herein also meet or exceed the requirements of the AAMA/WDMA/CSA 101/I.S.2/A440-17 standard.

Element Specimen No.:	21-06-B0016-1
Type:	Fixed Window
Model:	5400 HTP Series Curtain Wall
Overall Window Size:	1530 mm x 2520 mm (60.24" x 99.21")
Sampling:	N/A

2.0 SAMPLE DESCRIPTION

The following sample description has verified by Element. Details and drawings of the described test specimen, as provided by the manufacturer, have been included in Appendix A.

Product Type:	Fixed Window
Frame:	Extruded Aluminum, 1530 mm x 2520 mm x 160 mm (60.24" x 99.21" x 6.30")
Joinery:	Butt corners, each corner held with internal aluminium bracket, sealed with flexile sealant
Installation:	
Test Buck:	Wood Buck
Fasteners:	Frame fastened to buck with aluminium angle, 3 mm (0.12) thick, angle fastened to buck with #14x1" hex head machine screws, five per head/sill, 300 mm (11.81" c/c), eight per jamb, 300 mm (11.81") c/c
Sealant:	Angle sealed at exterior perimeter with butyl tape and sealed at interior with flexible sealant.
Glazing Type:	Tempered, overall thickness 25 mm (0.98"), glass thickness 6 mm (0.24"), dual sealed stainless steel spacer, gap thickness 13 mm (0.51"), argon filled
Glazing Method:	Laid in, dry glazed
Gasket:	One row, EPDM, 6 mm (0.24") high, interior perimeter Two rows, EPDM, 6 mm (0.24") high, exterior perimeter, sealed at the ends with flexible sealant
Pressure Plate:	Extruded aluminium fastened to interior frame with #14x3/4" hex head machine screws, 140 mm (5.51") c/c, sealed at the ends with flexible sealant
Cap:	Extruded Aluminium, snap on sealed at the ends with flexible sealant
Thermal Break:	
Frame:	Nylon, crimped in place, 2 rows, 18 mm (0.71") wide, frame perimeter
Drainage/Ventilation:	
Drain Slot:	Two per head/sill, 45 mm x 6 mm (1.77" x 0.24"), pressure plate, 260 mm (10.24") from the ends Two per head/sill 30 mm x 5 mm (1.18" x 0.20"), cap, 170 mm (6.69") from the ends

3.0 TEST RESULTS

Table 1 - Summarized Testing Results in Accordance with AAMA/WDMA/CSA 101/I.S.2/A440- 11and A440S1-17 Canadian Supplement

Test	Requirements		Results		Rating
Initial Air Leakage Resistance (Clause 9.3.2) *Per ASTM E283* **Test Date:** February 16, 2021	Allowable rate of air leakage shall be less than or equal to the following, L/s.m² (cfm/ft²), at the subsequent test pressure:		Test area, m² (ft²): 3.9 (41.51)		**PASS** Canadian Fixed Level
	Test Pressure, Pa (psf):	300 (6.27)	Measured Air Leakage Rate, L/s.m² (cfm/ft²):		
	Gateway:	0.2 (0.04)	Infiltration:	0.2 (0.04)	
	Canadian Fixed Level:	0.2 (0.04)	Exfiltration:	0.2 (0.04)	
Initial Water Penetration Resistance (Clause 9.3.3) *Per ASTM E547* **Test Date:** February 16, 2021	No water leakage shall be observed at the following specified cyclic pressure differential, Pa (psf):		No water leakage was observed at the following specified cyclic pressure differential, Pa (psf):		**PASS** Gateway **(AW40-FW)** Optional Performance **(AW100-FW)**
	Gateway Performance:		**Gateway Performance:**		
	Test Pressure:	390 (8.15)	Test Pressure:	390 (8.15)	
	Optional Performance: (US / CAN)		**Optional Performance: (US / CAN)**		
	Test Pressure (US):	580 (12.11)	Test Pressure:	720 (15.04)	
	Test Pressure (CAN):	720 (15.04)			
Initial Water Penetration Resistance (Clause 9.3.3) *Per ASTM E331* **Test Date:** February 16, 2021	No water leakage shall be observed at the following specified static pressure differential, Pa (psf):		No water leakage was observed at the following specified static pressure differential, Pa (psf):		**PASS** Gateway **(AW40-FW)** Optional Performance **(AW100-FW)**
	Gateway Performance:		**Gateway Performance:**		
	Test Pressure:	390 (8.15)	Test Pressure:	390 (8.15)	
	Optional Performance: (US / CAN)		**Optional Performance: (US / CAN)**		
	Test Pressure (US):	580 (12.11)	Test Pressure:	720 (15.04)	
	Test Pressure (CAN):	720 (15.04)			

