Intertek | Architectural Testing

NFRC U-FACTOR, SHGC, VT, & CONDENSATION RESISTANCE COMPUTER SIMULATION REPORT

(Revised)

Rendered to:
ALUMINTECHNO JLLC

SERIES/MODEL:
ALTW72 DA

Report Number: **H0033.01-116-45**
Original Report Date: **03/27/18**
Revised Report Date: **04/13/18**

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NFRC U-FACTOR, SHGC, VT, & CONDENSATION RESISTANCE
COMPUTER SIMULATION REPORT
(Revised)

Rendered to:
ALUMINTECHNO JLLC
Selitskogo Str.12-211
220075 FEZ, Minsk Minsk Region, Belarus

Report Number:	H0033.01-116-45
Simulation Date:	03/27/18
Original Report Date:	03/27/18
Revised Report Date:	04/13/18

Project Summary:
Architectural Testing, Inc., an Intertek Company (Intertek-ATI) was contracted to perform U-Factor, Solar Heat Gain Coefficient, Visible Transmittance, and Condensation Resistance* computer simulations in accordance with the National Fenestration Rating Council (NFRC). The products were evaluated in full compliance with NFRC requirements to the standards listed

**NFRC's Condensation Resistance rating is NOT equivalent to a Condensation Resistance Factor (CRF) determined in accordance with AAMA 1503.*

Standards:

ANSI/NFRC 100-2017:	*Procedure for Determining Fenestration Product U-Factors*
ANSI/NFRC 200-2017:	*Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence*
NFRC 500-2017:	*Procedure for Determining Fenestration Product Condensation Resistance Values*

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 59.0

Simulations Specimen Description:

Series/Model:	ALTW72 DA
Type:	Dual Action, Tilt Turn
Frame Material:	AT Aluminum w/ Thermal Breaks - All Members
Sash Material:	AT Aluminum w/ Thermal Breaks - All Members
Standard Size:	1200mm x 1500mm

Modeling Assumptions/Technical Interpretations:

1) To prevent air infiltration, tape was applied to all interior sash crack locations.

Specialty Products Table:

The specialty products method allow the manufacturer to determine the overall product SHGC and VT for any glazing option. The center of glass SHGC and/or VT must be determined using WINDOW 7.4.14. The method gives overall product SHGC and VT indexed on center of glass properties. All values used in the calculations are truncated to six decimal place precision.

	No Dividers	Dividers < 1	Dividers > 1
SHGC0	0.006099	0.008824	0.011390
SHGC1	0.753020	0.673135	0.597930
VT0	0.000000	0.000000	0.000000
VT1	0.746920	0.664311	0.586541

SHGC = SHGC0 + SHGCc (SHGC1 - SHGC0)

VT = VT0 + VTc (VT1 - VT0)

Validation Matrix:

The following products are part of a validation matrix. Only one is required for validation testing.

Product Line	*Report Number*
None	-

Spacer Option Description

	Sealant		
Spacer Type	*Primary*	*Secondary*	*Code*
Aluminum Spacer	Butyl Rubber	Butyl Rubber	A1-D
Thermix Spacer	Butyl Rubber	Silicone	TS-D

Grid Option Description

Grid Size	*Grid Type*	*Grid Pattern*
None	-	-

Reinforcement Option Description

Location	*Material*
None	-

Gas Filling Technique Description

Fill Type	*Method*
90% Argon	Evacuated Chamber
97 % Argon	Evacuated Chamber

Edge-of-Glass Construction

Interior Condition	Aluminum bead with EPDM Gasket
Exterior Condition	Aluminum leg with EPDM Gasket

Weatherstripping

Type	*Quantity*	*Location*
EPDM Gasket	1	Sash and Frame Perimeter

Frame/Sash Materials Finish

Interior	Aluminum (Painted)
Exterior	Aluminum (Painted)

