

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

**Rendered to:
ALUMINTECHNO, JLLC**

**SERIES/MODEL:
W62 Casement**

**Report Number: I5154.02-116-45
Report Date: 10/25/18**



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

Rendered to:
ALUMINTECHNO, JLLC
12 Selitskogo Street
Minsk, Belarus 220075

Report Number: I5154.02-116-45
Simulation Date: 06/11/18
Report Date: 10/25/18

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 63.0

Simulations Specimen Description:

Series/Model: W62 Casement
Type: Casement, Single Vent
Frame Material: AT Aluminum w/ Thermal Breaks - All Members
Sash Material: AT Aluminum w/ Thermal Breaks - All Members
Standard Size: 600mm x 1500mm



Modeling Assumptions/Technical Interpretations:

- 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 100-2017, Section 4.2.1.L. The painted finish was simulated since it is the worst case (highest emissivity). The test sample was painted aluminum.

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	0.021123	0.022928	0.024626
SHGC1	0.512568	0.459577	0.409706
VT0	0.000000	0.000000	0.000000
VT1	0.491445	0.436650	0.385080

$$SHGC = SHGC0 + SHGCc (SHGC1 - SHGC0)$$

$$VT = VT0 + VTc (VT1 - VT0)$$

Validation Matrix:

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

<i>Product Line</i>	<i>Report Number</i>
W62 Casement	I5154.02-116-45
W62 Tilt & Turn	I5156.03-116-45

Spacer Option Description

<i>Spacer Type</i>	<i>Sealant</i>		<i>Code</i>
	<i>Primary</i>	<i>Secondary</i>	
Ensinger Thermix TX.N Spacer	Butyl Rubber	Butyl Rubber	TS-D

Grid Option Description

<i>Grid Size</i>	<i>Grid Type</i>	<i>Grid Pattern</i>
None	-	-

Reinforcement Option Description

<i>Location</i>	<i>Material</i>
None	-

Gas Filling Technique Description

<i>Fill Type</i>	<i>Method</i>
97% Argon	Evacuated Chamber

Edge-of-Glass Construction

<i>Interior Condition</i>	EPDM gasket between aluminum glazing bead and glass
<i>Exterior Condition</i>	EPDM gasket between aluminum sash and glass

Weatherstripping

<i>Type</i>	<i>Quantity</i>	<i>Location</i>
EPDM Gasket	1 Row	Sash Perimeter
EPDM Sweep Gasket	1 Row	Frame Perimeter

Frame/Sash Materials Finish

<i>Interior</i>	Painted Aluminum
<i>Exterior</i>	Painted Aluminum

NFRC 100/200/500 Summary Sheet W62 Casement

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) <small>Grids (None / <1 / >=1)</small>				Visible Transmittance (VT) <small>Grids (None / <1 / >=1)</small>			Condensation Resistance	
1	SB60 / AIR / CLR (6MM/6MM) - 25MM IG											
	0.223	0.500	0.223					AIR	0.035(#2)	CL	TS-D	N
	U-Factor 0.44			SHGC (N) 0.21				VT (N) 0.35			CR 54	
2	SB60 / ARG90 / CLR (6MM/6MM) - 25MM IG											
	0.223	0.500	0.223					ARG90	0.035(#2)	CL	TS-D	N
	U-Factor 0.42			SHGC (N) 0.21				VT (N) 0.35			CR 55	
3	SB67 / ARG90 / CLR (6MM/6MM) - 25MM IG											
	0.223	0.500	0.223					ARG90	0.035(#2)	CL	TS-D	N
	U-Factor 0.42			SHGC (N) 0.16				VT (N) 0.26			CR 55	
4	SB70 / ARG90 / CLR (6MM/6MM) - 25MM IG											
	0.223	0.500	0.223					ARG90	0.018(#2)	CL	TS-D	N
	U-Factor 0.42			SHGC (N) 0.15				VT (N) 0.31			CR 55	
5	SN 70/35 / ARG97 / CLR (6MM/6MM) - 28MM IG											
	0.230	0.625	0.221					ARG97	0.025(#2)	CL	TS-D	N
	U-Factor 0.41			SHGC (N) 0.18				VT (N) 0.34			CR 54	
6	SN 70/35 HT / ARG97 / CLR (6MM/6MM) - 28MM IG											
	0.230	0.625	0.221					ARG97	0.022(#2)	CL	TS-D	N
	U-Factor 0.41			SHGC (N) 0.19				VT (N) 0.34			CR 54	
7	SN 70/41 / AIR / CLR (6MM/6MM) - 28MM IG											
	0.230	0.625	0.221					AIR	0.037(#2)	CL	TS-D	N
	U-Factor 0.44			SHGC (N) 0.21				VT (N) 0.34			CR 54	
8	SN 70/41 / ARG97 / CLR (6MM/6MM) - 28MM IG											
	0.230	0.625	0.221					ARG97	0.037(#2)	CL	TS-D	N
	U-Factor 0.42			SHGC (N) 0.21				VT (N) 0.34			CR 54	
9	SNX 60 HT / ARG97 / CLR (6MM/6MM) - 28MM IG											
	0.230	0.625	0.221					ARG97	0.026(#2)	CL	TS-D	N
	U-Factor 0.41			SHGC (N) 0.15				VT (N) 0.30			CR 54	
10	RLE 70/36 / ARG97 / CLR (6MM/6MM) - 28MM IG											
	0.221	0.625	0.230					ARG97	0.036(#2)	CL	TS-D	N
	U-Factor 0.42			SHGC (N) 0.21				VT (N) 0.34			CR 54	

