

# ALUMIL SA TEST REPORT

**SCOPE OF WORK**

AAMA/WDMA/CSA 101/I.S.2/A440 AND CSA A440S1 TESTING ON S77, CASEMENT WINDOW

**REPORT NUMBER**

J3813.01-109-44

**TEST DATE(S)**

07/10/19 - 07/29/19

**ISSUE DATE**

08/26/19

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## TEST REPORT FOR ALUMIL SA

Report No.: J3813.01-109-44

Date: 08/26/19

### REPORT ISSUED TO

#### ALUMIL SA

Iatrou Gogousi 8

Thessaloniki, GR 56429

GREECE

### SECTION 1

#### SCOPE

Intertek Building & Construction (B&C) was contracted by Alumil SA to perform testing in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 and CSA A440S1 on their S77, Casement Window. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek B&C test facility in York, Pennsylvania. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

### SECTION 2

#### SUMMARY OF TEST RESULTS

TITLE	RESULTS
Primary Product Designator	Class AW – PG90 – 914 x 1524 (36 x 60) - C
Design Pressure	±4320 Pa (±90.23 psf)
Air Infiltration (6.27 psf)	0.4 L/s/m <sup>2</sup> (0.07 cfm/ft <sup>2</sup> )
Air Exfiltration (6.27 psf)	0.4 L/s/m <sup>2</sup> (0.07 cfm/ft <sup>2</sup> )
Canadian Air Infiltration/Exfiltration Level	A3
Water Penetration Resistance Test Pressure	720 Pa (15.04 psf)

Reference Intertek B&C Report No. J3813.01-109-44, dated 08/26/19 for complete test specimen description and test results.

For INTERTEK B&C:

<b>COMPLETED BY:</b>	Richard E. Hartman III	<b>REVIEWED BY:</b>	Timothy J. McGill
<b>TITLE:</b>	Technician – Product Testing	<b>TITLE:</b>	Manager – Product Testing
<b>SIGNATURE:</b>		<b>SIGNATURE:</b>	
<b>DATE:</b>	08/26/19	<b>DATE:</b>	08/26/19

REH:wnl

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### SECTION 3

#### TEST METHOD(S)

The specimen was evaluated in accordance with the following:

**AAMA/WDMA/CSA 101/I.S.2/A440-17**, - North American Fenestration Standard/Specification for Windows, Doors, and Skylights

**AAMA 910-16**, Voluntary "Life Cycle" Specifications and Test Methods for AW Class Architectural Windows and Doors

**AAMA/WDMA/CSA 101/I.S.2/A440-11**, NAFS 2011 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights

**CSA A440S1-17**, Canadian Supplement to **AAMA/WDMA/CSA 101/I.S.2/A440**, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights

**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

**ASTM E330/E330M-14**, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform 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 E547-00(2016)**, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference

**ASTM E2068-00(2016)**, Standard Test Method for Determination of Operating Force of Sliding Windows and Doors<sup>1</sup>

**ASTM F588-14**, Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact

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### SECTION 4

#### MATERIAL SOURCE/INSTALLATION

Test specimen(s) was provided by the client. Representative samples of the test specimen(s) will be retained by Intertek B&C for a minimum of four years from the test completion date.

The specimen was installed into a 1-1/2" LVL buck. The rough opening allowed for a 1/2" shim space. The exterior perimeter of the window was sealed with sealant. Installation of the tested product was performed by the client.

LOCATION	ANCHOR DESCRIPTION	ANCHOR LOCATION
Head, sill, and jambs	#12 x 2-1/2" flat head screw through the buck and into the frame	2-1/2" from each corner and spaced 8" on center

### SECTION 5

#### EQUIPMENT

Tape Measure Verification: 63788

Force Gauge: 63156, INT00155

Control Panel: 005644

Weather Station: 63316

Spray Rack: 003956-B, 003956-A

Spring Scale: INT00009, 63395

Thermal Tenney: INT00000

Linear Transducers: INT00147, 65989, INT00151, INT00148

### SECTION 6

#### LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Athanasiadis Thanasis	Alumil SA
Tsokakis Constantine	Alumil SA
John A. Shanabrook	Intertek B&C
Timothy J. McGill	Intertek B&C
Richard E. Hartman III	Intertek B&C

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### SECTION 7

#### TEST SPECIMEN DESCRIPTION

**Product Type:** Casement Window

**Series/Model:** S77

#### Product Size(s):

OVERALL AREA:	WIDTH		HEIGHT	
	millimeters	inches	millimeters	inches
1.4 m <sup>2</sup> (15.0 ft <sup>2</sup> )				
Overall size	914	36	1524	60
Vent size	854	33-5/8	1464	57-5/8

#### Frame Construction:

FRAME MEMBER	MATERIAL	DESCRIPTION
Head, sill, and jambs	Aluminum	Extruded, thermally broken, dual strutted

	JOINERY TYPE	DETAIL
All corners	Mitered	Sealed, keyed at the interior and exterior hollows and lanced twice per member end

#### Vent Construction:

VENT MEMBER	MATERIAL	DESCRIPTION
Rails and stiles	Aluminum	Extruded, thermally broken, dual strutted

	JOINERY TYPE	DETAIL
All corners	Mitered	Sealed, keyed at the interior and exterior hollows and lanced twice per member end

**Reinforcement:** No reinforcement was utilized.

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### Weatherstripping:

DESCRIPTION	QUANTITY	LOCATION
0.187" backed by 0.205" high vinyl fin seal	1 Row	Frame perimeter
Co-extruded custom central gasket	1 Row	Frame perimeter
0.187" backed by 0.290" diameter foam bulb seal	1 Row	Vent perimeter

**Glazing:** *No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made.*

GLASS TYPE	SPACER TYPE	INTERIOR LITE	EXTERIOR LITE	GLAZING METHOD
1-9/16" IG	Desiccant-filled aluminum box spacer	5/16" tempered	1/4" tempered	The glazing was set from the interior onto a vinyl glazing strip against the frame. Sealant was used around the entire perimeter of the glazing channel. The glazing was secured using extruded aluminum snap-in glazing beads with a vinyl glazing strip. The glazing beads at the top rail and bottom rail also utilized two #10 x 3/4" pan head screws per glazing bead.

