MMM GROUP

NFRC 100
Procedure for Determining Fenestration Product U-Factors

NFRC 200
Solar Heat Gain Coefficient and Visible Transmittance

NFRC 500
Procedure for Determining Fenestration Product Condensation Resistance Values

Fenestration Simulation Report

925 Window Wall

Report Number

WIN15247w

Friday, July 24, 2015

Prepared For

Oren Anava
Windspec Inc.
1310 Creditstone Road
Concord, Ontario
L4K 5T7
(905)-738-8311

TABLE OF CONTENTS

Manufacturer:	Windspec Inc.
Report Number:	WIN15247w
Product Line:	925 Window Wall

Frame:	Thermally Broken Aluminum
Sash:	NA
Thermal Break:	P
Edge of Glass:	Interior edge of the glazing is held by EPDM gasket, exterior edge is held by butyl rubber gasket.
Glazing:	Glazing options are double, triple, low-e, air, argon or krypton fill.
Spacer:	Superspacer TriSeal: ZF-D, Aluminum: A1-D, Stainless Steel: SS-D

Weatherstripping:	NA

Simulations:	Performed using WINDOW 6, and THERM 6.
General:	This product line includes the 925 Window Wall manufactured by Windspec Inc.

Tyler McPherson

Digitally signed by Tyler McPherson
DN: cn=Tyler McPherson, o=MMM Group, ou=Fenestration Services, email=mcphersont@mmm.ca, c=CA
Date: 2015.07.24 11:32:50 -04'00'

Tyler McPherson

Simulator

Michael Barclay

Digitally signed by Michael Barclay
DN: cn=Michael Barclay, o=MMM Group Ltd, ou=Fenstration Services, email=barclaym@mmm.ca, c=CA
Date: 2015.08.04 14:01:10 -04'00'

Simulator in Responsible Charge

The windows documented in this report were simulated in accordance with the NFRC 100: Procedure for Determining Fenestration Product U-Factors (2014), NFRC 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence (2014) and NFRC 500: Procedure for Determining Fenestration Product Condensation Resistance Values (2014).

The windows were simulated using WINDOW 6 and THERM 6 computer programs as specified in NFRC 100 and NFRC 200. The most currently approved spectral data files from NFRC were also used. The WINDOW program models the one-dimensional heat flow through the center-of-glass portion of the window. The THERM program models the two-dimensional heat flow through the frame, edge-of-glass, divider, and divider-edge portions of the window. The input data for both programs is based on manufacturer's specifications. Defaults for material thermal and optical properties are given in the computer programs. When values other than defaults were used, they are documented.

Ratings values included in this report are for submittal to an NFRC-licenced IA and are not meant to be used directly for labeling purposes. Only those values identified on a valid Certification Authorization Report (CAR) by an NFRC accredited Inspection Agency (IA) are to be used for labeling purposes.

The values included in this report are not considered in compliance with NFRC 100, NFRC 200, and/or NFRC 500 unless the associated validation test requirements have been satisfied, as applicable.

DISCLAIMER:

This window simulation report was generated by MMM Group of Kitchener, ON. The report relates only to the items specified.

MMM Group and its employees neither endorse nor warrant the suitability of the product simulated. Every effort was taken to accurately model the performance of the windows documented in this report. Because of the large amount of input data and analyses, it is possible that errors or omissions could occur.

Neither MMM Group nor any of its employees shall be responsible for any loss or damage resulting directly or indirectly from any default, error, or omission.

SIMULATION NOTES

1 This is an "NFRC 100: Procedure for Determining Fenestration Product U-Factors" Certification Report.

2 This is an "NFRC 200: Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence" Certification Report.

3 This is an "NFRC 500: Procedure for Determining Fenestration Product Condensation Resistance Values" Certification Report.

4 Unit conversions and rounding are performed according to NFRC 601.

5 All glazing surface emissivities are assumed to be 0.84 unless otherwise stated.

6 The gas fill method is single probe with 90% argon or krypton fill.

7 Unless otherwise stated. All non-continuous hardware that does not create a thermal bridge such as hinges, balances, locks etc. are not modeled.

8 Where applicable, the following materials are used (Conductivity in W/mK): ADCO PIB-8 HSNB Gray (0.155), Cardinal Stainless Steel (14.187), Edgetech Silicone Foam S1 (0.19), Edgetech Silicone Foam S2 (0.102), Edgetech EPDM (0.127), GED Stainless Steel (13.63), TrueSeal Technologies Butyl 761-71X (0.231).

NFRC - U-Value Baseline Product

Manufacturer: Windspec Inc.

Product line: 925 Window Wall

Product Type: GWWW

Frame: Thermally Broken Aluminum

Report number: WIN15247w

Date: 7/24/2015

Revised date:

CPD:

Mfr contact: Oren Anava

Simulator in Responsibe Charge:

IA Name:

Product Description	SB70xl-kry-cl-kry-SB70XL, tts
Glass Thick 1 (in)	0.223
Glass Thick 2 (in)	0.225
Glass Thick 3 (in)	0.223
Glass Thick 4 (in)	
Glass Thick 5 (in)	
# of Glazing Layers	3
Surface #2 Emissivity	0.02
Surface #3 Emissivity	
Surface #4 Emissivity	
Surface #5 Emissivity	0.02
Surface #6 Emissivity	
Surface #7 Emissivity	
Surface #8 Emissivity	
Gap 1	0.528
Gap 2	0.528
Gap 3	
Gap 4	
Validation Size	2000 x 2000 mm
	78.74 x 78.74 in
Spacer Type	ZF-D
Grid	N
Gap Fill	Air (10%) / krypton (90%) Mix
U-Value	0.18

ID	Name	No. of Layers	Mode	Tilt	Environmental Conditions	Keff (Btu/h*ft*F)	Overall Thickness (in)	Uval (Btu/h*ft²F)	SHGC	Visible Transmittance
2	cl-arg-S400	2	#	90	NFRC 100-2010	0.017	1.000	0.277	0.636	0.761
3	cl-air-cl	2	#	90	NFRC 100-2010	0.041	1.000	0.471	0.704	0.786
4	SB70xl-kry-cl-kry-SB70XL	3	#	90	NFRC 100-2010	0.013	1.765	0.106	0.233	0.463
5	cl-arg-cl-arg-S400	3	#	90	NFRC 100-2010	0.026	1.765	0.191	0.548	0.680
6	cl-air-cl-air-cl	3	#	90	NFRC 100-2010	0.048	1.765	0.304	0.617	0.703
7	SB70xl-kry-SG400	2	#	90	NFRC 100-2010	0.012	1.000	0.181	0.265	0.618

NFRC Simulation Data – Summary

Manufacturer: Windspec Inc.
Series/Model #: 925 Window Wall

Spacer: Superspacer TriSeal: ZF-D, Aluminum: A1-D, Stainless Steel: SS-D

Operator Type: FIXD
Model Size: 2000 x 2000
Thermal Break: P

Sim Lab Code: SEEL
Report number: WIN15247w
Date: 7/24/2015
Revised Date:
Rating Procedure: 2014

