

ACRO ALUMINUM INC. COMPUTER SIMULATION REPORT

SCOPE OF WORK

STOREFRONT - AAMA 507 SIMULATIONS TO DETERMINE U-FACTOR, SOLAR HEAT GAIN COEFFICIENT, AND VISIBLE TRANSMITTANCE RATINGS

REPORT NUMBER

M1153.02-116-45 R0

TEST DATE

03/29/21

ISSUE DATE

08/11/23

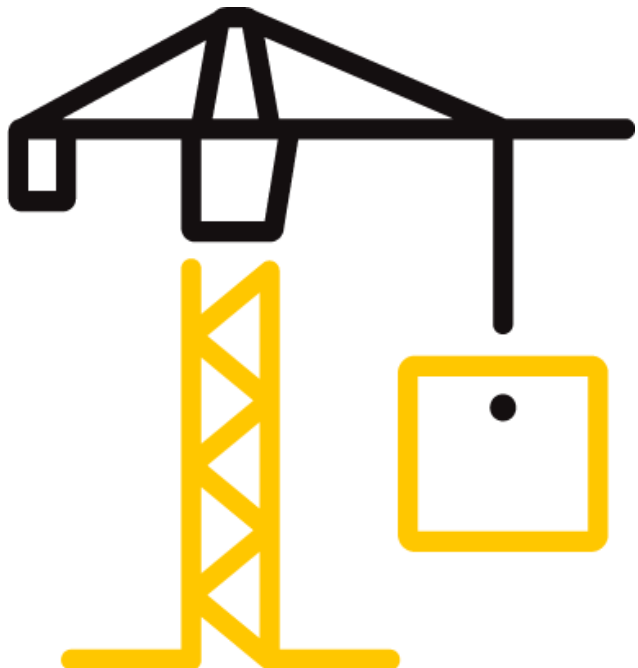
PAGES

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DOCUMENT CONTROL NUMBER

RT-R-AMER-Test-3754 (02/20/18)

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TEST REPORT FOR ACRO ALUMINUM

Report No.: M1153.02-116-45 R0

Date: 08/11/23

REPORT ISSUED TO

ACRO ALUMINUM

5430-275th St.

Langley, Arizona V4W 3X7

SECTION 1

SUMMARY

SERIES/MODEL: Storefront

Architectural Testing, Inc. (an Intertek company), dba Intertek Building & Construction (Intertek B&C) was contracted to perform AAMA 507 computer simulations utilizing thermal thermal modeling computer software developed by Lawrence Berkeley National Laboratory Laboratory (LBNL). Results obtained are simulated values and were secured using the designated test methods.

Intertek B&C is an NFRC accredited simulation laboratory and all simulations were conducted in full compliance with NFRC approved procedures and specifications.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. The record retention end date of this report is 03/29/2026

This report is reissued in the name of Acro Aluminum Inc. through written authorization of Clearbrook Glass to whom the original report was rendered. The original Clearbrook Glass report number is M1153.01-116-45.

For INTERTEK B&C:

COMPLETED BY: Eric S. Leitner
Manager - Thermal
TITLE: Testing & Simulations
SIGNATURE:
DATE: 08/11/23

REVIEWED BY: Allison M. Ford
TITLE: Simulation Technician
SIGNATURE:
DATE: 08/11/23

ESL:esl

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SECTION 2

TEST METHODS

The products were evaluated in accordance with the following:

AAMA 507-15, Standard Practice for Determining the Thermal Performance Characteristics of Fenestration Systems Installed in Commercial Buildings

ANSI/NFRC 100-2020, Procedure for Determining Fenestration Product U-Factors

ANSI/NFRC 200-2020, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

SECTION 3

TEST PROCEDURE

The total product, including specific frame, spacer, and glass details, was modeled using NFRC approved software.

FRAME AND EDGE MODELING	THERM 7.4.4
CENTER-OF-GLASS MODELING	WINDOW 7.4.14
TOTAL PRODUCT CALCULATIONS	WINDOW 7.4.14
SPECTRAL DATA LIBRARY	IGDB 77.0

Modeling Assumptions / Technical Interpretations

Any modeling assumptions and technical interpretations required to model this product are listed below.

- 1) To prevent air infiltration, tape was applied to all interior sash crack locations.
- 2) This product is available in either a painted or anodized finish. These two finish types may be grouped in accordance with ANSI/NFRC 100-2020, Section 4.2.1.L. The painted finish was simulated since it is the worst case (highest emissivity).
- 3) The center-line modeling approach was conducted using the horizontal intermediate for the head and sill members and the vertical intermediate for the jambs. This procedure is outlined in the NFRC Simulation Manual, Section 8.9.
- 4) Non-continuous hardware was not modeled.