LOCATION	QUANTITY	DAYLIGHT OPENING		GLASS BITE
		millimeters	inches	
Vent daylight opening	1	654 x 1270	25-3/4 x 50	5/8"

### Drainage:

DRAINAGE METHOD	SIZE	QUANTITY	LOCATION
Weepslot	5/8" wide by 7/32" high	2	Bottom Rail, 9" from member ends
Weepslot	1-3/8" wide by 5/16" high	2	Sill, 6" from member ends

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**Hardware:**

DESCRIPTION	QUANTITY	LOCATION
Handle and multipoint lock assembly	1 Set	Handle located at the midspan of the latch stile
		Head, 9-5/8" from the latch jamb
Receivers	9	Sill, 10-1/4" and 18-1/2" from the latch jamb
		Hinge jamb, 14-1/4" and 37-1/2" from the sill
Barrel hinges	2	Latch jamb, 2-1/2", 18-1/2", 38-1/2", and 53" from the sill
		Hinge jamb, head and sill corners

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**SECTION 8**  
**TEST RESULTS**

The temperature during testing was 26 - 31°C (78 - 88°F). The results are tabulated as follows:

TITLE OF TEST	RESULTS	ALLOWED	NOTE
<b>LIFE CYCLE per AAMA 910</b>			
<b>Operating Force,</b> per ASTM E2068	Initiate Motion: 4 N (1 lbf) Maintain Motion: 9 N (2 lbf) Latch: 62 N (14 lbf)	155 N (34.85 lbf) max  135 N (30.35 lbf) max  100 N (22.48 lbf) max	
<b>Air Leakage,</b> Infiltration per ASTM E283 at 300 Pa (6.27 psf)	0.3 L/s/m <sup>2</sup> (0.06cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	1, 2
<b>Air Leakage,</b> Exfiltration per ASTM E283 at 75 Pa (1.57 psf)	<0.1 L/s/m <sup>2</sup> (<0.01 cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	1, 2
<b>Air Leakage,</b> Exfiltration per ASTM E283 at 300 Pa (6.27 psf)	0.2 L/s/m <sup>2</sup> (0.03 cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	1, 2
<b>Canadian Air Infiltration/Exfiltration Level</b>	A3	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	
<b>Water Penetration,</b> per ASTM E547 and ASTM E331 at 720 Pa (15.04 psf)	Pass	No leakage	3
<b>VENTING</b>			
<b>Vent Cycling,</b> (First half) per AAMA 910 2000 cycles	Vent: Pass	No damage	4, 5
<b>Locking Hardware Cycling,</b> (First half) per AAMA 910 2000 cycles	Latch: Pass	No damage	4, 5



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TITLE OF TEST	RESULTS	ALLOWED	NOTE
<b>MISUSE TESTING per AAMA 910</b>			
<b>Ventilator Vertical Load Test,</b> at 667 N (150 lbf)	Pass	No damage	
<b>VENTING</b>			
<b>Vent Cycling,</b> (Second half) per AAMA 910 2000 cycles	Vent: Pass	No damage	4, 5
<b>Locking Hardware Cycling,</b> (Second half) per AAMA 910 2000 cycles	Latch: Pass	No damage	4, 5, 6
<b>Operating Force,</b> per ASTM E2068	Initiate Motion: 9 N (2 lbf) Maintain Motion: 13 N (3 lbf) Latch: 89 N (20 lbf)	155 N (34.85 lbf) max  135 N (30.35 lbf) max  100 N (22.48 lbf) max	
<b>Air Leakage,</b> (Optional) Infiltration per ASTM E283 at 300 Pa (6.27 psf)	0.3 L/s/m <sup>2</sup> (0.05 cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	1, 7
<b>Air Leakage,</b> (Optional) Infiltration per ASTM E283 at 75 Pa (1.57 psf)	0.1 L/s/m <sup>2</sup> (0.02 cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	1, 7
<b>Air Leakage,</b> (Optional) Exfiltration per ASTM E283 at 300 Pa (6.27 psf)	0.3 L/s/m <sup>2</sup> (0.05 cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	1, 7
<b>Canadian Air Infiltration/Exfiltration Level</b>	A3	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	
<b>Water Penetration,</b> (Optional) per ASTM E547 and ASTM E331 at 720 Pa (15.04 psf)	Pass	No leakage	3
<b>Thermal Cycling,</b> per AAMA 501.5 six cycles from 0°F to 180°F	See Chart 1 for Thermal Cycle		

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TITLE OF TEST	RESULTS	ALLOWED	NOTE
<b>Uniform Load Deflection,</b> per ASTM E330 Deflections taken between lock points +4320 Pa (+90.23 psf) -4320 Pa (-90.23 psf)	0.5 mm (0.02") 0.8 mm (0.03")	3.3 mm (0.13") max. 3.3 mm (0.13") max.	8, 9, 10
<b>Air Leakage,</b> Infiltration per ASTM E283 at 300 Pa (6.27 psf)	0.4 L/s/m <sup>2</sup> (0.07 cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	11
<b>Air Leakage,</b> Exfiltration per ASTM E283 at 75 Pa (1.57 psf)	0.1 L/s/m <sup>2</sup> (0.02 cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	11
<b>Air Leakage,</b> Exfiltration per ASTM E283 at 300 Pa (6.27 psf)	0.4 L/s/m <sup>2</sup> (0.07 cfm/ft <sup>2</sup> )	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	11
<b>Canadian Air Infiltration/Exfiltration Level</b>	A3	0.5 L/s/m <sup>2</sup> (0.10 cfm/ft <sup>2</sup> ) max.	
<b>Water Penetration,</b> per ASTM E547 and ASTM E331 at 720 Pa (15.04 psf)	Pass	No leakage	3
<b>Uniform Load Structural,</b> per ASTM E330 Permanent set taken between lock points +6480 Pa (+135.34 psf) -6480 Pa (-135.34 psf)	0.3 mm (0.01") 0.3 mm (0.01")	1.3 mm (0.05") max. 1.3 mm (0.05") max.	9, 10
<b>Forced Entry Resistance,</b> per ASTM F588, Type: B- Grade: 10	Pass	No entry	
<b>Sash/Leaf Torsion</b> 90 N (20 lbf)	12.2 mm (0.48")	65.0 mm (2.56") max.	
<b>Sash Vertical Deflection</b> 270 N (60 lbf)	1.3 mm (0.05")	1.8 mm (0.07") max.	

