

HANSEN POLSKA SP. Z O.O. THERMAL PERFORMANCE TEST REPORT

SCOPE OF WORK

HANSEN MILLENNIUM DUAL ACTION

REPORT NUMBER

S1261.01-116-46 R0

TEST DATE

04/15/25

ISSUE DATE

05/01/25

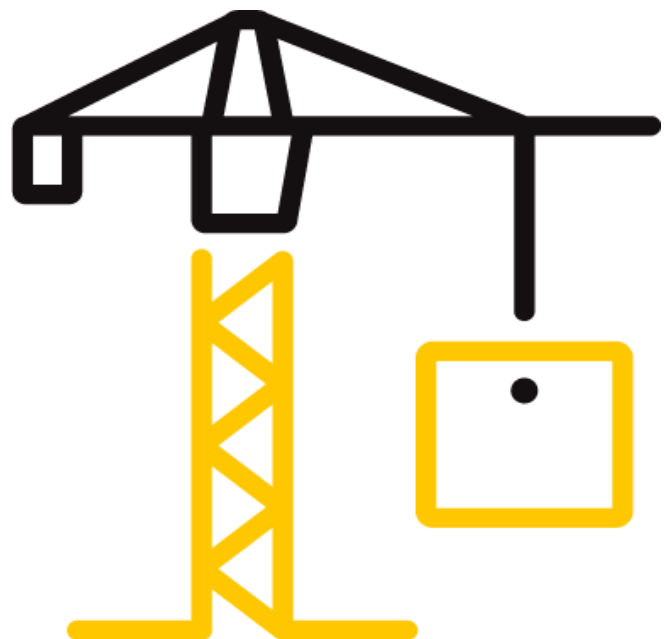
PAGES

25

DOCUMENT CONTROL NUMBER

RTTDS-R-AMER-Test-8197(a) (02/04/25)

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TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

Date: 05/01/25

REPORT ISSUED TO

HANSEN POLSKA SP. Z O.O.

Lotniskowa 17 Street

Glogow Malopolski, 36-060 (Poland)

SECTION 1

SCOPE

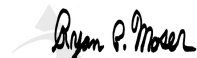
SERIES/MODEL: Hansen Millennium Dual Action

TYPE: Dual Action (Tilt Turn)

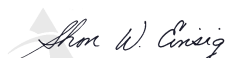
Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted by Hansen Polska Sp. Z o.o. to evaluate the thermal performance per NFRC 102-2023. Results obtained are tested values and were secured by using the designated test method. Testing was conducted at Intertek B&C test facility in York, Pennsylvania.

Intertek B&C will service this report for the entire test record retention period. The test record retention period ends five years after the test date. Test records, such as detailed drawings, datasheets, or other pertinent project documentation, will be retained for the entire test record retention period. Representative samples of the test specimen will be retained by Intertek B&C for a minimum of two and a half years from the submittal date to the Inspection Agency and no more than five years from the test date.

For INTERTEK B&C:

COMPLETED BY	Ryan P. Moser
TITLE	Technician Team Lead, IIRC
SIGNATURE	
DATE	05/01/25

RPM:pan

REVIEWED BY	Shon W. Einsig
TITLE	Project Lead, IIRC
SIGNATURE	
DATE	05/01/25

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TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

Date: 05/01/25

SECTION 2

SUMMARY OF TEST RESULTS

Standardized U-factor (Ust):

0.18 Btu/hr·ft²·F (CTS Method)

SECTION 3

TEST SPECIMEN SUMMARY

SERIES/MODEL	Hansen Millennium Dual Action
TYPE	Dual Action (Tilt Turn)
OVERALL SIZE	47-1/4" x 59" (1200 mm x 1499 mm) (Model Size)
NFRC STANDARD SIZE	47.2" x 59.1" (1200 mm wide x 1500 mm high)
TEST SAMPLE SUBMITTED BY	Client
TEST SAMPLE SUBMITTED FOR	Validation for Initial Certification (Production Line Unit) & Plant Qualification

SECTION 4

TEST METHOD

The specimens were evaluated in accordance with the following:

NFRC 102-2023, Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems

SECTION 5

MATERIAL SOURCE/INSTALLATION

The test specimen was provided by the client.

The test sample was installed in a vertical orientation, the exterior of the specimen was exposed to the cold side.

SECTION 6

LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Shon W. Einsig	Intertek B&C
Ryan P. Moser	Intertek B&C

TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

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SECTION 7

TEST SAMPLE DESCRIPTION

FRAME

MATERIAL	AT (1.31"): Aluminum w/ Polyamide Thermal Breaks		
SIZE	47-1/4" x 59" (Model Size)		
DAYLIGHT OPENING	N/A	GLAZING METHOD	N/A
EXTERIOR COLOR	Gray	EXTERIOR FINISH	Paint
INTERIOR COLOR	Gray	INTERIOR FINISH	Paint
CORNER JOINERY	Mitered / Screws / Unsealed		

VENT

MATERIAL	AT (1.52"): Aluminum w/ EPDM Thermal Breaks		
SIZE	46-5/8" x 58-1/2"		
DAYLIGHT OPENING	43-1/4" x 55-1/8"	GLAZING METHOD	Exterior
EXTERIOR COLOR	Clear	EXTERIOR FINISH	Glass
INTERIOR COLOR	Gray	INTERIOR FINISH	Paint
CORNER JOINERY	Mitered / Keys / Unsealed		

GLAZING INFORMATION

LAYER 1	1/4"	Guardian ClimaGuard 1.0+ T (e=0.027*, #2)	
GAP 1	0.78"	TS-D: Rolltech Chromatech Ultra Spacer	90% Argon*
LAYER 2	1/4"	Clear	
GAP 2	0.78"	TS-D: Rolltech Chromatech Ultra Spacer	90% Argon*
LAYER 3	1/4"	Guardian ClimaGuard 1.0+ T (e=0.027*, #5)	
GAS FILL METHOD	Single-Probe Method*		

**Stated per the client/manufacture and can affect the validity of results*

N/A Non-Applicable

TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

Date: 05/01/25

SECTION 7 (CONTINUED)

TEST SAMPLE DESCRIPTION (CONTINUED)

WEATHERSTRIPPING

DESCRIPTION	QUANTITY	LOCATION
Single-fin gasket	1 Row	Frame perimeter
Single-fin gasket	1 Row	Frame perimeter
Single-fin gasket	1 Row	Vent perimeter
Vent gasket	1 Row	Vent perimeter

HARDWARE

DESCRIPTION	QUANTITY	LOCATION
Multi-point lock assembly	1	Lock stile
Metal keeper	9	Three per hinge jamb, two per head, sill and lock jamb
Multi-arm hinge	2	Head/top rail, sill/bottom rail
Single-arm hinge	1	Head/top rail, sill/bottom rail
Metal pivot rod	1	Sill/hinge stile

DRAINAGE

DRAINAGE METHOD	SIZE	QUANTITY	LOCATION
Weepslot	1.25" x 0.38"	3	Sill

TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

Date: 05/01/25

SECTION 8

THERMAL TRANSMITTANCE (U-FACTOR): MEASURED TEST DATA

HEAT FLOWS

1. Total Measured Input into Metering Box (Qtotal)	299.40 Btu/hr
2. Surround Panel Heat Flow (Qsp)	40.28 Btu/hr
3. Surround Panel Thickness	5.00 inches
4. Surround Panel Conductance	0.0362 Btu/hr·ft ² ·F
5. Metering Box Wall Heat Flow (Qmb)	-0.36 Btu/hr
6. EMF vs Heat Flow Equation (equivalent information)	0.0119*EMF + -0.037
7. Flanking Loss Heat Flow (Qfl)	9.44 Btu/hr
8. Net Specimen Heat Loss (Qs)	250.04 Btu/hr

AREAS

1. Test Specimen Projected Area (As)	19.36 ft ²
2. Test Specimen Projected Frame Area (Af)	2.80 ft ²
3. Test Specimen Projected Glazing Area (Ag)	16.56 ft ²
4. Metering Box Opening Area (Amb)	36.11 ft ²
5. Metering Box Baffle Area (Ab1)	33.94 ft ²
6. Surround Panel Interior Exposed Area (Asp)	16.75 ft ²

TEST CONDITIONS

1. Average Metering Room Air Temperature (th)	69.88 F
2. Average Cold Side Air Temperature (tc)	-0.28 F
3. Average Guard/Environmental Air Temperature	71.27 F
4. Metering Room Average Relative Humidity	7.02 %
5. Metering Room Maximum Relative Humidity	7.56 %
6. Metering Room Minimum Relative Humidity	6.67 %
7. Measured Cold Side Wind Velocity (Perpendicular Flow)	12.66 mph
8. Measured Warm Side Wind Velocity (Parallel Flow)	0.04 mph
9. Measured Static Pressure Difference Across Test Specimen	0.00" ± 0.04" H ₂ O

AVERAGE SURFACE TEMPERATURES

1. Metering Room Surround Panel	66.34 F
2. Cold Side Surround Panel	-0.01 F

RESULTS

1. Thermal Transmittance of Test Specimen (Us)	0.18 Btu/hr·ft ² ·F
2. Standardized Thermal Transmittance of Test Specimen (Ust)	0.18 Btu/hr·ft ² ·F

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Report No.: S1261.01-116-46 R0

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SECTION 9

THERMAL TRANSMITTANCE (U-FACTOR): CALCULATED TEST DATA

CTS METHOD RESULTS

1. Warm Side Surface Emittance of CTS (e1)	0.84
2. Warm Side Area-Weighted Surface Emittance of Specimen Frame (ef1)	0.90
3. Warm Side Area-Weighted Surface Emittance of Specimen Glazing (eg1)	0.84
4. Warm Side Surface Emittance of Surround Panel (esp1)	0.90
5. Warm Side Area-Weighted Surface Emittance in View of the Baffle (es1)	0.87
6. Warm Side Baffle Emittance (eb1)	0.92
7. Cold Side Baffle Emittance (eb2)	N/A
8. Equivalent Warm Side Surface Temperature (t1)	59.77 F
9. Equivalent Cold Side Surface Temperature (t2)	2.24 F
10. Warm Side Baffle Surface Temperature	68.57 F
11. Cold Side Baffle Surface Temperature	N/A F
12. Measured Warm Side Surface Conductance (hh)	1.28 Btu/hr·ft ² ·F
13. Measured Cold Side Surface Conductance (hc)	5.13 Btu/hr·ft ² ·F
14. Test Specimen Thermal Conductance (Cs)	0.22 Btu/hr·ft ² ·F
15. Convection Coefficient (Kc)	0.32 Btu/(hr·ft ² ·F ^{1.25})
16. Radiative Test Specimen Heat Flow (Qr1)	136.01 Btu/hr
17. Conductive Test Specimen Heat Flow (Qc1)	114.03 Btu/hr
18. Radiative Heat Flux of Test Specimen (qr1)	7.03 Btu/hr·ft ² ·F
19. Convective Heat Flux of Test Specimen (qc1)	5.89 Btu/hr·ft ² ·F
20. Standardized Warm Side Surface Conductance (hsth)	1.22 Btu/hr·ft ² ·F
21. Standardized Cold Side Surface Conductance (hstc)	5.28 Btu/hr·ft ² ·F
22. Standardized Thermal Transmittance (Ust)	0.18 Btu/hr·ft ² ·F

SECTION 10

TEST DURATION

1. The environmental systems were started at 06:45 hours, 04/14/25.
2. The test parameters were considered stable for two consecutive four hour test periods from 07:25 hours, 04/15/25 to 15:25 hours, 04/15/25.
3. The thermal performance test results were derived from 11:25 hours, 04/15/25 to 15:25 hours, 04/15/25.

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SECTION 11

GLAZING DEFLECTION

	VENT EXT. / INT.
EDGE GAP WIDTH	0.78" / 0.78"
ESTIMATED CENTER GAP WIDTH upon receipt of specimen in laboratory (after stabilization)	0.72" / 0.72"
CENTER GAP WIDTH at laboratory ambient conditions on day of testing	0.72" / 0.72"
CENTER GAP WIDTH at test conditions	0.59" / 0.63"

Glass collapse determined using a digital glass and air space meter

The sample was inspected for the formation of frost or condensation, which may influence the surface temperature measurements. The sample showed no evidence of condensation/frost at the conclusion of the test.

“This test method does not include procedures to determine the heat flow due to either air movement through the specimen or solar radiation effects. As a consequence, the thermal transmittance results obtained do not reflect performances which are expected from field installations due to not accounting for solar radiation, air leakage effects, and the thermal bridge effects that have the potential to occur due to the specific design and construction of the fenestration system opening. The latter can only be determined by in-situ measurements. Therefore, it is important to recognize that the thermal transmittance results obtained from this test method are for ideal laboratory conditions and should only be used for fenestration product comparisons and as input to thermal performance analyses which also include solar, air leakage and thermal bridge effects.”

Required annual calibrations for the Intertek B&C, 'thermal test chamber' (ICN 000001) in York, Pennsylvania were last conducted in May 2024 in accordance with Intertek B&C calibration procedure. A CTS Calibration verification was performed February 2025. A Metering Box Wall Transducer and Surround Panel Flanking Loss Characterization was performed November 2024.

The reported Standardized Thermal Transmittance (Ust) was determined using CTS Method, per Section 9.2(A) of NFRC 102.

TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

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SECTION 12

CTS CALIBRATION DATA

1. CTS Test Date	12/21/24
2. CTS Size	21.53 ft ²
3. CTS Glass/Core Conductance	0.41 Btu/hr·ft ² ·F
4. Warm Side Air Temperature	69.81 F
5. Cold Side Air Temperature	-0.40 F
6. Warm Side Average Surface Temperature	54.01 F
7. Cold Side Average Surface Temperature	3.65 F
8. Convection Coefficient (Kc)	0.32 Btu/(hr·ft ² ·F ^{1.25})
9. Measured Cold Side Surface Conductance (hc)	5.13 Btu/hr·ft ² ·F
10. Measured Thermal Transmittance	0.31 Btu/hr·ft ² ·F

ANSI/NCSL Z540-2-1997 type B uncertainty for this test was 2.29%.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called "Shared Risk Approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

"Ratings included in this report are for submittal to an NFRC licensed IA for certification purposes and are not meant to be used for labeling purposes. Only those options identified on a valid Certificate of Authorization (CA) are to be used for labeling purposes."

The direction of heat transfer was from the interior (warm side) to the exterior (cold side) of the specimen. The ratings were rounded in accordance to NFRC 601, NFRC Unit and Measurement Policy. The data acquisition frequency is 5 minutes.

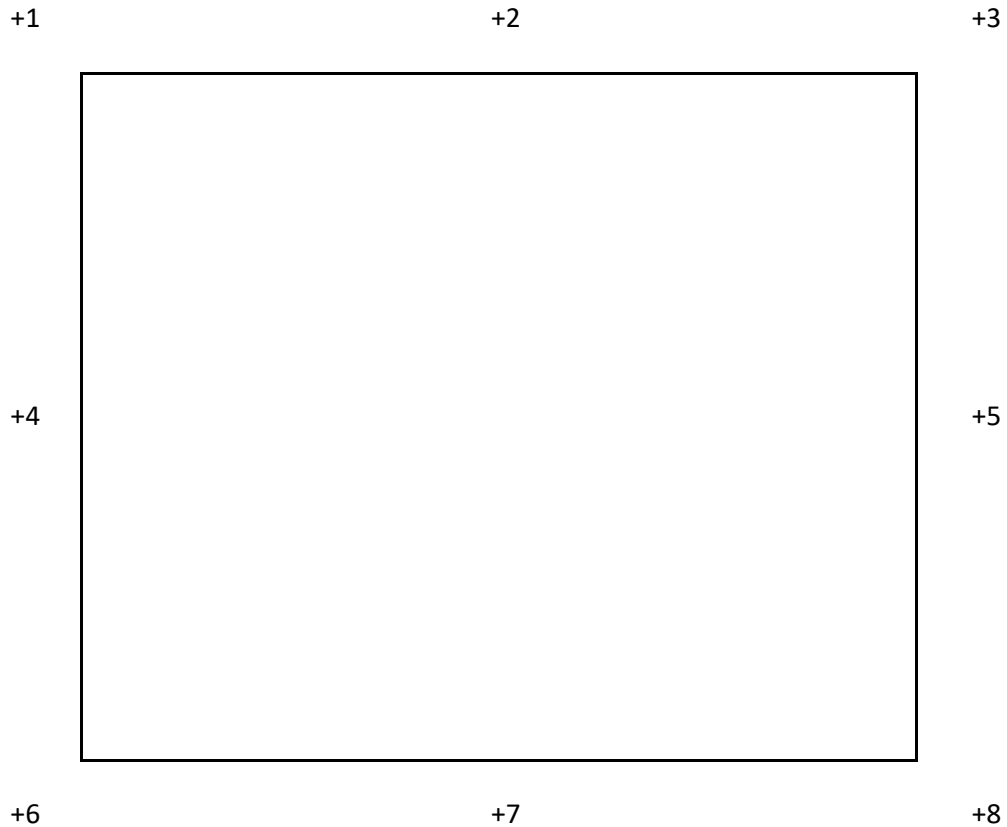
TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

Date: 05/01/25

SECTION 13

SURROUND PANEL WIRING DIAGRAM



TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

Date: 05/01/25

SECTION 14

BAFFLE WIRING DIAGRAM



TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

Date: 05/01/25

SECTION 15

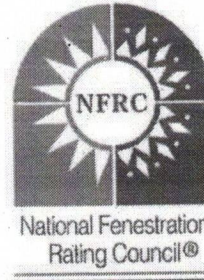
SUBMITTAL FORM AND DRAWINGS

The test specimen drawings which follow have been reviewed by Intertek B&C and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.