NFRC 100/200/500 Summary Sheet W62 Casement

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	
11	iPlus ENERGY N / AIR / CLR (6MM/6MM) - 28MM IG											
	0.230	0.625	0.230					AIR	0.033(#2)	CL	TS-D	N
	U-Factor 0.44			SHGC (N) 0.21				VT (N) 0.35			CR 54	
12	iPlus ENERGY N / ARG97 / CLR (6MM/6MM) - 28MM IG											
	0.230	0.625	0.230					ARG97	0.033(#2)	CL	TS-D	N
	U-Factor 0.42			SHGC (N) 0.21				VT (N) 0.35			CR 54	
13	SUNCOOL 70/35 PRO T / ARG97 / CLR (6MM/6MM) - 30MM IG											
	0.230	0.750	0.230					ARG97	0.021(#2)	CL	TS-D	N
	U-Factor 0.41			SHGC (N) 0.20				VT (N) 0.34			CR 54	
14	iPlus ADVANCED 1.0 / ARG97 / TOP N+T (6MM/8MM) - 30MM IG											
	0.230	0.625	0.309					ARG97	0.022(#2) / 0.04(#3)	CL	TS-D	N
	U-Factor 0.41			SHGC (N) 0.25				VT (N) 0.36			CR 54	
15	iPlus ENERGY N / AIR / STRATOBEL 44.1 (6MM/6MM) - 31MM IG											
	0.230	0.625	0.318					AIR	0.033(#2)	CL	TS-D	N
	U-Factor 0.44			SHGC (N) 0.21				VT (N) 0.35			CR 54	
16	iPlus ENERGY N / ARG97 / STRATOBEL 44.1 (6MM/6MM) - 31MM IG											
	0.230	0.625	0.318					ARG97	0.033(#2)	CL	TS-D	N
	U-Factor 0.41			SHGC (N) 0.20				VT (N) 0.35			CR 54	
17	TOP N+T / ARG97 / TOP N+T (10MM/6MM) - 32MM IG											
	0.388	0.625	0.230					ARG97	0.04(#2) / 0.04(#3)	CL	TS-D	N
	U-Factor 0.41			SHGC (N) 0.26				VT (N) 0.37			CR 53	
18	SUNCOOL 70/35 PRO T / ARG97 / STRATOBEL 44.1 (6MM/8MM) - 35MM IG											
	0.230	0.750	0.318					ARG97	0.021(#2)	CL	TS-D	N
	U-Factor 0.41			SHGC (N) 0.19				VT (N) 0.34			CR 54	
19	SN 70/35 / ARG97 / SN 70/35 / ARG97 / CLR (6MM/6MM/6MM) - 48MM IG											
	0.230	0.500	0.230	0.625	0.221			ARG97	0.025(#2) / 0.025(#4)	CL	TS-D	N
	U-Factor 0.34			SHGC (N) 0.14				VT (N) 0.26			CR 52	
20	RLE 70/36 / ARG97 / CLR / ARG97 / iPlus ADVANCED 1.0 (6MM/4MM/6MM) - 50MM IG											
	0.221	0.625	0.152	0.750	0.230			ARG97	0.036(#2) / 0.022(#5)	CL	TS-D	N
	U-Factor 0.34			SHGC (N) 0.18				VT (N) 0.29			CR 52	

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.

This report is reissued in the name of AluminTechno, JLLC through written authorization of Avrams Inc., to whom the original report was rendered. The original Avrams Inc. report number is I5154.01-116-45.

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 June 11, 2023.

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:

REVIEWED BY:

Megan M. Yingst
Simulation Technician

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

MMY:mmy
I5154.02-116-45

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A: Drawings and Bills of Material (7)


Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
.01R0	06/11/18	All	Original Report Issued to Avrams Inc.
.02R0	10/25/18	All	Report reissued to AluminTechno, JLLC

All drawings and Bills of Material used to simulate this product are enclosed in this Appendix
Some drawings may be omitted at the extruder's request.

PROJECT NAME:

47 1/4" X 59 1/16"
SOUND TEST

PREPARED BY:


PROJECT ADDRESS:
130 DERRY CT YORK, PA 17406

DATE	REVISION	#

APPROVED
 CLIENT'S SIGNATURE _____
 DATE ____/____/____

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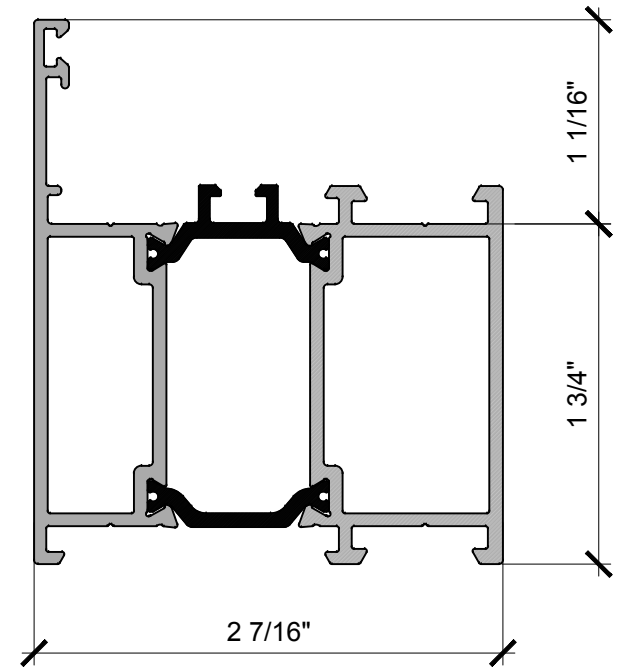
DRAWING TITLE:
INDIVIDUAL FRAME AND SASH COMPONENTS SECTIONS

