OSHA FALL PROTECTION TEST REPORT

Rendered to:

VELUX America Inc.

SERIES/MODEL: VCM/VCE 4646 2004B
PRODUCT TYPE: Venting Curb Mounted Skylight

Report No: 96235.01-109-44
Test Date: 01/06/10
Report Date: 03/15/10
Expiration Date: 01/06/14
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VELUX America Inc.
P.O. Box 5001
Greenwood, South Carolina 29648-5001

Report No:  96235.01-109-44
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Project Summary: Architectural Testing, Inc. was contracted by VELUX America Inc. to perform testing on a Series/Model VCM/VCE 4646 2004B, venting curb mounted skylight. The test specimen description and results are reported herein. The test sample was provided by the client.

Test Specification: The test specimen was tested to assess compliance with Occupational Safety and Health Administration/U.S. Department of Labor Regulations (Standards- 29 CFR)-1910.23(e)(8). A 200 lbf weight, fabricated from a bag filled with sand, was placed on the center of the dome for a minimum of 60 seconds and then dropped from increasing heights above the skylight starting at 2' until permanent visible damage was noted. All impact load drops were noted, and the resulting damage was recorded.

Test Specimen Description:

Series/Model: VCM/VCE 4646 2004B

Product Type: Venting Curb Mounted Skylight

Overall Size: 51-1/4" wide by 51-1/4" long

Sash Size: 51-1/4" wide by 51-1/4" long

Overall Area: 18.24 ft²

Finish: All ABS structural members were white and aluminum was coated.
Test Specimen Description: (Continued)

Frame Construction: All frame members were constructed of ABS capped with ASA with mitered and welded corner construction. Extruded aluminum counter flashing with mitered and welded corners was secured to the frame at the bottom using #10 x 1/2" self-tapping pan head screws, located 4-7/8" from each end and spaced 13-3/4" on center. The aluminum counter flashing was secured to each side using 2.2-2.5 x 13 mm T-nails, located 4-7/8" from each end and midspan. An ASA-Luran S 778 T-operator cover was secured to the bottom rail interior using #8 x 3/4" pan head screws.

Sash Construction: The sash frame members were constructed of ABS capped with ASA with mitered and welded corner construction. A roll-formed aluminum cover with mitered and butted corners was sealed using butyl tape and secured at each end to a molded ASA plastic corner key using a 2.2-2.5 x 13 mm T-nail. The ABS/ASA sash members were secured to the aluminum outer cover using #10 x 1-1/4" wafer head Phillips screws. An extruded aluminum hinge was utilized on the top and was secured using #10 x 5/8" long self-tapping Phillips pan head screws, located 2-1/2" from each end and spaced 10" on center.

Weatherstripping:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; diameter custom shaped hollow EPDM bulb glazing</td>
<td>1 Row</td>
<td>Sash, all members under the glazing</td>
</tr>
<tr>
<td>gasket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Custom shaped EPDM durometer condensation gasket</td>
<td>1 Row</td>
<td>Frame, all members</td>
</tr>
<tr>
<td>Custom TPE frame to sash gasket</td>
<td>1 Row</td>
<td>Frame, all members</td>
</tr>
</tbody>
</table>

Glazing Detail: The unit was glazed with 17.6 mm (11/16") thick insulating glass, fabricated from a sheet of 3.0 mm (1/8") thick clear Lo-E coated tempered glass outboard, a sheet of 5.8 mm (7/32") thick laminated glass inboard, and a stainless steel box spacer system. The laminated glass was fabricated from two sheets of 2.5 mm (3/32") thick clear heat-strengthened glass and a 0.76 mm (0.030") thick PVB interlayer. The glass was interior glazed against a bead of sealant on the aluminum outer frame. The glazing was secured as the ABS/ASA sash was secured to the roll-formed aluminum outer frame using #10 x 1-1/4" wafer head Phillips screws.

Drainage: Condensation weepage holes were utilized on the frame sill.
Test Specimen Description: (Continued)

**Hardware:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote automatic operator with chain drive (VCE Specimen)</td>
<td>1</td>
<td>Midspan of frame bottom rail</td>
</tr>
<tr>
<td>Extruded aluminum hinge</td>
<td>1</td>
<td>Full length of frame and vent top rail</td>
</tr>
<tr>
<td>Rotary operator handle with chain drive (VCM Specimen)</td>
<td>1</td>
<td>Midspan of frame bottom rail</td>
</tr>
</tbody>
</table>

**Reinforcement:** No reinforcement was utilized.

**Screen Construction:** All screen members were constructed of roll-formed aluminum with square-cut corners, secured using an outside plastic corner key. The fiberglass mesh was secured to the frame using a flexible vinyl spline. A spring retention latch was located 9" from the head on each stile.

**Installation:** The unit was installed into a Spruce-Pine-Fir wood buck upon a 2x4 wood curb. The installation counter flashing was set over the wood curb, with the ABS/ASA frame and foam tape against the curb. The skylight was secured through all sides of the frame counter flashing using #8 x 1-3/4" pan head screws, (supplied by the manufacturer) located 4-1/2" from each end and midspan. The specimen was installed in accordance with the installation instructions provided by the manufacturer.
**Test Results**: The results are tabulated as follows:

**OSHA Safety Drop Test**

<table>
<thead>
<tr>
<th>Test Method</th>
<th>Load Location</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 lbf at rest</td>
<td>Center of glass</td>
<td>No visible damage, See Note #1</td>
</tr>
<tr>
<td>400 lbf-ft (2’ drop height)</td>
<td>Center of glass</td>
<td>No visible damage</td>
</tr>
<tr>
<td>800 lbf-ft (4’ drop height)</td>
<td>Center of glass</td>
<td>No visible damage</td>
</tr>
<tr>
<td>1200 lbf-ft (6’ drop height)</td>
<td>Center of glass</td>
<td>See Note #2</td>
</tr>
<tr>
<td>1600 lbf-ft (8’ drop height)</td>
<td>Center of glass</td>
<td>See Note #3</td>
</tr>
</tbody>
</table>

**General Note**: The test specimen was tested at a 0° slope (Reference Photo #1).

**Note #1**: The 200 lbf weight was gently applied perpendicular to the center of glass. After 60 seconds of rest time, there was no visible damage to the skylight.

**Note #2**: At the 6’ drop height, bag shattered exterior tempered glass. The bag did not fall through the skylight.

**Note #3**: At the 8’ drop height, the bag penetrated the interior laminated glass, deglazing the glass from frame at multiple locations (Reference Photo #2).
Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. 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 Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC:

Russell W. Clark  
Technician  
RWC:vlm/dem

Michael D. Stremmel, P.E.  
Senior Project Engineer

Attachments (pages): This report is complete only when all attachments listed are included.
   Appendix-A: Photographs (1)
   Appendix-B: Drawings (2) Complete drawings packet on file with Architectural Testing, Inc.
## Revision Log

<table>
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<th>Date</th>
<th>Page(s)</th>
<th>Revision(s)</th>
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<tr>
<td>0</td>
<td>03/15/10</td>
<td>N/A</td>
<td>Original report issue</td>
</tr>
</tbody>
</table>

This report produced from controlled document template ATI 00205, issued 03/05/09.
Appendix A

Photographs

Photo No. 1
Test Set-up

Photo No. 2
Damage from 1600 lbf Drop at 8'
Appendix B

Drawings

*Note:* Complete drawings packet on file with Architectural Testing, Inc.