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POLYTECH PRODUCTS LTD

TEST REPORT

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

PRODUCT SERIES & TYPE
Vinyl Dual Action Side Hinged Composite Door

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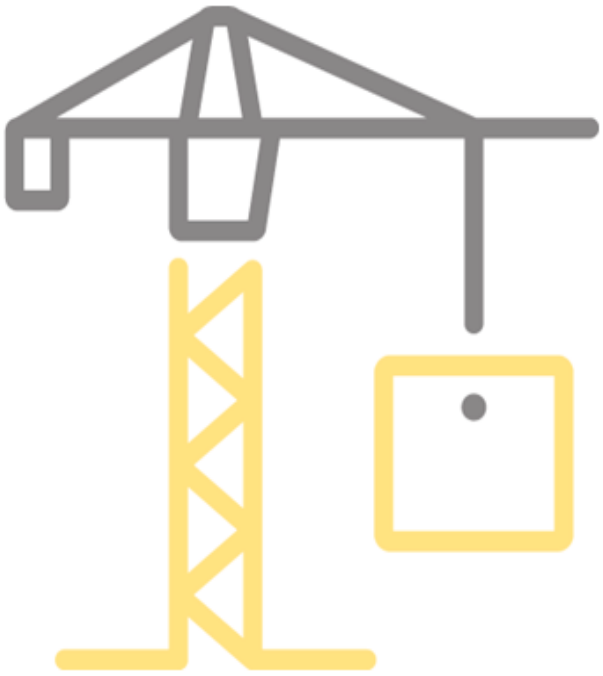

REPORT ISSUED TO

Polytech Products Ltd.
8819 Highway 105 RR3
Baddeck, NS B0E 1B0
Canada

SECTION 1
SCOPE

Intertek Building & Construction (B&C) was contracted by Polytech Products Ltd to perform testing in accordance with AAMA/WDMA/CSA 101/I.S.2/A440-17 "North American Standard/Specification for windows, doors, and skylights", and A440S1-17 "Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS – North American Fenestration Standard/Specification for windows, doors, and skylights", on their Dual Action Vinyl Side Hinged Composite Door. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at Intertek test facility in Mississauga, Ontario.

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 four 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.

SECTION 2
SUMMARY OF RESULTS

AAMA/WDMA/CSA 101/I.S.2/A440-17 *"North American Standard/Specification for windows, doors, and skylights",* and 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
Air Leakage Resistance @ +75 Pa (1.6 psf)	US – Pass; Can: 0.04 L/s/m² (A3)
Air Leakage Resistance @ -75 Pa (1.6 psf)	US – Pass; Can: 0.03 L/s/m² (A3)
Water Penetration Resistance	720 Pa (15.04 psf)
Uniform Load – Deflection	1920 Pa (40.10 psf)
Uniform Load – Structural	2880 Pa (60.15 psf)
Forced Entry Resistance	Pass
Force to Latch	Recorded
Sash/Leaf Concentrated Load on latch rail	Pass
Stabilizing Arm Load	Pass
Operating Cycle Performance	100,000
Insect Screen Serviceability Test	Pass
Thermoplastic Corner weld Test	Pass

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

Primary and Secondary Designations are as indicated below:

Dual Action Side Hinged Composite Door
Class LC – PG40 – Size Tested 1800 x 2100 mm (70.87 x 82.68 in) – DASHD

Secondary Designator
Positive Design Pressure = 1920 Pa (40.10 psf)
Negative Design Pressure = 1920 Pa (40.10 psf)
Water Penetration Resistance = 720 Pa (15.04 psf)
Canadian Air Leakage Resistance = A3

Mullion Assembly Primary Designator
Class LC – PG40 – Size Tested 2060 mm(81.10 in)/900 mm (35.43 in) TribWd MA

Mullion Assembly Secondary Designator
Positive Design Pressure = 1920 Pa (40.10 psf)
Negative Design Pressure = 1920 Pa (40.10 psf)
Water Penetration Resistance = 720 Pa (15.04 psf)
Canadian Air Leakage Resistance = A3

For INTERTEK B&C:

COMPLETED BY:	Edsel Lopez	**REVIEWED BY:**	David Park
TITLE:	Technical Analyst - Building & Construction	**TITLE:**	Reviewer Building & Construction
SIGNATURE:		**SIGNATURE:**	
DATE:	11/10/20	**DATE:**	11/10/20

SECTION 3
OBJECTIVE

Intertek Testing Services NA Ltd. (Intertek) has conducted testing for Polytech Products Ltd. on an 1800 x 2100 mm (70.87 x 82.68 in) Dual-Action Side Hinged Composite Door. Testing was conducted in accordance with following standard / specification:

- AAMA/WDMA/CSA 101/I.S.2/ A440-17 *"North American Standard/Specification for windows, doors, and unit skylights"* (NAFS-17)
- 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)

This evaluation was started on April 20, 2020 and completed on May 4, 2020.