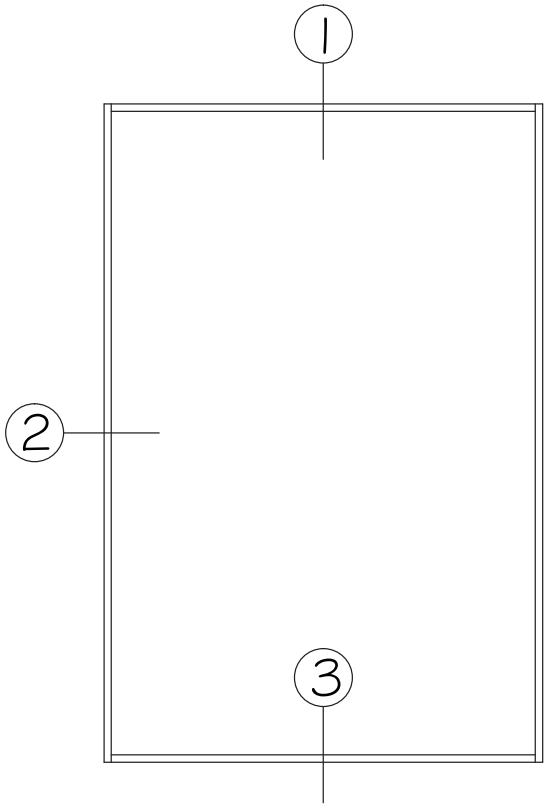
Mfr Product Code	Product Number	Gap 1 (in)	Gap 2 (in)	Gap Fill 1	Gap Fill 2	Emissivity Surface 2	Emissivity Surface 3	Emissivity Surface 4	Emissivity Surface 5	Tint	Spacer	Grid Type	Grid Size	U-Factor (Btu/h*ft²F)	SHGC	VT	*CR
cl-arg-S400, al	0001	0.53		ARG			0.12			CL	A1-D	N		0.37	0.57	0.67	49
cl-arg-S400, sl	0002	0.53		ARG			0.12			CL	SS-D	N		0.36	0.57	0.67	53
cl-arg-S400, ts	0003	0.53		ARG			0.12			CL	ZF-D	N		0.33	0.57	0.67	60
cl-air-cl, al	0004	0.53		AIR						CL	A1-D	N		0.53	0.63	0.70	40
cl-air-cl, sl	0005	0.53		AIR						CL	SS-D	N		0.52	0.63	0.70	44
cl-air-cl, ts	0006	0.53		AIR						CL	ZF-D	N		0.50	0.63	0.70	47
SB70xl-kry-cl-kry-SB70XL, al	0007	0.53	0.53	KRY	KRY	0.02			0.02	CL	A1-D	N		0.22	0.21	0.41	52
SB70xl-kry-cl-kry-SB70XL, sl	0008	0.53	0.53	KRY	KRY	0.02			0.02	CL	SS-D	N		0.20	0.21	0.41	57
SB70xl-kry-cl-kry-SB70XL, ts	0009	0.53	0.53	KRY	KRY	0.02			0.02	CL	ZF-D	N		0.18	0.21	0.41	64
cl-arg-cl-arg-S400, al	0010	0.53	0.53	ARG	ARG				0.12	CL	A1-D	N		0.29	0.49	0.60	50
cl-arg-cl-arg-S400, sl	0011	0.53	0.53	ARG	ARG				0.12	CL	SS-D	N		0.28	0.49	0.60	54
cl-arg-cl-arg-S400, ts	0012	0.53	0.53	ARG	ARG				0.12	CL	ZF-D	N		0.26	0.49	0.60	61
cl-air-cl-air-cl, al	0013	0.53	0.53	AIR	AIR					CL	A1-D	N		0.39	0.55	0.62	50
cl-air-cl-air-cl, sl	0014	0.53	0.53	AIR	AIR					CL	SS-D	N		0.37	0.55	0.62	54
cl-air-cl-air-cl, ts	0015	0.53	0.53	AIR	AIR					CL	ZF-D	N		0.35	0.55	0.62	60
SB70xl-kry-SG400, al	0016	0.53		KRY		0.02		0.12		CL	A1-D	N		0.29	0.24	0.55	43
SB70xl-kry-SG400, sl	0017	0.53		KRY		0.02		0.12		CL	SS-D	N		0.27	0.24	0.55	47
SB70xl-kry-SG400, ts	0018	0.53		KRY		0.02		0.12		CL	ZF-D	N		0.25	0.24	0.55	53

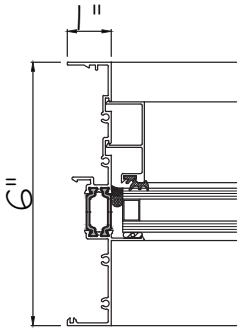
*Note: The Condensation Resistance results obtained from this procedure are for controlled laboratory conditions and do not include the effects of air movement through the specimen, solar radiation, and the thermal bridging that may occur due to the specific design and construction of the fenestration system opening.

APPENDIX A

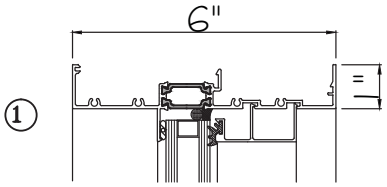
Product Drawings

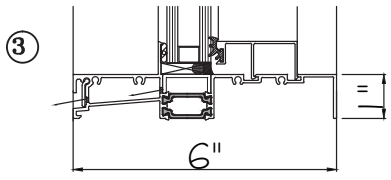
925 RAIN SCREEN
PHYSICAL TESTING
DOUBLE GLAZED





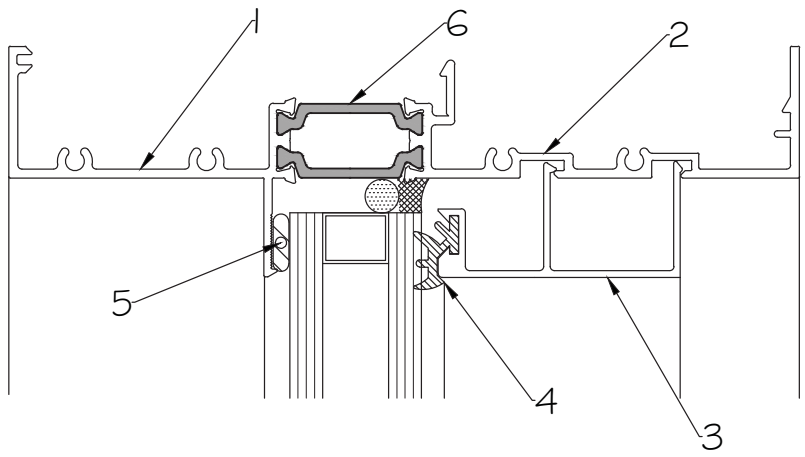
②





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

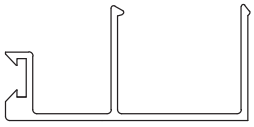
925R.S. HEAD/JAMB



1	EXTERIOR PERIMETER
2	INTERIOR PERIMETER
3	GLASS STOP
4	GLAZING SPLINE
5	1/8" POLYSHIM
6	GLASS REINFORCED NYLON
7	
8	
9	
10	
11	