REVIEWED BY PROJECT MANAGER
 BY: _____ DATE: _____
 NOTE: _____

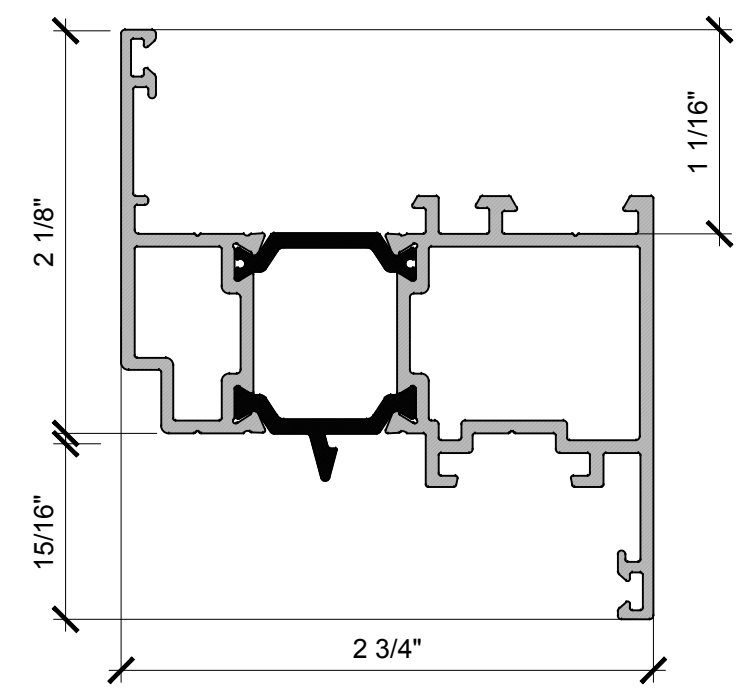
DIMENSIONS FIELD VERIFIED
 BY: _____ DATE: _____
 NOTE: _____

DATE: 06.07.2018
 DRAWN BY: EG
 CHECKED BY: VP; AA

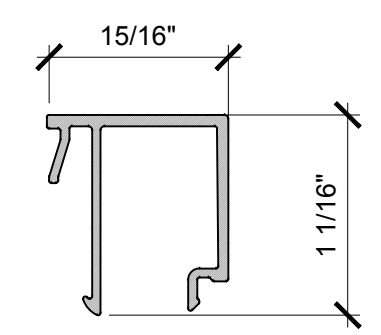
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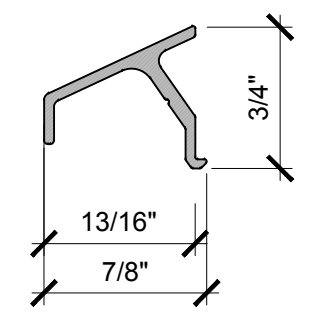
Material: Extruded Aluminum with Thermal Break
1 HEAD, SILL, SIDE JAMBS MOLDING EXTRUSION W62.0103E
 SCALE: 1'-0" = 1'-0"



Material: Extruded Aluminum with Thermal Break
2 SASH MOLDING EXTRUSION W62.0222E
 SCALE: 1'-0" = 1'-0"



Material: Extruded Aluminum
3 GLAZING BEAD EXTRUSION C48.0606
 SCALE: 1'-0" = 1'-0"



Material: Extruded Aluminum
4 WATER DEFLECTOR EXTRUSION C48.0611
 SCALE: 1'-0" = 1'-0"

PROJECT NAME:

47 1/4" X 59 1/16"
SOUND TEST

PREPARED BY:

CAD
S H O P S

PROJECT ADDRESS:

130 DERRY CT YORK, PA 17406

DATE	REVISION	#

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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: _____

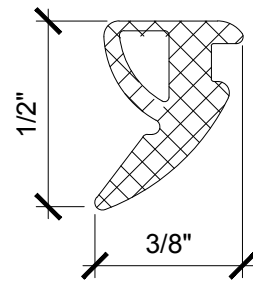
DATE: 06.07.2018

DRAWN BY: EG

CHECKED BY: VP; AA

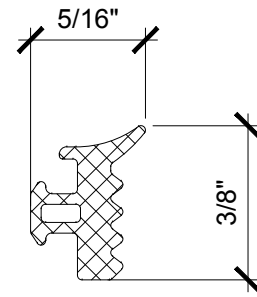
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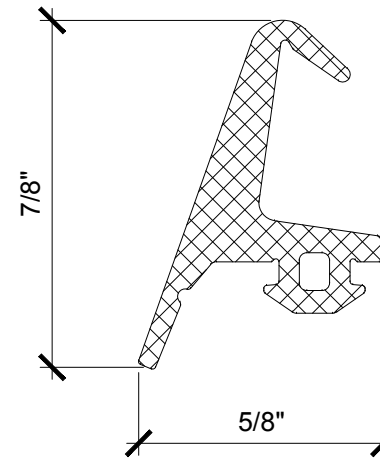
Material: Rubber

5 INTERIOR GASKET FRK36
SCALE: 2'-0" = 1'-0"



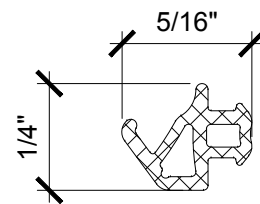
Material: Rubber

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



Material: Rubber

7 FRAME GASKET FRK51
SCALE: 2'-0" = 1'-0"



Material: Rubber

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

PROJECT NAME:

47 1/4" X 59 1/16"
SOUND TEST

PREPARED BY:



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DRAWING TITLE:

INSTALLATION DETAILS

REVIEWED BY PROJECT MANAGER

BY: _____ DATE: _____
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DIMENSIONS FIELD VERIFIED

BY: _____ DATE: _____
NOTE: _____

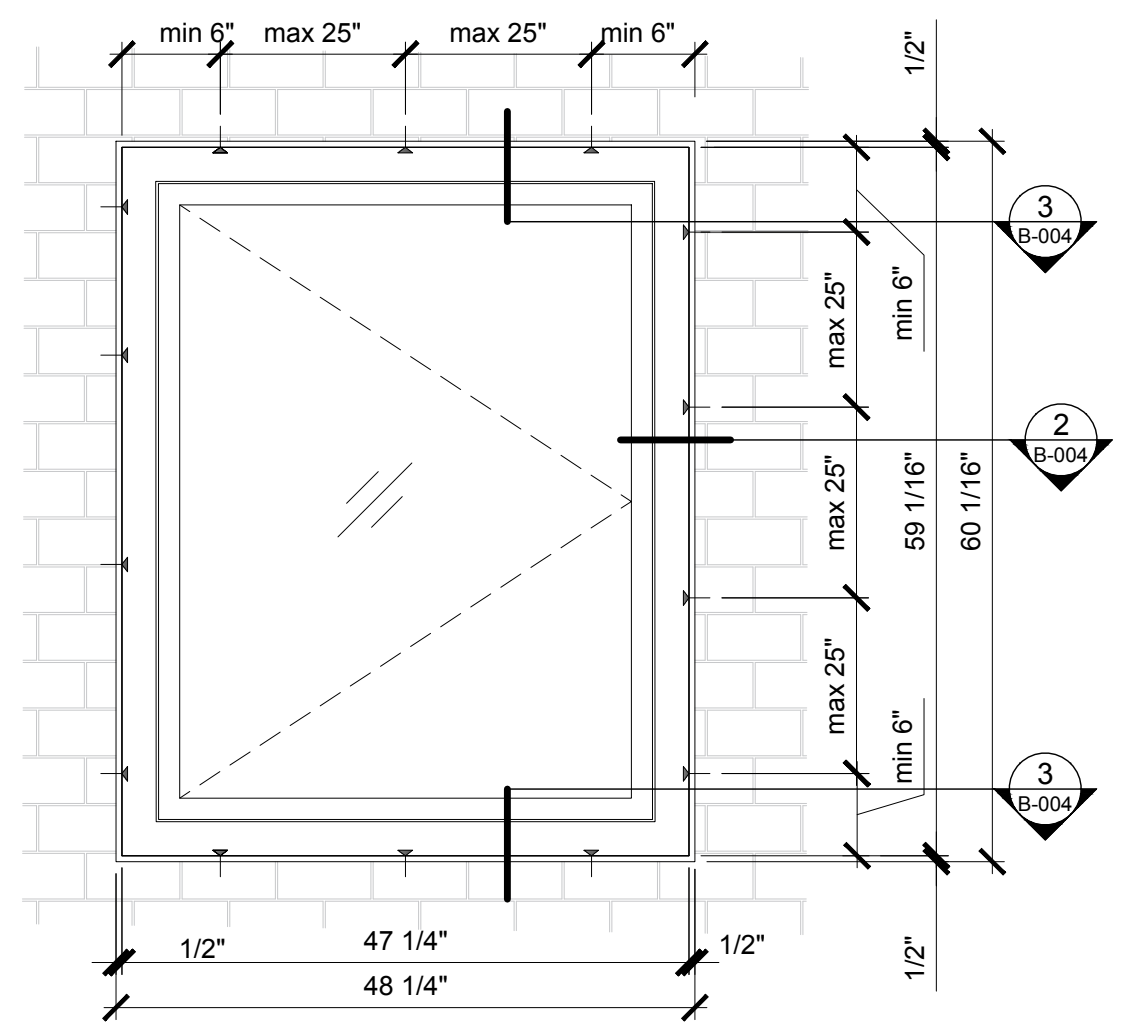
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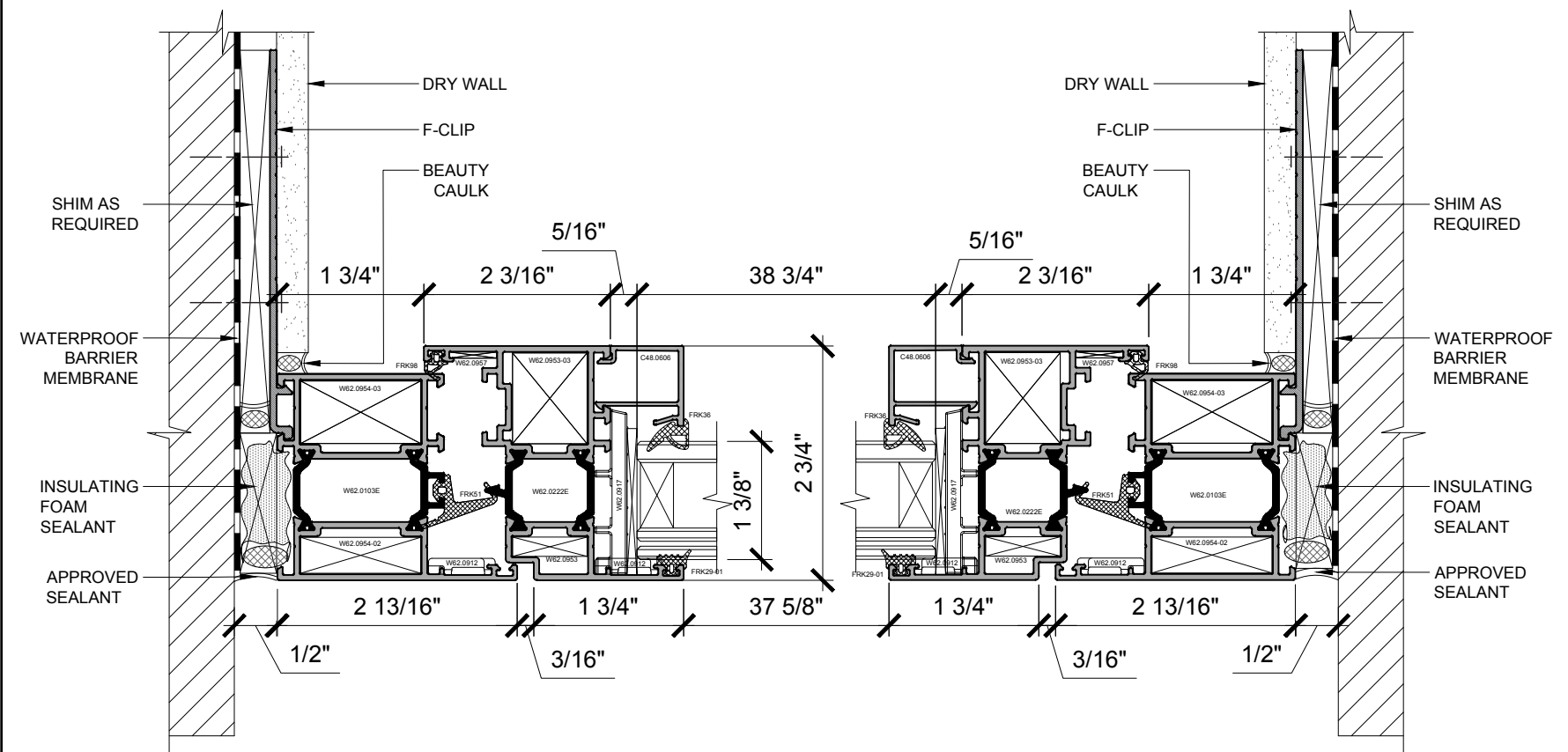
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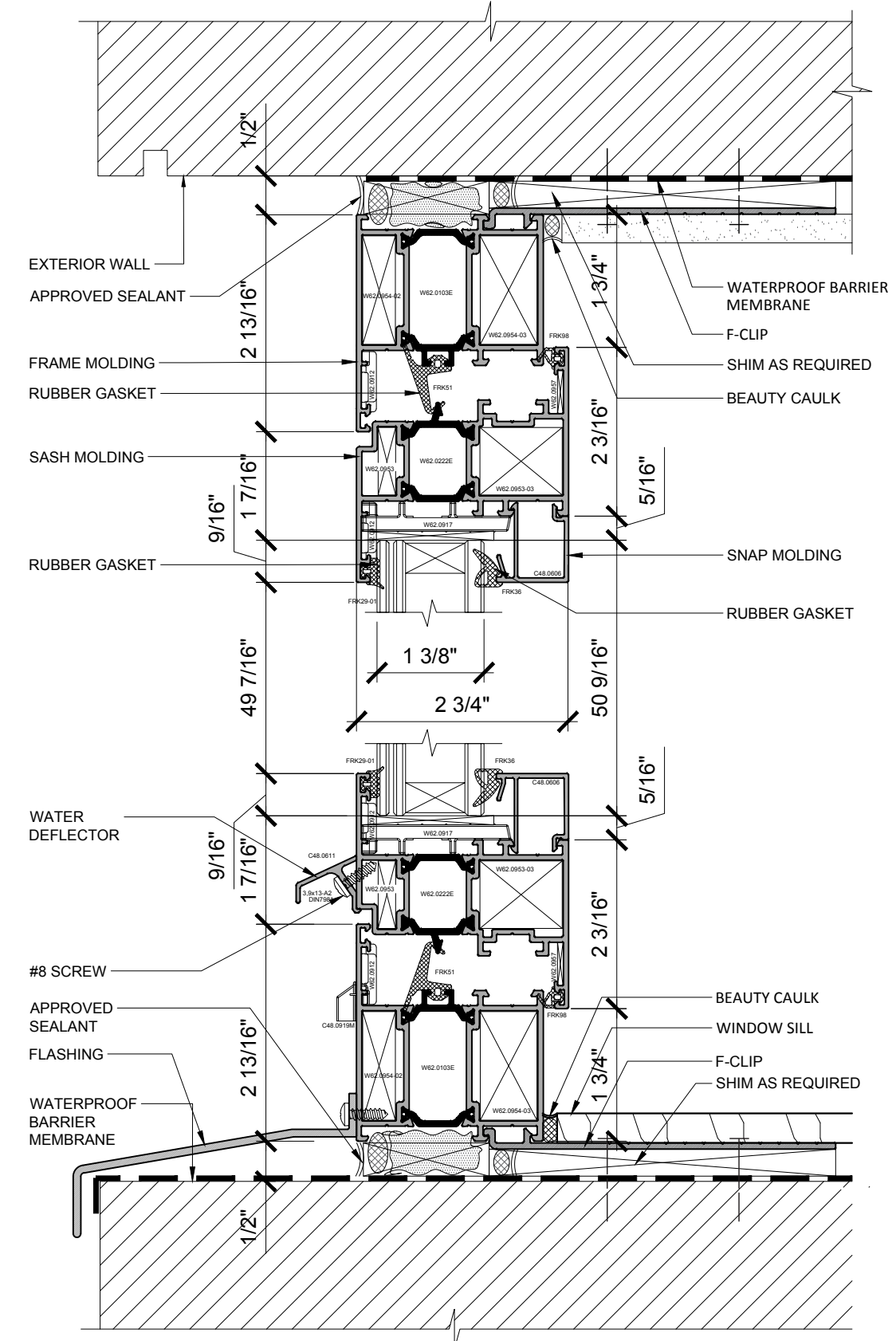


