TEST REPORT

Report No.: F6539.01-109-47

Rendered to:

MI WINDOWS AND DOORS, LLC
Gratz, Pennsylvania

PRODUCT TYPE: Polyvinyl Chloride (PVC) Double Hung Window (Integral Fin)

SERIES/MODEL: 1650


<table>
<thead>
<tr>
<th>Title</th>
<th>Test Specimen #1</th>
<th>Test Specimen #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAMA/WDMA/CSA 101/I.S.2/A440-08</td>
<td>Class R-PG25 965 x 1956*</td>
<td>Class R-PG30 965 x 1956*</td>
</tr>
<tr>
<td></td>
<td>(38 x 77)*-H</td>
<td>(38 x 77)*-H</td>
</tr>
<tr>
<td>Design Pressure</td>
<td>+1200 Pa (+25.06 psf)</td>
<td>+1440 Pa (+30.08 psf)</td>
</tr>
<tr>
<td>Negative Design Pressure</td>
<td>-1440 Pa (-30.08 psf)</td>
<td>-1440 Pa (-30.08 psf)</td>
</tr>
<tr>
<td>Air Infiltration</td>
<td>0.6 L/s/m² (0.12 cfm/ft²)</td>
<td>0.6 L/s/m² (0.12 cfm/ft²)</td>
</tr>
<tr>
<td>Water Penetration Resistance Test Pressure</td>
<td>260 Pa (5.43 psf)</td>
<td>260 Pa (5.43 psf)</td>
</tr>
</tbody>
</table>

Test Completion Date: 03/17/16

1.0 Report Issued To: MI Windows and Doors, LLC  
650 West Market Street  
P.O. Box 370  
Gratz, Pennsylvania 17030-0370

2.0 Test Laboratory: Architectural Testing, Inc., an Intertek company ("Intertek-ATI")  
130 Derry Court  
York, Pennsylvania 17406-8405  
717-764-7700

3.0 Project Summary:

3.1 Product Type: Polyvinyl Chloride (PVC) Double Hung Window (Integral Fin)

3.2 Series/Model: 1650

3.2.1 This product also labeled under the following names: 1555, 1556, 1655, BMDH3, and NCDH3

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test method(s). The specimens tested successfully met the performance requirements for the following ratings.

<table>
<thead>
<tr>
<th>Test Specimen(s)</th>
<th>Title</th>
<th>Summary of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101/I.S.2/A440-08</td>
<td>Class R-PG25 965 x 1956* (38 x 77)*-H</td>
</tr>
<tr>
<td>2</td>
<td>101/I.S.2/A440-08</td>
<td>Class R-PG30 965 x 1956* (38 x 77)*-H</td>
</tr>
</tbody>
</table>


General Note: An asterisk (*) next to the size designation indicates that the size tested for optional performance was smaller than the Gateway test size for the product type and class.

3.4 Test Dates: 03/16/16 - 03/17/16

3.5 Test Record Retention End Date: All test records for this report will be retained until March 17, 2020.

3.6 Test Location: MI Windows and Doors, LLC test facility in Gratz, PA. Calibration of test equipment was performed by Intertek-ATI in accordance with AAMA 205-01 "In-Plant Testing Guidelines for Manufacturers and Independent Laboratories".

3.7 Test Specimen Source: The test specimen(s) were provided by the client. Representative samples of the test specimen(s) will be retained by Intertek-ATI for a minimum of four years from the test completion date.
3.0 Project Summary: (Continued)

3.8 Drawing Reference: The test specimen drawings have been reviewed by Intertek-ATI and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek-ATI per the drawings on file with Intertek-ATI. Any deviations are documented herein or on the drawings.