Table 1, Continued - Summarized Testing Results in Accordance with AAMA/WDMA/CSA 101/I.S.2/A440-11 and A440S1-17 Canadian Supplement

Test	Requirements		Results		Rating
Life Cycle Testing: (Clause 7.3.5) *Per AAMA 910-10* **Test Date:** Feb 26-28, 2021	**Thermal Cycling:***		*No damage to fasteners, hardware parts, supports arms, window fully functional		**PASS**
	No damage to fasteners, hardware parts, supports arms, actuating mechanisms or any other damage which causes the window to malfunction after six cycles of the following temperatures, °C (°F):				
	High Temperature:	82 (180)			
	Low Temperature:	-18 (0)			
Uniform Load Deflection (Clause 9.3.4.2) *Per ASTM E330* **Test Date:** March 16, 2021	No member shall deflect more that L/175 of unsupported span at the following specified test pressures, Pa (psf):		Measured net deflection of Left Jamb, mm (in):		**PASS** Gateway **(AW40-FW)** Optional Performance **(AW100-FW)**
	Allowable deflection, mm (in): 14.4 (0.57)		Left Jamb span, mm (in): 2520 (99.21)		
	Gateway Performance:		Positive:	3.1 (0.12)	
	Test Pressure:	±1920 (40.10)	Negative:	-2.8 (-0.11)	
	Optional Performance:				
	Test Pressure:	±4800 (100.25)			
Post Design Pressure Air Leakage Resistance (Clause 9.3.2) *Per ASTM E283* **Test Date:** March 16, 2021	Allowable rate of air leakage shall be less than or equal to the following, L/s.m² (cfm/ft²), at the subsequent test pressure:		Test area, m² (ft²): 3.9 (41.51)		**PASS** Canadian Fixed Level
			Measured Air Leakage Rate, L/s.m² (cfm/ft²):		
	Test Pressure, Pa (psf):	300 (6.27)			
	Gateway:	0.2 (0.04)	Infiltration:	0.2 (0.04)	
	Canadian Fixed Level:	0.2 (0.04)	Exfiltration:	0.2 (0.04)	
Post Design Pressure Water Penetration Resistance (Clause 9.3.3) *Per ASTM E547* **Test Date:** March 16, 2021	No water leakage shall be observed at the following specified cyclic pressure differential, Pa (psf):		No water leakage was observed at the following specified cyclic pressure differential, Pa (psf):		**PASS** Gateway **(AW40-FW)** Optional Performance **(AW100-FW)**
	Gateway Performance:		**Gateway Performance:**		
	Test Pressure:	390 (8.15)	Test Pressure:	390 (8.15)	
	Optional Performance: (US / CAN)		**Optional Performance: (US / CAN)**		
	Test Pressure (US):	580 (12.11)	Test Pressure:	720 (15.11)	
	Test Pressure (CAN):	720 (15.04)			

Table 1, Continued - Summarized Testing Results in Accordance with AAMA/WDMA/CSA 101/I.S.2/A440-11 and A440S1-17 Canadian Supplement

