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Vector mapping/electronic leak detection pinpoints roof membrane breaches

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Sooner or later, building owners and property managers will end up asking a very old question: "Can you show me where my roof is leaking?" Until recently, the only honest reply a contractor could give was, "I can try."

But now there's a technological revolution that's delivering a faster, safer, more accurate and less expensive way to find leaks in low-slope roofs and waterproofing membranes. It goes by different names, including vector mapping (VM) and 'electronic leak detection (ELD), but it all stems from the same basic breakthrough - using electrical current to precisely locate membrane breaches.

Today ELD is being adopted around the world. Manufacturers, specifiers, and contractors are turning to trained and experienced ELD technicians for membrane integrity testing and forensic leak detection.

Traditionally, flood testing has been used to try to find leaks, but it can be time-consuming and expensive. To avoid potentially catastrophic damage, the load carrying capacity of the building and the weight of the required water must be clearly understood. When leaks are present, flood testing can cause significant water damage within the building. Unlike electronic leak detection, which pinpoints leaks directly so they can be immediately repaired and retested, flood testing is indirect - actually locating the leaks requires hit-or-miss visual inspection and one or more additional flood tests.

Where and How It Works

ELD can be conducted on roofing or waterproofing systems in which the membrane is electrically non-conductive and the structural deck is grounded and made of electrically conductive material, such as metal or concrete. Almost all membrane types can be tested, with the notable exception of black EPDM, which is electrically conductive.

An ELD device works by creating an electrical field on the membrane surface and a second electrical field in the grounded deck of the system. No electrical hazard is involved because the device generates only a very small amount of electrical current.

When the electric field at the membrane surface encounters a breach, electricity travels from the surface to the ground below. This completes an electrical circuit, triggering the testing device to alert the technician that a breach has been detected. The technician then uses the test equipment to pinpoint the location of the breach.

Low or High Voltage Testing?

There are two types of ELD equipment, low voltage and high voltage. They are sometimes referred to as "Low Voltage Electrical Conductance Testing" and "High Voltage Spark Testing". Both types

use a mobile battery-driven electrical generator to create the necessary electrical charge. Each has its particular advantages and limitations. Selecting the most appropriate device for the job at hand will minimize cost and enable the technician to obtain the most thorough and accurate testing results.

In low voltage leak testing, a "trace wire" is placed around the perimeter of the test area and the roof or waterproofing membrane must be kept wet (not flooded). Usually a second person must be present to spray water on the roofing or waterproofing membrane.

High voltage testing is conducted on a dry surface and does not require a trace wire, so it can be conducted by a single technician and typically takes less time to complete. High voltage ELD is ideal for testing vertical surfaces such as foundation and parapet walls because there's no need to maintain a moist surface. However, care must be taken to ensure that all test surfaces are completely dry.

The electrically charged brush used in high voltage ELD must directly contact the membrane being tested, so the high voltage technique is not suitable for testing systems with overburden, such as green roof vegetation, pavers, ballast, etc. However, if the overburden can be sufficiently wetted and a trace wire can be laid at the perimeter, low voltage testing can usually deliver sound test results.

Bright Future

Electronic leak detection is a major step forward in the age-old battle against roof leaks and water intrusion. It's already saving savvy building owners and managers significant amounts of time and money. And it's improving contractors' ability to verify their work and satisfy customers. With its obvious advantages, ELD looks to become the standard method for pinpointing leaks and water intrusion issues in the years ahead.

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