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SECTION 4

SIMULATION SPECIMEN DESCRIPTION

SERIES/MODEL	Storefront
PRODUCT TYPE	Glazed Wall System
FRAME MATERIAL	AT - Aluminum w/ Thermal Breaks - All Members
SASH MATERIAL	NA - Not Applicable

GLAZING OPTIONS					
	<i>OUTER PANE</i>	<i>MIDDLE PANE</i>	<i>INNER PANE</i>	<i>GAP SIZES</i>	<i>IG OVERALL</i>
GL1	1/4"	N/A	1/4"	0.500"	1"
GL2	1/4"	Heat Mirror	1/4"	0.250"	1"

GL1: Dual glazed IG unit (COG=0.48 - COG=0.20)

GL2: Dual glazed IG unit w/ heat mirror (COG=0.18 - COG=0.10)

SPACER OPTIONS			
<i>TYPE</i>	<i>PRIMARY SEAL</i>	<i>SECONDARY SEAL</i>	<i>CODE</i>
Quanex Premium Plus Super Spacer	Butyl Rubber		ZF-S

SECTION 5

MEASURED SIMULATION DATA

U-FACTOR CALCULATIONS	
Exterior Air Temperature	-0.4°F
Exterior Wind Velocity	12.3 mph (Perpendicular Flow)
Interior Air Temperature	69.8°F

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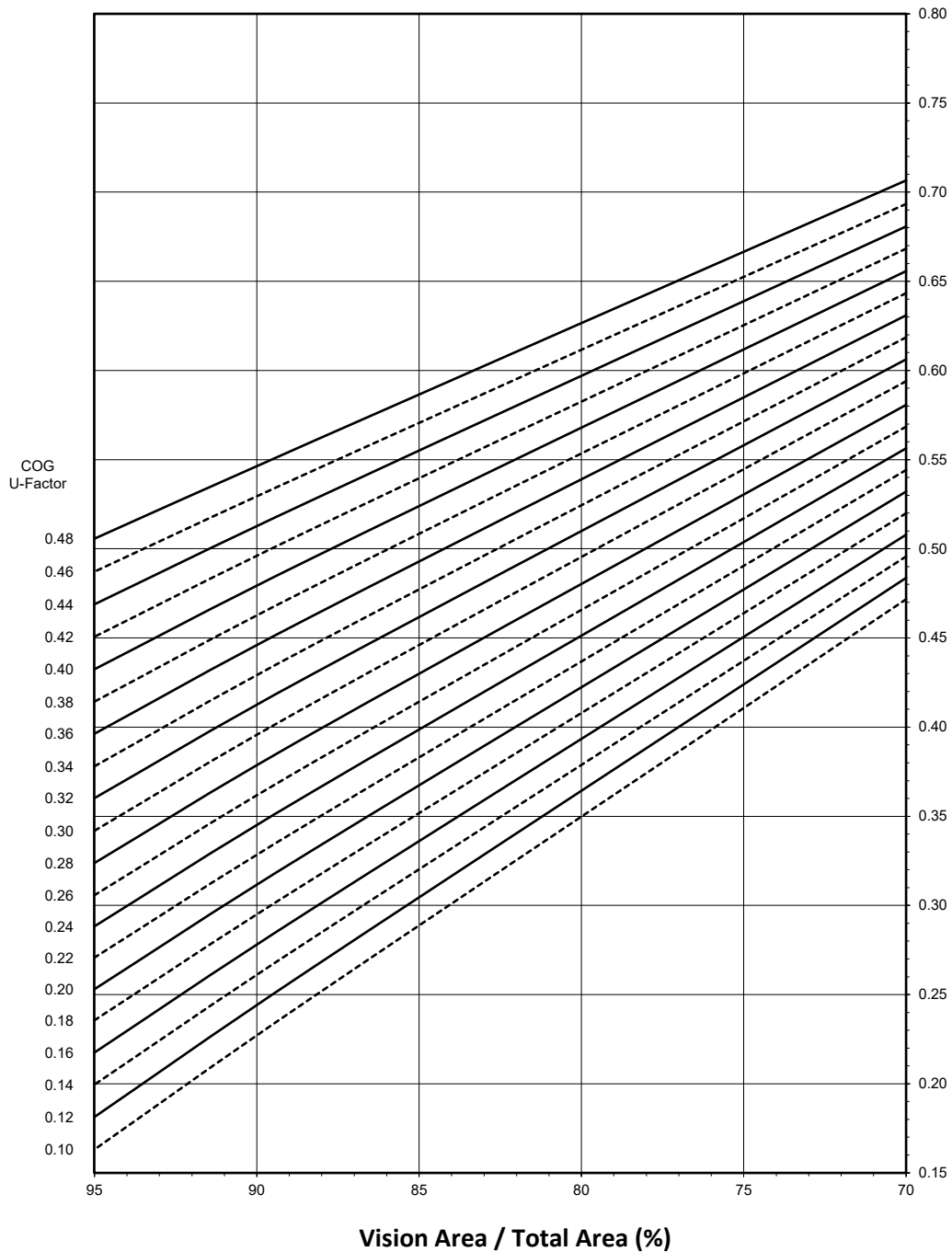
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SECTION 6

