ASCE 7-10 Wind Provisions and Effects on Wood Design and Construction

By Philip Line, P.E. and William L. Coulbourne, P.E., M. ASCE

The major change for wind design in ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures*, is often broadly described as the introduction of new wind speed maps (referred to as ultimate wind speed maps in the 2012 *International Building Code* (IBC)). Several coordinated changes include:

- revised load factors for wind in allowable stress design (ASD), and load and resistance factor design (LRFD) load combinations;
- removal of the Occupancy Factor for wind due to new wind speed maps that vary by Risk Category (analogous to Occupancy Category);
- reinstating applicability of Exposure D in hurricane prone regions;
- revised wind speed triggers for definition of hurricane prone region and wind-borne debris region; and,
- revised pressure values for minimum design loads.

Comparison of Design Velocity Pressure

The net effect of changes to mapped wind speeds and wind load factors on the calculated design velocity pressure can be significant in some locations, as shown in *Table 1*.

Locations outside of the hurricane prone region, excluding special wind regions, can be generally represented by a ratio of approximately 1.0, as shown for Dallas, TX. An expected outcome, due to the uniform hazard basis of the new maps, is that design pressures for Exposure C locations in the hurricane prone region (Boston, Virginia Beach, and Miami) are smaller under ASCE 7-10. Assuming Exposure D, which is applicable in hurricane prone regions per ASCE 7-10, an approximate 10 percent increase in design pressure is observed for Boston, MA and an approximate 16 percent decrease in design pressure is observed for Virginia Beach, VA.

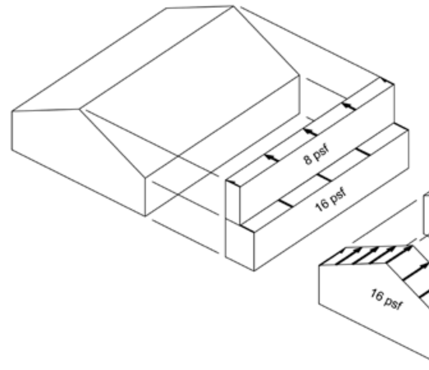

Figure 1: Application of minimum wind loads.

Minimum Design Wind Loads

Minimum wind load provisions of ASCE 7-10 for design of main wind force resisting systems (MWFRS), under the directional procedure and envelop procedure, have also been revised to specify a minimum 16 psf wall pressure and a minimum roof pressure of 8 psf projected onto a vertical plane (*Figure 1*). And, it is now less likely to be the controlling minimum design wind load, particularly for some building configurations in lower wind speed regions and for low-rise buildings designed in accordance with the envelop procedure for low-rise buildings. For comparison, the minimum design pressure of 10 psf, applicable for both walls and roofs under ASCE 7-05, when factored for LRFD is equal to 16 psf (i.e. 10 psf x 1.6 = 16 psf).

Wind Speed Triggers

Changes to mapped wind speeds are also coordinated with revision of several wind-speed "trigger" values, such as the definition of hurricane prone regions (*Figure 2*). The revised wind speed trigger in ASCE 7-10 for hurricane prone regions (i.e. 115 mph) represents an algebraic conversion of the 90 mph wind speed trigger in ASCE 7-05. Revised wind speed triggers for wind-borne debris regions and glazed opening protection have also changed, and do not follow the same conversion and exclusive linkage to wind speed maps for Risk Category II.

Table 1: Comparison of LRFD design velocity pressures using ASCE 7-10 and ASCE 7-05 (33-foot mean roof height).

		ASCE 7-10			ASCE 7-05		Ratio	
Location	Risk Category	Design Wind Speed (MPH)	[A] Exp C Velocity Pressure (psf)	[B] Exp D Velocity Pressure (psf)	Design Wind Speed (MPH)	[C] Exp C Velocity Pressure (psf)	[A]/[C]	[B]/[C]
Boston, MA	II	128	35.7	42.1	105	38.4	0.93	1.10
Va Beach, VA	II	122	32.4	38.2	114	45.2	0.72	0.84
Miami, FL	II	170	62.9	74.2	146	74.2	0.85	1.00
Dallas, TX	II	115	28.8	-	90	28.2	1.02	-
Boston, MA	III, IV	140	42.6	50.3	105	44.1	0.97	1.14
Va Beach, VA	III, IV	132	37.9	44.7	114	52.0	0.73	0.86
Miami, FL	III, IV	181	71.3	84.1	146	85.3	0.84	0.99
Dallas, TX	III, IV	120	31.3	-	90	32.4	0.97	-