3.9 List of Official Observers:

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richie Williard</td>
<td>MI Windows and Doors</td>
</tr>
<tr>
<td>Joel Chronister</td>
<td>Intertek-ATI</td>
</tr>
</tbody>
</table>

4.0 Test Specification(s):


5.0 Test Specimen Description:

5.1 Product Sizes:

<table>
<thead>
<tr>
<th>Test Specimens #1 and #2:</th>
<th>Width</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Area: 1.9 m² (20.3 ft²)</td>
<td>millimeters</td>
<td>inches</td>
</tr>
<tr>
<td>Overall size</td>
<td>965</td>
<td>38</td>
</tr>
<tr>
<td>Exterior sash</td>
<td>862</td>
<td>33-15/16</td>
</tr>
<tr>
<td>Interior sash</td>
<td>878</td>
<td>34-9/16</td>
</tr>
<tr>
<td>Screen (full size)</td>
<td>865</td>
<td>34-1/16</td>
</tr>
<tr>
<td>Screen (half size)</td>
<td>865</td>
<td>34-1/16</td>
</tr>
</tbody>
</table>

The following descriptions apply to all specimens.

5.2 Frame Construction:

<table>
<thead>
<tr>
<th>Frame Member</th>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head, sill, and jambs</td>
<td>PVC</td>
<td>Extruded</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Joinery Type</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>All corners</td>
<td>Mitered</td>
</tr>
<tr>
<td></td>
<td>Thermally welded</td>
</tr>
</tbody>
</table>

5.0 Test Specimen Description: (Continued)

5.3 Sash Construction:

<table>
<thead>
<tr>
<th>Sash Member</th>
<th>Material</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rails and stiles</td>
<td>PVC</td>
<td>Extruded</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Joinery Type</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>All corners</td>
<td>Mitered</td>
</tr>
<tr>
<td></td>
<td>Thermally welded</td>
</tr>
</tbody>
</table>

5.4 Weatherstripping:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.187&quot; backed by 0.240&quot; high polypile with center fin</td>
<td>1 row</td>
<td>Vertical sill leg, head, exterior sash top rail, and interior meeting rail</td>
</tr>
<tr>
<td>0.187&quot; backed by 0.160&quot; high polypile with center fin</td>
<td>1 row</td>
<td>Exterior meeting rail</td>
</tr>
<tr>
<td>0.187&quot; backed by 0.240&quot; high polypile with center fin</td>
<td>2 rows</td>
<td>All sash stiles</td>
</tr>
<tr>
<td>7/8&quot; by 1/2&quot; by 0.400&quot; high polypile pad</td>
<td>2</td>
<td>Each end of interior meeting rail</td>
</tr>
<tr>
<td>0.187&quot; backed, custom, dual leaf, vinyl bulb seal</td>
<td>2 rows</td>
<td>Interior sash bottom rail</td>
</tr>
</tbody>
</table>

5.5 Glazing: No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made.

<table>
<thead>
<tr>
<th>Glass Type</th>
<th>Spacer Type</th>
<th>Interior Lite</th>
<th>Exterior Lite</th>
<th>Glazing Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot; IG</td>
<td>Metal-reinforced butyl</td>
<td>1/8&quot; clear annealed</td>
<td>1/8&quot; clear annealed</td>
<td>The glass was exterior glazed against sealant and secured with snap-in PVC glazing beads.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Quantity</th>
<th>Daylight Opening</th>
<th>Glass Bite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior sash daylight opening</td>
<td>1</td>
<td>787 x 868</td>
<td>31 x 34-3/16</td>
</tr>
<tr>
<td>Exterior sash daylight opening</td>
<td>1</td>
<td>787 x 868</td>
<td>31 x 34-3/16</td>
</tr>
</tbody>
</table>
5.0 Test Specimen Description: (Continued)

5.6 Drainage: A sloped sill was utilized.

<table>
<thead>
<tr>
<th>Drainage Method</th>
<th>Size</th>
<th>Quantity</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weephole</td>
<td>3/16&quot; diameter</td>
<td>4</td>
<td>3&quot; from the edge of the interior sash bottom rail</td>
</tr>
<tr>
<td>Weepslot</td>
<td>1/2&quot; long by 3/16&quot; wide</td>
<td>2</td>
<td>2-1/4&quot; from the edge of the exterior sash bottom rail</td>
</tr>
<tr>
<td>Weepslot</td>
<td>1/2&quot; long by 1/4&quot; wide</td>
<td>2</td>
<td>2-1/4&quot; from the corner under the glazing on the exterior sash bottom rail</td>
</tr>
</tbody>
</table>

