

# ALIPLAST sp. Z o.o.

## TEST REPORT

### TEST REPORT ISSUED TO

Aliplast sp. Z o.o.  
Waclawa Moritza 3  
20-276 Lublin  
Poland

### SPECIFICATION

ASTM E283, ASTM E547, ASTM E331, ASTM E330

### EVALUATION PROPERTIES

Air Leakage, Water Penetration Resistance & Uniform Load

### PRODUCT SERIES & TYPE

MS Wall – Fixed Window Wall Combination - Mulled

### REPORT NUMBER

103682459COQ-001H

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18-July-2019

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## TEST REPORT FOR ALIPLAST sp. Z o.o.


Report No.: 103682459COQ-001H


Date: 18-July-2019

### CONCLUSION

The MS Wall – Fixed Window Wall Combination - Muller System, submitted by Aliplast sp. Z o.o., tested and described within this report, achieved the overall performance requirements as noted in Section 1 of this report, when tested to the standard test methods of ASTM E283, ASTM E547, ASTM E331 and ASTM E330.

For INTERTEK B&C:

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**SECTION 1**  
**SUMMARY OF RESULTS**

A test procedure and summary of results completed on the MS Wall – Fixed Window Wall Combination - **Mulled** are as shown below:

Test	Result	
ASTM E283 - Air Leakage Test at 75 Pa, L/s*m <sup>2</sup> (cfm/ft <sup>2</sup> )	<u>Infiltration</u> 0.04 (0.01)	<u>Exfiltration</u> 0.01 (0.00)
ASTM E283 - Air Leakage Test at 300 Pa, L/s*m <sup>2</sup> (cfm/ft <sup>2</sup> )	<u>Infiltration</u> 0.10 (0.02)	<u>Exfiltration</u> 0.01 (0.00)
ASTM E547 - Static Water Penetration Test at 720 Pa	PASS	
ASTM E331 - Static Water Penetration Test at 720 Pa	PASS	
ASTM E330 - Structural – 100% of Design +4800 Pa / -4800 Pa	<u>Deflection – mm (in.)</u>	
	<u>Positive Windload</u> 6.97 (0.27)	<u>Negative Windload</u> 7.25 (0.29)
ASTM E330 - Structural – 150% of Design +7200 Pa / -7200 Pa	PASS	

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**SECTION 2**

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**SECTION 3**  
**OBJECTIVE**

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for **Aliplast sp. Z o.o.** (Aliplast) on a 3055 mm (120.3”) x 3050 mm (120.1”) MS Wall – Fixed Window Wall Combination - Muller System. Testing was conducted in accordance with following standard / specification:

- ASTM E283-04(2012) “Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Differences Across the Specimen”
- ASTM E547-00(2016) “Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference”
- ASTM E331-00(2016) “Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference”
- ASTM E330/E330M-14 “Standard Test Method for Structural Performance of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference”

This evaluation was started on March 13, 2019 and completed on March 14, 2019.

**SECTION 4**  
**SAMPLE ASSEMBLY AND DESCRIPTION**

<b>Manufacturer Information</b>	Aliplast sp. Z o.o. Waclawa Moritza 3 20-276 Lublin Poland
<b>Model Name</b>	<ul style="list-style-type: none"> <li>• MS Wall – Fixed Window Wall Combination - Muller</li> </ul>
<b>Installation</b>	<ul style="list-style-type: none"> <li>• Test Buck: Welded steel box frame, made from 4x pieces of 4” x 4” x 3/16” steel box beam. A wood frame made from nominal 2x12 spf was used around the perimeter of the steel box frame, secured with #12 x 3” Tek screws approximately 254-304 mm (10”-12”) o.c.             <ul style="list-style-type: none"> <li>• Specimen to Buck:                 <ul style="list-style-type: none"> <li>• The sample was secured to steel plates, each welded to the box frame in 4x locations along each the head and sill, at each jamb and vertical mullion end location. Each location was secured to the steel plates with 4x 3/8” x 1-1/4” bolts.</li> <li>• A steel plate is secured to the main-frame profile sill and head with 4x 5/16” x 1-1/8” flat-head bolts. The steel mounting plate has a rectangular steel profile welded to it, approximately 241 mm (9-1/2”) long, and inserts into the jamb or vertical mullion assembly. The jambs are also secured to the rectangular beam with 4x 5/16” x 5/8” pan head bolts.</li> </ul> </li> <li>• Silicone and foam rod were used around the entire perimeter of the sample, in the rough opening, on each the exterior and interior side.</li> </ul> </li> </ul>

<p><b>Size</b></p>	<ul style="list-style-type: none"> <li>• Overall Size:             <ul style="list-style-type: none"> <li>• Width: 3055 mm (120.3")</li> <li>• Height: 3050 mm (120.1")</li> </ul> </li> <li>• (2x) Bottom Jamb-side Window Size:             <ul style="list-style-type: none"> <li>• Width: 1002 mm (41.4")</li> <li>• Height: 2298 mm (90.5")</li> </ul> </li> <li>• (2x) Top Jamb-side Window Size:             <ul style="list-style-type: none"> <li>• Width: 1002 mm (41.4")</li> <li>• Height: 752 mm (29.6")</li> </ul> </li> <li>• Bottom Middle Window Size:             <ul style="list-style-type: none"> <li>• Width: 1050 mm (41.4")</li> <li>• Height: 2298 mm (90.5")</li> </ul> </li> <li>• Top Middle Window Size:             <ul style="list-style-type: none"> <li>• Width: 1050 mm (41.4")</li> <li>• Height: 752 mm (29.6")</li> </ul> </li> </ul>
<p><b>Main Frame</b></p>	<ul style="list-style-type: none"> <li>• Material: Thermally broken aluminum. Full length jambs, head and sill.             <ul style="list-style-type: none"> <li>• Reinforcement: None.</li> </ul> </li> <li>• Corners: Mitre joined             <ul style="list-style-type: none"> <li>• The steel installation plates with welded 241 mm (9-1/2") long rectangular profile inserted into the jambs were used to secure the corner joints. 4x 5/16" x 1-1/8" flat-head bolts were used to secure the steel plate to the head or sill. 4x 5/16" x 5/8" pan head bolts were used to secure the steel rectangular profile to the jambs. The holes for these bolts in the jambs were sealed with silicone.</li> <li>• An aluminum angle profile was used on the outside of the corner joint, on the exterior side. Secure to the jamb and head or sill, each with 2x #8 x 3/4" self-tapping pan head screws.</li> <li>• The corners of aluminum and gaskets were sealed with silicone</li> </ul> </li> </ul>
<p><b>Vertical Mullion (2x)</b></p>	<ul style="list-style-type: none"> <li>• Combination mullion – Thermally broken aluminum.             <ul style="list-style-type: none"> <li>• Reinforcement: None.</li> </ul> </li> <li>• The mullion is constructed with the use of 2x sub-frame profiles mullied back to back with additional gaskets used between.             <ul style="list-style-type: none"> <li>• The corners of aluminum and gaskets were sealed with silicone</li> </ul> </li> </ul>
<p><b>Horizontal Mullion (3x)</b></p>	<ul style="list-style-type: none"> <li>• Integral mullion – Thermally broken aluminum             <ul style="list-style-type: none"> <li>• Reinforcement: None.</li> </ul> </li> <li>• Each secured to the sub-frame profiles of the vertical mullions or jambs with the use of an aluminum shear block on either side. The shear block was secured to the frame profile with 4x #10 x 5/8" pan-head screws. The horizontal mullion profile slides over the shear blocks, and is then secured the shear block with 2x #8 x 1-1/4" self-tapping flat-head screws, and 2x into the screw chases of the shear block.             <ul style="list-style-type: none"> <li>• Silicone is used at the end of the mullion to seal it to the joining frame profile.</li> </ul> </li> </ul>

