

Considering the winds

Properly specifying wind design is key to roof system performance

by Mark S. Graham

With increasing frequency, NRCA has been receiving reports of roof system designs that include inadequate provisions for wind loads and resistances. Designs that only specify wind speeds, wind warranties or disproportionately high (or low) uplift-resistance classifications are telltale signs of insufficient design considerations for high winds.

Where it appears designers have not properly addressed wind design, contractors are encouraged to seek further guidance from designers

Code requirements

Building codes typically provide minimum requirements for determining and reporting design wind loads on a project-specific basis.

For example, in the *International Building Code, 2015 Edition*,[®] (IBC), design wind loads should be determined according to

Chapter 16—Structural Design. This chapter specifically references the 2010 edition of ASCE Standard 7, “Minimum Design Loads for Buildings and Other Structures.” ASCE 7-10 also is referenced in IBC 2012.

With ASCE 7-10, roof systems typically are considered components and cladding elements, and design wind loads are determined using one of two methods: strength design or allowable stress design (ASD). Most roof systems are designed using the ASD method. IBC 2006 and IBC 2009 reference ASCE 7-05, which results in design wind loads near those derived using ASCE 7-10’s ASD method.

IBC 2015’s Section 1603—Construction Documents indicates a building’s design

loads, including a roof system’s live load, snow load data, wind design and any special loads be noted in construction documents. Code-required wind design data include identifying the ultimate design wind speed, nominal design wind speed, risk category, wind exposure and applicable internal pressure coefficient. For component and cladding systems not specifically designed by a registered design professional, design wind pressures in terms of pounds per square foot (psf) also are required. Design wind pressures for the field, perimeter and corner regions of roof areas should specifically be noted.

A building’s design loads most commonly will be identified on the structural drawings in the project drawing set for new construction projects. For reroofing projects without specific structural drawings, design loads may be provided on the architectural drawings or in the project specifications.

IBC 2012 and previous editions include similar construction document requirements for indicating building design loads.

IBC 2015 also has specific requirements for designing roof systems’ abilities to resist design wind loads. For built-up, polymer-modified bitumen, and adhered and mechanically fastened single-ply membrane roof systems, for example, IBC 2015’s Section 1504—Performance Requirements specifies laboratory testing according to one of the following:

- FM 4474, “American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Pressure and/or Negative Pressures”
- UL 580, “Tests for Uplift Resistance of Roof Assemblies”

- UL 1897, “Uplift Tests for Roof Covering Systems”

These tests provide the basis for FM Approvals’ and Underwriters Laboratories’ (ULs) approval classifications for roof systems.

Roof Wind Designer

NRCA’s Roof Wind Designer application can help roof system designers properly determine and specify design wind loads on roof systems. Roof Wind Designer allows users to input specific project information and determine design wind loads using ASCE 7-05 or ASCE 7-10’s strength design and ASD methods for many commonly encountered building types. The application also determines minimum-recommended tested wind-resistance load capacities, taking into consideration a safety factor that allows designers to select appropriate uplift resistance-classified roof systems. Roof Wind Designer generates a project-specific report, which can be used for project documentation and submittal purposes.

Roof Wind Designer is free and can be accessed at www.roofwinddesigner.com. To date, the application has been used on more than 17,750 roofing projects.

In situations where it appears roof system designers have not properly addressed code-required considerations for wind design, contractors are encouraged to seek further guidance from designers. Referring designers to Roof Wind Designer is one possible approach to helping designers provide code-required documentation of design wind loads in contract documents. 📄🔗

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