

**THERMAL PERFORMANCE  
COMPUTER SIMULATION REPORT**

*(Revised)*

**Rendered to:**

**WINDLOCH, LLC**

**TYPE: Casement/Fixed Unit**

**Report No.: H3790.01-116-45**  
**Original Report Date: 7/25/2017**  
**Revised Report Date: 7/31/2017**

**THERMAL PERFORMANCE  
COMPUTER SIMULATION REPORT**

*(Revised)*

Rendered to:

WINDLOCH, LLC  
467 Brook Avenue  
Deer Park, New York 11729

Report No.:	H3790.01-116-45
Simulation Date:	7/25/2017
Original Report Date:	7/25/2017
Revised Report Date:	7/31/2017

**Project Summary:** Architectural Testing, Inc., an Intertek Company (Intertek-ATI) was contracted to conduct a computer model thermal analysis. Intertek-ATI utilized the THERM 7.4 and WINDOW 7.4 computer software developed by Lawrence Berkeley Laboratory. Simulations were conducted to determine the probability of interior surface condensation using a dewpoint temperature analysis and an estimated product/elevation U-Factor.

*Note: This report is prepared for research and informational purposes only. These results are only a guide to the actual system performance and should not be interpreted as exact performance. This analysis is performed at ideal steady-state conditions and does not account for any outside influences, three-dimensional interactions or final installation of the system in the field.*

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**Simulation Specimen Description:**

<b>Project:</b>	308 N 7th Street
<b>Type:</b>	Casement/Fixed unit
<b>Drawing Reference:</b>	308N 7th St
<b>Glazing Description:</b>	GL1 - 1" Overall IG Unit consisting of 1/4" Solarban 60 (#2, e=0.035) Outer Layer 1/2" Gap - 90% Argon Filled with Windloch spacer 1/4" Clear Inner Layer

**Modeling Assumptions:**

1. Models were constructed at ideal conditions. Hardware, fasteners, and weep holes were not modeled.
2. All simulations were completed using supplied AutoCAD drawings.
3. The modeling procedure is two-dimensional. It does not take into account three-dimensional heat flow, as might occur at the corners of an assembly.
4. Spectral data for glazing with frit patterns is currently unavailable, therefore glass options with frit were simulated as dictated but without frit.

**Modeling Conditions:**Dewpoint Analysis:

Exterior Air Temperature:	10.0 °F
Exterior Wind Velocity:	15.0 mph (Perpendicular Flow)
Interior Air Temperature:	70.0 °F
Relative Humidity:	30.0 %

U-Factor Calculation:

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

**References:**

THERM 7.4 Program: This software was developed by the Lawrence Berkeley Laboratory. The program calculates heat loss through frame and edge-of-glass components using finite difference analysis. The program solves for temperature and heat flow distribution throughout the cross section. The temperature distribution can then be used to determine overall heat loss, total and component U-factors, and local temperatures at points of interest.

WINDOW 7.4 Program: This software was developed by the Lawrence Berkeley Laboratory. The program calculates U-factor and temperatures for the center-of-glazing using a two-dimensional heat flow analysis.

**Results:**

Dewpoint Analysis: The component parts of the system were modeled at the specified conditions to determine the coldest temperature on the interior surface of each section. The coldest temperature can be compared with the dewpoint at the specified temperatures to determine the probability of condensation. Appendix A includes the temperature distribution plots for the system sections.

Dewpoint Temperature: 37.2 °F

Section Coldest Temperatures:

1/401	45.3 °F
2/401	45.6 °F
3/401	48.8 °F
4/401	45.3 °F
5/401	45.2 °F
6/401	48.8 °F
7/401	48.9 °F

U-Factor Calculation: The U-Factor of the system was determined in general accordance with ANSI/NFRC 100-2014: *Procedures for Determining Fenestration Product U-Factors*. See Appendix B for complete calculation data and Appendix C for the cross-sectional details used in the analysis.

	U-Factor	SHGC	VT
<i>Operable Unit</i>	0.371	0.319	0.564
<i>Fixed Unit</i>	0.317	0.317	0.567
<b>Total Product</b>	0.344	0.318	0.565

Intertek-ATI will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Intertek-ATI for the entire test record retention period. The test record retention end date for this report is July 25, 2022.

Results obtained are tested values and were secured by using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:

SIMULATED BY:



Digitally Signed by: Allison Ford

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Allison M. Ford  
Simulation Technician

REVIEWED BY:



Digitally Signed by: Michael J. Thoman

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Michael J. Thoman  
Senior Director - Building & Construction

AMF:mjt

H3790.01-116-45

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix A: Temperature Distribution Plots (14)

Appendix B: U-Factor Calculations (2)

Appendix C: Project and Cross-Sectional Drawings (3)

### Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
.01R0	7/25/2017	All	Original Report Issue to Windloch, LLC
.01R1	7/31/2017	Appendix B	Updated project sizes.