<b>Fixed Window (6x)</b>	
<b>Sub-Frame</b>	<ul style="list-style-type: none"> <li>• Material: Thermally broken aluminum                             <ul style="list-style-type: none"> <li>• Reinforcement: None.</li> </ul> </li> <li>• Corners: Aluminum corner key is used in the large frame cavity.</li> <li>• The thermal strut cavity was filled with a foam profile.</li> </ul>
<b>Drainage</b>	<ul style="list-style-type: none"> <li>• The horizontal glazing stops at the bottom of each glazing unit have 30 mm (1.18") x 5 mm (0.20") slots to provide drainage. 2x slots, each centered approximately 130 mm (5-1/8") from the end of the stops.</li> <li>• The 2x main frame gaskets along the sill each have 2x notches to allow drainage, each approximately 25 mm (1") wide. The exterior gasket is centered approximately 152 mm (6") from the corners, and the gasket behind the exterior layer was centered approximately 305 mm (12") from the corners.</li> </ul>
<b>Glazing (5x)</b>	<ul style="list-style-type: none"> <li>• IGU specification:                             <ul style="list-style-type: none"> <li>• 4 mm annealed / 4 mm annealed / 6 mm tempered with 2x 16 mm Warm-Edge Spacers (Chromatech Ultra, Black 9004), sealed together using Hot melt butyl.</li> <li>• Overall thickness, 46 mm (~1.8")</li> </ul> </li> <li>• Glazing Blocks: 2x aluminum angle profile setting block carriers are adhered to the sill or horizontal mullion, centered approximately 178 mm (7") – 229 mm (9") from the edge of glass. Each aluminum setting block carrier had a plastic setting block set on it, approximately 102 mm (4") x 32 mm (1-1/4") x 1 mm (0.04").</li> <li>• Laid-in, exterior glazed on top of glazing gaskets, applied as 4 strips with the corners sealed with silicone.</li> <li>• A foam profile is used around the entire perimeter of each sealed unit, adhered to the thermal strut, continuous around the corners but not at the setting block locations.</li> <li>• Glazing Stops: Aluminum glazing stop is continuous as 1 piece along the verticals for the bottom and top windows. The horizontal are mitred to the verticals at the top of the top unit, and bottom of the bottom unit, the glazing stops along the horizontal mullion are butted to the vertical. A glazing gasket is used around the perimeter of the glazing unit, applied as one strip with a joint at the mid-point of the top of each unit. The joint is sealed with silicone.</li> </ul>
<b>Drawings</b>	<ul style="list-style-type: none"> <li>• Copy of drawings supplied by Aliplast sp. Z o.o. included in Appendix A.</li> </ul>

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## SECTION 5

### TESTING AND EVALUATION METHODS

#### AIR LEAKAGE RESISTANCE

The Air Leakage Resistance test was performed in accordance with ASTM E283-04(2012), “*Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*”. Air infiltration and exfiltration tests were performed using test pressures of 75 Pa (1.57 psf) and 300 Pa (6.27 psf). The maximum air leakage rate was calculated and reported.

#### WATER PENETRATION RESISTANCE – ASTM E547

A four-cycle Water Penetration Resistance test was performed in accordance with ASTM E547-00(2016) “*Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference*” (ASTM E547). The test was performed using the specified pressure differential and a water spray rate of at least 204 L/m<sup>2</sup> per hour (5.0 U.S. gal/ft<sup>2</sup> per hour). Each cycle consisted of five minutes with the pressure applied and one minute with the pressure released, during which the water spray was continuously applied.

#### WATER PENETRATION RESISTANCE – ASTM E331

The Static Water Penetration Resistance Test was performed in accordance with ASTM E331-00(2016) “*Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*” (ASTM E331). The test was performed using the specified pressure differential and a water spray rate of at least 204 L/m<sup>2</sup> per hour (5.0 U.S. gal/ft<sup>2</sup> per hour). Duration of the test was 15 minutes, during which the water spray and air pressure were continuously applied.

#### UNIFORM LOAD DEFLECTION

The Uniform Load Deflection tests were conducted in accordance with ASTM E330/E330M-14 “*Standard Test Method for Structural Performance of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference*” (ASTM E330), Procedure A. The tests were performed in both the positive and negative directions. After a 60 second preload (50% of the test load), followed by 1 minute with the pressure released, the tests were conducted at the specified test pressure for a period of 60 seconds. Deflections were measured at the mid-span and at the ends. The end deflections were averaged and subtracted from the mid-span deflection (to eliminate deflections caused by movement at the ends of the structural supporting members).



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## UNIFORM LOAD STRUCTURAL

The Uniform Load Structural tests were conducted in accordance with ASTM E330/E330M-14 “Standard Test Method for Structural Performance of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference” (ASTM E330), Procedure A. After a 60 second preload (50% of test load), followed by 1 minute with the pressure released, the sample was subjected to a Uniform Load Structural test using a specified test pressure for a time of 60 seconds. The test was performed in both the positive and negative directions. After the test loads were released, the permanent deflections were recorded and the specimen was inspected for failure or permanent deformation of any part of the system that would cause any operational malfunction.

## SECTION 6

### TEST EQUIPMENT

Equipment used during testing is listed as follows:

Test	Equipment	Intertek ID#
Air Leakage Resistance, Water Penetration Resistance, and Uniform Load Deflection / Structural	Fenestration Testing Control Unit	60650
	Water spray assembly	60651
		60652
		60653
	20" Line Gauge	60673
		64928
		64926

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**SECTION 7****RESULTS AND OBSERVATIONS****AIR LEAKAGE RESISTANCE**

Air test data is indicated in the following table:

Property	Area m <sup>2</sup> (ft <sup>2</sup> )	Infiltration Rate L/s*m <sup>2</sup> (cfm/ft <sup>2</sup> )	Exfiltration Rate L/s*m <sup>2</sup> (cfm/ft <sup>2</sup> )
Overall Assembly @ 75 Pa	9.32 (100.30)	0.04 (0.01)	0.01 (0.00)
Overall Assembly @ 300 Pa	9.32 (100.30)	0.10 (0.02)	0.01 (0.00)

**WATER PENETRATION RESISTANCE – ASTM E547**

During the 24-minute test period, using a pressure differential of 720 Pa (15.0 psf), there was no water leakage observed. The system **met** the 720 Pa Water Penetration performance requirements.

**WATER PENETRATION RESISTANCE – ASTM E331**

During the 15-minute test period, using a pressure differential of 720 Pa (15.0 psf), there was no water leakage observed. The system **met** the 720 Pa Static Water Penetration performance requirements.