NFRC 100/200/500 Summary Sheet
ALTW72 DA

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)					Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance	
1	SB60/Air/Clear (6mm-6mm) 1" IG											
	0.223	0.500	0.223					AIR	0.035(#2)	CL	TS-D	N
	U-Factor 0.33			SHGC (N) 0.30					VT (N) 0.53		CR 57	
	Azuria/Air/SB60 (6mm-6mm) 1" IG											
	0.223	0.500	0.223					AIR	0.035(#3)	AZ	TS-D	N
	U-Factor 0.33			SHGC (N) 0.24					VT (N) 0.41		CR 57	
	VistaCool-Azuria/Air/SB60 (6mm-6mm) 1" IG											
	0.223	0.500	0.223					AIR	0.035(#3)	AZ	TS-D	N
	U-Factor 0.33			SHGC (N) 0.20					VT (N) 0.31		CR 57	
2	SB60/Argon90/Clear (6mm-6mm) 1" IG											
	0.223	0.500	0.223					ARG90	0.035(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.29					VT (N) 0.53		CR 59	
	SB60-Solargray/Argon90/Clear (6mm-6mm) 1" IG											
	0.223	0.500	0.223					ARG90	0.035(#2)	GY	TS-D	N
	U-Factor 0.30			SHGC (N) 0.19					VT (N) 0.26		CR 59	
3	SB67/Argon90/Clear (6mm-6mm) 1" IG											
	0.223	0.500	0.223					ARG90	0.035(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.22					VT (N) 0.40		CR 59	
4	SB70/Argon90/Clear (6mm-6mm) 1" IG											
	0.223	0.500	0.223					ARG90	0.018(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.21					VT (N) 0.48		CR 60	
5	SNX 60/Argon90/Clear (6mm-6mm) 28mm IG											
	0.230	0.630	0.221					ARG90	0.026(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.20					VT (N) 0.45		CR 62	
6	SN 70-37/Argon90/Clear (6mm-6mm) 28mm IG											
	0.230	0.630	0.221					ARG90	0.022(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.26					VT (N) 0.52		CR 62	
7	SN 70-35/Argon90/Clear (6mm-6mm) 28mm IG											
	0.230	0.630	0.221					ARG90	0.025(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.25					VT (N) 0.51		CR 62	

NFRC 100/200/500 Summary Sheet
ALTW72 DA

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)					Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance	
8	SN 70-41/Argon90/Clear (6mm-6mm) 28mm IG											
	0.230	0.630	0.221					ARG90	0.037(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.29					VT (N) 0.52		CR 61	
9	SN 70-41/Air/Clear (6mm-6mm) 28mm IG											
	0.230	0.630	0.221					AIR	0.037(#2)	CL	TS-D	N
	U-Factor 0.34			SHGC (N) 0.29					VT (N) 0.52		CR 58	
10	SN 70-35/Argon97/SN 70-37 UC/Argon97/Clear (6mm-6mm-6mm) 48mm IG											
	0.230	0.551	0.230	0.630	0.221			ARG97	0.025(#2) / 0.025(#4)	CL	TS-D	N
	U-Factor 0.19			SHGC (N) 0.20					VT (N) 0.40		CR 69	
11	IPlus Energy N/Argon90/ Lami 44.1 (6mm-8mm) 32mm IG											
	0.230	0.709	0.318					ARG90	0.033(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.28					VT (N) 0.53		CR 61	
12	IPlus Energy N/Argon90/Clear (6mm-6mm) 28mm IG											
	0.230	0.630	0.230					ARG90	0.033(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.29					VT (N) 0.54		CR 62	
13	Ipasol Neutral/Argon90/Clear (6mm-6mm) 28mm IG											
	0.230	0.630	0.230					ARG90	0.029(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.26					VT (N) 0.51		CR 62	
14	Ipasol Neutral/Argon97/Clear/Argon97/IPlus Advanced (6mm-6mm-6mm) 52mm IG											
	0.230	0.630	0.230	0.709	0.230			ARG97	0.029(#2) / 0.022(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC (N) 0.22					VT (N) 0.44		CR 68	
15	IPlus Advanced/Argon90/Top N+T (6mm-8mm) 30mm IG											
	0.230	0.630	0.309					ARG90	0.022(#2) / 0.04(#3)	CL	TS-D	N
	U-Factor 0.29			SHGC (N) 0.35					VT (N) 0.54		CR 60	
16	Top N+T/Argon97/Top N+T (6mm-8mm) 30mm IG											
	0.230	0.630	0.230					ARG97	0.04(#2) / 0.04(#3)	CL	TS-D	N
	U-Factor 0.29			SHGC (N) 0.39					VT (N) 0.57		CR 63	
17	TopN+//14mm Arg/TopN+/16mm Arg/TopN+/14mm Arg/TopN+											
	0.152	0.551	0.152	0.630	0.152	0.551	0.152	ARG90	0.04(#2) / 0.04(#4) / 0.04(#5) / 0.04(#7)	CL	TS-D	N
	U-Factor 0.16			SHGC (N) 0.31					VT (N) 0.46		CR 67	

NFRC 100/200/500 Summary Sheet
ALTW72 DA

ID	Pane Thickness 1	Gap Width 1	Pane Thickness 2	Gap Width 2	Pane Thickness 3	Gap Width 3	Pane Thickness 4	Gap Fill	Low-e (Surface#)	Tint	Spacer	Grid Type
	U-Factor			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)					Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance	
18	Suncool 70/35 ProT/Argon97/Stratobel 44.1 (6mm-9mm) 35mm IG											
	0.230	0.787	0.318					ARG97	0.021(#2)	CL	TS-D	N
	U-Factor 0.30			SHGC (N) 0.27					VT (N) 0.52		CR 61	

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.