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*Note 1: The tested specimen meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.*

*Note 2: Test Date 07/16/19 / Time: 11:50 AM*

*Note 3: Without insect screen.*

*Note 4: Lubrication and hardware adjustments were performed every 500 cycles per manufacturer's preventative maintenance manual.*

*Note 5: Minor cosmetic wear and metal shavings consistent with normal wear and tear.*

*Note 6: The handle developed a loud clicking action at 1850 operating cycles.*

*Note 7: Test Date 07/18/19 / Time: 1:10 PM*

*Note 8: The deflections reported are limited by AAMA/WDMA/CSA 101/I.S.2/A440 for this product designation.*

*Note 9: Loads were held for 10 seconds.*

*Note 10: Tape and film were not used to seal against air leakage during structural testing.*

*Note 11: Test Date 07/23/19 / Time: 8:00 AM*

**General Note:** *The window was tested in accordance with the venting use classification.*

## SECTION 9

### ALTERATIONS

**Alteration #1:** Date – 7/10/19  
Cause for alteration – Specimen failed air infiltration test  
Remedial action taken – Central gasket sealed, and hardware was adjusted

**Alteration #2:** Date – 7/11/19  
Cause for alteration – Specimen failed air infiltration test  
Remedial action taken – Vent removed, and hardware was adjusted

**Alteration #3:** Date – 7/13/19  
Cause for alteration – Specimen failed life cycle test  
Remedial action taken – Client provided a preventative maintenance manual, repaired vent, limit device was removed, and restarted testing

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**Alteration #4:** Date – 7/15/19  
Cause for alteration – Client not satisfied with air infiltration results  
Remedial action taken – Vent removed, and hardware was adjusted

**Alteration #5:** Date – 7/17/19  
Cause for alteration – Specimen failed water penetration test  
Remedial action taken – Sill corners sealed

### SECTION 10

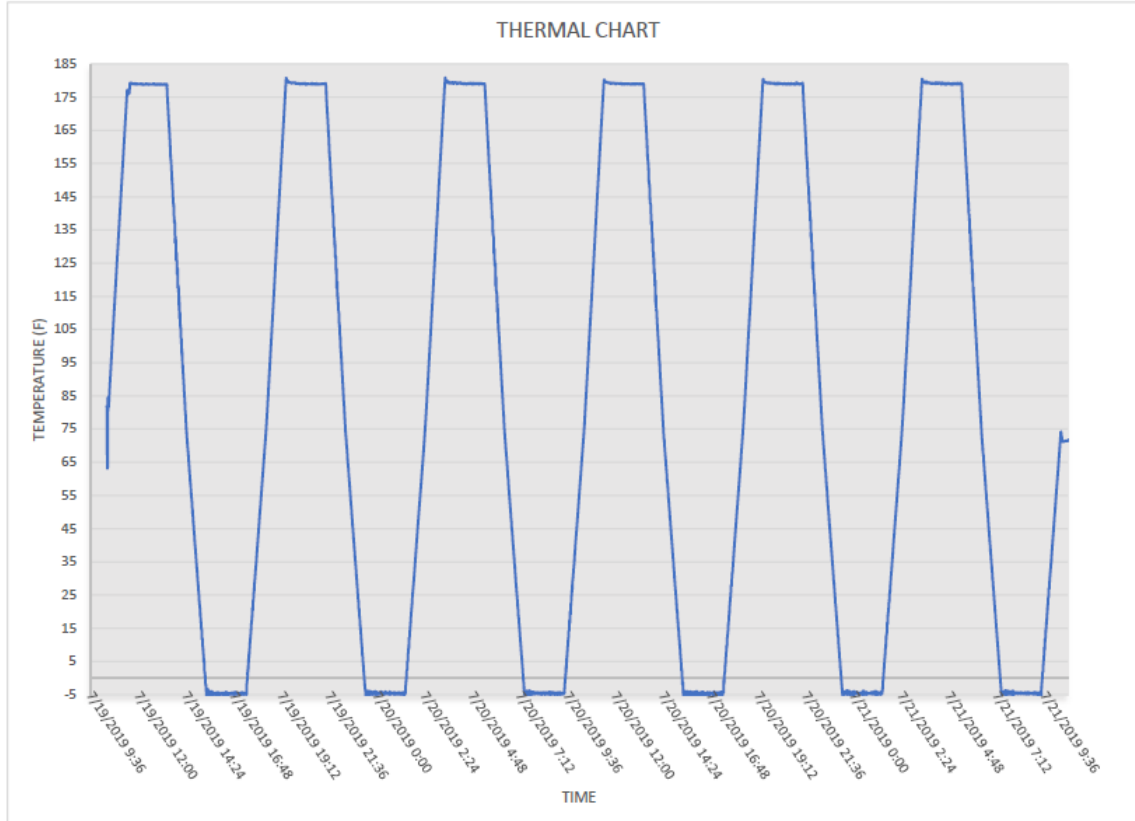
#### CONCLUSION

The specimen tested successfully met the performance requirements for a **Class AW – PG90 – 914 x 1524 (36 x 60) - C** rating.

Reference Intertek B&C Report No. J3813.01-109-44, dated 08/26/19 for complete test specimen description and test results.

### SECTION 11

#### CHART(S)





Total Quality. Assured.

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**SECTION 12**

**MAINTENANCE MANUAL**

130 Derry Court  
York, Pennsylvania 17406

Telephone: 717-764-7700

Facsimile: 717-764-4129

[www.intertek.com/building](http://www.intertek.com/building)

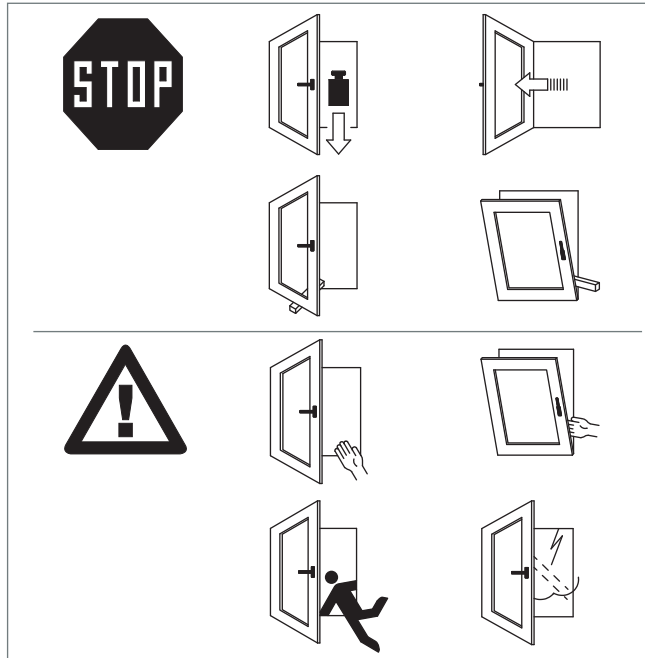
**GU** Information regarding dangers, omissions and operation

In order to avoid damage to your window, please take note of the following advice:

- Do not put any additional load on the sash
- Do not turn the sash against the wall beyond the point of resistance
- Do not jam the sash by placing an object between sash and frame

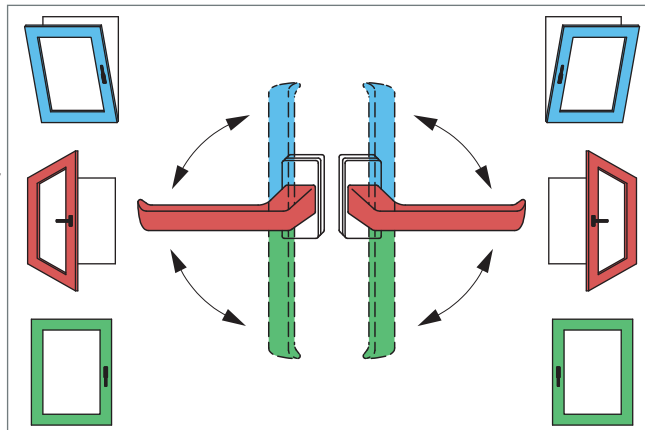
In order to prevent accidents be aware of the following hazards:

- Risk of getting crushed between frame and sash
- Risk of falling out of the open window
- Risk of injury by sash swinging open through a gust of wind



How to operate a Tilt&Turn window (Meaning of symbols)

- green: sash closed
- blue: sash in tilt position for ventilation
- red: sash in Turn-Only position for cleaning or inrush airing



**Attention:**  
In order to prevent hazards it is necessary that sashes in Turn-Only position be held or secured.

**Maintain your window's warranty!**

In order to maintain the warranty on the window hardware it is imperative that the advice on maintenance, care and hazard prevention be observed.