SIMULATION RESULTS

U-FACTOR CALCULATIONS: System U-Factor vs. Percentage of Vision Area



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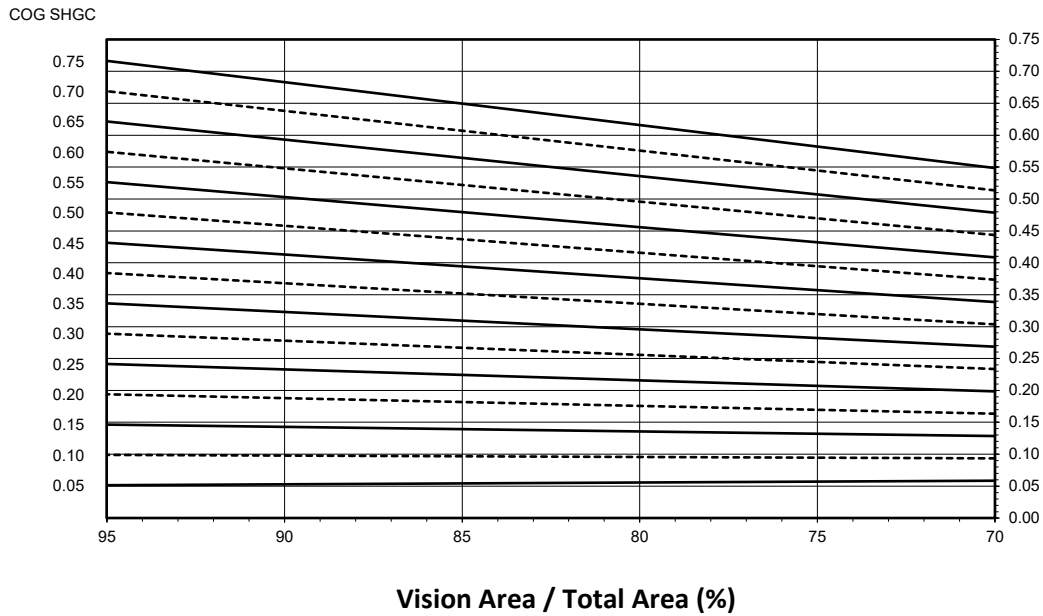
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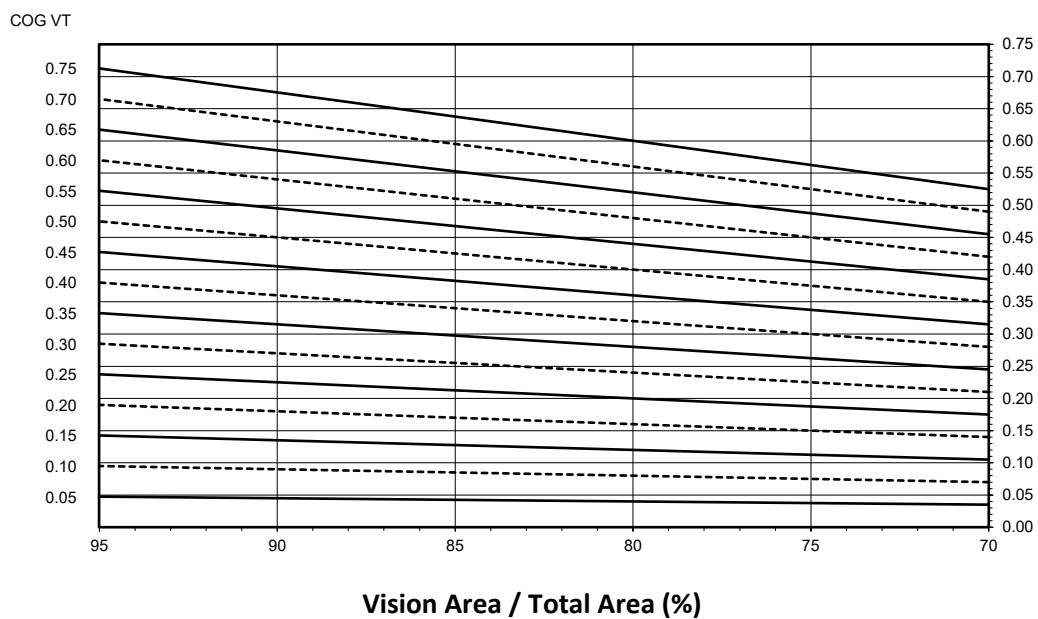
SECTION 6

SIMULATION RESULTS

SHGC CALCULATIONS: System SHGC vs. Percentage of Vision Area



VT CALCULATIONS: System VT vs. Percentage of Vision Area



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SECTION 6

SIMULATION RESULTS

U-FACTOR CALCULATIONS (Storefront)		
Size Specific U-Factor Matrix*		
Glazing Option	Center-of-Glass U-Factor	Overall U-Factor
1	0.48	0.56
2	0.46	0.54
3	0.44	0.53
4	0.42	0.51
5	0.40	0.50
6	0.38	0.48
7	0.36	0.46
8	0.34	0.45
9	0.32	0.43
10	0.30	0.41
11	0.28	0.40
12	0.26	0.38
13	0.24	0.36
14	0.22	0.35
15	0.20	0.33
16	0.18	0.32
17	0.16	0.30
18	0.14	0.28
19	0.12	0.27
20	0.10	0.25

*The size specific U-Factor matrix is based on the Glazed Wall System NFRC specimen size of 2000mm x 2000mm (78.75 in x 78.75 in). This represents 88.2% Vision Area / Total Area.

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SECTION 6

SIMULATION RESULTS

SHGC/VT CALCULATIONS (Storefront)			
Size Specific SHGC Matrix*		Size Specific VT Matrix*	
Center-of-Glass SHGC	Overall SHGC	Center-of-Glass VT	Overall VT
0.75	0.67	0.75	0.66
0.70	0.63	0.70	0.62
0.65	0.58	0.65	0.57
0.60	0.54	0.60	0.53
0.55	0.49	0.55	0.49
0.50	0.45	0.50	0.44
0.45	0.41	0.45	0.40
0.40	0.36	0.40	0.35
0.35	0.32	0.35	0.31
0.30	0.27	0.30	0.26
0.25	0.23	0.25	0.22
0.20	0.19	0.20	0.18
0.15	0.14	0.15	0.13
0.10	0.10	0.10	0.09
0.05	0.05	0.05	0.04

*The size specific SHGC and VT matrices are based on the Glazed Wall System NFRC specimen size of 2000mm x 2000mm (78.75 in x 78.75 in). This represents 88.2% Vision Area / Total Area.