**UNIFORM LOAD – DEFLECTION & STRUCTURAL**Vertical Mullion Deflection Data:

Vertical Mullion span, L = 3050 mm (120.08")

Test Pressure, Pa (psf)	Deflection Measurements, mm (in.)			
	Positive		Negative	
	Deflection	Residual	Deflection	Residual
4800 (100.2)	6.97 (0.27)	0.00 (0.00)	7.25 (0.29)	0.03 (0.00)
7200 (150.4)	n/a	0.05 (0.00)	n/a	0.03 (0.00)

Horizontal Mullion Deflection Data:

Horizontal Mullion span, L = 972 mm (38.27")

Test Pressure, Pa (psf)	Deflection Measurements, mm (in.)			
	Positive		Negative	
	Deflection	Residual	Deflection	Residual
4800 (100.2)	0.31 (0.01)	0.05 (0.00)	0.38 (0.01)	0.03 (0.00)
7200 (150.4)	n/a	0.05 (0.00)	n/a	0.15 (0.01)

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## SECTION 8 CONCLUSION

The MS Wall – Fixed Window Wall Combination - Muller System, submitted by Aliplast sp. Z o.o., tested and described within this report, achieved the overall performance requirements as noted in Section 1 of this report, when tested to the standard test methods of ASTM E283, ASTM E547, ASTM E331 and ASTM E330.

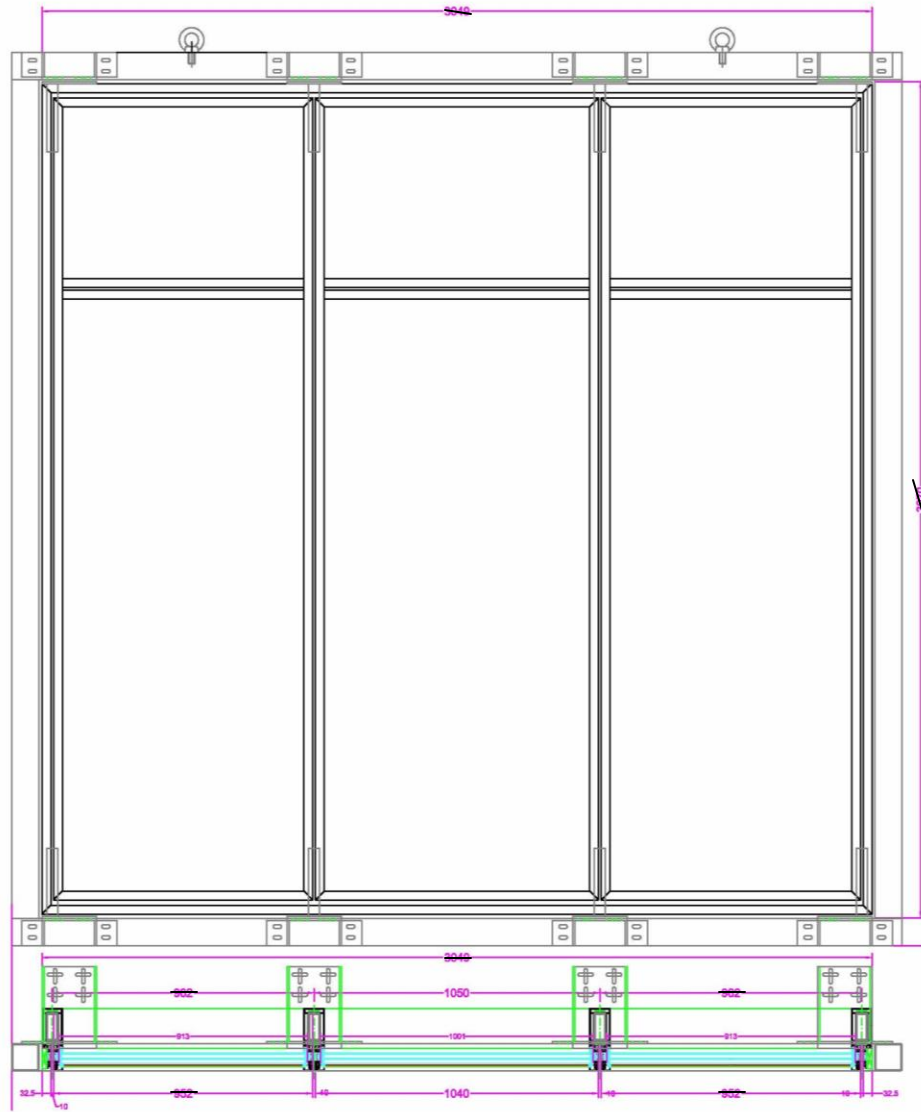
**SECTION 9**

**APPENDIX A: DRAWINGS**

**(12 Pages)**

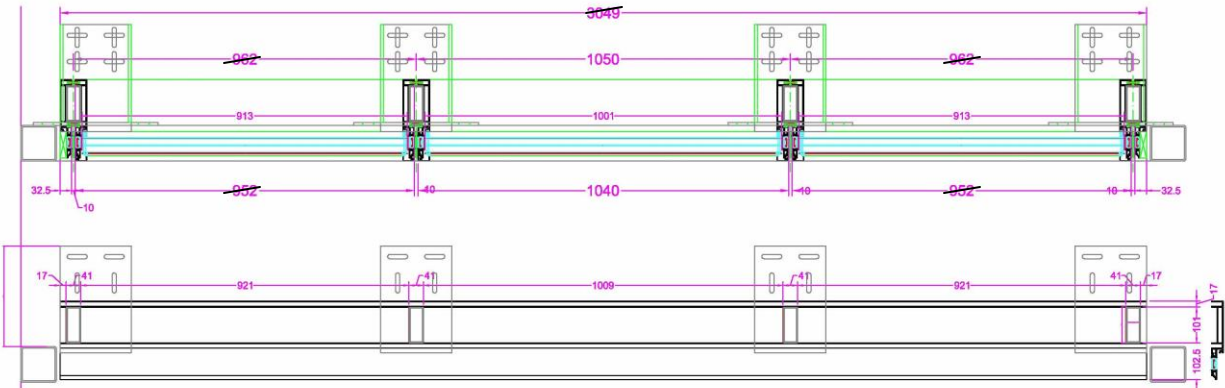
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MS Series