Adhesive label with operating symbols available on request.

**GU** Appropriate operation, maintenance and care of windows



Address / Your Window Service



You have acquired a window fitted with high-quality Tilt&Turn hardware from Gretsch-Unitas.

Like every other building element, a window is subject to normal wear.

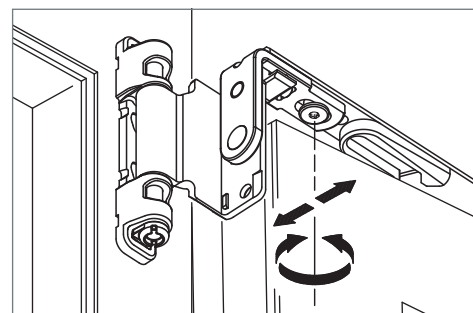
The smooth and easy movement of the window hardware and the service life of the window largely depend on regular maintenance and care.

The user should carry out the following maintenance work on his windows and balcony-doors at least once a year:

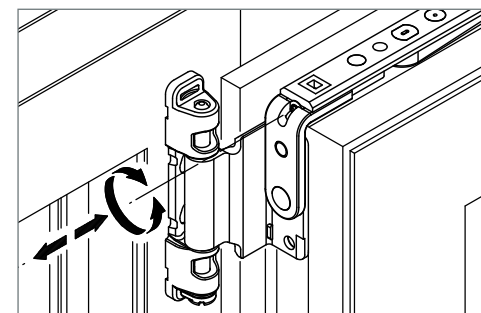
- ☰ Operational check and lubrication of all moving parts and locking points.
- + Retightening of handle fixing screws (handle rosette must be removed carefully)

**We recommend to conclude a service contract**

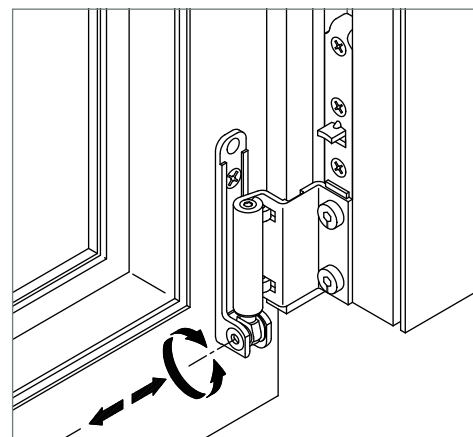
When problems appear such that a safe function of the window is no longer guaranteed, please call in your window specialist without delay.



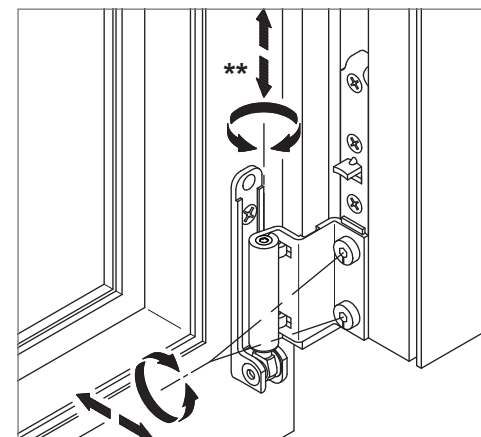
Adjusting the gasket pressure on the stay-arm



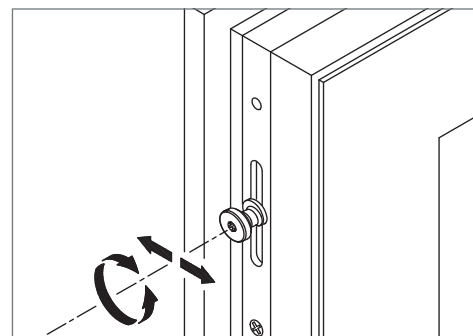
Horizontal sash adjustment on the stay-arm



Horizontal sash adjustment on the pivot-rest



Lifting the sash, adjusting the gasket pressure



Adjusting the gasket pressure on the locking cam

We recommend that the window finish and glazing be regularly checked over and damage made good.

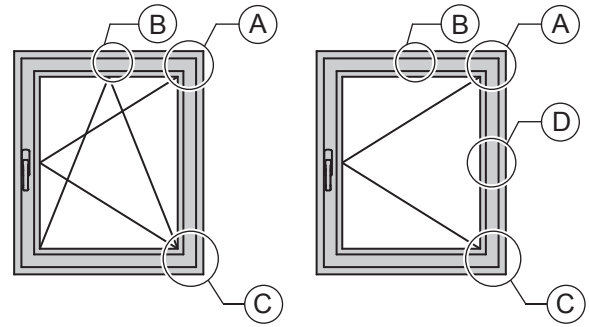
The gasket must not be painted over or cleaned with aggressive agents.

**Ask your window fabricator to undertake the adjustments, if required. \***

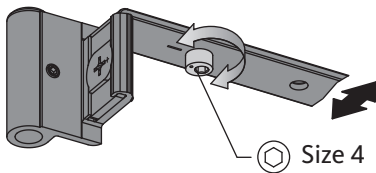
(\*) Adjustment tool = Torx 15 screwdriver or Allen key size 4 (\*\*)

