PART 2

Building Planning

Chapter 3

Chapter 3 Building Planning

Chapter 3 includes the bulk of the nonstructural provisions, including the location on the lot, fire-resistant construction, light and ventilation, emergency escape and rescue, fire protection, safety glazing, fall protection, and many other provisions aimed at protecting the health, safety, and welfare of the public. In addition to such health and life-safety issues, Chapter 3 provides the overall structural design criteria for residential buildings regulated by the CRC. Section R301 addresses live loads, dead loads, and environmental loads such as wind, seismic, and snow.

TABLE R301.2(1)
Climatic and Geographic Design Criteria

R301.2
Wind Design Criteria

R301.2
Wind Speed Maps

TABLE R301.2(2)
Component and Cladding Loads

R301.2.1.1.1
Sunrooms

R301.2.1.2
Protection of Openings in Wind-Borne Debris Regions

R301.2.1.4
Wind Exposure Category

TABLE R301.2.1.5.1
Modifications for Topographic Wind Effects

R301.2.4
Floodplain Construction

R301.3
Story Height

R302.1
Exterior Walls

R302.2
Townhouse Separation

R302.13
Fire Protection of Floors

R303.7, R303.8
Stairway Illumination

R304.1
Minimum Habitable Room Area

R305
Ceiling Height

R308.4.2
Glazing Adjacent to Doors

R308.4.5
Glazing and Wet Surfaces

R308.4.7
Glazing Adjacent to the Bottom Stair Landing

R309.8
Electric Vehicle (EV) Charging Infrastructure

R310
Emergency Escape and Rescue Openings

R310.5, R310.6
Emergency Escape and Rescue Openings for Additions, Alterations and Repairs

R311.1
Means of Egress

R311.7.3, R311.7.5.1
Stair Risers

R311.7.10.1
Spiral Stairways

R311.7.11, R311.7.12
Alternating Tread Devices and Ships Ladders

R311.8
Ramps

R312.1.2
Guard Height

R312.2.1
Window Fall Protection

R314
Smoke Alarms

R315
Carbon Monoxide Alarms

R322.1, R322.2
Flood Hazards

R322.3
Coastal High-Hazard Areas

R325
Mezzanines

R334 (FORMERLY R324)
Construction Waste Reduction, Disposal and Recycling

Table R301.2(1)

Climatic and Geographic Design Criteria

CHANGE TYPE: Modification

CHANGE SUMMARY: Table R301.2(1) Climatic and Geographic Design Criteria now contains a section to include whether the jurisdiction contains special wind regions or wind borne debris zones.

2016 CODE:

TABLE R301.2(1) Climatic and Geographic Design Criteria

Ground Snow Load	Wind Design				Seismic Design Category[f]
	Speed[d] (Mph)	Topographic effects[k]	Special wind region[l]	Wind-borne debris zone[m]	

(Portions of table and footnotes not shown remain unchanged)

l. In accordance with Figure R301.2(4)A, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with "YES" and identify any specific requirements. Otherwise, the jurisdiction shall indicate "NO" in this part of the table.

m. In accordance with Section R301.2.1.2.1, the jurisdiction shall indicate the wind-borne debris wind zone(s). Otherwise, the jurisdiction shall indicate "NO" in this part of the table

CHANGE SIGNIFICANCE: The special wind regions and wind design required regions are shown on a single map for the continental United States in Figure R301.2(4)B. For wind-borne debris zones, attempting to interpret wind speed from Figure R301.2(4)B near locations where the contour lines occur can be difficult and may lead to misapplication. The contour lines do not follow county lines or borders. Identification of zones where wind-borne debris requirements are applied should be provided by the local jurisdiction to ensure that provisions are applied correctly.

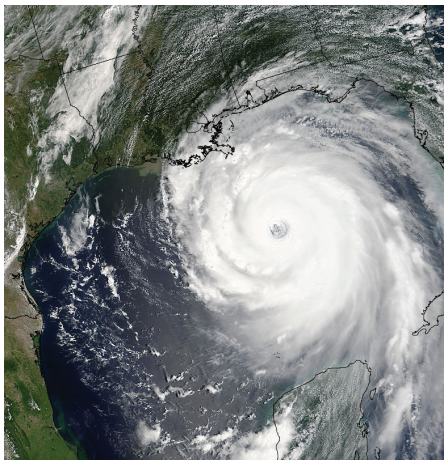
Although the special wind region and wind-borne debris requirements do not apply to most of the United States, when applicable they can have a major impact on the design and construction of residential structures. It is important that the designer determine when a project is in one of these regions by contacting the building department.

International Code Council®

Special wind region—Columbia River gorge

R301.2

Wind Design Criteria



Hurricane-force winds

Photo courtesy of NASA/Jeff Schmaltz, MODIS Land Rapid Response Team

CHANGE TYPE: Modification

CHANGE SUMMARY: Ultimate design wind speed values replace basic wind speed values for 3-sec gust wind speeds in Section R301.2.1. A wind speed conversion table has been added for conversion from ultimate design to nominal design wind speeds.

2016 CODE:

SECTION R202
DEFINITIONS

HURRICANE-PRONE REGIONS. Areas vulnerable to hurricanes, defined as the U.S. Atlantic Ocean and Gulf of Mexico coasts where the ultimate design wind speed, V_{ult}, ~~basic wind speed~~ is greater than 115 ~~90~~ miles per hour (514~~0~~ m/s), and Hawaii, Puerto Rico, Guam, Virgin Islands, and America Samoa.

