

ALIPLAST sp. Z o.o.

TEST REPORT

TEST REPORT ISSUED TO

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

SPECIFICATION

AAMA/WDMA/CSA 101/I.S.2/A440-11
AAMA/WDMA/CSA 101/I.S.2/A440-17
A440S1-17

PRODUCT SERIES & TYPE

Star Series Tilt & Turn Window

PRIMARY DESIGNATION

Class CW – PG45 – Size Tested 1230 x 2200 mm (48 x 87 in) – Type DAW

SECONDARY DESIGNATION

Positive Design Pressure = 2160 Pa (45.1 psf)
Negative Design Pressure = 2160 Pa (45.1 psf)
Water Penetration Resistance = 720 Pa (15.0 psf)
Canadian Air Leakage Resistance = A3

REPORT NUMBER

103682459COQ-001B

ISSUE DATE

15-May-2019

PAGES

27

DOCUMENT CONTROL NUMBER

GFT-OP-10b (13-March-2017)
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TEST REPORT FOR ALIPLAST sp. Z o.o.


Report No.: 103682459COQ-001B


Date: 15-May-2019

CONCLUSION

The Star Series Tilt & Turn Window System, submitted by Aliplast sp. Z o.o., tested and described within this report, achieved the overall performance requirements of **Class CW – PG45** when tested in accordance with NAFS-11, NAFS-17 and A440S1-17.

For INTERTEK B&C:

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TITLE:	Technician – Building & Construction
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DATE:	05/15/19

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SECTION 1
SUMMARY OF RESULTS

A summary of results for AAMA/WDMA/CSA 101/I.S.2/A440-11 “Standard/Specification for windows, doors, and unit skylights”, AAMA/WDMA/CSA 101/I.S.2/A440-17 “Standard/Specification for windows, doors, and unit skylights”, A440S1-17 “Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS – North American Fenestration Standard/Specification for windows, doors, and skylights”, are as indicated in the table below:

Evaluation Property	Results
Operational Force	US – Pass; Can – Pass
Air Leakage Resistance @ 75 Pa (1.6 psf)	US – Pass; Can – A3
Water Penetration Resistance	720 Pa (15.0 psf)
Uniform Load – Deflection	2160 Pa (45.1 psf)
Uniform Load – Structural	3240 Pa (67.7 psf)
Forced Entry Resistance	Gr.20
Sash/Leaf Concentrated Load Test on Latch Rail	Pass
Stabilizing Arm Load Test	Pass
Thermoplastic Corner Weld Test	N/A
Insect Screen Serviceability	N/A

Details of the tested results can be found in Section 7 of this report.

Primary and Secondary Designations are as indicated below:

Star Series Tilt & Turn Window
Class CW – PG45 – Size Tested 1230 x 2200 mm (48 x 87 in) – Type DAW

Secondary Designator
Positive Design Pressure = 2160 Pa (45.1 psf)
Negative Design Pressure = 2160 Pa (45.1 psf)
Water Penetration Resistance = 720 Pa (15.0 psf)
Canadian Air Leakage Resistance = A3

SECTION 2

INDEX

SECTION NAMES	PAGE
SUMMARY OF RESULTS.....	3
INDEX	4
OBJECTIVE.....	5
SAMPLE ASSEMBLY AND DESCRIPTION	5
TESTING AND EVALUATION METHODS.....	7
OPERATING FORCE.....	7
AIR LEAKAGE RESISTANCE.....	7
WATER PENETRATION RESISTANCE	7
UNIFORM LOAD DEFLECTION	8
UNIFORM LOAD STRUCTURAL.....	8
FORCED ENTRY RESISTANCE.....	8
SASH/LEAF CONCENTRATED LOAD TEST ON LATCH RAIL	8
STABILIZING ARM LOAD TEST.....	8
THERMOPLASTIC CORNER WELD TEST	9
INSECT SCREEN SERVICEABILITY	9
TEST EQUIPMENT.....	9
RESULTS AND OBSERVATIONS	10
OPERATING FORCE.....	10
AIR LEAKAGE RESISTANCE.....	10
WATER PENETRATION RESISTANCE	10
UNIFORM LOAD – DEFLECTION & STRUCTURAL.....	10
FORCED ENTRY RESISTANCE.....	11
SASH/LEAF CONCENTRATED LOAD TEST ON LATCH RAIL	11
STABILIZING ARM LOAD TEST.....	11
CONCLUSION	12
APPENDIX A: DRAWINGS.....	13
APPENDIX B: PHOTOGRAPHS	20
APPENDIX C: REVISION TABLE.....	26

