Technical Bulletin

SUBJECT

RILEM Tube Evaluations

PURPOSE

1. To provide a summary of how to utilize the RILEM tube for field water-repellency evaluations.

2. To provide guidelines for interpreting the data generated from using the RILEM tube.

3. To provide a correlation between the water level in the tube in milliliters and a velocity of wind-driven rain.

REFERENCE

RILEM Test No. II.4, water absorption under low pressure (pipe method)

DISCUSSION

RILEM is an acronym for Reunion Internationale des Laboratoires d'Essals et de Recherches sur les Materiaux et des Constructions (International Union of Testing and Research Laboratories for Materials and Structures) located in Paris, France. Their function and purpose are similar to the American organization ASTM (American Society for Testing and Materials) in that technical committees are formed to develop standard testing methods, RILEM works specifically with measuring properties, performance and durability of various building fabrics.

One technical committee, Commission 25-PEM developed a method to assess deterioration of natural building stone utilizing what has become known as a RILEM tube (Figure 1). These tubes are now commonly used to evaluate water absorption rates on many types of new, existing, man-made and naturally occurring building materials. This evaluation may be used to determine a substrate's need for a water-repellent, it may be used to compare the water absorption of treated vs. untreated substrates or it may be used to compare the performance of different treatments.




The tube is temporarily affixed to the substrate with a water impermeable putty, such as Bostik's BluTack®. The tube is then slowly filled with water to the appropriate level (the tube is graduated in milliliters), taking care to avoid trapping air bubbles. Most substrates are evaluated with the tube filled to the "0.0 mL" graduation, which is the top-

most graduation. Experience with many concrete masonry units (CMU) indicates that this poses conditions that are too severe for many CMU, even following treatment with a water-repellent. Because of this, for CMU only, it is recommended that the tube be filled to the “2.5 mL” graduation when evaluating water-repellent treatments. If a performance differentiation is not observed when the tube is filled to this level, e.g. when an elastomeric is evaluated on CMU, the tube may be filled to the “0.0 mL’ graduation.

Typically the volume of water absorbed is recorded after 20-minutes of contact, however, longer time frames may be used. If a 20-minute dwell is not providing data which allows for differentiation between areas (treated vs. Untreated, one treatment vs. another), the tube can be left on the substrate for time periods longer than 20 minutes. If this technique is utilized record the time at which performance differentiation could be determined.

In general, acceptable performance is achieved if the level of water drops no more than 20% of the original height during the 20-minute test period. For example, if a clay brick wall is evaluated, the tube would be filled to the “0.0 mL” graduation at the beginning of the test. After 20 minutes, the water level should be no lower than the “1.0 mL” graduation. If CMU is evaluated, the original water level would be “2.5 mL” and the final height should be no lower than “3.0 mL”

The height of the column of water, as measured from the center of the bowl to the meniscus in the tube, determines the hydrostatic pressure applied to the test area. This pressure can subsequently be converted into a velocity, or wind-driven rain speed. As an example, if the tube is filled to the “0.0 mL” graduation, this exerts a pressure of 1139.36 Pa, which correlates to a 98.1-mph wind-driven rain. Filling the tube to the “2.5 mL” graduation correlates to a 78.2-mph wind-driven rain. The attached chart illustrates the range of pressures/velocities and water levels.