



Hi-Performance Seamless Flooring Solutions
(904) 693-8800 Office · (904) 693-8700 Fax · www.plexi-chemie.com

Moisture Vapor Transmission and Moisture Mitigation

When it comes to moisture content within concrete substrates, it's all about water and pressure. Water is the lifeblood of concrete—without enough water in a concrete pour, the substrate is weak and will crumble. However, if a concrete slab contains too much water, pressure will force the moisture to the surface, creating a substrate condition that is not conducive to the proper adhesion of the epoxy floor resin that is to be applied. (Epoxy floor coatings that are applied to substrates with too much moisture are subject to delamination and ultimately to complete coating system failure). The moisture content of the concrete should not exceed 8% for satisfactory performance. Percentage refers to the weight of the water inside the slab in relationship to the overall weight of the slab. Pounds is a measurement of dynamic volume whereas percentage is a measurement of static content. When too much moisture exists within the substrate, a moisture mitigation system such as PlexiFloor EpoCrete must be installed.



Moisture in Concrete Slab

What's In a Name?

Although many people use the terms concrete and cement interchangeably, one is actually part of the other. Cement is the powder that is mixed with water, sand and aggregate to create concrete. When cement is added to these other ingredients, a chemical reaction takes place that binds them together and forms a concrete substrate. Depending on the thickness of the concrete pour and environmental factors such as ambient temperature and the humidity of the air, concrete typically takes 30 days to cure prior to application of any polymer topping. Even after this time, a cured concrete substrate can still contain almost two-thirds of the moisture from the original mixture. This amount of water is too much for a coating system to adhere properly to the surface. Over time, the concrete continues to dry through moisture vapor transmission. The pressure within the porous substrate draws moisture up through capillary action to the surface of the slab, where it evaporates into the atmosphere. The only way to determine if concrete is dry enough to receive a coating system or if moisture mitigation is necessary is by conducting moisture testing.



Taking the Test

A relatively simple qualitative test for moisture content of concrete ASTM D4263, consists of placing a roughly 2 feet X 2 feet sheet of plastic such as polyethylene or PVC over the surface to be tested, secure the edges and leave for 24 hours. This *Standard Test Method for Indicating Moisture in Concrete* is also referred to as the Plastic Sheet Method. If an objectionable (undesirable) level of moisture is present, condensed moisture will be visible. However at temperatures below 40° F, the passage of moisture will be too slow to be obvious. This test is most effective when the slab temperature is at least 40° F. This qualitative method will indicate the presence of moisture, but it will not quantify the amount of moisture movement and is only useful in determining that additional testing is required.



Plastic Sheet Method



Hi-Performance Seamless Flooring Solutions
(904) 693-8800 Office · (904) 693-8700 Fax · www.plexi-chemie.com



Calcium Chloride Test

When the Plastic Sheet Method indicates the presence of moisture movement a quantitative evaluation is warranted. To minimize the risk of delamination due to the effects of moisture vapor transmission a calcium chloride test should be conducted on the concrete surface(s). The most common method to measure moisture vapor emission is the *ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor* using a Calcium Chloride test. This test is typically administered every 1,000 square feet, and consists of sealing a small dish of calcium chloride under a plastic dome on a clean section of abraded concrete. The salt absorbs the moisture under the dome over the course of 72 hours.

At that time, the weight gain is calculated and used to determine the MVER. This method is described in ASTM F1869. As a manufacturer Plexi-Chemie's recommendations are: if the CCT test results exceed 6 pounds per 1,000 square feet per 72 hours please consult the Plexi-Chemie technical department for the proper Plexi-Chemie Moisture Mitigation products.

Another form of testing is the relative humidity method, where in situ probes are inserted into holes drilled into the substrate. This method is described in ASTM F2170 and measures the moisture content within the substrate, rather than just at the surface.



Relative Humidity Test

Other Considerations

Although it may seem as if moisture issues only occur within newly poured concrete, older concrete slabs can also require moisture mitigation. If the concrete was not allowed to cure properly when it was originally poured, too much water was in the mix or the vapor retardant that was placed underneath the concrete was faulty, a major moisture problem could be hidden within the concrete's porous composition. For this reason, moisture tests should always be performed prior to the application of any coating system, regardless of age. Determining whether the concrete is sound enough for a specific polymer flooring installation or whether too much water will cause a failure, even when adequate preparations have been done, is best accomplished with experience in making such decisions; **there is no substitute.**

The Moisture Solution

If the calcium chloride test at a jobsite comes back with moisture levels that are too high for the application of an epoxy floor coating, it is time to mechanically prepare the concrete substrate and apply EpoCrete. EpoCrete is a three-component, water-based, solvent-free, moisture tolerant epoxy and high performance cementitious self-leveling slurry mortar. The EpoCrete specially formulated chemistry takes the standard A and B components (epoxy and emulsion hardener) and mixes them with a C component that is a cement copolymer. This cement copolymer cross-links with the water in the concrete substrate and creates a bond that is greater than the pressure trying to move the moisture upward. In other words, the EpoCrete blocks the water from coming to the surface and orients it laterally throughout the substrate. In this way, the EpoCrete creates a vapor barrier and readies the substrate for the application of Plexi-Chemie epoxy floor coatings. For additional information please visit our website at www.plexi-chemie.com or email us at office@plexi-chemie.com.