Date: 15-May-2019

SECTION 3

OBJECTIVE

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for **Aliplast sp. Z o.o.** (Aliplast) on a 1230 mm (48.4") x 2200 mm (86.6") Star Series Tilt & Turn Window System. Testing was conducted in accordance with following standard / specification:

- AAMA/WDMA/CSA 101/I.S.2/A440-11 *“Standard/Specification for windows, doors, and unit skylights”* (NAFS-11)
- A440S1-17 *“Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS – North American Fenestration Standard/Specification for windows, doors, and skylights”* (A440S1-17)
- AAMA/WDMA/CSA 101/I.S.2/A440-17 *“Standard/Specification for windows, doors, and unit skylights”* (NAFS-17)

This evaluation was started on March 5, 2019 and completed on April 12, 2019.

SECTION 4

SAMPLE ASSEMBLY AND DESCRIPTION

Manufacturer Information	Aliplast sp. Z o.o. Waclawa Moritza 3 20-276 Lublin Poland
Model Name	<ul style="list-style-type: none"> • Star Series Tilt & Turn Window
Installation	<ul style="list-style-type: none"> • 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 2x4 spf was used on the interior face of the steel box frame to an additional 1-1/2" spacing away from the test wall. <ul style="list-style-type: none"> • Specimen to Buck: <ul style="list-style-type: none"> • Fasteners secured into the buck with #6 x 1" stainless steel self tapping flat-head screws spaced approximately 254 mm – 304 mm (10"-12") o.c. • Silicone was used to seal around the exterior perimeter to the test buck.
Size	<ul style="list-style-type: none"> • Overall Size: <ul style="list-style-type: none"> • Width: 1230 mm (48.4") • Height: 2200 mm (86.6")

Date: 15-May-2019

<p>Frame</p>	<ul style="list-style-type: none"> • Material: Thermally broken aluminum profiles • Corners: Mitred with aluminum inserts • Reinforcement: None • Polystyrene foam was used within the cavity formed between the 2 thermal breaks
<p>Sash Panel</p>	<ul style="list-style-type: none"> • Material: Thermally broken aluminum profiles • Corners: Mitred with aluminum inserts • Sash Size: <ul style="list-style-type: none"> • Width: 1160 mm (45.7") • Height: 2130 mm (83.9") • Reinforcement: None • Polystyrene foam was used within the cavity formed between the 2 thermal breaks
<p>Locks and Hardware</p>	<ul style="list-style-type: none"> • A multi-point lock and hinge system controlled through a single 3-stage lock handle set located approximately at mid-span of the lock stile. • Lock assembly secured to the panel stiles and rails with factory provided fasteners at pre-determined locations. • Keepers: 7x keepers, clipped into the track on the main frame profiles and secured in place using 2x set screws: <ul style="list-style-type: none"> • Along the sill, approximately 565 mm (22-1/4") from the lock jamb • Along the lock jamb, approximately 83 mm (3-1/4"), 562 mm (22-1/8") and 1448 mm (57") up from the sill. • Along the hinge jamb, approximately 235 mm (9-1/4") and 711 mm (28") down from the head and 702 mm (27-5/8") up from sill. • Along the head, approximately 675 mm (23-1/2") from the lock jamb. • The top and bottom hinge assemblies are secured to the frame and sash profiles with the factory provided fasteners • Tilt support arm along the head at the lock jamb corner, set in place with 2x set screws
<p>Drainage</p>	<ul style="list-style-type: none"> • The sill drained out through 2x slots, 19 mm (3/4") x 13 mm (1/2"), centered approximately 159 mm (6-1/4") from either outside jamb edge each fit with a snap-in plastic hooded drain gate insert. • 2x sets of 3x 5 mm (3/16") drain holes out of the sash bottom rail approximately centered approximately 133 mm (5-1/4") from corners.
<p>Weather-strip</p>	<ul style="list-style-type: none"> • The sash had an exterior facing EPDM gasket, around the full perimeter of the sash applied as a continuous strip with the joint located at the mid-point of the top rail • The frame had an EPDM center seal style of gasket, applied as 4 strips with the corners sealed with silicone

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Glazing	<ul style="list-style-type: none"> • IGU specification: <ul style="list-style-type: none"> • Press Glass, 4 mm / 4 mm clear with a 16 mm Warm-Edge Spacer (Chromatech Ultra, Black 9004), sealed together using Hot melt butyl. • Overall thickness, 25 mm (~1") • Glazing Blocks: 8x plastic setting blocks, snapped into place approximately 51 mm (2-1/2") from each corner. Foam strips were installed in the gaps between the glazing blocks and between the glazing blocks and edge to the frame. • Laid-in, interior glazed on top of a full perimeter of an EPDM gasket, applied as a single length, turned around the corner with the joint at the mid-point of the top rail. • Glazing Stops: Aluminum, snap-in with EPDM compression gasket
Drawings	<ul style="list-style-type: none"> • Copy of drawings supplied by Aliplast sp. Z o.o. included in Appendix A.

