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

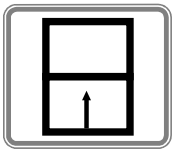
Report No.:

AI-04016-T1 Rev.1

Product Manufacturer:

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

Test Report Summary:



Product type:	PVC Hung Window- Vertical Sliding
Product series/model:	GP111 Series Single Hung, 3 1/4" Frame
Primary product designator:	**Class R-PG45-H Size tested 1000 x 1600 (39 x 63)**
Optional secondary designator:	Positive Design pressure (DP) = 2160 Pa (45.0 psf) Negative design pressure (DP) = -2160 Pa (-45.0 psf) Water penetration resistance test pressure = 330 Pa (6.75 psf) Canadian air infiltration / exfiltration level = A3 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: Vertical Sliding, type A of AAMA/WDMA/CSA 101/I.S. 2/A440-08.

- Number of sashes: (1) operable sash

Model: Single hung 3-1/4" framing (GP111SH)

Assembly drawings: Single hung 3-1/4" framing (GP111SH)

Other drawings reviewed: Parts no.: GP104, GP337, GP103, GP111, 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

For items marked with *, please refer to Section 3.0, for detailed alterations

Test specimen installation (test buck):

- Material: Eastern Pine (2" x 6")
- Rough opening clearances: None
- Fastening: Screws # 8-2"trough wood buck 5/Rails, 8/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: Piece no. GP111
- Interlock mullion: Piece no. TSH02 (Extrusion R2220)
- Water deflector: Piece no. GP106 (Extrusion R2234)
- Vertical rail: Piece no. GP104 (Extrusion R2683)
- Cover balance: Piece no. GP107
- Overall dimensions: 1000 mm width x 1599 mm height

Sash:

- Material: Extruded P.V.C.
- Assembly method: Mitre cut, thermally welded
- Sash perimeter: Piece no. GP103 (Extrusion R2219)
- Meeting adaptor: Piece no. TSH28 (Extrusion R2664)
- Pull handle: Piece no. TSH08
- Glazing stops: Piece no. TSH07 (Extrusion R2229)
- Overall dimensions: 911 mm width x 794 mm height

Hardware:

- Cam locks: (2) 08703BG (Servitek)
- Keepers: (2) 08703KB (Servitek)
- Shoe: (2) KNOB-N0590 (Gearmould)
- Tilt latch: (2) 110-2224-10 LH/RH (Roman Industrie)
- Balance: (2) 30 HD (Unique Balance)

Weatherstripping: **(see assembly drawings)**

Sash:
- FS-7322-187 (Schlegel) at meeting rail.
- EZ FIN 1831-80V6-1 (SSI) at stiles of sash.

Frame:
- FS-7322-187 (Schlegel) at sill and interlock mullion.
- FS-7330-187 (Schlegel) at water deflector.

Dust plug: (See assembly drawings)

Sash:
- Foam block installed in the groove of sash stiles at the interlock level.
- DPAB 1500-750 (Schlegel) at both extremities of meeting rail.
- PBAB 8625-430 (Schlegel) dust plug stuck on the sash stiles, at meeting rail level.

Frame: Foam blocks installed in exterior and interior cavities of the cover balances.

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 glazing stops junctions (**Alteration #1**).

Frame:
- Sealant at lower rail of sash and continue on 150 mm at jambs, before glazing stops installation (fixed part).
- Sealant on 125 mm at centre part of jambs and head, before glazing stop installation.
- Sealant on 2 x 300 mm between the both glazing seal, at jambs and head, before sealed unit installation.

- Sealant at mullion junctions with jambs.
- Sealant at glazing stops junctions (**Alteration #1**).
- Sealant at lower extremities of vertical rails (**Alteration #1**).

Glazing method:

- Glazing: With glazing stops
- Glazing seal:
  - Interior side: 2 soft co-extruded fin on the glazing stops extrusion.
  - Exterior side: 2 soft co-extruded fin on the sash extrusion. 2 soft co-extruded fin on the jambs and head extrusions (fixed part). Glazing tape (Profoam #614-C-K) on mullion.
- Glazing shims: 3 shims per stile/rail and 3 shims on the mullion.

Glazing:

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

Drainage holes or drainage system : (see drawings)

Frame:
- 2 slots (6 mm x 32 mm) in front of frame for the drainage of the space under the moving sash, with flaps.
- 2 slots (6 mm x 32 mm) at the bottom of screen, with flaps (**Alteration #2**).
- 2 slots (3 mm x 16 mm) in the sill inner groove.
- 2 slots (6 mm ø) for mullion drainage.

Sash: 2 slots of 5mm ø.

Screen:

- Frame materials: Rolled aluminum
- Mesh materials: Fiberglass
- Anchoring method: Channelled at mullion and sill.
- Auxiliary parts: - 4 assemblies braces

- 2 nylon handles
- 2 springs

- Overall dimensions: 899 mm width x 738 mm height

3.0 ALTERATION(S)

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

(1) **Air tightness** :

- Sealant at glazing stops junctions.
- Sealant at lower extremities of vertical rails.