# ALU-JET 610 adjustment options

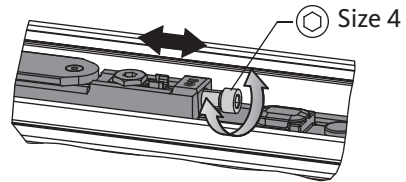
## Surface-mounted hinge-sides



**(A)** Gasket pressure adjustment  
±1 mm



**(B)** Horizontal adjustment  
±3 mm



**(C)**

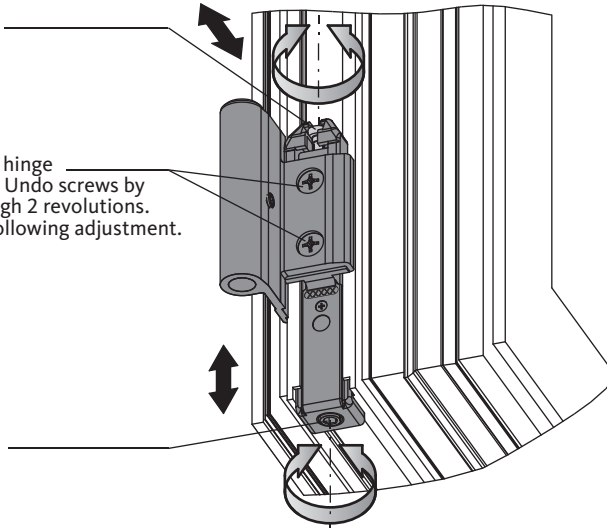
Size 2.5  
Horizontal  
adjustment ±1 mm



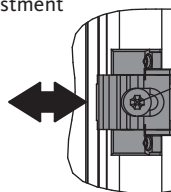
Fully relieve corner hinge  
before adjustment. Undo screws by  
turning them through 2 revolutions.  
Retighten screws following adjustment.

PH2  
3.5 Nm

Size 4  
Vertical  
adjustment  
+2.5 mm  
-1 mm



**(D)** Gasket pressure adjustment  
+2 mm  
-1 mm



Undo screw to adjust.  
Retighten screw following adjustment.

PH2  
2 Nm

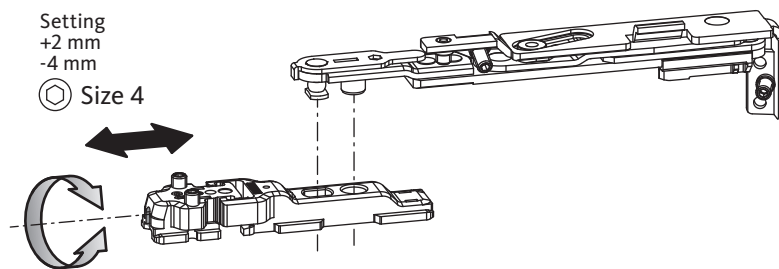
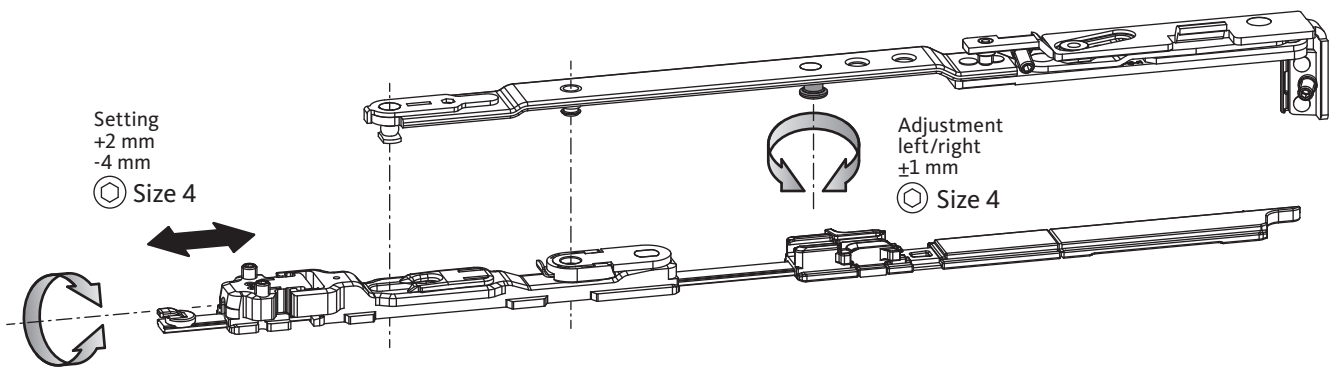
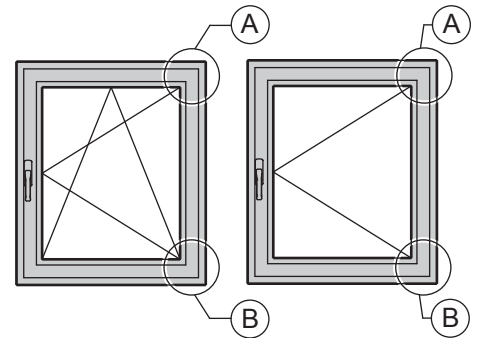


# ALU-JET CC610 adjustment options

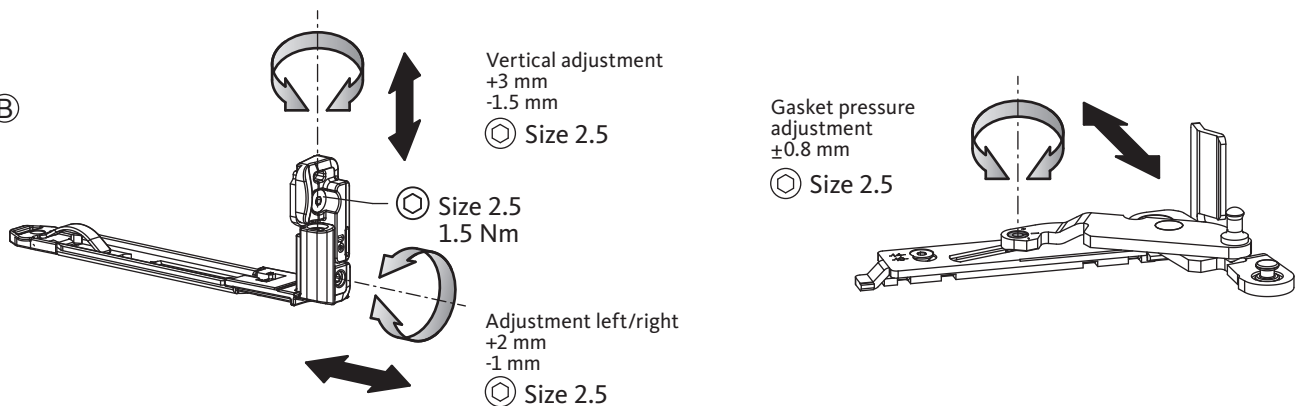
Concealed hinge-sides



Ⓐ



Ⓑ



## 11. Adjustments



Gasket pressure adjustment  $\pm 1$  mm

⊙ Size 4

at corner-drive, tilter and locking cam

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**NOTE**

Grease the locking points and sliding points with an acid-free lubricant which is not prone to gumming.

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### SECTION 13

### PHOTOGRAPH



**Photo No. 1**  
**View of Tested Specimen**



Total Quality. Assured.