NFRC PRODUCT CERTIFICATION PROGRAM

Submittal Form for Test Samples

For use by Manufacturers, Lineal Suppliers and Fabricators



1. Information on Production of the Test Sample (complete ALL fields):

Manufacturer: HANSEN POLSKA Date of sample manufacture: 14.01.2025
Plant Address where manufactured: LOTNISKOWA 17 STREET
City: GLOGOW MALOPOLSKI State: POLAND Zip Code: 36-060
Name of IA: _____ Phone: +48 533 030 116 Fax: _____

2. Product Information (complete APPLICABLE fields):

Existing Product Line ID (CPD) No.: _____ Product/Operator Type (Table 4-3 of NFRC 100): DUAL ACTION
Series/Model: HANSEN MILLENNIUM DUAL ACTION

3. Test sample is being submitted for (select ONE):

- a. ☐ Validation for Initial Certification (prototype only) no plant qualification
- b. ☒ Validation for Initial Certification or Recertification (production line unit) & plant qualification
- c. ☐ Plant Qualification Only (production line unit)
- d. ☐ Test Only Alternative (production line unit) & plant qualification

I, JAROSL SCOWIK, as the designated agent for HANSEN POLSKA do hereby attest that the foregoing information is true to the best of my information, knowledge, and belief. Further, if the unit is identified in Section 3 as a production line unit, I hereby authorize the NFRC-accredited testing laboratory to send a copy of the test report to the IA identified above for plant qualification purposes pursuant to the NFRC Product Certification Program.

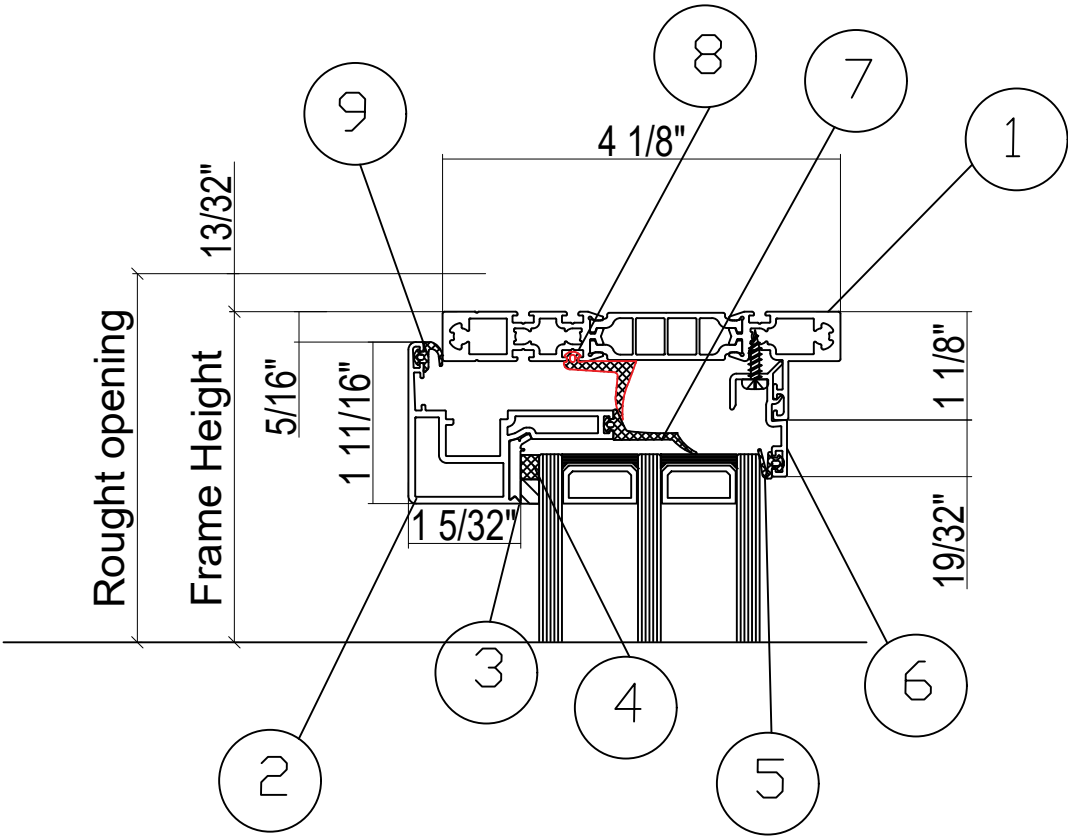
Signature: [Signature] Date: 30.04.2025

For Laboratory Use Only

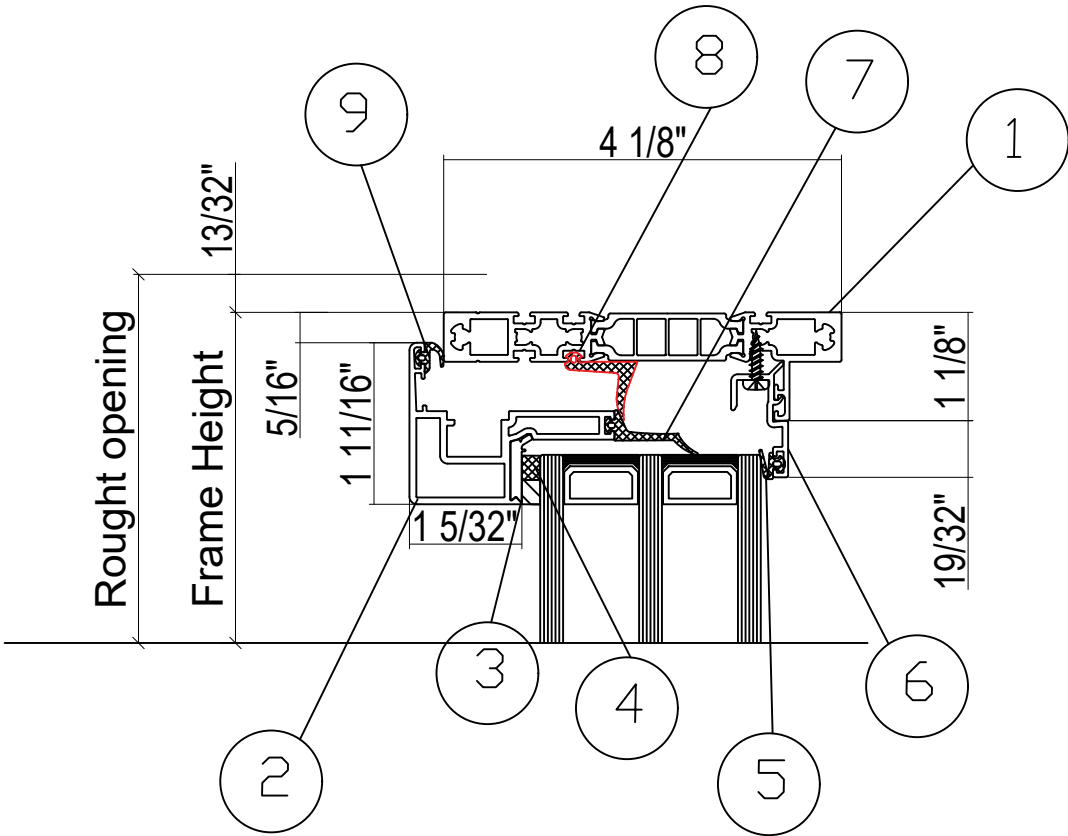
1. Laboratory: In t/d/k
2. Date Sample Received: 2/19/25 Test Report #: 51261
3. Date Sample Tested: 4/15/25 By: [Signature]
4. Modifications made: _____

Aluminium Dual Action Window

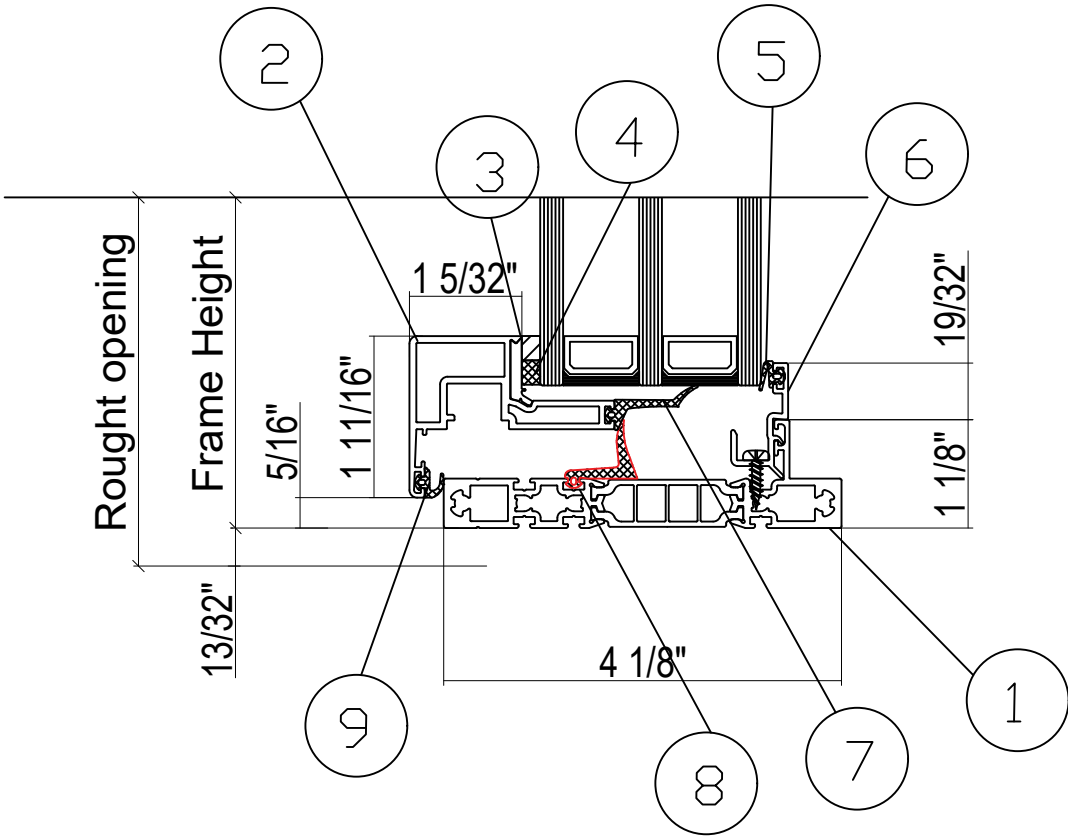
Head Section



Jamb Section



Jamb Section



Appendix - A

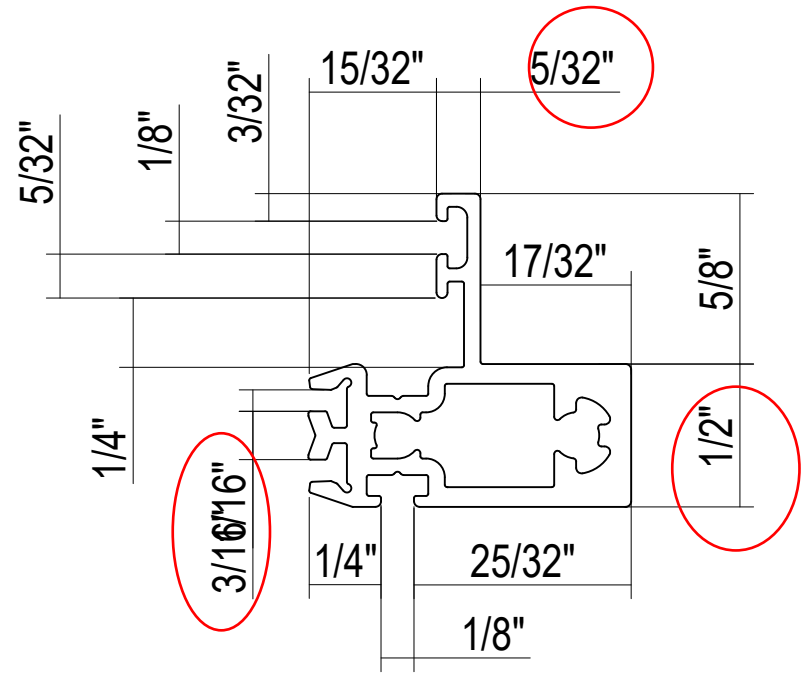
Bill of Materials

Part Identification	Part Nr.	Material
Head, Side and Sill frame	#1	Alluminium + PA66 Aluminum-Painted
Sash	#2	Alluminium Aluminum-Painted
DC 791 structural Glue	#3	Sylicone
Thermalbond V2100 tape	#4	Polyurethane foam
Closing gasket	#5	EPDM
Cover profile	#6	Alluminium Aluminum-Painted
Thermal gasket	#7	EPDM
Central gasket	#8	EPDM
Tightness gasket	#9	EPDM

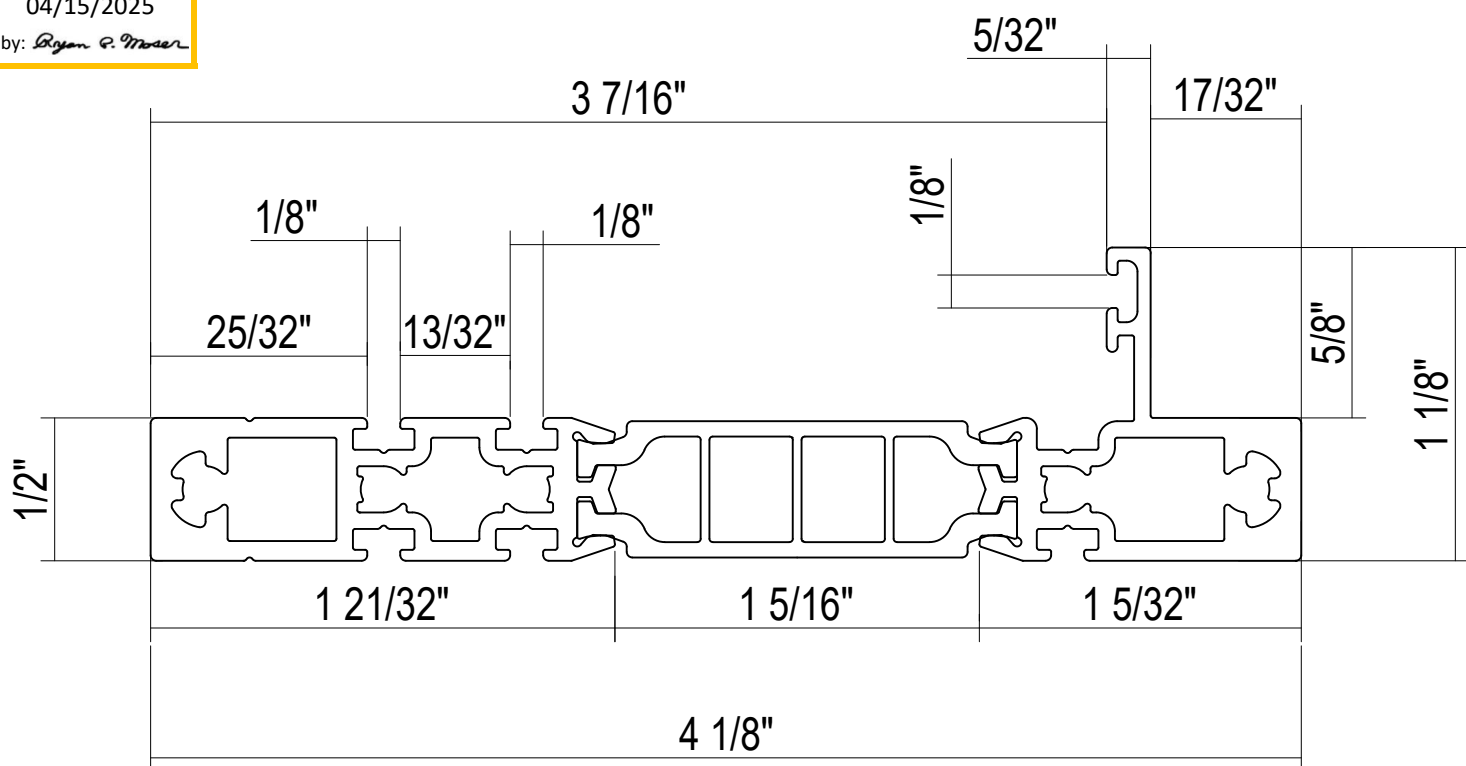
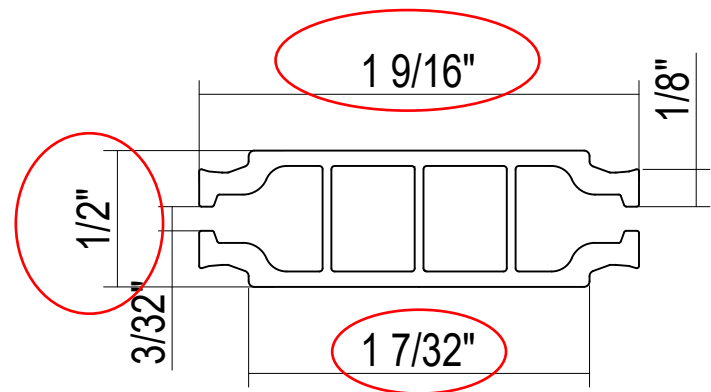
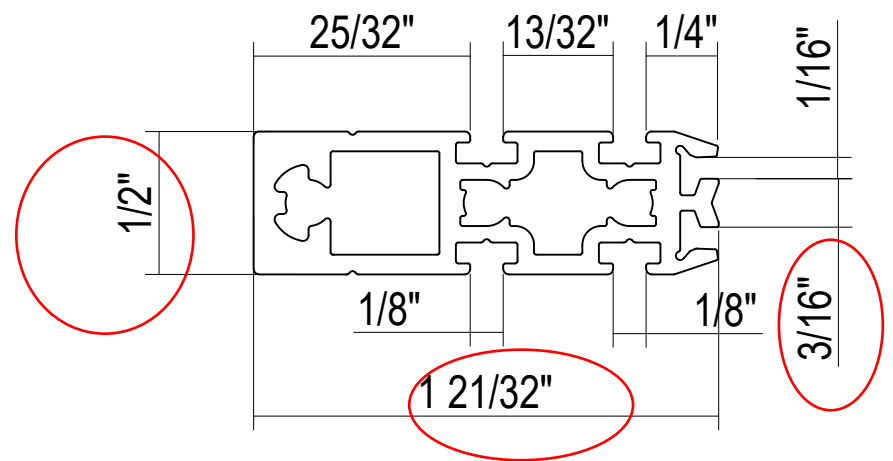
Frame

