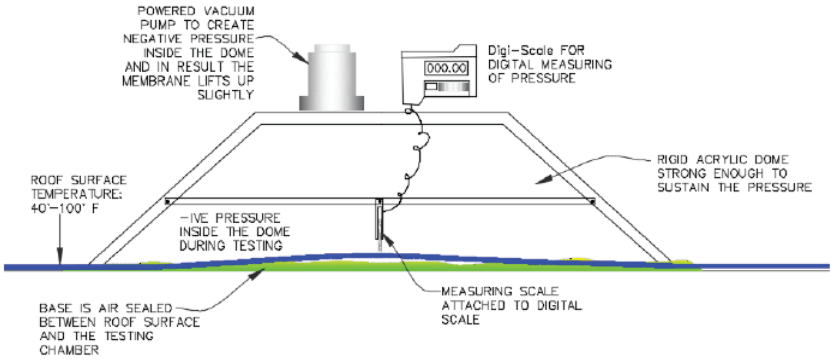
UNDERSTANDING FM 1-52

There are two recognized field test methods for determining uplift resistance of adhered membrane roof systems, both of which can be problematic:

1. ASTM E907, "Standard Test Method for Field Testing Uplift Resistance of Adhered Membrane Roofing Systems," and
2. FM Global Loss Prevention Data Sheet 1-52 (FM 1-52), "Field Verification of Roof Wind Uplift Resistance."

Both test methods provide for affixing a 5' x 5' dome-like chamber to the roof's surface and applying a defined negative (uplift) pressure inside the chamber to the roof system's exterior-side surface using a vacuum pump, like in the photo below.



However, ASTM E907 and FM 1-52 differ notably in their test cycles and maximum test pressures for determining roof system deflections and whether a roof system passes or is "suspect".

- Using ASTM E907, a roof system is "suspect" if the deflection measured during the test is 25 mm (about 1 inch) or greater.
- Using FM 1-52, a roof system is "suspect" if the measured deflection is between ¼ of an inch and 15⁄16 of an inch, depending on the maximum test pressure; 1 inch where a thin cover board is used; or 2 inches where a thin cover board or flexible, mechanically attached insulation is used.

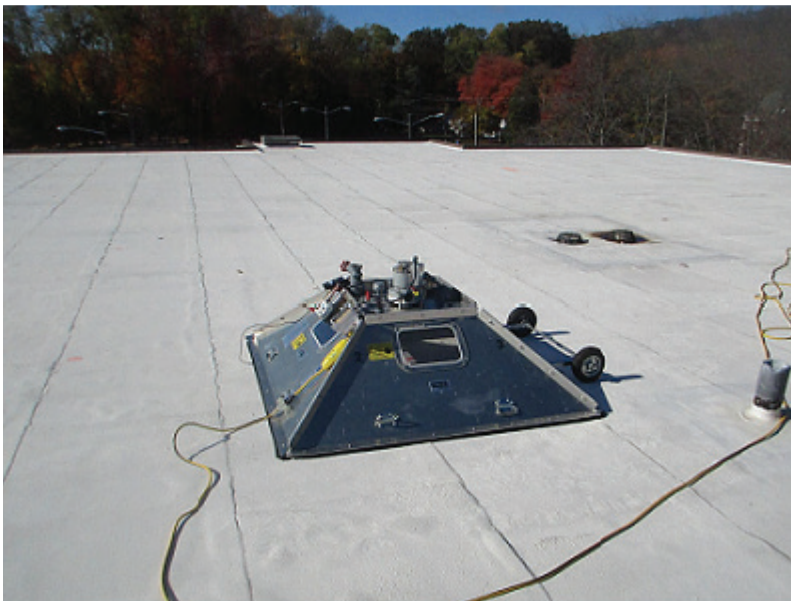
TEST RESULTS' RELIABILITY

The reliability of the results derived from ASTM E907 and FM 1-52 is a concern, especially when the tests are used for quality assurance purposes. A note in ASTM E907 acknowledges its test viability. "Deflection due to negative pressure will potentially vary at different locations because of varying stiffness of the roof system assembly. Stiffness of a roof system assembly, including the deck, is influenced by the location of mechanical fasteners, thickness of insulation, stiffness of deck, and by the type, proximity, and rigidity of connections between the deck and framing system."

For example, when testing an adhered roof system over a steel roof deck, placement of the test chamber relative to the deck supports (bar joists) can have a significant effect on the test results. If positioned between deck supports, the test chamber's deflection gauge will measure roof assembly deflection at the deck's midspan, which is the point of maximum deck deflection. Also, in many instances, field-uplift testing results in steel roof deck overstress and deck deflections far in excess of design values, which can result in roof system failure. These situations can result in false "suspect" determinations of a roof system.

INDUSTRY POSITION/ RECOMMENDATIONS

Because of the known variability in test results using ASTM E907 and FM 1-52 and the lack of correlation between laboratory uplift-resistance testing and field-uplift testing, the roofing industry considers field-uplift testing to be inappropriate for use as a post-installation quality-assurance measure for membrane roof systems.



CONCLUSION

FM 1-52 is an FM Global-promulgated evaluation method and not a recognized industry-consensus test standard. The scope of FM 1-52 indicates that it's only intended to confirm acceptable wind-uplift resistance on completed roof systems in hurricane-prone regions, where a partial blow-off has occurred, or where inferior roof system construction is suspected or known to be present.

FM 1-52 was originally published by FM Global in October 1970. The negative-pressure uplift test was added in August 1980 and has been revised several times. The current edition is dated July 2021 and clarifies the test method can be used to assess existing roof systems for adequate wind resistance but not to determine the cause of wind-uplift damage after a storm event.