

The Use of AAMA 508 with Insulated Metal Panels

Overview

The following Expert Analysis will review the significance of the American Architectural Manufacturers Association (AAMA) 508 testing protocol in relation to CENTRIA Formawall® (herein, FWDS) insulated metal panel system. In addition, CENTRIA will explore the AAMA 508 testing procedure and the performance characteristics the test is designed to measure, including air leakage, cyclic pressure, static water penetration, and dynamic water penetration. CENTRIA will also provide a summary of Formawall testing as per AAMA 508 for air leakage, cyclic pressure, static water penetration, and dynamic water penetration.

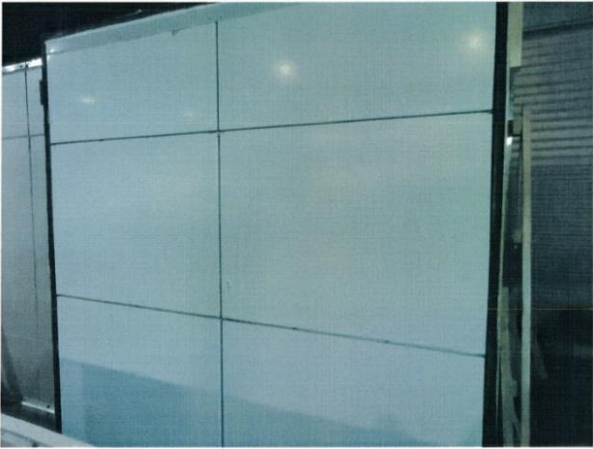
AAMA 508 is intended for use with rainscreens, so why is CENTRIA testing FWDS to this standard?

The title of the AAMA 508 test method is “Voluntary Test Method and Specification for Pressure-Equalized Rainscreen Wall Cladding Systems.” A typical wall assembly with a rainscreen panel consists of metal studs, air/water barrier, waterproofing, an air gap, and the exterior rainscreen panel. CENTRIA’s typical wall assembly with a barrier wall panel consists of just metal studs and the barrier wall panel. Part of the AAMA 508 test is to evaluate the ability of the wall cavity to achieve pressure-equalization with the exterior. For an insulated metal panel—since there is no “wall cavity”—the ½” gap within the panel joinery is where pressure equalization occurs. The panel joint is designed with a J-hook featuring vent slots, which allows similar pressure-equalizing performance without water entrapment in the side joint. If panel installation is not perfect, air leakage through the panel joinery could exist. If the panel joint cannot equalize pressure during weather events, water could be pulled into the building. Passing the AAMA 508 test ultimately demonstrates the pressure equalization of our panel joinery to prevent water intrusion with an imperfect installation.

AAMA 508-07 Test Procedure

The AAMA 508-07 test is conducted with a differential pressure of 1.57 psf and an air infiltration rate of 0.12 cfm/sf. This differential pressure with air infiltration introduces a “wicking” effect that attempts to pull water/vapor through the joint and other seals in the system. Once the air leakage test, per ASTM E283, verifies the infiltration rate, the cyclic pressure test, per a modified version of ASTM E1233, is performed. This evaluates the pressure-equalization capability of the system by applying three-second maximum interval pressure cycles between 5 psf and 25 psf for 100 cycles.

The pressure in the joinery must equalize to the applied pressure within 0.08 seconds after each pressure change, and the peak pressure differentials must be less than 50 percent. The static water penetration test, per ASTM E331, and the dynamic water penetration, per AAMA 501.1—with a minimum pressure differential of 6.24 psf and a spray rate of 5 gal/sf/hr—must not result in water penetration of the system. CENTRIA’s Formawall panels meet the performance requirements of the AAMA 508-07 test standard as described above.



Elevation view of AAMA 508 test assembly

Acceptance of the Panel System per AAMA 508-07

To define acceptance of the panel system, there are four performance characteristics that are measured as part of AAMA 508-07:

1. Air leakage (Static) of 0.12 cfm/sf (measured per ASTM E283) is introduced to the system at a differential pressure of 1.57 psf to simulate the imperfect air barrier.
2. Pressure equalization behavior of the system is evaluated per a modified version of ASTM E1233. Positive pressure cycles between 5 psf and 25 psf at average intervals of three seconds maximum for 100 cycles are applied to the system. For the system to be considered pressure equalized, the lag time between the cavity and cyclic wind pressure cannot exceed 0.08 seconds, and the maximum differential between the cavity and the cyclic wind pressure cannot exceed 50 percent of the maximum test pressure.
3. Water penetration of the system is evaluated per ASTM E331 (Static) and AAMA 501.1 (Dynamic) at a minimum of pressure 6.24 psf. Failure is defined as water mist or water droplets appearing in excess of 5 percent on the air/water barrier surface or continuous streaming at any location on the air/water barrier.
4. For a project-specific system only, structural performance of the system is evaluated per ASTM E330 (Static) at 0.5, 1.0 and 1.5 times the specified design pressures.

