AAMA/WDMA/CSA 101/I.S.2/A440-08
AAMA/

TEST REPORT SUMMARY

Rendered to:

MI WINDOWS AND DOORS, INC.
650 West Market Street
Gratz, PA 17030

PRODUCT TYPE: PVC Casement
SERIES/ MODEL: “9770”

<table>
<thead>
<tr>
<th>Title</th>
<th>Summary of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Product Designator</td>
<td>Class LC-PG50: 914 x 1829 mm (36 x 72 in) C</td>
</tr>
<tr>
<td>Positive Design Pressure</td>
<td>+2400 Pa (+50.13 psf)</td>
</tr>
<tr>
<td>Negative Design Pressure</td>
<td>-2400 Pa (-50.13 psf)</td>
</tr>
<tr>
<td>Operating Force (in motion)</td>
<td>9 N (2 lbf)</td>
</tr>
<tr>
<td>Air Infiltration</td>
<td>0.4 L/s/m² (0.07 cfm/ft²)</td>
</tr>
<tr>
<td>Water Penetration Resistance</td>
<td>Test Pressure 580 Pa (12.11 psf)</td>
</tr>
<tr>
<td>Uniform Load Structural Test Pressure</td>
<td>±3600 Pa (75.19 psf)</td>
</tr>
<tr>
<td>Forced Entry Resistance</td>
<td>ASTM F588-07 - Grade 10 Pass</td>
</tr>
</tbody>
</table>

Reference must be made to Report No. NCTL-110-15580-3 dated 11/13/12 for complete test specimen description and data.

For National Certified Testing Laboratories

Robert WM. DeFayette
Field Testing/ Curtain Wall Coordinator
AAMA/WDMA/CSA 101/I.S.2/A440-08

STRUCTURAL TEST REPORT

NCTL-110-15580-3

REPORT TO:
MI WINDOWS AND DOORS, INC.
650 WEST MARKET STREET
GRATZ, PA 17030

REPORT NUMBER: NCTL-110-15580-3
REPORT DATE: 11/13/12
REVISION DATE: 02/21/13

PRODUCT:
“9770” PVC Casement
Description of Specimen Tested

Note: All dimensions are in the order (Width x Height x Thickness) unless otherwise noted.

Model/ Series
“9770”

Configuration
PVC Casement
This product is also labeled under the following names: 1675 and CT Case

Overall Frame Size
914.4 mm x 1828.8 mm (36” x 72”)

Vent Size
874.71 mm x 1789.11 mm (34.4375” x 70.4375”)

Viewing Area
742.95 mm x 1657.35 mm (29.25” x 65.25”)

Frame & Sash Type
Extruded vinyl

Joint Construction
Frame & Vent
Mitered, welded

Glazing Components

Overall
19.05 mm (0.750”) Nominal

Glass Thickness
(2) Lites of 3 mm (0.117”) nominal annealed glass

Spacer Type/Size
13.11 mm (0.516”) Polycarbonate-butyl composite spacer (Type P1-D)

Glazing System
Exterior glazed with an adhesive back-bedding and a snap-in single-leaf dual durometer glazing bead

Weatherstrip

Type
(1) Strip center fin

Size
8.89 mm (0.350”) high

Location
Vent perimeter

Type
(2) Strips foam-filled bulb-vinyl

Location
Vent perimeter

Size
7.62 mm (0.300”) High
Operating Hardware

Locks
Type: Single handle (4)-point lock assembly with lock points
Location: Lock points located at 82.55 mm (3.25"), 730.25 mm (28.75"), 1130.3 mm (44.5") and 1612.9 mm (63.5") from the sill

Keeper
Type: Metal
Location: Lock stile at the lock point locations

Roto-Operator
Type: Standard
Location: 379.4 mm (11") From the hinge jamb on the sill

Hinge Hardware
Type: (3)-Bar
Location: Head/ top rail and sill/ bottom jamb

Auxiliary
Type: Plastic vent guide
Location: 76.2 mm (3") From the lock jamb on the sill

