



Testing and observation of windows and doors: Quality assurance beyond installation

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As discussed in my first window article titled "The View Of Your Windows Is Not Always The Same," there is great variation in the suitability of a window for a particular application. In all cases, there is a very specific need for proper detailing and attention to detail with respect to integration of the window with the building envelope and proper detailing during installation. This sequel to my first window article focuses on quality control measures for installation once your window has been selected and specified.

Generally, a performance specification is prepared that will detail the necessary performance criteria with respect to structural, wind and water resistance as well as material and dimensional requirements. Primary references that must be considered in window specifications include (but are not limited to) Local Building Code, Local Energy Code, Local (City) Ordinances, ASTM E2112, ASTM E330, and AAMA Voluntary Specification.

Local Building Codes must be referenced as they are often based upon a national code such as the International Building Code (IBC), but may have specific requirements in certain geographical areas that result in more stringent requirements for installation/specification.

The specifier will often select several manufacturers that have published data indicating they can meet the specified criteria and the contractor is typically permitted to submit alternate manufacturers provided they can document that the specified criteria are met.

Even when installed by an independent third party, the actual results of an installed unit assembled in the field and integrated with the existing building envelope can vary significantly, regardless of the published performance criteria. The installed unit's performance may differ from typical published laboratory results for several reasons:

The laboratory testing is in a very controlled environment - AAMA & ASTM Testing Standards have adjustments for this issue.

The laboratory unit will be handled differently from the unit that is to be shipped from the manufacturer, delivered to the site, unpacked and hauled up the side of a building.

The laboratory unit will not be assembled under any specific time/profit restrictions.

The field unit will have necessary installation detailing which may consist of drainage reservoirs, drainage pans and seals. These may not be part of the laboratory assembly.

ASTM E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference outlines a standard for experts to test installed windows and doors. The method includes specialized equipment which building envelope and window experts use on a regular basis. This equipment includes specialized vacuums and barometers to create and measure air pressure, calibrated water spray racks to apply a controlled amount of water to the test window or door, and

specific construction materials to create a chamber on the inside of the window in which a negative pressure can be created. Negative pressures within the chamber are correlated to exterior wind pressures and the water is applied with cyclical applications of negative pressure and neutral pressure. Observations of performance are compared to the specified requirements and areas of failure are observed to be further addressed.

The American Architectural Manufacturers Association (AAMA) published AAMA 502-08 Voluntary Specification for Field Testing of Newly Installed Fenestration Products. The scope is similar to that of ASTM E1105, except that the chamber is constructed beyond the limits of the fenestration frame itself, to include the seals around the window or door. In addition, this test is not just for water infiltration, but for air infiltration as well.

The number of windows to be tested is prescribed by AAMA 502-08 as three (at intervals of 5%, 50% and 90% installation completion); however, AAMA recommends that the actual sampling size for any given project consider the size of the project and budgetary constraints. We recommend a minimum sample size of three.

In summary, whether a part of a larger facade cladding project or stand alone, your window/door replacement project will be a large financial undertaking. If you have retained a Professional Engineer to design and specify the proper window and detailing, you have taken one important step towards your investment. The second crucial step involves the observation and testing of the units as they are installed to make sure the final product will meet the specified requirements and provide years of proper service.

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