1 SCHEME OF F-CLIPS LOCATION
SCALE: 3/4" = 1'-0"

SYMBOL LEGEND:
◀ - ANCHORING POINT




2 SECTION #1
SCALE: 6" = 1'-0"



3 SECTION #2
SCALE: 6" = 1'-0"

PROJECT NAME:

47 1/4" X 59 1/16"
SOUND TEST

PREPARED BY:


PROJECT ADDRESS:
130 DERRY CT YORK, PA 17406

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DRAWING TITLE:

HARDWARE DETAILS

REVIEWED BY PROJECT MANAGER
 BY: _____ DATE: _____
 NOTE: _____

DIMENSIONS FIELD VERIFIED
 BY: _____ DATE: _____
 NOTE: _____

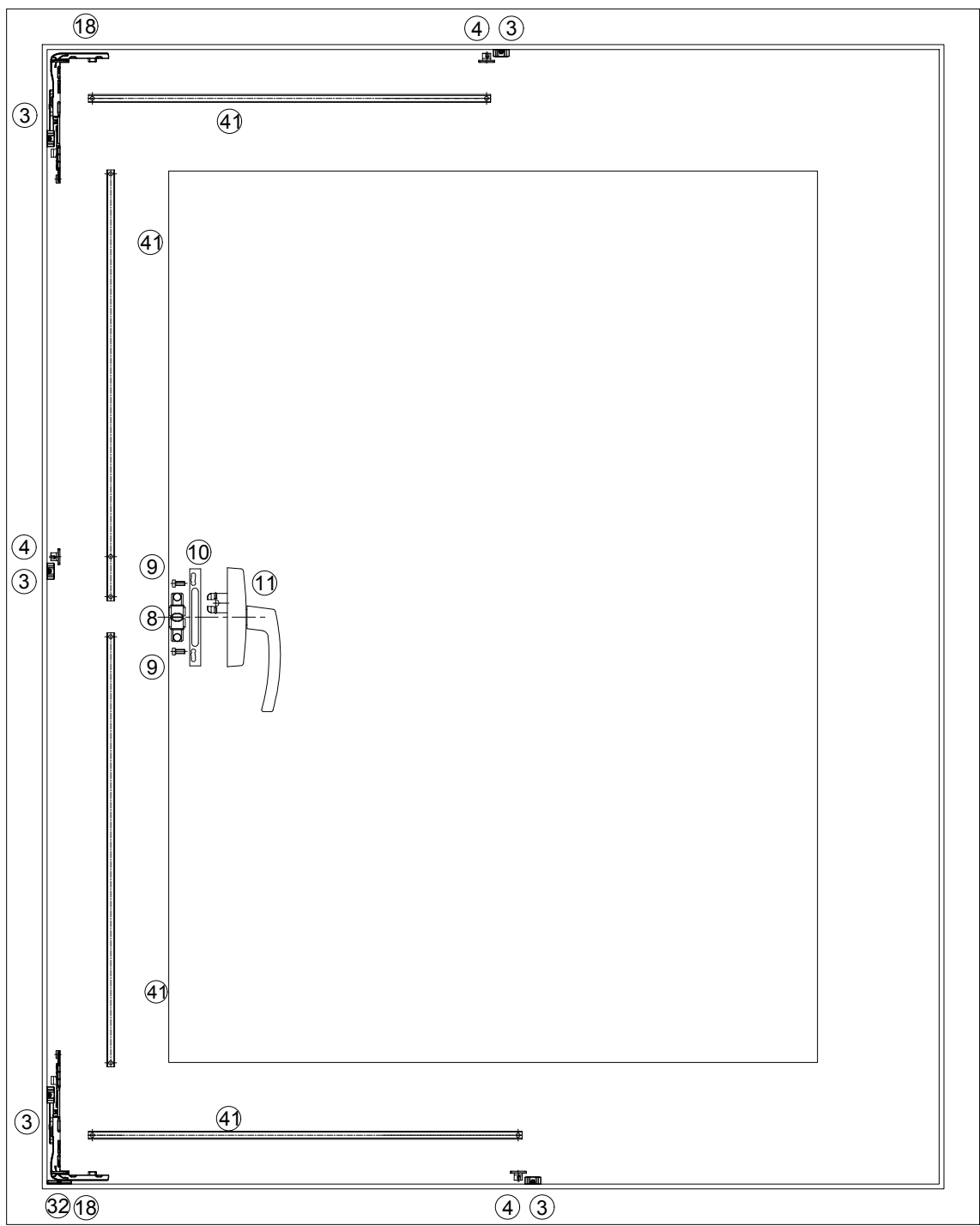
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DRAWN BY: EG