SECTION 5

TESTING AND EVALUATION METHODS

OPERATING FORCE

The Operating Force test was performed on the sash and latch in accordance with ASTM E2068-00(2016). The forces required initiate motion of the operable panel from both the fully open and fully closed positions, as well as the force required to maintain motion to the opposite limits of travel, were measured. The forces required to open and close the latches were also recorded.

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). The maximum air leakage rate was calculated and compared to the allowable air leakage.

WATER PENETRATION RESISTANCE

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/m² per hour (5.0 U.S. gal/ft² 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.

Date: 15-May-2019

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 10 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 10 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). Polyethylene film was used during the positive wind pressure sequences.

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 10 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 10 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. Polyethylene film was used during the positive wind pressure sequences.

FORCED ENTRY RESISTANCE

The Forced-entry Resistance Test was conducted in accordance with ASTM F588-14 *“Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact”*. This included the Disassembly, Sash Manipulation, Lock Hardware Manipulation, and Assembly Tests.

SASH/LEAF CONCENTRATED LOAD TEST ON LATCH RAIL

The Sash/Leaf Concentrated Load Test on Latch Rail was performed in accordance with Section 9.3.6.4.3 of NAFS-11 and Section 9.3.6.4.3 of NAFS-17. With the specified load applied, deflections were measured, the load was released. After the two loading sequences were complete, the deflections were compared against the maximum allowable.

STABILIZING ARM LOAD TEST

The Stabilizing Arm Load Test was performed in accordance with Section 9.3.6.5.3 of NAFS-11 and Section 9.3.6.5.3 of NAFS-17. After the test load was released, the specimen was inspected for failure or permanent deformation of any part of the system that would cause any operational malfunction.

Date: 15-May-2019

THERMOPLASTIC CORNER WELD TEST

Test not applicable.

INSECT SCREEN SERVICEABILITY

Test not applicable.

DEVIATION FROM STANDARD METHOD

The Concentrated Load Test on Latch Rail was performed on an unglazed sash as per NAFS-11 for Class CW however within NAFS-17, this test is performed on a glazed sash. Due to the unglazed sash being the worst case scenario, the NAFS-11 version would automatically qualify for the NAFS-17.

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		
Forced-entry Resistance	Hydraulic Ram & Pump	D2701
		D2702
		D2703
Sash/Leaf Concentrated Load Test on Latch Rail and Stabilizing Arm Load Test	Hydraulic Ram & Pump	D2701
	Digital Force Gauge	D2710
	Mitutoyo Digital Deflection Gauge	P60175

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Date: 15-May-2019

SECTION 7 RESULTS AND OBSERVATIONS

OPERATING FORCE

The forces required to operate the system:

Initiate Opening:	12.4 N (2.8 lbs)	Initiate Closing:	10.1 N (2.3 lbs)
Maintain Opening:	12.0 N (2.7 lbs)	Maintain Closing:	8.5 N (1.9 lbs)
Latch Opening:	47.6 N (10.7 lbs)	Latch Closing:	35.8 N (8.0 lbs)

Maximum allowable force to initiate motion:	155 N (34.9 lbs)
Maximum allowable force to maintain motion:	100 N (22.5 lbs)
Maximum allowable force to open and close latch:	100 N (22.5 lbs)

AIR LEAKAGE RESISTANCE

Air test data is indicated in the following table:

Property	Area m ² (ft ²)	Infiltration Rate L/s*m ² (cfm/ft ²)	Exfiltration Rate L/s*m ² (cfm/ft ²)	Compliance US (CAN)
Overall Assembly	2.71 (29.13)	0.38 (0.07)	0.31 (0.06)	Pass (A3)
Allowable Leakage Rates				
Maximum allowable air leakage rate (US, CAN – A2):		1.5 L/s*m ² , 0.3 cfm/ft ²		
Maximum allowable air leakage rate (CAN – A3):		0.5 L/s*m ² , 0.1 cfm/ft ²		

The overall system **met** the US and Canadian performance requirements as reported above when evaluated under NAFS-11, NAFS-17 and A440S1-17.

WATER PENETRATION RESISTANCE

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 **(CAN) PG100** Water Penetration Resistance performance requirements under NAFS-11, NAFS-17 and A440S1-17.