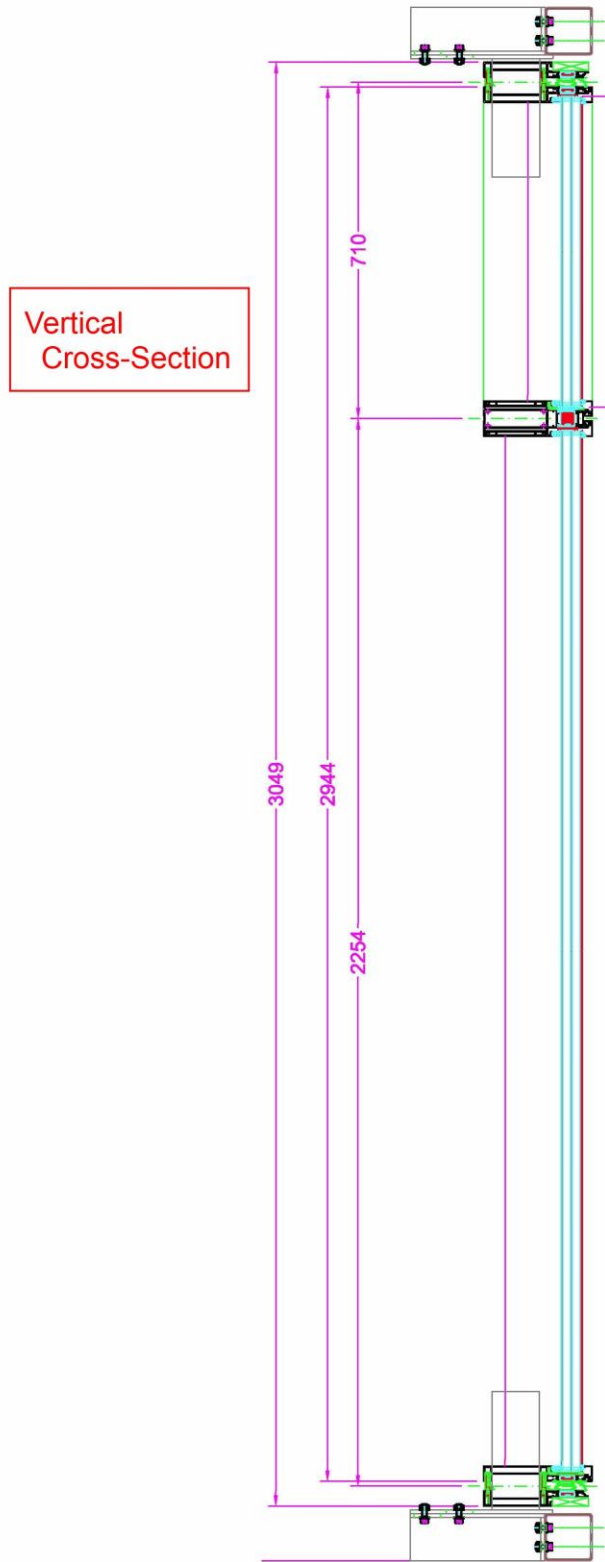
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Horizontal Cross-Sections



