



Air Leakage and Water Resistance

ASTM E2357 and ASTM E331

Scope Statement

During testing, the Owens Corning® Enclosure Solutions for CMU with Masonry Veneer were 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

Architectural Testing, Inc.
130 Derry Court
York, PA 17406

Testing Witnessed and Listed By

Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, IL 60062-2096
Listed as UL File No. **EWS0023**
See UL online certifications directory

Testing Date

March 2, 2015

Test Report No

- E4153.01-109-44

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 ft², 5.946 m²)

Opaque Wall

The opaque wall was constructed from 16" long by 8" wide by 8" thick concrete masonry units (CMU) with 1/2" mortar joints. Heckmann #1300 hook & ladder joint reinforcement and #1300 pintle wire ties were installed every two courses of CMU spaced vertically with eye wires spaced 16" on center horizontally. The CMU base wall was built inside a steel frame and secured to the frame using concrete anchors at each side, spaced 8" on center, into each course. Owens Corning® FOAMULAR® 250 XPS insulation, 2" thick, 4'x 8', straight edge, was preliminarily secured on one half of the test wall with Plastic Masonry Fasteners (PMF) from Rodenhouse, Inc, and, on the other half of the wall the FOAMULAR® XPS was secured with Grip-Deck Masonry Screws and Thermal-Grip® ci Prong Washers. Final attachment was made with Heckmann Building Products Pos-I-Tie® masonry anchors and Rodenhouse, Inc Thermal-Grip® Brick Tie Washers. The XPS insulation joints, perimeter edges and penetrations were sealed with Owens Corning® JointSealR® foam joint sealing tape.

Penetrated Wall

The penetrations included a 625 mm by 1225 mm rough opening with a 600 mm by 1200 mm wood frame window blank, a 100 mm by 100 mm HVAC duct, a 38 mm PVC pipe, and two junction box penetrations; one square and one octagon per ASTM E 2357. The penetrated wall was constructed the same as the Opaque Wall, including all joints sealed with Owens Corning® JointSealR® Foam Joint Sealing Tape. All penetrations were sealed with FlashSealR® Flashing Tape.



Photos: Penetrated wall during air leakage and water resistance testing

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	0.0005	0.0016	0.04 maximum	Yes
Penetrated Wall	0.0003	0.0002	0.04 maximum	Yes

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), 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 Owens Corning® Enclosure Solutions CMU Wall System with Masonry Veneer and FOAMULAR® 250 XPS air barrier system, 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 Owens Corning® Enclosure Solutions 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 Owens Corning® Enclosure Solutions CMU Wall System with FOAMULAR® 250 XPS Air Barrier Assembly passed the prescribed criteria.

ASTM E331, Water Exposure for Penetrated Wall

Table 3

(hr:min:sec)	00:15:00	01:00:00	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	No Leakage	NA



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The Owens Corning® Enclosure Solutions Concrete Masonry Unit (CMU) Wall System with FOAMULAR® 250 XPS air barrier assembly excludes the masonry veneer and concrete masonry units. A detailed list of the components is available at OwensCorning.com/enclosure.