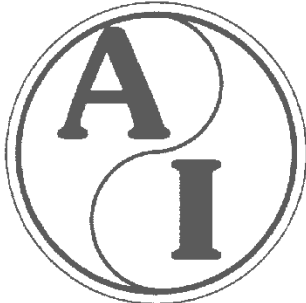


PERFORMANCE TESTS IN ACCORDANCE WITH
AAMA/WDMA/CSA 101/I.S.2/A440-08



Report No.:

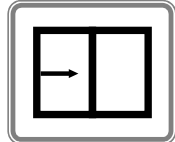
AI-04016-U1 Rev.1

Product Manufacturer:

ACRYLON PLASTICS
122 PAQUIN ROAD
WINNIPEG, MANITOBA
R2J 3V4
204-669-2345

Test Report Summary:

Product type:	PVC Horizontal Sliding Window
Product series/model:	GP111 Series Single Slider, 3 1/4" Frame
Primary product designator:	Class R-PG25-HS Size tested 1600 x 1099 (63 x 43)
Optional secondary designator:	Positive Design pressure (DP) = 1680 Pa (35.0 psf) Negative design pressure (DP) = -1680 Pa (-35.0 psf) Water penetration resistance test pressure = 180 Pa (3.75 psf) Canadian air infiltration / exfiltration level = A2 Level
Test completion date:	02/07/2013
Report date:	11/11/2013
Revision date:	12/17/2013
Number of pages:	8



Note: Reference must be made to Air-Ins Inc. complete report for test specimen description and detailed test results.

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**PERFORMANCE TESTS IN ACCORDANCE
WITH AAMA/WDMA/CSA 101/I.S. 2/A440-08**

1.0 INTRODUCTION

Air-Ins Inc. laboratory was retained by " **Acrylon Plastics** " to test a window according to the performance levels in the AAMA/WDMA/CSA 101/I.S.2/A440-08 Standard. The sample components and manufacturing are documented in section 2.0.

Note concerning the use of units of measurement in this report:

According to the AAMA/WDMA/CSA 101/I.S.2/A440-08 Standard, the use of SI (metric) units is the standard, while IP (Imperial) values given in parentheses are for reference purposes only, and are inexact rounded values. Section 5.0 contains testing results converted to IP units for the sake of convenience only. The only exception to using SI values is in the Performance Grade (PG) portion of the product designation.

Note concerning drawings:

The drawings reviewed for the production of this report are stamped and are on file at Air-Ins Inc. The availability of individual drawings will be at the discretion of the client.

2.0 DESCRIPTION OF THE SPECIMEN TESTED

Type: Horizontal Sliding, type A of AAMA/WDMA/CSA 101/I.S. 2/A440-08.
- Number of sashes: (1) operable sash

Model: Single slider 3-1/4" framing (GP111SS)

Assembly drawings: Single slider 3-1/4" framing (GP111SS)

Drawings reviewed: Parts no.: GP103, GP111, GP112, GP106, TSH02, TSH07, TSH28 and TSH08.



Date of CSA audit: None

Date(s) of sample reception: 01/29/2013

Date(s) of testing: 02/04/2013 to 02/07/2013

Test specimen installation (test buck):

- Material: Eastern Pine (2" x 6")
 - Rough opening clearances: None
 - Fastening: Screws # 8-2"trough wood buck 8/Rails, 5/Stiles.
 - Sealing detail: Sealant between test buck and specimen on exterior side only.

Frame :

- Material: Extruded P.V.C.
- Assembly method: Mitre cut, thermally welded
- Head, sill and jambs: Extrusion no. GP101
- Sill rail: Extrusion no. GP112
- Interlock mullion: Extrusion no. TSH02
- Water deflector: Extrusion no. GP106
- Overall dimensions: 1598 mm width x 999 mm height

Sash:

- Material: Extruded P.V.C.
- Assembly method: Mitre cut, thermally welded
- Sash perimeter: Extrusion no. GP103
- Pull handle: Extrusion no. TSH08
- Meeting adaptor: Extrusion no. TSH28
- Glazing stops: Extrusion no. TSH07
- Overall dimensions: 796 mm width x 933 mm height

Hardware:

- Cam locks: (2) 08703BG (Servitek)
- Keepers: (2) 08703KB (Servitek)

Performance Evaluation: Horizontal Sliding Window



Weatherstripping: (see assembly drawings)

- Sash: - EZ FIN 1821-80V6-1 (SSI) at stile rails and top rail.
- FS-7322-187 (Schlegel) at meeting rail.
- Frame: - FS-7325-187 (Schlegel) at mullion.
- FS-7330-187 (Schlegel) at sill, head, jamb and water deflector of frame.

