



## Technical Bulletin

August 30, 2011

### Relating ASCE/SEI 7-10 Design Wind Loads to Fenestration Product Ratings

The American Society of Civil Engineers (ASCE) and the Structural Engineering Institute (SEI) have published the 2010 edition of **ASCE/SEI 7, *Minimum Design Loads for Buildings and Other Structures***. This updated standard is approved for reference in the 2012 International Codes and in the 2010 Florida Building Code, replacing the text taken from the previous edition, ASCE/SEI 7-05.

This bulletin is intended to inform building specifiers and other interested users:

1. That the 2010 version of ASCE/SEI 7 cannot be intermixed with earlier versions,
2. That exterior fenestration products (windows, doors and skylights) do not need to be tested differently as a result of the new 2010 version of ASCE/SEI 7, and
3. How the design loads from the new 2010 edition of ASCE/SEI 7 relate to exterior fenestration (windows, doors and skylights) product ratings and performance grades. .

This bulletin is not intended to highlight all the changes from version 2005 to 2010 of ASCE/SEI 7, such as those related changes where opening protection in windborne debris regions is required. Please review ASCE/SEI 7-10 in its entirety for full details.

ASCE/SEI 7-10 revised the method used for establishing basic wind speed, resulting in three different wind speed maps of the United States. ASCE/SEI 7-10 also revised the mechanics of the calculations used to incorporate building design considerations and convert wind speed into appropriate load requirements for fenestration, based on the wind speeds shown in the updated maps. Further, ASCE/SEI 7-10 calculations now provide design wind pressure values based on strength design/load and resistance factor design in place of previously used allowable stress design. ASCE/SEI 7-10 allows for conversion from strength design to allowable stress design by applying a factor of 0.6. This conversion is important in correlating the correct design load to fenestration product ratings.

Because of the way these three revisions relate to each other, **editions of the ASCE/SEI 7 standards cannot be intermixed**. Doing so could result in excessively high or inappropriately low load predictions for windows, exterior doors and skylights. However, except for a few locations where variances created by the new wind maps produce significantly different wind pressures, the products that would be specified by correctly using either version of the ASCE/SEI 7 standard are essentially the same.

The 2009 and 2012 International Building Code and International Residential Code reference either the 2011 or 2008 edition of **AAMA/WDMA/CSA 101/I.S.2/A440 – NAFS North American Fenestration Standard/Specification for windows, doors, and skylights** for fenestration testing, depending upon which edition of the codes are adopted in a particular jurisdiction. Both editions of NAFS evaluate a product's ability to resist uniform loading based mainly on compliance testing, and **assign Performance Grades based on allowable stress design**. NAFS Performance Grades correlate directly with required design wind pressures, when those pressures are determined by ASCE/SEI 7 utilizing Combination Loading Equations for Allowable Stress Design, regardless of which edition is used. Therefore, the testing requirements for fenestration products to correlate to the design load requirements of ASCE/SEI 7, 2005 vs. 2010 edition, have not changed.

Below is an example of design pressures determined for vertical fenestration products using both the 2010 and 2005 editions of ASCE/SEI 7. The analytical method in ASCE/SEI 7-10 was used for these calculations. Calculations for sloped (i.e. roof) products produce different loads.

**Comparison of ASCE/SEI 7-05 and ASCE/SEI 7-10  
Component and Cladding Design Pressures Analytical Procedure**

Example Location		Dallas, TX		Coastal Palm Beach Cnty, FL	
ASCE/SEI Standard		ASCE/SEI 7-05	ASCE/SEI 7-10	ASCE/SEI 7-05	ASCE/SEI 7-10
Exposure Category		B	B	C	D
Basic Wind Speed		90 mph	115 mph	150 mph	170 mph
Risk Category		II		II	
Mean Roof Height		30 ft.		150 ft.	
Fenestration Tributary Area		18 sq. ft.		18 sq. ft.	
Strength Design	Positive Pressure	20.5 lbf/ft <sup>2</sup>	20.9 lbf/ft <sup>2</sup>	116.8 lbf/ft <sup>2</sup>	104.6 lbf/ft <sup>2</sup>
	Negative Pressure (zone 4)	-22.3 lbf/ft <sup>2</sup>	-22.8 lbf/ft <sup>2</sup>	-116.8 lbf/ft <sup>2</sup>	-104.6 lbf/ft <sup>2</sup>
	Negative Pressure (zone 5)	-26.8 lbf/ft <sup>2</sup>	-27.4 lbf/ft <sup>2</sup>	-214.0 lbf/ft <sup>2</sup>	-191.8 lbf/ft <sup>2</sup>
Allowable Stress Design	Positive Pressure	12.8 lbf/ft <sup>2</sup>	12.6 lbf/ft <sup>2</sup> *	73.0 lbf/ft <sup>2</sup>	62.8 lbf/ft <sup>2</sup> *
	Negative Pressure (zone 4)	-13.9 lbf/ft <sup>2</sup>	-13.7 lbf/ft <sup>2</sup> *	-73.0 lbf/ft <sup>2</sup>	-62.8 lbf/ft <sup>2</sup> *
	Negative Pressure (zone 5)	-16.8 lbf/ft <sup>2</sup>	-16.4 lbf/ft <sup>2</sup> *	-133.8 lbf/ft <sup>2</sup>	-115.1 lbf/ft <sup>2</sup> *
Minimum NAFS Performance Grade		<b>PG 20</b>	<b>PG 20</b>	<b>PG 135</b>	<b>PG 120</b>