Ratings values included in this report are for submittals to an NFRC-licensed 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 ratings values were rounded in accordance to NFRC 601, NFRC Unit and Measurement Policy.

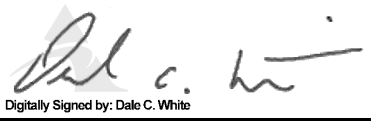
Intertek-ATI is an NFRC accredited simulation laboratory and all simulations were conducted in full compliance with NFRC approved procedures and specifications. The values included in this report are not considered in compliance with ANSI/NFRC 100, ANSI/NFRC 200, and/or NFRC 500 unless the associated validation test requirements have been satisfied, as applicable.

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 March 27, 2018.

Results obtained are simulated 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 product simulated. This report may not be reproduced, except in full, without the written approval of Intertek-ATI

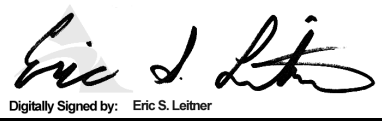
For INTERTEK-ATI:

SIMULATED BY:



Dale C. White
Simulation Technician
NFRC Certified Simulator

REVIEWED BY:



Eric S. Leitner
Simulation Technician Team Leader
Simulator-In-Responsible-Charge

DCW:dcw
H0033.01-116-45

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A: Drawings and Bills of Material

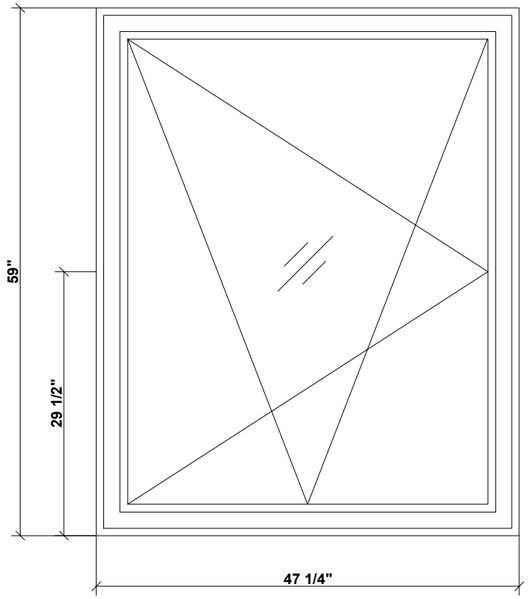
Revision Log

Rev. #	Date	Page(s)	Revision(s)
.01R0	03/27/18	All	Original report issued to AluminTechno JLLC
.01R1	04/13/18	All	Revised report to correct glass on option 18, client name, and address

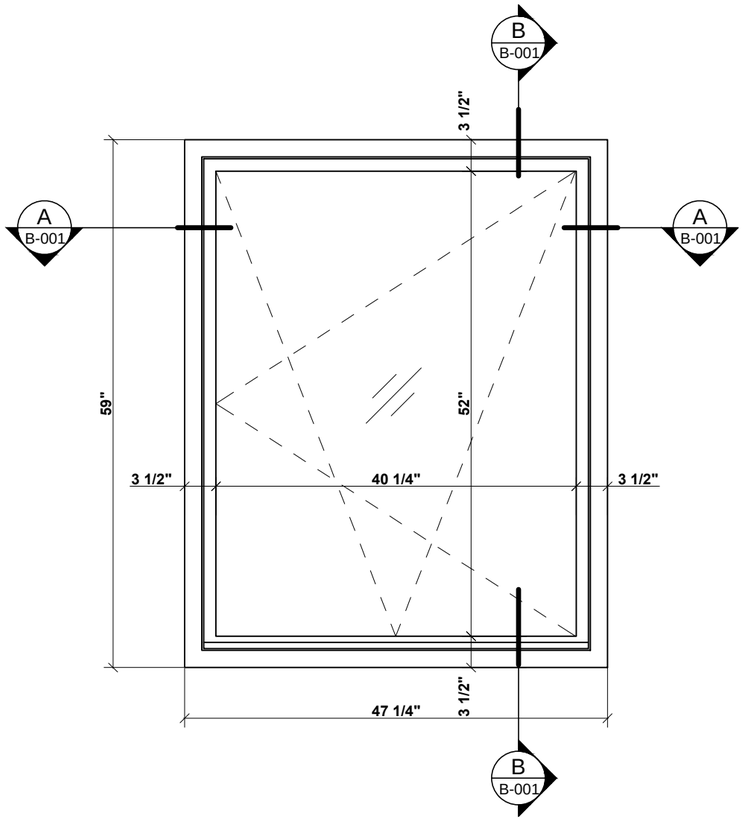
All drawings and Bills of Material used to simulate this product are enclosed in this Appendix