UNIFORM LOAD – DEFLECTION & STRUCTURAL

Sash Deflection Data:

Hinge stile span, L = 2035 mm (80.12")
 Deflection limit, L/175 = 11.63 mm (0.46")
 Residual deflection limit, L*0.3% = 6.11 mm (0.24")

Test Pressure, Pa (psf)	Deflection Measurements, mm (in.)				Compliance
	Positive		Negative		
	Deflection	Residual	Deflection	Residual	
2160 (45.1)	2.08 (0.08)	0.03 (0.00)	1.72 (0.07)	0.08 (0.00)	Pass DP45
3240 (67.7)	n/a	0.03 (0.00)	n/a	0.00 (0.00)	

Date: 15-May-2019

After the test loads were released, the specimen was inspected and there was found to be no failure or permanent deformation of any part of the window system that would cause any operational malfunction. The system met the overall **DP45** Uniform Load performance requirements under NAFS-11 and NAFS-17.

FORCED ENTRY RESISTANCE

Attempts to gain entry by opening the glazing panel, in accordance with the Disassembly and Sash Manipulation tests for a Type B assembly, were unsuccessful. The system met the **Grade 20** Forced-entry Resistance performance requirements of NAFS-11 and NAFS-17.

SASH/LEAF CONCENTRATED LOAD TEST ON LATCH RAIL

	Parallel Direction	Perpendicular Direction
Load, N (lbs)	230 (51.7)	135 (30.4)
Deflection, mm (in.)	0.64 (0.03)	1.18 (0.05)
Max. Allowable, mm (in.)	1.50 (0.06)	2.30 (0.13)

**Note – Testing was performed with the sash unglazed.*

After the test loads were released, the recorded deflections did not exceed the maximum allowable deflection. The tested specimen **met** the Sash/Leaf Concentrated Load Test on Latch Rail performance requirements of NAFS-11 and NAFS-17.

STABILIZING ARM LOAD TEST

Corner Test Load: 890 N (200 lbs)

Mid-Span Test Load: 1780 N (400 lbs)

After the test loads were released the specimen was inspected and there was found to be no failure or permanent deformation that would impair with the operation of the system. The specimen **met** the Stabilizing Arm Load performance requirements of NAFS-11 and NAFS-17.

Date: 15-May-2019

SECTION 8 CONCLUSION

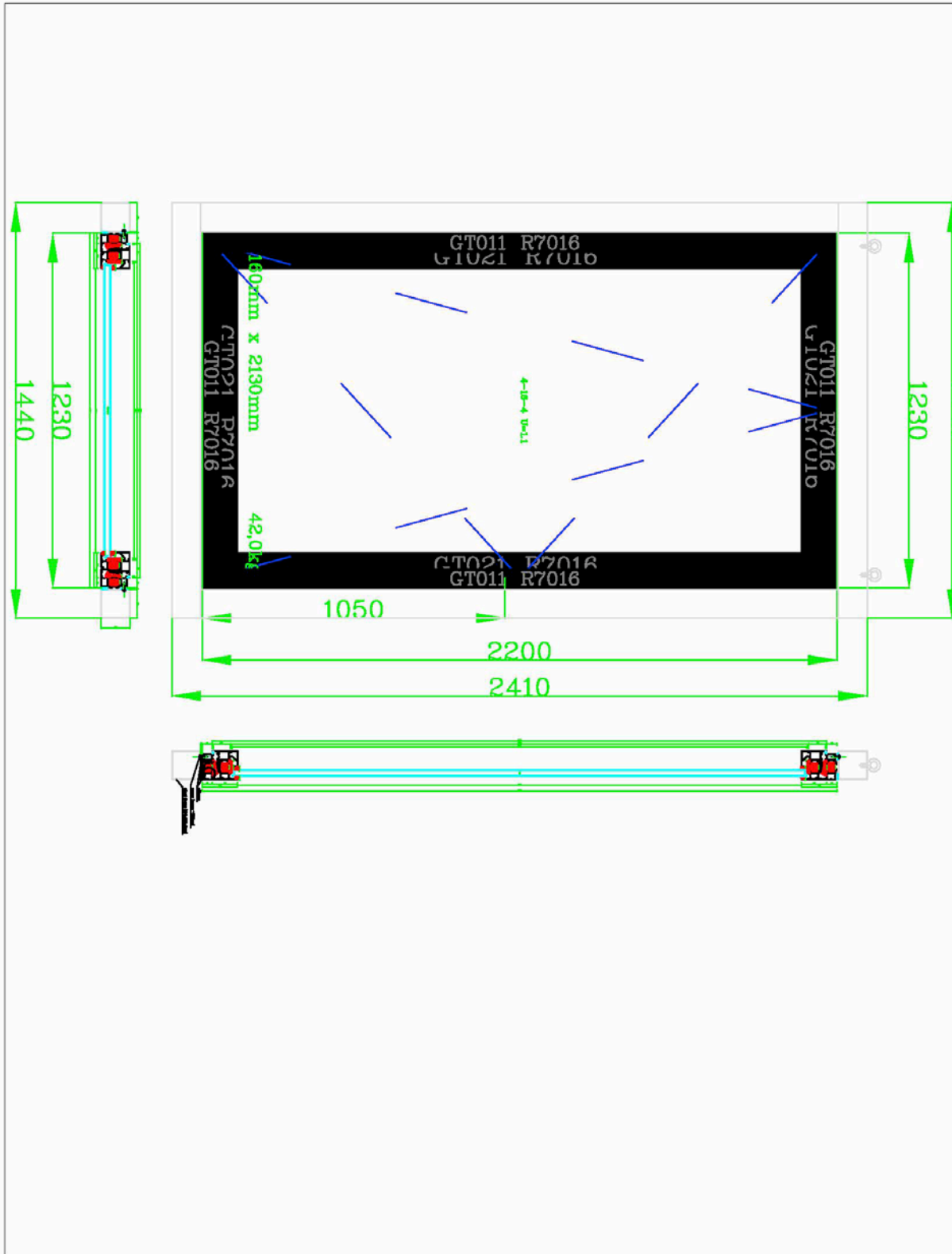
The Star Series Tilt & Turn Window System, submitted by Aliplast sp. Z o.o., tested and described within this report, achieved the overall performance requirements of **Class CW – PG45** when tested in accordance with NAFS-11, NAFS-17 and A440S1-17.