\*[Strength Design Load] X 0.6 = Allowable Stress Design Load (for the ASCE/SEI 7 2010 version only)

The 2009 and 2012 International Building Code and International Residential Code also reference **ANSI/DASMA 108 – Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference** for testing of vehicular access doors, i.e. garage doors and rolling doors. The acceptance criteria in ANSI/DASMA 108 is used to determine the pass/fail of doors tested. For garage doors and rolling doors, the chart below compares the differences between the two editions of ASCE/SEI 7. Calculations are for sloped roof homes, and use a weighted average of 2 ft. of door width in Zone 5 and the rest of the door in Zone 4.

**Comparison of ASCE/SEI 7-05 and ASCE/SEI 7-10  
Component and Cladding Design Pressures Analytical Procedure for Garage Doors and Rolling Doors**

Example Location		Dallas, TX		Miami-Dade, FL	
ASCE/SEI Standard		ASCE/SEI 7-05	ASCE/SEI 7-10	ASCE/SEI 7-05	ASCE/SEI 7-10
Exposure Category		B	B	C	C
Basic Wind Speed		90 mph	115 mph	146 mph	175 mph
Risk Category		II		II	
Mean Roof Height		25 ft.		25 ft.	
Single Car 9 ft. x 7 ft.	Positive Pressure	12.8 lbf/ft <sup>2</sup>	12.6 lbf/ft <sup>2</sup>	45.3 lbf/ft <sup>2</sup>	39.0 lbf/ft <sup>2</sup>
	Negative Pressure	-14.5 lbf/ft <sup>2</sup>	-14.2 lbf/ft <sup>2</sup>	-51.2 lbf/ft <sup>2</sup>	-44.1 lbf/ft <sup>2</sup>
Double Car 16 ft. x 7 ft.	Positive Pressure	12.3 lbf/ft <sup>2</sup>	12.0 lbf/ft <sup>2</sup>	43.4 lbf/ft <sup>2</sup>	37.4 lbf/ft <sup>2</sup>
	Negative Pressure	-13.7 lbf/ft <sup>2</sup>	-13.4 lbf/ft <sup>2</sup>	-48.4 lbf/ft <sup>2</sup>	-41.7 lbf/ft <sup>2</sup>
Commercial 10 ft. x 10 ft.	Positive Pressure	11.4 lbf/ft <sup>2</sup>	11.1 lbf/ft <sup>2</sup>	40.2 lbf/ft <sup>2</sup>	34.7 lbf/ft <sup>2</sup>
	Negative Pressure	-12.7 lbf/ft <sup>2</sup>	-12.5 lbf/ft <sup>2</sup>	-45.1 lbf/ft <sup>2</sup>	-38.9 lbf/ft <sup>2</sup>

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This technical bulletin is jointly endorsed by the American Architectural Manufacturers Association (AAMA) ([www.aamanet.org](http://www.aamanet.org)), the Door and Access Systems Manufacturers Association (DASMA) ([www.dasma.com](http://www.dasma.com)), the Fenestration Manufacturers Association (FMA) ([www.fmausaonline.org](http://www.fmausaonline.org)) and the Window & Door Manufacturers Association (WDMA) ([www.wdma.com](http://www.wdma.com)). This bulletin contains summarized information about current standards and codes related to the design of buildings and use of fenestration assemblies. The information is not exhaustive, and is not intended to replace appropriate engineering design, specification or code compliance. The sponsoring organizations have taken precautions to ensure the accuracy and timeliness of the information presented. However, users are encouraged to contact referenced organizations directly for their most current information. Copies of AAMA/WDMA/CSA 101/I.S.2/A440 can be obtained from AAMA, WDMA or the Canadian Standards Association (CSA) ([www.csa.ca](http://www.csa.ca)). Copies of ASCE/SEI 7 can be obtained from the American Society of Civil Engineers (ASCE) ([www.asce.org](http://www.asce.org)). Copies of ANSI/DASMA 108 can be obtained from DASMA.

