Intertek Testing Services
ETL SEMKO

REPORT NO:	281-1268-1
CLIENT NO:	L09215
DATE:	August 14, 2000
DESCRIPTION:	**Performance Evaluation of a Vinyl Window**
CLIENT:	Remodelers Supply Center 2500 North Pulaski Road, Chicago, IL, 60639
ATTENTION:	Ella Karpowicz

Introduction

This report covers testing carried out on a window submitted July 7, 2000 for performance evaluation. Testing was performed in accordance with AAMA/NWWDA 101/I.S. 2-97.

Description

Designation: Royal 564 Series Single Hung.

Type: Vertically sliding tilt vinyl window, having one operating sash and one fixed lite.

Condition: New and undamaged.

Frame: Extruded vinyl frame members having welded corners. A horizontal mullion spanned the jambs at the mid point. The mullion was reinforced with an extruded aluminum channel measuring 38-7/16" long by 11/16" wide by 13/16" deep by .086" thick (976.3 mm by 17.5 mm by 20.6 mm by 2.2 mm). Ends of the mullion were fastened with two #8 x 3" (76.2 mm) long pan head screws through each jamb and sealed with silicone on the interior. Sash travel limiters were fitted into the jamb tracks at the head The unit was installed into a wood buck by the co-extruded vinyl nailing fin using six nails each per head and sill, and ten per jamb and sealed on the exterior.

Overall Size: 45" wide by 60-3/4" high
(1143 mm by 1543 mm)

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Description (contd)

Sash: Extruded vinyl sash members having welded corners. A vinyl interlock leg was notched out at a length of 3-7/8" (98.4 mm) at the locking hardware. The head rail was reinforced with extruded aluminum channel measuring 35-1/4" long by 1/2" wide by 3/4" deep by 0.063" thick (895 mm by 12.7 mm by 19.1 mm by 1.6 mm). Vinyl tilt latches (Ashland Part# 76200, and 76300) were fitted in cut outs at the ends of the interlock rail. Steel pivot bars (Caldwell Part# 16T120) fastened to the ends of the sill rail using three #8 x 5/8" (15.8 mm) long pan head screws per bar, engaged shoes (Caldwell Part # 16T145) operated by spiral balance hardware (Caldwell Part # 9/16" Spiral) installed into the jamb tracks. Two cam type locks (Allan Stevens Part # 9324) installed 10-1/2" (268 mm) from the ends of the interior interlock rail engaged keepers (Allan Stevens Part # 9857) installed on the mullion. Each lock or keeper was fastened to their respective member using two #6 x 1" (25.4 mm) long flathead screws.

Overall Size: 41-1/2" wide by 29-1/2" high
(1053 mm by 754 mm)

Glazing Method:

Sash: Laid in glazed on 1/16" by 1/2" (1.6 mm by 12.7 mm) double sided adhesive glazing tape (Tom Broun Part# F932) on the interior. As well, a heel bead of silicone was placed on the exterior with the exception of 1" up each stile and 3" cross the sill rail to allow drainage in the glazing cavity and vinyl stops. Three neoprene setting blocks, measuring 3/4" wide 1" long by 1/8" thick (19.1 mm by 25.4 mm by 3.2 mm), were placed at third points alone each sash member.

Fixed Lite: Laid in glazed on 1/16" by 1/2" (1.6 mm by 12.7 mm) double sided adhesive glazing tape (Tom Broun Part# F932) on the exterior. As well, a needle bead of silicone was placed on the interior edge of the glazing tape. Three neoprene setting blocks, measuring 3/4" wide 1" long by 1/8" thick (19.1 mm by 25.4 mm by 3.2 mm), were placed at third points alone each member.

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Description (contd)

Glazing: Factory sealed glazing units having two sheets of 7/64" (3 mm) glass, and a 5/8" (15.9 mm) air space and metal spacer.

Igmac Identification: HCP 64 IGCC CBA 98.

Screen: Roll formed aluminum screen members having fiberglass mesh and corners supported by aluminum corner keys.