Appendix A

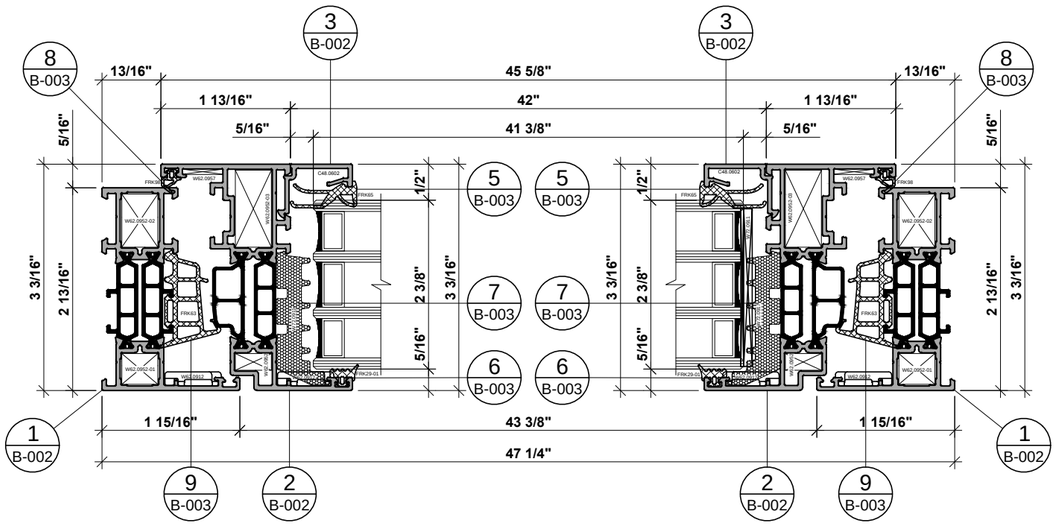
H0033.01-116-45



1 WINDOW ELEVATION INTERIOR VIEW
SCALE: 3/4" = 1'-0"



2 WINDOW ELEVATION EXTERIOR VIEW
SCALE: 3/4" = 1'-0"



3 SECTION A-A
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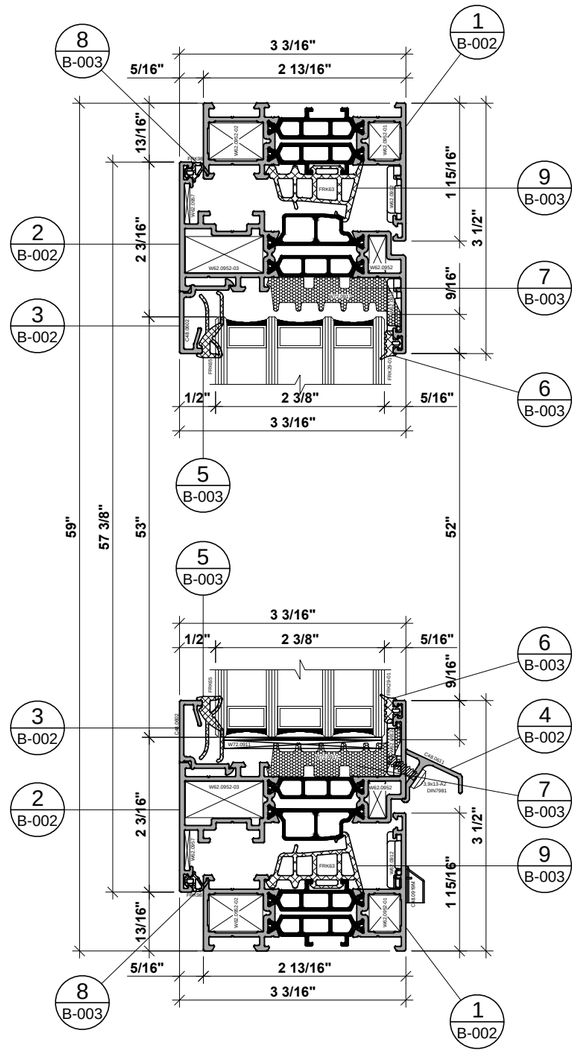

4 SECTION B-B
SCALE: 6" = 1'-0"

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AluminTechno
ALUMINUM PROFILE SYSTEMS

ARCHITECT:

PREPARED BY:

CAD SHOPS

PROJECT ADDRESS:

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SPECIAL NOTES:

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DRAWING TITLE:

ASSEMBLY DRAWING AND SECTIONS

REVIEWED BY PROJECT MANAGER

BY:_____ DATE:_____

NOTE:_____

DIMENSIONS FIELD VERIFIED

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NOTE:_____

DATE: 02.28.2018

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CHECKED BY: AA

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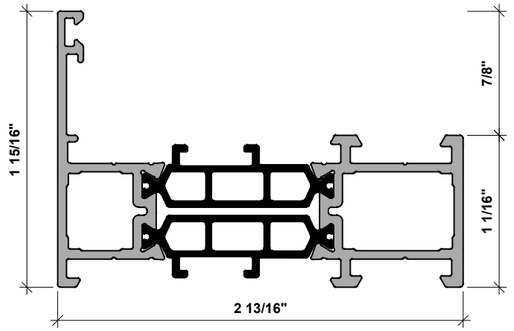
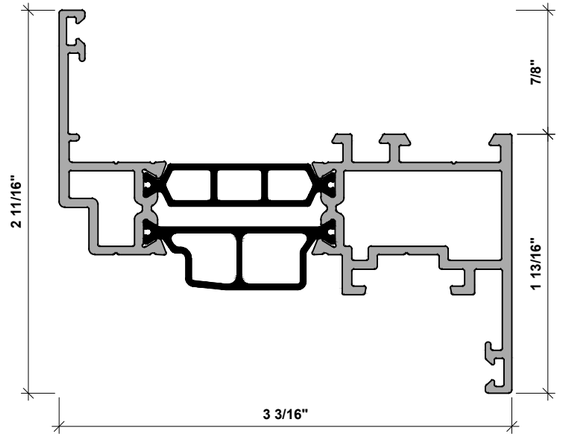
SIZE: B



Material: Extruded Aluminum with Thermal Break

1 HEAD, SILL, SIDE JAMBS MOLDING EXTRUSION W72.0101E

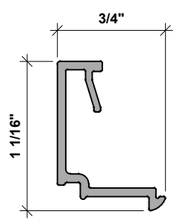
SCALE: 1'-0" = 1'-0"



Material: Extruded Aluminum with Thermal Break

2 SASH MOLDING EXTRUSION W72.0221E

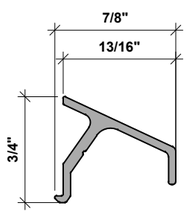
SCALE: 1'-0" = 1'-0"



Material: Extruded Aluminum

3 GLAZING BEAD EXTRUSION C48.0602

SCALE: 1'-0" = 1'-0"



Material: Extruded Aluminum

4 WATER DEFLECTOR EXTRUSION C48.0611

SCALE: 1'-0" = 1'-0"

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PREPARED BY:

CAD SHOPS

PROJECT ADDRESS:

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DATE ____ /____ /_____

SPECIAL NOTES:

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DRAWING TITLE:

INDIVIDUAL FRAME AND SASH COMPONENTS SECTIONS

REVIEWED BY PROJECT MANAGER

BY:_____ DATE:_____

NOTE:_____

DIMENSIONS FIELD VERIFIED

BY:_____ DATE:_____

NOTE:_____

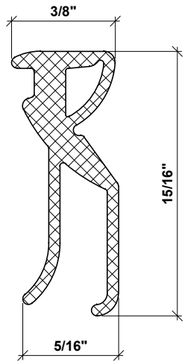
DATE: 02.28.2018

DRAWN BY: MK

CHECKED BY: AA

DRAWING No: **SIZE: B**

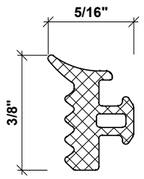
B-002.00



Material: Rubber

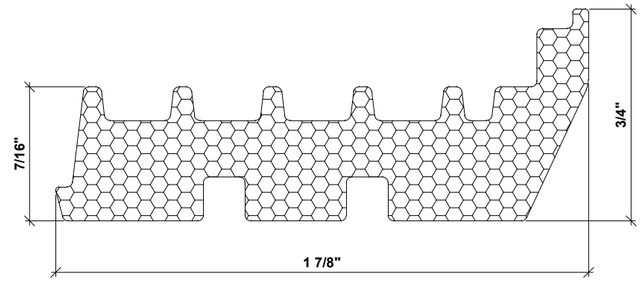
5 INTERIOR GASKET FRK65
SCALE: 2'-0" = 1'-0"

Rubber is EPDM Rubber



Material: Rubber

6 EXTERIOR GASKET FRK29-01
SCALE: 2'-0" = 1'-0"



Material: PU

7 FOAM INSULATION W72.0911
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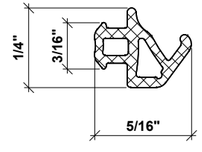
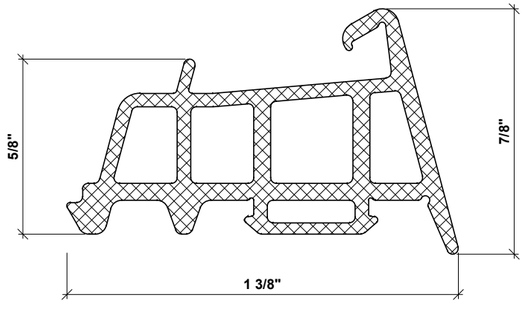


