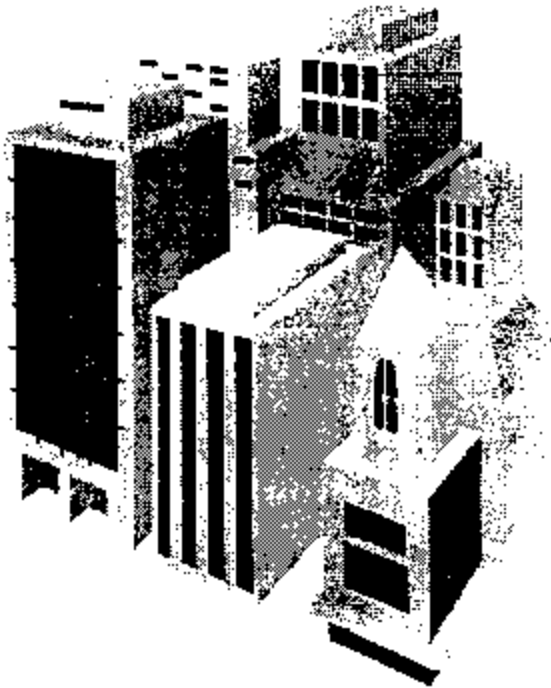


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Report Number ETC-01-552-11348.0

Test Start Date: 11/20/01

Test Finish Date: 01/02/02

Report Date: 02/21/02

Expiration Date: 02/21/06

Fenestration Structural Test Report

Rendered To

Great Lakes Windows, Inc.
30499 Tracy Road
Toledo, OH 43603

Series/Model

GLW-CO-101 Operating Casement

Description: The product tested was a vinyl Casement window with a vinyl sash. The glazing consisted of an IG unit with a nominal overall thickness of 3/4 inch, using two lights of double strength annealed glass and a steel channel spacer with PIB edge sealant. The frame size was 36 inches wide by 76 inches high by 3-1/4 inches deep.

Test Specification: AAMA/NWDA 101/I.S.2-97

Summary of Results

Overall Design Pressure	40.0 psf
Air Leakage Rate	0.01 scfm/ft ²
Maximum Water Pressure Achieved	8.25 psf
Maximum Structural Pressure Achieved	60.0 psf
Forced Entry Resistance - ASTM F588	Grade 10
Overall Product Rating	C-R40 - 36 x 76 (X)

Accreditations/Recognitions

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Specifications: The test specimen was evaluated in accordance with AAMA/NWWDA 101/I.S.2-97 "Voluntary Specification For Aluminum, Vinyl and Wood Windows and Glass Doors", sections 1,2 and 4 only. All performance specifications in this standard shall be met for full compliance to the standard and for product certification, labeling or represented as conforming to this standard.

Referenced Test Reports: None

Note – The test data in any section below with an "RTR" comment have not been obtained from this specimen but from the Referenced Test Report with a specimen of the same or larger size and identical construction.

Design Pressure (DP) – The product tested herein has been first evaluated to the Gateway pressure in the referenced specification for the performance class rating achieved.

Gateway Performance Tests

<u>Specification Paragraph</u>	<u>Title of Test</u>	<u>Results</u>	<u>Allowed</u>
2.1.2	<u>Air Infiltration – ASTM E283</u> Test Pressure - 1.57 psf The tested specimen exceeds the performance levels specified in AAMA/NWWDA 101/I.S.2-97 for air infiltration.	0.01 scfm/ft ²	0.3 scfm/ft ²
2.1.3	<u>Water Resistance – ASTM E547</u> 5 gal/hr-ft ² – 4 Test cycles – 24 Minutes Design Pressure - 15.0 psf Test Pressure – 2.86 psf With Screen Without Screen	NA Pass	No Leakage
2.1.4	<u>Uniform Structural Load - ASTM E 330</u> Design Pressure - 15.0 psf Test Pressure Positive Load – 22.5 psf (150% x DP) Negative Load – 22.5 psf (150% x DP)	0.008 in. 0.016 in.	0.144 in. 0.144 in.
2.1.7	<u>Welded Corner Test</u> Load corner weld to failure	Pass	<100%
2.1.8	<u>Forced Entry Resistance - ASTM F 588-97</u> Grade Level - 10 - Type B window Lock Manipulation Test Tests B1, B2, B3 Lock Manipulation Test	Pass Pass Pass	No Entry No Entry No Entry

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Gateway Performance Tests (con't)

Specification Paragraph	Title of Test	Results	Allowed
2.2.5.6.1	<u>Vertical Deflection Test</u> Design Pressure - 15.0 psf Test Load - 45 lbs	0.050 in.	0.722 in.
2.2.5.6.2	<u>Hardware Load Test</u> Design Pressure - 15.0 psf Test Load - 5.00 lbs/ft ² Load x Area = 48 lbs	Pass	No Damage

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Optional Performance Tests

The manufacturer specified herein has successfully achieved all the required criteria in section 2 of the referenced specification for the Gateway size of the achieved Performance Rating and has further successfully tested the product to higher performance levels as indicated below.

Design Pressure (DP) – The product tested herein has been additionally evaluated to the Design Pressures referenced below.