Dust plugs: (see assembly drawings):

- Sash: - Dust plug 16 mm (L) x 30 mm (l) x 3.5 mm (h) installed at both extremities of meeting stile.
- Foam block 12 mm (L) x 25 mm (l) x 8 mm (h) installed in the groove of sash at the meeting stile level.
- Frame: - Dust plug 25 mm (L) x 38 mm (l) x 15 mm (h) stuck into the head frame interior groove at meeting rail level.
- Dust plug 25 mm (L) x 16 mm (l) x 6.5 mm (h) stuck on the sill rail at the meeting rail level.
- Foam block 13.5 mm (L) x 38 mm (l) x 10 mm (h) at extremities of the sill rail at jamb level.

Sealant:

- Sash: - Sealant at lower rail of sash and continue on 100 mm at stiles, before glazing stops installation.
- Sealant on 2 x 100 mm at centre part of stiles, before glazing stop installation.
- Sealant on 2 x 300 mm between the both glazing seal, on each stile and rail, before sealed unit installation.
- Sealant at junctions of glazing stops (**Alteration #1**).
- Frame: - Sealant at sill and continue on 150 mm at jamb and mullion, before glazing stops installation (fixed part).
- Sealant on 125 mm at centre part of jamb and mullion, before glazing stop installation.
- Sealant on 2 x 300 mm between the both glazing seal, at jamb, sill and head, before sealed unit installation.
- Sealant at mullion junctions with head and sill.



Glazing method:

- Glazing: With glazing stops
- Weatherstripping:
 - Interior side: 2 soft P.V.C. co-extruded on the glazing stop extrusion.
 - Exterior side: 2 soft co-extruded fin on the sash extrusion. 2 soft co-extruded fin on the jamb, sill and head extrusions (fixed part). Glazing tape on mullion (Profoam #614-C-K).

- Setting block:**
- 3 blocks at stiles
 - 3 blocks at inferior rail.

Glazing:

- Type: Dual glazed insulated glass unit
- Total thickness: 22 mm
- Glass thickness: 3 mm (interior, exterior)
- Type of glass: Clear annealed
- Type of spacer: Inex
- Type of filling gas: Air

Drainage holes or drainage system: (see drawings)

- Frame:
- 2 slots (6.5 mm x 32 mm) in front of frame for the drainage of the space under the moving sash, with flaps.
 - 2 slots (6.5 mm x 32 mm) at the bottom of screen, with flaps (**Alteration #2**).
 - 2 slots (3 mm x 15 mm) in the sill inner groove.
 - 1 hole (5.5 mm \varnothing) and 1 slot (15.5 mm x 4.5 mm) for fixed part drainage.
 - 1 slot (22 mm x 15 mm) in the sill rail, at meeting stile level. The sill rail is shorter by 5 mm at both extremities for drainage.
- Sash: 2 slots of (4.7 mm \varnothing).

Screen:

- Frame materials: Rolled aluminum
- Mesh materials: Fiberglass
- Anchoring method: Channelled at stiles.

Performance Evaluation: Horizontal Sliding Window



- Auxiliary parts: - 4 assembly braces
 - 2 nylon handles
 - 2 springs
 - 2 shims 6.3 mm thick.
- Overall dimensions: 718 mm width x 862 mm height

3.0 ALTERATION(S)

Alteration(s) performed in the laboratory on tested specimen to meet the reported performances:

Water tightness:

- (1) Sealant at junctions of glazing stops.
- (2) Addition of 2 slots (3 mm x 12 mm) in front of frame for screen cavity drainage. The initial slots for the drainage in the inner cavity of sill were blocked.

