

## Air Leakage and Water Resistance

### ASTM E2357 and ASTM E331

#### Scope Statement

During testing, the CavityComplete™ Wall System for Wood Stud 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

Tremco Commercial Sealants & Waterproofing,  
23150 Commerce Park Drive, Beachwood, OH 44122

#### Testing Witnessed and Independently Verified By

Architectural Testing, Inc.  
1140 Lincoln Avenue  
Springdale, PA 15144

#### Testing Date

January 20, 2015

#### Test Report No

- E4797.01-501-47

#### Test Methods

- ASTM E 2357-11, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- ASTM E331-00 (2009), 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 of 2" x 4", spruce/pine/fir studs, spaced 16" on center. The wall was sheathed with nominal 1/2" thick Norbond OSB sheathing, secured with #6 x 1-1/4" long bugle head screws, spaced 8" on center. The sheathing was applied with one 8 ft. long horizontal seam and two 4' long vertical seams. The seams and screw heads were sealed with Tremco Dymonic® 100. The wall was coated with a 70 mil wet thickness of Tremco ExoAir® 230 and allowed to dry to an approximate dry film thickness of 35 mil.

#### 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 a 24" x 48" rough opening with a 24" x 48" plywood window blank wrapped with ExoAir® 111, a 4" x 4" HVAC duct, a 1-1/2" PVC pipe, and two junction box penetrations; one square and one octagon per ASTM E 2357. All penetrations were sealed with Tremco® Dymonic® 100 sealant.

After the penetrated wall air barrier cured:

- Mortar Net Solutions™ TotalFlash® Flashing was applied to the base of the wall. The flashing system was secured with screws applied through the termination bar into each stud.
- Two layers of 2" Owens Corning® FOAMULAR® 250 Extruded Polystyrene (XPS) Rigid Foam Insulation (24" x 96") was installed horizontally with staggered joints. First and second layers were secured with Rodenhouse, Inc., Grip-Deck™ screws and Thermal-Grip® washers.
- After rigid insulation installation, Heckmann Building Products Pos-I-Tie® masonry veneer anchors with ThermalClip® and Rodenhouse, Inc., ThermalGrip® Brick-Tie washers, and pintle wire ties were installed on each stud and spaced 16" o.c. vertically.

## 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](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™ Wood Stud 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™ Wood Stud Wall System described had the air leakage ratings shown in Table 2 measured at 75 pa (1.57 psf).



Photos: Penetrated wall during air leakage and water resistance testing

### 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™ Wood Stud 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/ft<sup>2</sup>)

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	0.002*	0.002	0.04 maximum	Yes
Penetrated Wall	0.002	0.002	0.04 maximum	Yes

\* The air leakage reported for this assembly is 0.002 cfm/ft<sup>2</sup> (0.010 L/s•m<sup>2</sup>)

## 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	No leakage	NA

The CavityComplete™ Wood Stud Wall System excludes the masonry veneer, wood studs, interior gypsum board and exterior sheathing. A detailed list of the components is available at [www.CavityComplete.com](http://www.CavityComplete.com).