Temperature Distribution Plots



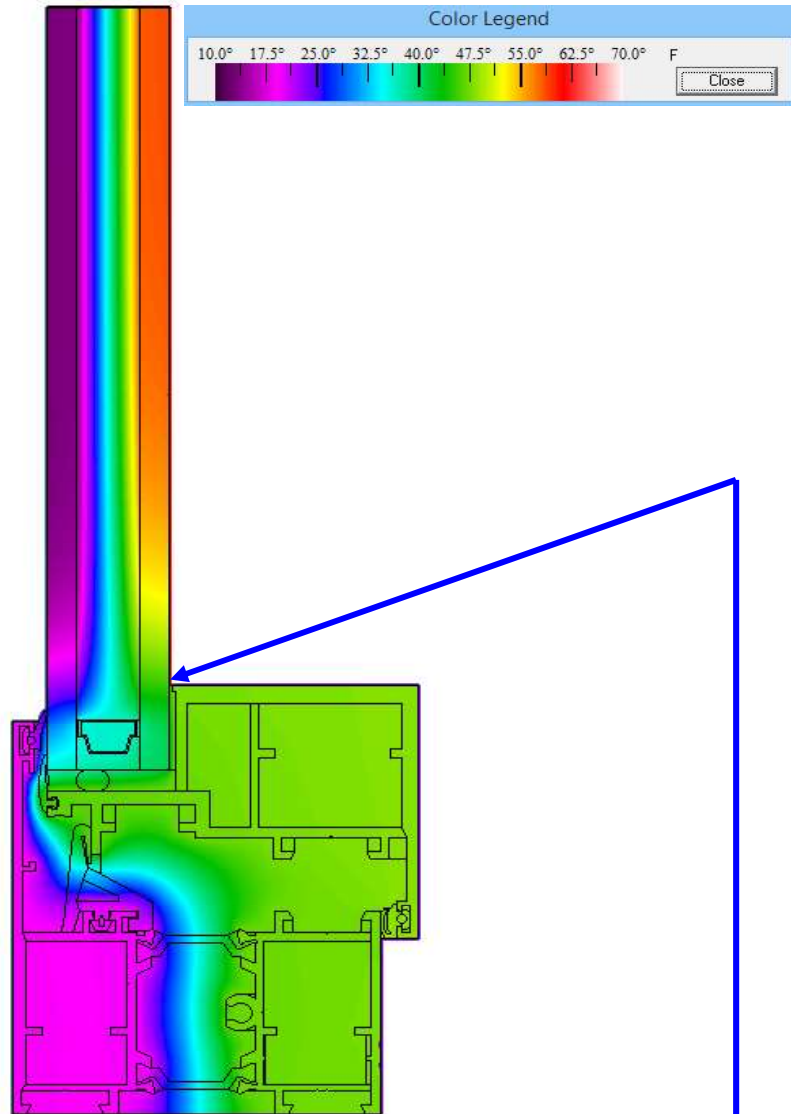
**Windloch, LLC**  
308 N 7th Street

Cross Section: 1/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition



Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 47.5 °F

Edge of Glass Temperature: 50.9 °F

Coldest Interior Temperature: 45.3 °F

**Windloch, LLC**

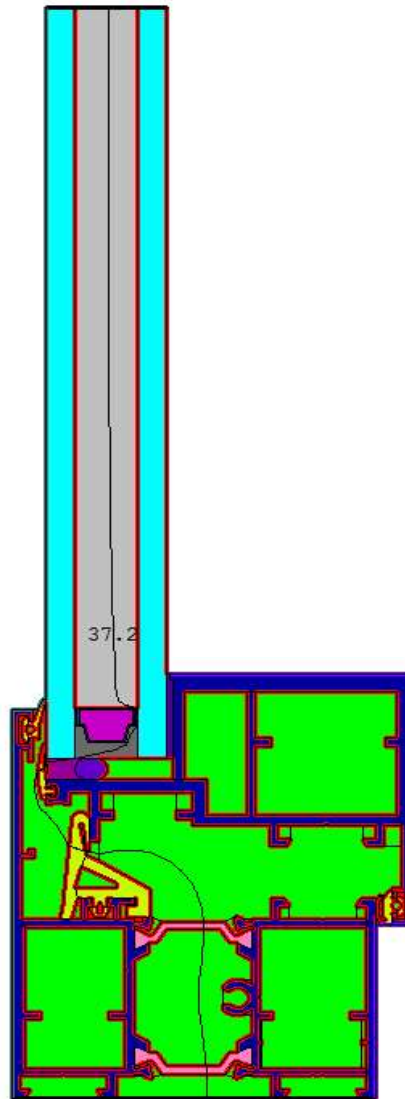
308 N 7th Street

Cross Section: 1/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition

**Dewpoint Line Plot**

Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 47.5 °F

Edge of Glass Temperature: 50.9 °F

Coldest Interior Temperature: 45.3 °F

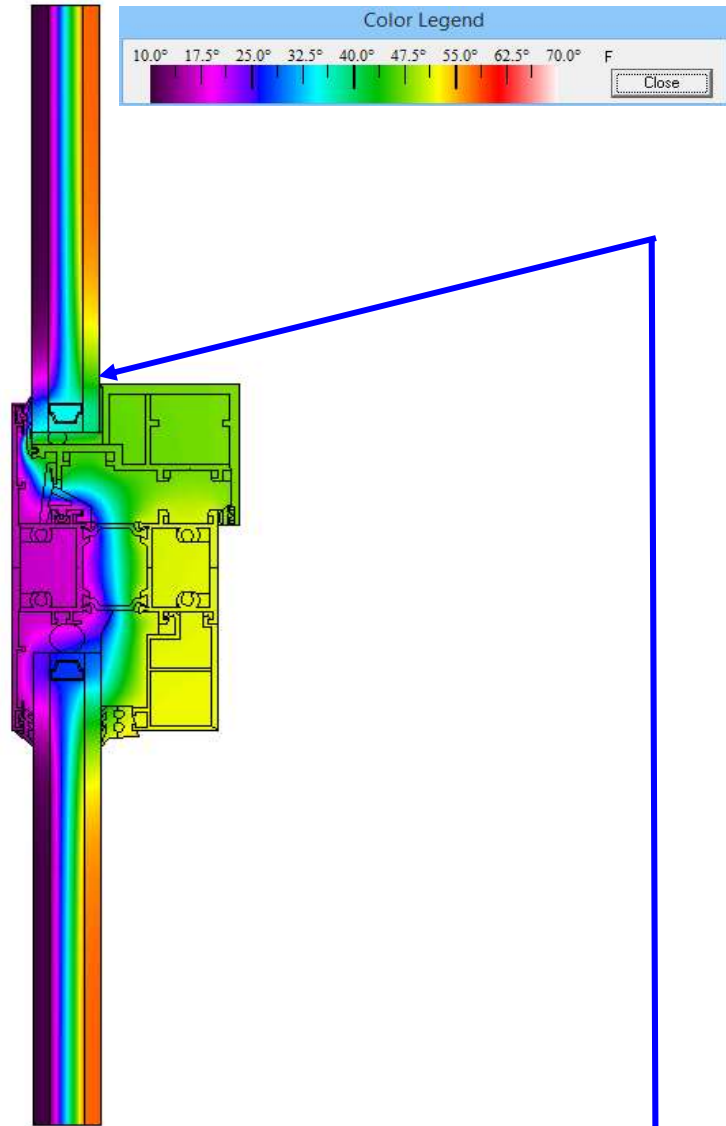
**Windloch, LLC**  
308 N 7th Street

Cross Section: 2/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition



Dewpoint Temperature: 37.2 °F  
Coldest Interior Frame Temperature: 48.0 °F  
Edge of Glass Temperature: 51.0 °F  
Coldest Interior Temperature: 45.6 °F