4.0 TEST BENCH INFORMATION

Information regarding the Test Bench and related instrumentation used for testing:

Test bench identification: TB-02-GC. The calibration of this test bench was done as per Article 9.0 of *ASTM E283, Standard Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors*, and *ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference* and *ASTM E547 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Cycling Static Air Pressure Difference*.

The last calibration of this test bench and related equipment was performed in January, 2013.



5.0 RESULTS OF PERFORMANCE TESTS

5.1 TEST SPECIMEN PRIMARY TESTING

TEST	<div style="border: 1px solid black; padding: 5px; display: inline-block; font-size: 2em; font-weight: bold; margin-right: 10px;">R</div> CLASS SPECIFICATIONS	TEST RESULTS	GRADE OR COMMENT
Operating Force Test	<p><u>U.S. (only) requirements:</u> Force to initiate motion: Reported only Force to maintain motion < 90 N (20 lbf) Force to latch < 100 N (22.5 lbf)</p> <p><u>Canadian (only) requirements:</u> Force to initiate motion: (normal use) < 90 N (20 lbf) (cleaning/maintenance) < 180 N (40 lbf)</p> <p>Force to maintain motion: (normal use) < 45 N (10 lbf) (cleaning/maintenance) < 115 N (25 lbf)</p> <p>Force to latch < 100 N (22.5 lbf)</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.1.1 & ASTM-E2068-00</p>	<p>Measured to initiate = 71.2 N (16 lbf) Measured to maintain = 44.5 N (10 lbf) Measured to latch = 4.5 N (1.0 lbf)</p>	Passed
Air Leakage Resistance Test	<p>$Q_{inf} \leq 1.5 \text{ l/s-m}^2 @ 75 \text{ Pa}$ ($\leq 0.3 \text{ cfm/ft}^2 @ 1.57 \text{ psf}$)</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.2.1 & ASTM-E283-04</p>	<p>Surface: 1.76 m² (18.93 ft²) $Q_{inf} = 0.60 \text{ l/s-m}^2 @ 75 \text{ Pa}$ ($0.12 \text{ cfm/ft}^2 @ 1.57 \text{ psf}$)</p>	Passed
	<p><u>Canadian air infiltration/exfiltration level:</u> A2: $Q_{inf \& \text{exf}} \leq 1.5 \text{ l/s-m}^2 @ 75 \text{ Pa}$ ($\leq 0.3 \text{ cfm/ft}^2 @ 1.57 \text{ psf}$) A3: $Q_{inf \& \text{exf}} \leq 0.5 \text{ l/s-m}^2 @ 75 \text{ Pa}$ ($\leq 0.1 \text{ cfm/ft}^2 @ 1.57 \text{ psf}$)</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.2.2 & ASTM-E283-04</p>	<p>$Q_{inf} = 0.60 \text{ l/s-m}^2 @ 75 \text{ Pa}$ ($0.12 \text{ cfm/ft}^2 @ 1.57 \text{ psf}$) $Q_{exf} = 0.55 \text{ l/s-m}^2 @ 75 \text{ Pa}$ ($0.11 \text{ cfm/ft}^2 @ 1.57 \text{ psf}$) $Q_{avg} = 0.58 \text{ l/s-m}^2 @ 75 \text{ Pa}$ ($0.11 \text{ cfm/ft}^2 @ 1.57 \text{ psf}$)</p>	A2 level
Water Resistance Test	<p>No water infiltration under a minimum pressure differential of 140 Pa (2.90 psf)</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.3.2 & ASTM-E547-00</p>	<p>No water infiltration under a pressure differential of 180 Pa (3.75 psf) with and without insect screen.</p>	25
Uniform Load Deflection Test	<p>Deflection at 720 Pa (15.00 psf) minimum class level and at optional Design Pressure (DP) performance level.</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.4.2 & ASTM-E330-02</p>	<p>Net deflection measured on the meeting stile: 4.75 mm @ -720 Pa (0.18 " @ -15.00 psf) 4.79 mm @ +720 Pa (0.18 " @ +15.00 psf) 13.13 mm @ -1680 Pa (0.51 " @ -35.00 psf) 12.33 mm @ +1680 Pa (0.48 " @ +35.00 psf)</p> <p>Net deflection measured on the top rail: 2.12 mm @ -720 Pa (0.08 " @ -15.00 psf) 3.33 mm @ +720 Pa (0.13 " @ +15.00 psf) 2.92 mm @ -1680 Pa (0.11 " @ -35.00 psf) 9.29 mm @ +1680 Pa (0.36 " @ +35.00 psf)</p> <p>Allowed: Not applicable for this performance class</p>	Reported only