Post Design Pressure Water Penetration Resistance (Clause 9.3.3) *Per ASTM E331* **Test Date:** March 16, 2021	No water leakage shall be observed at the following specified static pressure differential, Pa (psf):				No water leakage was observed at the following specified static pressure differential, Pa (psf):			**PASS** Gateway **(AW40-FW)** Optional Performance **(AW100-FW)**
	Gateway Performance:				**Gateway Performance:**			
	Test Pressure:	390 (8.15)			Test Pressure:	390 (8.15)		
	Optional Performance: (US / CAN)				**Optional Performance: (US / CAN)**			
	Test Pressure (US):	580 (12.11)			Test Pressure:	720 (15.04)		
	Test Pressure (CAN):	720 (15.04)						
Uniform Load Structural (Clause 9.3.4.3) *Per ASTM E330* **Test Date:** March 17, 2021	There shall be no permanent damage to the window components after the following specified test pressures, Pa (psf). No member shall have permanent deflect more that 0.2% of span.				Measured permanent deflection of Left Jamb, mm (in):			**PASS** Gateway **(AW40-FW)** Optional Performance **(AW100-FW)**
	Allowable permanent deflection, mm (in): 5.0 (0.20)				Left Jamb span, mm (in): 2520 (99.21)			
	Gateway Performance:				Positive:	0.02 (0.001)		
	Test pressure:	±2880 (60.15)			Negative:	-0.02 (-0.001)		
	Optional Performance:							
	Test pressure:	±7200 (150.38)						
Forced-Entry Resistance (Clause 9.3.5) *Per ASTM F588* **Test Date:** March 16, 2021	No entry shall be gained during the following test sequence:				For Type D Window no entry was gained during the following specified test sequence:			**PASS** Grade 40
	Load Identification	Grade Loads, N (lbf)						
		10	20	30	40			
	Disassembly T1:	5 min		10 min		Disassembly T1:	No Entry	
	Manipulation T1:	5 min		10 min		Manipulation T1:	No Entry	

4.0 MODIFICATIONS

No modification was made to the Windspec Inc., Fixed Window "5400 HTP Series Curtain Wall", Element Specimen No.: 21-06-B0016-1, during testing to achieve the results stated in this report.

5.0 CONCLUSION

Based on the results of the testing summarised in Table 1, Windspec Inc., Fixed Window "5400 HTP Series Curtain Wall," Element Specimen No.: 21-06-B0016-1 met the following requirements as outlined in the AAMA/WDMA/CSA 101/I.S.2/A440-11 and AAMA/WDMA/CSA 101/I.S.2/A440-17 standards and A440S1-17 Canadian Supplement.

Performance Rating

- Air Leakage Resistance — Pass (Canadian Fixed Level)
- Water Penetration Resistance — 580 Pa (12.11 psf) (US); 720 Pa (15.04 psf) (CAN)
- Uniform Load Deflection — ±4800 Pa (100.25 psf)
- Uniform Load Structural — ±7200 Pa (150.38 psf)
- Life Cycle Testing — Pass
- Forced Entry Resistance — Grade 40

Product Designation for Class AW:

- Class AW – PG4800 – Size tested 1530 x 2520 mm – Fixed Window
- Class AW – PG100 – Size tested 60.04 x 99.21 in – FW

Product Manufacturer:	Windspec Inc.
Product Type:	Fixd
Product Series/Model:	5400 HTP Series Curtain Wall
Primary Product Designator:	Class AW – PG4800 – Size tested 1530 x 2520 mm – Fixed window Class AW – PG100 – Size tested 60.04 x 99.21 in – FW
Secondary Product Designator:	
Positive Design Pressure:	4800 Pa (100.25 psf)
Negative Design Pressure:	4800 Pa (100.25 psf)
Water Penetration Resistance:	720 Pa (15.04 psf)
Air Infiltration/Exfiltration:	Canadian Fixed Level
Test Completion Date:	March 16, 2021
Report Number:	21-06-B0016-1

6.0 REPORT REVISION SUMMARY

Revision No:	**Date:**	**Description of Revisions:**
21-06-B0016-1	May 18, 2021	Original Document

Reviewed by:

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

Reported by:

Scott Hallam, B.Eng. Ext 11511
Building Systems Specialist, Building Systems
Building Science Division

APPENDIX A

Manufacturer's Detail Drawings

(5 Pages)