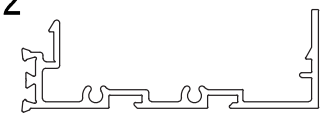
10

3



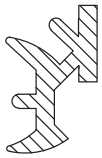
9

2



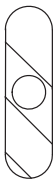
6

4

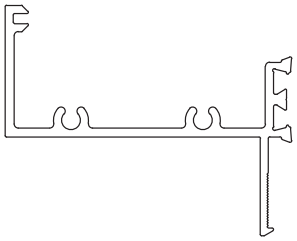


8

5



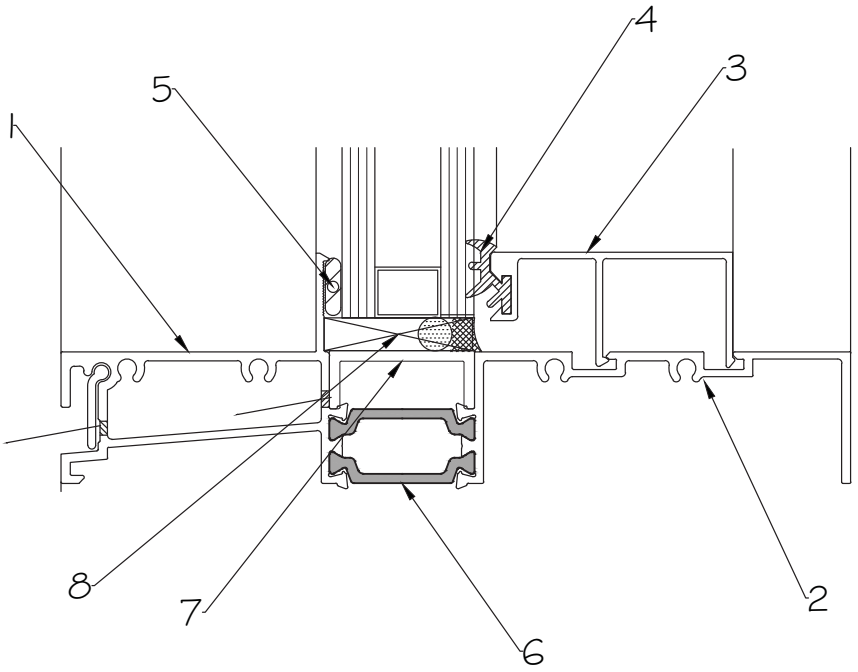
1



7

11

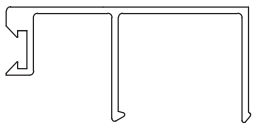
925R.S. SILL



1	RAIN SCREEN SILL EXTERIOR
2	RAIN SCREEN SILL INTERIOR
3	GLASS STOP
4	GLAZING SPLINE
5	1/8" POLYSHIM
6	GLASS REINFORCED NYLON
7	GLAZING BLOCK SUPPORT (PVC)
8	SETTING BLOCK
9	
10	
11	

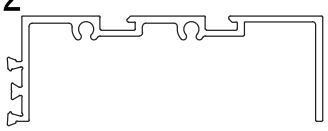
10

3

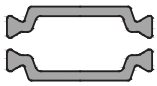


9

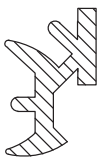
2



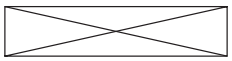
6



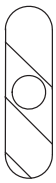
4



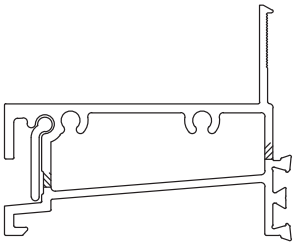
8



5



1



7

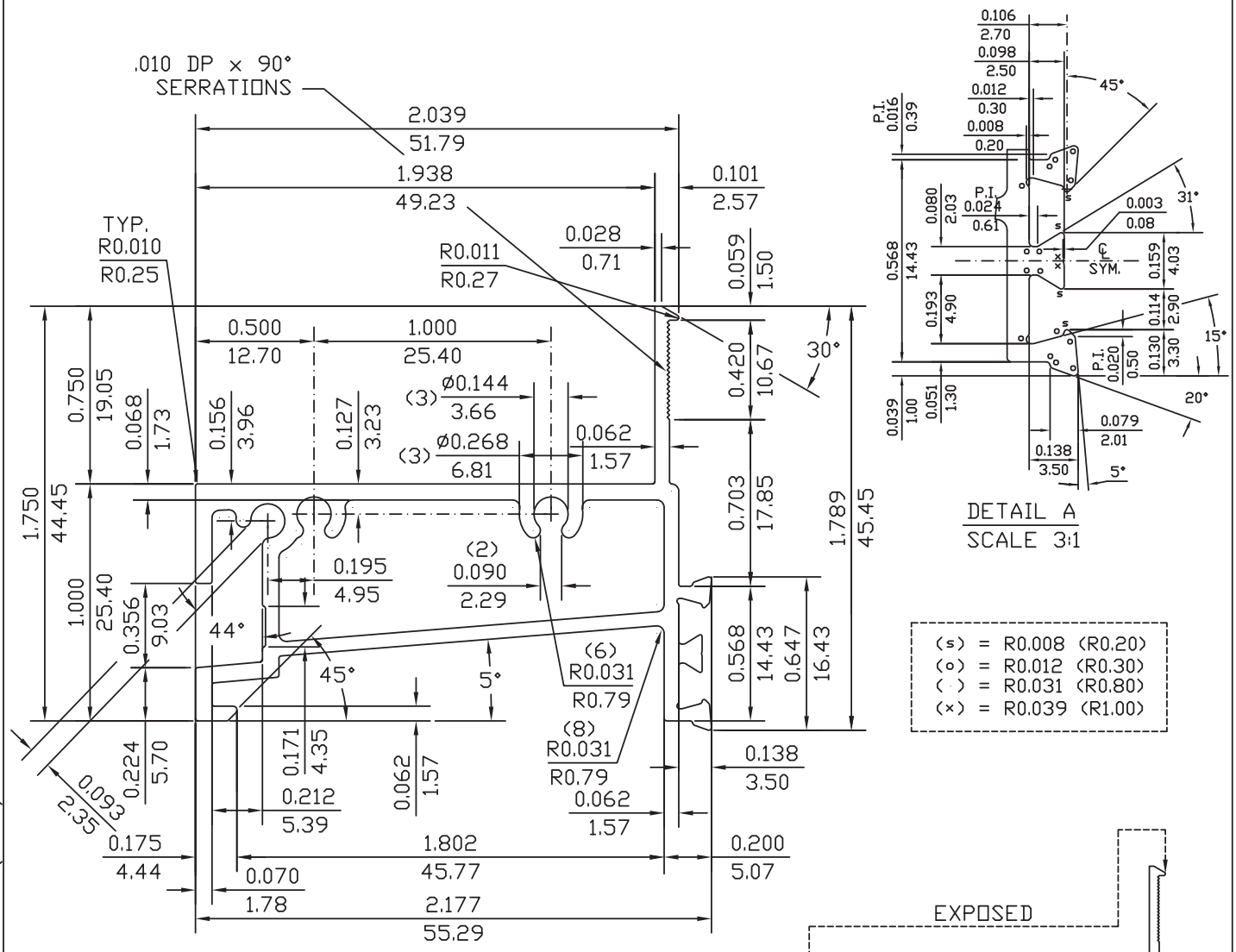
11

MMM GROUP LTD. JULY 24 2015

CUSTOMER	DIE No.	REV. No.
AALCOR WINDOWS		

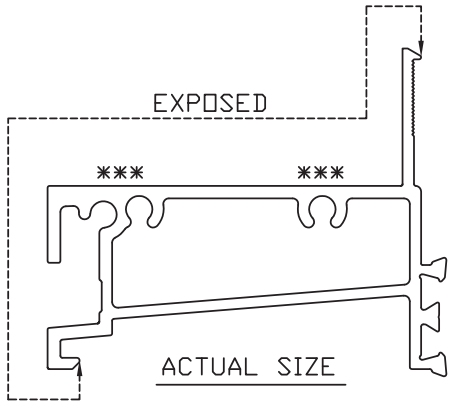
DESCRIPTION	CUSTOMER PART No.	QUOTE No.	PROPOSAL No.
		14-0231-4	H-29614

NOTE: BREAK ALL CORNERS WITH 0.015" (.38 MM) RADIUS UNLESS OTHERWISE NOTED. STANDARD TOLERANCES TO APPLY UNLESS OTHERWISE SPECIFIED.



