



AAMA/NWWDA 101/I.S.2-97
TEST REPORT SUMMARY

Rendered to:

VEKA, INC.

SERIES/MODEL: DH31WW/Slope
TYPE: PVC Double Hung Window

| Title of Test | Results | |
|--------------------------|--------------------------|------------------|
| | Test Specimen #1 | Test Specimen #2 |
| Rating | H-R20 44 x 77 | H-R50 44 x 60 |
| Overall Design Pressure | 20 psf | 50 psf |
| Operating Force | 30 lb max. | N/A |
| Air Infiltration | 0.17 cfm/ft ² | N/A |
| Water Resistance | 6.0 psf | 7.5 psf |
| Structural Test Pressure | 30.0 psf | 75.0 psf |
| Deglazing | Passed | N/A |
| Forced Entry Resistance | Passed | N/A |

Reference should be made to Report No. 05-30208.01 for complete test specimen description and data.

For ARCHITECTURAL TESTING, INC.

Lynn George, Project Manager

LG:nlb



Architectural Testing

AAMA/NWWDA 101/L.S.2-97 TEST REPORT

Rendered to:

VEKA, INC.
100 Veka Drive
Fombell, Pennsylvania 16123-0250

Report No: 05-30208.01
Test Date: 04/12/01
Report Date: 05/10/01
Expiration Date: 04/12/05

Project Summary: Architectural Testing, Inc. (ATI) was contracted to perform tests on Series/Model DH31WW/Slope, PVC double hung windows at the Veka, Inc. facility in Fombell, Pennsylvania. The samples tested successfully met the performance requirements for the following ratings: Test Specimen #1 H-R20 44 x 77; Test Specimen #2 H-R50 44 x 60. Additional structural performance tests were conducted in accordance with the North Carolina Residential Building Code. Specimen #1 met the wind load requirements for a 35' mean roof height in the 70 mph Wind Zone and for a 15' mean roof height in the 80 mph Wind Zone. Specimen #2 met the wind load requirements for a 35' mean roof height in the 110 mph Wind Zone. Test specimen descriptions and results are reported herein.

Test Specification: The test specimen was evaluated in accordance with AAMA/NWWDA 101/L.S.2-97, *Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors*.

Test Specimen Description:

Series/Model: DH31WW/Slope

Type: Poly Vinyl Chloride (PVC) Double Hung Window

Test Specimen #1: H-R20 44 x 77

Overall Size: 3' 8" wide by 6' 5" high

Bottom Sash Size: 3' 5-11/16" wide by 3' 1-3/4" high

Top Sash Size: 3' 4-5/8" wide by 3' 1-3/4" high

Screen Size: 3' 4-1/2" wide by 3' 1-3/4" high



Test Specimen Description: (Continued)

Test Specimen #2: H-R50 44 x 60

Overall Size: 3' 8" wide by 5' 0" high

Bottom Sash Size: 3' 5-3/4" wide by 2' 5-1/4" high

Top Sash Size: 3' 4-3/4" wide by 2' 5-1/4" high

Screen Size: 3' 4-1/2" wide by 2' 5-1/4" high

The following descriptions apply to all specimens.

Finish: All vinyl was white.

Glazing Details: The sash were exterior glazed with 3/4" thick sealed insulating glass fabricated from two sheets of 1/8" clear annealed glass and a metal spacer system. The glass was set onto a silicone back bedding and secured with rigid vinyl glazing beads.

Weatherstripping:

| <u>Description</u> | <u>Quantity</u> | <u>Location</u> |
|------------------------------------------------------|-----------------|-----------------------------------------------|
| 0.187" backed by 0.280" high pile with center fin | 1 Row | Lock rail, bottom rail, head insert, and sill |
| 0.187" backed by 0.280" high pile with center fin | 2 Rows | All stiles, top rail, keeper rail |
| 0.350" diameter vinyl jacket/foam filled offset bulb | 1 Row | Bottom rail |

Frame Construction: The PVC frame was constructed using mitered and welded corner construction. A snap-in PVC adapter was located at the head.

Sash Construction: The PVC sash were assembled utilizing mitered and welded corner construction.

