AAMA SOUTHEAST
Southeast Region

AAMA SER-1-18, Storm-Driven Rain Penetration of Windows, Skylights and Doors White Paper

Purpose

In the aftermath of tropical storms and hurricanes, questions are often raised concerning wind-driven rain leaking through or around windows, doors and skylights that otherwise remained structurally intact and with little to no apparent damage following these extraordinary events. AAMA updated this document to provide information to homeowners, distributors, builders and insurance adjusters regarding water penetration during severe wind-driven rain. Water driven by storm surge or flooding is not covered by this document.

Potential Sources of Water Penetration

Rain driven by high winds may enter the interior of the home or building at any number of entry points. Some of these areas may be well above or away from the location at which water appears, such as the attic, roof, soffit or wall penetrations, such as exhaust fans. Water running down the inside of the wall or along roof supports may exit around the rough opening at a window, door or skylight.

Installation

Even if the window, door or skylight has been properly anchored for structural integrity, it may leak if not correctly flashed and sealed in accordance with manufacturer's instructions. Improper installation may leave gaps, which are sufficient to allow rain water penetration when driven by storm-force winds.

Maintenance

The age of a window, door or skylight, condition of seals and weather-stripping and other maintenance matters, such as clogged drainage or weep holes, can contribute to leaks appearing during storm-driven rain conditions. All windows, doors and skylights should be regularly inspected for damage or wear, which should be repaired. Proper care and maintenance will also help with optimal performance of these products.

Ratings

Windows, door and skylights must be selected for their compliance with building code requirements. The primary consideration for wind load resistance in building codes is the structural integrity of the window, door or skylight, in order to keep the product intact and to prevent the pressure of high-velocity wind from entering the building and causing catastrophic structural damage. However, in tropical storms and hurricane wind-driven rain conditions, the product selected may still experience water leakage because these extraordinary conditions can exceed the product's rating for water penetration. The tables on the next page provide information to help understand how extreme environmental conditions may cause water leakage.

TABLE 1

Water Test Pressure Equivalent Wind Velocities for Windows, Skylights and Doors Tested to the Nationally-Recognized Standard [1]

Design Pressure Rating	Water Test Pressure [2]	Approximate Wind Speed Equivalent to Water Test Pressure [3]
15 psf	2.86 psf	33 mph
20 psf	3.00 psf	34 mph
25 psf	3.75 psf	38 mph
30 psf	4.50 psf	42 mph
35 psf	5.25 psf	45 mph
40 psf	6.00 psf	49 mph
45 psf	6.75 psf	51 mph
50 psf	7.50 psf	54 mph
55 psf	8.25 psf	57 mph
60 psf	9.00 psf	59 mph
65 psf	9.75 psf	62 mph
70 psf	10.50 psf	64 mph
75 psf	11.25 psf	66 mph
80 psf	12.00 psf	68 mph
85 psf	12.75 psf [4]	71 mph
90 psf	13.50 psf [4]	73 mph
95 psf	14.25 psf [4]	75 mph [5]
100 psf	15.00 psf [4]	77 mph [5]

[1] AAMA/WDMA/CSA 101/I.S. 2/A440 North American Fenestration Specification/Standard (NAFS) as referenced by the International Residential Code® (IRC) and International Building Code® (IBC)

[2] Applies to R, LC and CW performance class windows and doors, as well as all unit skylights (15% of design pressure; minimum 2.86 psf; maximum 12 psf); AW performance class is tested for water penetration at 20% of design pressure.

[3] Pressure/velocity conversions are based on a standard engineering equation, not to be used for code compliance. IRC/IBC uses geographic wind speeds along with other jobsite and building attributes to determine a required design load for windows and doors. Windows and doors are tested to the AAMA/WDMA/CSA 101/I.S. 2/A440 industry standard for design pressures to determine applicability to design loads referenced in building codes.

[4] For comparison only; NAFS caps water test pressure at 12 psf for the U.S. and 15 psf for Canada.

[5] For reference, the Saffir-Simpson wind velocity for a category one hurricane starts at 74 mph.

Summary

Many windows, doors and skylights are tested for water penetration resistance at wind pressures shown in Table 1. When rain events are coupled with extraordinary wind speeds, it is not uncommon to experience water penetration through or around a window, door or skylight. Water resistance performance of these products is often affected by a variety of design parameters, including operational or functional concerns, market or economic preferences, life safety, accessibility and egress codes, or other physical limitations.

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