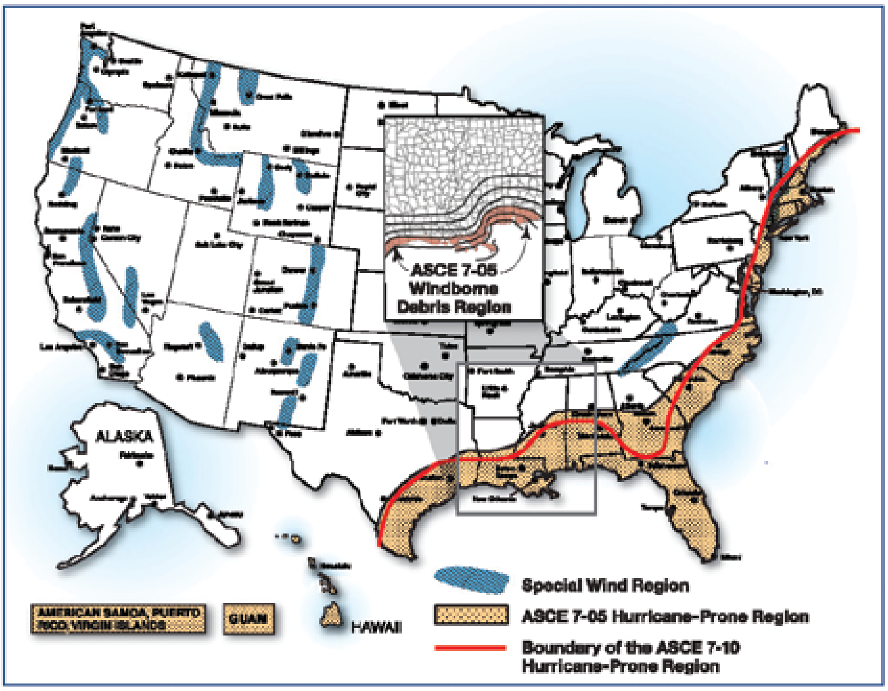

Figure 2: Illustration of hurricane prone regions (FEMA P-804).

Coordination with Codes and Standards

IBC adopts ASCE 7-10 provisions for wind design by reference, and incorporates ASCE 7-10 wind speed maps. A conversion of mapped wind speed to an ASD basis (i.e. V_{asd} per 2012 IBC is calculated as $V_{asd} = V_{ult} \times 0.6^{1/2}$) is added to the IBC to coordinate with previously established IBC wind speed triggers. For wood construction, the conversion is necessary for use of tables covering attachment of wood structural panels for wind, wind applicability limit for conventional light-frame construction, and wind uplift connector requirements in Section 2308. Within the 2012 *International Residential Code* (IRC), new maps illustrate ASD-based wind speeds. The IRC format of the wind speed map eliminates the need for conversion of the mapped value as is done in the IBC; however, the contour lines do not directly align with those in ASCE 7-10 maps incorporated in the IBC.

The 2012 *Wood Frame Construction Manual* (WFCM) for One- and Two-Family Dwellings includes ASCE 7-10 Risk Category II wind speed maps, tabulated requirements for wind speeds ranging from 110 mph to 195 mph for both Exposures B and C, and a conversion table to adjust tabular values for Exposure D. The removal of the occupancy factor adjustment to wind loads in ASCE 7-10 will generally limit ease of applicability of WFCM load tables to other occupancy categories. Prior WFCM load tables were based on occupancy Category II, and were easily adjusted by the occupancy factor.

Summary

Model building codes and standards that rely on the new wind design approach in ASCE 7-10 include the 2012 IRC, the 2012 IBC, and the 2012 WFCM. Each of these documents addresses implementation of ASCE 7-10 in a different manner. This will likely create confusion for the users of these documents, as they reconcile new wind speed basis of ASCE 7-10 maps and different formats of the maps appearing in the 2012 IRC and 2012 IBC. For wood construction in accordance with the WFCM, the Risk Category II wind speed map is incorporated into the standard directly as it appears in ASCE 7-10 and tabulated requirements will be associated with ASCE 7-10 mapped wind speeds.▪

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A synopsis of this article appeared in the print version of STRUCTURE® magazine, January 2011.