Screen Construction: The screen was constructed from extruded aluminum. The corners were mitre cut and secured with corner keys. Fiberglass mesh screen cloth was held-in-place with a flexible spline. A 1/8" high spacer button was located at each end of the bottom rail.



Test Specimen Description: (Continued)

Hardware:

| <u>Description</u> | <u>Quantity</u> | <u>Location</u> |
|-----------------------------------------------|-----------------|---------------------------------------------------------------------------------|
| Metal cam lock with metal keepers | 2 | Lock rail, 8" from each end, corresponding keepers on the exterior meeting rail |
| Spiral balance system with locking tilt shoes | 4 | Two per jamb |
| Plastic spring-loaded tilt latches | 4 | Top corners of each sash |
| Metal sash tilt pins | 4 | Bottom corners of each sash |

Drainage:

| <u>Description</u> | <u>Quantity</u> | <u>Location</u> |
|----------------------------------------------|-----------------|---------------------------------------------------------------------------------------|
| 1-1/8" wide by 1/8" high weepslot with flaps | 2 | One 3" from each end of the exterior sill face |
| 1-1/8" wide by 3/16" high weepslot | 2 | Each end of the sill intermediate leg, draining the cavity |
| 1-1/4" wide by 1/2" high weephole | 2 | One at each end of the sill at the interior jamb track draining into the hollow below |
| 3/4" wide by leg height high weep notch | 4 | One at each end of the interior and exterior vertical screen legs at the sill |
| 3/16" diameter hole | 4 | One at each end of the exterior meeting rail and bottom rail (through two walls) |

Reinforcement: All horizontal sash rails contained a custom shaped steel reinforcement measuring 1.000" x 0.520" x 0.060", (Drawing # SE35RF-1).

Installation: The unit was installed in a 2" x 10" wood buck constructed from Spruce/Pine/Fir construction lumber. A 3/4" by 3/4" wood stop was applied at the interior and exterior perimeter and secured with 2" long drywall screws spaced approximately 18" o.c. The interior and exterior perimeter was sealed with a silicone caulking, with the exception of a 4" void at each interior sill corner.



Test Results:

The results are tabulated as follows:

| <u>Paragraph</u> | <u>Title of Test - Test Method</u> | <u>Results</u> | <u>Allowed</u> |
|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------|
| <u>Test Specimen #1: H-R20 44 x 77</u> | | | |
| 2.2.1.6.1 | Operating Force | 30 lbs | 30 lbs max. |
| 2.1.2 | Air Infiltration per ASTM E 283 (See Note #1) @ 1.57 psf (25 mph) | 0.17 cfm/ft ² | 0.3 cfm/ft ² max. |
| <i>Note #1: The tested specimen meets (or exceeds) the performance levels specified in AAMA/NWWDA 101/I.S. 2-97 for air infiltration.</i> | | | |
| 2.1.3 | Water Resistance per ASTM E 547-96 (with and without screen) WTP = 6.00 psf | No leakage | No leakage |
| 2.1.4.2 | Uniform Load Structural per ASTM E 330-97 (measurements reported were taken on the meeting rails) @ 22.5 psf (positive) @ 22.5 psf (negative) | 0.00" 0.00" | 0.164" max. 0.164" max. |
| 2.2.1.6.2 | Deglazing Test per ASTM E 987 | | |
| | <u>Bottom Sash</u> | | |
| | In operating direction at 70 lbs | | |
| | Lift Rail | 0.030"/6% | 0.500"/100% |
| | Meeting Rail | 0.030"/6% | 0.500"/100% |
| | In remaining direction at 50 lbs | | |
| | Left Stile | 0.020"/4% | 0.500"/100% |
| | Right Stile | 0.020"/4% | 0.500"/100% |
| | <u>Top Sash</u> | | |
| | In operating direction at 70 lbs | | |
| | Lift Rail | 0.030"/6% | 0.500"/100% |
| | Meeting Rail | 0.030"/6% | 0.500"/100% |
| | In remaining direction at 50 lbs | | |
| | Left Stile | 0.010"/2% | 0.500"/100% |
| | Right Stile | 0.010"/2% | 0.500"/100% |
| 2.1.7 | Welded Corner Test | Passed | <100% of Weld Line |