5400 HTP SERIES CURTAIN WALL

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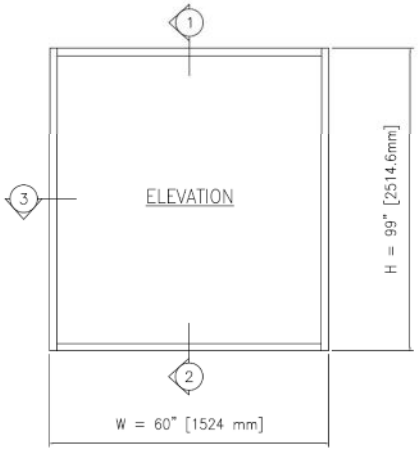
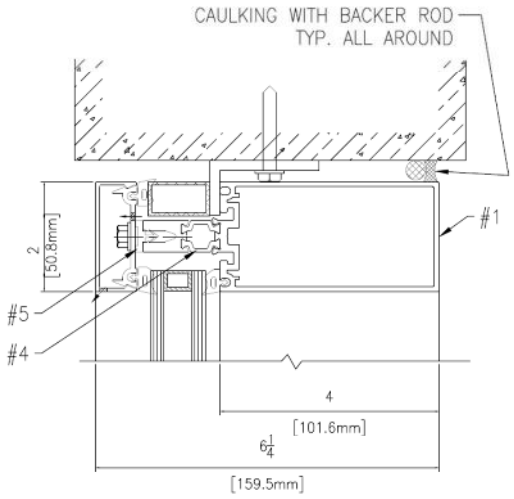
APPROVED





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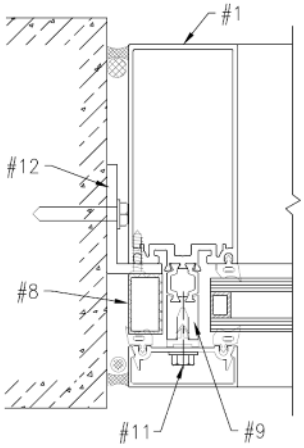

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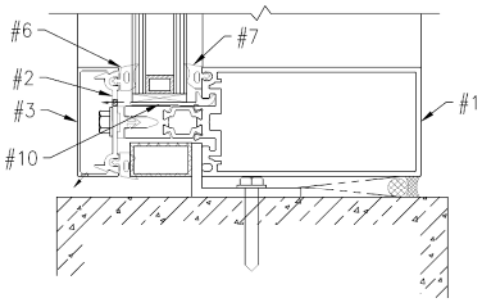


2

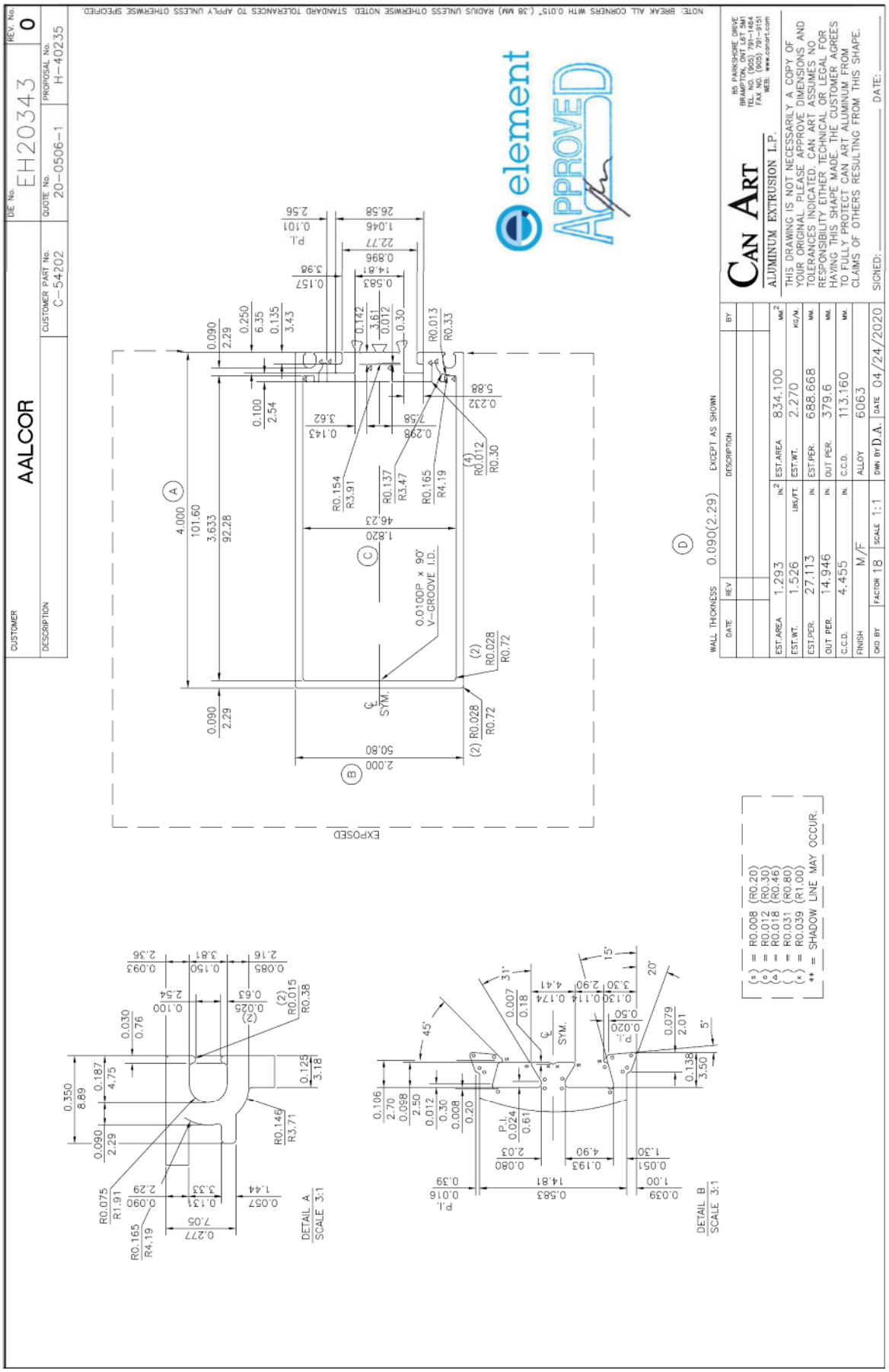
SEALED UNIT GLAZING 1" THK:

EXTERIOR GLASS: 6mm CLEAR TEMPERED
13mm AIR SPACE WITH ALUM. SPACERS
INTERIOR GLASS: 6mm CLEAR TEMPERED
1 @ 56"X95"

#	DIE #	DESCRIPTIONS
1	C-54202	NEW ALUM. HTP MULLION
2	C-54006	NEW ALUM. PRESSURE PLATE
3	C-54004	NEW ALUM. SNAP-ON CAP
4	N/A	BAUTEC STRIP NYLON 18mm WIDE
5	R-55202	FLEXIBLE PVC THERMAL BREAK
6	R-55105	EXTERIOR EPDM GASKET
7	R-55104	INTERIOR EPDM GASKET
8	R-55001	PVC POCKET FILLER
9	N/A	NEW ALUM. NECK
10	H-55104	SUPPORT TAB
11	N/A	FASTENER #14X3/4" LG
12	N/A	ALUM. ANGLE L-1"X2"X1/8"

WINDSPEC INC.
MANUFACTURERS OF HIGH PERFORMANCE 'WINDSPEC' WINDOWS
ALUMINUM ENTRANCE SYSTEMS AND ARCHITECTURAL PANELS
1310 CREDITSTONE RD, CONCORD, ONTARIO L4K 5T7
Telephone: (905) 738 -8311 Fax (905) 738 - 6188