Material: Rubber

8 INTERIOR GASKET FRK98
SCALE: 2'-0" = 1'-0"



Material: Rubber

9 FRAME GASKET FRK63
SCALE: 2'-0" = 1'-0"

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ARCHITECT:

PREPARED BY:
CAD SHOPS

PROJECT ADDRESS:
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SPECIAL NOTES:

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DRAWING TITLE:
INDIVIDUAL FRAME AND SASH COMPONENTS SECTIONS

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NOTE:_____

DIMENSIONS FIELD VERIFIED

BY:_____ DATE:_____

NOTE:_____

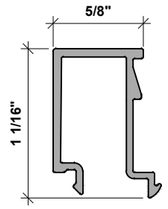
DATE: 02.28.2018

DRAWN BY: MK

CHECKED BY: AA

DRAWING No: **SIZE: B**

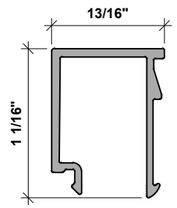
B-003.00



Material: Extruded Aluminum

1 GLAZING BEAD EXTRUSION C48.0604 FOR 52 MM INFILL

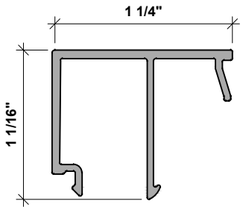
SCALE: 1'-0" = 1'-0"



Material: Extruded Aluminum

2 GLAZING BEAD EXTRUSION C48.0605 FOR 48 MM INFILL

SCALE: 1'-0" = 1'-0"



Material: Extruded Aluminum

3 GLAZING BEAD EXTRUSION C48.0608 FOR 34 MM INFILL

SCALE: 1'-0" = 1'-0"

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Report #: H0033-116-45

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PROJECT ADDRESS:

THERMAL PERFORMANCE TEST

130 Derry Court York, PA 17406 Intertek

DATE	REVISION	#

APPROVED

CLIENT'S SIGNATURE _____

DATE_____ /_____ /_____

SPECIAL NOTES:

DO NOT SCALE DRAWINGS

ALL DIMENSIONS TO BE FIELD VERIFIED PRIOR TO ANY FABRICATION.

DRAWING TITLE:

VARIOUS GLAZING BEADS

REVIEWED BY PROJECT MANAGER

BY:_____ DATE:_____

NOTE:_____

DIMENSIONS FIELD VERIFIED

BY:_____ DATE:_____

NOTE:_____

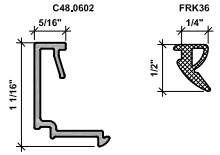
DATE: 02.28.2018

DRAWN BY: MK

CHECKED BY: AA

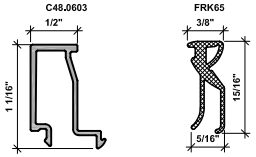
DRAWING No: **SIZE: B**

B-005.00



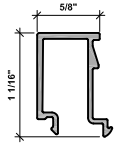
Material: Extruded Aluminum

GLAZING BEAD EXTRUSION C48.0602
WITH RUBBER GASKET FRK36 FOR 52 MM INFILL
SCALE: 1'-0" = 1'-0"



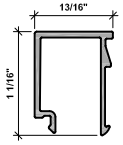
Material: Extruded Aluminum

GLAZING BEAD EXTRUSION C48.0603
WITH RUBBER GASKET FRK65 FOR 48 MM INFILL
SCALE: 1'-0" = 1'-0"



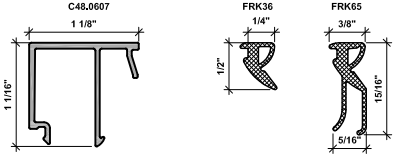
Material: Extruded Aluminum

1 GLAZING BEAD EXTRUSION C48.0604
FOR 52 MM INFILL
SCALE: 1'-0" = 1'-0"



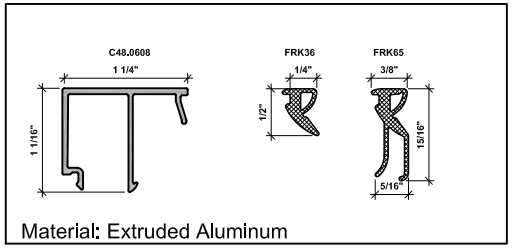
Material: Extruded Aluminum

GLAZING BEAD EXTRUSION C48.0605
FOR 48 MM INFILL
SCALE: 1'-0" = 1'-0"



