Components and Cladding Anchorage

There are varying wind load provisions in local, state and model building codes used in the United States, most of which are based on wind engineering research. ASCE 7 is the reference design guide for most codes which contains separate provisions for the design of major structural elements using the “Main Wind Force-Resisting System” (MWFRS) loads and secondary structural elements using “Components and Cladding” (C&C) loads. Component and Cladding construction has become more diverse including the use of new and varying exterior wall materials with customized detailing. This fact, coupled with the enhanced concern for exterior wall performance, results in more scrutiny from architects and exterior wall consultants. Even details which were considered “standard or typical” in the past are often more carefully analyzed, inspected and tested. One example of this is the increase inspection of exterior wall components anchorage details; which historically have been verified through engineering analysis, are now being routinely inspected and tested in the field. This bulletin is intended to provide guidance in order to avoid problems with anchorage of wall components such as windows, doors, panels, and other cladding.

Reference Documents

The American Architectural Manufacturers Association (AAMA) recently published AAMA 2501-06, Voluntary Guideline for Engineering Analysis of Window and Sliding Glass Door Anchorage Systems. This AAMA document provides criteria and requirements for engineering analysis of anchorage systems for fenestration products. It also introduces a logical paper trail of the requirements and submittals and provides standardized practices for requesting, preparing and submitting anchorage analyses. AAMA 2501-06 is most typically used for specific projects. It is important to note however, that this standard does not address air leakage and water intrusion issues.

Installation Analysis

It usually is not cost effective to test all possible installation conditions for a project. Architectural Testing's engineers are experienced in establishing job-specific installation details based on engineering analyses. In these cases installation reports and/or shop drawings with a professional engineer review are typically provided. Generic installation details encompassing multiple substrates and details can also be analyzed.

Field Anchor Testing

While it could be said that anchor testing is not really new; at least in terms of laboratory testing, it is something that is relatively new in the field. (See Figure 1.) Architectural Testing has noticed a significant increase in the number field anchor tests that have been specified in recent years, but this increase in
anchor testing should not be surprising when you think about it. Consider: If you as a “building owner” were to spend significant dollars on the development, manufacture and testing of a fenestration system for your building, not only would you want to make sure the fenestration system was installed correctly, you would also want to have some assurance that the anchors were installed into a suitable material, and that all the anchor components performed as required. Field testing is cheap insurance compared to the cost of defending a claim regarding glass falling from a building.

Figure 1: Example of Field Anchor Testing at Slab Edge

The Standard

One standard for anchor testing, is covered in ASTM E 488-96 (Revised 2003), “Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements”. According to the standard, “The test methods cover procedures for determining the static, seismic, fatigue and shock, tensile and shear strengths of post-installed and cast-in-place anchorage systems in structural members made of concrete or structural members made of masonry.” Essentially, the standard covers both laboratory and field testing of anchors and materials while giving guidance as to the equipment necessary to perform these tests. (See Figure 2.)

In the field, the standard requires not only suitable equipment to perform the test and sustain the load, but it also requires that the load be applied at a given rate of speed while obtaining a minimum of 50 data points prior to reaching the peak load. This essentially means that the load cell needs to be connected to a computer capable of collecting the required data.

Figure 2: Field Anchor Test Setup at Wall Interface

Conclusion

The purpose of this Informational Bulletin is to provide an overview of the anchor testing services that are available to assist the industry. The information contained herein is not manufacturer or product specific, and is provided as advisory information to our customers.

Architectural Testing continues to research new service opportunities related to building science. We welcome the opportunity to share our experience and knowledge with our customers. Should you have any questions with regard to this informational bulletin or know of other unique opportunities, please don’t hesitate to contact us.

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