It is well known that the major change for wind design in ASCE 7-10 *Minimum Design Loads for Buildings and Other Structures* is the introduction of new wind speed maps, referred to as ultimate wind speed maps in the 2012 *International Building Code* (IBC). Several other coordinated changes include:

- revised load factors for wind in allowable stress design (ASD), and load and resistance factor design (LRFD) load combinations;
- removal of the Occupancy Factor for wind;
- reinstating applicability of Exposure D in hurricane prone regions;
- revised wind speed triggers for definition of hurricane prone region and wind-borne debris region; and,
- revised pressure values for minimum design loads.

This article explores the net effect of these changes on calculated design velocity pressures, and provides comparison tables for select geographic locations. It also compares select provisions of ASCE 7-10 with similar provisions in ASCE 7-05, and discusses implementation of ASCE 7-10 in model codes and the *Wood Frame Construction Manual for One-and Two-family Dwellings* (WFCM).

Major Changes

Wind design in ASCE 7-10 incorporates several major changes. Among the changes are new wind speed maps that vary by risk category (e.g. separate maps are provided for each of the following risk categories: I, II, and III, and IV) and the incorporation of uniform recurrence interval wind speed contours throughout all geographic regions, including hurricane prone regions of the U.S.

These changes directly affect calculation of unfactored wind loads. Revised load factors for wind in ASD and LRFD load combinations were coordinated to compensate for the new wind speeds, resulting in design velocity pressures that are very similar to those calculated using provisions of ASCE 7-05 for most U.S. regions. In addition, recent studies of hurricane winds over open water resulted in changes to hurricane wind modeling that, in general, increased wind speeds near the hurricane eye, reduced wind speeds over the broader storm area, and revised the definition of Exposure D so that it is no longer precluded from being applicable in hurricane prone regions.

The outcome of these changes are that design velocity pressures are reduced in some hurricane prone regions, while design velocity pressures remain largely unchanged in non-hurricane prone regions. To confirm this, design velocity pressure per ASCE 7-10 was calculated and compared to design velocity pressure determined in accordance with ASCE 7-05. In addition to serving as limited confirmation of generally expected outcomes, the purpose of the comparison is two-fold: to illustrate where differences in calculations occur; and provide insight into the effect of changes on calculated pressures for specific locations and buildings of varying risk categories.

Changes in ASCE 7-10 that coordinate with the introduction of new maps include: 1) revised wind speed triggers defining hurricane prone regions and wind-borne debris regions, and 2) revised pressure values for minimum design loads. Model building codes and standards that rely on the new wind design approach in ASCE 7-10 include the 2012 *International Residential Code* (IRC), the 2012 IBC, and the 2012 WFCM; however, each of these documents addresses implementation of ASCE 7-10 wind provisions differently.

Design Velocity Pressure Example

Design velocity pressures calculated herein are intended to allow comparison of ASCE 7-10 and ASCE 7-05, and represent factored pressures from use of ASD or LRFD load combinations contained in ASCE 7.

ASCE 7-05 Velocity Pressure

$q_{z05} = 0.00256 K_z K_{zt} K_d V^2 I$ *(Equation 1)*

where:

q_{z05} = ASCE 7-05 velocity pressure evaluated at mean roof height (psf)
K_z = velocity pressure exposure coefficient
K_{zt} = topographic factor
K_d = wind directionality factor
V = basic wind speed (mph) from ASCE 7-05 maps
I = Importance factor (1.0 for Category II buildings, 1.15 for Category III and IV buildings)

Design velocity pressure for ASD and LRFD are:
ASD: $q_{z05\_ASD} = (1.0)(q_{z05})$ *(Equation 2)*
LRFD: $q_{z05\_LRFD} = (1.6)(q_{z05})$ *(Equation 3)*

where:
1.0 = ASCE 7-05 ASD load factor for wind
1.6 = ASCE 7-05 LRFD load factor for wind

ASCE 7-10 Velocity Pressure

$q_{z10} = 0.00256 K_z K_{zt} K_d V^2$ *(Equation 4)*

where:

q_{z10} = ASCE 7-10 velocity pressure evaluated at mean roof height (psf)
K_z = velocity pressure exposure coefficient
K_{zt} = topographic factor
K_d = wind directionality factor
V = basic wind speed (mph) from ASCE 7-10 maps referred to as ultimate wind speed maps in 2012 IBC.