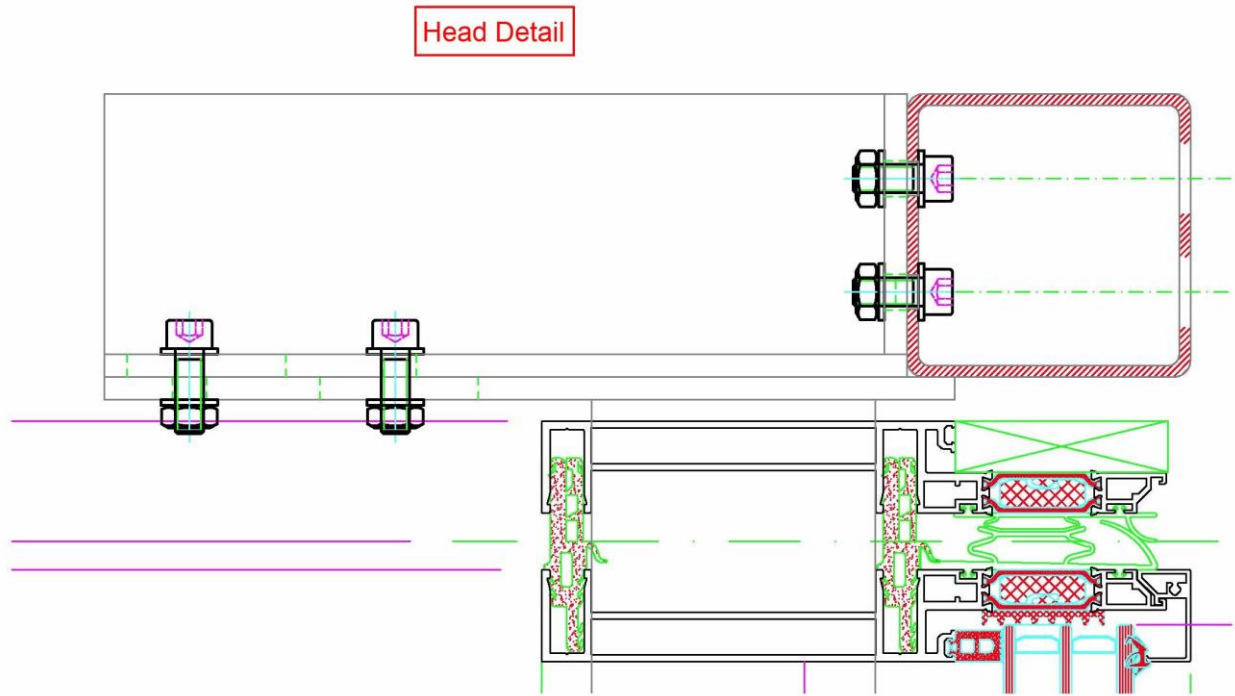
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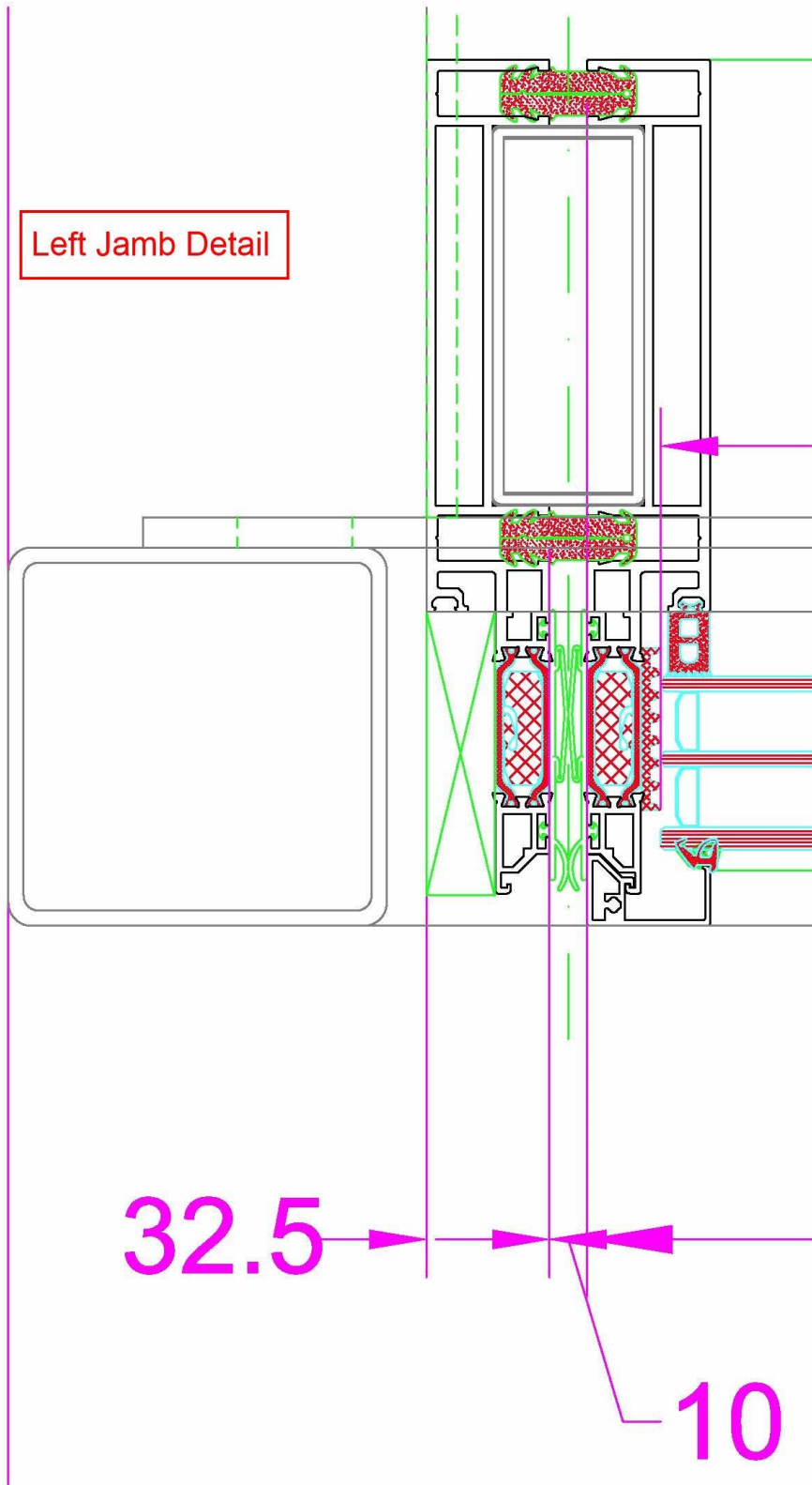
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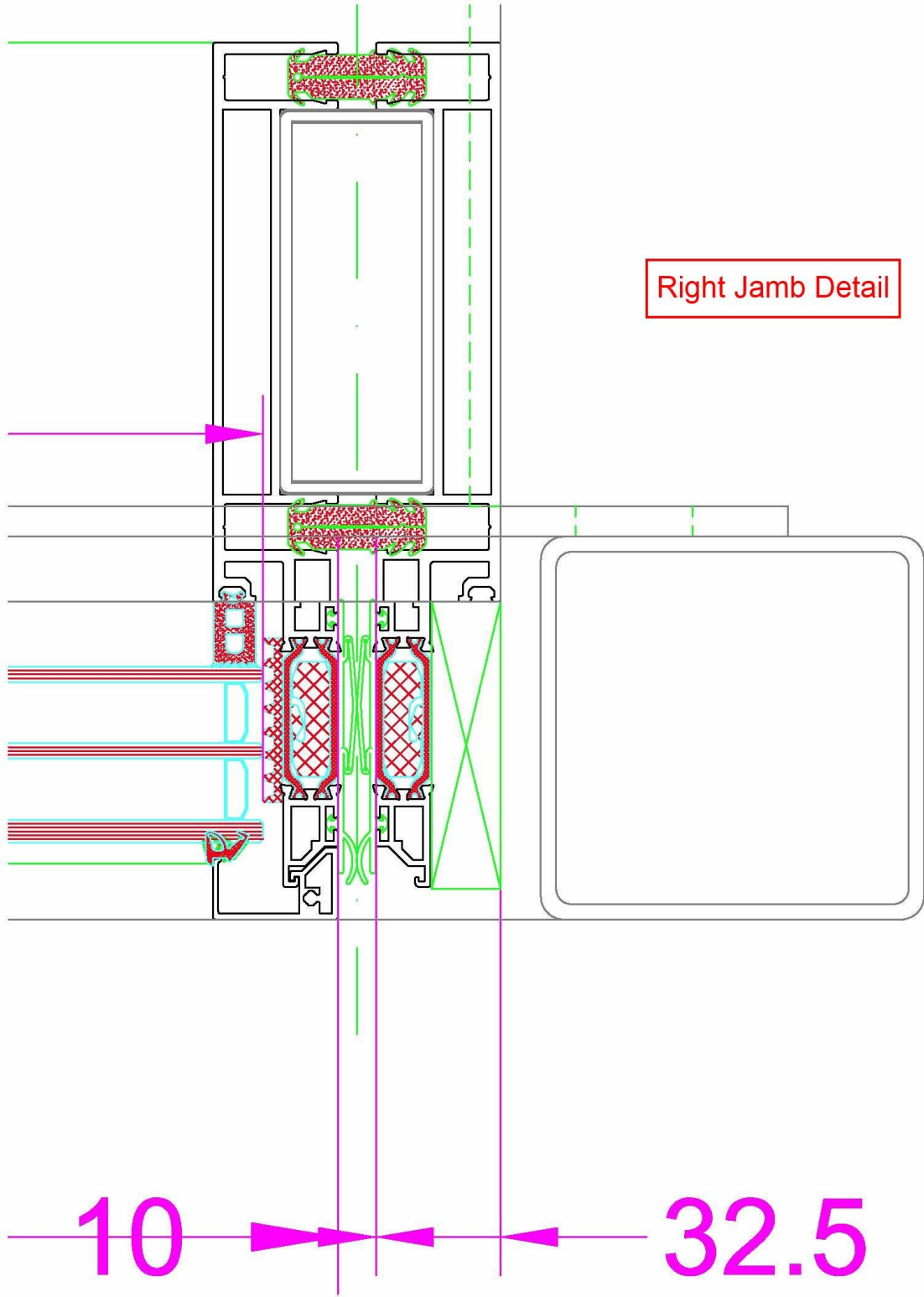
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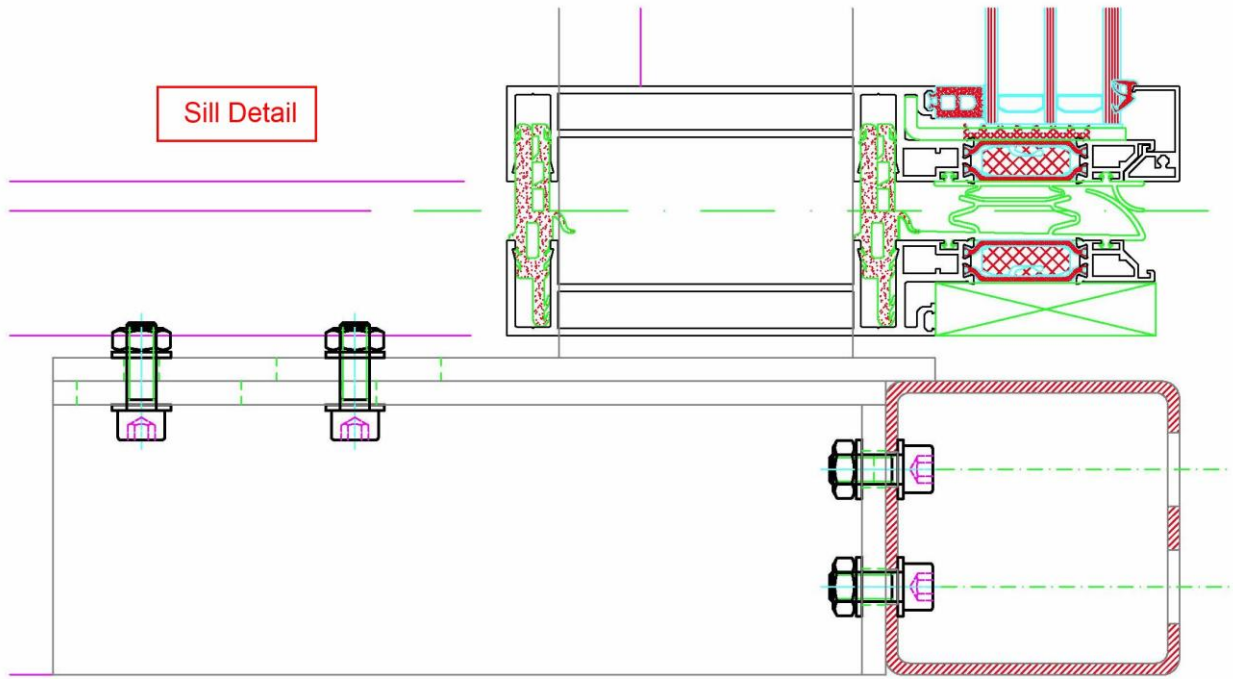