SECTION 4
TEST SPECIMEN DESCRIPTION

Manufacturer Information	Polytech Products Ltd. 8819 Highway 105 RR3 Baddeck, NS B0E 1B0 Canada
Sample Type	Vinyl Dual Action Combination Door
Installation	• The combination door assembly was attached to a 2 x 10 in. wood buck and fastened with #8 x 3" wood screws spaced approximately 450 mm along the exterior perimeter of the buck. The perimeter joint between the window frame and wood buck on the interior was sealed with a bead of caulking at the exterior. The test mock-up was built by Polytech Products
Frame	• Overall Size: • Width – 1800mm • Height – 2100 mm • Extruded rigid vinyl frame members with mitered and welded corners • Reinforcement :16 GA galvanized rectangular box section installed in each frame member cavity and fastened with 4 mm diameter by 16 mm length metal screws spaced at approx. 250 mm along the perimeter. • Aluminum sill cap is placed at the bottom frame of the left operable leaf facing the • exterior and fastened with four # 6 x 20 mm stainless steel screws spaced at 240 mm. • Screen track kit installed to exterior of the frame jamb and fastened with seven #6 -20mm stainless steel screws spaced at 250 mm.
Mullion	• Extruded rigid vinyl with mitred and welded corners integrated with the frame and installed at the center. • Reinforcement: 16 GA galvanized rectangular box section installed in the full length of the mullion cavity and fastened with one #6 x 20 mm stainless steel screws on both cavity interface. • An extruded rigid vinyl screen track was bonded to the exterior interface of the mullion
(Dual Action Doors) 1&2	• Extruded rigid vinyl with mitred and welded corners. • Sash Size: Width:840 mm Height:2015 mm • The sash top and bottom rails were reinforced with a galvanized 16 GA J-section along the entire length of the rails and fastened with two 4 mm diameter by 16 mm self-drilling screws spaced at 450 mm. • The stiles were reinforced with galvanized 16 GA J-section along the entire length

	of the stiles and fastened with nine 4 mm diameter by 16 mm self-drilling screws spaced at approx. 660 mm. • Deflector kit was installed at the exterior bottom rail interface and fastened with five #6-20 mm stainless steel screws
Locks and Hardware	**Door 1 & 2** • **Lock:** A locking handle was fastened to a cavity along the lock stile through an aluminium backing plate and was fastened with two # 10 X 2" flat head stainless steel machine screws. The lock engaged a multipoint latch system that engages to nine metal keepers that are located at the jambs, header and sill. The handle was installed at the interior face of the sash at 1060 mm from the underside of the sash. • **Keepers**: Ten metal keepers are fastened to the interior sash with three #7 x 1 ¼" flat head stainless steel screw. One at the header located at 300 mm from the interior weld of header and lock jamb, four along the lock jamb/mullion spaced at 500 mm, 700 mm and45 mm respectively, three at hinge jamb spaced at 650mm and two at the sill approximately 450 mm apart • Tilt and turn hardware was installed at the interior mullion interface 900 mm from the bottom frame. • Hinge was installed at the top corner of the hinge jamb. A hinge arm 430 mm in length is attached to the multipoint system at the top rail of the sash rail
Drainage	• The top rail was vented by two 5mm x 25 mm slots spaced at 430 mm from the centre of the rail at the glazing cavity. • The bottom rail was drained by two 5mm x 25mm slots spaced at approximately 430 mm apart measured at the centre of bottom rail glazing cavity. • The top rail is vented by two 5mm x 25 mm slot at the exterior interface of the operable sash and spaced at 430 mm from the centre of the top rail. • The bottom rail is drained by two 5mm x 25 mm slot at the exterior interface of the operable sash spaced at 430 mm from the centre of the bottom rail. • The interior header cavity was vented by two 5mm x 25 mm slots spaced at 1350 mm from the centre of the header. • The interior sill track was drained to a forward cavity by two 5 mm x 25 mm slots that are spaced at 1480 mm O.C. • The sill cavity was drained to the exterior by two slots, measuring 5 mm x 25 mm, spaced at 1280 mm on centre. The exterior drain slots were fitted with eyelid weep covers.