R301.2.1 Wind Design Criteria. Buildings and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design ~~basic~~ wind speed in Table R301.2(1) as determined from Figure R301.2(4)A. The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section R301.2.1.1. Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where not otherwise specified, the wind loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors, and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section R802.11.1 from the roof assembly to the foundation.

R301.2.1.1 Wind Limitations and Wind Design Required. The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B ~~or where the basic wind speed from Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s)~~.

Exceptions:

1. For concrete construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R404 and R608.

2. For structural insulated panels, the wind provisions of this code shall apply in accordance with the limitations of Section R610.
3. For cold-formed steel light-frame construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R505, R603, and R804.

In regions where wind design is required in accordance with Figure R301.2(4)B ~~or where the basic wind speed shown on Figure R301.2(4)A equals or exceeds 110 miles per hour (49 m/s)~~, the design of buildings for wind loads shall be in accordance with one or more of the following methods:

1. AF&PA *Wood Frame Construction Manual* (WFCM).
2. ICC *Standard for Residential Construction in High-Wind Regions* (ICC 600).
3. ASCE *Minimum Design Loads for Buildings and Other Structures* (ASCE 7).
4. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings* (AISI S230).
5. *California Building Code*.

The elements of design not addressed by the methods in Items 1 through 5 shall be in accordance with the provisions of this code.

Where ASCE 7 or the *California Building Code* is used for the design of the building, the wind speed map and exposure category requirements as specified in ASCE 7 and the *California Building Code* shall be used.

R301.2.1.3 Wind Speed Conversion. Where referenced documents are based on nominal design ~~fastest mile~~ wind speeds and do not provide the means for conversion between the ultimate design wind speeds and the nominal design wind speeds, the ultimate design ~~three-second gust basic~~ wind speeds, V_{ult} ~~V_{3s}~~, of Figure R301.2(4)A shall be converted to nominal design ~~fastest mile~~ wind speeds, V_{asd} ~~V_{fm}~~, using Table R301.2.1.3.

TABLE R301.2.1.3 Wind Speed Conversions[a]

V_{ult}	110	115	120	130	140	150	160	170	180	190	200
V_{asd}	85	89	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.447 m/s.

a. Linear interpolation is permitted.

CHANGE SIGNIFICANCE: This code change brings the wind provisions of the *California Residential Code* (CRC) in line with the 2016 *California Building Code* (CBC) and ASCE 7-10 standard, *Minimum Design Loads for Buildings and Other Structures*. For the 2013 CRC, maps based on the ASCE 7-10 ultimate design wind speed data for 3-second gusts were converted to allowable stress design (ASD) values. Meanwhile, wind speed maps in the 2013 CBC and ASCE 7-10 were printed using strength

R301.2 continues

R301.2 continued

design or "ultimate design" values. This led to confusion among users working with both codes.

For the 2016 CRC, winds speeds are ultimate design wind speeds. These values are provided in wind maps. The boundaries between wind speeds moved slightly as wind speeds are rounded to the nearest 5 or 10 mph. This means values on wind speed maps change, but component and cladding loads converted to allowable stress design values remain the same as in the 2013 CRC. This change affects engineered design, but doesn't affect prescriptive requirements. High wind regions, areas that previously required wind design, will continue to require alternate design, whether by use of an alternate design standard or engineered design. Changes in the 2016 CRC update wind design criteria, definitions, and maps, and provide a conversion table from ultimate design wind speeds (V_{ult}) to nominal design wind speeds (V_{asd}). Table R301.2.1.3 gives ultimate design wind speeds and their equivalent nominal design wind speeds for use with standards that have not updated their provisions.

Note, the former CRC term "basic wind speed" is now "nominal design wind speed" and refers to wind values based on allowable stress design, an engineering method to determine loads on a building. The new term "ultimate design wind speed" refers to values based on wind speeds of the 2016 CRC Figures R301.2.4(A) and R301.2.4(B). Although these values are higher, when the adjustment factor of $\sqrt{0.6}$ is applied to them, the value will be approximately the same as the former basic wind speed. The terms "nominal design wind speed" and "ultimate design wind speed" have been added to tables, figures, and code text throughout the CRC to clarify which wind speed is described. Most code provisions in the CRC now use ultimate design wind speed limits.

A Discussion of Engineering and Wind Speed. The following section describes why wind speeds have changed. Understanding why the values changed is not necessary for use of the CRC, but may be of interest.

The most visible aspect of the wind speed modifications is the change in wind speed maps in the 2016 CRC. The maps were updated to match those adopted in ASCE 7-10. Over the past 10 years, new research indicated that the hurricane wind speeds provided in ASCE 7-05 were too conservative and should be adjusted downward. As more hurricane data became available, it was recognized that substantial improvements could be made to the hurricane model used to develop the wind speed maps. The new data resulted in an improved representation of the hurricane wind field.

Changes to the model include:

- Refined modeling of sea–land transition and hurricane boundary layer height.
- New models for hurricane weakening after landfall.
- Improved statistical modeling for the characteristic controlling wind pressure relationships.

Although the new hurricane hazard model yields hurricane wind speeds lower than those given in earlier code editions, the overall rate of intense storms produced by the new model increased compared to those produced by the hurricane model used to develop previous wind speed maps. This means lower wind speeds over land but more frequent storms. As the wind speed model is developed in part by looking at the statistical chance that a