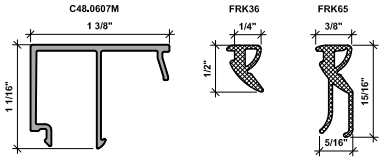
Material: Extruded Aluminum

GLAZING BEAD EXTRUSION C48.0607
WITH RUBBER GASKET FRK36 OR FRK65
FOR 30-32 MM INFILL
SCALE: 1'-0" = 1'-0"



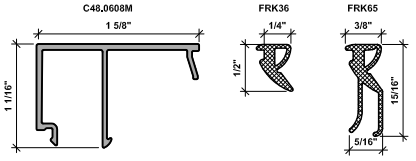
Material: Extruded Aluminum

GLAZING BEAD EXTRUSION C48.0608
WITH RUBBER GASKET FRK36, FRK65 OR FRK67
FOR 25-28 MM INFILL
SCALE: 1'-0" = 1'-0"



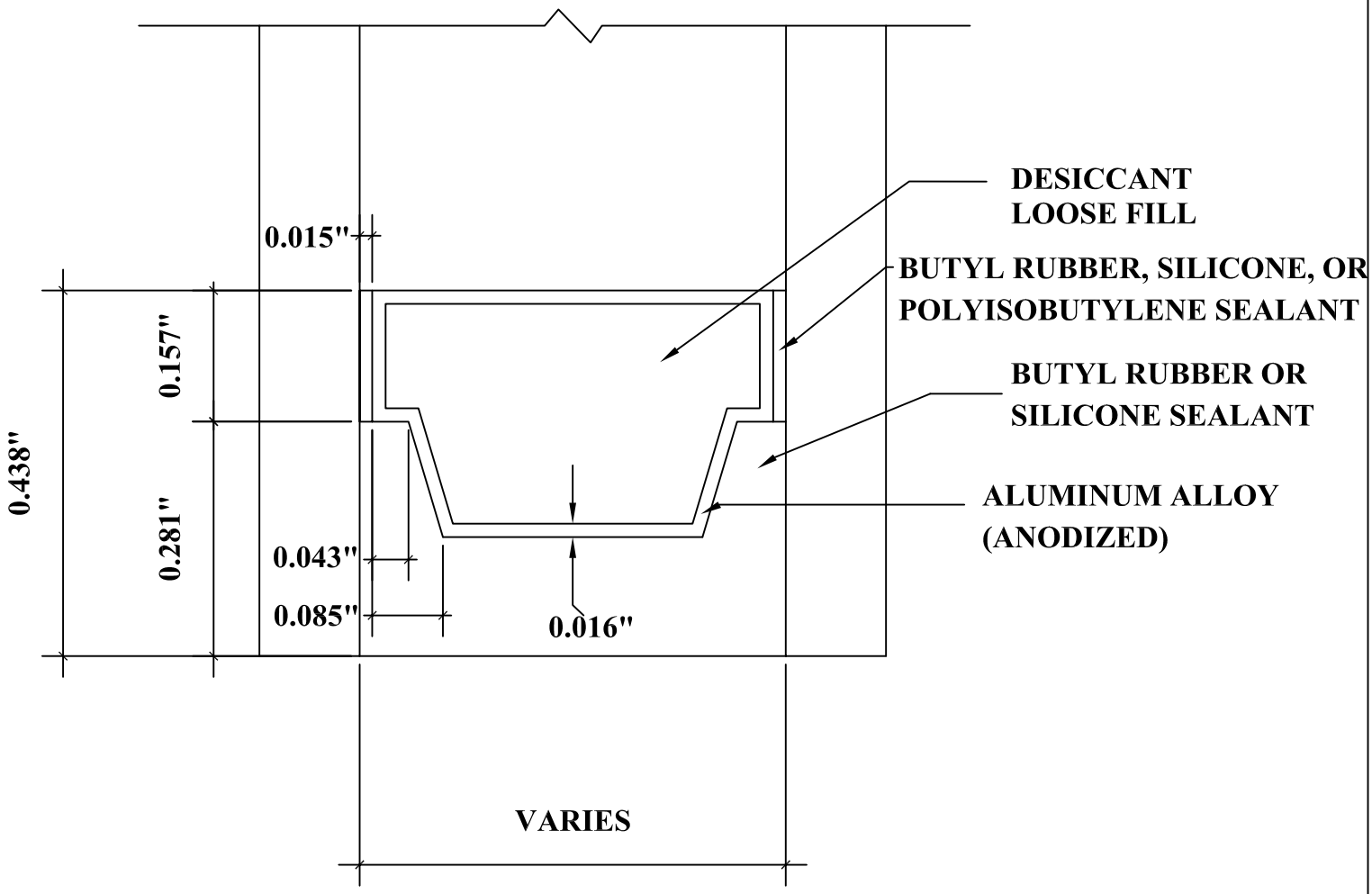
Material: Extruded Aluminum

3 GLAZING BEAD EXTRUSION C48.0607M
WITH RUBBER GASKET FRK36, FRK65 OR FRK67
