

Impact-Resistant Windows: An Overview

Impact-resistant windows are evaluated in two ways for design pressure (DP). The first test evaluates a window's structural performance (air infiltration, water resistance and resistance to wind loading, among other criteria) and is written jointly by the American Architectural Manufacturers Association (AAMA), the Window & Door Manufacturers Association (WDMA) and the Canadian Standards Association (CSA). Only windows that achieve a baseline rating of DP50 may move onto the second test standard, applicable to impact-resistant windows: the very stringent ASTM E1996, "Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes." This test evaluates the product's ability to resist the impact of flying debris. It also requires that the window be subjected to thousands of cycles of severe wind loading after the impact to ensure it will hold up to both positive and negative pressures.

When Viwinco launched its impact-resistant OceanView® product line, we tested to the industry standard of DP50. Now with the introduction of fortified housing (which necessitates windows that meet a higher DP standard) and increasingly tougher codes being imposed on coastal communities, Viwinco has taken the leadership role by enhancing its impact DP ratings. With our latest round of testing, we tested to AAMA and ASTM standards of DP70 for two of our OceanView products. See the chart for specifics.



Missile Level D Impact Testing. In the initial part of the impact test, the window is shot with a 9-lb, 8-foot-long 2x4 projected out of a canon.

Glossary of Terms

Viwinco tests all its products in-house at our state-of-the-art R & D facility. Third-party technicians certify our results.

American Architectural Manufacturers Association (AAMA) Design Pressure (Structure)

A rating that identifies the load induced by wind and other dynamic pressures. The higher a DP rating, the more resistant the window is to the effects of wind and other pressures.

Performance Grade

A numeric designation that defines the performance of a product in accordance with AAMA standards. The performance grade is determined upon successful completion and verification of all applicable tests (air, water, structure).

ASTM Impact DP

A numeric designation that defines the performance of our windows impacted by a "missile" (for our testing purposes, a 9-lb 2x4) and subjected to 4,500 positive and 4,500 negative static pressure differentials. The number represents pounds per square foot (psf). ASTM International was known until 2001 as the American Society of Testing & Materials.

Wind-Speed Equivalent (DP Rating)

In the testing environment, windows are subjected to positive and negative wind cycles, with wind speeds simulated by air-blowing mechanisms and vacuums. The wind-speed equivalent for a DP50 window is 139.8 mph. In order to be certified at DP50 however, the window must remain intact in the testing environment at 1.5 times this speed. The added speed ensures the window's structural integrity in the field.

Enhanced Sill Riser

Viwinco's enhanced sill riser elevates the height of the sill dam to 1-5/8", providing superior protection against water penetration and enabling the window to achieve a DP70 rating. See chart.



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Design Pressure Ratings Guide



At-a-glance DP ratings chart and explanation of associated terminology



Impress the Weather

January 2015



A Word About This Guide

We created this guide as a quick reference to help you understand the products Viwinco offers at various DP ratings and sizes. It also allows you to objectively compare our product line to other window manufacturers' offerings.

As much as we tried to simplify this guide, there are some areas that might cause confusion. We aim to explain them here:

- The vast majority of our S-Series/Cambridge windows have been rated for both commercial and residential uses. Performance Grades with an "R" before them stand for residential; those with a "C," "LC," or "CW," designate commercial ratings. The results displayed inside this document are accurate based on the sizes and reinforcement required to obtain the DP ratings in each performance class (e.g., residential, commercial). For example, a commercial window size 48x72 has a higher DP rating than our Cambridge 48x72. This is because we tested our commercial window at this size with the required reinforcement to pass the commercial test and achieve a higher DP.
- Gateway sizes for residential and commercial windows are different. Commercial gateways are larger than residential ones and require a minimum DP30; residential gateways are smaller than commercial ones and require only a minimum DP15. A 56x91 double-hung was tested as our commercial gateway window; to satisfy the requirements, additional reinforcement was necessary at this size.