Summary of CENTRIA Testing of FWDS per AAMA 508-07

ASTM E283 - Air Leakage Test

Test Parameter	Parameter Value	Value Used
Static Pressure Differential	1.57 psf	1.57 psf
Air Infiltration Rate	0.12 cfm/sf	0.108 - 0.132 cfm/sf

ASTM E1233 - Pressure Cyclic Test

Test Parameter	Parameter Value	Value Used
Min. and Max. Cyclic Pressure	5 psf - 25 psf	5 psf - 25 psf
Cycle Period	3 seconds	3 seconds
Total Cycles	100	100

RESULTS: Peak Pressure Time Shift \leq 0.08 seconds? YES
 Peak Pressure Differentials < 50%? YES

ASTM E331 - Static Water Penetration Test

Test Parameter	Parameter Value	Value Used
Static Pressure Differential	6.24 psf	15 psf
Spray Rate	5 gal/sf/hr	5 gal/sf/hr

RESULTS: % Water Droplets on Air/Water Barrier < 5%? YES
 Streaming Water on Air/Water Barrier? NO

AAMA 501.1 - Dynamic Water Penetration Test

Test Parameter	Parameter Value	Value Used
Static Pressure Differential	6.24 psf	15 psf
Spray Rate	5 gal/sf/hr	5 gal/sf/hr

RESULTS: % Water Droplets on Air/Water Barrier < 5%? YES
 Streaming Water on Air/Water Barrier? NO

CENTRIA's stance on AAMA 508 and FWDS

CENTRIA Formawall insulated metal panels function as the air, water, and vapor barrier of the exterior wall system—not just a rainscreen panel. We do not require our panels to be installed over sheathing and/or waterproofing, and we typically recommend these additional items be eliminated as a cost savings and to minimize installation time. If the architect desires to install these two additional items to enclose the building quicker or for additional water protection, installers can simply shim the panels off the sheathing.

The AAMA 508 test requires that air leakage be introduced to the panel system to simulate an imperfect air barrier. This imperfect air barrier as it relates to insulated metal panels, where the panel liner acts as the air/water/vapor barrier, simulates possible construction and workmanship flaws during installation of the panels. For insulated metal panels, one flaw could be missing sealant on the liner side between panels. This would result in a breach in the air barrier of the system and, in turn, the possibility of air, water, or vapor penetrating the system. The various tests performed as a part of AAMA 508 verifies that even with minor installation flaws, the panels will still perform as designed.

In conclusion, CENTRIA conducted the AAMA 508-07 test standard for our Formawall barrier wall panel system to demonstrate the ability of the panel joinery to pressure equalize with the exterior. The main benefit of this pressure equalization capability of the joinery is to confirm that even with an imperfect panel installation, water intrusion into the building will not occur.

Formawall High Performance Building Envelope System

As CENTRIA's flagship line of insulated metal panels, Formawall High Performance Building Envelope System combines unprecedented design freedom with unmatched thermal and moisture performance. All Formawall products include a standard halogen-free foam core, enabling the architectural community to create a more sustainable building environment, while improving the product's fire performance. Red-list free Formawall insulated metal panels are exclusively FM 4882- certified at the most stringent level, surpass the required protocols for the NFPA 285 complete wall assembly test, and are the subject of a health product declaration (HPD).



FWDS 3''-T

The Formawall system consolidates up to six components found in common wall assemblies into just one. The product's five distinct profiles deliver unlimited design combinations to create the world's most imaginative building envelopes with varying articulations, rhythms, and textures. Showcase the ultimate in performance with integrated Formavue® windows, engineered with integral head and sill joinery to ensure superior performance. And only Formawall high-performance building envelope system includes the seamless integration of the industry's highest quality daylighting and ventilation components.

Discover more at www.CENTRIA.com/Formawall.

Brian Sharlow, P.E., is a Structural Engineer at CENTRIA.

Appendix



Definitions of Relevant Tests

ASTM E283 - Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

This test method covers the standard laboratory procedure for determining the air leakage rates of exterior windows, curtain walls and doors under specified differential pressure conditions.

ASTM E1233 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Static Air Pressure Differential

This test method is a standard procedure for determining structural performance under cyclic air pressure differential. This typically is intended to represent the long-term effects of repeated applications of wind load on exterior building surface elements, or those loads that may be experienced during a hurricane or other extreme wind event. This test method is intended to be used with building elements that endure cyclic or repeated wind loads that could impact the structural performance of the system.

ASTM E331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

This test method is designed to determine the water penetration resistance of windows, curtain walls, skylights, and doors when water is applied using a calibrated spray apparatus, while simultaneously applying uniform static pressure to the opposite side of the test specimen. The calibrated spray apparatus applies water uniformly to the surface of the specimen at a rate of 5.0 gal/sf/hr. The minimum testing pressure is 6.24 psf. To pass this test, no water leakage can be evident through the system.

AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure

This test method is designed to determine the water penetration resistance of windows, curtain walls, skylights, and doors when a specified air pressure differential is applied to the system utilizing a wind generator employing an 84" diameter propeller. Water is simultaneously sprayed on the exterior face of the assembly at 5 gal/sf/hr for 15 minutes. To pass this test, no water leakage can be evident through the system.

AAMA 508-07 - Voluntary Test Method and Specification for Pressure-Equalized Rainscreen Wall Cladding Systems

The intent of this voluntary test is to demonstrate the ability of the panel system to prevent water entry through the entire wall system; vent any water vapor to the exterior that diffuses through the wall system; resist the full positive and negative wind loads; and to control rainwater. The test method recognizes that final project installation can result in a less than perfect air/water barrier seal. Therefore, a prescribed volume of air leakage is introduced to simulate the imperfect air barrier. The AAMA 508 test method is a pass/fail standard that evaluates the pressure equalization ability and the water, air penetration, and/or leakage capabilities of the panel system to limit water intrusion.