ELIMINATING THE POTENTIAL FOR AIR AND MOISTURE INFILTRATION IN STUCCO FACADES AT THE WINDOW-WALL INTERFACE

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adjoining components structurally sound as well.

Stucco facades, as with most stucco facades, are comprised of a 3/4 inch layer of a mortar base coat, a brown coat and a finish coat, all of which are applied with a metal lath or wire mesh reinforcement, covered by a layer of fiberglass netting. The purpose is to create a continuous bond between the plaster and the wall surface, while also relying on flashing metal at the base and sides of the wall. Fasteners are typically also required to anchor the mesh to the building frame.

TABLE 1. AIR INFIL

| Pressure | Test
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<tbody>
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CONCLUSION

The development of pre-engineered transition assemblies which were flexible, durable, could simply the detailing and that could provide clear proof of a secure bond was key to the design of the wall, and this was shown in the test results. Once cured, the assembly provides a clear bond to the wall in the transition area with silicone sealant.

The Grade D was placed as a single layer on top of the dry or wet wall system. A concrete was used as a horizontal reinforcing layer and was applied on top of the assembly to provide fire protection. The assembly was tested at 900 Pa (6.47 paf) and 35 mm gauge to check for leaks. Once cured, the assembly provided a clear bond to the wall in the transition area with silicone sealant.

The fluid-applied air barrier system in accordance with ASTM guidelines was used for self-sealing. The assembly was tested at 900 Pa (6.47 paf) and 35 mm gauge to check for leaks. Once cured, the assembly provided a clear bond to the wall in the transition area with silicone sealant.

This wall assembly was put to all of today's test standards and beyond. The results surpassed expectations, providing a solution that eliminates trial and error, uncertainty and offers a cost-effective, durable and reliable system. The assembly was tested at 900 Pa (6.47 paf) and 35 mm gauge to check for leaks. Once cured, the assembly provided a clear bond to the wall in the transition area with silicone sealant.

Peter Prather is the Technical Director of Tremco Building Envelope Solutions. Bill Hopper is the Research & Development Manager for Kaufman Company, Inc.
Outline

Review Past Industry Study
Define Type of Stucco Wall Construction
Define Wall Performance Standards
Define Component Performance Standards
Review Window-Wall Connection
Review Seismic Performance Requirements
Review Test Specimens Construction
Review Test Test Data
In 2008, the Western Construction Consultant Association known as WESTCON set out to test commercially available flashing systems to a standard storefront window in a stucco application.

Their results were presented at RCI’s October 26-27, 2009 Building Envelope Technology Symposium in San Diego, CA.

Study revealed that there is very limited guidance available for flashing aluminum storefront windows that lack attachment flanges. Of the six assemblies tested, two were considered successful, while the others leaked.
Stucco Wall Assembly

- Framing Members
- Sheathing Board
- 2-Layers Building Paper
- Metal Lath
- Finish Coat
- Brown Coat
- Scratch Coat

24” (609 mm) O.C. MAX
Perimeter Sealant Bead
Defined Wall Performance Standards

California Building Code, Section 1403 Performance Requirements

In accordance with ASTM E 331 under the following conditions:

2.1. Exterior wall envelope test assemblies shall include at least one opening, one control joint, one wall/eave interface and wall sill. All tested openings and penetrations shall be representative of the intended end-use configuration.

2.2. Exterior wall envelope test assemblies shall be at least 4’ X 8’ (1219 mm X 2438 mm) in size.

2.3. Exterior wall envelope assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (psf) (0.297 kN/m²).

2.4.1. Exterior wall envelope assemblies shall be subjected to a minimum test exposure duration of 2 hours.
Defined Wall Performance Standards

**ASHRAE 90.1-2010**, which establishes 0.2 L/s.m² at 75 Pa (0.04 cfm/ft² at 1.57 psf) as the maximum allowable assembly air leakage as tested in accordance to **ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies**.