SCALE	DESCRIPTION	DWG. NO.
NTS	5400 HTP SERIES FIXED WINDOW	001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AALCOR
DESCRIPTION
CUSTOMER PART No. C-54202
DIE No. EH20343
QUOTE No. 20-0506-1
PROPOSAL No. H-40235
REV. No. 0
NOTE: BREAK ALL CORNERS WITH 0.015" (.38 MM) RADIUS UNLESS OTHERWISE NOTED. STANDARD TOLERANCES TO APPLY UNLESS OTHERWISE SPECIFIED.
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CAN ART
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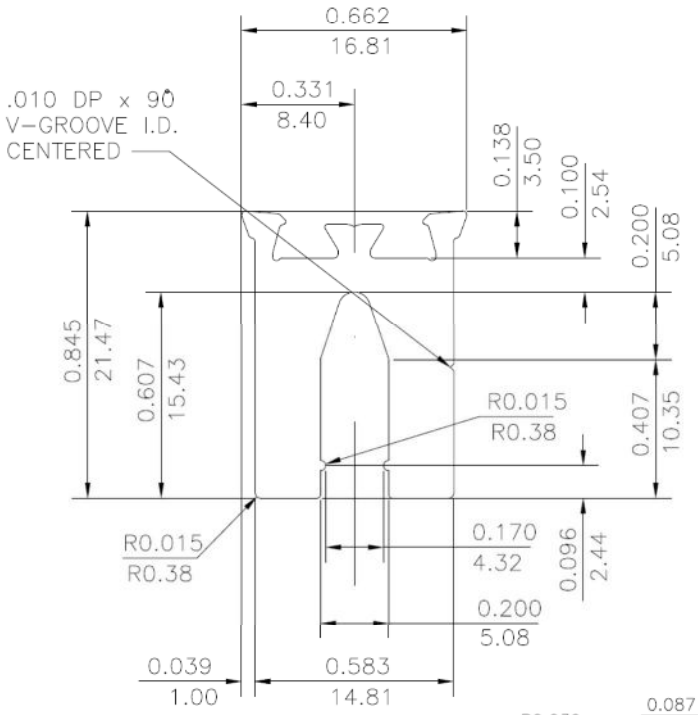
SIGNED:
DATE:
WALL THICKNESS 0.090(2.29) EXCEPT AS SHOWN
DATE REV DESCRIPTION BY
EST.AREA 1.293 IN.2 EST.AREA 834.100 MM.2
EST.WT. 1.526 LBS/FT. EST.WT. 2.270 KG/M.
EST.PER. 27.113 IN. EST.PER. 688.668 MM.
OUT PER. 14.946 IN. OUT PER. 379.6 MM.
C.C.D. 4.455 IN. C.C.D. 113.160 MM.
FINISH M/F ALLOY 6063
DWG BY D.A. DATE 04/24/2020
DIG BY FACTOR 18 SCALE 1:1
EXPOSED
0.010DP x 90° V-GROOVE I.D.
SYM.
DETAIL A SCALE 3:1
DETAIL B SCALE 3:1
(s) = R0.008 (R0.20)
(o) = R0.012 (R0.30)
(Δ) = R0.018 (R0.46)
( ) = R0.031 (R0.80)
(x) = R0.039 (R1.00)
** = SHADOW LINE MAY OCCUR.

CUSTOMER		DIE No.	REV. No.
AALCOR WINDOWS		ES17883	0
DESCRIPTION	CUSTOMER PART No.	QUOTE No.	PROPOSAL No.
5500 SHORT NECK		14–0810–1	S–30473



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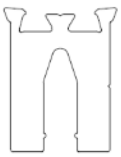

ACTUAL SIZE

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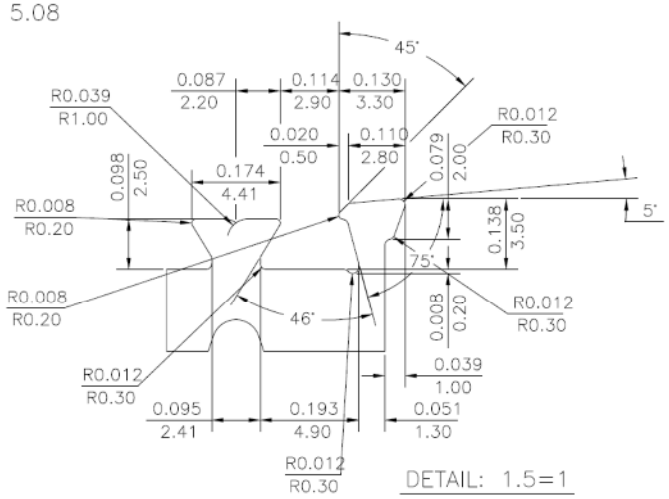