130 Derry Court  
York, Pennsylvania 17406

Telephone: 717-764-7700  
Facsimile: 717-764-4129  
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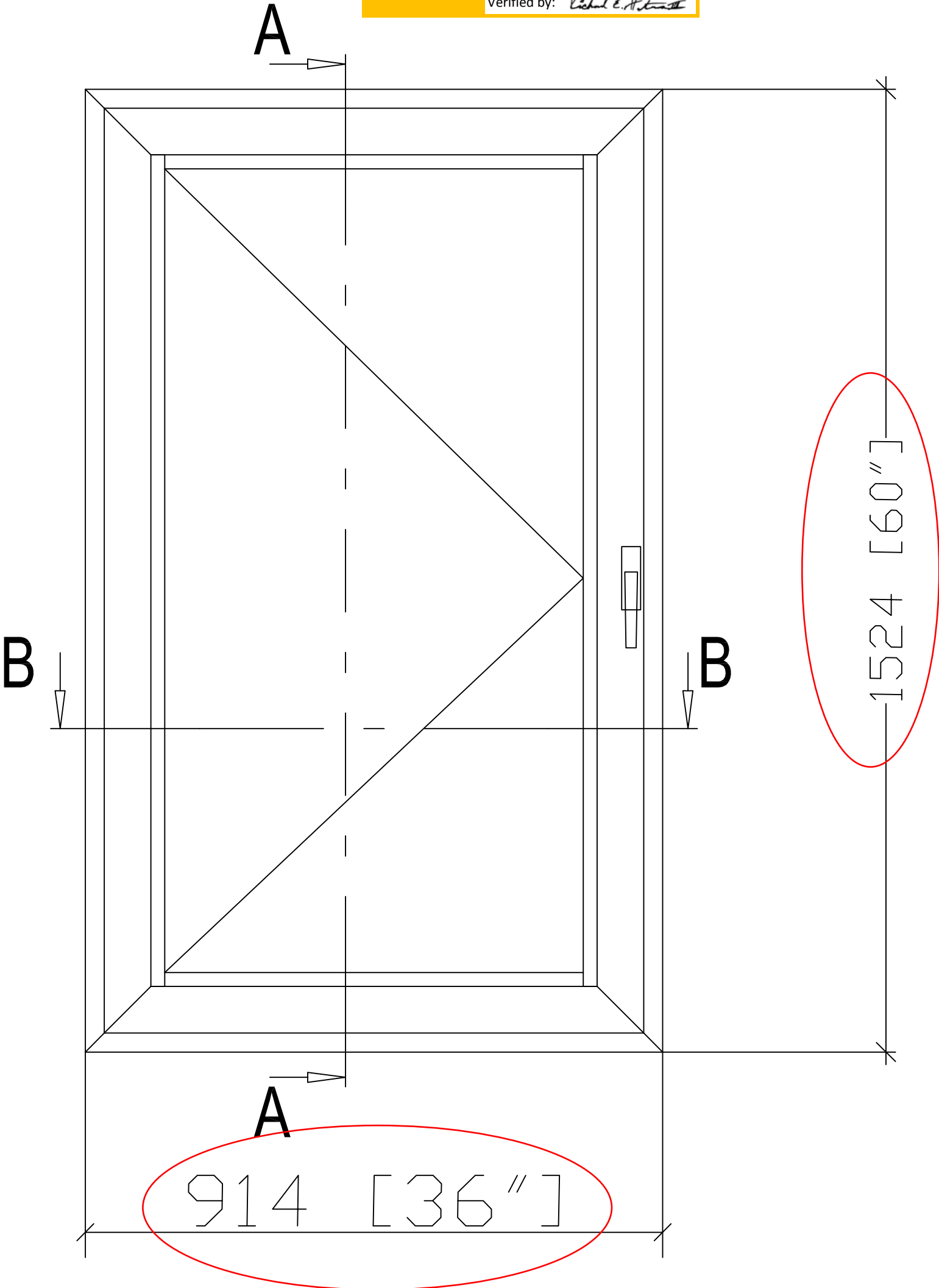
## TEST REPORT FOR ALUMIL SA