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SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Storefront)									
Option Number	COG U-Factor	COG Temperature	Cross Section	Frame Height	Frame U-Factor	Edge U-Factor	Total Product U-Factor		
							70.00% Vision Area	ANSI/NFRC 100-2020	95.00% Vision Area
1	0.48	43.7°F	Head	2.1749	1.0048	0.4747	0.7066	0.5606	0.5057
			L. Jamb	2.1749	1.0048	0.4747			
			R. Jamb	2.3499	1.4783	0.4897			
			Mullion	1.1750	1.4512	0.4956			
			Sill	2.6749	0.9953	0.4723			
2	0.46	44.8°F	Head	2.1749	1.0035	0.4595	0.6934	0.5440	0.4872
			L. Jamb	2.1749	1.0035	0.4595			
			R. Jamb	2.3499	1.4732	0.4748			
			Mullion	1.1750	1.4460	0.4808			
			Sill	2.6749	0.9944	0.4572			
3	0.44	45.8°F	Head	2.1749	1.0023	0.4444	0.6808	0.5278	0.4689
			L. Jamb	2.1749	1.0023	0.4444			
			R. Jamb	2.3499	1.4719	0.4599			
			Mullion	1.1750	1.4446	0.4660			
			Sill	2.6749	0.9934	0.4421			
4	0.42	46.8°F	Head	2.1749	1.0011	0.4296	0.6683	0.5116	0.4507
			L. Jamb	2.1749	1.0011	0.4296			
			R. Jamb	2.3499	1.4707	0.4454			
			Mullion	1.1750	1.4433	0.4516			
			Sill	2.6749	0.9925	0.4275			
5	0.40	47.9°F	Head	2.1749	1.0001	0.4144	0.6557	0.4952	0.4324
			L. Jamb	2.1749	1.0001	0.4144			
			R. Jamb	2.3499	1.4695	0.4306			
			Mullion	1.1750	1.4420	0.4369			
			Sill	2.6749	0.9918	0.4123			
6	0.38	48.9°F	Head	2.1749	0.9990	0.3998	0.6434	0.4790	0.4143
			L. Jamb	2.1749	0.9990	0.3998			
			R. Jamb	2.3499	1.4683	0.4162			
			Mullion	1.1750	1.4408	0.4226			
			Sill	2.6749	0.9909	0.3977			

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SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Storefront)									
Option Number	COG U-Factor	COG Temperature	Cross Section	Frame Height	Frame U-Factor	Edge U-Factor	Total Product U-Factor		
							70.00% Vision Area	ANSI/NFRC 100-2020	95.00% Vision Area
7	0.36	50.0°F	Head	2.1749	0.9979	0.3850	0.6309	0.4628	0.3963
			L. Jamb	2.1749	0.9979	0.3850			
			R. Jamb	2.3499	1.4672	0.4017			
			Mullion	1.1750	1.4396	0.4082			
			Sill	2.6749	0.9901	0.3830			
8	0.34	51.0°F	Head	2.1749	0.9969	0.3702	0.6186	0.4464	0.3780
			L. Jamb	2.1749	0.9969	0.3702			
			R. Jamb	2.3499	1.4662	0.3872			
			Mullion	1.1750	1.4386	0.3937			
			Sill	2.6749	0.9893	0.3683			
9	0.32	52.0°F	Head	2.1749	0.9959	0.3557	0.6062	0.4302	0.3602
			L. Jamb	2.1749	0.9959	0.3557			
			R. Jamb	2.3499	1.4652	0.3728			
			Mullion	1.1750	1.4375	0.3794			
			Sill	2.6749	0.9886	0.3538			
10	0.30	53.1°F	Head	2.1749	0.9949	0.3412	0.5940	0.4137	0.3419
			L. Jamb	2.1749	0.9949	0.3412			
			R. Jamb	2.3499	1.4643	0.3586			
			Mullion	1.1750	1.4364	0.3652			
			Sill	2.6749	0.9879	0.3393			
11	0.28	54.2°F	Head	2.1749	0.9939	0.3267	0.5807	0.3970	0.3238
			L. Jamb	2.1749	0.9939	0.3267			
			R. Jamb	2.3499	1.4566	0.3441			
			Mullion	1.1750	1.4287	0.3509			
			Sill	2.6749	0.9872	0.3249			
12	0.26	55.2°F	Head	2.1749	0.9929	0.3122	0.5685	0.3806	0.3058
			L. Jamb	2.1749	0.9929	0.3122			
			R. Jamb	2.3499	1.4556	0.3299			
			Mullion	1.1750	1.4277	0.3367			
			Sill	2.6749	0.9865	0.3106			