Design velocity pressure for ASD and LRFD are:
ASD: $q_{z10\_ASD} = (0.6)(q_{z10})$ *(Equation 5)*
LRFD: $q_{z10\_LRFD} = (1.0)(q_{z10})$ *(Equation 6)*

where:
0.6 = ASCE 7-10 ASD load factor for wind
1.0 = ASCE 7-10 LRFD load factor for wind

Values for the topographic factor are taken as 1.0 and the wind directionality factor is taken as 0.85. ASCE 7-10 and ASCE 7-05 equations for calculation of design velocity pressure have a similar form and are easily compared. For example, the importance factor applicable in ASCE 7-05 calculations is not a specific factor in the ASCE 7-10 calculation (i.e. building or structure importance is addressed by use of separate wind speed maps that vary by risk category in ASCE 7-10); and, load factors for calculation of ASD and LRFD design wind pressures are different. The effects of these changes on design velocity pressure, when combined with changes to the mapped basic wind speed, are less obvious. To see effects, *Equations 1* through *6* are applied to buildings of different risk categories in different U.S. locations.

Risk Category and Building Location

Design velocity pressures for specific building locations and risk categories are shown in *Table 1*. All locations are within the hurricane

Table 1: Comparison of design velocity pressures between ASCE 7-10 Exposure C and ASCE 7-05 Exposure C.

		ASCE 7-10			ASCE 7-05		
Location	Risk Category	Design Wind Speed (MPH)	ASD Velocity Pressure[1] (psf)	LRFD Velocity Pressure[1] (psf)	Design Wind Speed (MPH)	ASD Velocity Pressure[1] (psf)	LRFD Velocity Pressure[1] (psf)
Boston, MA	II	128	21.4	35.7	105	24.0	38.4
VA Beach, VA	II	122	19.4	32.4	114	28.3	45.2
Miami, FL	II	170	37.7	62.9	146	46.4	74.2
Galveston, TX	II	150	29.4	49.0	132	37.9	60.7
Dallas, TX	II	115	17.3	28.8	90	17.6	28.2
Boston, MA	III, IV	140	25.6	42.6	105	27.6	44.1
VA Beach, VA	III, IV	132	22.7	37.9	114	32.5	52.0
Miami, FL	III, IV	181	42.8	71.3	146	53.3	85.3
Galveston, TX	III, IV	160	33.4	55.7	132	43.6	69.8
Dallas, TX	III, IV	120	18.8	31.3	90	20.3	32.4

[1] *Exposure C at 33-foot mean roof height, K_z = 1.0.*

Table 2: Comparison of design velocity pressures between ASCE 7-10 Exposure D and ASCE 7-05 Exposure C.

Location	Risk Category	ASCE 7-10			ASCE 7-05		
		Design Wind Speed (MPH)	ASD Velocity Pressure[1] (psf)	LRFD Velocity Pressure[1] (psf)	Design Wind Speed (MPH)	ASD Velocity Pressure[2] (psf)	LRFD Velocity Pressure[2] (psf)
Boston, MA	II	128	25.2	42.1	105	24.0	38.4
VA Beach, VA	II	122	22.9	38.2	114	28.3	45.2
Miami, FL	II	170	44.5	74.2	146	46.4	74.2
Galveston, TX	II	150	34.7	57.8	132	37.9	60.7
Boston, MA	III, IV	140	30.2	50.3	105	27.6	44.1
VA Beach, VA	III, IV	132	26.8	44.7	114	32.5	52.0
Miami, FL	III, IV	181	50.5	84.1	146	53.3	85.3
Galveston, TX	III, IV	160	39.4	65.7	132	43.6	69.8

[1] *Exposure D at 33-foot mean roof height, K_z = 1.18.*
[2] *Exposure C at 33-foot mean roof height, K_z = 1.0.*

Table 3: Comparison of LRFD design velocity pressures based on ASCE 7-10 and ASCE 7-05.