DETAIL A
SCALE 3:1

(s) = R0.008 (R0.20)
(o) = R0.012 (R0.30)
( ) = R0.031 (R0.80)
(x) = R0.039 (R1.00)



*** = SHADOW LINE EXPECTED.

WALL THICKNESS 0.062(1.57) EXCEPT AS SHOWN

DATE	REV	DESCRIPTION	BY

EST.AREA	0.363	IN.^{2}	EST.AREA	234.239	MM.^{2}
EST.WT.	0.428	LBS/FT.	EST.WT.	0.638	KG/M.
EST.PER.	11.193	IN.	EST.PER.	284.309	MM.
OUT PER.		IN.	OUT PER.		MM.
C.C.D.	2.654	IN.	C.C.D.	67.399	MM.
FINISH	M/F		ALLOY	6063	
CKD BY	FACTOR 26	SCALE 1.5:1	DWN BY C.P.	DATE 02/18/2014	

CAN ART
ALUMINUM EXTRUSION INC.
85 PARKSHORE DRIVE
BRAMPTON, ONT L6T 5M1
TEL. NO. (905) 791-1464
FAX NO. (905) 791-9151
WEB: www.canart.com

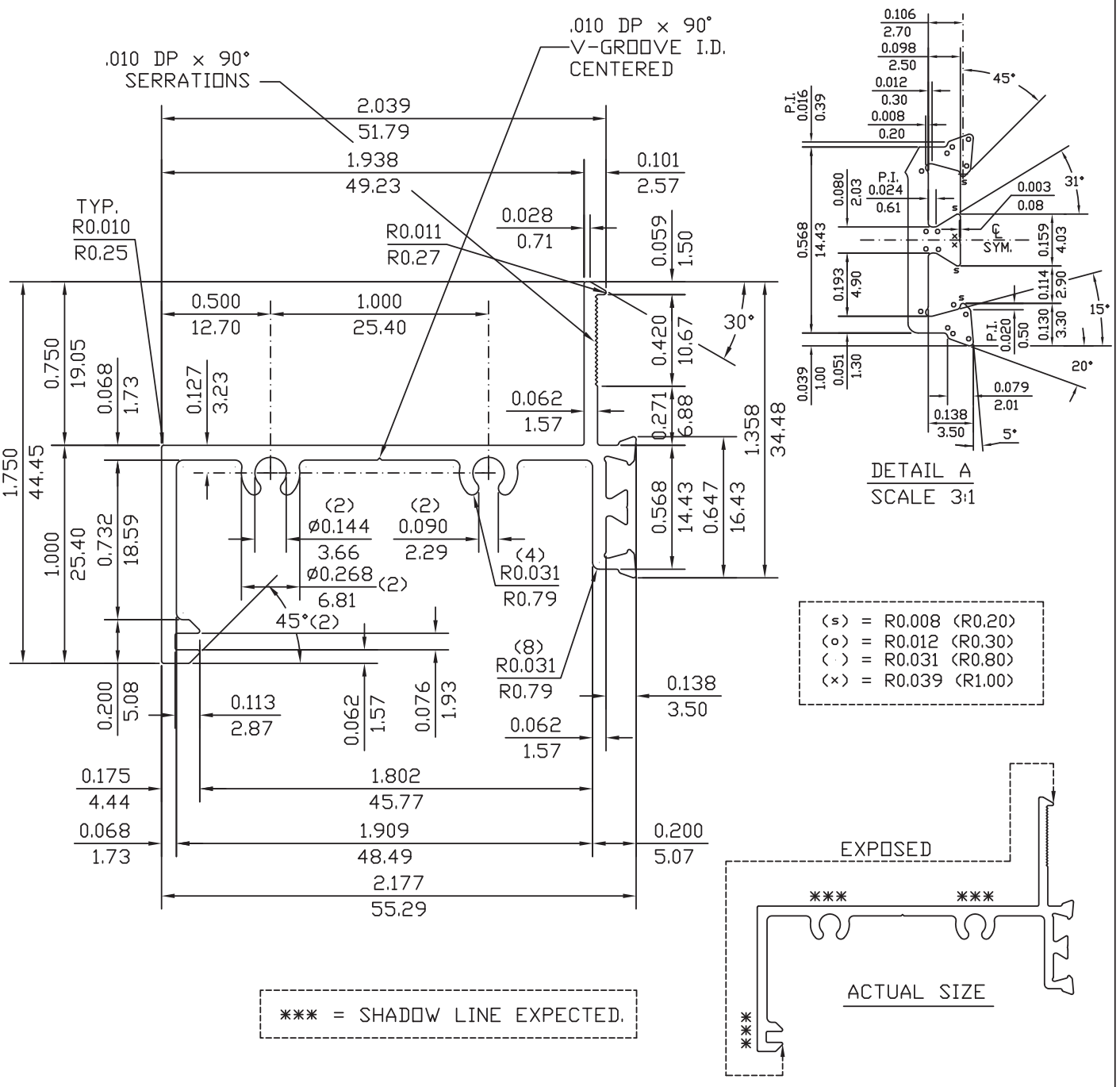
SIGNED: _____ DATE: _____

MMM GROUP LTD. JULY 24 2015

CUSTOMER	DIE No.	REV. No.
AALCOR WINDOWS	ES17712	0

DESCRIPTION	CUSTOMER PART No.	QUOTE No.	PROPOSAL No.
		14-0217-2	S-29612

NOTE: BREAK ALL CORNERS WITH 0.015" (.38 MM) RADIUS UNLESS OTHERWISE NOTED. STANDARD TOLERANCES TO APPLY UNLESS OTHERWISE SPECIFIED.



