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## NEGATIVE-SIDE AND TOP-SIDE MOISTURE FAILURE MODES TECHNICAL BULLETIN

In instances of resilient flooring failure, it is critically important to understand the source of a moisture-related failure. With the exception of fundamental product failures in the form of poor-quality flooring materials, cementitious materials, adhesives, and improper installations, the most common resilient flooring moisture failure modes are either **negative-side** (from within the concrete substrate) or **top-side** (external from the top of the flooring down through the flooring system) moisture. It is important to note that the two most prevalent types of negative-side moisture control systems are Day of Pour (DoP) spray-apply (Creteseal CS2000) or admixture (Creteshield UltraMix) products and two-component resin-based (Creteseal MAX) products. All of these Creteseal and Creteshield products are highly-effective in preventing negative-side moisture intrusion. However, moisture vapor emission control (MVEC) products cannot reliably prevent top-side moisture damage to resilient flooring that results from excessive rain, flooding, or water and cleaning products employed in the maintenance of the flooring system during tenant and owner occupancy.

### Negative-Side Moisture Control Systems

Beyond a significant difference in cost—DoP is considerably less expensive than resin-based systems—the principal distinction in DoP products and two-component resin-based products is how they work to control negative-side moisture. DoP (Creteseal CS2000 and Creteshield UltraMix) products limit the amount of moisture vapor that migrates, and ultimately emits, from the slab. DoP products limit the rate at which that moisture vapor can escape to levels that will prevent premature damage to the flooring system. The chemical composition of CS2000 works at a molecular-level to fundamentally reduce concrete porosity and substantially reduce the ability for water vapor to migrate through the internal capillary structure of fully-hydrated and cured concrete. DoP products installed in accordance with manufacturer specifications are very effective at preventing moisture vapor intrusion at levels which might lead to premature resilient flooring failures. Over the lifespan of the product, Creteseal CS2000 has been tested and refined to provide industry-leading negative-side moisture vapor emission control performance.

Whereas DoP moisture control systems limit the levels of moisture vapor emissions, resin-based systems eliminate moisture vapor emissions by encapsulating the entire slab with the two-component resin-based system. As a result, the only occasions when a resin-based system will permit negative-side moisture intrusion is in instances when the system is breached. Breaching of the system may occur based on slab shifting, settling, cracking, or as a function of mechanical breaches such as trenching, cutting and drilling. Unless one or more of these conditions exist, it would be an incredibly rare occasion for an ASTM F3010 resin-based system to fail in protecting against negative-side moisture intrusion. OBEX offers an environmentally-friendly zero VOC two-component resin-based system that meets ASTM F3010 specifications for Two-Component Resin-Based Moisture Mitigation Systems.

### Preventing Top-side Moisture

Advances in cementitious topcoat formulations, incorporating polymers and other proprietary materials, may further reduce the risks of top-side moisture-related flooring system failure. Many interior cementitious topcoat products are highly-susceptible to top-side moisture intrusion. In these instances, cementitious materials exposed to top-side moisture will tend to breakdown and produce efflorescence and alkalinity resulting in damage to adhesives and/or resilient flooring. There are moisture resistant, exterior grade, cementitious topcoat products (i.e. ARX Poly) available presently that are formulated to help reduce the impact top-side moisture intrusion may have on resilient flooring systems.

Repeated and excessive exposure of resilient flooring to top-side moisture will result in premature failure of the flooring. As a result, it is very important that contractors and building owners/tenants take specific care in preventing excessive top-side moisture exposure to resilient flooring. It is critically important that contractors manage projects



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in a manner that will prevent any instances of top-side moisture intrusion for projects following the moisture control system and flooring system installations. Further, it is equally important that contractors and owners/tenants follow manufacturer specifications with respect to the cleaning and maintenance of installed flooring systems. There are conditions that support the undeniable, and warranted, negative-side moisture control efficacy of the Creteseal CS2000 and MAX products. However, neither of these products (or any others in the market place presently) will provide 100% protection against top-side moisture intrusion resulting in the premature failure of resilient flooring. The most common instances of top-side moisture intrusion are rain, flooding or poor flooring maintenance practices (floor waxing, floor cleaning, and the related amounts of liquid cleaning products applied to resilient flooring). One of the most frequent resilient flooring failure modes is related to failure to properly clean and maintenance the flooring in accordance with manufacturer requirements and the results of those failures are easy to characterize. Failure to maintain an appropriate floor wax regimen can contribute to premature resilient flooring failure on an accelerated timeline.

### **Selecting the Right Moisture Control System**

For fresh concrete, both DoP and resin-based solutions are applicable for negative-side moisture control. In retrofit/existing slab contexts, only resin-based solutions are an acceptable system for preventing negative-side moisture control. As noted, the principal difference in DoP systems as compared to resin-based systems, other than cost, is the fact that DoP systems effectively mitigate moisture vapor emissions to acceptable levels that will prevent premature flooring failures, whereas resin-based systems completely prevent moisture vapor emissions. Creteseal CS2000 and MAX have proven their effectiveness in application over millions of square feet of freshly poured and retrofit concrete scenarios. The efficacy of CS2000 and MAX are clearly demonstrated by OBEX's confidence in providing an industry-leading 15-year warranty against premature flooring failure resulting from negative-side moisture intrusion. Both Creteseal CS2000 and MAX are formulated to provide integral, complimentary properties to the concrete slabs on which they are applied.