Location	Risk Category	ASCE 7-10			ASCE 7-05		Ratio	
		Design Wind Speed (MPH)	[A] Exp C Velocity Pressure[2] (psf)	[B] Exp D Velocity Pressure[1] (psf)	Design Wind Speed (MPH)	[C] Exp C Velocity Pressure[2] (psf)	[A]/[C]	[B]/[C]
Boston, MA	II	128	35.7	42.1	105	38.4	0.93	1.10
VA Beach, VA	II	122	32.4	38.2	114	45.2	0.72	0.84
Miami, FL	II	170	62.9	74.2	146	74.2	0.85	1.00
Galveston, TX	II	150	49.0	57.8	132	60.7	0.81	0.95
Dallas, TX	II	115	28.8	-	90	28.2	1.02	-
Boston, MA	III, IV	140	42.6	50.3	105	44.1	0.97	1.14
VA Beach, VA	III, IV	132	37.9	44.7	114	52.0	0.73	0.86
Miami, FL	III, IV	181	71.3	84.1	146	85.3	0.84	0.99
Galveston, TX	III, IV	160	55.7	65.7	132	69.8	0.80	0.94
Dallas, TX	III, IV	120	31.3	-	90	32.4	0.97	-

[1] *Exposure D at 33-foot mean roof height, K_z = 1.18.*
[2] *Exposure C at 33-foot mean roof height, K_z = 1.0.*

prone region, with the exception of Dallas, TX. Wind speeds shown for each location within the hurricane prone region are taken from ASCE 7 *Commentary*, Tables C26.5-3. From *Table 1*, it can be seen that for a given location under ASCE 7-10, mapped velocity varies by risk category. For example, in Miami, FL, Risk Category II has a design wind speed of 170 mph while Risk Categories III and IV have a design wind speed of 180 mph.

Use of the term "risk category" and descriptions of varying risk categories in ASCE 7-10 is new. For purposes of comparison in this article, risk categories in ASCE 7-10 are analogous to the familiar occupancy categories in ASCE 7-05. For example, Risk Category II can be associated with most residential dwellings and other buildings and structures with limited occupancies (e.g. those that are not Risk Category I, III, or IV). Risk Category III is associated with building types that pose substantial risk to human life and Risk Category IV is associated with buildings that are designated as essential facilities.

Exposure Category D

Table 2 provides the same information as *Table 1*, except ASCE 7-10 design velocity pressure is calculated assuming Exposure D (e.g. sites where flat, unobstructed areas and water surfaces prevail in the upwind direction). For an assumed 33-foot mean roof height, design pressures calculated in accordance with ASCE 7-10 for Exposure D are 18% greater than those for Exposure C. Design velocity pressures for ASCE 7-05 in *Table 2* are based on Exposure C, because Exposure D is not applicable in hurricane prone regions per ASCE 7-05.

Effect of mean roof height is a factor in calculation of design velocity pressure. For the example in this article, all calculations are based on a mean roof height of 33 feet which corresponds to the height limit of the WFCM. The value of the velocity pressure exposure coefficient, K_z, for Exposure C and 60-foot mean roof height is K_z =1.13. For Exposure D and 60-foot mean roof height, the value of K_z = 1.31. The ratio of Exposure D to Exposure C at this height is 1.16, indicating reduced influence of Exposure D as building height increases.

Wind Load Factors

The ratio of ASD to LRFD design wind pressures in *Tables 1* and *2* is constant, as would be expected based on the applicable equations. A slight reduction in ASD pressures relative to LRFD pressures results from the load factor differences between ASCE 7-10 and ASCE 7-05 (i.e. ratio of 0.6 versus 0.625

Table 4: Comparison of wind speed values for use in ASCE 7 definitions of hurricane prone regions and wind-borne debris regions.