SECTION 9

APPENDIX A: DRAWINGS

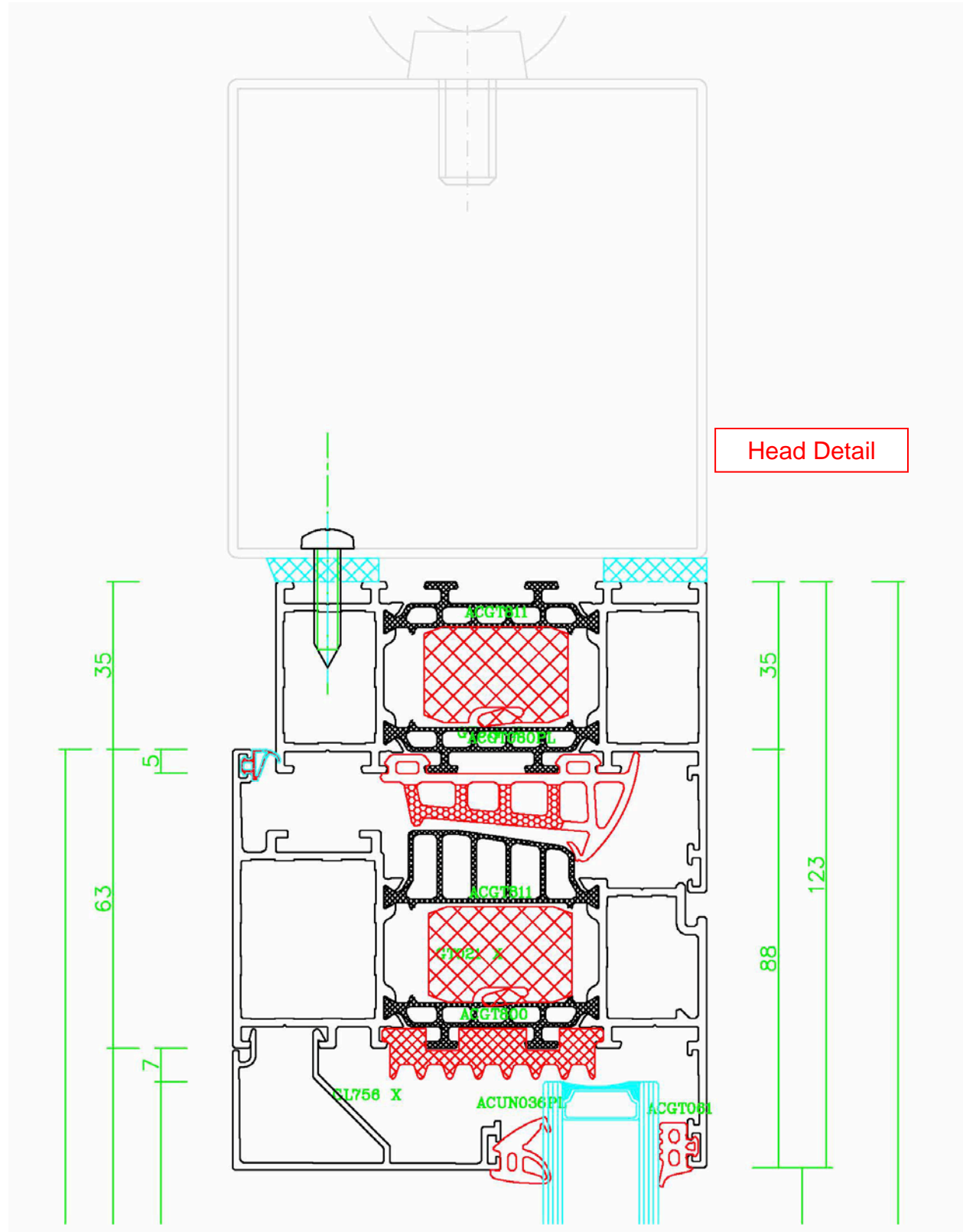
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Date: 15-May-2019



