

Field Testing for Curtain Wall Leaks—Case Study

5750 Explorer Drive Office Building

Overview

5750 Explorer Drive is a five storey (plus mechanical penthouse) office building in Etobicoke, ON, just south of Pearson Airport. The building is clad almost entirely in glass and metal curtain wall, with a combination of conventionally capped pressure plates and structural silicone glazing. Soon after handover in 2007, the owner noticed water coming into the building under some wind and rain conditions. EllisDon and the glazing subcontractor used several methods to identify the source of these leaks.

Investigation

A thermal scan (infrared photography) of the building revealed several ‘hot spots’, or thermal expressions, visible from the exterior. (IR scans are performed on a cold day with the air handling systems under positive pressure.) Hot spots on an IR scan are often indicative of warm interior air

To help identify the source of the water leaks and confirm the IR expressions, a section of the curtainwall known to be leaky was surrounded on the interior with an airtight stud wall chamber. A smoke generator was placed in the chamber, which was then pressurized with a blower door. At some locations, smoke came through the curtain wall



Trapped water escaping when a blocked weep is opened.

system and was visible on the exterior side under a relatively low 30 Pa of applied pressure. Further investigation was deemed necessary where smoke was observed to penetrate the system. Several panels were deglazed— in other words, the caps, pressure plates and seals were systematically removed and inspected before removing the entire panel. Water was found to be collecting between the weather seal and air seal in the vertical channels, and some drainage paths were blocked. Here, as in many such cases, deglazing is essential in order to hunt for defects in the air seal, which is usually hidden deep inside the system.

General notes

Curtainwall systems on small jobs frequently do not have the benefit of job-specific lab testing, as is typically done on larger projects. Without a



Sealed test chamber on inside of curtain wall.

escaping through the building envelope; thus, they can help to identify any breaches in the air seal.

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job-specific lab test to identify design, material or installation flaws, reliance is placed on the stock system and its installer to ensure an airtight, watertight building envelope. If a completed system does leak, a number of tests are available (in varying degrees of accuracy and complexity) to help isolate the specific element responsible for the leak. It is important to identify and fix curtainwall leaks, as repeated moisture infiltration can damage interior finishes and promote mould growth. Leaks also cost the owner money: where water can get in, climate-controlled indoor air can escape, taking heating or air conditioning dollars with it.

Most water or smoke testing methods are somewhat disruptive to the tenant once the building is operational, and repairs can take weeks or months. It is generally cheaper, faster, and less disruptive to perform testing on a mockup or field sample early in the job, correcting any problems before the system is fully installed, than to investigate and remediate leaks once the owner or tenant is actively using the space.

Further Reading

For detailed information on laboratory and field testing of curtain walls, windows and doors, refer to the AAMA 501.x family of standards.