CHECKED BY: VP; AA

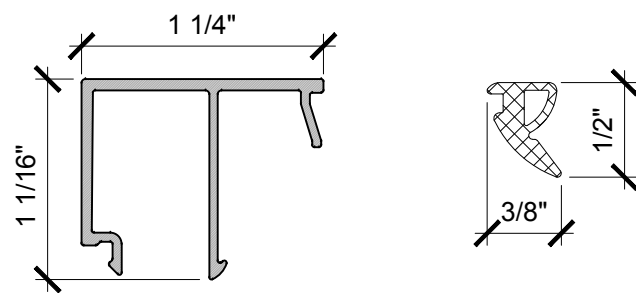
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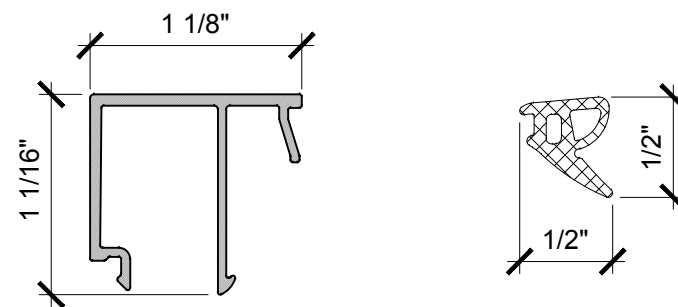


- ③ ④ ⑬ ⑳ locking elements kit - art. 728743
- ③ strike plate - art. 728918
- ④ locking element, snap in - art. 334671
- ⑥ T-receptor - art. 334574
- ⑦ ⑧ handle bearing - art. 331937
- ⑨ handle ROTO LINE - art. 377400
- ⑰a ⑰b hinge - art. 624200
- ④① rod profile - art. AYPC.W62.0607
- ② handle 180 degrees turn locking - art. 212008

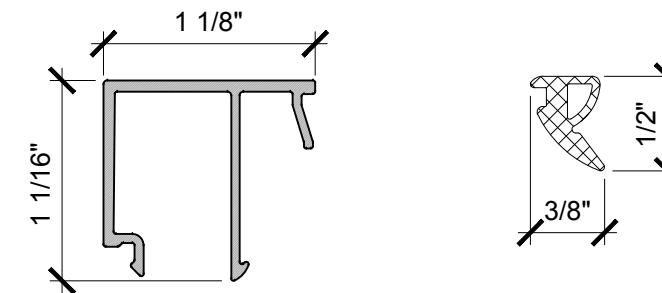
1 HARDWARE DIAGRAM
 SCALE: 1" = 1'-0"



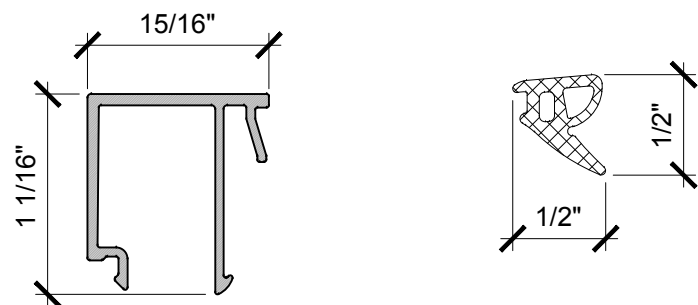
1 Material: Extruded Aluminum, Rubber
 GLAZING BEAD EXTRUSION C48.0608
 AND INTERIOR GASKET FRK36 FOR
 26 MM INFILL
 SCALE: 1'-0" = 1'-0"



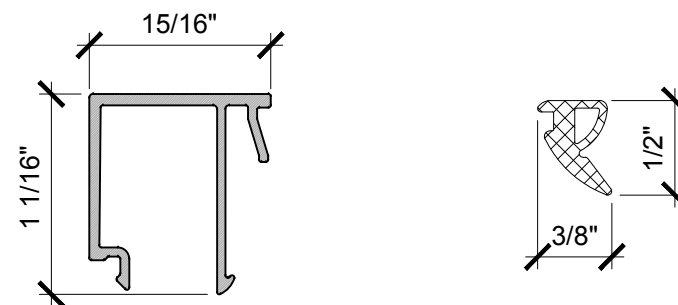
2 Material: Extruded Aluminum, Rubber
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 AND INTERIOR GASKET FRK67 FOR
 28 MM INFILL
 SCALE: 1'-0" = 1'-0"



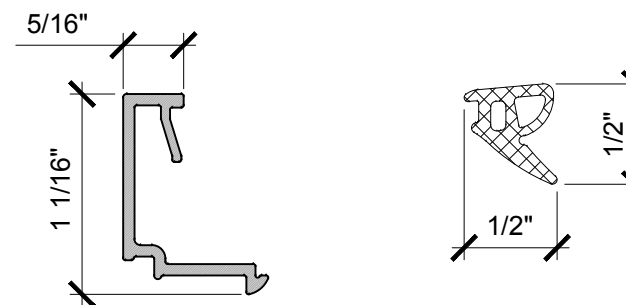
3 Material: Extruded Aluminum, Rubber
 GLAZING BEAD EXTRUSION C48.0607
 AND INTERIOR GASKET FRK36 FOR
 30 - 31 MM INFILL
 SCALE: 1'-0" = 1'-0"