Materia: Aluminum + PA66

Aluminium

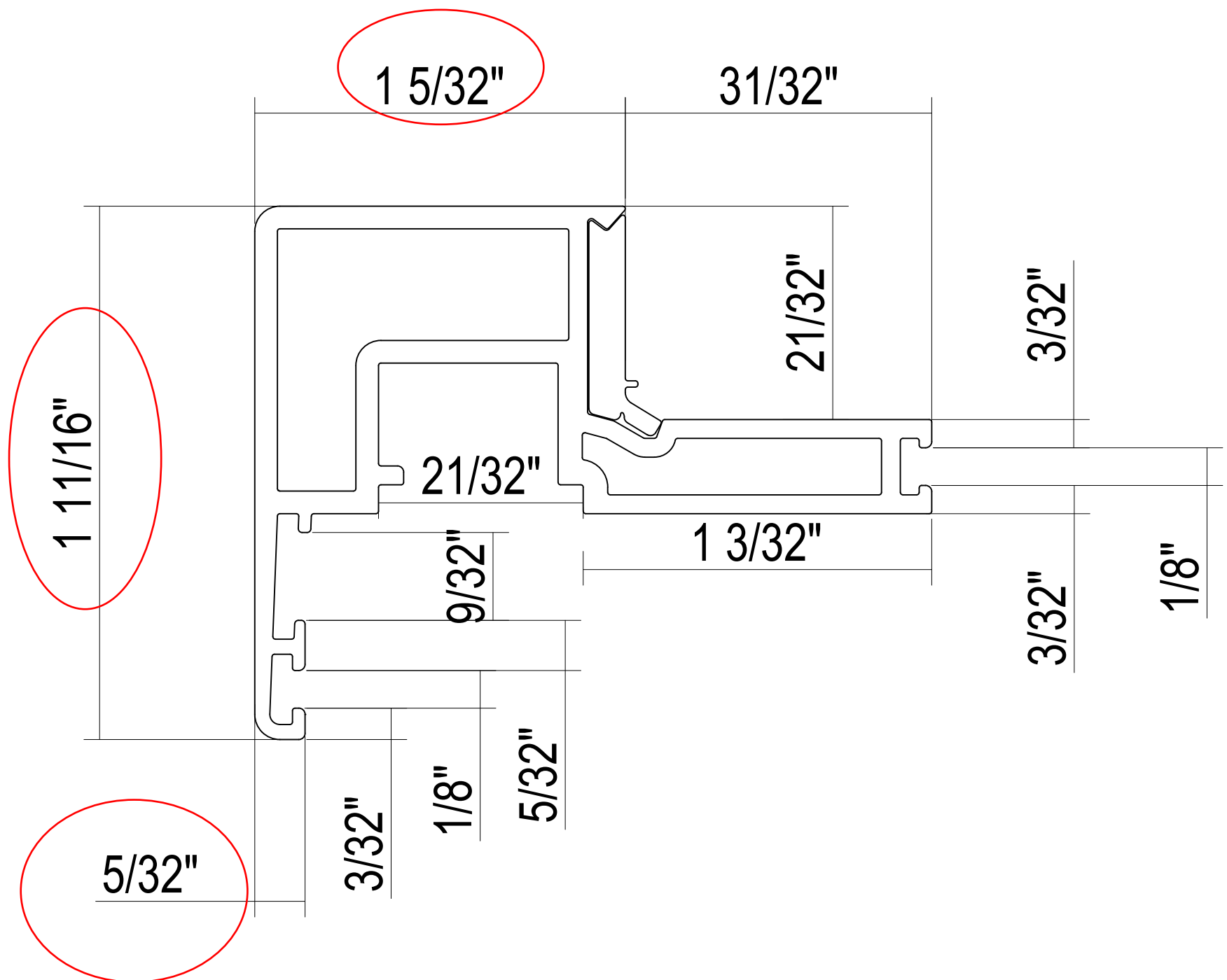


Aluminium



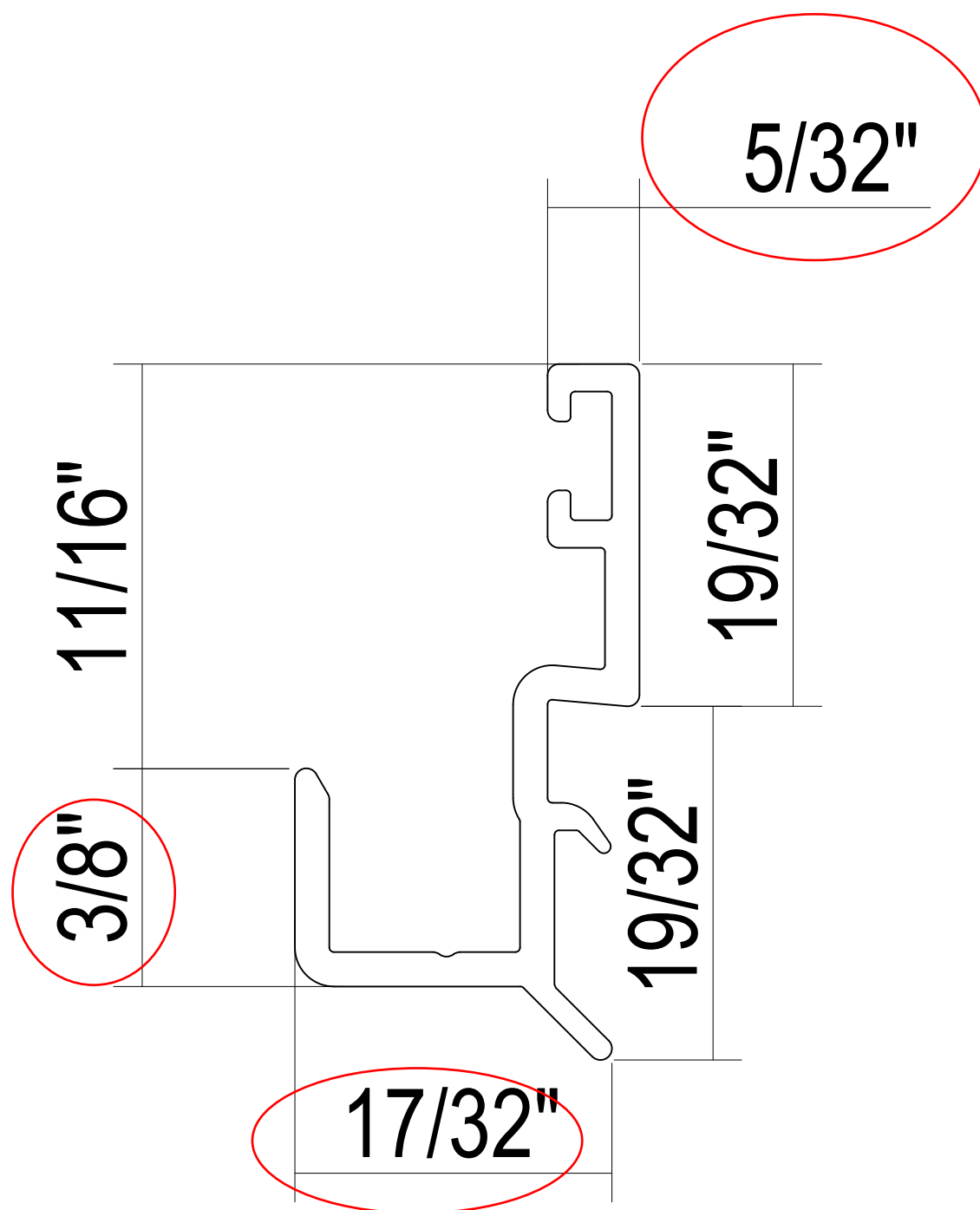
Sash

Material: Aluminum



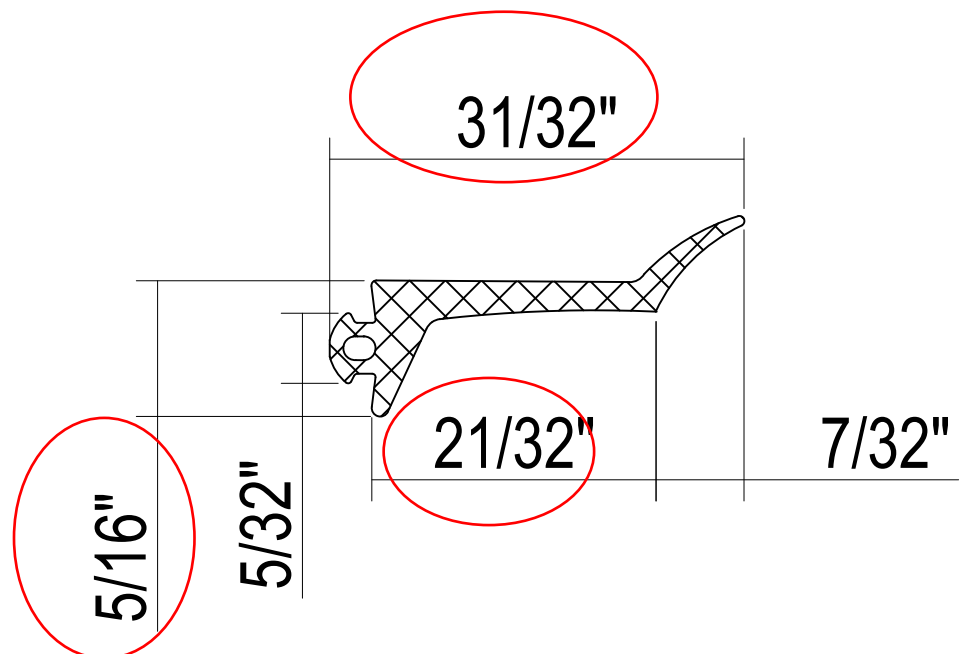
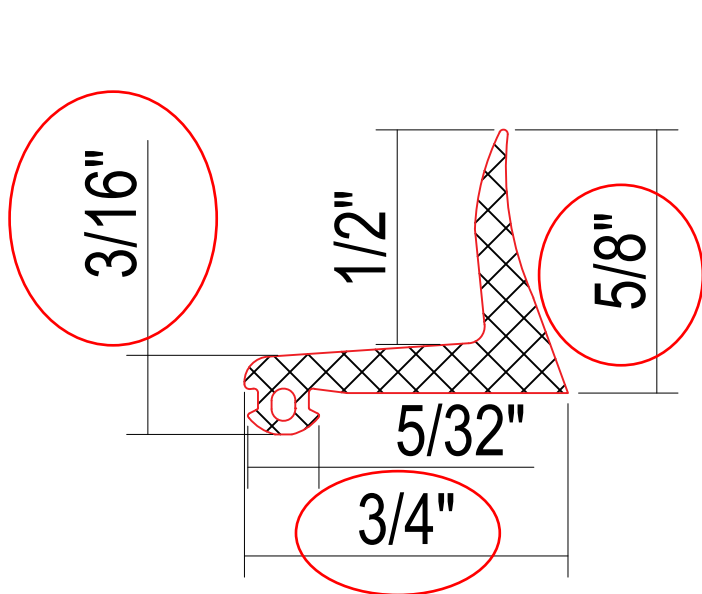
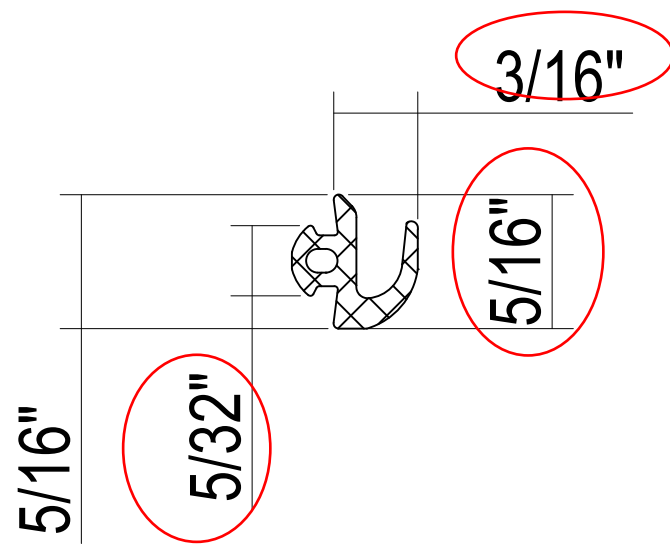
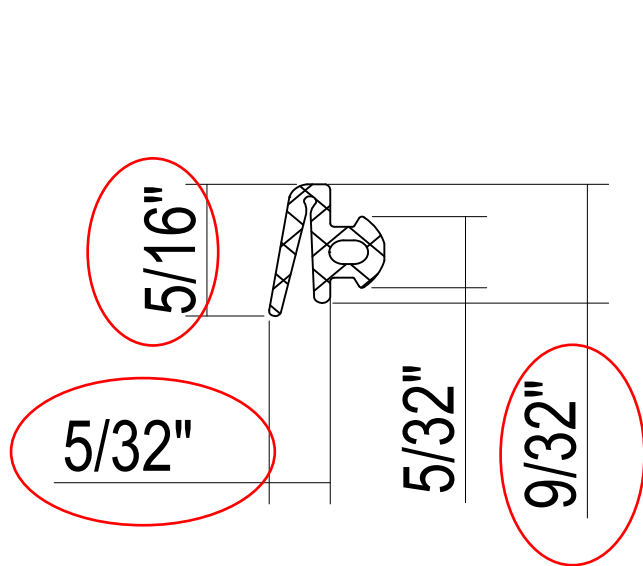
Cover profile

Materia: Aluminum



Gaskets

Material: EPDM



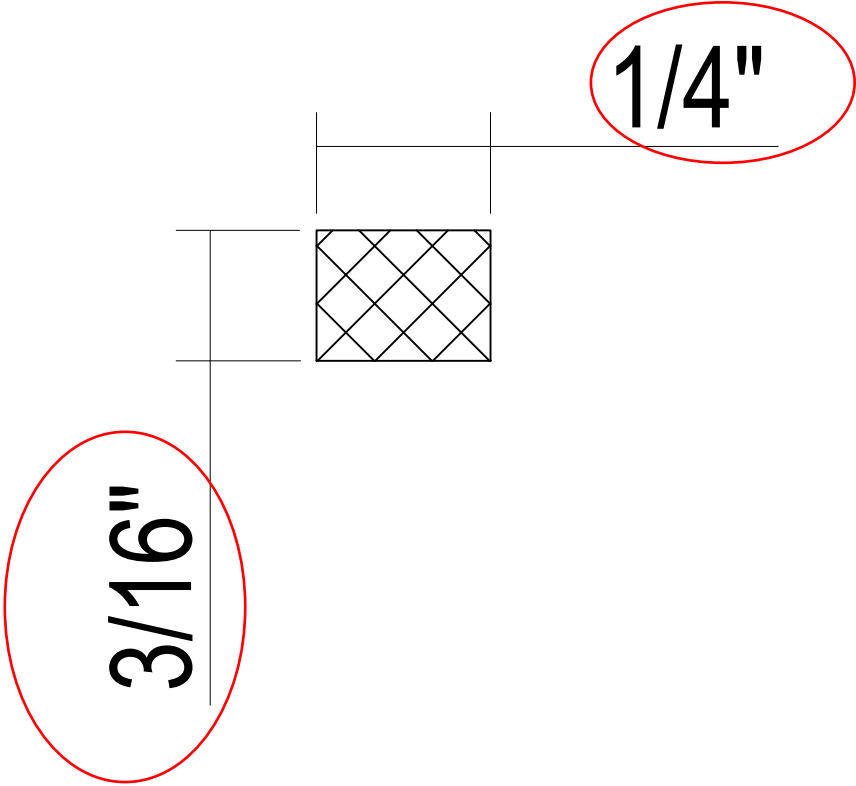
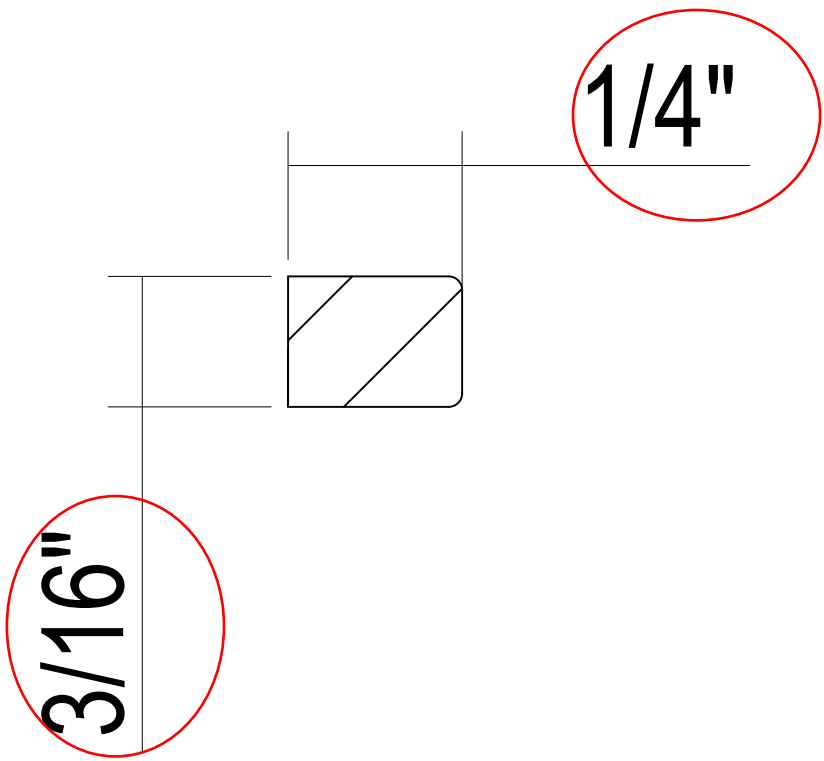
Glazing Elements