Type: (2) Metal snubber
Location: 596.6 mm (23.5") and 1206.5 mm (47.5") From the sill and the hinge jamb with corresponding snubbers located on the hinge stile

Reinforcement
No reinforcement employed

Weep Description
Size: 12.7 mm (0.5") x 3.18 mm (0.125") High
Location: 76.2 mm (3") From each end of the bottom rail glazing bead

Interior/ Exterior
Surface Finish: White vinyl (PVC)

Sealant
No apparent sealant applied

Insect Screen
No screen employed

Installation Method
The window was installed in a spruce-pine-fir wood buck and fastened through the frame with (1) #8 x 44.45 mm (1.75") pan head screw located at 76.2 mm (3") from each end and 40.6.4 mm (16") on center thereafter at the jambs. The exterior perimeter was sealed with a silicone sealant.

Test Results - AAMA/WDMA/CSA 101/I.S.2/A440-2008

<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2</td>
<td>Operating Force and Force to Latch - Method B (Force Gauge)</td>
</tr>
<tr>
<td></td>
<td>ASTM E2068-00(08)</td>
</tr>
<tr>
<td></td>
<td>Initiate Motion = 27 N (6 lbf)</td>
</tr>
<tr>
<td></td>
<td>Maintain Motion - Opening = 9 N (2 lbf)</td>
</tr>
<tr>
<td></td>
<td>Maintain Motion - Closing = 9 N (2 lbf)</td>
</tr>
<tr>
<td></td>
<td>Allowed (LC Rating08) = 30 N (7 lbf)</td>
</tr>
<tr>
<td></td>
<td>Latches = 18 N (4 lbf)</td>
</tr>
<tr>
<td></td>
<td>Allowed = 100 N (22.5 lbf)</td>
</tr>
</tbody>
</table>

NOTE: The results above represent the maximum force among all sash tested.
Paragraph 5.3.2.1  Test Air Leakage Resistance
ASTM E283-04(12)
The tested specimen meets or exceeds the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440-2008 for air infiltration at 75 Pa (1.6 psf).

- Maximum Allowable = 1.5 L/s/m² (0.3 cfm/ft²)
- Air Leakage Rate = 0.4 L/s/m² (0.07 cfm/ft²)

Paragraph 5.3.3  Test Water Penetration Resistance
ASTM E547-00(09)
No Leakage after 4 cycles of 5 minutes at 580 Pa (12.11 psf)

Paragraph 5.3.4.2  Test Uniform Load Deflection at Design Pressure
ASTM E330-02(10)
- No damage after positive 2400 Pa (50.13 psf) held for 10 seconds
- No damage after negative 2400 Pa (50.13 psf) held for 10 seconds
- Measured Deflection Positive = 1.02 mm (0.040 inches)
- Measured Deflection Negative = 1.65 mm (0.065 inches)

Paragraph 5.3.4.3  Test Uniform Load Structural Test
ASTM E330-02(10)
- No damage after positive 3600 Pa (75.19 psf) held for 10 seconds
- No damage after negative 3600 Pa (75.19 psf) held for 10 seconds
- Measured Permanent Set Positive = <0.03 mm (<0.001 inches)
- Measured Permanent Set Negative = 0.51 mm (0.020 inches)
- Maximum Allowed (0.4%) = 2.44 mm (0.096 inches)

NOTE: Deflection and Permanent Set measurements taken on the hinge stile over a 609.6 mm (24") span.

Paragraph 5.3.5  Test Forced Entry Resistance
ASTM F588-07
Type B Window Assembly/Grade 10/20: Pass