WALL THICKNESS 0.062(1.57) EXCEPT AS SHOWN

DATE	REV	DESCRIPTION	BY

EST.AREA	0.363	IN.^{2}	EST.AREA	234.239	MM.^{2}
EST.WT.	0.428	LBS/FT.	EST.WT.	0.638	KG/M.
EST.PER.	11.193	IN.	EST.PER.	284.309	MM.
OUT PER.		IN.	OUT PER.		MM.
C.C.D.	2.654	IN.	C.C.D.	67.399	MM.
FINISH	M/F		ALLOY	6063	
CKD BY	FACTOR 26	SCALE 1.5:1	DWN BY C.P.	DATE 03/19/2014	

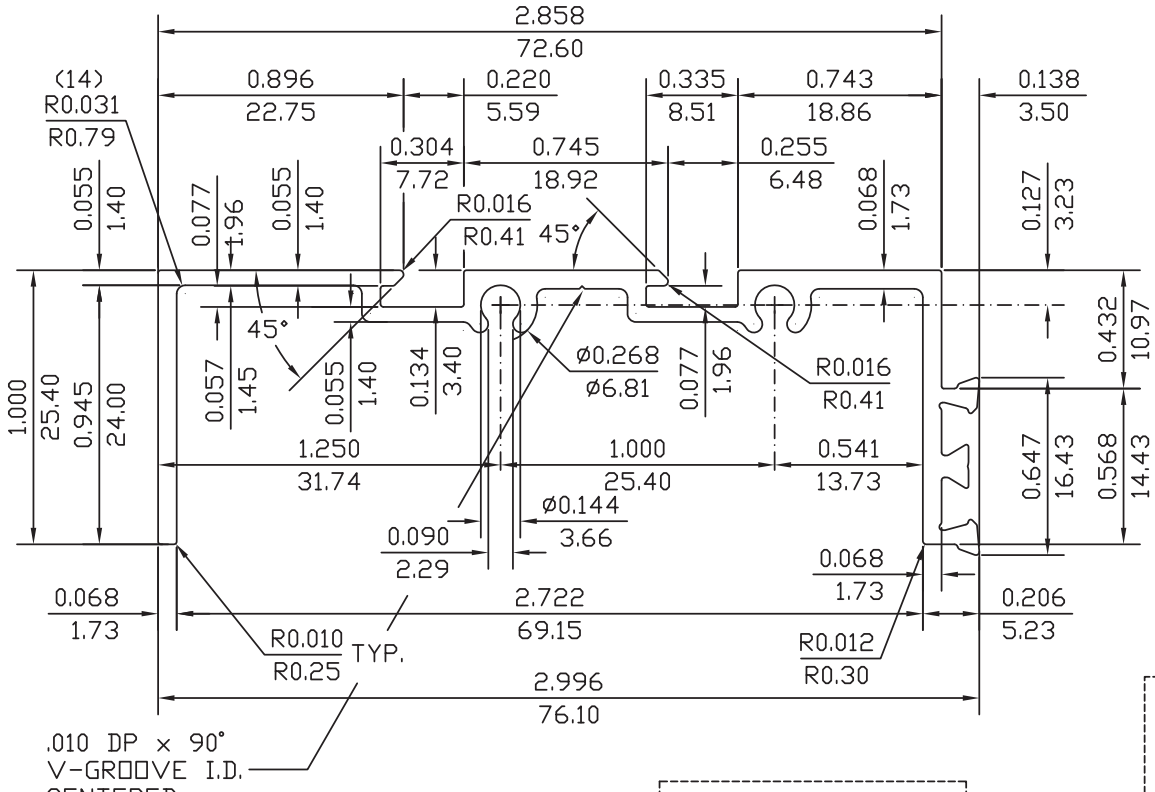
CAN ART
ALUMINUM EXTRUSION INC.
85 PARKSHORE DRIVE
BRAMPTON, ONT L6T 5M1
TEL. NO. (905) 791-1464
FAX NO. (905) 791-9151
WEB: www.canart.com

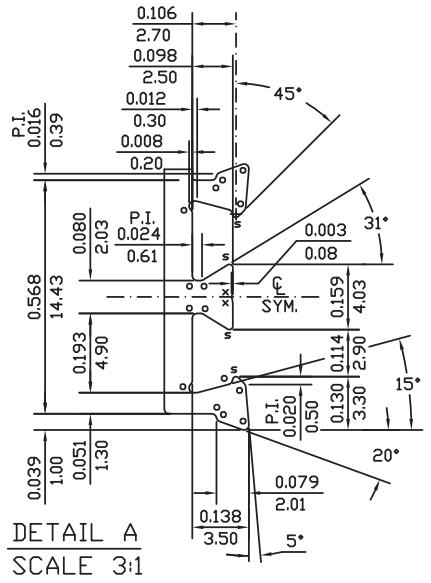
SIGNED: _____ DATE: _____

MMM GROUP LTD. JULY 24 2015

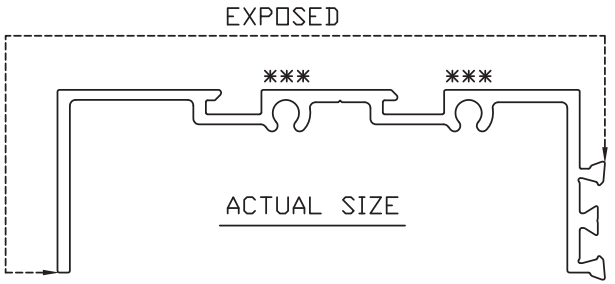
CAN ART
ALUMINUM EXTRUSION INC.

CUSTOMER		DIE No.	REV No.
AALCOR WINDOWS		ES17711	0
DESCRIPTION	CUSTOMER PART No.	QUOTE No. 14-0217-1	PROPOSAL No. S-29611





DETAIL A
SCALE 3:1



*** = SHADOW LINE EXPECTED.

(s) = R0.008 (R0.20)
(o) = R0.012 (R0.30)
( ) = R0.031 (R0.80)
(x) = R0.039 (R1.00)

WALL THICKNESS 0.068(1.73) EXCEPT AS SHOWN

DATE	REV	DESCRIPTION	BY

EST.AREA	0.403	IN.^{2}	EST.AREA	260.259	MM.^{2}
EST.WT.	0.476	LBS/FT.	EST.WT.	0.708	KG/M.
EST.PER.	12.425	IN.	EST.PER.	315.604	MM.
OUT PER.		IN.	OUT PER.		MM.
C.C.D.	3.163	IN.	C.C.D.	80.337	MM.
FINISH	M/F		ALLOY	6063	
CKD BY	FACTOR 26	SCALE 1.5:1	DWN BY C.P.	DATE 03/19/2014	