ASCE 7 Term	ASCE 7-10	ASCE 7-05
Hurricane Prone Regions[1]	Areas vulnerable to hurricanes; in the United States and its territories defined as: 1. The U.S. Atlantic Ocean and Gulf of Mexico coasts where the basic wind speed for Risk Category II buildings is greater than 115 mph, and 2. Hawaii, Puerto Rico, Guam, Virgin Islands, and American Samoa.	Areas vulnerable to hurricanes; in the United States and its territories defined as: 1. The U.S. Atlantic Ocean and Gulf of Mexico coasts where the basic wind speed is greater than 90 mph, and 2. Hawaii, Puerto Rico, Guam, Virgin Islands, and American Samoa.
Wind-borne Debris Regions[2]	Areas within hurricane prone regions where impact protection is required for glazed openings, see Section 26.10.3. 26.10.3 Glazed openings shall be protected in accordance with Section 26.10.3.2 in the following locations: 1. Within 1 mile of the coastal mean high water line where the basic wind speed is equal to or greater than 130 mph, or 2. In areas where the basic wind speed is equal to or greater than 140 mph.	Areas within hurricane prone regions located: 1. Within 1 mile of the coastal mean high water line where the basic wind speed is equal to or greater than 110 mph and in Hawaii, or 2. In areas where the basic wind speed is equal to or greater than 120 mph.

[1] Wind speed in ASCE 7-10 corresponds to the rounded value from the following relationship: $V_{ASCE7\text{-}10} = V_{ASCE7\text{-}05} \times (1.6)^{1/2}$.

[2] See ASCE 7 for detailed information on glazed opening protection and considerations for new treatment of Risk Category under ASCE 7-10. Both ASCE 7-05 and ASCE 7-10 contain an exception to glazed opening protection based on height above ground and proximity to aggregate surfaced roofs.

where 0.6 = 0.6/1.0 and 0.625 = 1/1.6). The precise value of the reduction in ASD load relative to LRFD load between ASCE 7-10 and ASCE 7-05 due to load factor changes alone is 0.6/0.625 = 0.96 or 4 percent.

Summary of comparison of design velocity pressure between ASCE 7-10 and ASCE 7-05

Table 3 compares the relative increase or decrease in design velocity pressures based on location, building risk category, and exposure.

The inland location, Dallas, TX, shows only small differences between ASCE 7-10 and ASCE 7-05. Locations outside of the hurricane prone region, not including special wind regions, can be generally represented by a ratio of approximately 1.0 (see *Table 3*, column [A]/[C]) as shown for Dallas, TX.

An expected outcome, due to the uniform hazard basis of the new maps, is that design pressures for Exposure C locations in the hurricane prone region are smaller under ASCE 7-10 than ASCE 7-05 (i.e. ratio values are less than 1.0 in *Table 3*, column [A]/[C]).

In this example, the effect of new maps and applicability of Exposure D in hurricane prone regions relative to Exposure C in ASCE 7-05 varies by location (see *Table 3*, column [B]/[C]). An approximate 10 percent increase in design pressure is observed for Boston, MA and an approximate 16 percent decrease in design pressure is observed for Virginia Beach, VA.

Minimum Design Wind Loads

Minimum wind load provisions of ASCE 7-10 for design of main wind force resisting systems (MWFRS), under the directional procedure and envelop procedure, have also been revised to specify a minimum 16 psf wall pressure and a minimum roof pressure of 8 psf projected onto a vertical plane (*Figure 1*). For comparison, the minimum design value of 10 psf, applicable for both walls and roofs under ASCE 7-05, when factored for LRFD is 16 psf (i.e. 10 psf x 1.6 = 16 psf) which identically matches the LRFD pressure of 16 psf for walls under ASCE 7-10.

Under ASCE 7-05 and prior editions, the net force for some elements of the MWFRS were smaller than would result from minimum pressure requirements. The minimum LRFD pressures of 8 psf for roofs and 16 psf for walls in ASCE 7-10 are now less likely to be the controlling minimum design wind loads for some building configurations, particularly in lower wind speed regions and for low-rise buildings designed in accordance with the envelop procedure for low-rise buildings.

Wind Speed Triggers

The geographic area within the hurricane prone region per ASCE 7-05 and ASCE 7-10 are shown in *Figure 2*. It can be seen that the geographic area for hurricane prone regions is reduced in portions of the southeast including Georgia, South Carolina, Alabama, and Mississippi. The wind speed trigger in ASCE 7-10 for hurricane prone regions is 115 mph from Risk Category II maps, and represents an algebraic conversion of the 90 mph wind speed trigger in ASCE 7-05. Revised wind speed triggers for wind-borne debris regions do not follow the same conversion and exclusive linkage to wind speed maps for Risk Category II. A comparison of these new values and revised definitions is provided in *Table 4*.

