CavityComplete®
CMU Wall System

Technical Bulletin
CMU-03

Air Leakage and Water Resistance
ASTM E2357 and ASTM E331

Scope Statement
During testing, the CavityComplete® Wall System for CMU with Masonry Veneer was subjected to thousands of positive/negative pressure cycles simulating wind/structural/ thermal movement stress testing of the durability of the air/ water resistive barrier assembly. The system was tested in large scale simulations of both unpenetrated (opaque) and penetrated wall surfaces.

Testing Conducted By
PRI Construction Materials Technologies LLC
6412 Badger Drive, Tampa, FL 33610

Testing Date
December 1, 2016-January 27, 2017

Test Report No
- OCF-299-02-01

Test Methods
- ASTM E 2357-11, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- ASTM E331-09, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

Specimen Description
Test Specimen Size: 96" x 96" (64 ft^2, 5.946 m^2)

Opaque Wall
The opaque wall was constructed from 16" long by 8" wide by 8" thick concrete masonry units (CMU) with Type S mortar joints struck flush. Heckmann #1300 hook and ladder joint reinforcement and #1300 pintle wire ties were installed every two courses of block spaced vertically with eye wires spaced 16” on center horizontally. The CMU wall was built inside a steel base frame and secured to the frame using concrete anchors at each side, spaced 8" on center, into each course. The wall was detailed with PROSOCO Joint & Seam Filler and coated with PROSOCO R-Guard® Cat-5 vapor permeable Air Barrier at a nominal 350sf/gal and a target dry film thickness of 12 mil. Owens Corning FOAMULAR® CW25, 2" thick, 16” wide straight edge, extruded polystyrene insulation board was friction-fit between the wall ties on half of the specimen wall. Owens Corning Thermafiber® RainBarrier® 45 2" thick, 16" wide, straight edge, mineral wool insulation board was friction-fit between the wall ties of the other half of the specimen wall and secured with Owens Corning Thermafiber® RainBarrier® Clips attached to half of the pintle eyes.

Penetrated Wall
Same as the opaque Wall described above except with wall penetrations prescribed by the ASTM E2357 test standard and with all CavityComplete® Wall System components installed. The penetrations included two 625mm by 1225mm rough openings with metal frame window blank (one installed in the FOAMULAR® side and one in the Thermafiber® side), a 100mm by 100mm HVAC duct, a 38mm PVC pipe, and two junction box penetrations; one square and one octagon per ASTM E2357. Additional penetrations included a TotalFlash® flashing/ termination bar/ drainage mesh fabricated panel system from Mortar Net Solutions installed along the base of the system and trimmed to allow sealing of the specimen wall, 6 Heckmann Pos-I-Ties with Rodenhouse Washers (half installed on the FOAMULAR® side and half on the Thermafiber® side) and six Rodenhouse Impaling Fasteners with Washers (all installed on the Thermafiber® side). All penetrations were sealed with PROSOCO Joint & Seam Filler or FastFlash® fluid-applied flashing.

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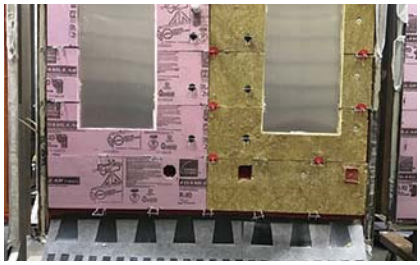

Photos: Penetrated wall during air leakage and water resistance testing

Test Results Summary and Codes/Standards Compliance

Air Barrier

When tested in accordance with ASTM E2357, both ASHRAE 90.1 (commercial building energy standard, Section 5.4.3.1.3 b), and The Air Barrier Association of America (ABAA, http://www.airbarrier.org/materials/assemblies_e.php), define an air barrier assembly as having an average air leakage not to exceed 0.04 cfm/ft² at a pressure of 75 pa (1.57 psf).

The CavityComplete® CMU Wall System with Masonry Veneer, as described in this technical bulletin, was tested per ASTM E2357 and successfully qualified as an air barrier assembly. After thousands of pressure loading cycles as specified in ASTM E2357 (see Table 1), the CavityComplete® CMU Wall System had the air leakage ratings shown in Table 2 measured at 75 pa (1.57 psf).

Weather Resistive Barrier

The International Code Council "Acceptance Criteria for Water Resistive Coatings Used as Water Resistive Barriers over Exterior Sheathing", AC 212, Section 4.5, requires that specimens be tested in accordance with ASTM E331, and that the specimen show no visible water penetration for 15 minutes at an air-pressure differential across the specimen of 2.86 psf (137 Pa). The CavityComplete® CMU Wall System passed the prescribed criteria, and further, held water tight for 120 minutes, at more than 2x the required pressure, 6.27 psf (300 Pa).

Deformation Loading Sequence

Table 1

Test	# Cycles/Period	Pressure	Result
Deformation	1/60 minutes	+600 Pa (+12.54 psf)	No Damage
Deformation	1/60 minutes	-600 Pa (-12.54 psf)	No Damage
Cyclic Loading	2000/5 seconds (1000 each, infiltration & exfiltration)	+/- 800 Pa (+/- 16.72 psf)	No Damage
Gust Loading	2/3 seconds (1 each, infiltration & exfiltration)	+/- 1200 Pa (+/- 25.06 psf)	No Damage

ASTM E2357, Air Leakage Rate After Loading Sequence (cfm/ft²)

Table 2

Tested at 75 pa (1.57 psf)	Air Infiltration	Air Exfiltration	ASHRAE 90.1 and ABAA Air Barrier Criteria	Qualifies as an Air Barrier Assembly
Opaque Wall	0.004	0.003	0.04 maximum	Yes
Penetrated Wall	0.004	0.003	0.04 maximum	Yes

** The air leakage reported for this assembly is 0.0008 cfm/ft² (0.004 L/s•m²)*

ASTM E331, Water Exposure for Penetrated Wall

Table 3

(hr:min:sec)	00:15:00	02:00:00	Qualifies Against Water Penetration Testing per ICC Acceptance Criteria 212, Section 4.5, Water Penetration Resistance Criteria
Tested at 137 Pa (2.86 psf)	No leakage	NA	Yes No visible water penetration at 15 minutes
Tested at 300 Pa (6.27 psf)	No leakage	NA	NA

The CavityComplete® Concrete Masonry Unit (CMU) Wall System excludes the masonry veneer and concrete masonry units. A detailed list of the components is available at www.CavityComplete.com.

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