

# LESSONS LEARNED:

FACILITIES ENGINEERING

## OBSERVATIONS AND LESSONS FROM THE SCHOOL OF EXPERIENCE

### WATER PENETRATION TESTING

Building envelope water testing is a means of determining the resistance to water penetration of building envelope components. These components include exterior walls, windows, doors, roofs, plaza decks, and other building envelope components which separate the exterior environment from the interior spaces. When are water penetration tests performed? Oftentimes, testing is not performed until after the interior spaces have been damaged from water entering during building operation; at which point, water testing is performed to assist in determining the location and cause of the water penetration.

In an effort to prevent the occurrence of such damage, building owners, property managers, design architects, and construction management companies have found value in performing water penetration testing at the time of construction. The testing provides ownership and management the quality assurance during building envelope construction and provides architects and contractors the opportunity to correct any deficiencies before the cost of correction escalates, and damage occurs to tenant finishes.

The primary standards for water penetration surveys and test procedures are provided by the American Society of Testing and Materials (ASTM) and the American Architectural Manufacturers Association (AAMA). These standards provide guidelines that apply to many project specific constraints and needs including the following:

#### Construction Phase:

- Mock-up (laboratory or field) prior to installation
- Installed assembly

#### Test Specimen:

- Individual component type (i.e. windows, doors)
- Transitions within components (i.e. masonry wall limestone panel to clay brick)
- Transitions between components (i.e. curtain wall and precast concrete wall panel)
- Transitions between assemblies (i.e. roof to vertical wall)
- Quality assurance/forensic spot-check

Typical water penetration testing includes the application of water spray in the direction of the exterior face and a pressure differential across the wall (i.e. suction at the interior face). Variations in testing may include the addition of a large fan blowing towards the exterior face to simulate a driving rain condition, varying of the pressure differential (suction off and on) to simulate a cyclical rain condition, or a customized test to meet the specific needs of the project.

The following suggestions are offered from our "Lessons Learned" experience to help you avoid costly delays and preventable water penetration into your next building project.

- Choose a quality assurance testing consultant that is familiar with water penetration testing of the building components and materials used on your project. Choose a consultant that is experienced in determining the origin and cause of the water leakage, and who is able to provide effective recommendations for correction or repair.
- Introduce water penetration testing early into the design and construction processes. Early detection of leaking assemblies can prevent costly damage and delays.
- Test the wall assembly not just the individual components. Most water penetrations occur at the field-installed joints between components and assemblies.
- Test installed assemblies prior to the installation of fireproofing, installation, and interior finishes. Not only will it help to determine the presence and location of a water leak but it will also help avoid damage to the interior spaces.

We hope these "Lessons Learned" will be helpful to you in your next new construction, renovation, or repair project.

Respectfully,

**ECS Corporate Services, LLC**

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