85 PARKSHORE DRIVE
BRAMPTON, ONT L6T 5M1
TEL. NO. (905) 791-1464
FAX NO. (905) 791-9151
WEB: www.canart.com

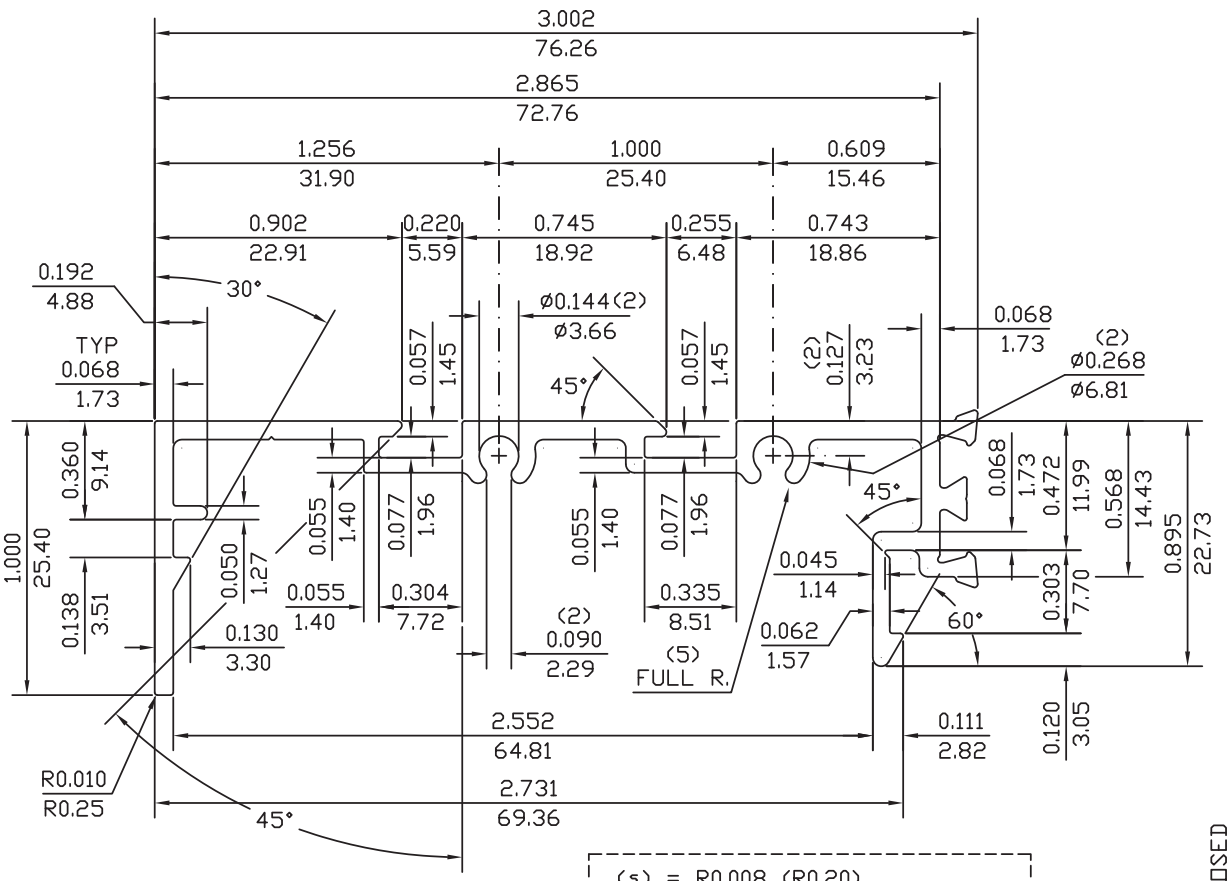
SIGNED:_____ DATE:_____

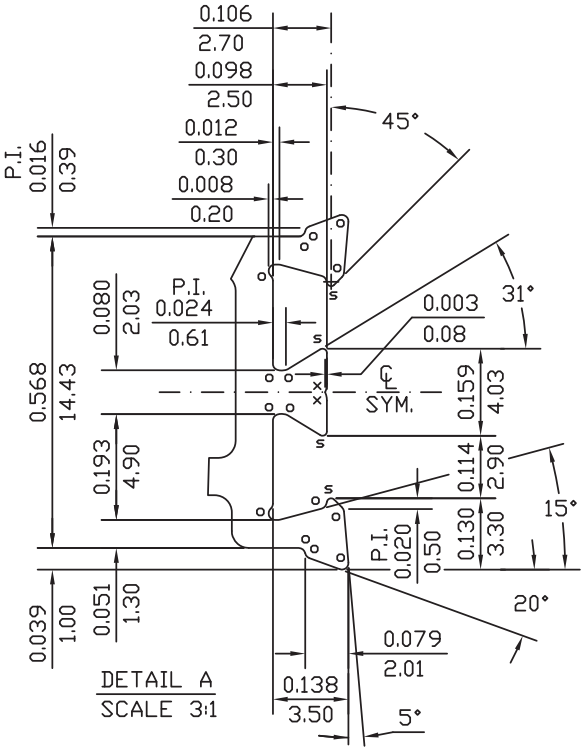
NOTE: BREAK ALL CORNERS WITH 0.015" (.38 MM) RADIUS UNLESS OTHERWISE NOTED. STANDARD TOLERANCES TO APPLY UNLESS OTHERWISE SPECIFIED.

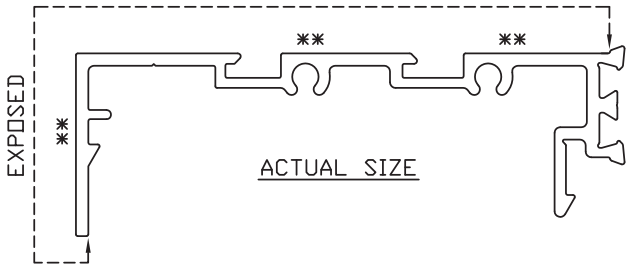
NOTE: BREAK ALL CORNERS WITH 0.015" (.38 MM) RADIUS UNLESS OTHERWISE NOTED. STANDARD TOLERANCES TO APPLY UNLESS OTHERWISE SPECIFIED.

CAN ART
ALUMINUM EXTRUSION INC.

CUSTOMER		DIE No.	REV No.
AALCOR WINDOWS		ES17638	0
DESCRIPTION	CUSTOMER PART No.	QUOTE No.	PROPOSAL No.
		13–1450–7	S–29347







(s) = R0.008 (R0.20)
(o) = R0.012 (R0.30)
( ) = R0.031 (R0.80)
(×) = R0.039 (R1.00)
** = SHADOW LINE MAY OCCUR.