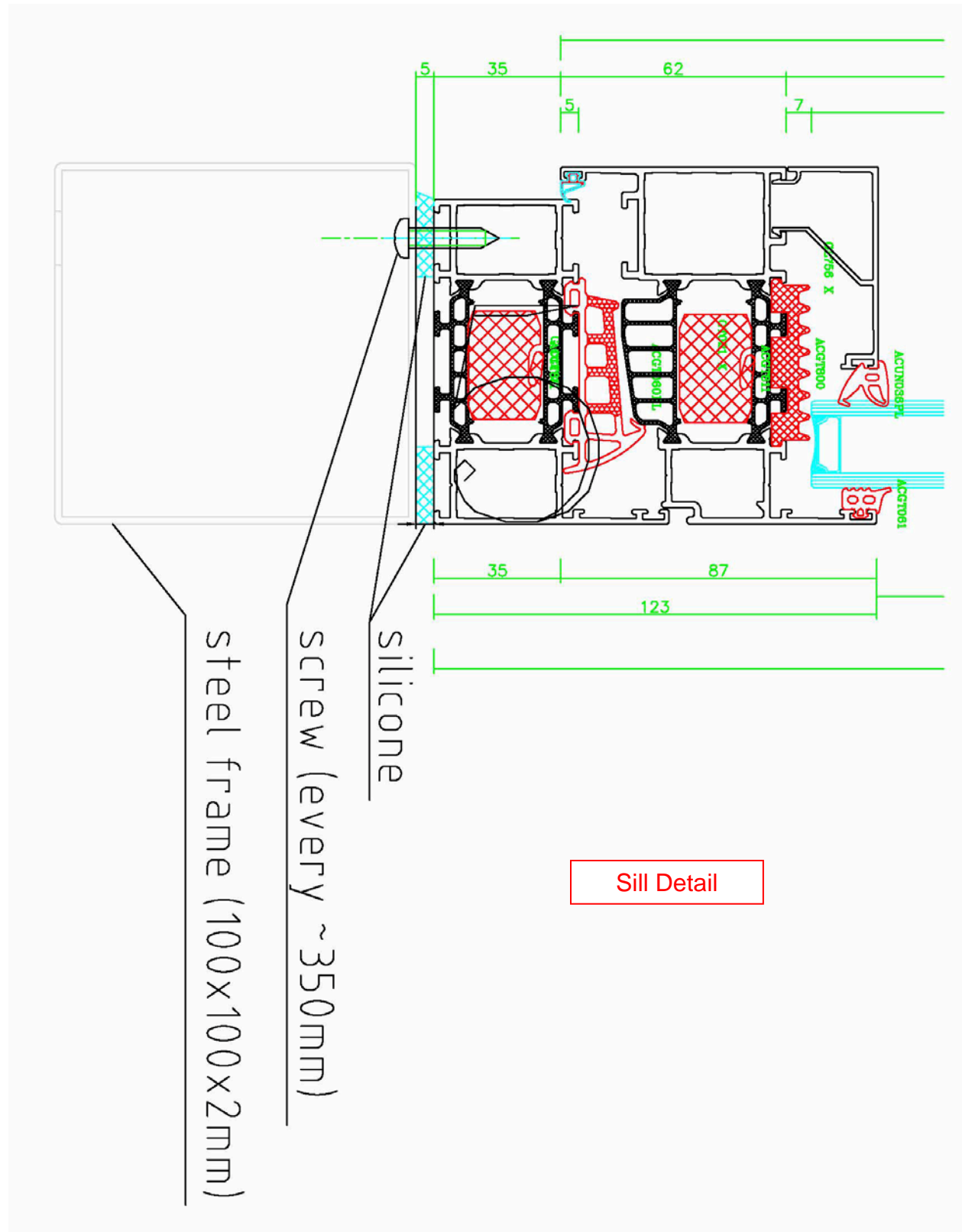
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Date: 15-May-2019