Glazing & Glazing Methods	• The IG (insulating glass) unit was dry glazed from the interior on the bulb seal of the glazing leg at the top rail and stiles. The bottom rail was sealed with silicone all throughout its length and upwards of 100 mm to both stiles. Glazing leg corners were welded prior to installation of the glass. • Two setting blocks measuring 100 x 30 x 5 mm supported the IG unit at the bottom rail located at 520 mm O.C. • One setting blocks measuring 100 x 30 x 5 mm supported the IG unit at the top rail located at 100 mm from the adjacent weld at the mullion. • Two setting blocks measuring 100 x 30 x 5 mm supported the IG unit at the stiles spaced approximately 600 mm apart and located 100 mm of the adjacent weld at the top rail and lock stile. • Two setting blocks measuring 100 x 30 x 5 mm supported the IG unit at the stiles spaced approximately 600 mm apart and located 100 mm of the adjacent weld at the bottom rail and hinge stile. • Factory sealed glazing unit having two sheets of nominally thick 4 mm glass with a 16 mm wide gap and a spacer. • Overall IG thickness was 24 mm.
Insect Screen	• Frame: Roll formed aluminium members supported by four plastic corners • Mesh: Fiberglass mesh retained by plastic spline • Installation: Screen stile engaged a track along the frame jambs and mullion Screen Size: Width: 850 mm Length:2060 mm
Drawings	• Drawings and Bill of Materials submitted by the client in the Appendix

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). 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/m^2 per hour (5.0 U.S. gal/ft^2 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.

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.

FORCE TO LATCH

The force-to-latch test was performed to the door system in accordance with Section 6.4.5.1 of NAFS-17. Testing was performed by positioning the side-hinged door leaf so that the latch bolt is not farther than 155 mm (~6 in) from the strike plate. A force meter with a tether (designed to stop travel of the force meter 6 to 12 mm [~1/4 to 1/2 in] before latch engagement occurs) shall be applied perpendicular to the face of the door at a point 25 mm (~1 in) from the lock side door leaf edge and within 75 mm (~3 in) vertically from the latch bolt centerline. The door leaf shall be closed by applying the tethered force meter against the door leaf until the tether stops the meter and the latch bolt fully enters the strike opening. The test door leaf shall not close on a confined space in such a way that air pressure differential slows movement. The minimum force required to latch shall be measured and reported.

The deadbolt latch test was performed in accordance with Section 6.4.5.2 of NAFS-17. After the side-hinged door was locked, the deadbolt was then engaged. The perpendicular force applied to the door to engage the deadbolt was measured and recorded. The torque applied to operate the dead bolt was also measured and recorded.

FORCED ENTRY RESISTANCE

The Forced Entry Resistance Test was conducted and evaluated in accordance with Clause 9.3.5, in conjunction with AAMA F1304-18 "Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems" The test specimen shall be of the same size configuration, material, hardware, components and anchorage for which approval is sought. A 135 kg (300 lb), single individual point load shall be applied in any direction that would tend to open the leaf within 300 mm (6 in) of each operable leaf lock stile corner and within 150 mm (3 in) above the lock. The duration of the load at peak shall be 30 seconds at each location. At the conclusion of testing, there shall be no opening through which access to the interior hardware, locking devices, or where the hardware could be manipulated. In addition, there shall be no opening which allows for entrance through the tested specimen. The leaf shall remain locked and closed. Locks and hinges shall not disengage

SASH /LEAF CONCENTRATED LOAD TEST ON LATCH RAIL

In accordance to Section 9.3.6.4.3 of the AAMA/WDMA/CSA 101/I.S.2/A440-17, a concentrated load was applied to the center span of the latch rail, perpendicular to the plane of the glazed sash or leaf. The load was applied in one perpendicular direction and then the opposite direction. While applying the load there shall not be any glass breakage, deglazing or deflection that is greater than specified in Tables 6.4 of the standard.