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SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Storefront)									
Option Number	COG U-Factor	COG Temperature	Cross Section	Frame Height	Frame U-Factor	Edge U-Factor	Total Product U-Factor		
							70.00% Vision Area	ANSI/NFRC 100-2020	95.00% Vision Area
13	0.24	56.3°F	Head	2.1749	0.9920	0.2979	0.5563	0.3642	0.2883
			L. Jamb	2.1749	0.9920	0.2979			
			R. Jamb	2.3499	1.4550	0.3157			
			Mullion	1.1750	1.4271	0.3225			
			Sill	2.6749	0.9858	0.2963			
14	0.22	57.3°F	Head	2.1749	0.9912	0.2835	0.5442	0.3479	0.2708
			L. Jamb	2.1749	0.9912	0.2835			
			R. Jamb	2.3499	1.4544	0.3015			
			Mullion	1.1750	1.4263	0.3084			
			Sill	2.6749	0.9852	0.2820			
15	0.20	58.4°F	Head	2.1749	0.9904	0.2693	0.5321	0.3315	0.2530
			L. Jamb	2.1749	0.9904	0.2693			
			R. Jamb	2.3499	1.4536	0.2874			
			Mullion	1.1750	1.4255	0.2945			
			Sill	2.6749	0.9846	0.2679			
16	0.18	59.5°F	Head	2.1749	0.9884	0.2561	0.5199	0.3152	0.2356
			L. Jamb	2.1749	0.9884	0.2561			
			R. Jamb	2.3499	1.4513	0.2743			
			Mullion	1.1750	1.4232	0.2813			
			Sill	2.6749	0.9830	0.2547			
17	0.16	60.6°F	Head	2.1749	0.9877	0.2418	0.5079	0.2987	0.2175
			L. Jamb	2.1749	0.9877	0.2418			
			R. Jamb	2.3499	1.4508	0.2602			
			Mullion	1.1750	1.4226	0.2672			
			Sill	2.6749	0.9826	0.2405			
18	0.14	61.6°F	Head	2.1749	0.9875	0.2268	0.4957	0.2822	0.1995
			L. Jamb	2.1749	0.9875	0.2268			
			R. Jamb	2.3499	1.4509	0.2452			
			Mullion	1.1750	1.4227	0.2522			
			Sill	2.6749	0.9825	0.2256			

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SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Storefront)									
Option Number	COG U-Factor	COG Temperature	Cross Section	Frame Height	Frame U-Factor	Edge U-Factor	Total Product U-Factor		
							70.00% Vision Area	ANSI/NFRC 100-2020	95.00% Vision Area
19	0.12	62.7°F	Head	2.1749	0.9868	0.2127	0.4837	0.2656	0.1814
			L. Jamb	2.1749	0.9868	0.2127			
			R. Jamb	2.3499	1.4504	0.2312			
			Mullion	1.1750	1.4221	0.2382			
			Sill	2.6749	0.9820	0.2115			
20	0.10	63.9°F	Head	2.1749	0.9861	0.1985	0.4717	0.2490	0.1632
			L. Jamb	2.1749	0.9861	0.1985			
			R. Jamb	2.3499	1.4500	0.2171			
			Mullion	1.1750	1.4215	0.2242			
			Sill	2.6749	0.9816	0.1974			

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SECTION 7

DRAWINGS / BILL OF MATERIALS

The drawings which follow have been reviewed by Intertek B&C and are representative of the simulation result(s) reported herein. Any deviations are documented herein or on the drawings.



33470 South Fraser Way
Abbotsford, BC V2S 2B5
604-854-1327

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Date : MARCH 16th, 2021

Scale :

Drawing By :

Revision No :

1

2

3

4

PAGE

T1

THERMAL SIMULATION REQUEST

STOREFRONT

FRAMING MATERIALS				DRAWING INDEX		PERFORMANCE NOTES
FRAMING	TYPE	OVERALL DIMENSION	GLAZING	SHEET	DESCRIPTION	
	T451 STOREFRONT	2" X 4 1/2" OVERALL	DOUBLE GLAZED	T1	TITLE PAGE / SPECIFICATIONS	
				E1	FRAMING ELEVATIONS	
				D1-D2	CONNECTION DETAILS	
				4 PAGES		
TYPICAL PROJECT INFORMATION				GLAZING SCHEDULE		
ALUMINUM FINISHES				GL1	1" OVERALL	- 6mm CLEAR - 1/2" ARGON WARM EDGE SPACER - 6mm CLEAR
SILL FLASHING	.040 PRE-FINISHED ALUMINUM SHEET			GL2	1" OVERALL	- 6mm SOLARBAN 60/ LOW-E #2 SURFACE - 1/2" ARGON WARM EDGE SPACER - 6mm CLEAR
PEEL AND STICK	SOPREMA SOPRASEAL STICK 1100T			GL3	1" OVERALL	- 6mm SOLARBAN 60/ LOW-E #2 SURFACE - 1/2" ARGON WARM EDGE SPACER - 6mm PILKINGTON ENERGY ADVANTAGE HARD COAT LOW-e #4 SURFACE
SEALANT	DYMONIC FC, DOW CWS					
DOOR TYPES		DOOR HARDWARE				