Materia: Sylicone + Poliurethane

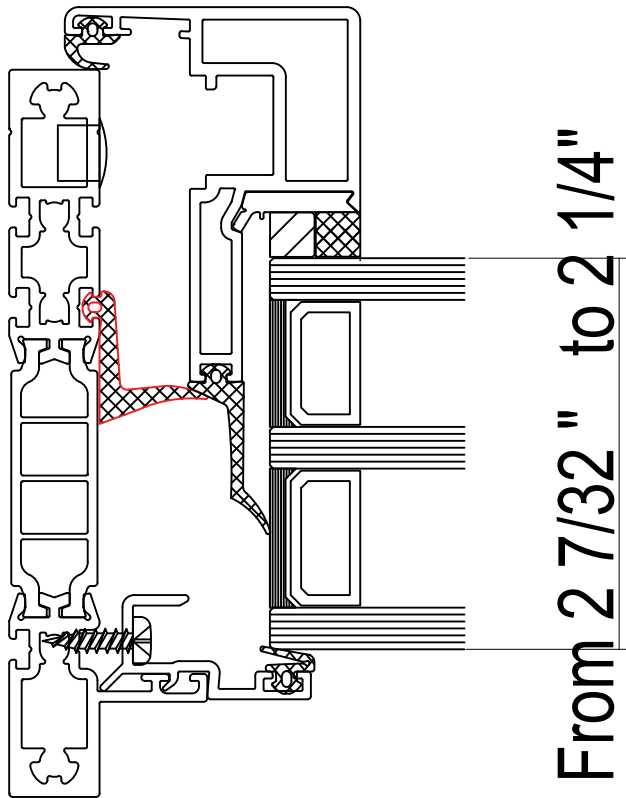
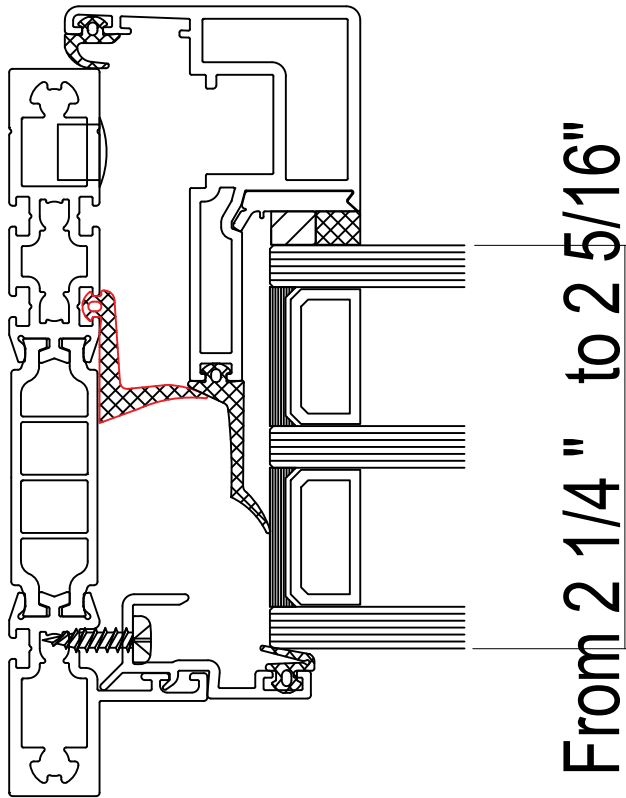
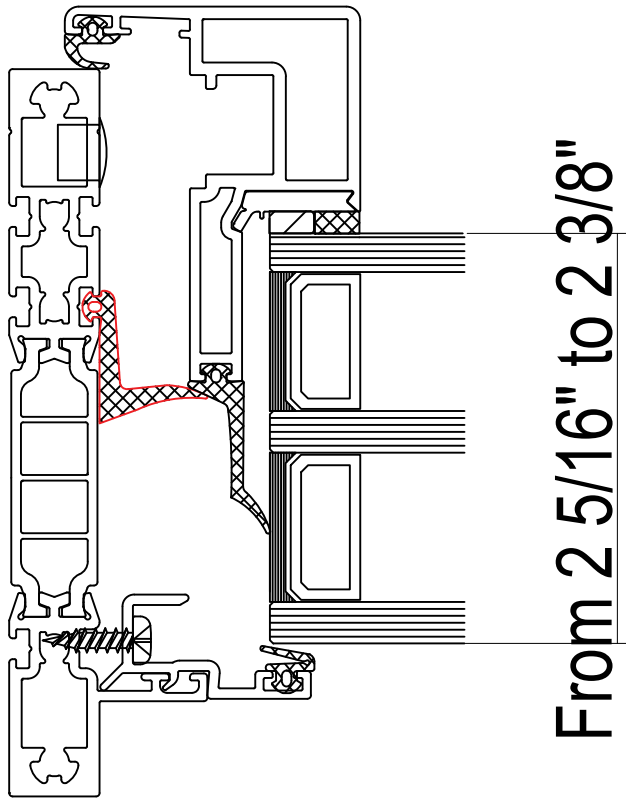
Sylicone

Poliurethane

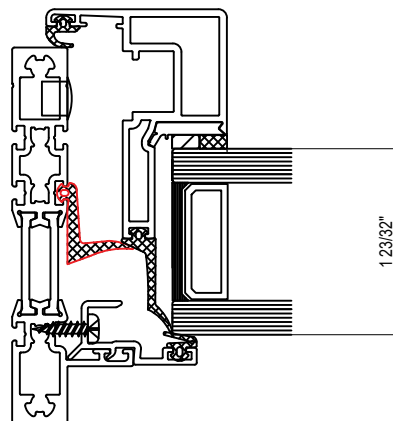
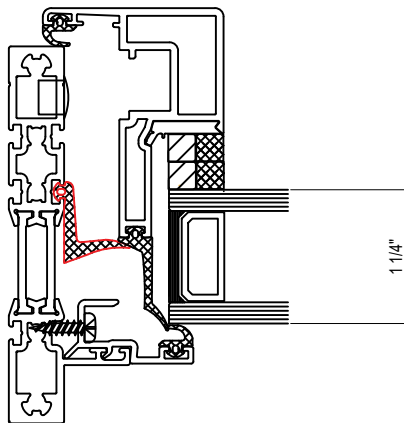
Polyurethane Foam

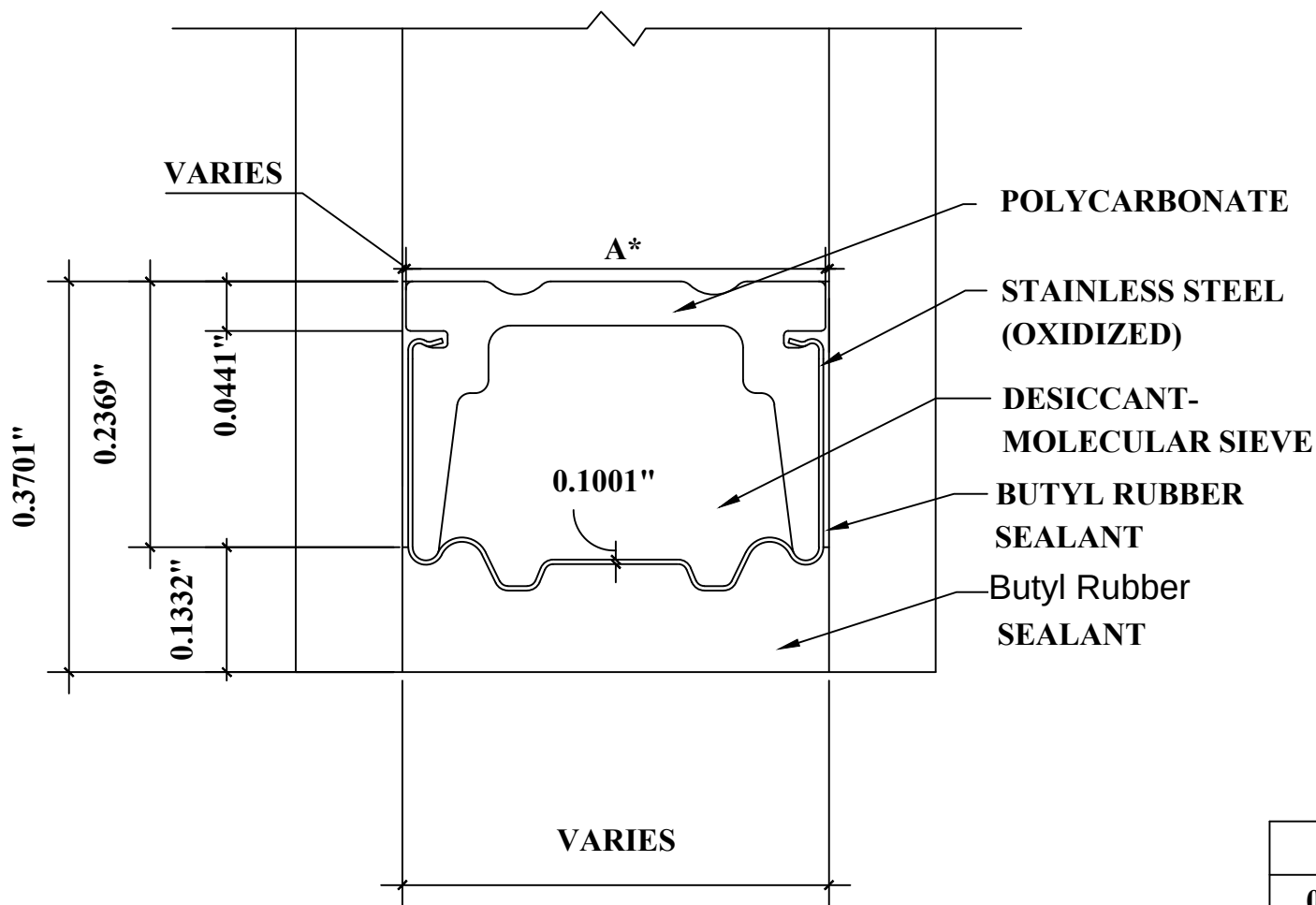


Glazing range



Glazing Range





DETAIL FOR THERMAL MODELING OF
ROLLTECH CHROMATECH ULTRA SPACER (TS-D)

A
0.929"
0.850"
0.772"
0.693"
0.614"
0.575"
0.535"
0.496"
0.457"
0.378"
0.299"



Report #: S1261-116-46

Date: 04/15/2025

Verified by: *Bryan P. Moser*

***SPACER AVAILABLE IN 11 SIZES.**

TEST REPORT FOR HANSEN POLSKA SP. Z O.O.

Report No.: S1261.01-116-46 R0

Date: 05/01/25

SECTION 16

REVISION LOG

REVISION #	DATE	PAGES	REVISION
.01 R0	05/01/25	N/A	Original Report Issue

HANSEN POLSKA COMPUTER SIMULATION REPORT

SCOPE OF WORK

DUAL ACTION - NFRC 100/200/500

REPORT NUMBER

S1260.01-116-45 R0

TEST DATE

04/10/25

ISSUE DATE

04/10/25

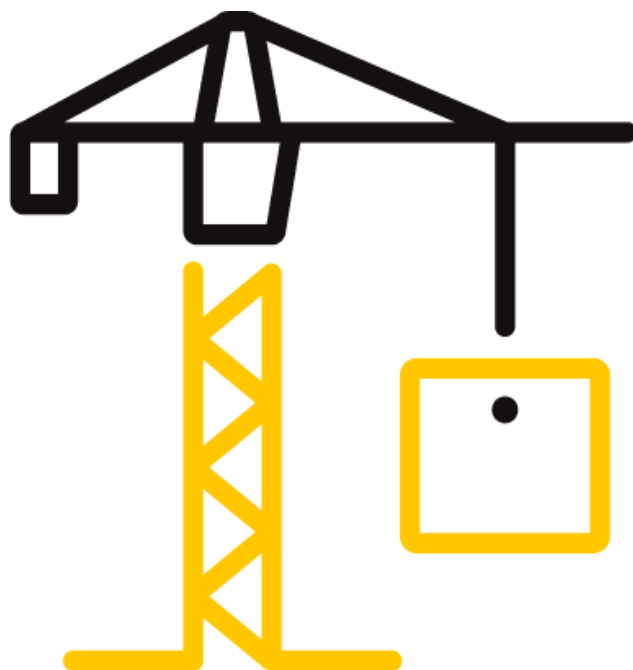
PAGES

28

DOCUMENT CONTROL NUMBER

RT-R-AMER-Test-4044 (04/11/22)

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TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

REPORT ISSUED TO

HANSEN POLSKA

ul. Lotniskowa 17

Glogow Malopolski, Poland 36-060

SECTION 1

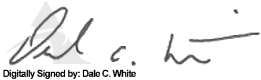
SUMMARY

SERIES/MODEL: Dual Action

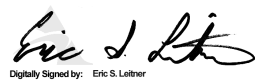
Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted to perform U-Factor, Solar Heat Gain Coefficient, Visible Transmittance and Condensation Resistance simulations in accordance with the National Fenestration Rating Council (NFRC).

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends five years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.

FOR INTERTEK B&C:

COMPLETED BY: Dale C. White
TITLE: Simulation Technician,
NFRC Certified Simulator
SIGNATURE: 
DATE: 04/10/25

DCW:dcw

REVIEWED BY: Eric S. Leitner
TITLE: Manager - Simulations
and Thermal Testing, SIRC
SIGNATURE: 
DATE: 04/10/25

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TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 2

TEST METHODS

The products were evaluated in accordance with the following:

ANSI/NFRC 100-2023, Procedure for Determining Fenestration Product U-Factors

ANSI/NFRC 200-2023, 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

**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 Certificate of Authorization (CA) by an NFRC accredited Inspection Agency (IA) are to be used for labeling purposes. The ratings values were rounded in accordance with NFRC 601, NFRC Unit and Measurement Policy.

Intertek B&C 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.

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

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 7.8.71
CENTER-OF-GLASS MODELING	WINDOW 7.8.71
TOTAL PRODUCT CALCULATIONS	WINDOW 7.8.71
SPECTRAL DATA LIBRARY	IGDB 103

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) Internal grids do not require modeling in some options per the NFRC 3mm rule.

SECTION 4

SIMULATION SPECIMEN DESCRIPTION

SERIES/MODEL	Dual Action
PRODUCT TYPE	Dual Action (Tilt Turn)
FRAME MATERIAL	AT - Aluminum w/ Thermal Breaks
SASH MATERIAL	AT - Aluminum w/ Thermal Breaks
STANDARD SIZE	1200mm x 1500mm

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 4 (Continued)
SIMULATION SPECIMEN DESCRIPTION

SPACER OPTIONS			
TYPE	PRIMARY SEAL	SECONDARY SEAL	CODE
Chromatec Ultra Spacer	Butyl Rubber	Butyl Rubber	TS-D

GRID OPTIONS		
GRID SIZE	GRID TYPE	GRID PATTERN
1/2" x 1.0"	Aluminum Flat Grid (Painted)	NFRC Standard

REINFORCEMENT OPTIONS	
LOCATION	MATERIAL
None	-

GAS FILLING TECHNIQUE	
FILL TYPE	METHOD
90% Argon	Single Probe

EDGE-OF-GLASS CONSTRUCTION	
INTERIOR CONDITION	Aluminum Bead with PU Foam and Silicone
EXTERIOR CONDITION	Aluminum Leg with EPDM Gasket

WEATHERSTRIPPING		
TYPE	QUANTITY	LOCATION
EPDM Gasket	1	Frame & Sash Center
EPDM Gasket	1	Sash Interior Perimeter
EPDM Gasket	1	Frame Exterior Perimeter

FRAME/SASH MATERIALS FINISH	
INTERIOR	Aluminum (Painted)
EXTERIOR	Aluminum (Painted)

VALIDATION MATRIX*	
PRODUCT LINE	REPORT NUMBER
None	-

*These products are part of a validation matrix. Only one is required for validation testing.