WALL THICKNESS 0.068 (1.73) EXCEPT AS SHOWN

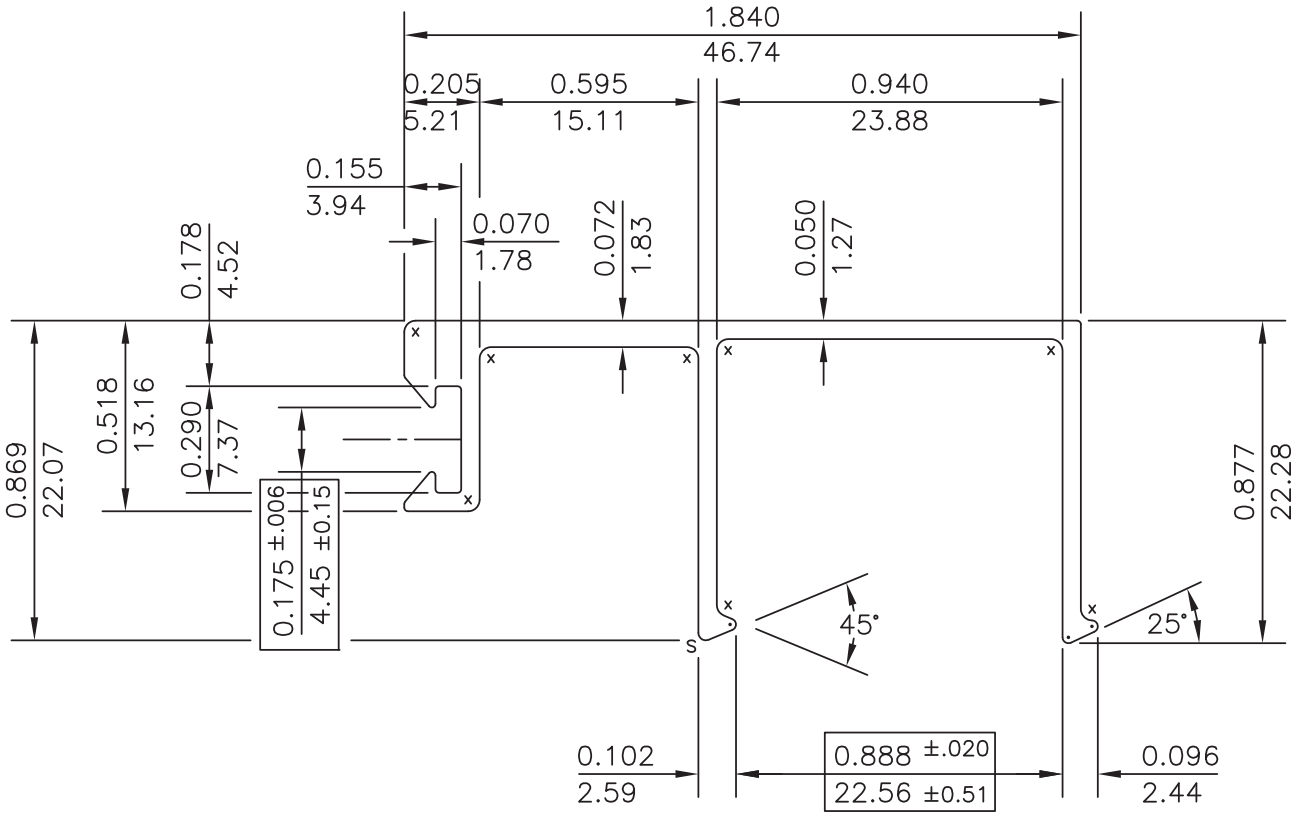
DATE	REV	DESCRIPTION	BY

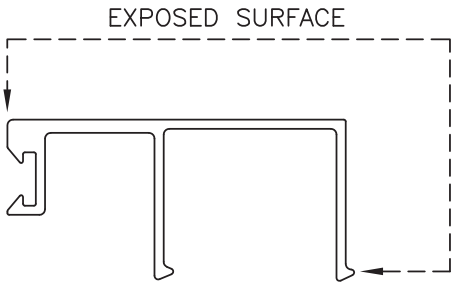
EST.AREA	0.433	IN.^{2}	EST.AREA	279.171	MM.^{2}
EST.WT.	0.511	LBS/FT.	EST.WT.	0.760	KG/M.
EST.PER.	13.097	IN.	EST.PER.	332.655	MM.
OUT PER.		IN.	OUT PER.		MM.
C.C.D.	3.170	IN.	C.C.D.	80.530	MM.
FINISH	M/F		ALLOY	6063	
CKD BY	FACTOR 26	SCALE 1.5:1	DWN BY P.M.	DATE 1/23/2014	

85 PARKSHORE DRIVE
BRAMPTON, ONT L6T 5M1
TEL. NO. (905) 791–1464
FAX NO. (905) 791–9151
WEB: www.canart.com

SIGNED:_____ DATE:_____

CUSTOMER	PART NO.	DIE NO.	DASH
AALCOR	–	AS–40129	1
DESCRIPTION: 920 GLASS STOP (5–1/4 FRAME)	TARRIF# 7604.29.10.00	PROPOSAL# 7712–3	
INDALEX LIMITED 5675 Kennedy Road Mississauga, Ontario L4Z 2H9	DATE / SYM / REVISION		