Performance Evaluation: Horizontal Sliding Window



<p>Uniform Load Structural Test</p>	<p>Permanent deformation $\leq 0.4\%$ of the member span at minimum class level of 1080 Pa (22.5 psf) and at optional Structural Test Pressure (STP) levels.</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.4.3 & ASTM-E330-02</p>	<p>Permanent deformation measured on the meeting stile:</p> <p>0.82 mm @ -1080 Pa (0.03 " @ -22.50 psf) 0.98 mm @ +1080 Pa (0.03 " @ +22.50 psf) 1.90 mm @ -2520 Pa (0.07 " @ -52.50 psf) 2.29 mm @ +2520 Pa (0.09 " @ +52.50 psf) Allowed ≤ 3.84 mm (0.15 ")</p> <p>Permanent deformation measured on the top rail:</p> <p>0.14 mm @ -1080 Pa (0.00 " @ -22.50 psf) 0.49 mm @ +1080 Pa (0.01 " @ +22.50 psf) 0.33 mm @ -2520 Pa (0.01 " @ -52.50 psf) 1.15 mm @ +2520 Pa (0.04 " @ +52.50 psf) Allowed ≤ 2.95 mm (0.11 ")</p>	<p>35</p>
<p>Forced-Entry Resistance Test</p>	<p>All windows shall be tested according to ASTM F588-04 performance level 10.</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.5</p>	<p>Grade 20 of ASTM F588-04</p> <p>T₁=5 min., L₁=890 N (200 lbf), L₂=445 N (100 lbf) & L₃=155 N (35 lbf)</p>	<p>Passed</p>

5.2 TEST SPECIMEN AUXILIARY TESTING

TEST	<div style="border: 1px solid black; padding: 5px; display: inline-block; font-size: 2em; font-weight: bold; margin-right: 10px;">R</div> CLASS SPECIFICATIONS	TEST RESULTS	GRADE OR COMMENT
<p>Welded Corner Test</p>	<p>When loaded to failure, the break shall not extend along the entire weld line.</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.6.2</p>	<p>For each corner detail (sash and frame) the breakage does not extend along the entire weld line.</p>	<p>Passed</p>
<p>Deglazing Test</p>	<p>Deglazing < 90% of original glazing bite. The load for vertical sash members is 320 N (70 lbf) and 230 N (50 lbf) for all other rails.</p> <p>AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.6.3 & ASTM E987-88(2001)</p>	<p>Allowed: 14.4 mm (0.56") / 90 % Measured: 1.5 mm (0.06") / 10 % for stiles Measured: 1.0 mm (0.04") / 7 % for rails</p>	<p>Passed</p>
<p>Insect Screen Test</p>	<p><u>Canadian (only) requirements:</u> Insect screens shall be tested in accordance with ASTM E1748 in the outward direction only under a load of 60 N (13 lbf).</p> <p>A440S1-09 Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440 par. 5.1</p>	<p>No screen disengagement or permanent deformation under a 60 N (13 lbf) load.</p>	<p>Passed</p>

Performance Evaluation: Horizontal Sliding Window



6.0 CONCLUSION

Based on the tests results, the window described in this report meets the requirements of the AAMA/WDMA/CSA 101/I.S. 2/A440-08 Standard regarding performance testing (article 5.0).

Detailed assembly drawings showing wall thickness of all members, corner construction and hardware application are on file and have been compared to the sample submitted.

The above results were secured by using the designated test methods and they indicate compliance with the performance requirements of the referenced specification. The test records from this evaluation will be retained for a minimum of four (4) years from the date of report issuance. This report does not constitute certification of this product, which may only be granted by a certification agency.

Note on the Limitation of Liability:

Due care was taken in performing the testing sequence and in reporting the results related to the test specimen received for evaluation. Through acceptance of this report, the Client agrees to exempt Air-Ins Inc. employees and owners from all liability claims and demands arising from any matter related to or concerning the quality and execution of the performance evaluation contained in this report.