Architectural Testing

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Field Water Testing - Lessons Learned

Photo 1: Jobsite Meeting to Discuss Test Protocol

It isn't all that unusual for people to find themselves standing at the jobsite scratching their head wondering "How did I get myself in this position?" (See Photo 1) Perhaps you have been there? You know, when you find yourself "discussing" the details of the field testing protocol that is about to take place. Questions like "What field test method was specified?" or "When was the product installed?" or "What field performance was specified?" These are just a few of the questions that often come up with regard to field testing.

LOTS OF QUESTIONS - HOW ABOUT ANSWERS

Let's face it, the construction industry probably won't see field water testing go away anytime soon. With that in mind, it would be constructive if all team members at least had a mutual understanding of the project's field testing requirements:

- What is the appropriate field test method to specifiy/use?
- What is the appropriate performance criteria to specify/use?
- How many specimens are to be tested?
- What is the pass fail criteria?
- What happens after failed test?

- When is it acceptable to vary from industry standards, or what if there are no guidelines?

LET'S START WITH THE SPECIFICATIONS

Sometimes project specifications do not reference the most recent version of the standard and/or test method. When this happens it is important to be informed and educate other involved parties on which test methods are relevant and current.

As an example, it is common to find AAMA 502-02 Method-A in the project specification more than two years after the document was revised and republished as AAMA 502-08. The AAMA 502-08 specification omitted the optional test method and defaults directly to what was formally the Method-B test arrangement. The question is, "When you see a specification that refers to AAMA 502-02, do you ignore it or do you notify others that there is a more current version?"

TEST METHOD VS. PERFORMANCE STANDARD

A point that is critical to a complete understanding of field performance is related to the questions of test methods vs. performance criteria.

Some test methods relative to field testing of fenestration products include ASTM E 783 and ASTM E 1105 (see Photo 2). However, these ASTM test methods do not include performance criteria. Referring to an ASTM field test method is acceptable for stating how to conduct the test, but more information is needed regarding the performance requirements. This is why AAMA has developed the voluntary specifications AAMA 502 and AAMA 503 to provide this guidance and clearly stipulate performance requirements.

Whether you agree or disagree with the industry default performance requirements is not the primary concern. However, understanding the project's performance criteria is paramount. Either the architect can specify the test method and then stipulate the field performance requirements for a given project, or a guide specification with embedded performance criteria must be specified to have a true means to evaluate pass or fail for any specific project.

USING THE CORRECT TEST METHOD

Photo 2: ASTM E 1105 Test Conducted in Accordance w/ AAMA 502-08 Voluntary Specification

We are often asked, "Which test method is appropriate for this application?" Again, we always recommend that you first refer to what was specified, but there are some guidelines that we can suggest. Refer to Table 1 at the end of this bulletin for more information.

One example that comes to mind is the use of the AAMA 501.2 hose nozzle test which is entitled, "Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems." This test method specifically states that **it is not intended to be used on operable components such as windows**. Now the argument could be made that the hose nozzle test method is never to be used on a window, right? And you would have some "expert" support for this position because the standard says so, yes? But what if it is a fixed window or what if you masked off the operable component of the window in order to check just the

Photo 3: AAMA 501.2 Test on Fixed Transom Window

Photo 4: Portable Dynamic Wind Generator for Field Dynamic Water Testing

glazing (see Photos 3)? We don't recommend inappropriate adaptations of industry standards, but there are times when adaptations may be appropriate. Let's look deeper into the AAMA 501.2 question to see this example clearly.

AAMA 501.2 uses a special nozzle that directs a cone of water spray at a pressure of 30 to 35 psi normal to the plane of the specimen at a distance of 12 inches. This 30-35 psi water pressure application can easily force the water past the weatherstripping of an operable window or door - which the weatherstripping was never intended to resist. Hence, it is inappropriate to use it at operable weatherstripping interfaces. However, if you used this test method for diagnostic purposes to check the water integrity of a fixed piece of glass or a sidelight of a door, would that be an inappropriate application of this test method?

What about a clad panel system, a masonry wall, or a security camera penetration through the roof? These conditions and many others are often included in the scope of a field water test performed via the AAMA 501.2 for diagnostic and quality assurance purposes.