ACTUAL SIZE

(·) = 0.016(0.41) R. (3)
(s) = 0.020(0.51) R. (1)
(×) = 0.031(0.79) R. (8)
UNMARKED RADII = RADIUS TO SUIT

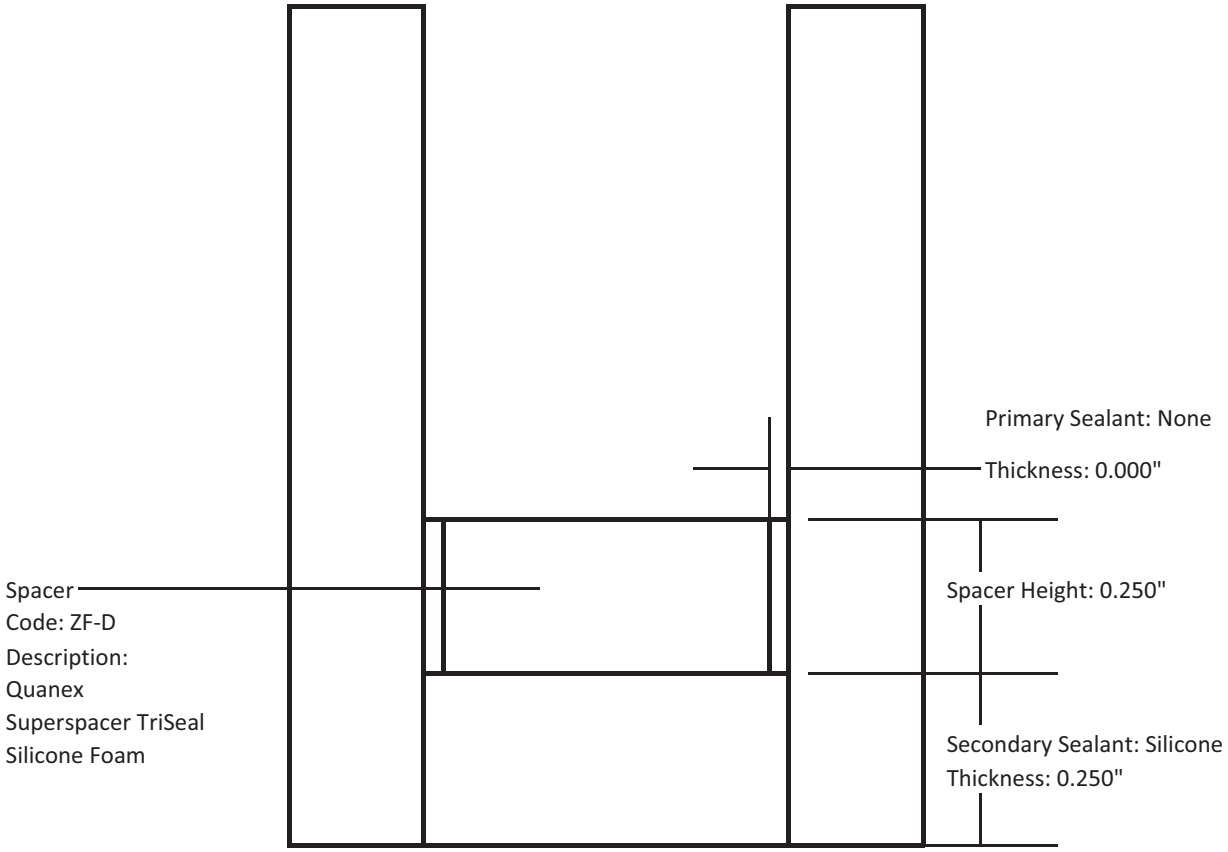
INDALEX ALUMINUM SOLUTIONS

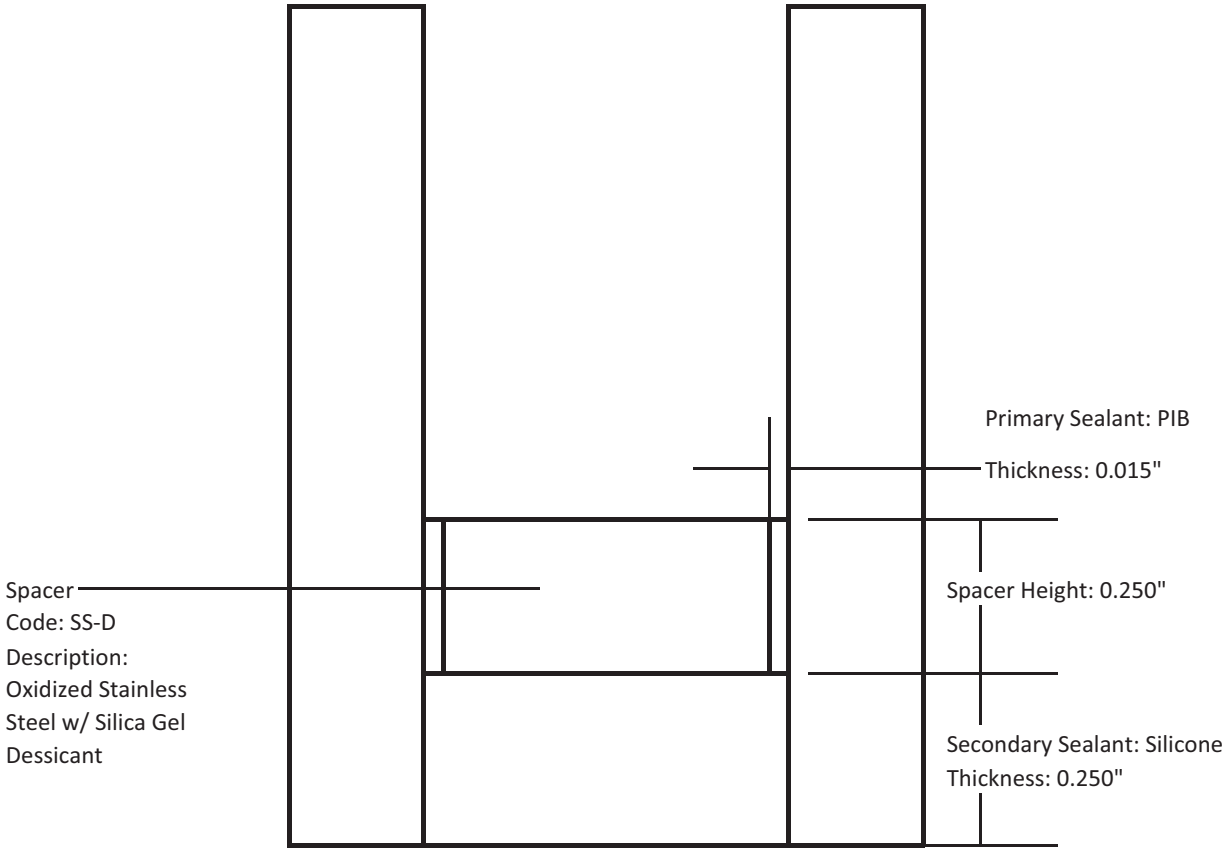
UNSPECIFIED WALL THICKNESS: 0.050(1.27)

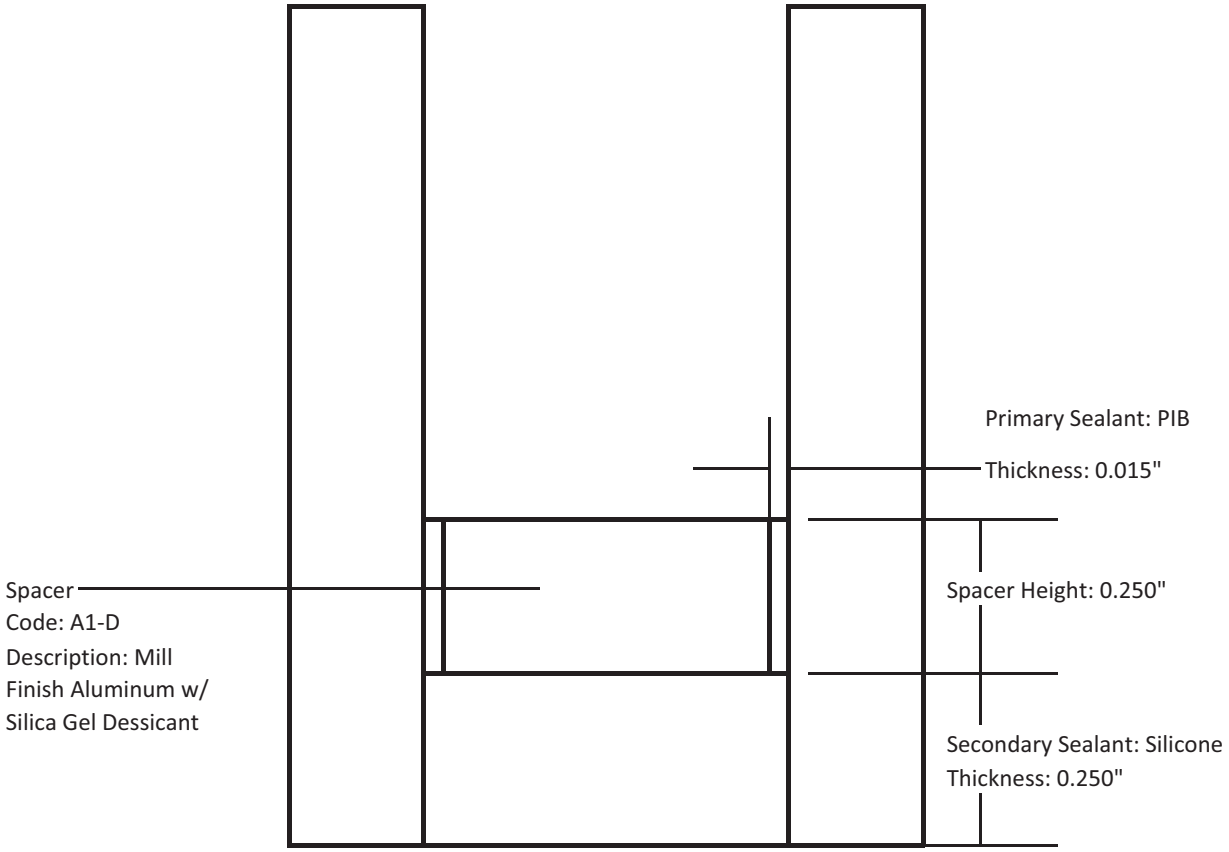
EST. AREA 0.246 IN² 159 MM²		OUT PER. – IN – MM	
EST. WT. 0.290 LBS/FT. 0.431 KG/M		FACTOR 29	
EST. PER. 8.376 IN 213 MM		C.C.D. 2.045 IN 52 MM	
DWN BY GFG	ALLOY 6063–T5	SCALE 2:1	DATE 01/04/16

BREAK ALL CORNERS .010"R (0.25R) UNLESS OTHERWISE NOTED.

STANDARD ALUMINUM ASSOCIATION TOLERANCES TO APPLY UNLESS OTHERWISE SPECIFIED


Primary Sealant: None
Thickness: 0.000"
Spacer
Code: ZF-D
Description:
Quanex
Superspacer TriSeal
Silicone Foam
Spacer Height: 0.250"
Secondary Sealant: Silicone
Thickness: 0.250"


Primary Sealant: PIB
Thickness: 0.015"
Spacer
Code: SS-D
Description:
Oxidized Stainless
Steel w/ Silica Gel
Dessicant
Spacer Height: 0.250"
Secondary Sealant: Silicone
Thickness: 0.250"


Primary Sealant: PIB
Thickness: 0.015"
Spacer
Code: A1-D
Description: Mill
Finish Aluminum w/
Silica Gel Dessicant
Spacer Height: 0.250"
Secondary Sealant: Silicone
Thickness: 0.250"