A concentrated load was applied to center of the latch rail. The load applied was parallel or in the plane of the sash or leaf first in one direction then was performed in the other direction. While applying the load there shall not be any glass breakage, deglazing or deflection that is greater than specified in Tables 6.4 of the standard.

STABILIZING ARM LOAD TEST

Stabilizing arm load test was conducted in accordance with Clause 9.3.6.5.3 of the AAMA/WDMA/CSA 01/I.S.2/A440-17. The testing unit was mounted vertically with a concentrated load acting vertically downward applied on both corners and in the middle of the leaf, while being in full ventilating position supported solely by the stabilizing arm at one jamb, for 10 seconds. After the test loads were released, the casement was inspected for any damage to the frame, leaves, glass, stabilizing arm, and hardware components that would cause any operational malfunction.

OPERATION/CYCLING PERFORMANCE

The side-hinged door system was tested to AAMA 920-11 “Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems” for the LC class with a total number of 100,000 cycles, as governed by NAFS-17.

INSECT SCREEN SERVICEABILITY TEST

The Insect Screen test was conducted in accordance with Clause 5.1 of CSA A440S1-17 Canadian Supplement and evaluated in accordance with ASTM E1748 in the outward direction only. The load for the test shall be 60 N and the results shall be reported as pass or fail. It was applied to the insect screen (perpendicular to the plane of the screen and in an outward direction) through a 300 mm (12") diameter, rigid, circular platen centered on the centroid of the insect screen and held for a period of 60 seconds. After the test load was released, the screen was inspected for deformation or damage.

THERMOPLASTIC CORNER WELD TEST

Corner weld tests were conducted in accordance with Clause 9.3.6.2 of the AAMA/WDMA/CSA 101/I.S.2/A440-17. Each corner sample was mounted in a test fixture as per Figure 9.3 of the standard. The frame corners and the sash corners were loaded as per Figure 9.3 with a gradually increasing load until breakage of the corner occurred.

DEVIATION FROM STANDARD METHOD

There were no noted deviations from the test standards used in the evaluation reported herein.

SECTION 6
TEST EQUIPMENT

Equipment used during testing is listed as follows:

Test	Equipment	Intertek Asset#	Cal. Due
Air Leakage Resistance	Laminar Flow Element	280-01-0171	Apr. 15, 2021
	Pressure Transducer	280-01-0961	Dec. 19, 2020
Water Penetration	Spray Rack	273-01-0974	November 6, 2020
Uniform Load Deflection / Structural	String Pots	280-01-0956A	February 5,2021
		280-01-0956B	February 5,2021
		280-01-0956C	February 5,2021
		280-01-0956D	February 5,2021
		280-01-0956E	February 5,2021

SECTION 7
RESULTS AND OBSERVATIONS

AIR LEAKAGE RESISTANCE

Air Infiltration + 75 Pa	
Net infiltration:	0.16 L/s
Door System Area:	3.78 m²
Infiltration rate:	0.04 L/s·m²
Air Exfiltration – 75 Pa	
Net exfiltration:	0.10 L/s
Door System Area:	3.78 m²
Exfiltration rate:	0.03 L/s·m²

Maximum allowable air leakage rate (US infiltration only):	1.5 L/s·m²
Maximum allowable air leakage rate (Canadian A3):	0.5 L/s·m²

WATER PENETRATION RESISTANCE

During the 24-minute test period, using a pressure differential of 720 Pa, there was no water leakage observed, nor was there trapped water in the door assembly following completion of the test.

The door system **met** the Water Penetration Resistance requirements at 720 Pa (15.04 psf) as specified in AAMA/WDMA/CSA 101/I.S.2/A440-17 and CSA A440S1-17

UNIFORM LOAD TEST

Uniform Load Deflection Tests at Design Pressure						
Member	Top Rail		Lock Stile		Mullion	
Span Length (L)	770 mm		1930 mm		2060 mm	
Allowable Deflection	Repot Only					
Test Pressure	Positive	Negative	Positive	Negative	Positive	Negative
	1920 Pa	1920 Pa	1920 Pa	1920 Pa	1920 Pa	1920 Pa
Maximum Net Deflection (mm)	0.16	0.09	12.88	13.53	15.40	15.97
Post-test Details	After the test loads were released, the door system was inspected and there was found to be no failure or permanent deformation of any part of the door system.					