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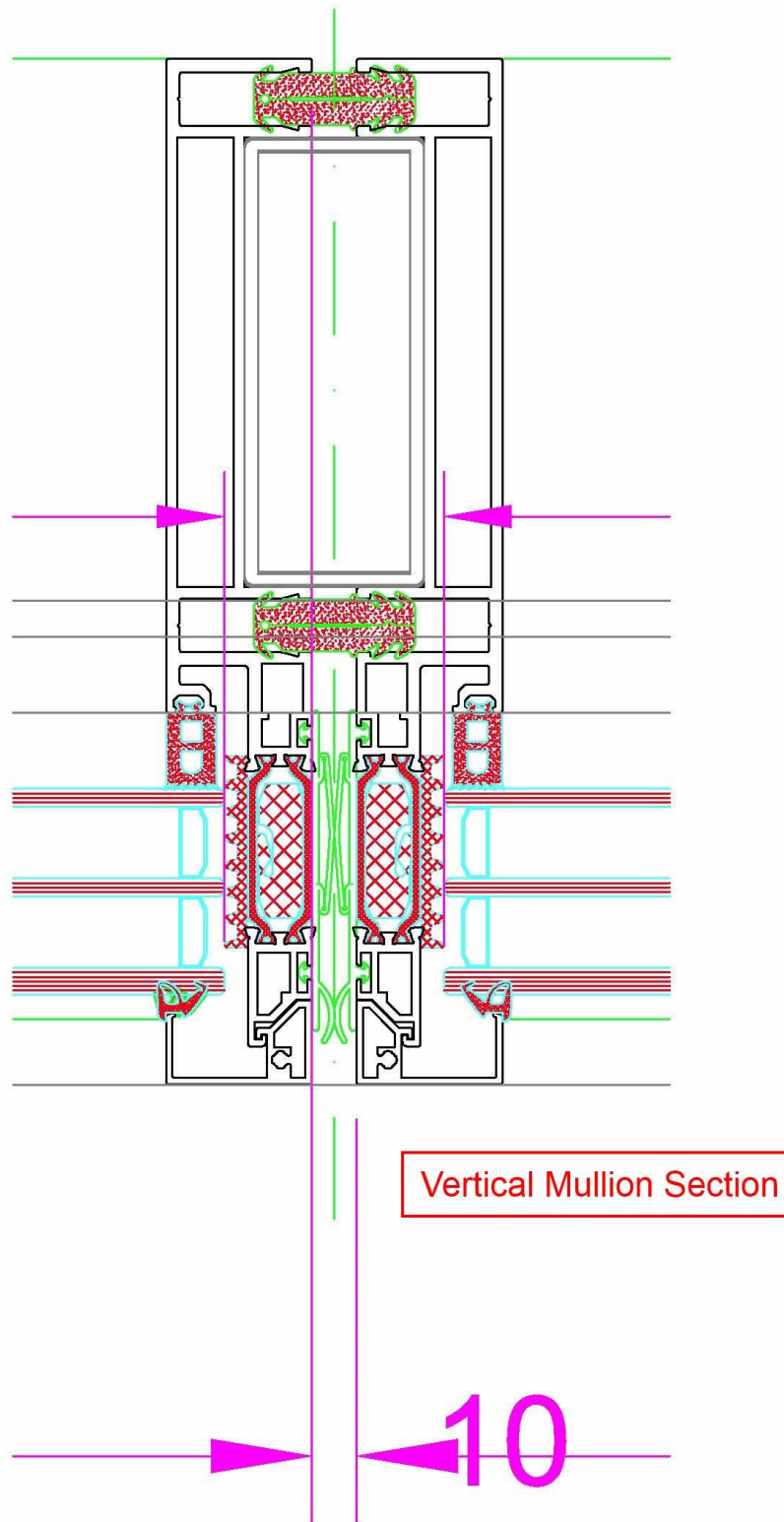
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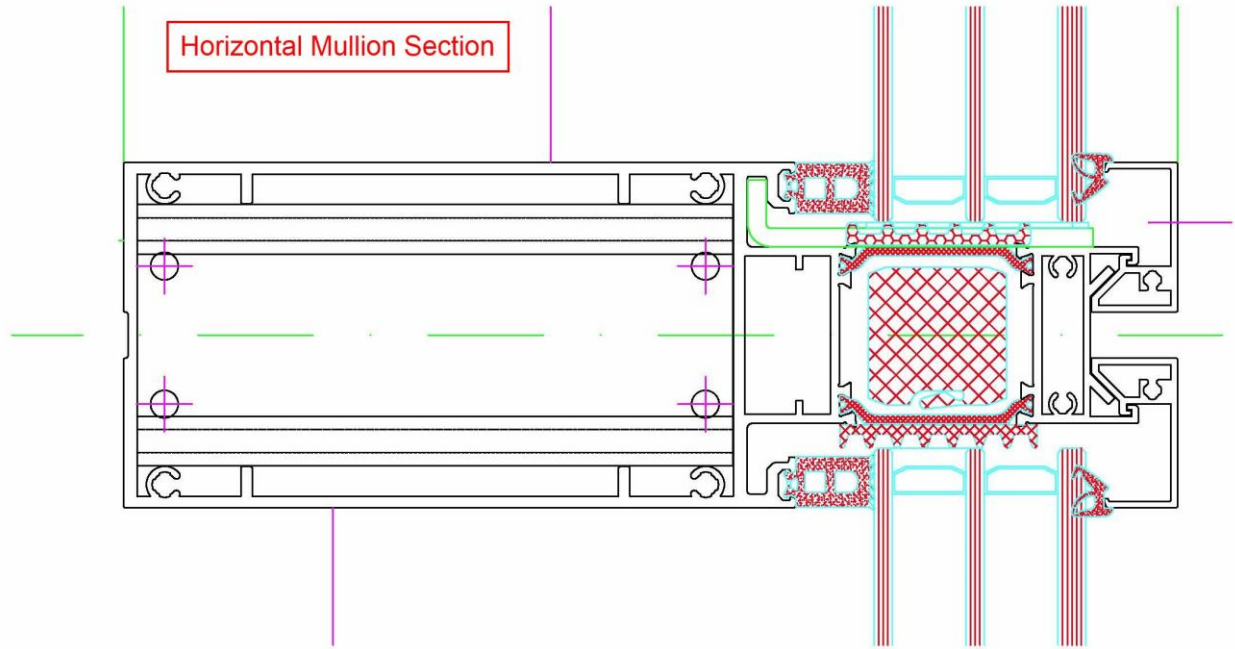