**Windloch, LLC**

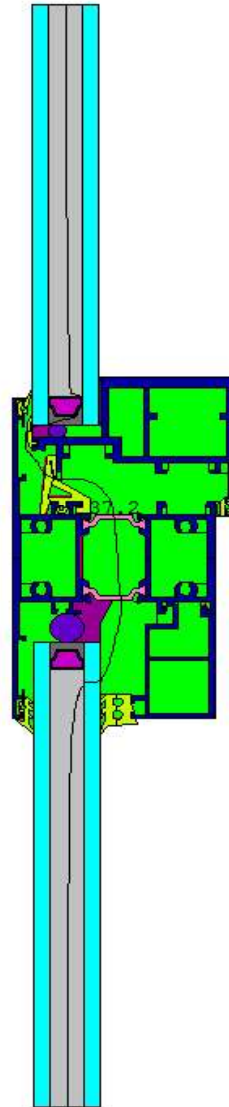
308 N 7th Street

Cross Section: 2/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition

**Dewpoint Line Plot**

Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 48.0 °F

Edge of Glass Temperature: 51.0 °F

Coldest Interior Temperature: 45.6 °F

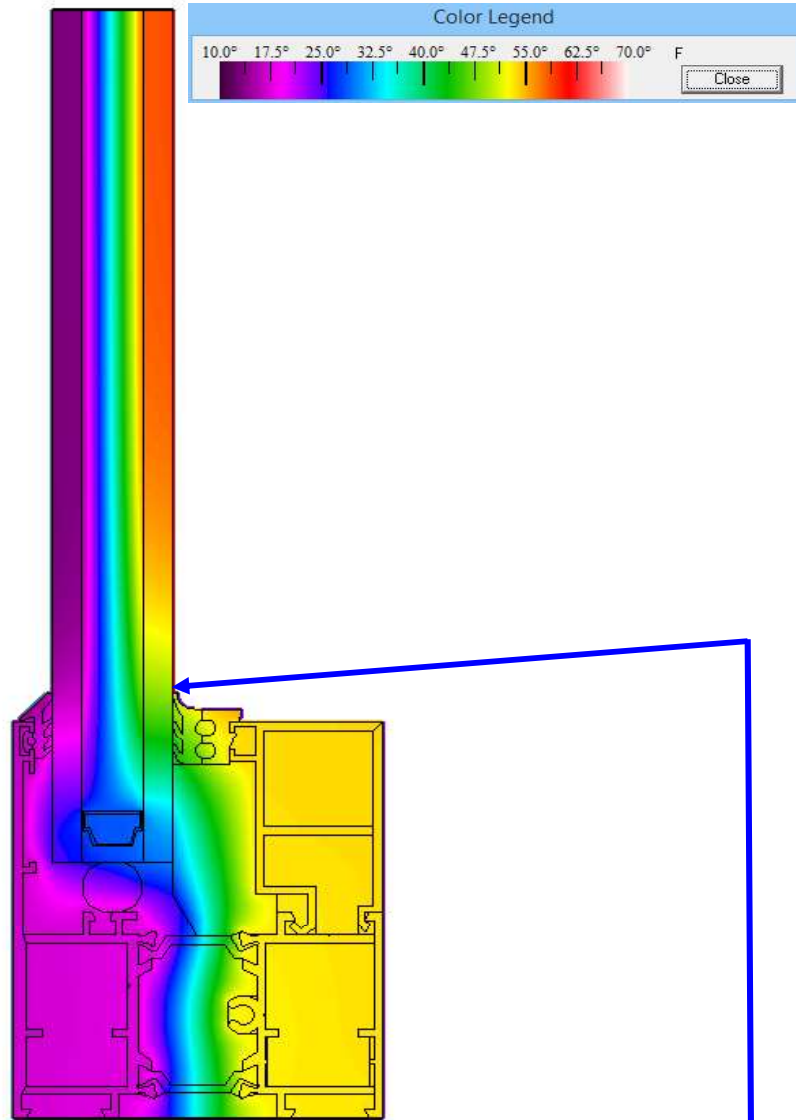
**Windloch, LLC**  
308 N 7th Street

Cross Section: 3/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition



Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 53.6 °F

Edge of Glass Temperature: 52.5 °F

Coldest Interior Temperature: 48.8 °F

**Windloch, LLC**

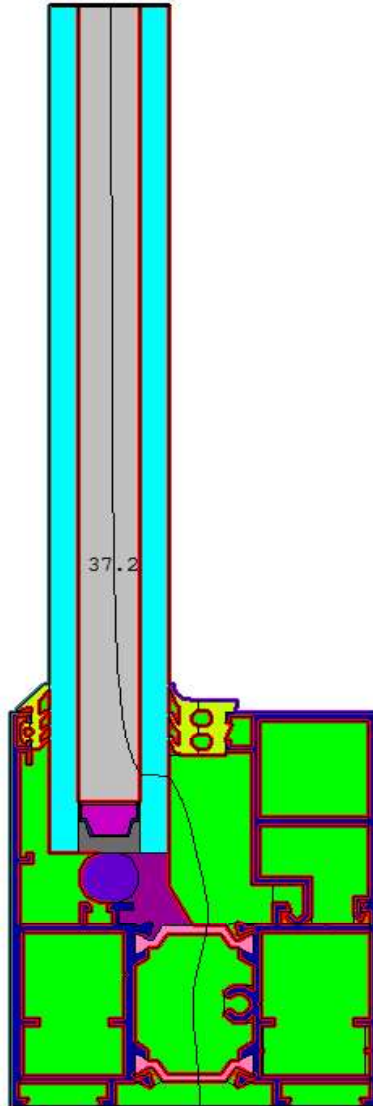
308 N 7th Street

Cross Section: 3/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition

**Dewpoint Line Plot**

Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 53.6 °F

Edge of Glass Temperature: 52.5 °F

Coldest Interior Temperature: 48.8 °F

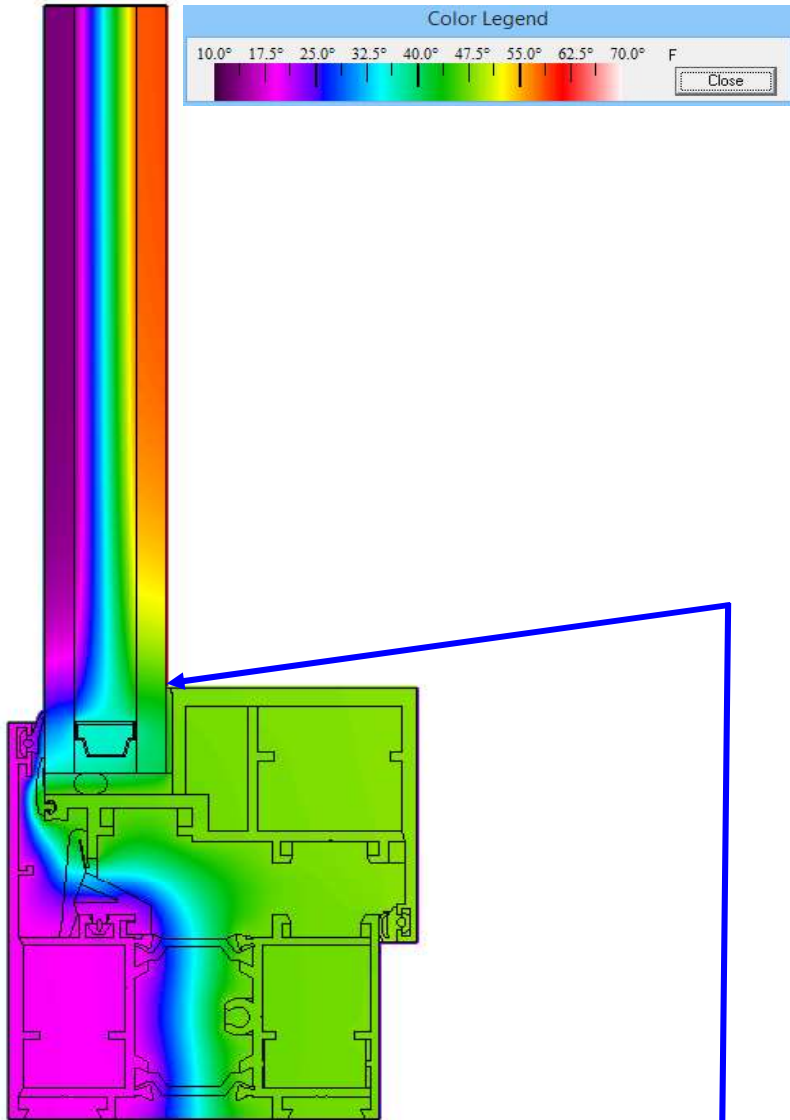
**Windloch, LLC**  
308 N 7th Street

Cross Section: 4/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition



Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 47.5 °F

Edge of Glass Temperature: 50.9 °F

Coldest Interior Temperature: 45.3 °F

**Windloch, LLC**

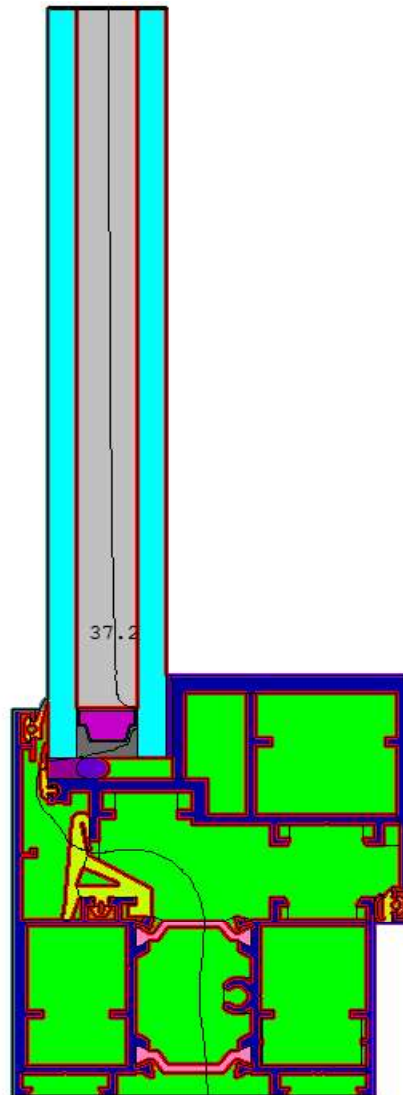
308 N 7th Street

Cross Section: 4/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition

**Dewpoint Line Plot**

Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 47.5 °F

Edge of Glass Temperature: 50.9 °F

Coldest Interior Temperature: 45.3 °F



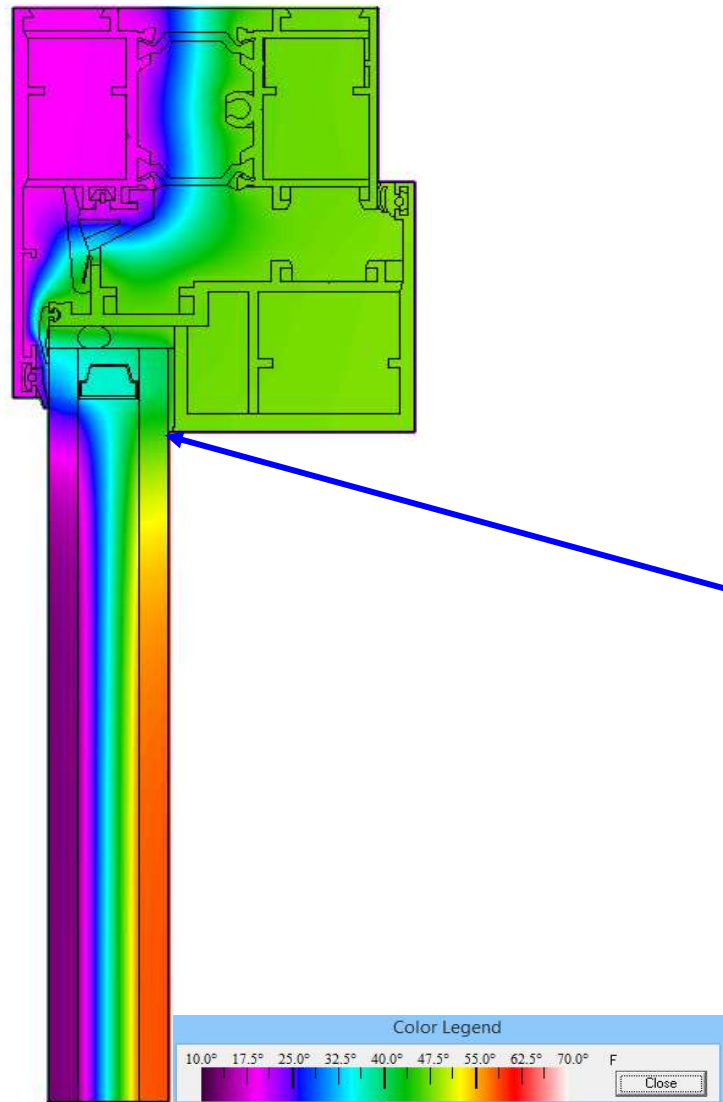
**Windloch, LLC**  
308 N 7th Street

Cross Section: 5/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition



Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 47.3 °F

Edge of Glass Temperature: 50.8 °F

Coldest Interior Temperature: 45.2 °F

**Windloch, LLC**

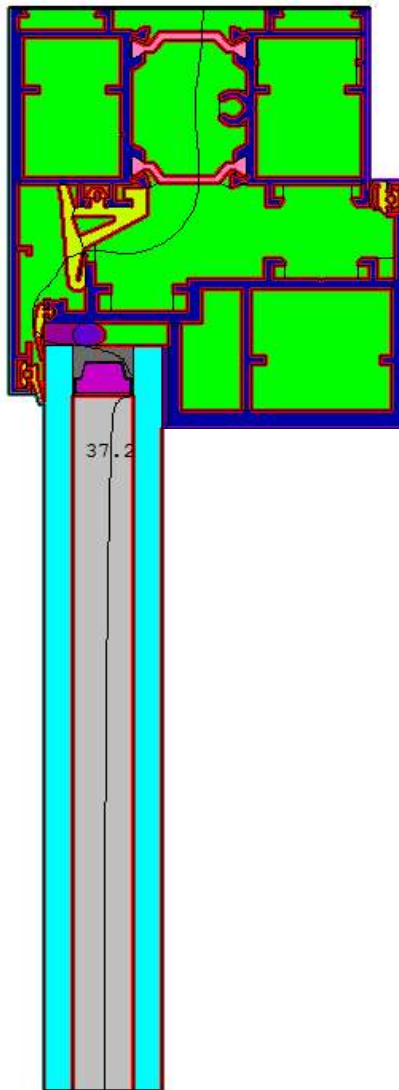
308 N 7th Street

Cross Section: 5/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition

**Dewpoint Line Plot**

Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 47.3 °F

Edge of Glass Temperature: 50.8 °F

Coldest Interior Temperature: 45.2 °F

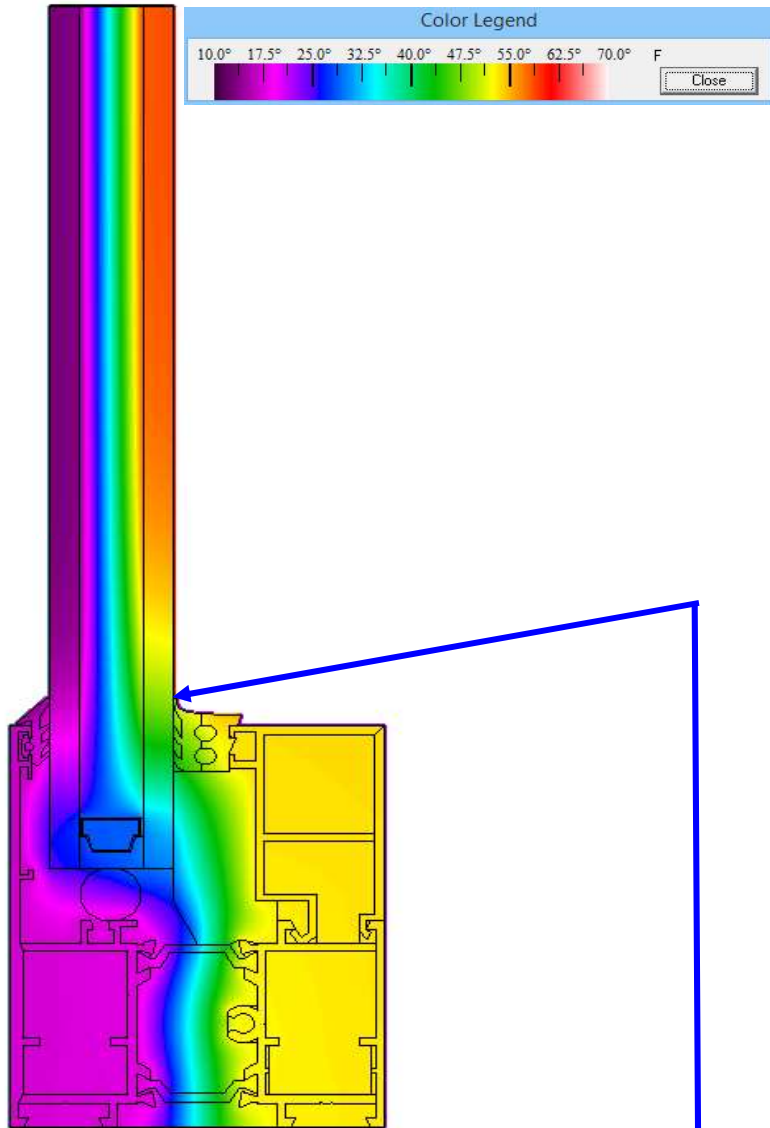
**Windloch, LLC**  
308 N 7th Street

Cross Section: 6/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition



Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 53.4 °F

Edge of Glass Temperature: 52.5 °F

Coldest Interior Temperature: 48.8 °F

**Windloch, LLC**

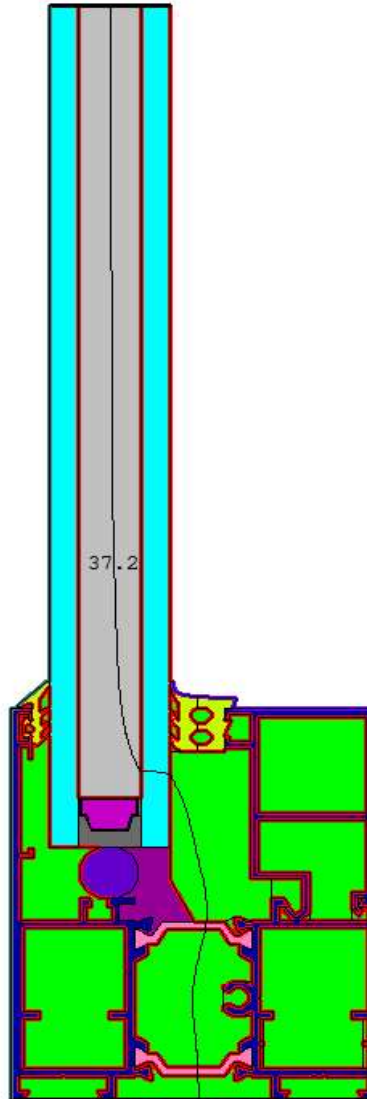
308 N 7th Street

Cross Section: 6/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition

**Dewpoint Line Plot**

Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 53.4 °F

Edge of Glass Temperature: 52.5 °F

Coldest Interior Temperature: 48.8 °F

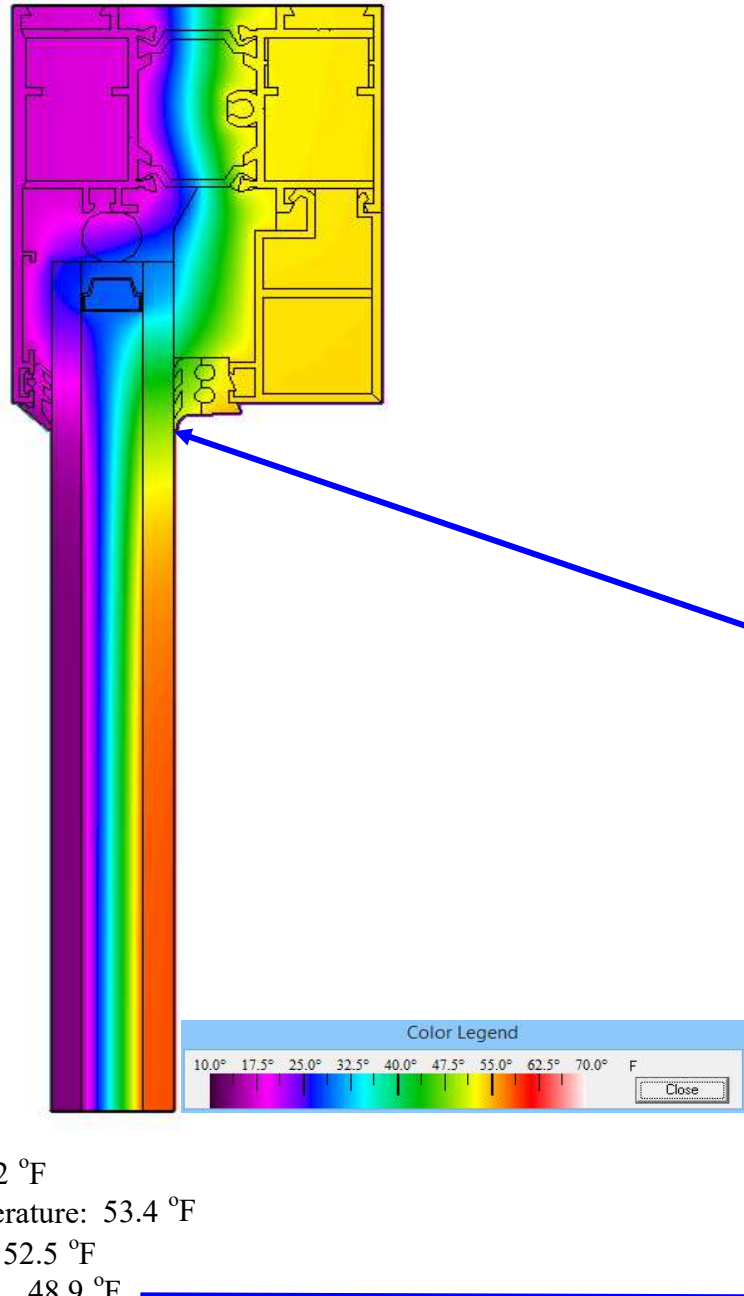
**Windloch, LLC**  
308 N 7th Street

Cross Section: 7/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition



Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 53.4 °F

Edge of Glass Temperature: 52.5 °F

Coldest Interior Temperature: 48.9 °F

**Windloch, LLC**

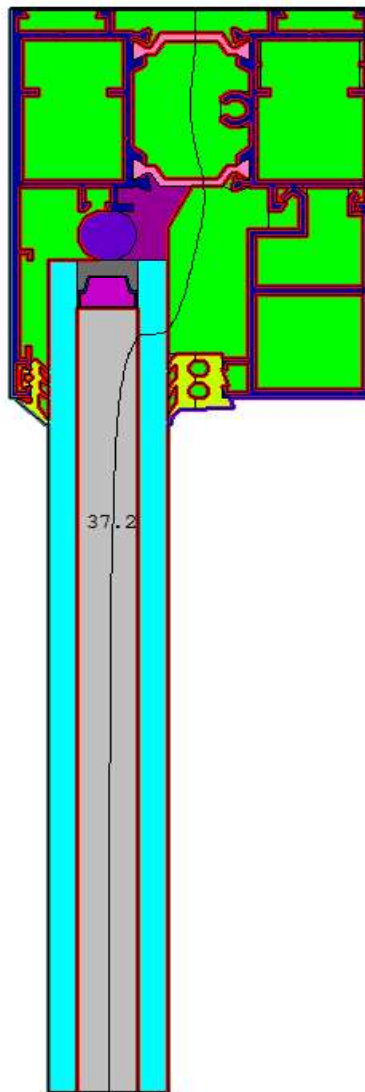
308 N 7th Street

Cross Section: 7/401

Environmental Conditions:

70.0 °F Interior Ambient Air Temperature with 30% Relative Humidity

10.0 °F Exterior Ambient Air Temperature with an applied 15mph wind condition