Specification

<u>Paragraph</u>	<u>Title of Test</u>	<u>Results</u>	<u>Allowed</u>
4.3	<u>Water Resistance - ASTM E 547</u> 5 gal/hr-ft ² – 4 Test cycles – 24 Minutes Design Pressure - 55.0 psf Test Pressure – 8.25 psf (15% x DP) With Screen Without Screen	NA Pass	No Leakage
4.4.2	<u>Uniform Structural Load - ASTM E 330</u> Design Pressure - 40.0 psf Test Pressure Positive Load – 60.0 psf (150% x DP) Negative Load – 60.0 psf (150% x DP)	0.007 0.008	0.144 0.144

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Product Description of Test Specimen

Glazing:

Overall Thickness	3/4 inch nominal (0.780 in.)
Thickness of Glass(s)	Double strength - (0.128/0.121 in.) - annealed
Number of Lights	Two
Laminate Thickness	NA
Sealant Material(s)	PIB
Spacer Material	Steel channel (0.490 in. wide x 0.325 in. high)

Frame:

Width, Height, Depth	36 in. Wide x 76in. High x 3-1/4 in. Deep
Material	Vinyl
Corner Construction	Mitered
Corner Fastening	Welded
Corner Sealing	None
Cladding	None

Sash:

Width, Height, Depth	34-5/8 in. Wide x 74-1/2 in. High x 2-3/16 in. Deep
Material	Vinyl
Corner Construction	Mitered
Corner Fastening	Welded
Corner Sealing	None
Cladding	None
Method of Glazing	Interior Drop In
Exterior	Wet glazed with silicone
Interior	Snap in vinyl glazing bead

Weather-stripping

Frame	
Head	Two rows of foam filled bulb seal, 0.295 in. W x 0.325 in. H
Sill	Two rows of foam filled bulb seal, 0.295 in. W x 0.325 in. H
Jambs	Two rows of foam filled bulb seal, 0.295 in. W x 0.325 in. H
Sash	
Stiles	One row of fin pile, 0.188 in. W x 0.280 in. H
Top Rail	One row of fin pile, 0.188 in. W x 0.280 in. H
Bottom Rail	One row of fin pile, 0.188 in. W x 0.280 in. H

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Product Description of Test Specimen (con't)

Drainage:

Type:	Weep holes
Size:	1/8 in. Dia
Location:	In glazing pocket of bottom rail 2-1/8 in. from corners through the bottom of the sash
Quantity	2

Reinforcement:

Material	Aluminum
Location	Top and bottom rail of the sash
Shape	Box beam with flange, 31 in L x 0.650 in. W x 0.555 in. H x 0.062 in. wall Thk

Hardware:

Locks	Truth Hardware model 3-point lock system
Keeper	Three steel keepers located 10, 37, and 65 in. top of the frame, secured by two #6 x 3/8 in. L screws each
Operator	Truth Hardware model 41011 rotary operator, sealed with a foam gasket
Hinges	Truth Hardware model 31862 two bar hinges, secured by eight #8 x 1/2 in. L screws
Anchors	One set of snubbers centered on hinge jamb and hinge stile, secured to sash using two #8 x 3/8 in. long screws each

Screens:

None provided

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Product Description of Test Specimen (con't)

Anchorage of Frame to Test Buck:

Type	Screws
Material	Steel
Size	#8 x 2-1/2 in. long - Phillips Head
Quantity	11
Location	5 per jamb, 4 inches and 21 inches from the corners and centered and one centered on the head

Test Buck:

Mounting Gap	Flush mounted
Shims-Qty./Location	None
Stops: size, Qtn., Loc.	None
Sealant	Silicone sealant
Buck Size	Double buck, 2 x 8 used on outside 2 x 6 used on inside
Material	SPF

Review of Bill of Materials – Reviewed as supplied

Review of Assembly and Detail Drawings – Reviewed as supplied – EV00727-A001, EV00727, EV00731, EV00578, IF00149, EA00168, IR00116

Components changed or altered during testing to achieve stated results – None

This report, in its original form contains product drawings and a Bill of Materials.

Product Description Approval

Clients Representative Signature on File

Date: 7/17/2000

Product Description Analysis

William Yanda

Laboratory Representative

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Conditions, Terms, and General Notes Regarding These Tests

The product tested has been compared to the detailed drawings, bill of materials and fabrication information supplied by the client so named herein. Our analysis, which includes dimensional and component description comparisons, indicate the tested product and engineering information supplied by the client "Are Equivalent". The report and representative samples will be retained for four years from the date of initial test.

These test results were obtained by employing all requirements of the designated test methods with no deviations. The test results and specimen supplied for testing are in compliance with the referenced specifications.

The test results are specific to the product tested by this laboratory and of the sample supplied by the client named herein, and they relate to no other product either manufactured by the client, a Fabricator of the client or of installed field performance.

This report does not constitute an AAMA or NWWDA certified product under the certification programs of these organizations. The program administrator of these programs and organizations may only grant product certification.

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No conclusions of any kind regarding the adequacy of the glass in the test specimen may be drawn from the test. Procedure "A" in ASTM E330 was used for this test.


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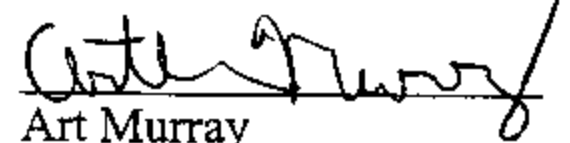


VP Approval

For ETC Laboratories



William Yanda
Test Technician



Art Murray
Test Engineer

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