Under ASCE 7-10 provisions for glazed opening protection, wind speed maps associated with Risk Category II are used for all Risk Category II buildings and structures and Risk Category III buildings except for health care facilities. Wind speed maps for Risk Category III and IV are used for Risk Category III health care facilities and Risk Category IV buildings and structures.

The combined effect of map changes and revised wind speed triggers is that there are location- and building-specific differences between ASCE 7-10 and ASCE 7-05 requirements. These differences can be significant. For example, some locations and building types may require glazed opening protection under ASCE 7-10 where opening protection was not previously required under ASCE 7-05.

Coordination with Codes and Standards

Wind provisions of ASCE 7-10 are recognized in the 2012 IRC, the 2012 IBC, and the 2012 WFCM; however, each of these documents addresses implementation of ASCE 7-10 wind provisions differently.

IBC adopts ASCE 7-10 provisions for wind design by reference and incorporates ASCE 7-10 wind speed maps. A conversion of mapped wind speed to an ASD basis (i.e. V_{asd} per 2012 IBC is calculated as $V_{asd} = V_{ult} \times 0.6^{1/2}$) is added to the IBC to coordinate with previously established IBC wind speed triggers, many of which remain unchanged. For wood construction, the conversion from ultimate to ASD-based wind speed is needed to use: tables for attachment of wood structural panels for wind, wind applicability limits for conventional light-frame construction, and wind uplift connector requirements in IBC Section 2308.

Within the IRC, new maps illustrate ASD-based wind speeds. The IRC format of the wind speed map eliminates the need for conversion of the mapped value, as is done in the IBC; however, the mapped contour lines do not directly align with those in ASCE 7-10 maps incorporated in the IBC.

The 2012 WFCM will include ASCE 7-10 Risk Category II wind speed maps and tabulate requirements for wind speeds ranging from 110 mph to 195 mph for both Exposures B and C. The reinstatement of Exposure D in ASCE 7-10 is a new consideration for the WFCM, as prior editions provided tabulated requirements for Exposure B and C only, with a conversion table to adjust tabular values in Chapter 2 for Exposure D. The removal of the occupancy factor adjustment to wind loads will generally limit applicability of WFCM load tables. While prior WFCM load tables were based on occupancy category II, they were easily adjusted by the occupancy factor to estimate loads for other occupancy types.

Conclusions

Changes in wind design provisions introduced in ASCE 7-10 produce the greatest differences in design velocity pressures for areas within the hurricane prone region. For Exposure D sites, design velocity pressures can be both larger (Boston, MA) and smaller (Virginia Beach, VA) than those determined in accordance with ASCE 7-05. For Exposure C sites, design velocity pressures were as much as 28 percent smaller than those calculated using ASCE 7-05 for sites evaluated in this article. Changes to design velocity pressures followed the same trends for Risk Category II, III, and IV buildings.

Revised minimum wind loads in ASCE 7-10 will reduce occurrences where they control in lieu of more detailed methods for calculation of wind pressures for MWFRS. Additionally, changes to wind speed maps and load factors for wind are coordinated with revision of familiar wind speed triggers and minimum wind loads. For example, hurricane prone regions in ASCE 7-10 are associated with mapped wind speeds of 115 mph and higher instead of 90 mph and higher in ASCE 7-05, with similar wind speed revisions occurring for definition of wind-borne debris regions. Similarly, the minimum wind load for walls is given as 16 psf in ASCE 7-10, instead of the familiar 10 psf in ASCE 7-05.

Model building codes and standards that rely on the new wind design approach in ASCE 7-10 include the 2012 IRC, the 2012 IBC, and the 2012 WFCM. Each of these documents addresses implementation of ASCE 7-10 in a different manner. For design of wood construction in accordance with the WFCM, it is expected that the Risk Category II wind speed map will be incorporated as it appears in ASCE 7-10 and the tabulated requirement within the WFCM will be associated with ASCE 7-10 mapped wind speeds.▪

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