**Dewpoint Line Plot**

Dewpoint Temperature: 37.2 °F

Coldest Interior Frame Temperature: 53.4 °F

Edge of Glass Temperature: 52.5 °F

Coldest Interior Temperature: 48.9 °F

## U-Factor Calculations

Overall Product: Operable Unit  
 Height 84  
 Width 54.4688  
 Area 31.773

		THERM Values		Calculated				
		U-Factor	Height	Width	Area	U*A	SHGC*A	VT*A
Frame	Head	0.836	3.738	51.174	1.328	1.110	0.063	0.000
	Sill	0.828	3.738	51.174	1.328	1.100	0.062	0.000
	Right Jamb	0.868	2.852	80.262	1.590	1.381	0.078	0.000
	Left Jamb	0.828	3.738	80.262	2.084	1.725	0.098	0.000
Edge	Head	0.308	2.500	45.378	0.788	0.242	0.304	0.555
	Sill	0.307	2.500	45.378	0.788	0.242	0.304	0.555
	Right Jamb	0.306	2.500	74.024	1.285	0.393	0.496	0.905
	Left Jamb	0.307	2.500	74.024	1.285	0.395	0.496	0.905
Glass	COG	0.245	71.524	42.879	21.297	5.212	8.219	14.997
	SHGC	0.386						
	VT	0.704						

Sums:

31.773	11.799	10.121	17.916
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Total Product:

U-Factor	0.371
SHGC	0.319
VT	0.564



Overall Product: Fixed Unit  
 Height 84  
 Width 54.4688  
 Area 31.773

		THERM Values		Calculated				
		U-Factor	Height	Width	Area	U*A	SHGC*A	VT*A
Frame	Head	0.551	3.666	51.246	1.305	0.719	0.041	0.000
	Sill	0.551	3.666	51.246	1.305	0.719	0.041	0.000
	Right Jamb	0.546	3.666	80.334	2.045	1.116	0.063	0.000
	Left Jamb	0.658	2.780	80.334	1.551	1.021	0.058	0.000
Edge	Head	0.300	2.500	45.523	0.790	0.237	0.305	0.557
	Sill	0.300	2.500	45.523	0.790	0.237	0.305	0.557
	Right Jamb	0.301	2.500	74.169	1.288	0.387	0.497	0.907
	Left Jamb	0.300	2.500	74.169	1.288	0.387	0.497	0.907
Glass	COG	0.245	71.669	43.023	21.413	5.240	8.264	15.078
	SHGC	0.386						
	VT	0.704						