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 5

SPECIALTY PRODUCTS TABLE

The specialty products method allows 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 7.8.71. The method calculates 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	0.004700	0.007589	0.010320
SHGC1	0.858867	0.773233	0.692279
VT0	0.000000	0.000000	0.000000
VT1	0.854167	0.765644	0.681960

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

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

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 6
SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Dual Action)												
Option Number	Pane Thickness 1 (in)	Gap Width 1 (in)	Pane Thickness 2 (in)	Gap Width 2 (in)	Pane Thickness 3 (in)	Gap Width 3 (in)	Pane Thickness 4 (in)	Gap Fill	Low-e (Surface #)	Tint	Spacer	Grid Type
	U-Factor (Btu/Hr-Ft2-F)			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance (CR)		
1	Planiclear / Arg90 / Planitherm XN II (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					AIR	0.051(#3)	CL	TS-D	N
	U-Factor 0.37			SHGC(N) 0.52				VT(N) 0.68		CR 57		
2	Planiclear / Arg90 / Planitherm One II (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					ARG90	0.048(#3)	CL	TS-D	N
	U-Factor 0.34			SHGC(N) 0.42				VT(N) 0.60		CR 58		
3	Planitherm One II / Arg90 / Planitherm One II (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					ARG90	0.048(#2) / 0.048(#3)	CL	TS-D	N
	U-Factor 0.33			SHGC(N) 0.33				VT(N) 0.52		CR 58		
4	Planitherm XN II / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.051(#2)	CL	TS-D	N
	U-Factor 0.33			SHGC(N) 0.49				VT(N) 0.67		CR 58		
5	Planitherm One II / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.048(#2)	CL	TS-D	N
	U-Factor 0.33			SHGC(N) 0.39				VT(N) 0.59		CR 58		
6	CL Xtreme 50/22 / Arg90 / Extra Clear (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.230					ARG90	0.016(#2)	CL	TS-D	N
	U-Factor 0.33			SHGC(N) 0.17				VT(N) 0.40		CR 58		
7	CL Xtreme 50/22 / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.016(#2)	CL	TS-D	N
	U-Factor 0.32			SHGC(N) 0.17				VT(N) 0.39		CR 58		
8	CL Xtreme 61/29 / Arg90 / Planiclear (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					ARG90	0.021(#2)	CL	TS-D	N
	U-Factor 0.33			SHGC(N) 0.23				VT(N) 0.52		CR 58		
9	CL Xtreme 61/29 / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.021(#2)	CL	TS-D	N
	U-Factor 0.32			SHGC(N) 0.22				VT(N) 0.51		CR 58		
10	CL Xtreme 70/33 / Arg90 / Planiclear (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					ARG90	0.018(#2)	CL	TS-D	N
	U-Factor 0.33			SHGC(N) 0.26				VT(N) 0.59		CR 58		

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 6 (Continued)
SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Dual Action)													
Option Number	Pane Thickness 1 (in)	Gap Width 1 (in)	Pane Thickness 2 (in)	Gap Width 2 (in)	Pane Thickness 3 (in)	Gap Width 3 (in)	Pane Thickness 4 (in)	Gap Fill	Low-e (Surface #)	Tint	Spacer	Grid Type	
	U-Factor (Btu/Hr-Ft2-F)			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance (CR)			
11	CL Xtreme 70/33 / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG												
	0.236	0.750	0.345					ARG90	0.018(#2)	CL	TS-D	N	
	U-Factor		0.32	SHGC(N)				0.26	VT(N)		0.59	CR	
12	SunGuard 70S / Arg90 / Extra Clear (6mm/6mm) 1-1/4" IG												
	0.230	0.750	0.230					ARG90	0.028(#2)	CL	TS-D	N	
	U-Factor		0.33	SHGC(N)				0.30	VT(N)		0.60	CR	
13	SunGuard 70S / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG												
	0.230	0.750	0.345					ARG90	0.028(#2)	CL	TS-D	N	
	U-Factor		0.33	SHGC(N)				0.30	VT(N)		0.59	CR	
14	SunGuard 70S / Arg90 / Clear Lami (8mm/4mm 030PVB 4mm) 1-3/8" IG												
	0.305	0.690	0.345					ARG90	0.029(#2)	CL	TS-D	N	
	U-Factor		0.33	SHGC(N)				0.30	VT(N)		0.58	CR	
15	Planitherm XN II / Arg90 / Planiclear / Arg90 / Planitherm XN II (6mm/6mm/6mm) 2-1/8" IG												
	0.236	0.709	0.236	0.709	0.236			ARG90	0.051(#2) / 0.051(#5)	CL	TS-D	N	
	U-Factor		0.19	SHGC(N)				0.42	VT(N)		0.61	CR	
16	Planitherm XN II / Arg90 / Planiclear / Arg90 / XN Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG												
	0.236	0.709	0.236	0.709	0.345			ARG90	0.051(#2) / 0.054(#5)	CL	TS-D	N	
	U-Factor		0.19	SHGC(N)				0.42	VT(N)		0.60	CR	
17	Planitherm One II / Arg90 / Extra Clear / Arg90 / 1.0+ Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG												
	0.236	0.709	0.230	0.709	0.332			ARG90	0.048(#2) / 0.027(#5)	CL	TS-D	N	
	U-Factor		0.19	SHGC(N)				0.31	VT(N)		0.49	CR	
18	CL Xtreme 50/22 / Arg90 / Extre Clear / Arg90 / CG Premium 2 (6mm/6mm/6mm) 2-1/8" IG												
	0.236	0.709	0.230	0.709	0.230			ARG90	0.016(#2) / 0.039(#5)	CL	TS-D	N	
	U-Factor		0.19	SHGC(N)				0.15	VT(N)		0.36	CR	
19	CL Xtreme 50/22 / Arg90 / Extre Clear / Arg90 / CG 1.0+ T (6mm/6mm/6mm) 2-1/8" IG												
	0.236	0.709	0.230	0.709	0.230			ARG90	0.016(#2) / 0.027(#5)	CL	TS-D	N	
	U-Factor		0.19	SHGC(N)				0.14	VT(N)		0.33	CR	
20	CL Xtreme 50/22 / Arg90 / Extra Clear / Arg90 / CGP2 Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG												
	0.236	0.709	0.230	0.709	0.332			ARG90	0.016(#2) / 0.039(#5)	CL	TS-D	N	
	U-Factor		0.19	SHGC(N)				0.15	VT(N)		0.35	CR	

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 6 (Continued)
SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Dual Action)												
Option Number	Pane Thickness 1 (in)	Gap Width 1 (in)	Pane Thickness 2 (in)	Gap Width 2 (in)	Pane Thickness 3 (in)	Gap Width 3 (in)	Pane Thickness 4 (in)	Gap Fill	Low-e (Surface #)	Tint	Spacer	Grid Type
	U-Factor (Btu/Hr-Ft2-F)			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance (CR)		
21	CL Xtreme 61/29 / Arg90 / Planiclear / Arg90 / Planitherm XN II (6mm/6mm/6mm) 2-1/8" IG											
	0.236	0.709	0.236	0.709	0.236			ARG90	0.021(#2) / 0.051(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.20				VT(N) 0.46		CR 68		
22	CL Xtreme 61/29 / Arg90 / Planiclear / Arg90 / Planitherm One II (6mm/6mm/6mm) 2-1/8" IG											
	0.236	0.709	0.236	0.709	0.236			ARG90	0.021(#2) / 0.048(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.18				VT(N) 0.41		CR 68		
23	CL Xtreme 61/29 / Arg90 / Planiclear / Arg90 / XN Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG											
	0.236	0.709	0.236	0.709	0.345			ARG90	0.021(#2) / 0.054(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.20				VT(N) 0.46		CR 67		
24	CL Xtreme 70/33 / Arg90 / Planiclear / Arg90 / Planitherm XN II (6mm/6mm/6mm) 2-1/8" IG											
	0.236	0.709	0.236	0.709	0.236			ARG90	0.018(#2) / 0.051(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.24				VT(N) 0.53		CR 68		
25	CL Xtreme 70/33 / Arg90 / Planiclear / Arg90 / Planitherm One II (6mm/6mm/6mm) 2-1/8" IG											
	0.236	0.709	0.236	0.709	0.236			ARG90	0.018(#2) / 0.048(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.21				VT(N) 0.47		CR 68		
26	CL Xtreme 70/33 / Arg90 / Planiclear / Arg90 / XN Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG											
	0.236	0.709	0.236	0.709	0.345			ARG90	0.018(#2) / 0.054(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.24				VT(N) 0.52		CR 67		
27	SunGuard 70S / Arg90 / Extre Clear / Arg90 / CG 1.0+ T (6mm/6mm/6mm) 2-1/8" IG											
	0.230	0.709	0.230	0.709	0.230			ARG90	0.028(#2) / 0.027(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.26				VT(N) 0.50		CR 68		
28	SunGuard 70S / Arg90 / Planiclear / Arg90 / CGP2 Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/8" IG											
	0.230	0.709	0.236	0.709	0.332			ARG90	0.028(#2) / 0.039(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.28				VT(N) 0.52		CR 67		
29	CL SKN 183 / Arg90 / Planiclear / Arg90 / Planitherm XN II (6mm/6mm/6mm) 2-1/8" IG											
	0.236	0.709	0.236	0.709	0.236			ARG90	0.022(#2) / 0.051(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.29				VT(N) 0.56		CR 68		
30	CL SKN 183 / Arg90 / Planiclear / Arg90 / XN Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG											
	0.236	0.709	0.236	0.709	0.345			ARG90	0.022(#2) / 0.054(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.29				VT(N) 0.56		CR 67		

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 6 (Continued)
SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Dual Action)												
Option Number	Pane Thickness 1 (in)	Gap Width 1 (in)	Pane Thickness 2 (in)	Gap Width 2 (in)	Pane Thickness 3 (in)	Gap Width 3 (in)	Pane Thickness 4 (in)	Gap Fill	Low-e (Surface #)	Tint	Spacer	Grid Type
	U-Factor (Btu/Hr-Ft2-F)			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance (CR)		
31	CG 1.0+ T / Arg90 / Extre Clear / Arg90 / CG 1.0+ T (6mm/6mm/6mm) 2-1/8" IG											
	0.230	0.709	0.230	0.709	0.230			ARG90	0.027(#2) / 0.027(#5)	CL	TS-D	N
	U-Factor 0.19			SHGC(N) 0.32				VT(N) 0.53		CR 68		
32	Planiclear / Arg90 / Planitherm XN II (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					AIR	0.051(#3)	CL	TS-D	G
	U-Factor 0.37			SHGC(>1) 0.42				VT(>1) 0.55		CR 57		
33	Planiclear / Arg90 / Planitherm One II (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					ARG90	0.048(#3)	CL	TS-D	G
	U-Factor 0.34			SHGC(>1) 0.35				VT(>1) 0.48		CR 58		
34	Planitherm One II / Arg90 / Planitherm One II (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					ARG90	0.048(#2) / 0.048(#3)	CL	TS-D	G
	U-Factor 0.33			SHGC(>1) 0.27				VT(>1) 0.41		CR 58		
35	Planitherm XN II / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.051(#2)	CL	TS-D	G
	U-Factor 0.33			SHGC(>1) 0.40				VT(>1) 0.54		CR 58		
36	Planitherm One II / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.048(#2)	CL	TS-D	G
	U-Factor 0.33			SHGC(>1) 0.32				VT(>1) 0.47		CR 58		
37	CL Xtreme 50/22 / Arg90 / Extra Clear (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.230					ARG90	0.016(#2)	CL	TS-D	G
	U-Factor 0.33			SHGC(>1) 0.14				VT(>1) 0.32		CR 58		
38	CL Xtreme 50/22 / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.016(#2)	CL	TS-D	G
	U-Factor 0.32			SHGC(>1) 0.14				VT(>1) 0.32		CR 58		
39	CL Xtreme 61/29 / Arg90 / Planiclear (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					ARG90	0.021(#2)	CL	TS-D	G
	U-Factor 0.33			SHGC(>1) 0.19				VT(>1) 0.41		CR 58		
40	CL Xtreme 61/29 / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.021(#2)	CL	TS-D	G
	U-Factor 0.32			SHGC(>1) 0.19				VT(>1) 0.41		CR 58		

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 6 (Continued)
SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Dual Action)												
Option Number	Pane Thickness 1 (in)	Gap Width 1 (in)	Pane Thickness 2 (in)	Gap Width 2 (in)	Pane Thickness 3 (in)	Gap Width 3 (in)	Pane Thickness 4 (in)	Gap Fill	Low-e (Surface #)	Tint	Spacer	Grid Type
	U-Factor (Btu/Hr-Ft2-F)			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance (CR)		
41	CL Xtreme 70/33 / Arg90 / Planiclear (6mm/6mm) 1-1/4" IG											
	0.236	0.750	0.236					ARG90	0.018(#2)	CL	TS-D	G
	U-Factor 0.33			SHGC(>1) 0.21				VT(>1) 0.47		CR 58		
42	CL Xtreme 70/33 / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.236	0.750	0.345					ARG90	0.018(#2)	CL	TS-D	G
	U-Factor 0.32			SHGC(>1) 0.21				VT(>1) 0.47		CR 58		
43	SunGuard 70S / Arg90 / Extra Clear (6mm/6mm) 1-1/4" IG											
	0.230	0.750	0.230					ARG90	0.028(#2)	CL	TS-D	G
	U-Factor 0.33			SHGC(>1) 0.25				VT(>1) 0.48		CR 58		
44	SunGuard 70S / Arg90 / Clear Lami (6mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.230	0.750	0.345					ARG90	0.028(#2)	CL	TS-D	G
	U-Factor 0.33			SHGC(>1) 0.25				VT(>1) 0.47		CR 58		
45	SunGuard 70S / Arg90 / Clear Lami (8mm/4mm 030PVB 4mm) 1-3/8" IG											
	0.305	0.690	0.345					ARG90	0.029(#2)	CL	TS-D	G
	U-Factor 0.35			SHGC(>1) 0.25				VT(>1) 0.47		CR 57		
46	Planitherm XN II / Arg90 / Planiclear / Arg90 / Planitherm XN II (6mm/6mm/6mm) 2-1/8" IG											
	0.236	0.709	0.236	0.709	0.236			ARG90	0.051(#2) / 0.051(#5)	CL	TS-D	G
	U-Factor 0.21			SHGC(>1) 0.34				VT(>1) 0.49		CR 67		
47	Planitherm XN II / Arg90 / Planiclear / Arg90 / XN Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG											
	0.236	0.709	0.236	0.709	0.345			ARG90	0.051(#2) / 0.054(#5)	CL	TS-D	G
	U-Factor 0.21			SHGC(>1) 0.34				VT(>1) 0.48		CR 67		
48	Planitherm One II / Arg90 / Extra Clear / Arg90 / 1.0+ Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG											
	0.236	0.709	0.230	0.709	0.332			ARG90	0.048(#2) / 0.027(#5)	CL	TS-D	G
	U-Factor 0.20			SHGC(>1) 0.25				VT(>1) 0.39		CR 67		
49	CL Extreme 50/22 / Arg90 / Extre Clear / Arg90 / CG Premium 2 (6mm/6mm/6mm) 2-1/8" IG											
	0.236	0.709	0.230	0.709	0.230			ARG90	0.016(#2) / 0.039(#5)	CL	TS-D	G
	U-Factor 0.20			SHGC(>1) 0.12				VT(>1) 0.29		CR 68		
50	CL Extreme 50/22 / Arg90 / Extre Clear / Arg90 / CG 1.0+ T (6mm/6mm/6mm) 2-1/8" IG											
	0.236	0.709	0.230	0.709	0.230			ARG90	0.016(#2) / 0.027(#5)	CL	TS-D	G
	U-Factor 0.20			SHGC(>1) 0.12				VT(>1) 0.27		CR 68		

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 6 (Continued)
SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Dual Action)													
Option Number	Pane Thickness 1 (in)	Gap Width 1 (in)	Pane Thickness 2 (in)	Gap Width 2 (in)	Pane Thickness 3 (in)	Gap Width 3 (in)	Pane Thickness 4 (in)	Gap Fill	Low-e (Surface #)	Tint	Spacer	Grid Type	
	U-Factor (Btu/Hr-Ft2-F)			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance (CR)			
51	CL Xtreme 50/22 / Arg90 / Extra Clear / Arg90 / CGP2 Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG												
	0.236	0.709	0.230	0.709	0.332			ARG90	0.016(#2) / 0.039(#5)	CL	TS-D	G	
	U-Factor		0.20	SHGC(>1)				0.12	VT(>1)		0.28	CR	
52	CL Xtreme 61/29 / Arg90 / Planiclear / Arg90 / Planitherm XN II (6mm/6mm/6mm) 2-1/8" IG												
	0.236	0.709	0.236	0.709	0.236			ARG90	0.021(#2) / 0.051(#5)	CL	TS-D	G	
	U-Factor		0.21	SHGC(>1)				0.17	VT(>1)		0.37	CR	
53	CL Xtreme 61/29 / Arg90 / Planiclear / Arg90 / Planitherm One II (6mm/6mm/6mm) 2-1/8" IG												
	0.236	0.709	0.236	0.709	0.236			ARG90	0.021(#2) / 0.048(#5)	CL	TS-D	G	
	U-Factor		0.21	SHGC(>1)				0.15	VT(>1)		0.32	CR	
54	CL Xtreme 61/29 / Arg90 / Planiclear / Arg90 / XN Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG												
	0.236	0.709	0.236	0.709	0.345			ARG90	0.021(#2) / 0.054(#5)	CL	TS-D	G	
	U-Factor		0.20	SHGC(>1)				0.17	VT(>1)		0.37	CR	
55	CL Xtreme 70/33 / Arg90 / Planiclear / Arg90 / Planitherm XN II (6mm/6mm/6mm) 2-1/8" IG												
	0.236	0.709	0.236	0.709	0.236			ARG90	0.018(#2) / 0.051(#5)	CL	TS-D	G	
	U-Factor		0.21	SHGC(>1)				0.19	VT(>1)		0.42	CR	
56	CL Xtreme 70/33 / Arg90 / Planiclear / Arg90 / Planitherm One II (6mm/6mm/6mm) 2-1/8" IG												
	0.236	0.709	0.236	0.709	0.236			ARG90	0.018(#2) / 0.048(#5)	CL	TS-D	G	
	U-Factor		0.20	SHGC(>1)				0.17	VT(>1)		0.37	CR	
57	CL Xtreme 70/33 / Arg90 / Planiclear / Arg90 / XN Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG												
	0.236	0.709	0.236	0.709	0.345			ARG90	0.018(#2) / 0.054(#5)	CL	TS-D	G	
	U-Factor		0.20	SHGC(>1)				0.20	VT(>1)		0.42	CR	
58	SunGuard 70S / Arg90 / Extre Clear / Arg90 / CG 1.0+ T (6mm/6mm/6mm) 2-1/8" IG												
	0.230	0.709	0.230	0.709	0.230			ARG90	0.028(#2) / 0.027(#5)	CL	TS-D	G	
	U-Factor		0.20	SHGC(>1)				0.21	VT(>1)		0.40	CR	
59	SunGuard 70S / Arg90 / Planiclear / Arg90 / CGP2 Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/8" IG												
	0.230	0.709	0.236	0.709	0.332			ARG90	0.028(#2) / 0.039(#5)	CL	TS-D	G	
	U-Factor		0.20	SHGC(>1)				0.23	VT(>1)		0.42	CR	
60	CL SKN 183 / Arg90 / Planiclear / Arg90 / Planitherm XN II (6mm/6mm/6mm) 2-1/8" IG												
	0.236	0.709	0.236	0.709	0.236			ARG90	0.022(#2) / 0.051(#5)	CL	TS-D	G	
	U-Factor		0.21	SHGC(>1)				0.24	VT(>1)		0.45	CR	

TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 6 (Continued)

SIMULATION RESULTS

TOTAL PRODUCT CALCULATIONS (Dual Action)													
Option Number	Pane Thickness 1 (in)	Gap Width 1 (in)	Pane Thickness 2 (in)	Gap Width 2 (in)	Pane Thickness 3 (in)	Gap Width 3 (in)	Pane Thickness 4 (in)	Gap Fill	Low-e (Surface #)	Tint	Spacer	Grid Type	
	U-Factor (Btu/Hr-Ft2-F)			Solar Heat Gain Coefficient (SHGC) Grids (None / <1 / >=1)				Visible Transmittance (VT) Grids (None / <1 / >=1)		Condensation Resistance (CR)			
61	CL SKN 183 / Arg90 / Planiclear / Arg90 / XN Lami (6mm/6mm/4mm 030PVB 4mm) 2-1/4" IG												
	0.236	0.709	0.236	0.709	0.345			ARG90	0.022(#2) / 0.054(#5)	CL	TS-D	G	
	U-Factor		0.20	SHGC(>1)				0.24	VT(>1)		0.45	CR	
62	CG 1.0+ T / Arg90 / Extre Clear / Arg90 / CG 1.0+ T (6mm/6mm/6mm) 2-1/8" IG												
	0.230	0.709	0.230	0.709	0.230			ARG90	0.027(#2) / 0.027(#5)	CL	TS-D	G	
	U-Factor		0.20	SHGC(>1)				0.26	VT(>1)		0.42	CR	



Total Quality. Assured.

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TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

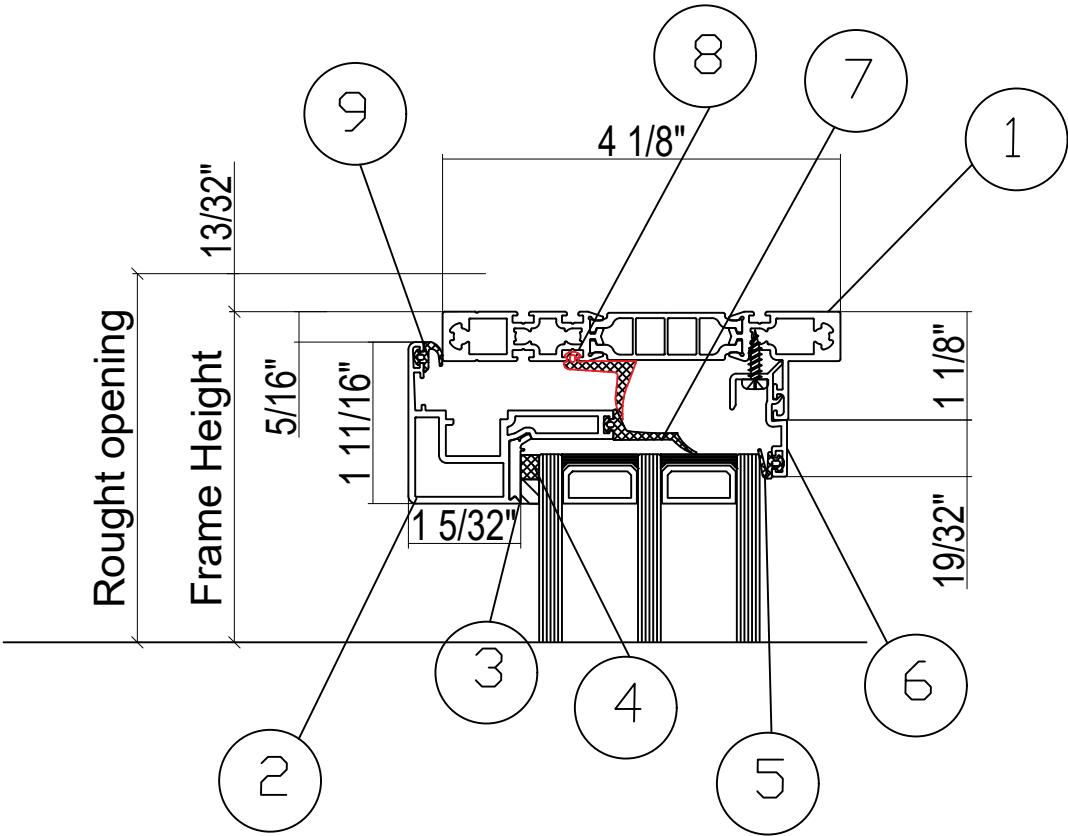
SECTION 7

DRAWINGS / BILL OF MATERIALS

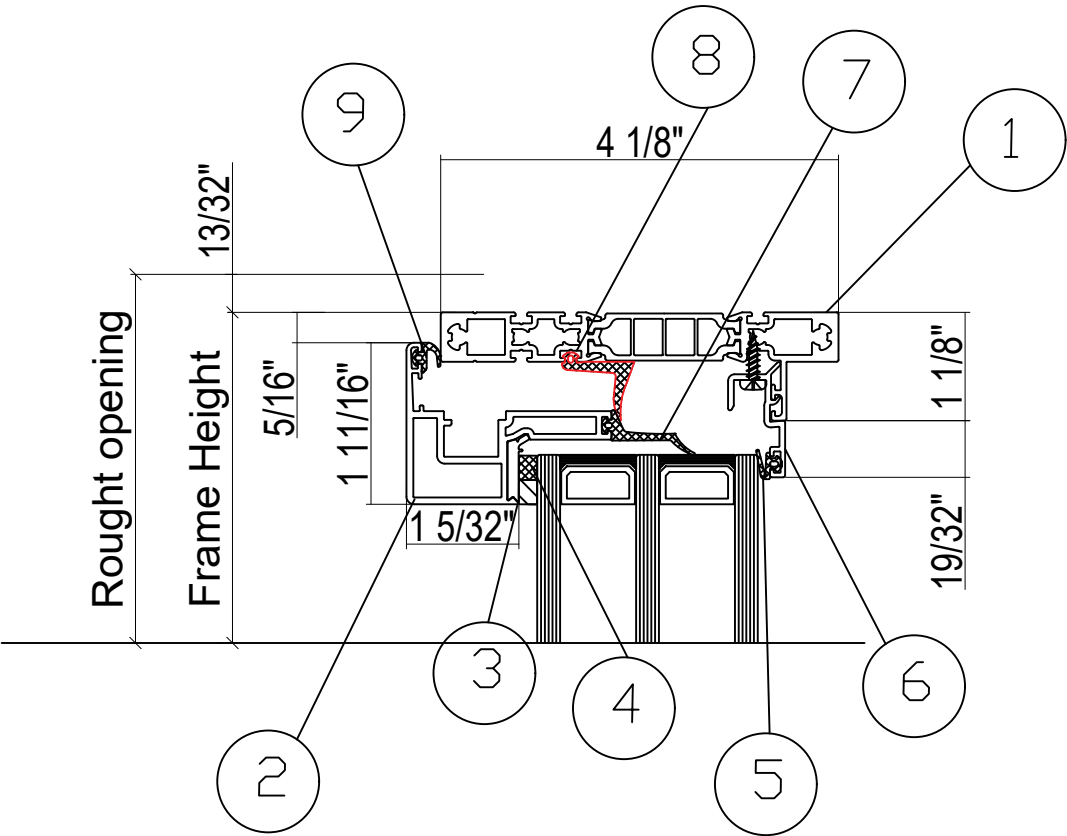
The drawings which follow have been reviewed by Intertek B&C and are representative of the simulation results reported herein. Any deviations are documented herein or on the drawings.

Aluminium Dual Action Window

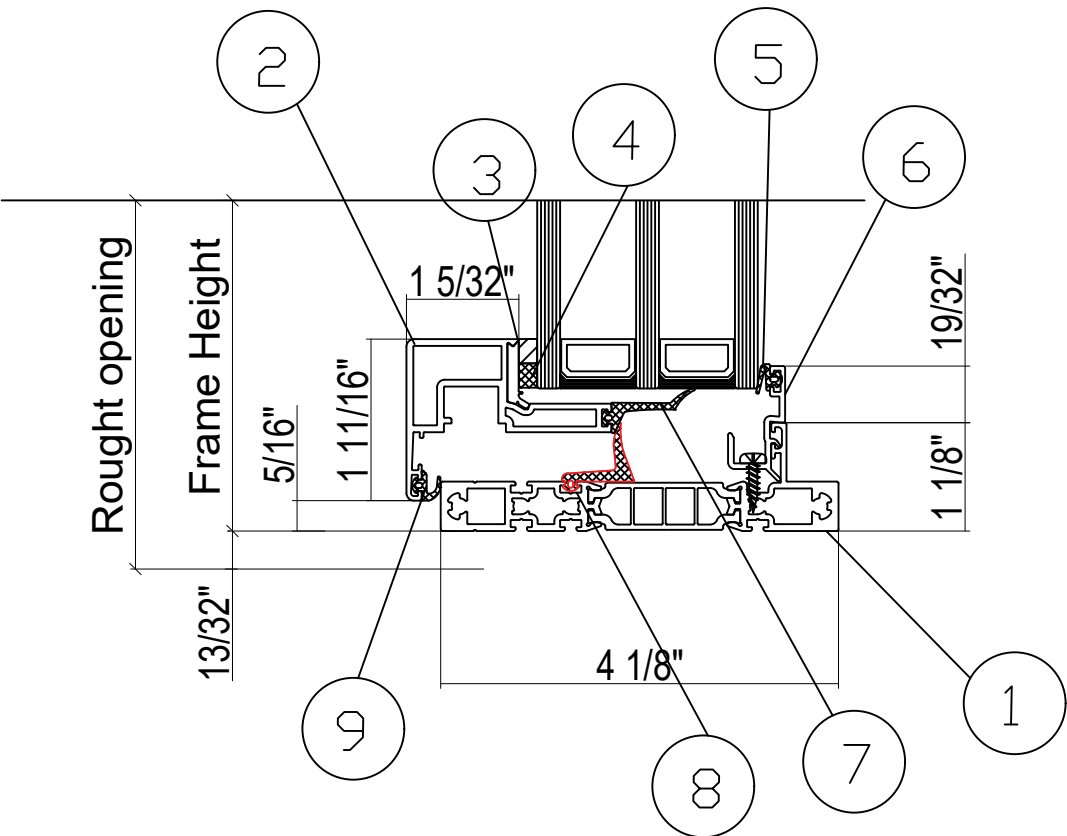
Head Section



Jamb Section



Jamb Section



Appendix – A

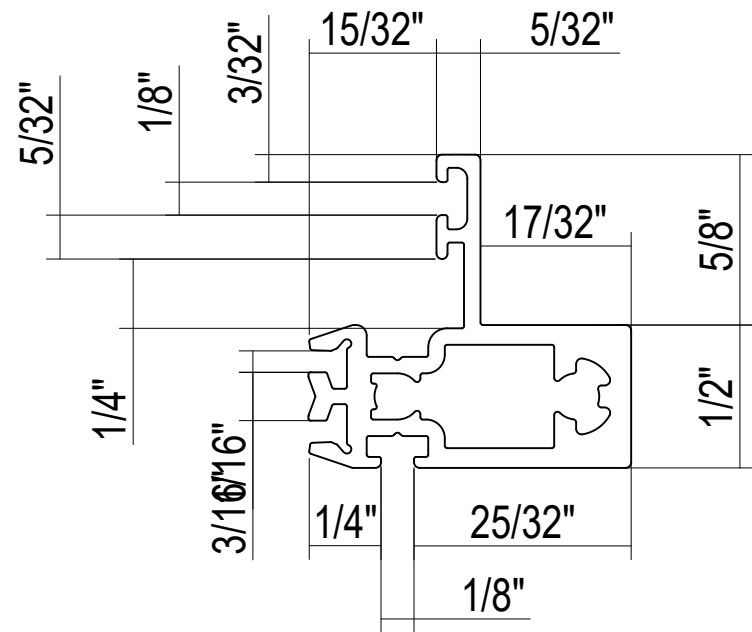
Bill of Materials

Part Identification	Part Nr.	Material
Head, Side and Sill frame	#1	Alluminium + PA66 Aluminum-Painted
Sash	#2	Alluminium Aluminum-Painted
DC 791 structural Glue	#3	Sylicone
Thermalbond V2100 tape	#4	Polyurethane foam
Closing gasket	#5	EPDM
Cover profile	#6	Alluminium Aluminum-Painted
Thermal gasket	#7	EPDM
Central gasket	#8	EPDM
Tightness gasket	#9	EPDM

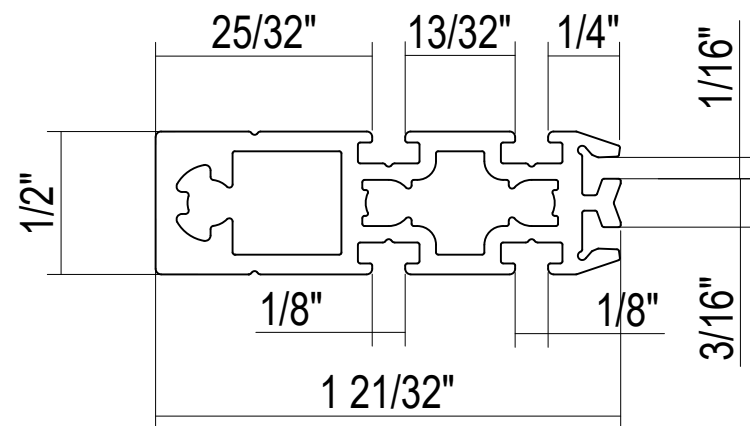
Frame

Materia: Allumminum + PA66

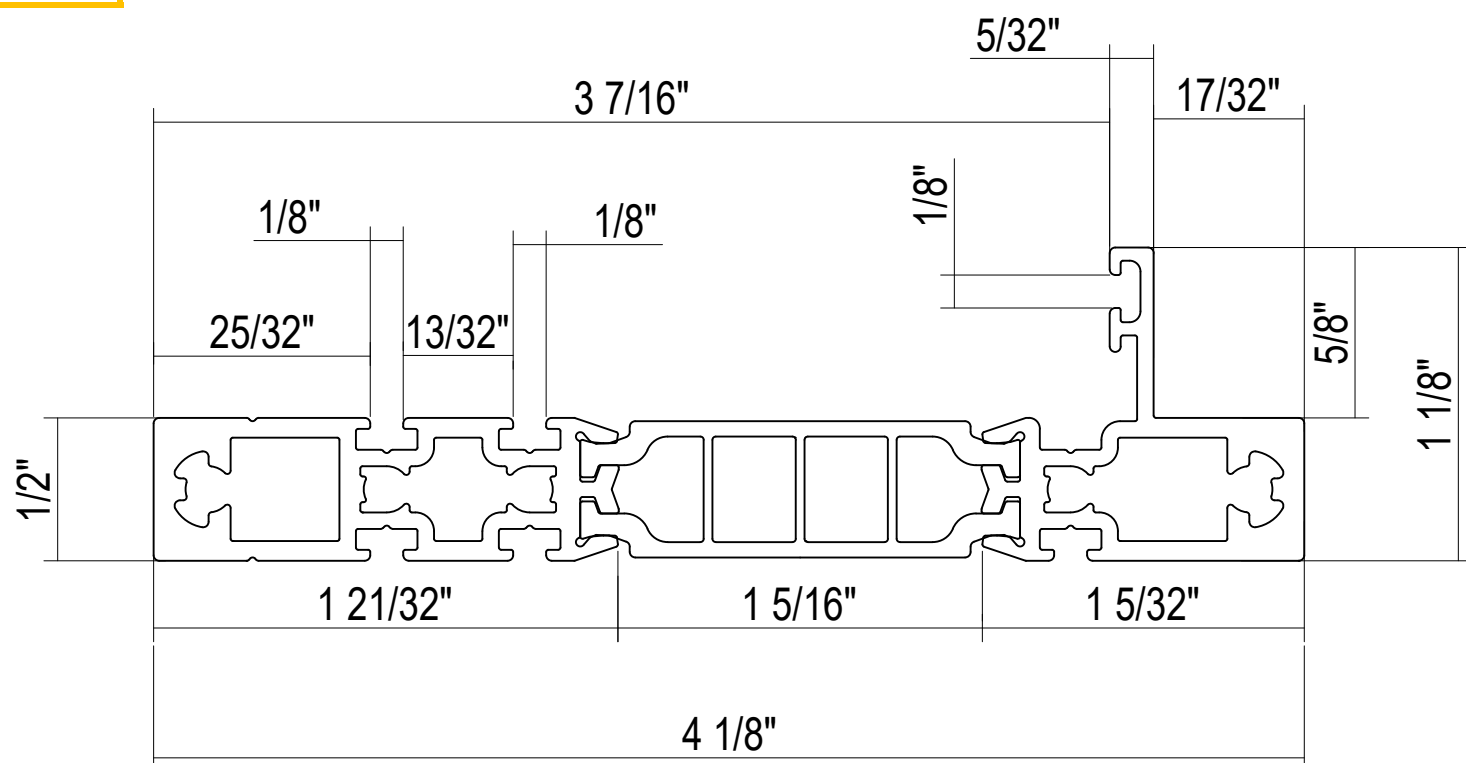
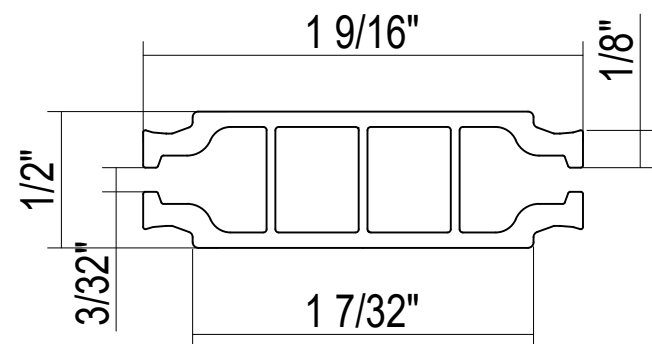
Allumminum