DP Ratings Guide

	SIZE	S-Series, Cambridge Residential		S-Series, Cambridge Commercial		OceanView Residential		
		AAMA DP Structure	Performance Grade	AAMA DP Structure	Performance Grade	ASTM Impact DP	Wind Speed Equivalent DP Rating	Structure Rating
Double-Hung	≤36x72	DP70	R70	DP60*	C60*	DP50*	139.8 mph	171.2 mph
	>36x72 ≤48x72	DP50	R50	DP60*	C60*	DP50	139.8 mph	171.2 mph
	≤48x72 w/CR	DP60	R60	DP60	C60	--	--	--
	>48x72 ≤48x80	DP50	R50	DP35*	C35*	DP50	139.8 mph	171.2 mph
	>48x80 ≤52x80	DP45	R45	DP35*	C35*	--	--	--
	>52x80 ≤56x91	DP35	R35	DP35	C35	--	--	--
Single-Hung	≤36x72	DP70	R70	DP60*	C60*	DP50	139.8 mph	171.2 mph
	>36x72 ≤48x72	DP55	R55	DP60*	C60*	DP50	139.8 mph	171.2 mph
	≤48x72 w/CR	DP60	R60	DP60	C60	--	--	--
	>48x72 ≤48x80	DP50	R50	DP40*	C40*	DP50	139.8 mph	171.2 mph
	>48x72 ≤52x80	DP45	R45	DP40*	C40*	--	--	--
	>52x80 ≤56x91	DP40	R40	DP40	C40*	--	--	--
Geometric	≤72x64	DP75*	R75*	DP75*	CW75*	DP50	139.8 mph	171.2 mph
	≤72x72	DP75*	R75*	DP75*	CW75*	DP50	139.8 mph	171.2 mph
	≤72x84	DP75	R75	DP75	CW75	--	--	--
	≤96x48	DP60	R60	DP60	C60	DP50	139.8 mph	171.2 mph
Picture	≤72x72	DP55*	R55*	DP55	C55*	DP50	139.8 mph	171.2 mph
	≤72x84	DP55	R55	DP55	C55	--	--	--
	≤96x48	DP70	R70	DP70	C70	DP50	139.8 mph	171.2 mph
Casement	≤36x72	DP65	R65	DP65	CW65	DP50	139.8 mph	171.2 mph
Awning	≤60x36	DP75	R75	DP75	CW75	DP50	139.8 mph	171.2 mph
Casement Picture	≤72x72	DP50	R50	DP50	C50	--	--	--
2-Lite Slider	≤72x48	DP60	R60	DP60	C60	DP50*	139.8 mph	171.2 mph
	>72x48 ≤96x48	DP50	R50	DP50	C50	DP50	139.8 mph	171.2 mph
	≤72x60	DP50	R50	DP50	LC50	DP50	139.8 mph	171.2 mph
	>96x48 ≤96x60	DP30	R30	DP30	C30	--	--	--
3-Lite Slider (Equal)	≤138x60	DP30	R30	DP30	C30	--	--	--
Patio Door SL/TR†	≤96x48	DP60	R60	DP60	C60	DP50	139.8 mph	171.2 mph
Patio Door 2-Panel (XO/OX)	≤96x96 Alum/Vinyl Sill	DP50*	R50*	DP50*	C50*	DP50	139.8 mph	171.2 mph
Patio Door 3-Panel (OXO)	≤108x82 Alum/Vinyl Sill	DP50	R50	DP50	C50	DP50	139.8 mph	171.2 mph
Patio Door 3-Panel (OXO)	≤108x96 Alum/Vinyl Sill	DP50	R50	DP50	C50	--	--	--
Patio Door 4-Panel (OXXO)	≤144 x82 Alum/Vinyl Sill	DP50	R50	DP50	C50	--	--	--
Bay 30°/45° Bow 10°	≤120x72	**	**	**	**	DP50	139.8 mph	171.2 mph
Bay 30°/45° Bow 10°	≤144x72	**	**	**	**	--	--	--

OceanView with Enhanced Sill Riser, Double- and Single-Hung 36 x 72
 ASTM Impact: DP70
 DP Rating: 165.4 mph
 Structure Rating: 202.5 mph

CR = Commercial Reinforcement
 C = Commercial
 CW = Low and mid-rise commercial
 LC = Light Commercial-- low and mid-rise multi-family
 *Qualifies because tested and certified at larger size
 **Overall DP dependent on lowest DP value of style selected
 †Sidelite/Transom