



Understanding Factory Mutual Wind Uplift Ratings

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What is an FM (Factory Mutual) Approvals wind test, and what do the various wind uplift ratings mean? This question is frequently asked, but often answered incorrectly.

Before we can answer the question, however, we must first define wind uplift.

Roof damage caused by wind occurs when the air pressure below the roofing assembly is greater than the air pressure above the building's roof. As wind flows over the building, the pressure directly above the surface of the roof decreases. At the same time, internal air pressure increases due to air infiltration through openings, cracks, etc. The result is a net upward force on the roofing system. This force is referred to as wind uplift.

FM Approvals is a nationally recognized testing laboratory that tests and certifies building materials, fire protection and electrical equipment that can help prevent or reduce property damage. Those products and services that meet FM Approvals' rigid testing criteria become FM approved and bear the "FM" diamond certification mark.

Based on decades of experience, FM Approvals has developed many test standards and industry protocols on various property conservation topics.

Neither FM Approvals nor FM Global are building code-making bodies, but FM-approved roofing systems are often specified, so it's important that contractors and owners understand FM Approval's role and the wind ratings. One common misconception is the belief that FM

Approvals windstorm classification ratings such as 1-60, 1-90 or 1-120 correlate to wind speeds of 60, 90 or 120 miles per hour (mph). Building owners and some contractors don't realize that the ratings apply to uplift pressures in pounds per square foot (psf), not wind speeds.

To correctly design a roof system to meet a FM wind uplift rating you must determine:

- The building's overall height
- The terrain surrounding the structure
- The type of roof deck on the structure
- Whether that deck meets FM minimum standards
- If the building is "special use" such as a hospital
- Whether the building has parapet walls, and their heights

For a roofing system to qualify for FM Approval, the system must be tested by the laboratory to its product testing standards. These tests usually are done on all components combined (deck, insulation, and membranes) on a test frame until there is a system failure. Failure can involve any number of events, such as delamination of the roof seam, membrane tear, screw pullout, etc. The pressure at failure determines FM's rating.

It is important for building owners to understand that FM Approvals ratings do not correlate directly to miles per hour of wind speed, and that understanding FM Approvals testing procedures and windstorm classification ratings will help avoid the many potential problems associated with wind uplift, one of the most common enemies to consider when designing any commercial roofing system.

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