Retention Method: Screen rails engaged tracks on the frame sill and mullion and two leaf springs at the head rail.

Overall Size: 39-5/8" wide by 29-1/2 " high
(1006 mm by 749 mm)

Weatherstripping: The horizontal mullion was single weatherstripped with finned woven pile (Schlegel Part # 7924-187). The stiles and were single weatherstripped on the interior and exterior edges with finned woven pile (Schlegel Part # 7924-187). The stiles were single weatherstripped on the exterior face with finned woven pile (Schlegel Part # 7924-187). The sill rail was weatherstripped on the exterior face with a extruded vinyl member complete with a co-extruded vinyl bulb. This member measured 41-1/16" (1043 mm) with both ends notched and fitted to the exterior face of the sill rail. The bottom interior of the sill rail was weatherstriped with a flexible vinyl bulb (Schlegel Part# SDB 066 094 T). The interlock rail was single weatherstripped with finned woven pile (Schlegel Part # 7924-187).

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Description (contd)

Weep Holes: Two 1/2" (12.7 mm) long by 13/64" (5.16 mm) wide slots drained the sash glazing cavity to the sill. The fixed lite glazing cavity drained to the mullion cavity via two 13/32" long by 3/16" wide slots at the end of the mullion. Two 13/32" long by 3/16" wide slots at the bottom ends of the mullion drain the mullion cavity to the exterior.

Drawings:

Cross Sections: Dominion Plastics Inc. drawings titled: "564-650 Single Hung Tilt Window, Vertical Section" and "Single Hung Tilt Window Horizontal Section", both dated 10-Aug-99.

Member Details: Dominion Plastics Inc. Die Drawing Numbered: VS564, VS576, VS652, VS650, VS649, VS648, D557, D348, D143.

A copy of the above drawings stamped "Intertek Testing Services NA Ltd." is enclosed with this report.

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Testing

Operating Force Test **Tested:** August 6, 2000

The force required to operate the sash was measured and found to be as follows;

Description of Force	Maximum Measured N	(lbs)	Maximum Allowable N	(lbs)
Maintain motion opening/closing	120	(27.0)	140	(30)

The test specimen meets the performance level specified in H-class for operating force.

Air Leakage Test **Tested:** July 10, 2000

Air infiltration testing was performed at a pressure differential of 1.56 psf (75 Pa) in accordance with the procedure outlined in A.S.T.M. E283. A Meriam Instrument Co. laminar flow element, Model No. 50MW20-2, Serial No. 729710-D1, an Ashcroft 0-5" W.C. to 0-5V DC pressure transducer Model No. XLDP, Serial No. 20227-101, and a calibrated Sciemetric Instruments System 200 analog to digital converter, were used to measure the volume of air leakage through the window.

Based on a corrected leakage rate of 1.0 cfm (1.70 m^3/h), and a product area of 19.04 ft^2 (1.769 m^2), the air leakage rate was calculated to be 0.053 cfm/ft^2 (0.961 $m^3/h/m^2$) of product area.

The test specimen exceeds the performance level specified in H-Class for air infiltration, with a specified maximum allowable leakage of 5.41 $m^3/h/m^2$ (0.3 cfm/ft^2).

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Testing (contd)

Water Resistance Test Tested: July 10, 2000

Water resistance testing was performed on the sample in accordance with the procedure outlined in A.S.T.M. E547, using pressure differential of 4.5 psf (220 Pa). A completed test period consisted of four cycles each having 5 minutes with the pressure applied and 1 minute with the pressure released during which the water spray was maintained.

No leakage was observed at the 4.5 psf (220 Pa) pressure level. The test specimen meets the performance level specified in H-R30 for water resistance

Uniform Load Structural Test Tested: August 06, 2000

The window unit was subjected to a uniform load structural test in accordance with the procedure outlined in A.S.T.M. E330 using a positive and negative pressure of 75.0 psf (3600 Pa) as specified in the standard for the H-R50 rating level.

Deflections were measured on the mullion.