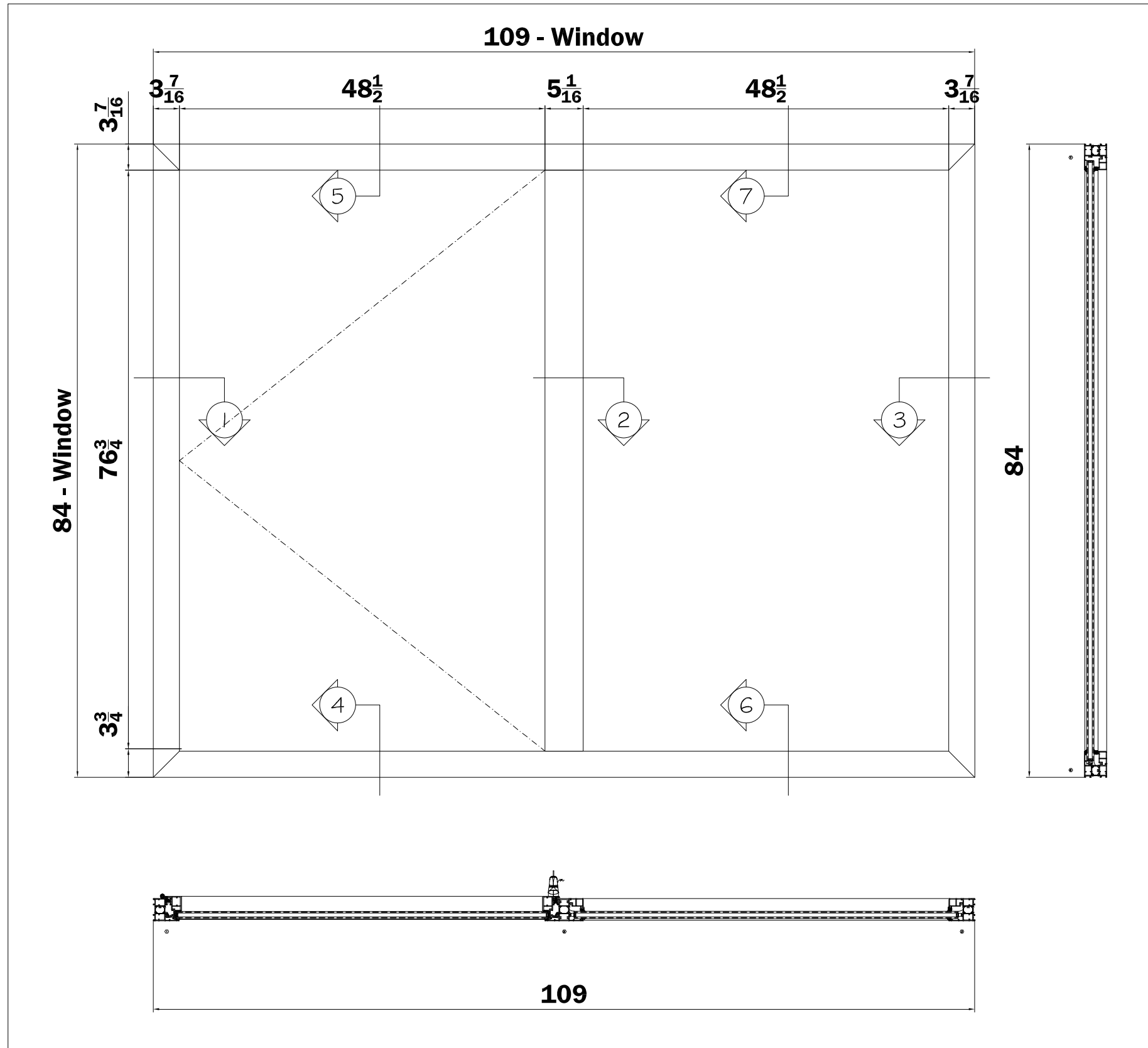
Sums:

31.773	10.062	10.071	18.005
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Total Product:

U-Factor	0.317
SHGC	0.317
VT	0.567

Project and Cross-sectional Drawings



**ALUMINUM**

ALUMINUM EXTRUSIONS TO BE 6063 ALLOY WITH T-6 TEMPER

**ALUMINUM FINISH**

EXTERIOR - KINAR 70% 2 COATS - UC127843 DURANAR CNC CHARCOAL  
 INTERIOR - PPG - UC128225 DURACRON S600 CNC CHARCOAL

**GLASS**

1" INSULATED GLASS  
 OUTER PANE: 1/4" SOLARBAN 60" #2 ON CLEAR TEMPERED  
 1/2" SPACER WITH 90% ARGON, AND 10% AIR.  
 INNER PANE: 1/4" CLEAR TEMPERED

**HARDWARE**

HARDWARE TO BE BLACK.  
 THE CASEMENTS INCLUDES FALL PREVENTION DEVICE, APPROVED BY NYC D.O.H.

**GASKETS**

ALL GASKETS TO BE E.P.D.M.

**SEALANT**

INTERIOR/EXTERIOR SILICON: PECORA 895.