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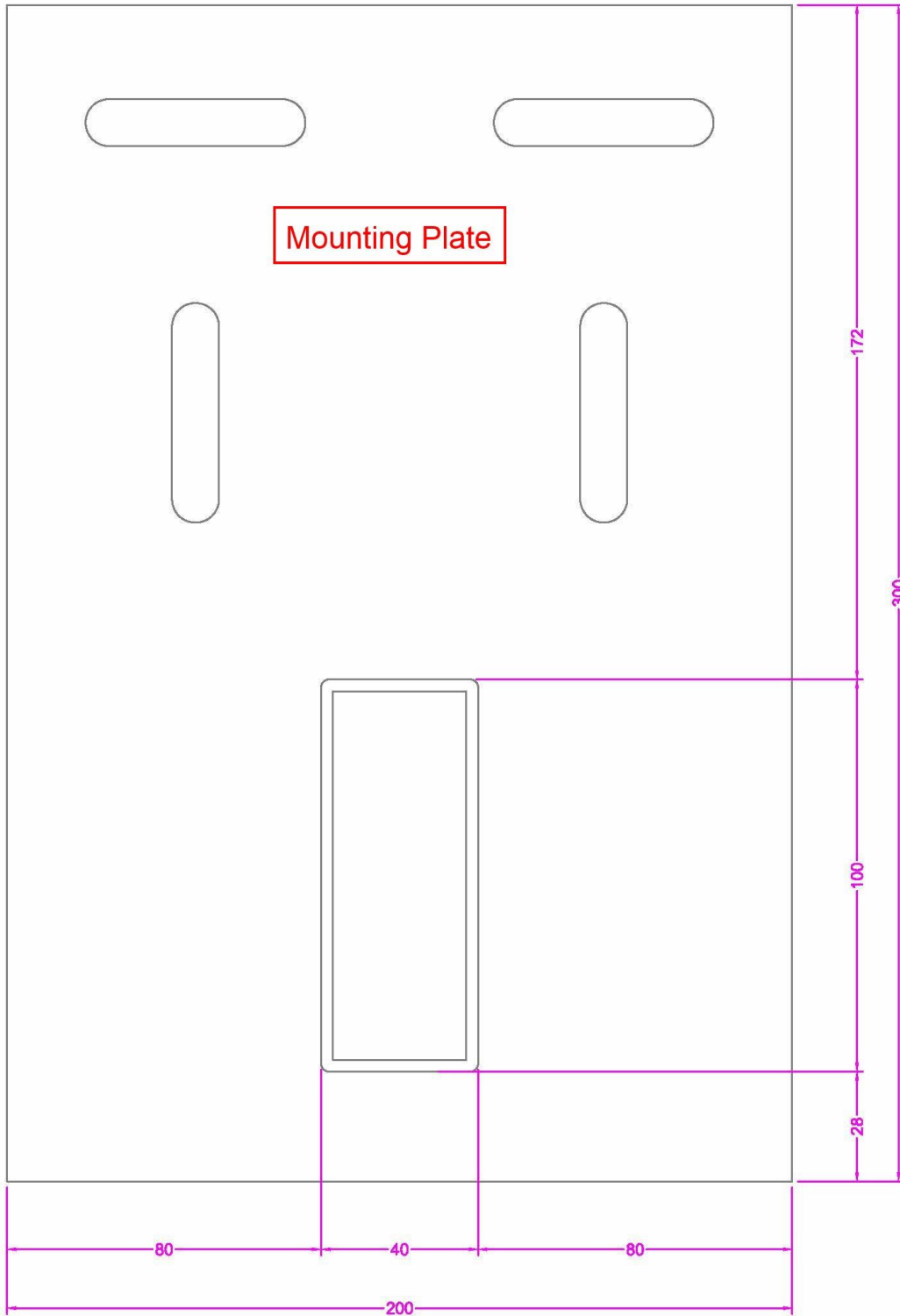
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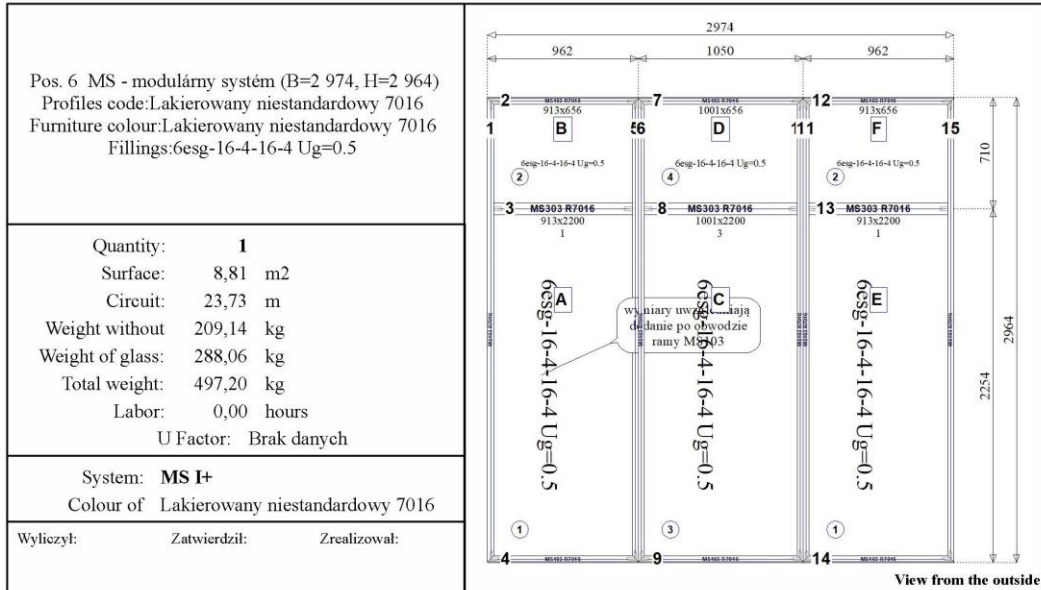


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**Errors and warnings:**

Brak elementów mocujących (okuć)

**Information from speech bubbles:**

wymiary uwzględniają dodanie po obwodzie ramy MS103

**Profiles**

Code	Quantity	Dimensions	Location	Description
MS103 R7016	6 pcs	2944 mm. (45';45')	... many ...	Profil ramy D=146mm
	4 pcs	952 mm. (45';45') Z(5 mm;5 mm)	2+4+12+14	
	2 pcs	1040 mm. (45';45') Z(5 mm;5 mm)	7+9	
	2 pcs	6900 mm.	12	
MS303 R7016	2 pcs	923 mm.	3+13	Rygiel 146 mm
	1 pcs	1011 mm.	8	

**Additional profiles**

Code	Quantity	Dimensions	Location	Description
MS202 R7016	6 pcs	2944 mm.	... many ...	Coverprofile
	4 pcs	952 mm.	2+4+12+14	
	4 pcs	887 mm.	3+13	
	2 pcs	1040 mm.	7+9	
	2 pcs	975 mm.	8	

**Seals**

Code	Quantity	Dimensions	Location	Description
ACFR146	17,80 m		... many ...	Promaseal with sticky surface all around 25 mm
ACGT810	23,73 m		... many ...	10x30mm
ACGT812	2,97 m		3+8+13	30x30mm
ACIP939	23,73 m		... many ...	Preform.insul.strip under glaz IP800

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Code	Quantity	Dimensions	Location	Description
ACMC716	28,30	m	1..15	Inside gasket 16 mm
ACMS600	34,48	m	... many ...	Uszczelka pionowa
ACMS601	20,76	m	... many ...	Seal
ACMS602	5,95	m	2+7+12	Uszczelka pozioma
ACMS603	2,97	m	2+7+12	
ACUN033PL	27,82	m	1..15	Uszczelka 7mm