DETAIL: 1.5=1

WALL THICKNESS AS SHOWN EXCEPT AS SHOWN

DATE	REV	DESCRIPTION	BY

EST.AREA	0.340	IN.^{2}	EST.AREA	219.117	MM.^{2}
EST.WT.	0.401	LBS/FT.	EST.WT.	0.596	KG/M.
EST.PER.	4.682	IN.	EST.PER.	118.932	MM.
OUT PER.		IN.	OUT PER.		MM.
C.C.D.	1.039	IN.	C.C.D.	26.383	MM.
FINISH	M/F		ALLOY	6063	
CKD BY	FACTOR 12	SCALE 2:1	DWN BY C.P.	DATE 08/07/2014	

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BRAMPTON, ONT L6T 5M1
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INDALEX

AS–28991

2" CAP

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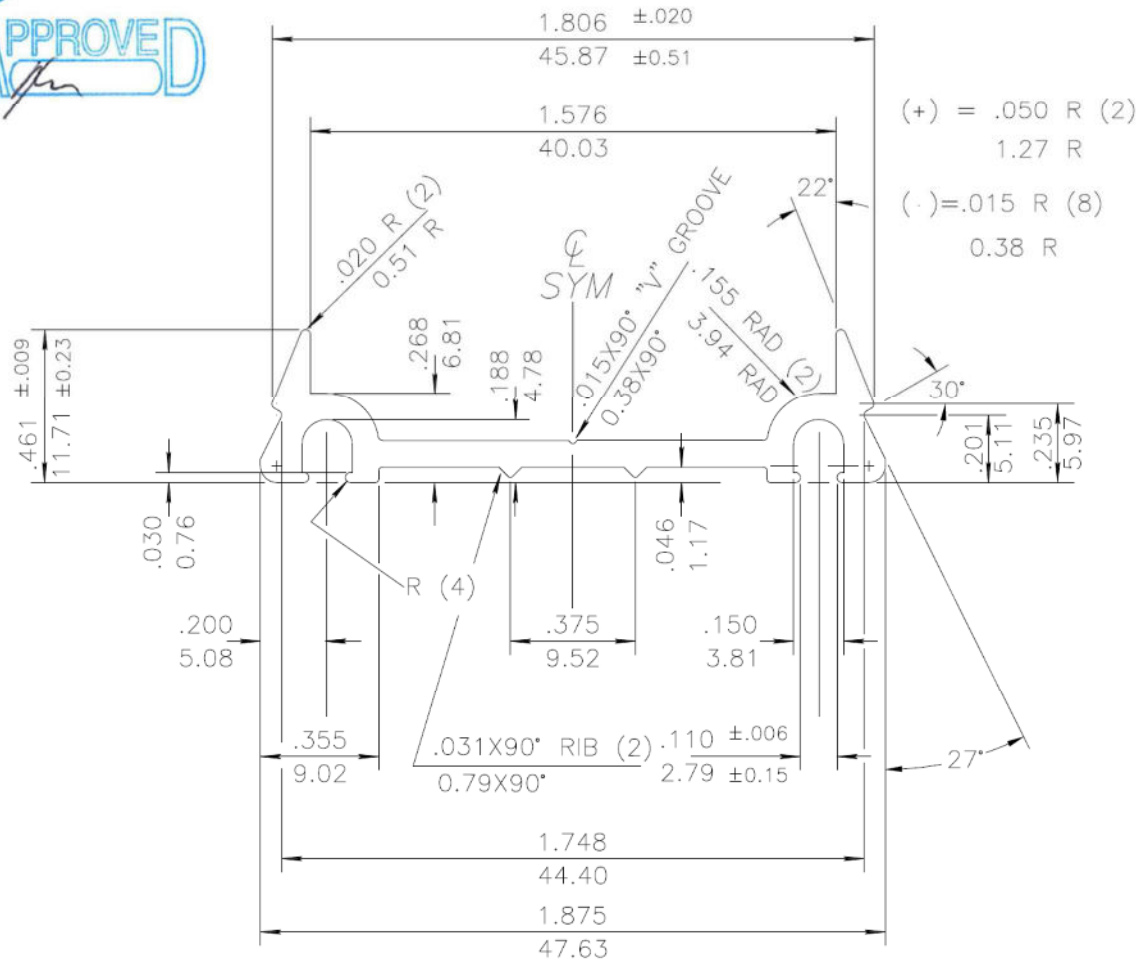
26918–S