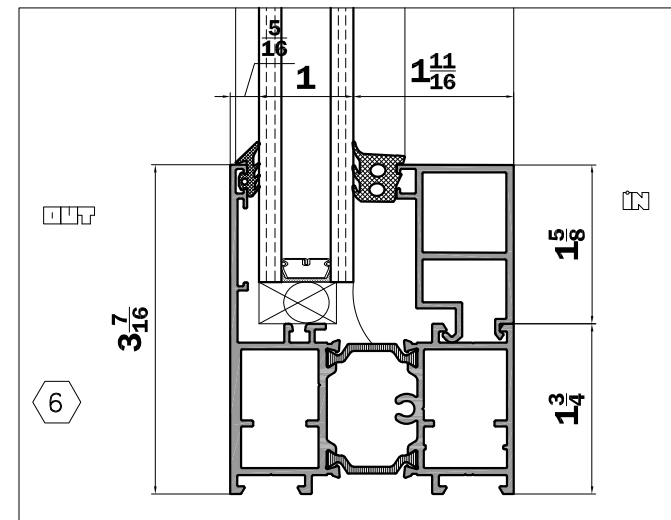
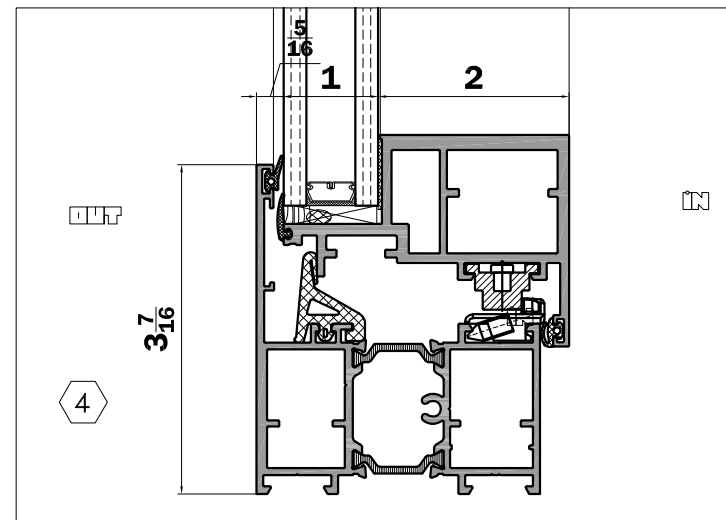
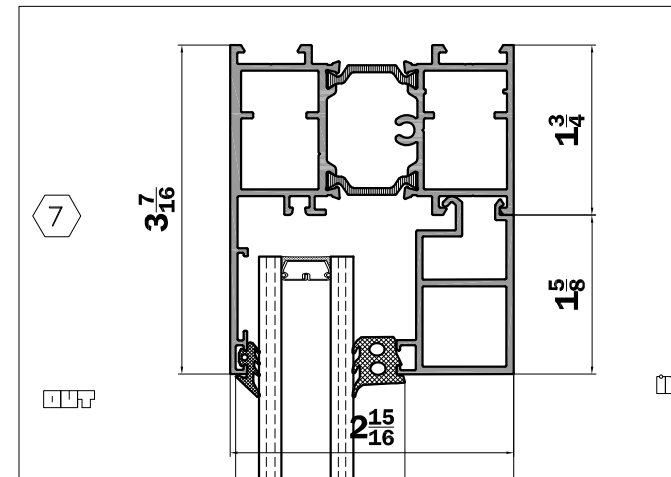
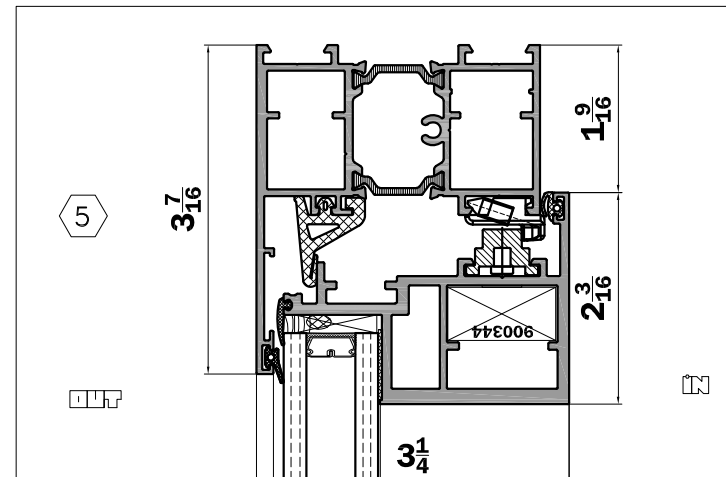
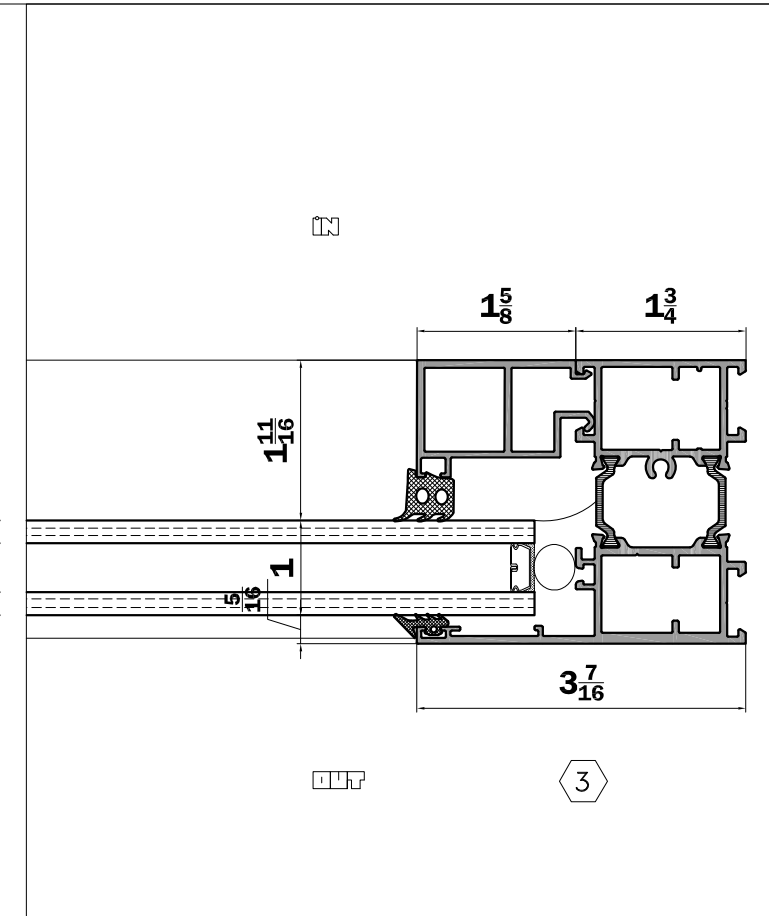
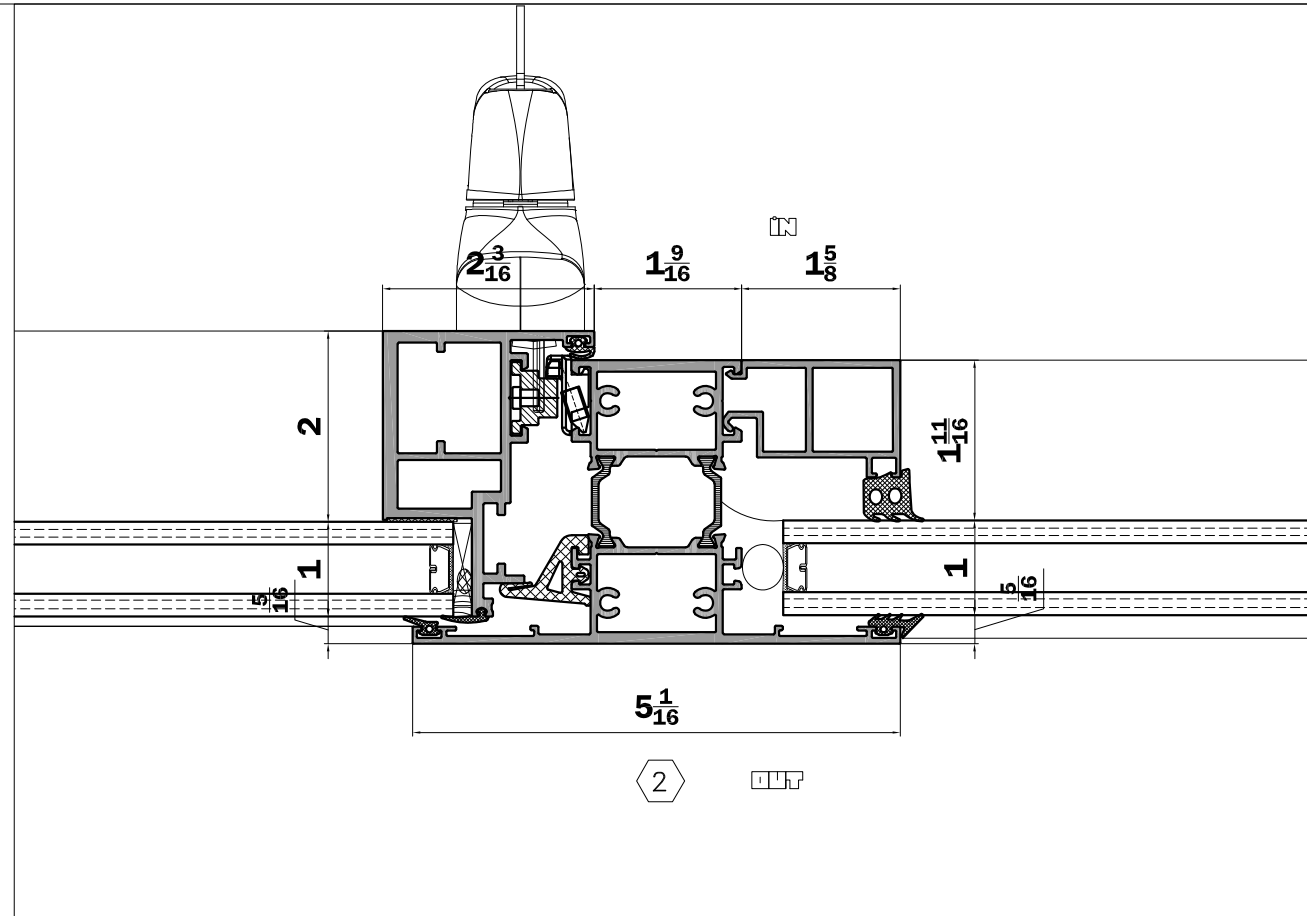
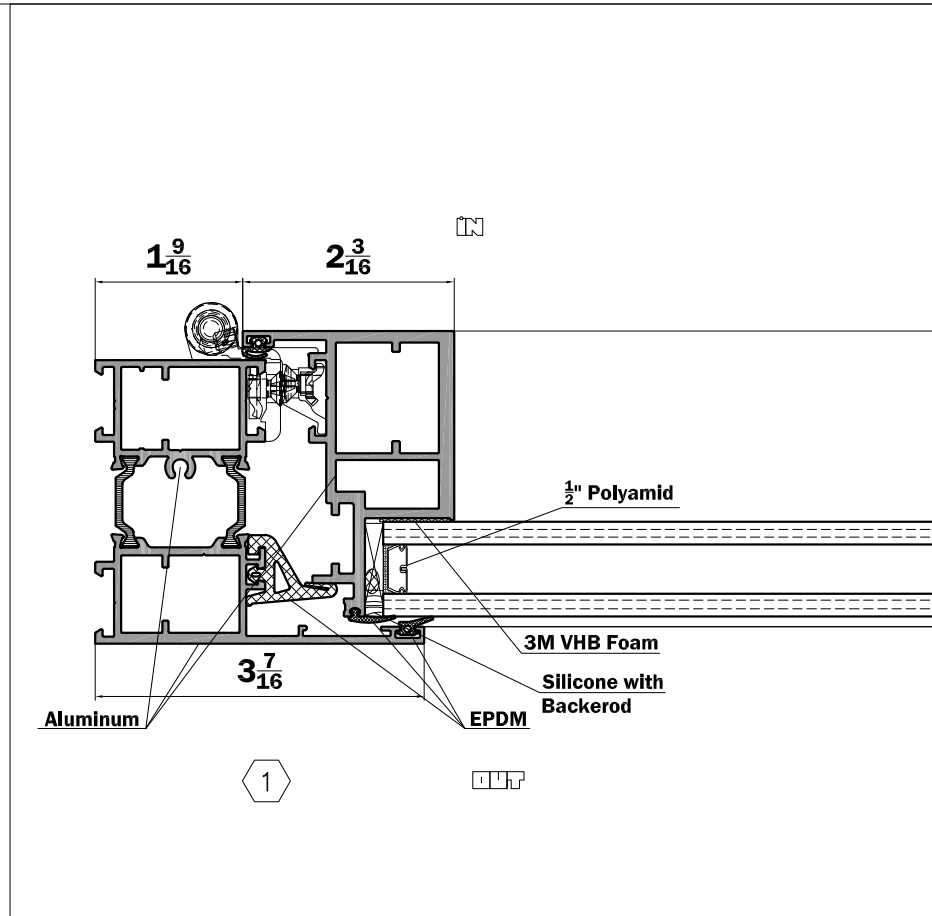
Intertek ISO 9001 MT Report #: H3790-116-45  
 Date: 07/25/17  
 Verified by: *Allison M. Ford*