5.7 Hardware:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic tilt latches (recessed)</td>
<td>4</td>
<td>Ends of the top rail and interior meeting rail</td>
</tr>
<tr>
<td>Constant force balance</td>
<td>4</td>
<td>Two per jamb</td>
</tr>
<tr>
<td>Metal tilt pins</td>
<td>4</td>
<td>Ends of the bottom rail and exterior meeting rail</td>
</tr>
<tr>
<td>Metal lock with adjacent keeper</td>
<td>2</td>
<td>7&quot; from the ends of the meeting rail</td>
</tr>
</tbody>
</table>

5.8 Reinforcement: No reinforcement was utilized.

<table>
<thead>
<tr>
<th>Drawing Number</th>
<th>Location</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF-104S-020</td>
<td>Interior meeting rail</td>
<td>Roll-formed steel</td>
</tr>
<tr>
<td>GVL-450</td>
<td>Sash</td>
<td>Roll-formed steel</td>
</tr>
</tbody>
</table>

5.9 Screen Construction:

<table>
<thead>
<tr>
<th>Frame Material</th>
<th>Corner Construction</th>
<th>Mesh Type</th>
<th>Mesh Attachment Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extruded aluminum</td>
<td>Mitered and keyed with plastic key</td>
<td>Fiberglass</td>
<td>Flexible vinyl spline</td>
</tr>
</tbody>
</table>
6.0 Installation:

The specimen was installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 1/8" shim space. The exterior perimeter of the window was sealed with sealant.

**Test Specimen #1:**

<table>
<thead>
<tr>
<th>Location</th>
<th>Anchor Description</th>
<th>Anchor Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head, sill, and jambs</td>
<td>#6 x 1-5/8&quot; long drywall screws</td>
<td>3&quot; from the corners and spaced 8&quot; on center, through the mounting fin into the wood buck</td>
</tr>
</tbody>
</table>

**Test Specimen #2:**

<table>
<thead>
<tr>
<th>Location</th>
<th>Anchor Description</th>
<th>Anchor Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jambs</td>
<td>#8 x 2&quot; long pan head screws</td>
<td>4&quot; from each corner through the frame jamb into the wood buck</td>
</tr>
</tbody>
</table>
7.0 Test Results: The temperature during testing was 19°C (67°F). The results are tabulated as follows:

### Test Specimen #1:

<table>
<thead>
<tr>
<th>Title of Test</th>
<th>Results</th>
<th>Allowed</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Force</strong>, per ASTM E 2068</td>
<td>Initiate motion: 116 N (26 lbf)</td>
<td>Report only</td>
<td></td>
</tr>
<tr>
<td>Maintain motion: 76 N (17 lbf)</td>
<td></td>
<td>135 N (30 lbf) max.</td>
<td></td>
</tr>
<tr>
<td>Latches:</td>
<td>9 N (2 lbf)</td>
<td>100 N (22.5 lbf) max.</td>
<td></td>
</tr>
<tr>
<td>Locks:</td>
<td>18 N (4 lbf)</td>
<td>100 N (22.5 lbf) max.</td>
<td></td>
</tr>
<tr>
<td><strong>Air Leakage</strong>, Infiltration per ASTM E 283</td>
<td>0.6 L/s/m² (0.12 cfm/ft²)</td>
<td>1.5 L/s/m² (0.3 cfm/ft²) max.</td>
<td>1</td>
</tr>
<tr>
<td>at 75 Pa (1.57 psf)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Water Penetration</strong>, per ASTM E 547</td>
<td>Pass</td>
<td>No leakage</td>
<td>2</td>
</tr>
<tr>
<td>at 260 Pa (5.43 psf)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Uniform Load Deflection</strong>, per ASTM E 330</td>
<td>Deflections taken at meeting rail</td>
<td></td>
<td>3, 4, 5</td>
</tr>
<tr>
<td>+1200 Pa (+25.06 psf)</td>
<td>5.1 mm (0.20&quot;)</td>
<td>Report only</td>
<td></td>
</tr>
<tr>
<td>-1440 Pa (-30.08 psf)</td>
<td>5.1 mm (0.20&quot;)</td>
<td>2.3 mm (0.09&quot;) max.</td>
<td></td>
</tr>
<tr>
<td><strong>Uniform Load Structural</strong>, per ASTM E 330</td>
<td>Permanent sets taken at meeting rail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+1800 Pa (+37.59 psf)</td>
<td>0.8 mm (0.03&quot;)</td>
<td>2.3 mm (0.09&quot;) max.</td>
<td>4, 5</td>
</tr>
<tr>
<td>-2160 Pa (-45.11 psf)</td>
<td>0.5 mm (0.02&quot;)</td>
<td>2.3 mm (0.09&quot;) max.</td>
<td></td>
</tr>
<tr>
<td><strong>Forced Entry Resistance</strong>, per ASTM F 588, Type: A - Grade: 10</td>
<td>Pass</td>
<td>No entry</td>
<td></td>
</tr>
<tr>
<td><strong>Thermoplastic Corner Weld</strong></td>
<td>Pass</td>
<td>Meets as stated</td>
<td></td>
</tr>
<tr>
<td><strong>Deglazing</strong>, per ASTM E 987</td>
<td>Operating direction, 320 N (70 lbf)</td>
<td>Pass</td>
<td>Meets as stated</td>
</tr>
<tr>
<td>Remaining direction, 230 N (50 lbf)</td>
<td>Pass</td>
<td>Meets as stated</td>
<td></td>
</tr>
</tbody>
</table>
7.0 Test Results: (Continued)