The door system **met** the minimum Uniform Load Deflection Gateway performance requirements for Class LC at 1200 Pa by virtue of meeting the Optional Performance requirements at ±1920 Pa for Uniform Load Structural as specified in AAMA/WDMA/CSA 101/I.S.2/A440-17.

Uniform Load Structural Test						
Member	Top Rail		Lock Stile		Mullion	
Span Length (L)	770 mm		1930 mm		2060 mm	
Allowable Deflection (L x 0.3%) Length	2.31 mm		5.79 mm		6.18 mm	
Test Pressure	Positive	Negative	Positive	Negative	Positive	Negative
	2880 Pa	2880 Pa	2880 Pa	2880 Pa	2880 Pa	2880 Pa
Net Residual Deflection (mm)	0.01	0.00	0.40	0.49	0.39	0.60
Post-test Details	After the test loads were released, the window was inspected and there was found to be no failure or permanent deformation of any part of the window system.					

The door system **met** the minimum Uniform Load Structural Gateway performance requirements for Class LC at 1800 Pa by virtue of meeting the Optional Performance requirements at ±2880 Pa for Uniform Load Structural as specified in AAMA/WDMA/CSA 101/I.S.2/A440-17.

FORCE-TO LATCH

The Operating Force-Latch Test results as described in NAFS-17 are reported below:

Force applied to fully engage the latch: 26 N

Applied perpendicular to the face and in a direction tending to close the door leaf:16 N

The requirements specified in NAFS-17 only require that the latch test and dead bolt operation torque values be reported only. There are no specifications.

FORCED ENTRY RESISTANCE TEST

No opening giving access to interior hardware, locking devices, or through which the hardware could be manipulated, were produced as a result of the test loads. As well, no opening allowing for entrance through the tested specimen was produced as a result of the test loads. The door system remained locked and closed, and the lock and hinges did not disengage as a result of the test loads.

The door system MET the Forced Entry Resistance performance requirements with respect to side hinged door systems as specified in AAMA 1304-18 "Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems.

SASH /LEAF CONCENTRATED LOAD ON LATCH RAIL

Dual Action Operable Sash				
	Perpendicular to Latch Rail		Parallel to Latch Rail	
Load Direction	1	2	1	2
Load Required	135N (30.35 lbf)	135N (30.35 lbf)	180N (40 lbf)	180 N (40 lbf)
Deflection limit	1.5 mm	1.5 mm	2.3 mm	2.3 mm
Results	0.05 mm	0.04 mm	1.20 mm	1.30 mm

The Dual Action Side-Hinged Door **met** the performance requirements specified in Clause 9.3.6.4.3 of NAFS-17.

STABILIZING ARM LOAD TEST

Dual Action Operable Sash	
Target Position	Load
Top Right Corner	890 N (200 lbf)
Top Left Corner	890 N (200 lbf)
Center	1780 N (400 lbf)
Comments	No damage occurred to the hardware and the sash operated properly.

The Dual Action Side-hinged door **met** the performance requirements specified in Clause 9.3.6.5.3 of NAFS-17.

INSECT SCREEN SERVICEABILITY TEST

After the test load was released, the screen was inspected and showed no signs of failure or permanent deformation.

The door system PASSED the performance requirements for Insect Screen Serviceability Test as outlined in CSA A440S1-17, Canadian Supplement.

OPERATION/CYCLING PERFORMANCE

The side-hinged door system **met** the requirements of AAMA 920-11 "Specification for Operating Cycle Performance of Side-Hinged Exterior Door Systems" for the LC class with a total number of 100,000 cycles as governed by NAFS-17.

THERMOPLASTIC CORNER WELD TEST

The sample was loaded until the point of failure. The break line did not extend along the entire weld line. The system **met** the Thermoplastic Corner Weld Test performance requirements of NAFS-17.

SECTION 8

CONCLUSION

The Dual Action Side Hinged Composite Door submitted by Polytech Products Ltd tested and described within this report, achieved the overall performance requirements of Class LC – PG40 when tested in accordance with NAFS-17, and A440S1-17.

Dual Action Side Hinged Composite Door
Class LC – PG40 – Size Tested 1800 x 2100 mm (70.87 x 82.68 in) – DASHD

Secondary Designator
Positive Design Pressure = 1920 Pa (40.10 psf)
Negative Design Pressure = 1920 Pa (40.10 psf)
Water Penetration Resistance = 720 Pa (15.04 psf)
Canadian Air Leakage Resistance = A3