Report No.: J3813.01-109-44

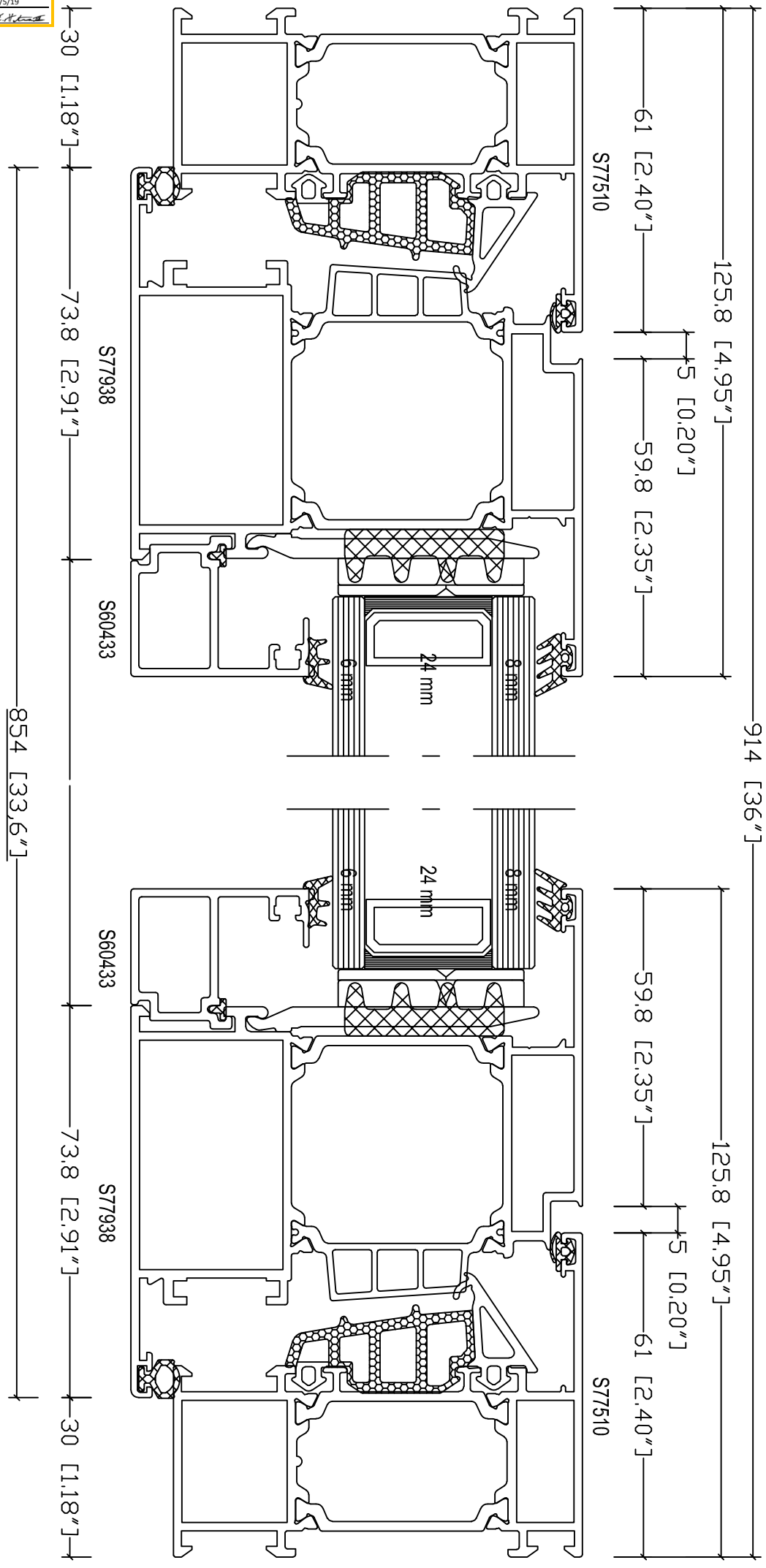
Date: 08/26/19

### SECTION 14 DRAWINGS

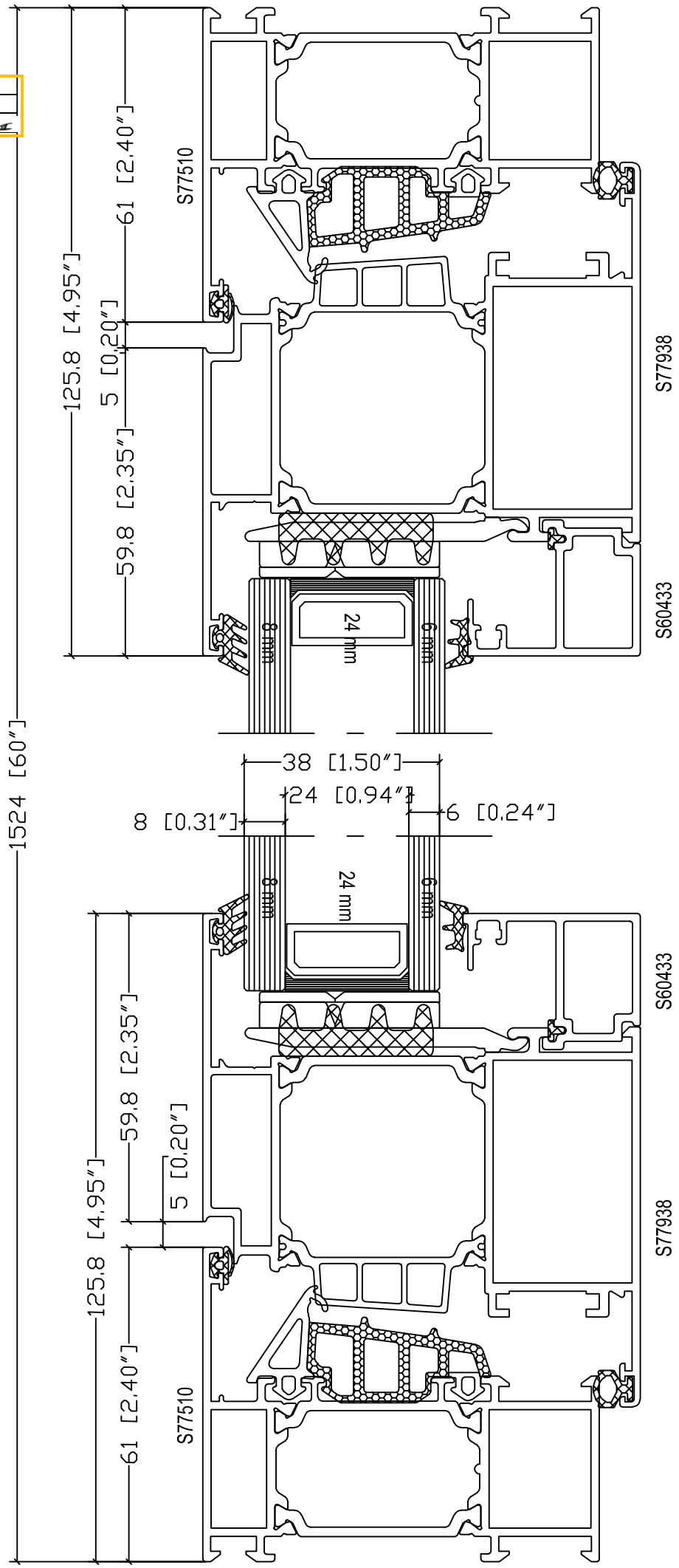
The test specimen drawings have been reviewed by Intertek B&C and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.



