Exterior Wall Weather Protection

Section 1403.2 of the International Building Code (IBC) requires exterior walls of a building to be provided with a weather-resistant exterior wall envelope. UL performance testing helps designers and code authorities achieve code compliance.

The exterior wall envelop is a system or assembly of exterior wall components, including exterior wall finish materials, that provides protection of the building structural members—including framing and sheathing materials, and conditioned interior space—from the detrimental effects of the exterior environment.

The exterior wall envelope must be designed and constructed to prevent damage from rain and snow, wind and other weather events. Exterior Insulation and Finish Systems (EIFS) must also meet weather resistance requirements. The IBC requires prevention of water accumulation within the wall assembly by providing a water-resistive barrier behind the exterior veneer, and a means for draining water that enters the assembly to the exterior. Protection against condensation within the exterior wall assembly must also be provided.

There are exceptions for when weather protection is not required, such as for certain concrete and masonry walls. One option for providing code mandated weather protection for exterior walls is through performance testing for water penetration and air leakage.

Performance testing to ASTM E 331

The IBC does not require a means of drainage to be provided for the exterior wall envelope when a representative test sample has been tested to resist a two hour simulated wind driven rain, including joints, penetrations and intersections with dissimilar materials. The test must be conducted in accordance with ASTM E 331, the Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference. This test is used to determine the resistance of exterior windows, curtain walls, skylights, and doors to water penetration when water is applied to the outdoor face and exposed edges simultaneously with a uniform static air pressure at the outdoor face higher than the pressure at the indoor face.

The exterior wall envelope design shall be considered to resist wind-driven rain where the E 331 testing indicates that water did not

penetrate control joints in the exterior wall envelope, joints at the perimeter of openings or intersections of terminations with dissimilar materials.

Air leakage testing

To demonstrate compliance with the wind resistance requirements of the IBC, UL also provides testing to evaluate the air leakage rates of exterior windows, curtain walls, and doors under specified differential pressure conditions across the specimen in accordance with ASTM E 283, the Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specific Pressure Difference Across the Specimen. This test method is for tests with constant Exterior Wall Weather Protection temperature and humidity across the specimen, and is intended to measure only such leakage associated with the assembly and not the installation. The test method can be adapted to evaluate the overall installation if needed.

UL also offers field air leakage tests on installed exterior windows and doors in accordance with ASTM E 783. Field testing demonstrates the building envelop systems meet code requirements for water and air resistance as well as ensuring designers and owners that these systems are safe, durable and energy efficient. Results of water penetration and air leakage testing will be documented in a test report, and may also be indicated in an adjunct ASTM E 331 or ASTM E 283 certification to a basic UL window or door certification.