

Revised wind maps

Revisions to ASCE 7's wind speed maps complicate asphalt shingle specification

by Mark S. Graham

Wind resistances of asphalt shingles are one of the primary performance considerations that should be evaluated when specifying asphalt shingle products. Recent changes to wind-load design procedures have resulted in a need for designers to reconsider how to specify asphalt shingles' wind resistances.

Wind resistance

Since the early 1970s, asphalt shingles' wind resistances have been tested according to a fan-induced wind test method described in ASTM D3161, "Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method)." With this test method, asphalt shingle products are classified as Class A, D or F, which represent maximum test

velocities of 60 mph, 90 mph or 110 mph, respectively.

UL 997, "Wind Resistance of Prepared Roof Covering Materials," is a test method similar to ASTM D3161 with similar classification designations.

When using ASTM D3161 or UL 997, designers should select an asphalt shingle product with a wind-resistance classification that exceeds the basic wind speed required by the applicable building code. This basic wind speed value, sometimes referred to as nominal design wind speed, is designated as V_{asd} .

In 2005, an alternative wind-resistance test method was developed for asphalt shingles that takes into consideration the uplift force applied to shingles' self-sealant strips. This test method, described in ASTM D7158, "Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)," classifies asphalt shingle products as Class D, G or H, representing passing basic wind speeds of 90 mph, 120 mph or 150 mph, respectively.

ASCE 7-10 and IBC 2012

With the publication of ASCE 7-10, "Minimum Design Loads for Buildings and Other Structures," the basic wind speed map from ASCE 7's previous editions has been replaced with three new maps with ultimate design wind speed (V_{ult}) values instead of the V_{asd} value in previous editions. The new V_{ult} values are somewhat higher than the V_{asd} values. For example, a V_{asd} of 90 mph previously applied to most of the continental U.S. Using ASCE 7-10, a V_{ult} of 115 mph now applies to Occupancy Category II buildings for most of the same region.

ASCE 7-10 and its revised maps are

incorporated in the *International Building Code, 2012 Edition*. As a result, V_{ult} now serves as the basis for wind load determination, which includes the required wind-resistance classifications for asphalt shingles, in the jurisdictions where IBC 2012 applies.


In IBC 2012's Section 1609.1-Wind Speed Conversion, an equation and table are provided for converting IBC 2012's V_{ult} values to V_{asd} values. Such a conversion is necessary when using asphalt shingle products' wind-resistance classifications.

A comparison of V_{asd} values applicable to specific V_{ult} values is provided in the figure.

Being aware

Revisions of ASCE 7-10's wind-load design procedures and IBC's 2012 wind speed maps have changed the code-required minimum design wind speeds applicable to buildings, including roof systems, where IBC 2012 applies. Because asphalt shingle products are tested and classified for wind resistance based on previous wind maps, conversion of the code's current V_{ult} values to V_{asd} values is necessary to accurately use ASTM D3161, UL 997 or ASTM D7158's classifications.

Designers should specify the wind resistances of asphalt shingle products after taking into consideration the wind speed map contained in the applicable code.

Additional information about the wind resistances of asphalt shingles is available in *NRCA Guidelines for Asphalt Shingle Roof Systems, The NRCA Roofing Manual: Steep-slope Roof Systems—2009* and from asphalt shingle manufacturers. 

| Ultimate design wind speed (V_{ult}) from IBC 2012 Figure 1609A, 1609B or 1609C | Nominal design wind speed ¹ |
|---|--|
| 100 mph | 78 mph |
| 110 mph | 85 mph |
| 120 mph | 93 mph |
| 130 mph | 101 mph |
| 140 mph | 108 mph |
| 150 mph | 116 mph |
| 160 mph | 124 mph |
| 170 mph | 132 mph |
| 180 mph | 139 mph |
| 190 mph | 147 mph |
| 200 mph | 155 mph |

¹ Nominal design wind speed determined from IBC 2012, Section 1609.3.1-Wind Speed Conversions, Equation 16-33 and Table 1609.3.1-Wind Speed Conversions

Comparison of ultimate design wind speed values to nominal design wind speed values

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