B-B

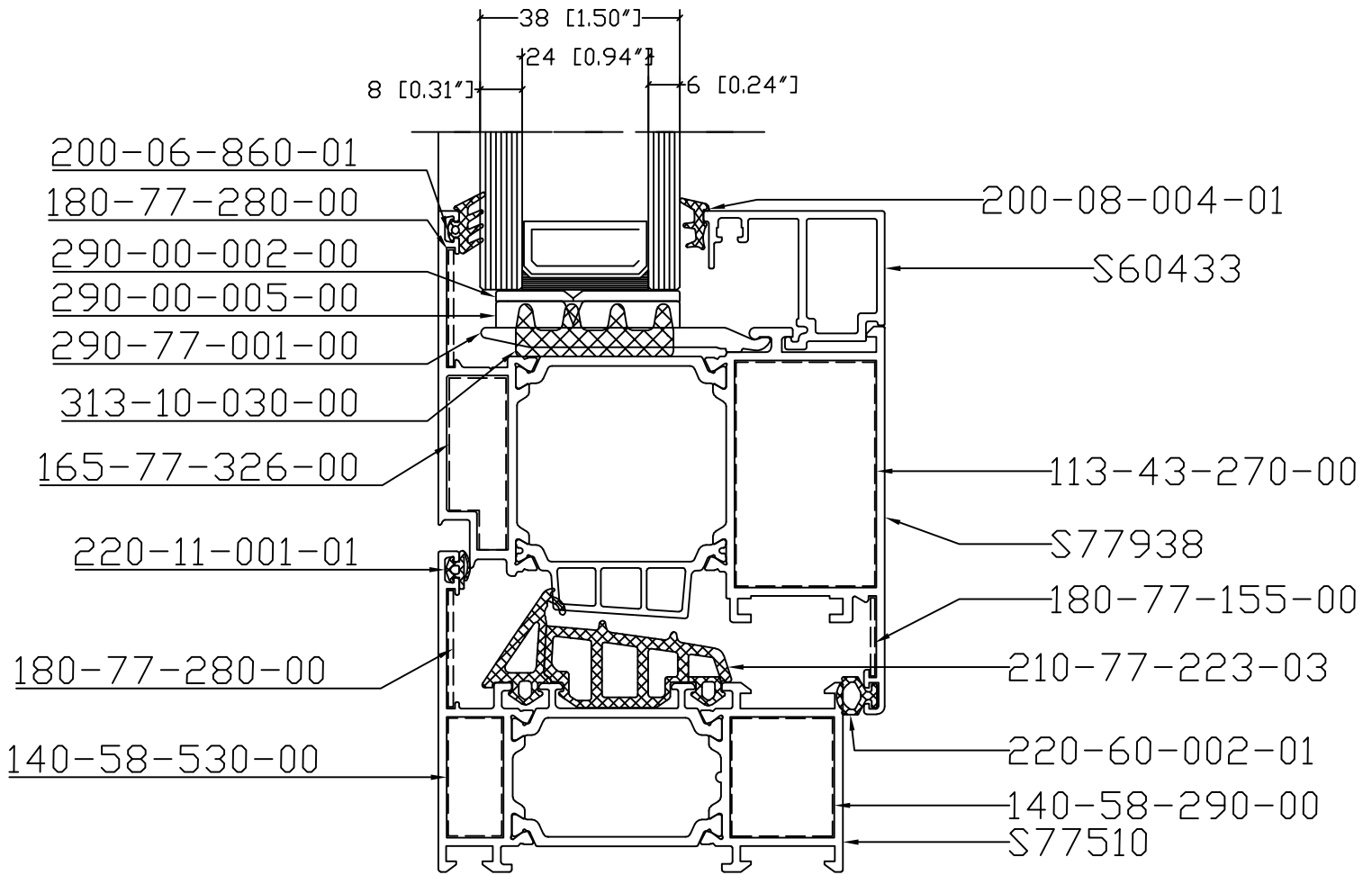















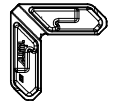
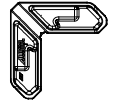
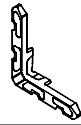
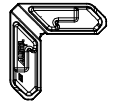
A-A



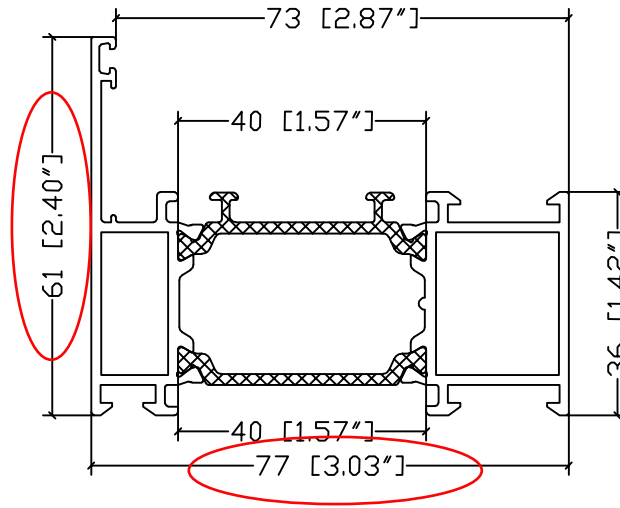




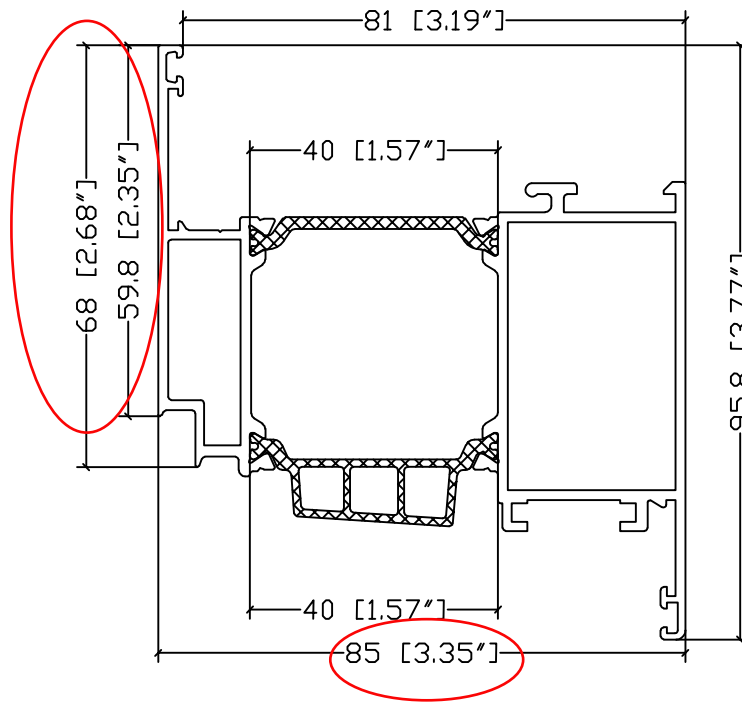


S77510 Frame width	2 pieces	210-77-223-03		Central gasket
		255-77-223-03		Vulcanized corner
S77510 Frame height	2 pieces	220-60-002-01		Sash gasket
		220-11-001-01		Frame gasket
S77938 Sash width	2 pieces	200-06-860-01		External glazing gasket
		200-08-004-01		Internal glazing gasket
S60433 Glazing bead width	2 pieces	220-11-449-12		Gasket for glazing bead
		290-00-005-00		5mm Shim
S60433 Glazing bead height	2 pieces	290-00-002-00		2mm Shim
		290-77-001-00		Glazing bridge
		313-10-030-00		Glazing foam 30x10 mm
		180-77-011-00		Alignment corner
		180-77-280-00		Alignment corner
		140-58-530-00		Die cast corner cleat
		140-58-290-00		Die cast corner cleat
		165-77-116-00		Cast spring cleat
		140-58-310-00		Die cast corner cleat

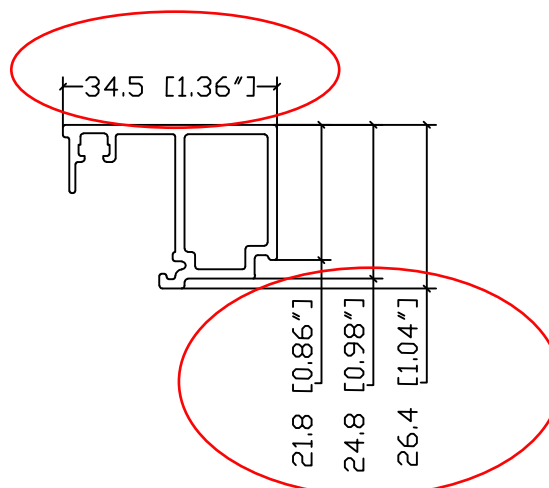
# S77510



# S77938



# S60433





Total Quality. Assured.

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**SECTION 15**

**REVISION LOG**

REVISION #	DATE	PAGES	REVISION
0	08/26/19	N/A	Original Report Issue