<table>
<thead>
<tr>
<th>Test</th>
<th>Results</th>
<th>Allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disassembly</td>
<td>No Entry</td>
<td>No Entry</td>
</tr>
<tr>
<td>Lock Manipulation</td>
<td>No Entry</td>
<td>No Entry</td>
</tr>
<tr>
<td>Sash Manipulation</td>
<td>No Entry</td>
<td>No Entry</td>
</tr>
<tr>
<td>Test B1</td>
<td>No Entry</td>
<td>No Entry</td>
</tr>
<tr>
<td>Test B2</td>
<td>No Entry</td>
<td>No Entry</td>
</tr>
<tr>
<td>Test B3</td>
<td>No Entry</td>
<td>No Entry</td>
</tr>
<tr>
<td>Hardware Manipulation Test</td>
<td>No Entry</td>
<td>No Entry</td>
</tr>
<tr>
<td>Sash Manipulation Test</td>
<td>No Entry</td>
<td>No Entry</td>
</tr>
</tbody>
</table>

NOTE: 1. T1 = 5 minutes, L1 = 667 N (150 lbf), L2 = 333 N (75 lbf), L3 = 111 N (25 lbf)
2. Loads were held for 60 seconds.
Paragraph | Test
--- | ---
5.3.6.2 | Thermoplastic Corner Weld Test (PVC products only) - Pass

Paragraph | Test
--- | ---
5.3.6.4.3 | Sash Vertical Deflection Test

Vertical load applied 200 N (45 lbf) held for 60 seconds

<table>
<thead>
<tr>
<th>Vertical Deflection Limit</th>
<th>Measured Deflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>= 0.8 mm (0.03 inches)</td>
<td>= 1.5 mm (0.06 inches)</td>
</tr>
</tbody>
</table>

Paragraph | Test
--- | ---
5.3.6.6.2 | Distributed Load Test

Uniform load applied 300 Pa (6.2 psf) held for 10 seconds

No failure or deformation = Pass

Testing performed at MI Windows and Doors, Inc.

This test report was prepared by National Certified Testing Laboratory (NCTL), for the exclusive use of the above named client and it does not constitute certification of this product. The results are for the particular specimen tested and do not imply the quality of similar or identical products manufactured or installed from specifications identical to the tested product. The test specimen was supplied to NCTL by the above named client. No conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimen are to be drawn from the ASTM E330 test. Forced entry resistance test equipment used is in compliance with Section 7 of the ASTM F588-07 test method. Foam tape is mounted to the perimeter of the test buck prior to clamping to the test wall. NCTL is a testing lab and assumes that all information provided by the client is accurate and does not guarantee or warranty any product tested or installed. The results in this report are actual tested values and are applicable to the specimen tested only, using the components and construction methods described herein.
Detailed drawings were available for laboratory records and compared to the test specimen at the time of this report. Component drawings were reviewed for product verification. The bill of materials contains details with any deviations noted. Ambient conditions during the referenced testing are available upon request. A copy of this report along with representative sections of the test specimen will be retained by NCTL. This report does not constitute certification or approval of the product, which may only be granted by a certification program validator or recognized approval entity. All tests were conducted in full compliance with the referenced specifications and/or test methods. This report is the joint property of National Certified Testing Laboratories Inc. and the Client to whom it is issued. Permission to reproduce this report by anyone other than National Certified Testing Laboratories Inc and the Client must be granted in writing by both of the above parties. This report may not be reproduced, except its entirety, without the written consent of NCTL.

National Certified Testing Laboratories

Robert WM. DeFayette
Field Testing/ Curtain Wall Coordinator

Robert H. Zeiders, P.E.
Vice-President Engineering & Quality

RWD/ hl
Attachments
   Appendix A – Revision Summary
   Appendix B – Drawings
Appendix A

Section 1:

Component Drawings, with Applicable Part Numbers, Manufacturing and Modeling Details, were Reviewed (as submitted) for Product Verification
(Reference: NCTL-110-15580-3)

See Attached Documentation;
any deviations noted.

Note: The above referenced component drawings along with representative sections of the test specimen will be retained per procedure by NCTL. This testing facility assumes that all information provided by the client is accurate.

Section 2:

<table>
<thead>
<tr>
<th>Identification</th>
<th>Date</th>
<th>Page &amp; Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Issue</td>
<td>11/13/12</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Revision 01</td>
<td>02/21/13</td>
<td>Appendix B page moved from report PDF to Prints PDF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PDF page numbering and naming</td>
</tr>
</tbody>
</table>