SECTION TO SNAP FIT WITH DIE #

0.080 2.03

NO EXPOSED SURFACES

ACTUAL SIZE

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0.276	0.411	21		
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		2:1	91,06,13	

6063–T6

AS–28991

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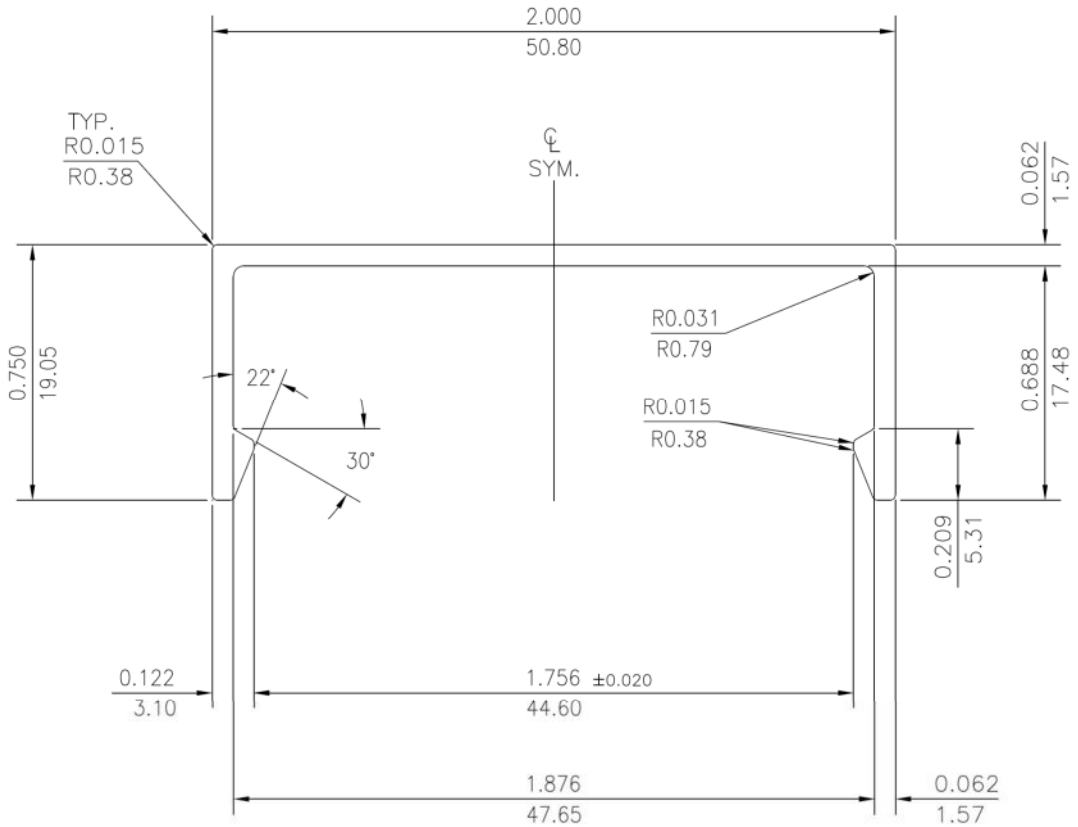

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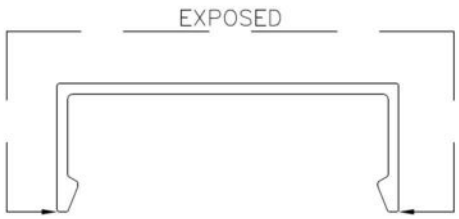

ACTUAL SIZE

WALL THICKNESS 0.062(1.57) EXCEPT AS SHOWN

DATE	REV	DESCRIPTION	BY

EST.AREA	0.224	IN.^{2}	EST.AREA	144.249	MM.^{2}
EST.WT.	0.264	LBS/FT.	EST.WT.	0.393	KG/M.
EST.PER.	6.905	IN.	EST.PER.	175.382	MM.
OUT PER.		IN.	OUT PER.		MM.
C.C.D.	2.126	IN.	C.C.D.	53.992	MM.
FINISH	PAINT/ANODIZED		ALLOY	6063	
CKD BY	FACTOR 26	SCALE 2:1	DWN BY C.P.	DATE 01/27/2009	

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