ALL DIMENSIONS TO BE CONFIRMED ON SITE

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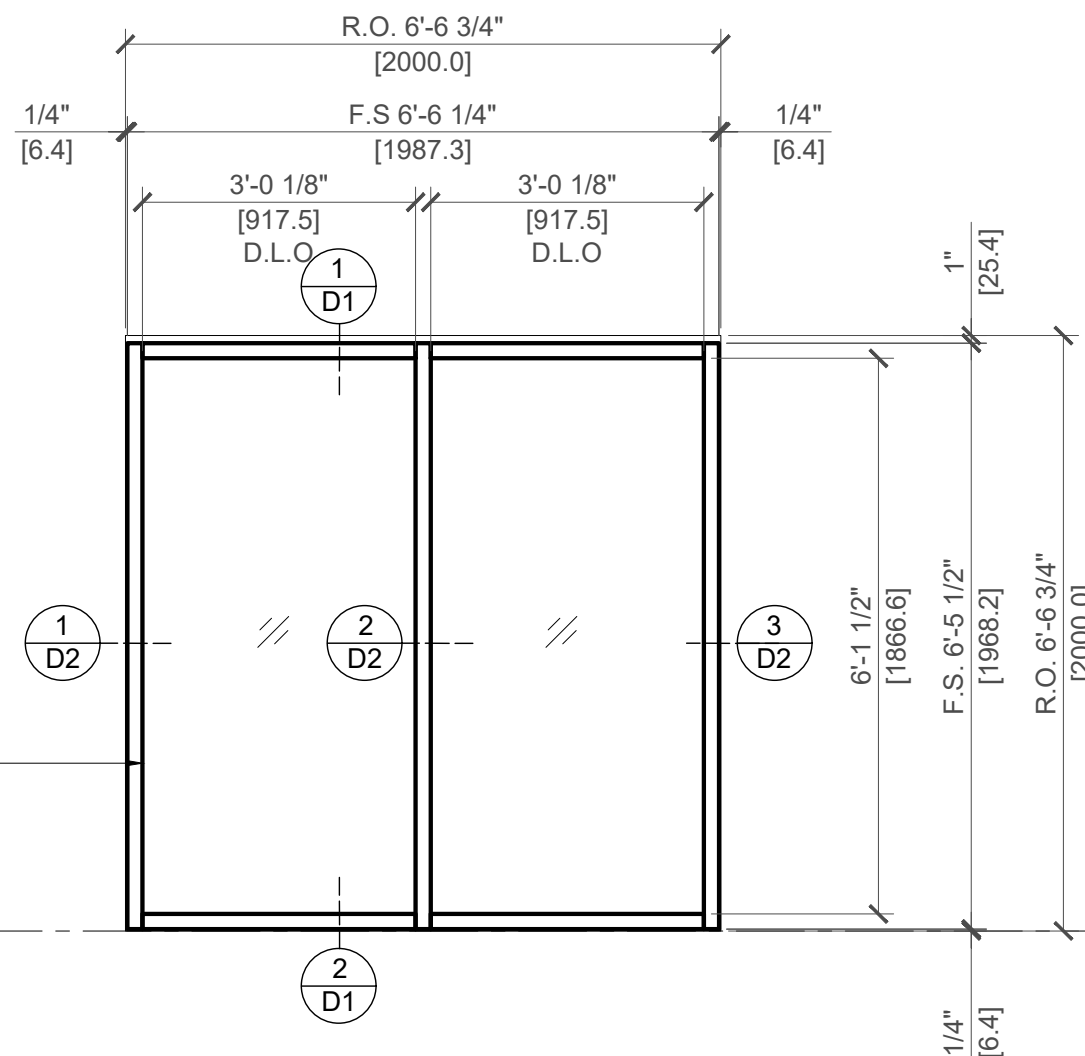
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PAGE

E1



REFER TO TITLE
PAGE FOR DIFFERENT GLASS
TYPES

0'-0"
T/O SLAB

SF1	1 REQ'
E1	SYSTEM T451 STOREFRONT
FINISH	

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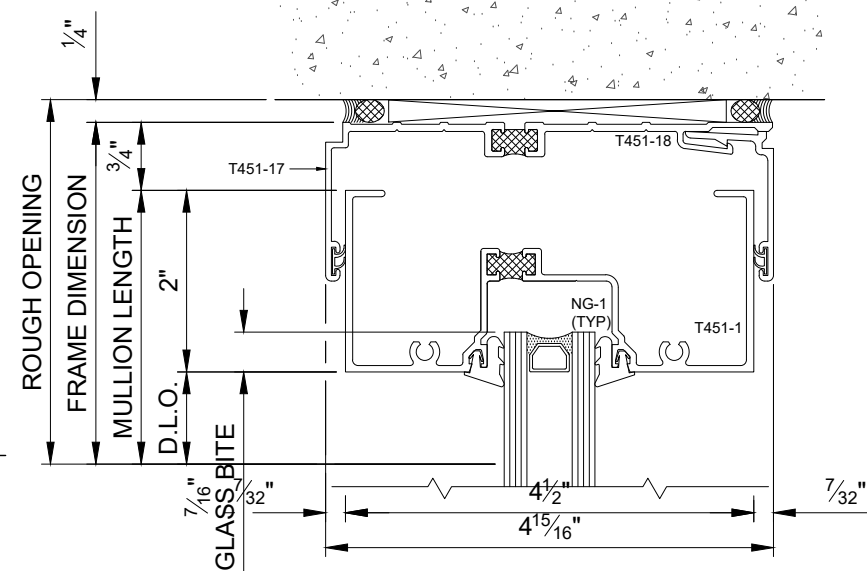
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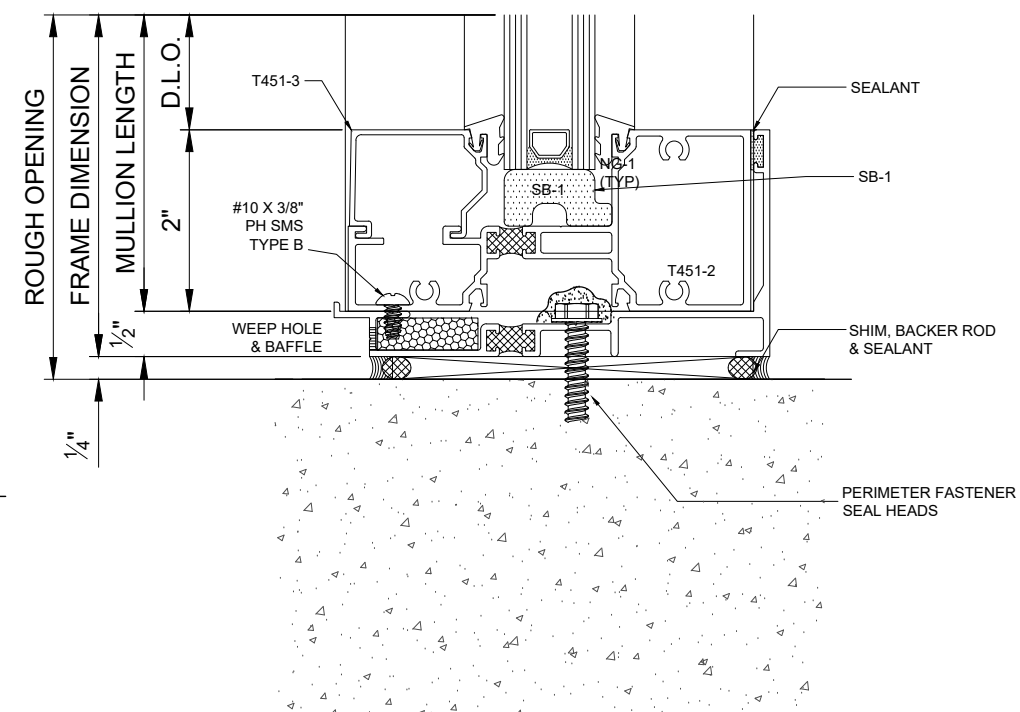
PAGE