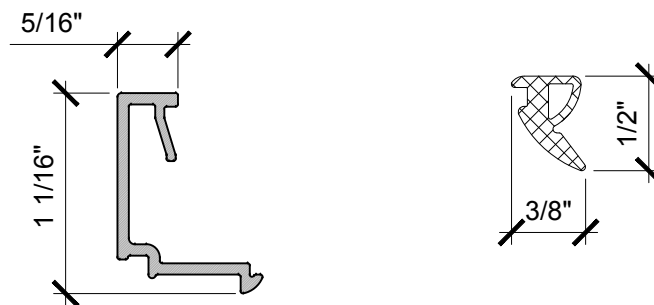
4 Material: Extruded Aluminum, Rubber
 GLAZING BEAD EXTRUSION C48.0606
 AND INTERIOR GASKET FRK67 FOR
 32 - 33 MM INFILL
 SCALE: 1'-0" = 1'-0"



5 Material: Extruded Aluminum, Rubber
 GLAZING BEAD EXTRUSION C48.0606
 AND INTERIOR GASKET FRK36 FOR
 34 - 35 MM INFILL
 SCALE: 1'-0" = 1'-0"



6 Material: Extruded Aluminum, Rubber
 GLAZING BEAD EXTRUSION C48.0602
 AND INTERIOR GASKET FRK67 FOR
 48 MM INFILL
 SCALE: 1'-0" = 1'-0"



7 Material: Extruded Aluminum, Rubber
 GLAZING BEAD EXTRUSION C48.0602
 AND INTERIOR GASKET FRK36 FOR
 50 MM INFILL
 SCALE: 1'-0" = 1'-0"

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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: **06.07.2018**

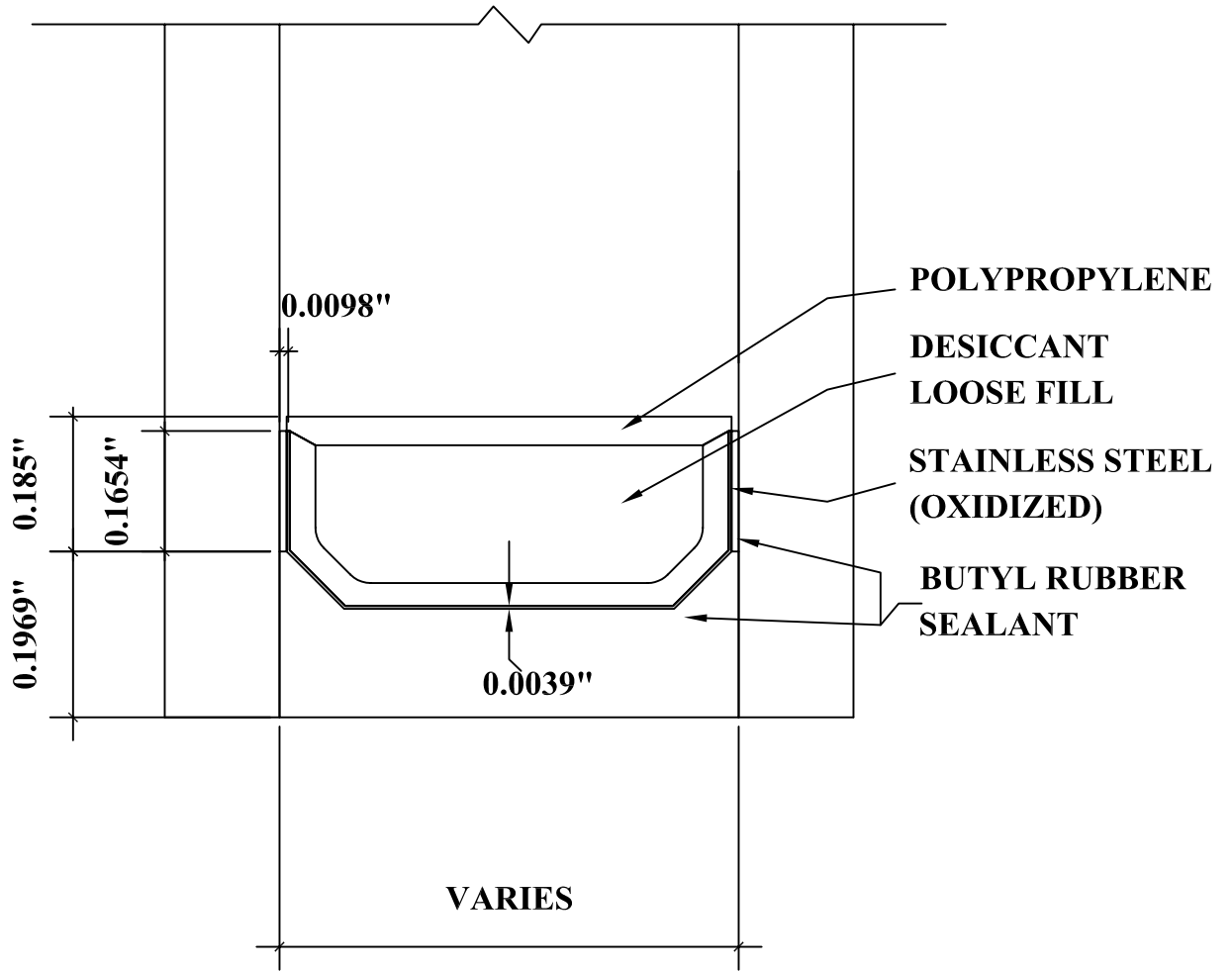
DRAWN BY: **EG**

CHECKED BY: **VP; AA**

DRAWING No: _____ SIZE: **B**

B-006.00

intertek Report #: I5154-116-45
 Total Quality Assured. Date: 06/15/18
 Verified by: Allison M. Ford



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