This test method requires two 2400mm X 2400 mm (8’ x 8’) test bucks.
ASTM E 2357
Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

Specimen 1 – Opaque Wall

Specimen 2 – Continuity at Penetrations

2400mm x 2400mm (8’ x 8’)

2400mm x 2400mm (8’ x 8’)

Specimen 2 – Continuity at Penetrations

- Galvanized Duct (100 mm)
- Typical Gap (8.35 – 12.5 mm)
- 38 mm PVC Pipe
- Hexagonal & rectangular external junction boxes

Added 1” Drift Joint

Actual Window Unit 600 x 1200 mm
Specimen 1 – Opaque Wall

Specimen 2 – Continuity at Penetrations
Test Methods

ASTM E 283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specific Pressure Difference Across the Specimen

ASTM E 331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference Modified AAMA 501.4 (Recommended static test method for evaluating curtainwall and storefront systems subjected to seismic and wind induced interstory drifts)

ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
Defined Component Performance Standards

Stain / Adhesion Testing:

Conditioned at 100°F and 100%RH.

Evaluated for adhesion and compatibility every month for three months.
All samples reported no change in adhesion and no staining (color change) to silicone sealant or silicone extrusion.
Exterior Gypsum Board
Fluid-applied synthetic vapor-permeable air barrier
Applied @ 70 wet mils and allowed to cure 4 days @ 75°F and 50%RH with final thickness of 35 mils
Grade D 60-Minute Building Paper
Grade D 60-Minute Building Paper
½” Layer of Pre-mix Concrete allowed to cure 7 days @ 75°F and 50% RH.

Cured coating exhibited a very small amount of adhesion to building paper. Building paper will create proper drainage plane between plaster and air barrier coating.
Defined Wall Performance Standards

ASTM D 1970-09 *Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; Section 8.9 Self Sealability (Head of Water Test).*

Gallon paint can with bottom removed
Defined Wall Performance Standards

ASTM D 1970-09 *Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; Section 8.9 Self Sealability (Head of Water Test).*

Paint can sealed to air barrier coating
Defined Wall Performance Standards

**ASTM D 1970-09 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; Section 8.9 Self Sealability (Head of Water Test).**

- Gallon paint can with deionized water for 3 days in refrigeration unit @ 40°F (4°C)
- No leakage observed

5” (127mm)
The Window-Wall Connection

SHIM INSTALLATION
Install support shims at head, sill and jamb. Place between pocket filler and perimeter condition at perimeter anchor locations.

FLAT HEAD PERIMETER FASTENER (NOT BY KATNEER)

3" LONG SHIM FILLER OR POCKET FILLER

CLEAR HOLE IN FLAT FILLER LINES UP WITH COUNTERSUNK HOLE IN POCKET OF PERIMETER MEMBER.

STANDARD HORSESHOE SHIM AS REQUIRED (NOT BY KAWNEER)
Seismic Performance Requirements

West Coast and many US states must address seismic movement
AAMA 501.4 *(Recommended static test method for evaluating curtain wall and storefront systems subjected to seismic and wind induced interstory drifts)*, the serviceability of the joint within the stucco assembly was evaluated. The upper section was racked laterally 19.0mm (¾") three times in both directions.
Wall Specimen Construction
Specimen 1 – Opaque Wall
Detailing joints and penetrations with sealant
Detailing perimeter joints with reinforcing fabric
Fluid-applied synthetic vapor-permeable air barrier coating
Specimen 2– Continuity at Penetrations
1" drift joint to move $\frac{3}{4}"$ horizontally
Ribbed Silicone Sheet Location
Detailing penetrations with sealant
Open-Weave Glass-Reinforcing Fabric
Open-Weave Glass-Reinforcing Fabric
Center Option Storefront System
Glazing Pocket
Head Condition
Sill Pan
Dry Fit Molded Corners
3D Molded Corner

Dimensions:
- Height: 2.800"
- Width: 12.300"
- Depth: 5.110"
- Depth Below: 1.500"
Molded Corners Trimmed
Dry Fit Components Around Window Frame
Edge Pressure Test - Averaged 4 pli (Pounds Per Lineal Inch)