FOR 30-32 MM INFILL
SCALE: 1'-0" = 1'-0"



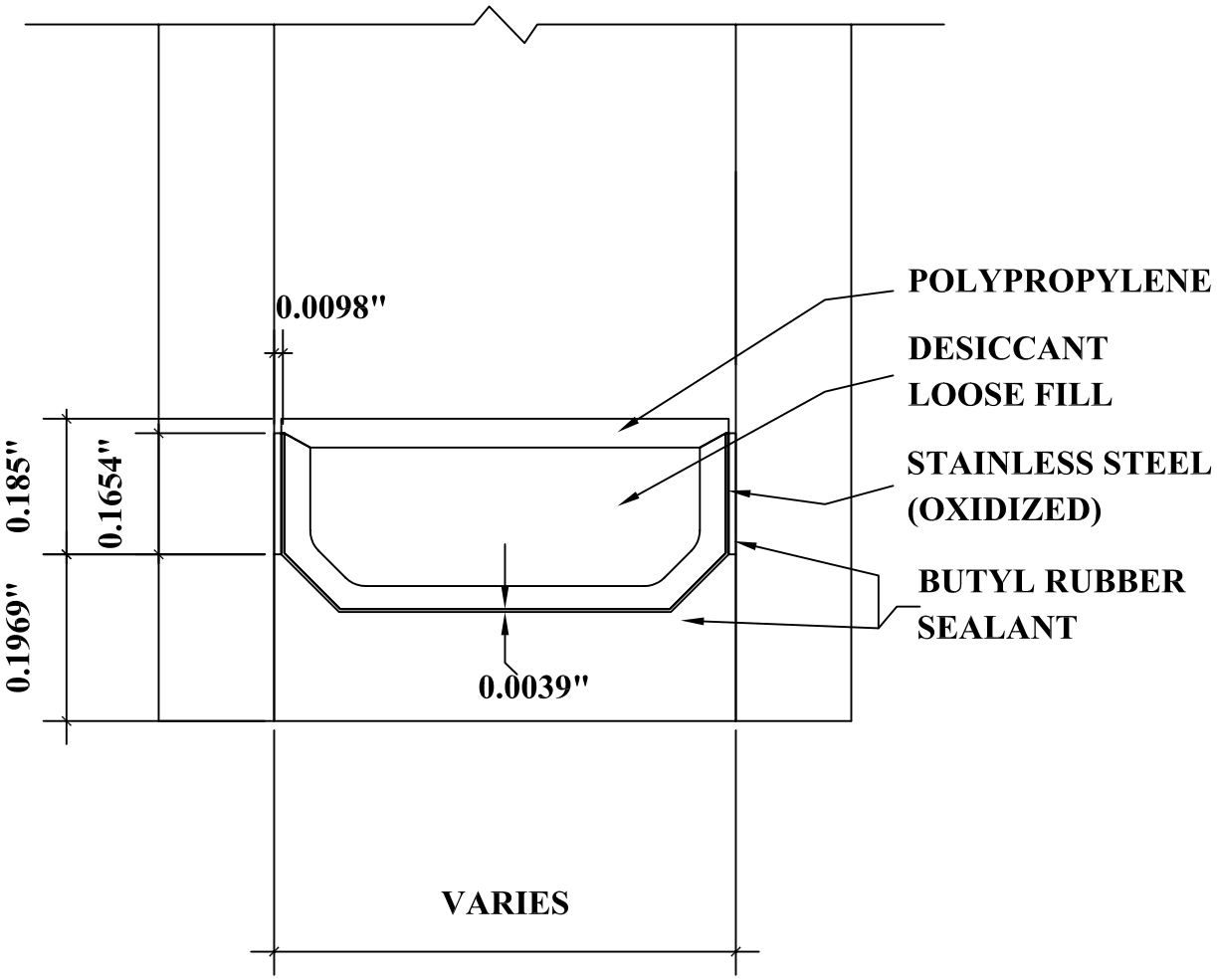
Material: Extruded Aluminum

4 GLAZING BEAD EXTRUSION C48.0608M
WITH RUBBER GASKET FRK36, FRK65 OR FRK67
FOR 25-28 MM INFILL
SCALE: 1'-0" = 1'-0"



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

Report #:	H0033-116-45
Date:	2/28/2018
Verified by:	



DETAIL FOR THERMAL MODELING OF
ENSINGER THERMIX TX.N SPACER (TS-D)

intertek
Total Quality. Assured.

Report #:	H0033-116-45
Date:	2/28/2018
Verified by:	