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Date: 15-May-2019



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Date: 15-May-2019

LISTA PRODUKCYJNA NR: LP 0010/03/2019 Created: 28.03.2019 15:28:22 Realization date: Date not set Client:		ORDER: Canada_tests_bez suwanek - Qty of positions: 6 Surface [m2]: 26,8 Qty of 6 Circuit [m]: 61,1 Labor [hours]: 0,00 Weight [kg]: 1 140,4	
Pos. 1 Star - windows and glass cases (B=1 230, H=2 200) hardware: FAPIM MAGICUBE (INVISIBLE HINGES) Profiles code:Lakierowany niestandardowy 7016 Furniture colour:Lakierowany niestandardowy 7016 Fillings:4-16-4 U=1.1			
Quantity: 1 Surface: 2,71 m2 Circuit: 6,86 m Weight without 37,58 kg Weight of glass: 41,44 kg Total weight: 79,03 kg Labor: 0,00 hours U Factor: 1,4 W/(m²*K)			
System: STAR Standard Colour of Lakierowany niestandardowy 7016			
Wylizyl:	Zatwierdził:	Zrealizował:	

Profiles

Code	Quantity	Dimensions	Location	Description
GT011 R7016	2 pcs	2200 mm. (45°;45°)	1+4	Window frame 65mm
	2 pcs	1230 mm. (45°;45°)	2..3	
GT021 R7016	2 pcs	1160 mm. (45°;45°)	A	Window sash 87,5mm
	2 pcs	2130 mm. (45°;45°)	A	

Additional profiles

Code	Quantity	Dimensions	Location	Description
GL.756 R7016	2 pcs	1035 mm.	A	Glazing bead 56mm
	2 pcs	1955 mm.	A	
VL.59/AN	1 pcs	537 mm.	A.odklamki	Linkbar silver anod
	1 pcs	1247 mm.	A.odklamki	
	1 pcs	1834 mm.	A.odklamki	

Seals

Code	Quantity	Dimensions	Location	Description
ACGT060PL	6,66 m		1..4	Central gasket triline (aclx031)
ACGT061	6,03 m		A	External glazing gasket 6mm
ACGT800	5,68 m		A	Preform.insul.strip
ACGT811	13,18 m		1..4+A	20x30mm
ACUN036PL	6,03 m		A	Seal

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Date: 15-May-2019

Accessories

Code	Quantity	Dimensions	Location	Description
ACGT011	8 pcs.		1..4	Clamping corner
ACGT021A	4 pcs.		A	Clamp.corner outs.chamb.gt021
ACGT021B	4 pcs.		A	Clamp.corner ins.chamb.gt021
ACGT057	6 pcs.		A	Glass support
ACGT160PL	4 pcs.		1..4	Corner central gasket
ACVG45Z	2 pcs.		3	Drain hole cover black
ACVL020A	8 pcs.		1..4+A	Framing square aluminium

Kovanie

Code	Quantity	Dimensions	Location	Description
FAZE182	1 pcs.		A	BASE SET RU
FAZE201/LAN	1 pcs.		A	FAPIM WINDOW HANDLE GEA - anode-like coating
FAZE22	10 pcs.		A	Fapim universal keeper 1597 - 1597i_z5
FAZE221	1 pcs.		A	Zaczep do klamki
FAZE222R	1 pcs.		A	Nożyce długie z dolnym zawiasem, prawe
FAZE223	9 pcs.		A	Punkt ryglujący
FAZE224	1 pcs.		A	Joint
FAZE34	3 pcs.		A	Fapim additional corner transmission
FAZE35	1 pcs.		A	Fapim additional arm 1455 - 1455_z5

Glazing and plates

Code	Quantity	Dimensions	Location	Description
4-16-4 U=1.1	1 pcs.	1 021mm x 1 991mm 2,0m2	1	4-16-4 U=1.1

SECTION 10

APPENDIX B: PHOTOGRAPHS

(5 Pages)

