PERFORMANCE FLOORING SOLUTIONS
DUR-A-FLEX® Inc.
EPOXIES • MMA • URETHANES
COLORED QUARTZ AGGREGATES

FLOOR EVALUATION GUIDELINE

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Flooring problems on concrete from vapor emission, dew point, alkalinity; pH, etc. cause millions of dollars in repair and replacement costs annually. By recognizing potential problems, testing for and mitigating them, steps can be taken to ensure a long lasting, successful flooring installation.

What is the traditional failure mode because of "moisture" problems?
There are two ways a polymeric floor can fail: (1) the floor system was never able to bond properly at the time of installation or (2) there were factors present at the time of installation to cause the bond to fail. Symptoms of failure on an already installed floor may include bubbles, blisters and/or delamination.

What causes a polymeric floor to fail?
Traditional theory has focused primarily on moisture failure such as capillary and hydrostatic, however more recent research has found that although moisture plays a role, it is not the only factor. In reality, the presence of ionic compounds in the concrete plays an even more significant role. For this reason we strongly recommend that you **do not rely on moisture testing alone to avoid floor failure!**

Through the chemical analysis of several thousand concrete cores we have developed a patent-pending process that can actually predict future moisture blister generation on concrete.

During the evaluation of these cores, we learned some slabs with moisture vapor emission rates of 25 lbs./1000 s.f./24 hours by calcium chloride as well as 95+% RH did not blister. Conversely, we saw slabs with much lower emission rates blister severely. We also understand that many slab owners are paying to install "moisture mitigation systems" to insure the flooring installed on top won't blister; yet in some cases, **blisters still occur!**

We also learned that specific ionic components of the surface chemistry of the slab (top 0-3/16"(5mm)), when present at certain levels, would predict moisture blisters **100% of the time.** Without this combination of compounds, regardless of the moisture levels, blisters wouldn't occur.

What is the main factor that will cause a failure?
Osmosis is one of the main factors that can cause floor failure. Osmosis occurs when actual moisture vapor emission through the concrete slab is seeking to equalize the soluble ions at the surface of the concrete slab. This creates a pressure that can be greater than the adhesion strength of the coating. Four conditions are needed for osmosis to occur: (1) a semi-permeable membrane, which can be the polymer primer or the upper layers of the slab, (2) a gradient of ionic activity (soluble salts), (3) a source of moisture vapor and (4) An impermeable prime, base and/or topcoat. If any one of these is removed, osmotic blistering cannot occur. And we aren't talking all theory here. We can make blisters happen on command!

What is Moisture Vapor Emission?
Water is added to turn cement, sand and aggregate into a concrete slab. There is a critical volume of water needed to "hydrate" the concrete, and an excess volume of water used to make the concrete pour-able and workable. Moisture Vapor Emission is movement of moisture that is not part of the concrete mix. It could be from ground water, plumbing, or landscaping runoff, etc. This moisture is a concern when the concrete slab has no vapor retarder installed, or the vapor retarder has been punctured.

How were moisture failures predicted?
Up until recently, there were three methods recommended to pre-test for moisture related floor failures; the plastic sheet method, Calcium Chloride using ASTM F1869, and Relative Humidity using ASTM F2170.

How will moisture failures be predicted by Dur-a-Flex?
Dur-A-Flex has developed a flow chart to assist you in determining what floor system will work best based on the test results of core samples and, where appropriate, relative humidity testing. (See flow chart on following page) If you are planning to use our Epoxy or MMA, use in-situ Relative Humidity Testing per ASTM F-2170-02 as a quantitative test method.

Unlike traditional calcium chloride testing, RH as well as core test results are not significantly impacted by ambient temperature and relative humidity conditions in the building.

What determines my flooring options?
Depending on the level of ionic compounds in your core samples, your floor will fall into one of four levels. Your test report will specify this level allowing you to select the best floor option as shown on the flow chart.

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Floor Evaluation Flow Chart