Allumminum

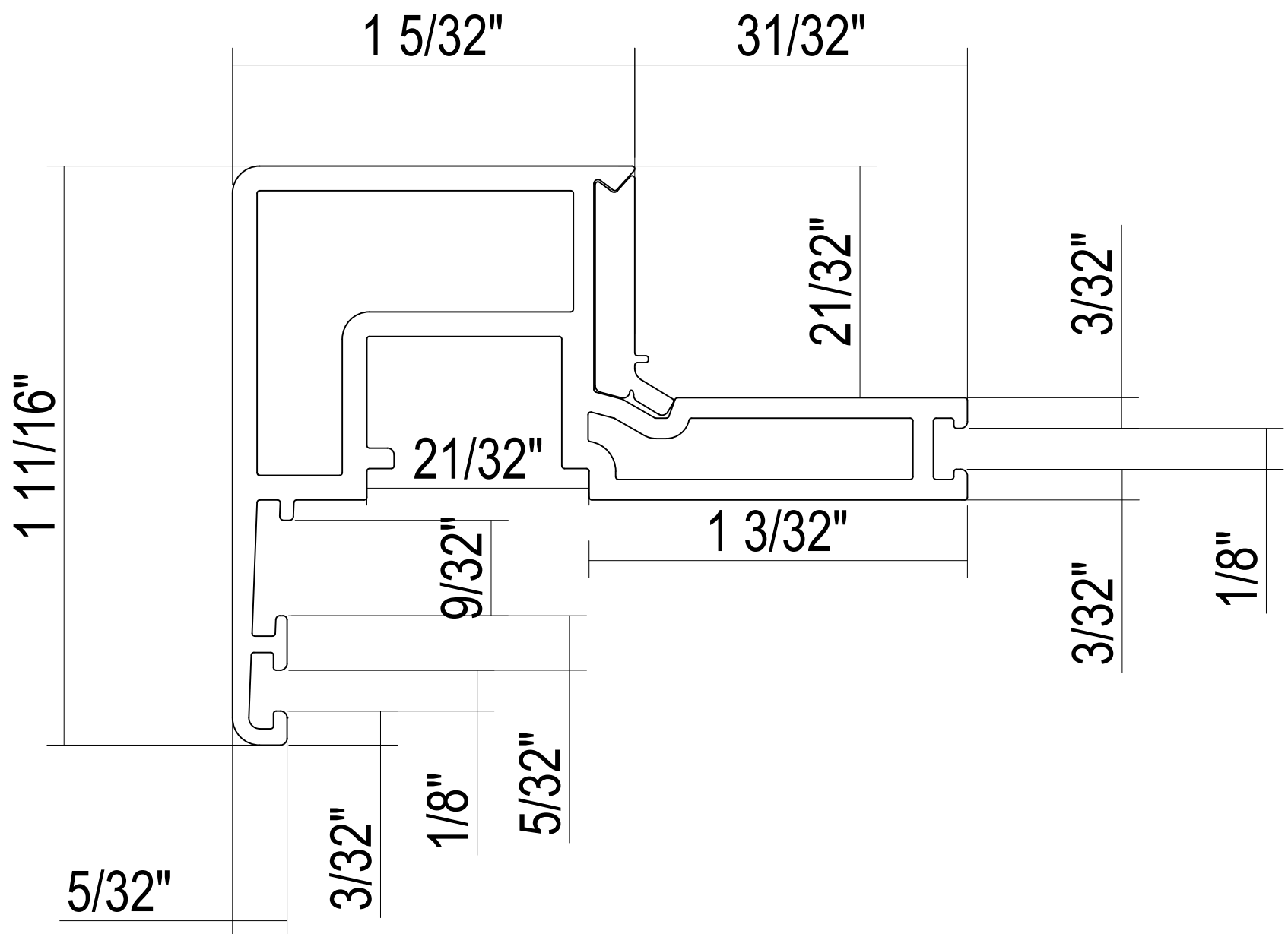


PA66



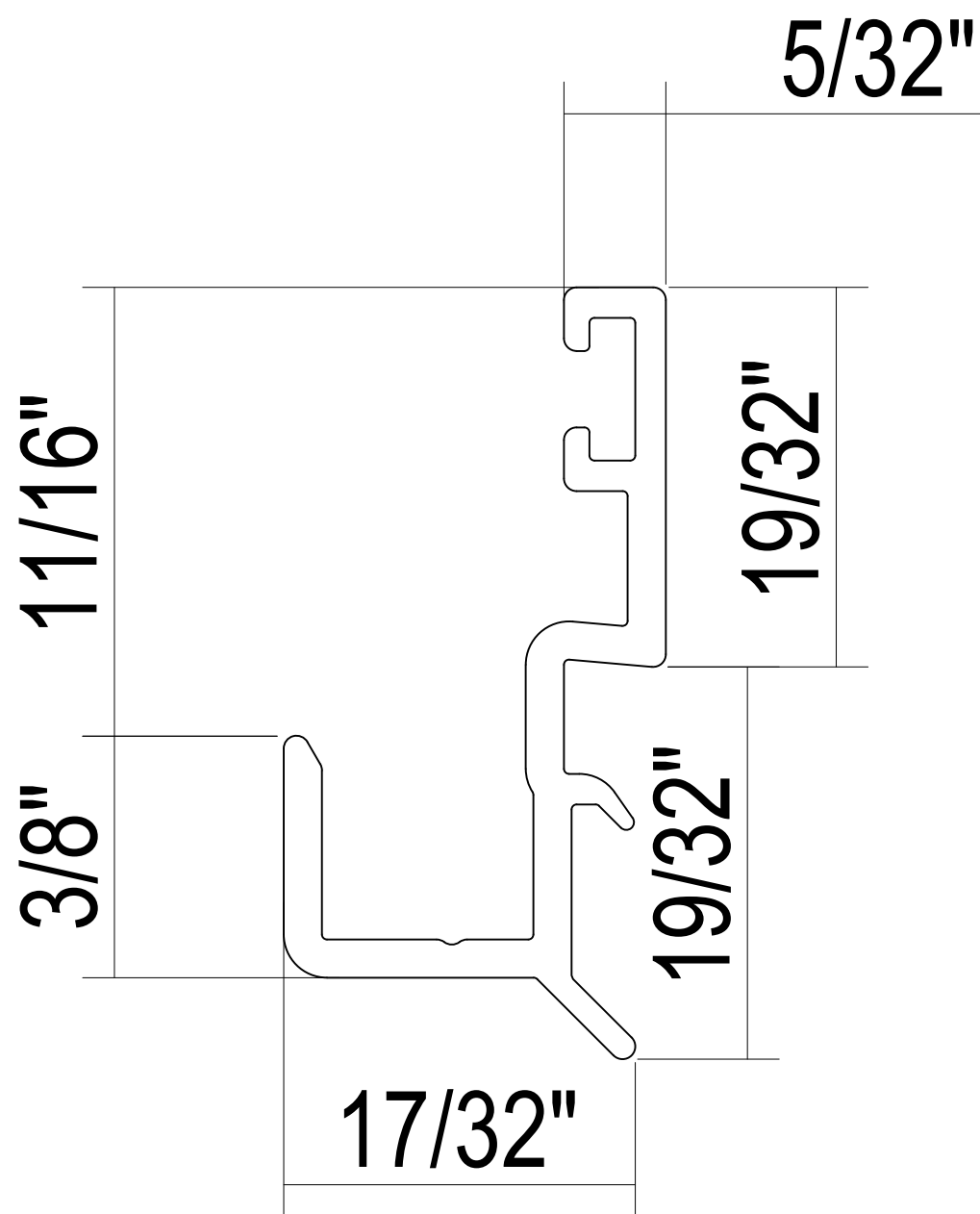
Sash

Material: Aluminum



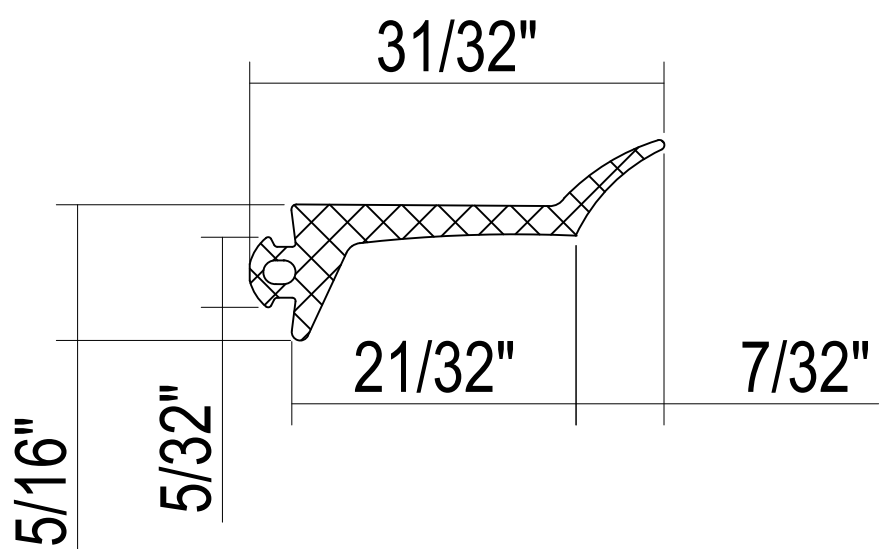
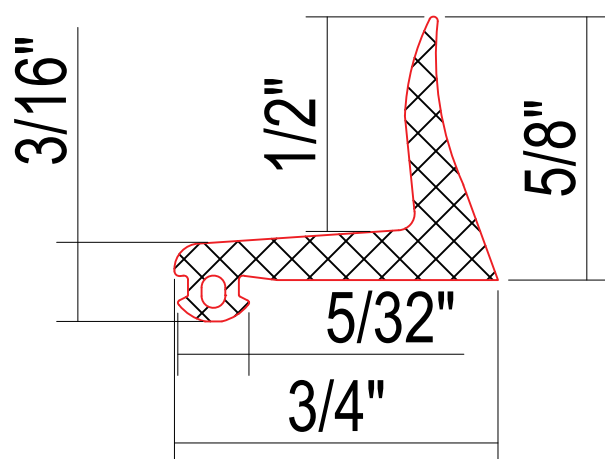
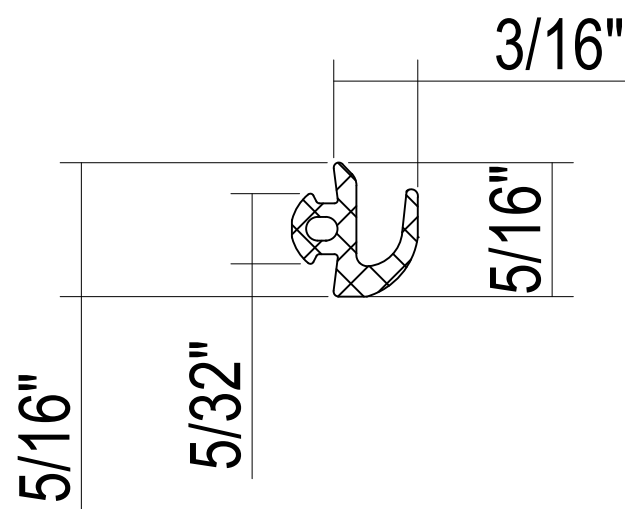
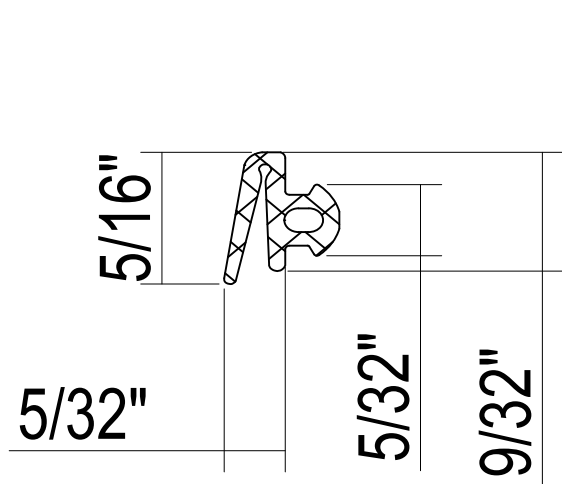
Cover profile

Materia: Aluminum



Gaskets

Material: EPDM



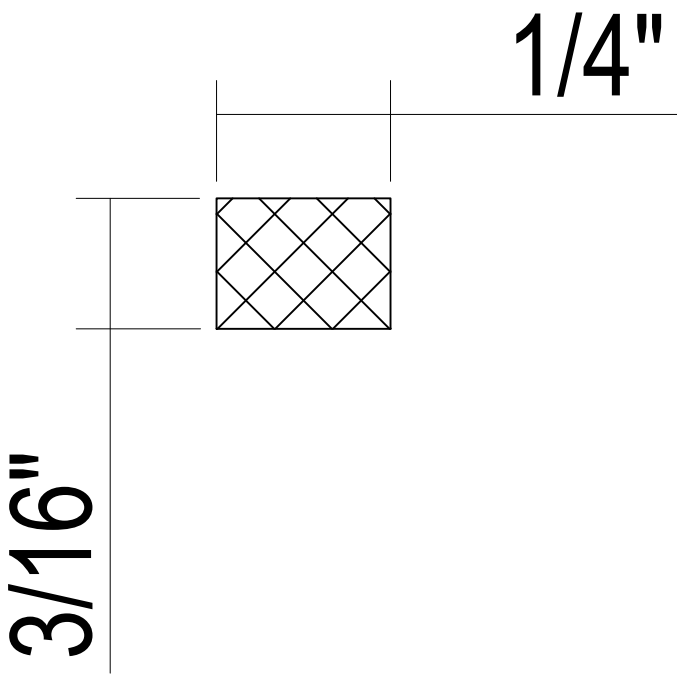
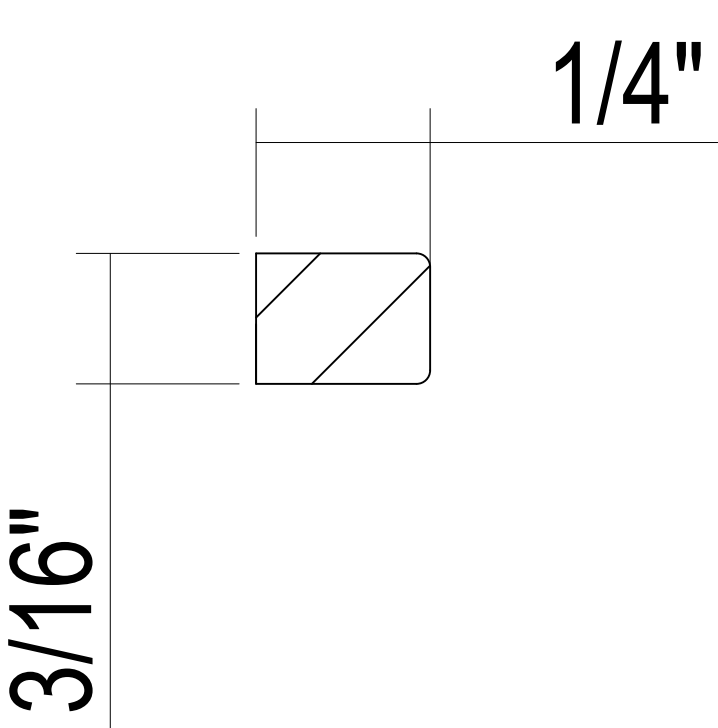
Glazing Elements