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 Deer Park, NY 11729  
 (718)-640-8391  
 (631)-940-7745  
 (941)-718-4868 Fax  
 info@windloch.com  
 WWW.WINDLOCH.COM

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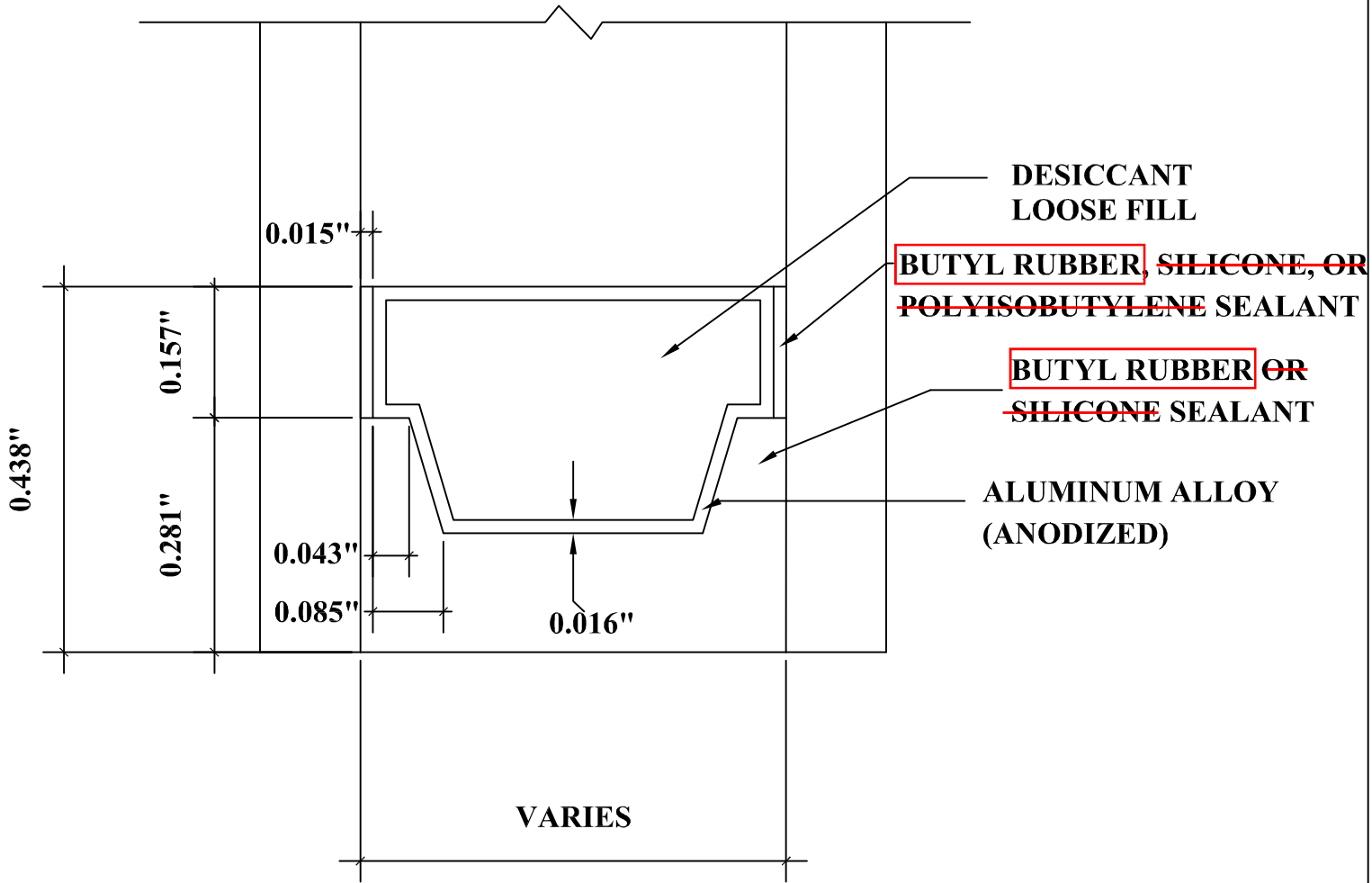
REV.	DESCRIPTION	BY	DATE
1	THERMAL SIMULATION	YB	07/13/17
PROJECT: 308N 7TH ST		DRAWN BY: YOAV BEN-SHIMON	
LOCATION: 308N 7TH ST, BROOKLYN, NY		SCALE: 3/4"=1' (11x17)	
ARCHITECT: ISSAC & STERN ARCHITECTS P.C.		DATE: 07/13/17	
CONSULTANT:		SHEET NO.: 201	
SHEET DESCRIPTION: WINDOW ELEVATION			




 Report #: H3790-116-45  
 Date: 07/25/17  
 Verified by: Allison M. Ford


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REV.	DESCRIPTION	BY	DATE
1	THERMAL SIMULATION	YB	07/13/17
PROJECT: 308N 7TH ST		DRAWN BY: YOAV BEN-SHIMON	
LOCATION: 308N 7TH ST, BROOKLYN, NY		SCALE: 6"=1' (11x17)	
ARCHITECT: ISSAC & STERN ARCHITECTS P.C.		DATE: 07/13/17	
CONSULTANT:		SHEET NO.: 401	
SHEET DESCRIPTION: WINDOW DETAILS			



DETAIL FOR THERMAL MODELING OF ALUMINUM SPACER (A1-D)