D1

1
D1 STOREFRONT HEAD



2
D1 STOREFRONT SILL



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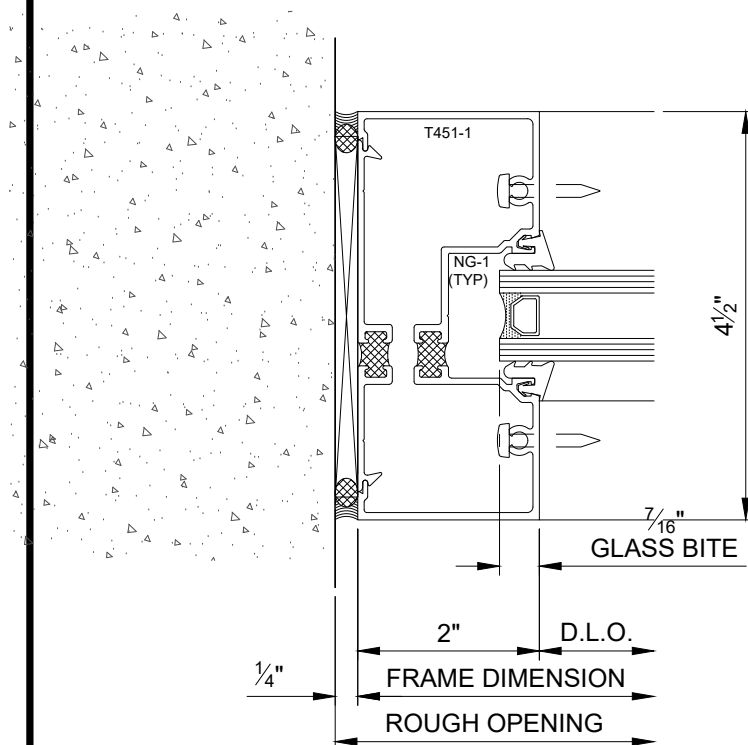
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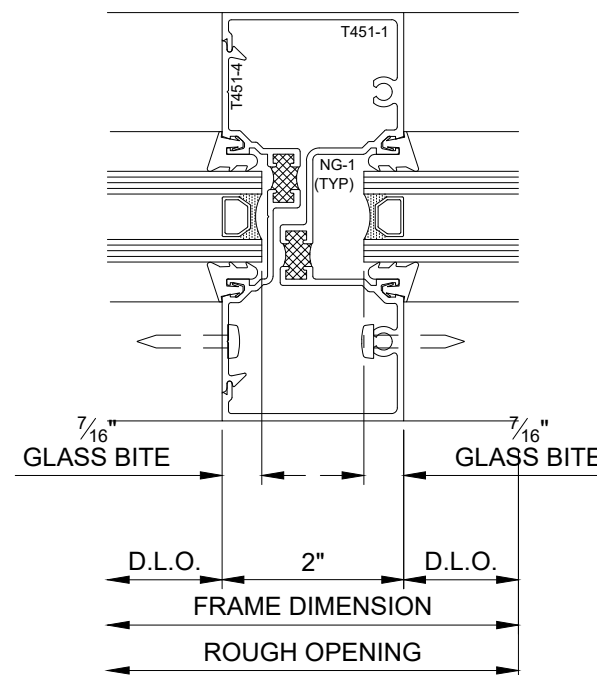
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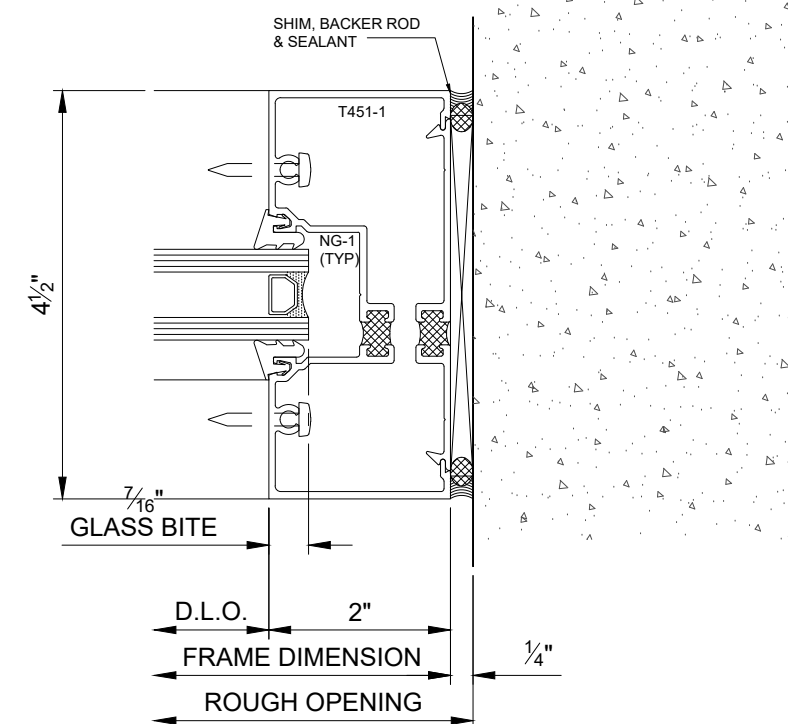
D2