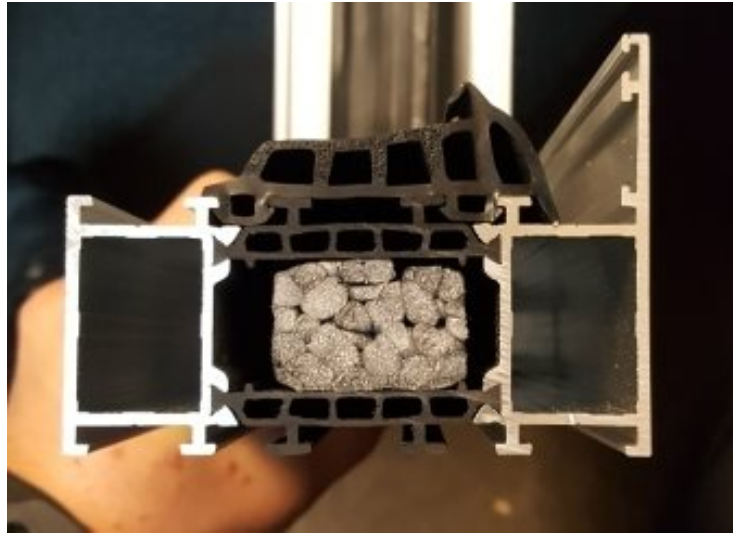
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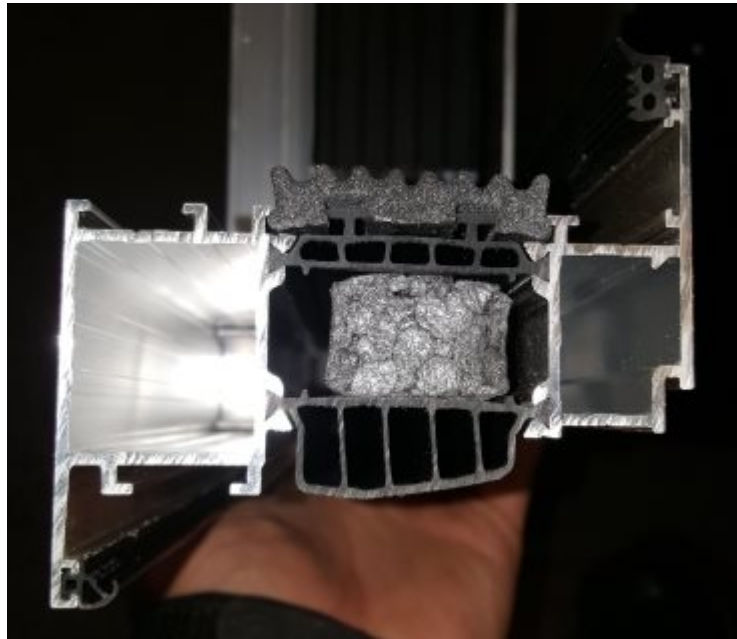
Star Series Tilt and Turn Window – Interior

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Frame profile



Sash profile

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Date: 15-May-2019



Corner Bracket Inserts – Main Frame



Corner Bracket Inserts – Sash Frame



Left, Sash Gasket; Right, Center Seal Gasket Profile

Date: 15-May-2019



Hinges – Left, Bottom Hinge; Right, Top Hinge



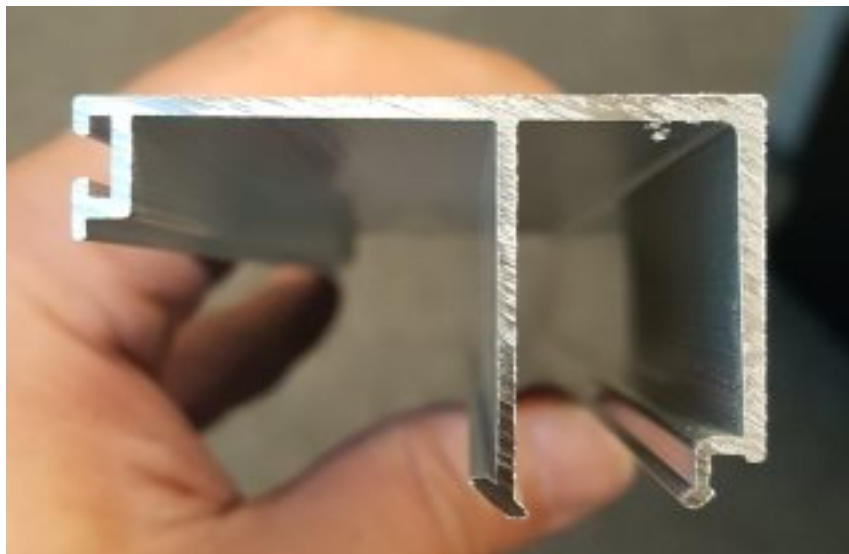
Glazing Cavity Foam

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Multi-Point Lock Keeper



Glazing Stop

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SECTION 11

APPENDIX C: REVISION TABLE

(1 Page)

Date: 15-May-2019

Revision Table				
Date	Section	Description	Technician	Reviewer
15-Mar-2019	---	Original Issue Date	---	---

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