<table>
<thead>
<tr>
<th>Test Specimen #2:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Title of Test</td>
<td>Results</td>
<td>Allowed</td>
<td>Note</td>
</tr>
</tbody>
</table>
| Operating Force, per ASTM E 2068 | Initiate motion: 116 N (26 lbf) 
Maintain motion: 76 N (17 lbf) 
Latches: 9 N (2 lbf) 
Locks: 18 N (4 lbf) | Report only |  |
| | | 135 N (30 lbf) max. |  |
| | | 100 N (22.5 lbf) max. |  |
| Air Leakage, Infiltration per ASTM E 283 at 75 Pa (1.57 psf) | 0.6 L/s/m² (0.12 cfm/ft²) | 1.5 L/s/m² (0.3 cfm/ft²) max. | 1 |
| Water Penetration, per ASTM E 547 at 260 Pa (5.43 psf) | Pass | No leakage | 2 |
| Uniform Load Deflection, per ASTM E 330 Deflections taken at meeting rail +1440 Pa (+30.08 psf) -1440 Pa (-30.08 psf) | 6.4 mm (0.25") 5.3 mm (0.21") | Report only | 3, 4, 5 |
| Uniform Load Structural, per ASTM E 330 Permanent sets taken at meeting rail +2160 Pa (+45.11 psf) -2160 Pa (-45.11 psf) | 0.5 mm (0.02") 0.5 mm (0.02") | 2.3 mm (0.09") max. | 4, 5 |
7.0 Test Results: (Continued)

Note 1: The tested specimen meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.

Note 2: With and without insect screen.

Note 3: The deflections reported are not limited by AAMA/WDMA/CSA 101/I.S.2/A440 for this product designation. The deflection data is recorded in this report for special code compliance and information only.

Note 4: Loads were held for 10 seconds.

Note 5: Tape and film were used to seal against air leakage during structural testing. In our opinion, the tape and film did not influence the results of the test.
Intertek-ATI will service this report for the entire test record retention period. Test records such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For ARCHITECTURAL TESTING, Inc.

Joel Chronister  
Technician  

Timothy J. McGill  
Manager - Product Testing

Attachments (pages): This report is complete only when all attachments listed are included.  
  Appendix-A: Alteration Addendum (1)  
  Appendix-B: Location of Air Seal (1)  
  Appendix-C: Complete drawings packet on file with Intertek-ATI.
Appendix A

Alteration Addendum

Note: No alterations were required.
Appendix B

Location of Air Seal: The air seal between the test specimen and the test wall is detailed below. The seal is made of foam weatherstripping and is attached to the edge of the test specimen buck. The test specimen buck is placed against the test wall and clamped in place, compressing the weatherstripping and creating a seal.
Appendix C

Drawing(s)

Note: Complete drawings packet on file with Intertek-ATI.