Test Results:

| <u>Paragraph</u> | <u>Title of Test - Test Method</u> | <u>Results</u> | <u>Allowed</u> |
|----------------------------------------------------|--------------------------------------------|----------------|----------------|
| <u>Test Specimen #1: H-R20 44 x 77 (Continued)</u> | | | |
| 2.1.8 | Forced Entry Resistance per AAMA 1302.5-76 | | |
| | Test A | No entry | No entry |
| | Test B | No entry | No entry |
| | Test C | No entry | No entry |
| | Test D | No entry | No entry |
| | Test E | No entry | No entry |
| | Test F | No entry | No entry |
| | Test G | No entry | No entry |

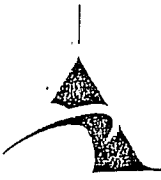
Optional Performance

| | | | |
|-------|------------------------------------------------------------------------------------------------------|------------|-------------|
| 4.3 | Water Resistance per ASTM E 547-96 (with and without screen) WTP = 6.0 psf | No leakage | No leakage |
| 4.4.2 | Uniform Load Structural per ASTM E 330-97 (measurements reported were taken on the meeting rails) | | |
| | @ 30.0 psf (positive) | 0.00" | 0.164" max. |
| | @ 30.0 psf (negative) | 0.02" | 0.164" max. |

Additional structural performance testing according to the North Carolina Residential Building Code:

| <u>Title of Test</u> | <u>Deflection Under Load</u> | <u>Permanent Set</u> |
|---------------------------------------------------------|------------------------------|----------------------|
| Uniform Load - per ASTM E 330-97* | | |
| (Measurements reported were taken on the meeting rails) | | |
| @ 20.0 psf (positive for 52 seconds) | 0.17" | 0.00" |
| @ 30.0 psf (positive for 10 seconds) | 0.25" | 0.00" |
| @ 20.0 psf (negative for 52 seconds) | 0.19" | 0.01" |
| @ 30.0 psf (negative for 10 seconds) | 0.29" | 0.02" |

*Note: Meets all requirements for this testing, but exceeds $L/175 = 0.232"$ for deflection at 30 psf positive and negative.



Test Results: (Continued)

| <u>Paragraph</u> | <u>Title of Test - Test Method</u> | <u>Results</u> | <u>Allowed</u> |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------|
| <u>Test Specimen #2: H-R50 44 x 60</u> | | | |
| <u>Optional Performance</u> | | | |
| 4.3 | Water Resistance per ASTM E 547-96 (with and without screen) WTP = 7.5 psf | No leakage | No leakage |
| 4.4.2 | Uniform Load Structural per ASTM E 330-97 (measurements reported were taken on the meeting rails) @ 75.0 psf (positive) @ 75.0 psf (negative) | 0.02" 0.04" | 0.164" max. 0.164" max. |

Additional structural performance testing according to the North Carolina Residential Building Code:

| <u>Title of Test</u> | <u>Deflection Under Load</u> | <u>Permanent Set</u> |
|----------------------------------------------------------------------------------------------|------------------------------|----------------------|
| Uniform Load - per ASTM E 330-97* (Measurements reported were taken on the meeting rails) | | |
| @ 50.0 psf (positive for 52 seconds) | 0.37" | 0.02" |
| @ 75.0 psf (positive for 10 seconds) | 0.56" | 0.02" |
| @ 50.0 psf (negative for 52 seconds) | 0.43" | 0.03" |
| @ 75.0 psf (negative for 10 seconds) | 0.64" | 0.04" |

*Note: Meets all requirements for this testing, but exceeds $L/175 = 0.232"$ for deflection.

Detailed drawings, representative samples of the test specimen, and a copy of this report will be retained by ATI for a period of four years. The above results were secured by using the designated test methods and they indicate compliance with the performance requirements of the above referenced specification. This report does not constitute certification of this product which may only be granted by the certification program administrator.

For ARCHITECTURAL TESTING, INC:

Lynn George

Lynn George
Project Manager

LG:nlb
05-30208.01

Allen N. Reeves

Allen N. Reeves, P.E.
Director - Engineering Services

10 MAY 2001