**Accessories**

Code	Quantity	Dimensions	Location	Description
ACMS100	12	pcs.	... many ...	Clamping corner
ACMS103	6	pcs.	... many ...	
ACMS113	6	pcs.	... many ...	
ACMS303	6	pcs.	... many ...	Joint
ACMS305	6	pcs.	... many ...	
ACMS310	12	pcs.	A.F	Wspornik szkła stalowy nierdzewny
ACMS601C	6	pcs.	... many ...	Naroznik uszczelki
ACMS90	12	pcs.	... many ...	Clamping corner
ALI604/IN	24	pcs.	... many ...	Pin k4x12mm
ALI605/IN	24	pcs.	... many ...	Pin k5x19mm
ALI607/IN	120	pcs.	1..15	
M5.5x13	24	pcs.	... many ...	5.5x13 DIN7981 A2
M5.5x70	92	pcs.	... many ...	Wkręt M5.5x70 DIN 7981

**Glazing and plates**

Code	Quantity	Dimensions	Location	Description	
6esg-16-4-16-4 Ug=0.5	2	913mm x 2 200mm	2,0m <sup>2</sup>	1	6esg-16-4-16-4 Ug=0.5
	2	913mm x 656mm	0,6m <sup>2</sup>	2	
	1	1 001mm x 2 200mm	2,2m <sup>2</sup>	3	
	1	1 001mm x 656mm	0,7m <sup>2</sup>	4	

Please check all results in terms of quantity, quality and construction strength. The print is not binding.



**SECTION 10**

**APPENDIX B: PHOTOGRAPHS**

**(9 Pages)**

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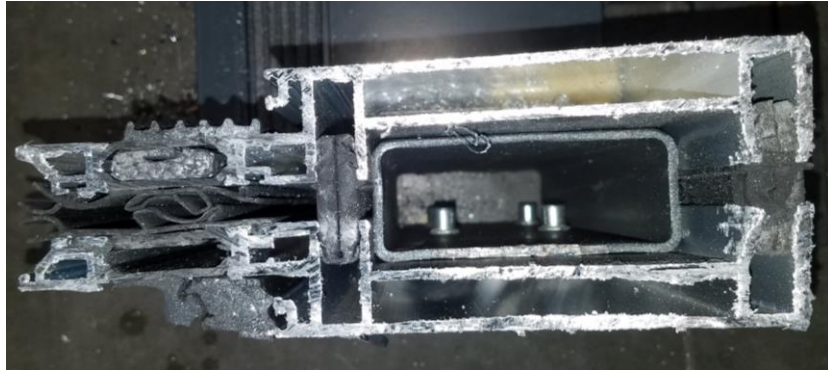
MS Wall – Mullioned façade window wall system – Interior



MS Wall – Mullioned façade window wall system – Exterior

\*Note – Picture taken with poly in place during the air leakage test

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Jamb assembly



Sill assembly



Installation plate bolted to the steel buck

Date: 18-July-2019



Installation plate secured to the sill



Installation plate secured to the jambs



Steel rectangular profile welded to install plate, inserted into the jamb

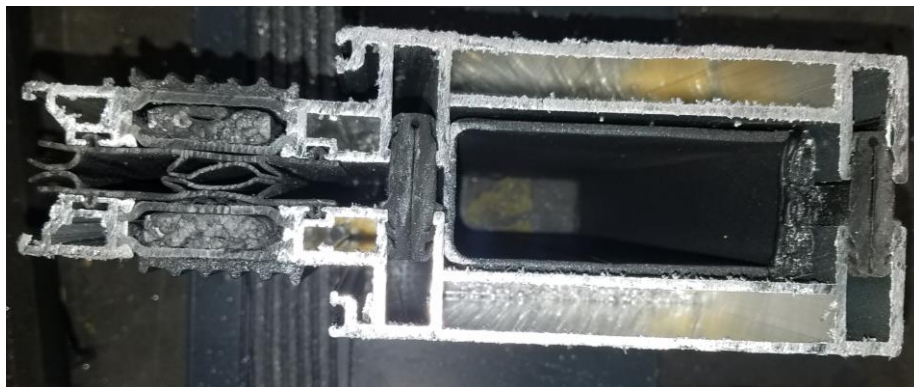
Date: 18-July-2019



Installation plate for mullion

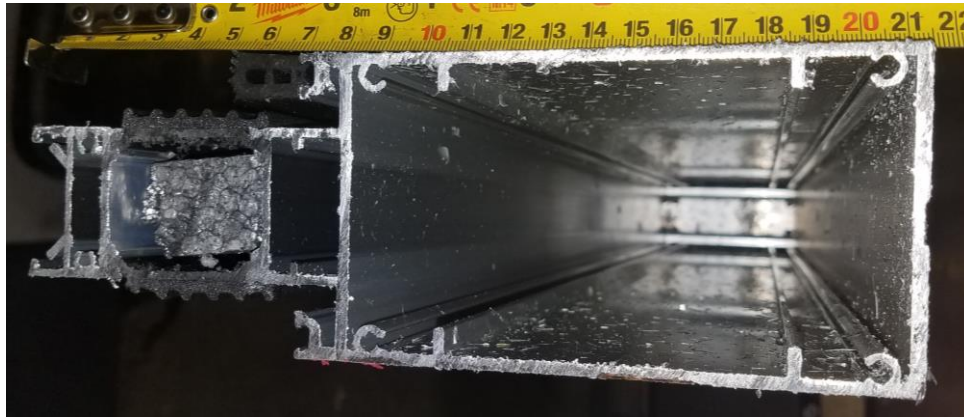


Aluminum corner bracket



Vertical mullion assembly

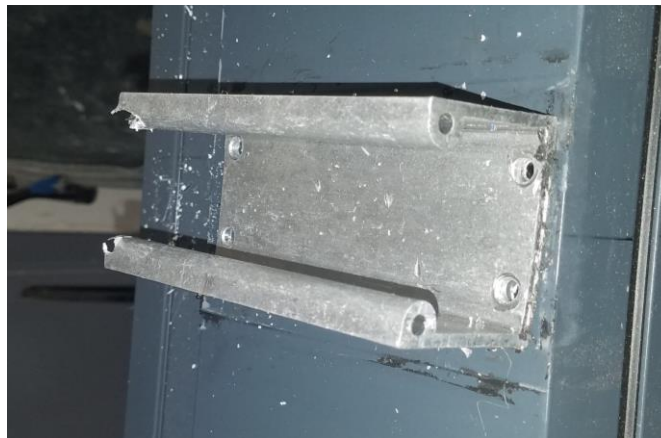
Date: 18-July-2019



Horizontal mullion assembly



Screws for the horizontal mullion in to shear block



Shear block for horizontal mullion

Date: 18-July-2019



Glazing stop profile



Glazing stop side glazing gasket



Interior side glazing gasket

Date: 18-July-2019



Foam profile around IGUs



Interior side frame and sub frame gasket for the jambs



Interior side frame gasket for the sill

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Date: 18-July-2019



Gasket joining the main frame and sub frame profiles for the sill.



Gasket joining the frame profiles for the sill and the vertical mullions



Drain slot out from the glazing stop

Date: 18-July-2019



Drain slots cut into sill gaskets



Setting blocks on aluminum carriers



Aluminum setting block carrier

**SECTION 11**  
**APPENDIX C: REVISION TABLE**  
**(1 Page)**

Date: 18-July-2019

Revision Table				
Date	Section	Description	Technician	Reviewer
18-July-2019	---	Original Issue Date	---	---

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