Materia: Sylicone + Poliurethane

Sylicone

Poliurethane

Polyurethane Foam

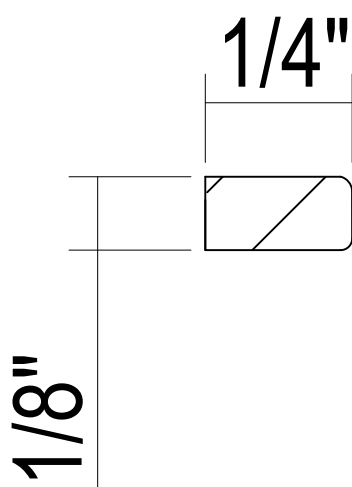
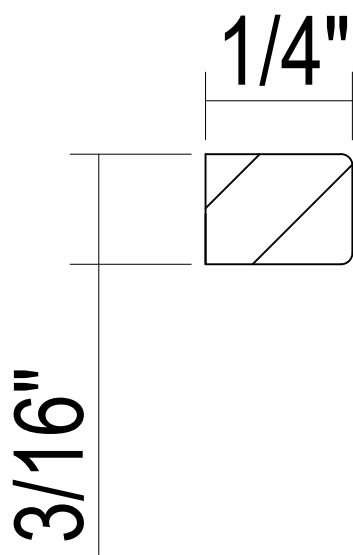
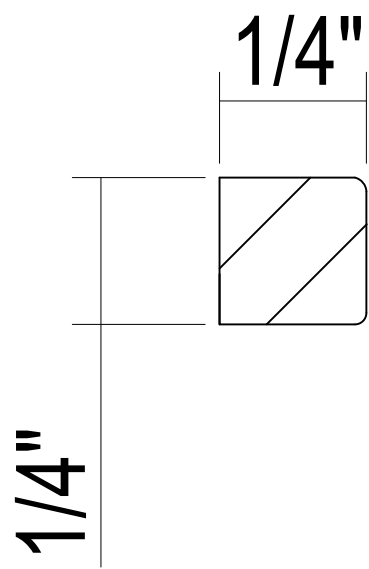


Glazing variants

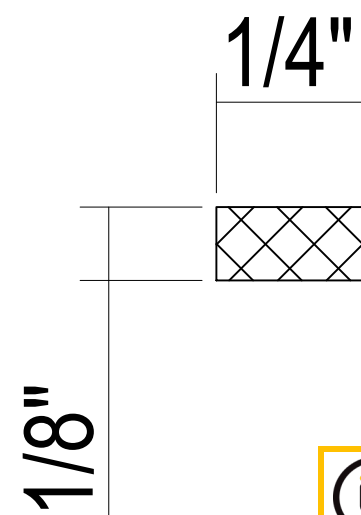
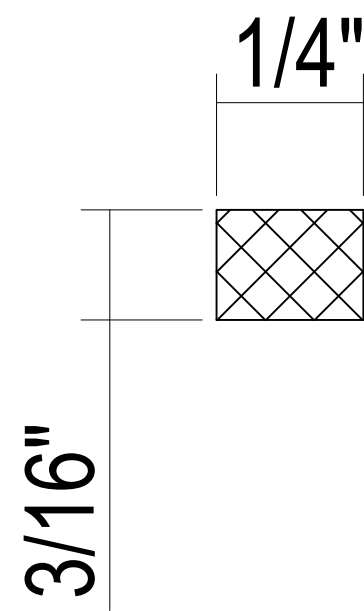
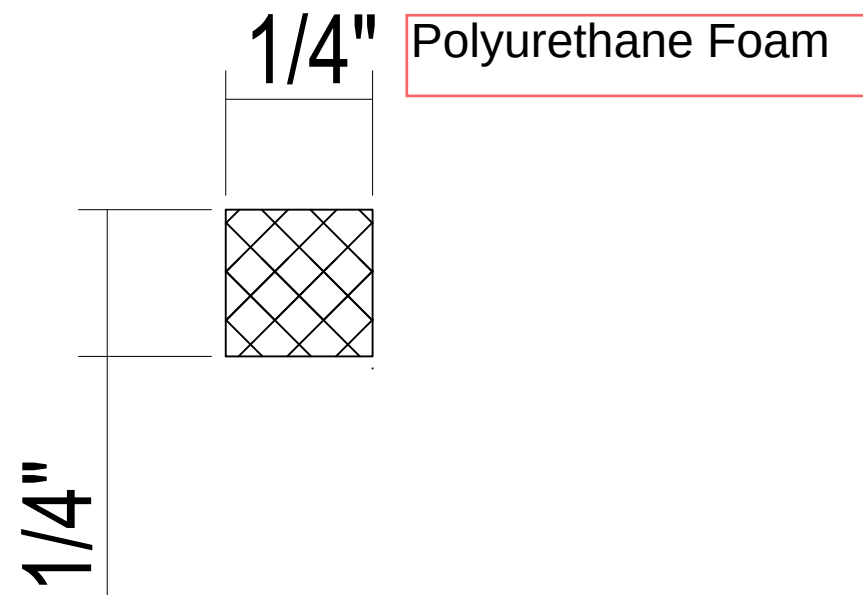
Glazing tape and sylicone

Materia: Sylicone + Poliurethane

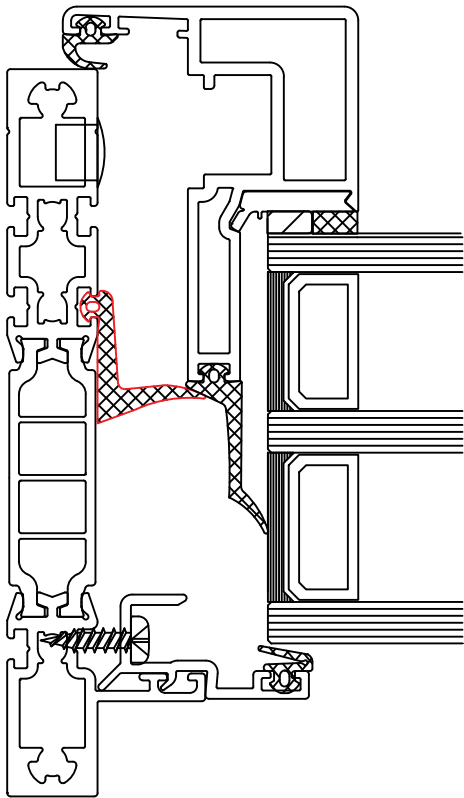
Sylicone



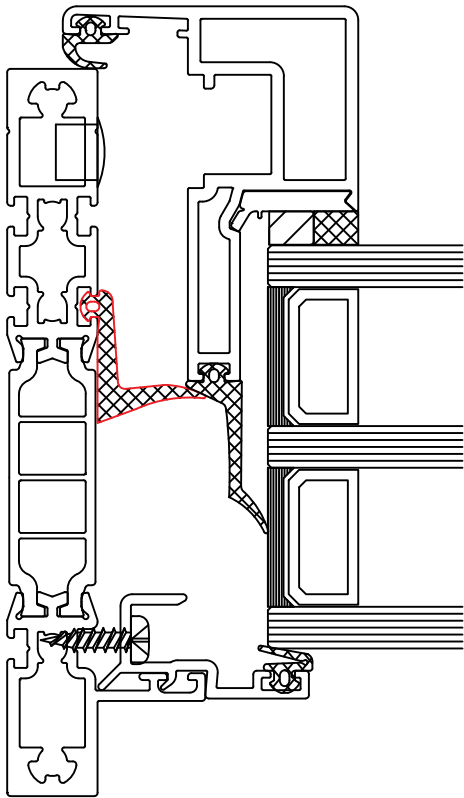
Poliurethane



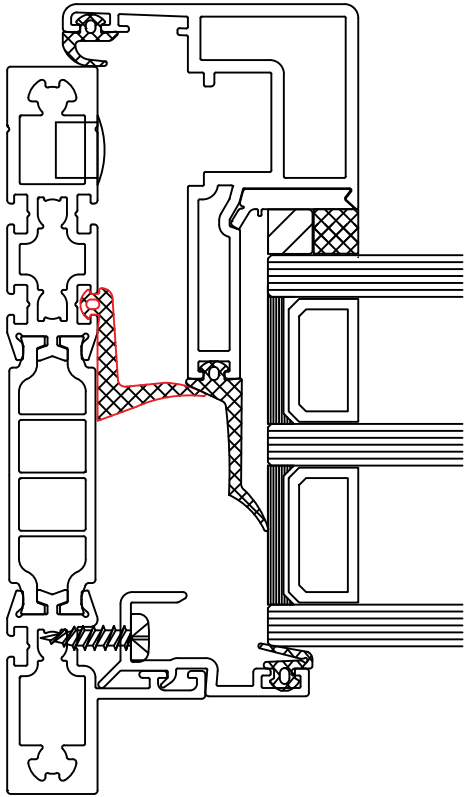
Glazing range



From 2 5/16" to 2 3/8"

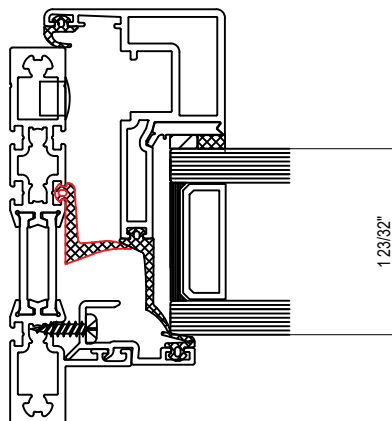
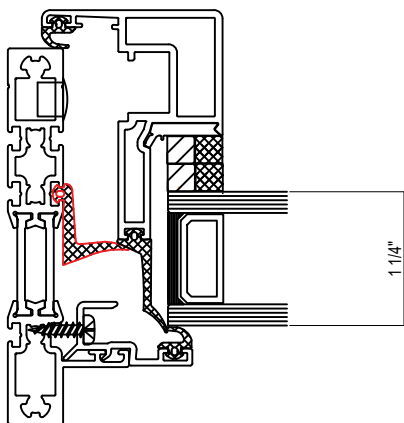


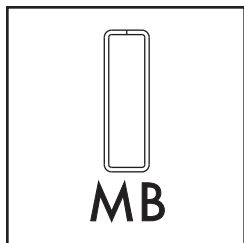
From 2 1/4 " to 2 5/16"



From 2 7/32 " to 2 1/4"

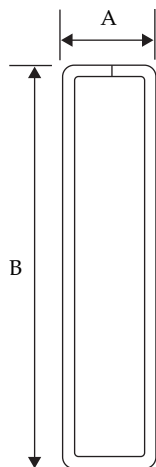
Glazing Range





Muntin Bar

Aluminum: Painted, Mill Finish, Clear & Color-In™ Anodized



TOLERANCE

A, ± .005 (.127mm)

B, ± .005 (.127mm)

SPECIAL NOTICE

Cleaning and Handling of Muntin Bar

We recommend muntin bar to be wiped clean before installation into an insulating glass unit. A household grade liquid cleaner may be used for this purpose.

To avoid breakdown of painted surfaces, do not use M.E.K., Triethane, Alcohol or like substances for the cleaning of painted muntin bar.

When machining and processing muntin bar in your plant, keep saw tables and work areas free of saw cut filings to avoid scratching the painted surfaces.

Packaging Information

Muntin Bar Size	Part #	Pieces Per Shipping Carton 12' 8" Lengths	Lineal Feet Per Shipping Carton 12' 8" Lengths
1/8 x .610	219697	200	2533
3/16 x 9/16 [†]	119320	150	1900
3/16 x .610 [†]	119705	125	1583
3/16 x 5/8 [†]	120874	125	1583
3/16 x 3/4	122909	110	1393
3/16 x 13/16	123618	110	1393
3/16 x 1	123823	85	1076
1/4 x 9/16	119427	135	1710
1/4 x 5/8 [†]	121410	120	1520
1/4 x 3/4	123063	95	1203
1/4 x 13/16	215017	95	1203
1/4 x 1	123836	70	887
1/4 x 1 1/4	123856	51	646
5/16 x 1	210318	60	684
3/8 x 5/8	121468	90	1140
3/8 x 3/4	123088	75	950
3/8 x 13/16	215016	70	887
3/8 x 7/8	123797	55	697
3/8 x 1	201968	55	696
3/8(.375) x 3/8	205591	140	1773
7/16 x 3/8	119016	115	1457
7/16 x 3/8	216500**	115	1457
7/16 x 1/2	213045	88	1115
7/16 x 5/8 ^Δ	214621	65	823
1/2 x 3/4 [*]	201043	50	633
1/2 x 1	203710	40	506

Specification In Inches

Muntin Bar Size	A	B
1/8 x .610	.125	.610
3/16 x 9/16 [†]	.187	.551
3/16 x .610 [†]	.187	.610
3/16 x 5/8 [†]	.187	.630
3/16 x 3/4 [†]	.187	.775
3/16 x 13/16 [†]	.187	.801
3/16 x 1	.187	1.000
1/4 x 9/16	.235	.562
1/4 x 5/8 [†]	.235	.625
1/4 x 3/4	.235	.765
1/4 x 13/16	.235	.801
1/4 x 1	.235	1.000
1/4 x 1 1/4	.235	1.250
5/16 x 1	.312	1.000
3/8 x 5/8 [†]	.325	.625
3/8 x 3/4	.325	.750
3/8 x 13/16	.325	.801
3/8 x 7/8	.325	.875
3/8 x 1	.325	1.000
3/8(.375) x 3/8	.375	.375
7/16 x 3/8	.438	.375
7/16 x 3/8	.438	.375
7/16 x 1/2	.438	.500
7/16 x 5/8 ^Δ	.438	.625
1/2 x 3/4 [*]	.500	.750
1/2 x 1	.500	1.000

Part numbers shown are standard white color.

[†] Available in tutone. Please see Color Selection Chart located in front of catalog.

^Δ Part number shown is Dark Bronze Anodized Color.

^{*} Part number shown is Clear Anodized. ^{**}Part number shown is white welded.

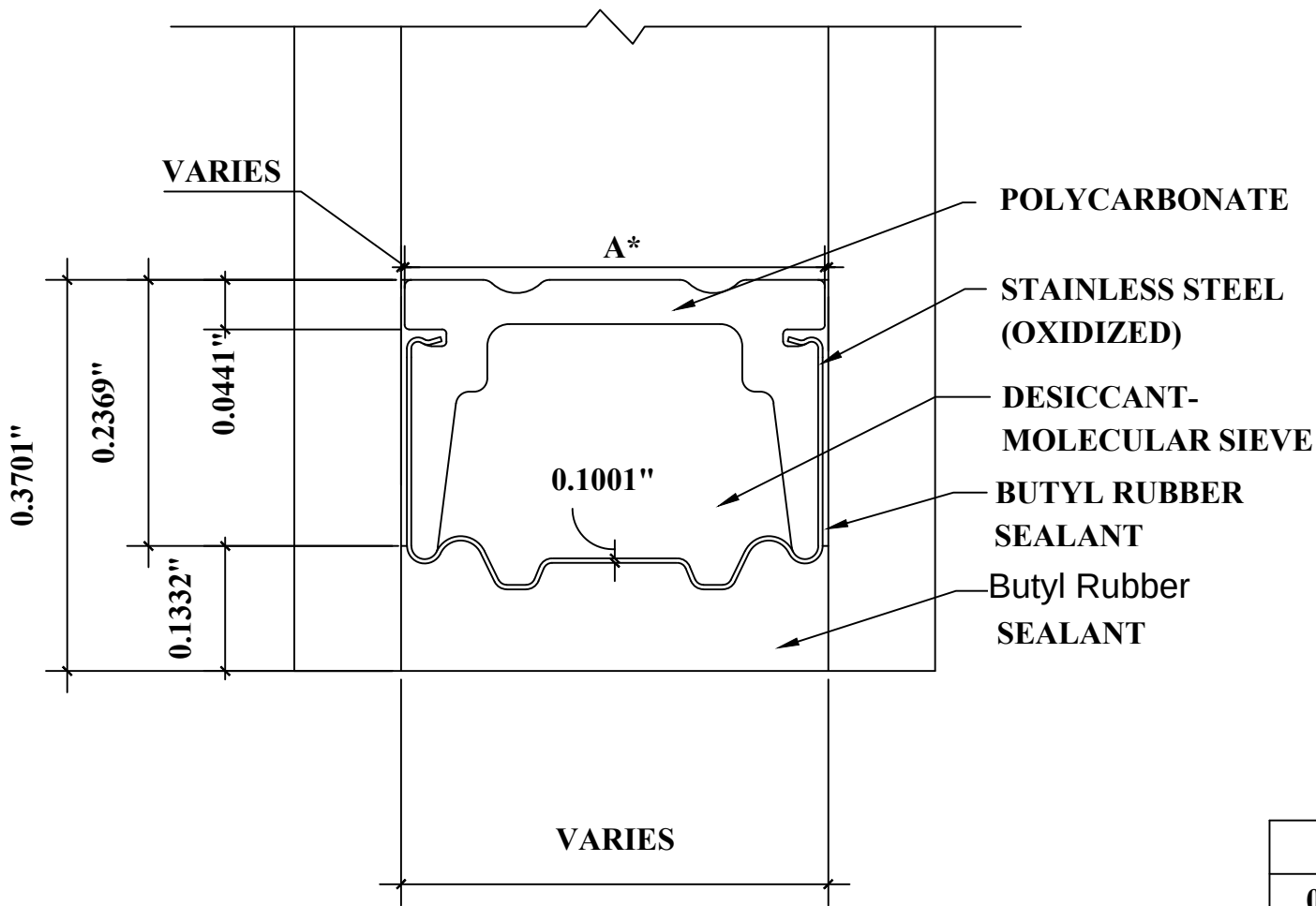
Note: Available in pre-cut lengths and pre-notched; tutone and post-painted. Custom colors also available.

Material thickness: .0185



Report #: S1260-116-45

Date: 4/9/2025



DETAIL FOR THERMAL MODELING OF
ROLLTECH CHROMATECH ULTRA SPACER (TS-D)

A
0.929"
0.850"
0.772"
0.693"
0.614"
0.575"
0.535"
0.496"
0.457"
0.378"
0.299"



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TEST REPORT FOR HANSEN POLSKA

Report No: S1260.01-116-45 R0

Date: 04/10/25

SECTION 8

REVISION LOG

REVISION #	DATE	PAGES	REVISION
.01 R0	04/10/25	N/A	Original report issue.