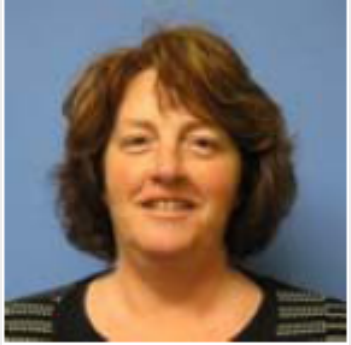
Another field testing adaptation of a water test is the use of AAMA 501.1. This document is entitled, "Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure." This is the test method almost everyone recognizes as the "airplane engine test." Static pressure chambers, such as the chamber described in ASTM E 1105 are sometimes difficult to construct on rain screen or cavity walls such that the desired pressure differential is obtained. AAMA 501.1 is often the most effective way to evaluate pressure equalized and back ventilated types of wall systems (see Photo 4).

CONCLUSION

It is absolutely critical that the construction industry does its best to stay current with relevant field testing standards and test methods. Standards should be reviewed and followed, with the understanding that practical adaptations or modifications are appropriate in some cases.

The purpose of this ATI - Informational Bulletin is to provide an overview of field testing and some of the complexities of this service provided by Architectural Testing. We are available to assist you and your clients with all of your field testing needs. For inquiries regarding field testing please contact Patricia Gordon at our corporate headquarters in York, PA or any of our Regional Laboratory Directors.

ABOUT THE AUTHOR



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COMPILATION OF TEST METHODS FOR FIELD USE

Doc. No.	Document Name	Referenced	Comments on Usage
AAMA 501.1-05	Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure	ASTM E 2099	Commonly recognized as a laboratory test method, but is also being referenced and used in the field with great success.
AAMA 501.2-09	Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems	ASTM E 2128	Clearly states inappropriate for operable products, however fixed portions of products can also be tested. Often used for diagnostic tool to pinpoint leak source in other substrates or connections.
AAMA 502-08	Voluntary Specification for Field Testing of Newly Installed Fenestration Products	AAMA 501.2, AAMA 503, AAMA 511, ASTM E 2128	Used for Newly Installed Fenestration Products. Stipulates performance requirements. Provides cautions about extraneous air during air infiltration tests.
AAMA 503-08	Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems	AAMA 501.2, AAMA 502, AAMA 511, ASTM E 2128	Used for Newly Installed Storefront/Curtain Wall/Sloped Glazing systems. Stipulates performance requirements. Provides cautions about extraneous air during air infiltration tests.
AAMA 511-08	Voluntary Guideline for Forensic Water Penetration Testing of Fenestration Products	AAMA 501.2, AAMA 502, AAMA 503	Intended to be used in the field for known cases of water penetration subsequent to the building completion. Also includes the "Optional Sill Dam Test" that formerly found in AAMA 502.
ASTM E 331-00 (2009)	Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Differential	AAMA 101-08, AAMA 501.1, ASTM E 331	Provides methodology applicable to several tests, whether laboratory or in the field. Method is based on static pressure, commonly used for AW grade products and curtain wall/storefront and sloped glazing products.
ASTM E 514-06	Standard Test Method for Water Penetration and Leakage Through Masonry	AAMA 511, ASTM E 2128	Laboratory test method, but is often adapted to test masonry in the field.
ASTM E 547-00 (2009)	Test Method for water Penetration of Exterior Windows, Curtain Walls, Doors by Cyclic Static Air Pressure Differential	AAMA 101-08, ASTM E 2128	Provides methodology applicable to several tests, whether laboratory or in the field. Method is based on cyclic pressure, commonly used for R, LC and CW grade products.
ASTM E 1105-00 (2008)	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	AAMA 502, AAMA 503, AAMA 511, ASTM E 2128	Provides methodology for field water testing using both static and cyclic air pressure differential.
ASTM E 2128-01a (2009)	Standard Guide for Evaluation Water Leakage of Building Walls	AAMA 502, AAMA 503, AAMA 511	Guide for forensic evaluation. Permits any number of ways to perform diagnostic testing and defined steps and information gathering requirements.