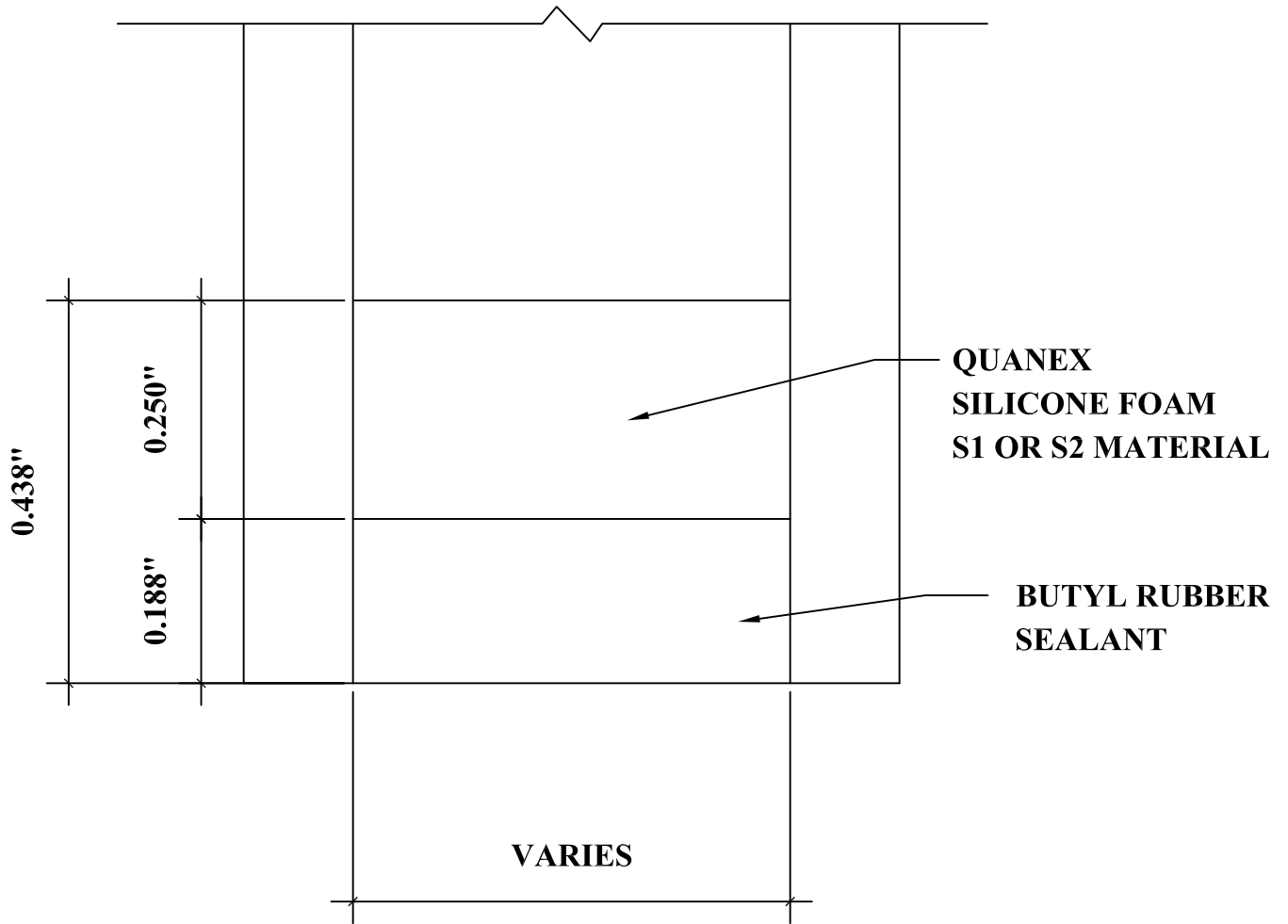
1 STOREFRONT JAMB
D2



2 HORIZONTAL MULLION
D2



3 STOREFRONT JAMB
D2



DETAIL FOR THERMAL MODELING OF
QUANEX SUPER SPACER PREMIUM PLUS (ZF-S)



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SECTION 8

REVISION LOG

REVISION #	DATE	PAGES	REVISION
.02R0	08/11/23	N/A	Report reissued to Acro Aluminum Inc.