(2) **Water tightness** :

- Addition of 2 slots (6 mm x 32 mm) in front of frame for screen cavity drainage, with flaps. 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	R CLASS SPECIFICATIONS	TEST RESULTS	GRADE OR COMMENT
Operating Force Test	*U.S. (only)requirements:* Force to initiate motion: Reported only Force to maintain motion < 155 N *(35lbf)* Force to latch< 100 N *(22.5 lbf)* *Canadian (only)requirements:* Force to initiate motion: (normal use)< 200N *(45 lbf)* (cleaning/maintenance)< 230 N *(50 lbf)* Force to maintain motion: (normal use)< 100 N *(22.5 lbf)* (cleaning/maintenance)< 200 N *(45 lbf)* Force to latch< 100 N *(22.5 lbf)* *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.1.1 & ASTM-E2068-00*	Measured to initiate = 20 N *(4.5 lbf)* Measured to maintain = 24 N *(5.4 lbf)* Measured to latch = 38 N *(8.5 lbf)*	**Passed**
Air Leakage Resistance Test	Q_{inf} ≤ 1.5 l/s-m² @ 75 Pa *(≤ 0.3 cfm/ft² @ 1.57 psf)* *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.2.1 & ASTM-E283-04*	Surface: 1.59 m² *(17.13 ft²)* Q_{inf} = 0.49 l/s-m² @ 75 Pa *(0.10 cfm/ft² @ 1.57 psf)*	**Passed**
	Canadian air infiltration/exfiltration level: A2: $Q_{inf\ \&\ exf}$ ≤ 1.5 l/s-m² @ 75 Pa *(≤ 0.3 cfm/ft² @ 1.57 psf)* A3: $Q_{inf\ \&\ exf}$ ≤ 0.5 l/s-m² @ 75 Pa *(≤ 0.1 cfm/ft² @ 1.57 psf)* *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.2.2 & ASTM-E283-04*	Q_{inf} = 0.49 l/s-m² @ 75 Pa *(0.10 cfm/ft² @ 1.57 psf)* Q_{exf} = 0.48 l/s-m² @ 75 Pa *(0.09 cfm/ft² @ 1.57 psf)* Q_{avg} = 0.49 l/s-m² @ 75 Pa *(0.10 cfm/ft² @ 1.57 psf)*	**A3 level**
Water Resistance Test	No water infiltration under a minimum pressure differential of 140 Pa *(2.90 psf)* *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.3.2 & ASTM-E547-00*	No water infiltration under a pressure differential of 330 Pa *(6.75 psf)* with and without insect screen.	**45**
Uniform Load Deflection Test	Deflection at 720 Pa *(15.00 psf)* minimum class level and at optional Design Pressure (DP) performance level. *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.4.2 & ASTM-E330-02*	Net deflection measured on the meeting rail: 2.92 mm @ –720 Pa *(0.11 " @ –15.00 psf)* 2.69 mm @ +720 Pa *(0.11 " @ +15.00 psf)* 11.70 mm @ –2160 Pa *(0.37 " @ –45.00 psf)* 10.20 mm @ +2160 Pa *(0.45 " @ +45.00 psf)* Net deflection measured on the stile: 1.15 mm @ –720 Pa *(0.05 " @ –15.00 psf)* 2.89 mm @ +720 Pa *(0.11 " @ +15.00 psf)* 5.54 mm @ –2160 Pa *(0.22 " @ –45.00 psf)* 11.42 mm @ +2160 Pa *(0.45 " @ +45.00 psf)* Allowed: Not applicable for this performance class	**Reported only**

Uniform Load Structural Test	Permanent deformation ≤ 0.4% of the member span at minimum class level of 1080 Pa *(22.5 psf)* and at optional Structural Test Pressure (STP) levels. *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.4.3 & ASTM-E330-02*	Permanent deformation measured on the meeting rail: 0.06 mm @ –1080 Pa *(0.00 " @ –22.5 psf)* 0.32 mm @ +1080 Pa *(0.01 " @ +22.5 psf)* 0.88 mm @ –3240 Pa *(0.03 " @ –67.50 psf)* 1.00 mm @ +3240 Pa *(0.04 " @ +67.50 psf)* Allowed ≤ 3.46 mm *(0.14 ")* Permanent deformation measured on the stile: 0.07 mm @ –1080 Pa *(0.00 " @ –22.5 psf)* 0.07 mm @ +1080 Pa *(0.00 " @ +22.5 psf)* 0.35 mm @ –3240 Pa *(0.01 " @ -67.50 psf)* 0.35 mm @ +3240 Pa *(0.01 " @ +67.50 psf)* Allowed ≤ 3.02 mm *(0.12 ")*	**45**
Forced-Entry Resistance Test	All windows shall be tested according to ASTM F588-04 performance level 10. *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.5*	Grade 30 of ASTM F588-04 T_1=10 min., L_1=1112 N *(250 lbf)*, L_2=556 N *(125 lbf)* & L_3=222 N *(50 lbf)*	**Passed**

5.2 TEST SPECIMEN AUXILIARY TESTING

TEST	R CLASS SPECIFICATIONS	TEST RESULTS	GRADE OR COMMENT
Welded Corner Test	When loaded to failure, the break shall not extend along the entire weld line. *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.6.2*	For each corner detail (sash and frame) the breakage does not extend along the entire weld line	**Passed**
Deglazing Test	Deglazing < 90% of original glazing bite. The load for horizontal sash members is 320 N *(70 lbf)* and 230 N *(50 lbf)* for all other rails. *AAMA/WDMA/CSA 101/I.S.2/A440-08 par. 5.3.6.3 & ASTM E987-88(2001)*	Allowed: 18.0 mm *(0.71")*/ 90 % Measured: 0.8 mm *(0.03")*/ 8.5 % for stiles Measured: 7.5 mm *(0.30")* / 6 % for rails	**Passed**
Insect Screen Test	Canadian (only)requirements: Insect screens shall be tested in accordance with ASTM E1748 in the outward direction only under a load of 60 N (13 lbf). *A440S1-09 Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440 par. 5.1*	No screen disengagement or permanent deformation under a 60 N (13 lbf) load.	**Passed**

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.