No breakage or damage that would impair the performance of the window was observed at the 75.0 psf (3600 Pa) pressure level.

The maximum allowable residual deflection was 0.4% of the span (0.152 in, 3.86 mm).

Rating	Test Pressure Pa	(PSF)	Net Mid Span Residual Deflection mm	(in)
H-R55	+3600	(+75.0)	0.32	(0.013)
	-3600	(-75.0)	0.50	(0.020)

Residual deflections were within the maximum allowable at the 75.0 psf (3600 Pa) pressure level.

The test specimen meets the performance level specified in H-R50 for the uniform load structural test.

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Testing (contd)

Deglazing Test Tested: August 8, 2000

Deglazing tests were carried out on the sash members in accordance with the procedure outlined in A.S.T.M. E987. The maximum allowable degree of deglazing is the original measured glazing bite.

Results were as follows;

Member	Load N (lbs)	Measured Deglazing mm (in)	Maximum Allowable mm (in)
Lift Rail	320 (70.0)	1.0 (0.041)	12.7 (0.50)
Interlock Rail	320 (70.0)	1.0 (0.040)	12.7 (0.50)
Stile	230 (50.0)	0.9 (0.036)	12.7 (0.50)

The test specimen meets the performance level specified for the deglazing test.

Corner Weld Test Tested: August 8, 2000

Corner weld tests were carried out on the frame corners and the sash corners in accordance with the procedure outlined in Appendix A of the Standard. When loaded to failure, the break shall not extend along the entire weld line.

Frame Corners

When loaded to failure, the break produced in each corner specimen did not extend along the entire weld line.

Sash Corners

When loaded to failure, the break produced in each corner specimen did not extend along the entire weld line.

The test specimen meets the performance level specified for the corner weld test.

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Testing (contd)

Forced-Entry Resistance **Tested:** August 8, 2000

The window was installed into a wood test buck as supplied by the manufacturer and mounted in a steel test frame. The test unit was subjected to the resistance to forced entry test in accordance with the procedure outlined in **A.S.T.M. Standard F588.**

1.0 Sample Preparation: During time T1 nothing was removed from the window and entry was not gained.

2.0 Lock Manipulation Test: During time T1 entry was not gained.

3.0 Static Load on Sash and Locking Device Strength Resistance Test

Test	Load Description	Comments
3.1	L1 on lock device(s) in opening direction.	No entry
3.2	L1 on lock device(s) in opening direction. L2 on interlock towards the interior.	No entry
3.3	L1 on lock device(s) in opening direction. L2 on interlock towards the exterior.	No entry
3.4	L1 on lock device(s) in opening direction. L2 on sill rail towards the interior.	No entry
3.5	L1 on lock device(s) in opening direction. L2 on sill rail towards the exterior.	No entry

The sash was pulled horizontally to within the confines of the frame for test 3.6.

Test	Load Description	Comments
3.6	L1 on lock device(s) in opening direction. L2 on interlock towards the interior. L3 on interlock at one stile.	No entry

4.0 Lock Manipulation Test: During time T1 entry was not gained.

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Testing (contd)

Forced-Entry Resistance (contd)

Loads: T1 = 5 minutes
L1 = 666 N (150 lbs)
L2 = 333 N (75 lbs)
L3 = 111 N (25 lbs) towards interior.

Conclusions

The window unit described herein met the air infiltration test H-class rating, water resistance test H-R30 rating, uniform load structural test H-R50 rating, operating force test H-class rating, deglazing test, corner weld test, and forced entry resistance test (Performance Level 10) performance requirements of AAMA/NWWDA 101/I.S. 2-97. Therefore the overall rating achieved by the single hung window is H-R30, based on the lower of the water resistance and the uniform load structural test.

Tested and reported by: Michael MacDonald

Respectfully submitted,

Intertek Testing Services NA Ltd.

Michael MacDonald
Physical Testing Services

Reviewed by:

Vern W. Jones, C.E.T.
Manager
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MGM:mgm
Encl.
2cc Client