Understanding Vapor Transmission Issues When Covering Concrete with Rubber Flooring

It would seem that installing a rubber floor on a concrete slab should be a simple task with minimal problems. This is often so, but things change when the concrete is on damp ground, below the water table, or in direct contact with moisture.

THE PROBLEM

Concrete is not the hard, dense, impermeable mass we tend to imagine it to be. It's a mineral/salt rich, porous material full of tiny channels and voids. These pathways are just right for the migration of fluids and vapors. Migration is due to simple physics - forces working to achieve temperature, humidity, concentration, or pressure (hydrostatic) equilibrium.

But there is more to it than simple equilibrium induced fluid migration. Dissolved metal salts in the migrating water can form relatively large calcium/potassium silicates (in a typical alkali-silica reaction) upon reaching the concrete surface. This ‘swelling' can result in pressure build-ups of well over 1000 pounds. That's a lot of pressure for any rubber flooring bond to resist.

Added to this situation is one more wrinkle. Nearly all adhesives used for bonding rubber flooring lose bond strength, or simply will not adhere at all, when applied to a damp, wet, or saturated surface. How dry is your concrete surface? Chances are it contains more moisture than we would recommend for optimum adhesion.

VAPOR BARRIERS

The pre-construction solution is to use a vapor barrier under the concrete. This vapor barrier is nothing more than a heavy plastic sheet. Unfortunately contractors or owners often discover that no vapor barrier was used or that the vapor barrier has probably been torn or damaged, possibly when the concrete was poured. Older buildings often do not have a vapor barrier.

Do You Have A Vapor Barrier? Sometimes it's easy to tell if you're lacking a much needed vapor barrier. There could be water (smelly water) under the rubber floor sitting directly on the concrete. If the rubber floor is sealed, there might be water/vapor filled bubbles underneath. If the concrete is not covered, it could be covered with tiny crystals, the result of mineral salts being left behind by the migrating moisture.

One way to test the exposed concrete for moisture migration is to tape a sheet of plastic (several square feet in area) to the floor and see if water condenses under the plastic. A lack of condensed water doesn't rule out a possible problem. Moisture migration might occur only after rainstorms, spring thaws, or other occasional events.

TREATING A VAPOR BARRIERLESS FLOOR

How do you fix a floor with a vapor transmission problem? There are lots of partial solutions, but no ‘sure thing' short of pouring new concrete over a new vapor barrier.

A ‘Breathable' system is one common solution. This lets the moisture pass through. Depending upon your requirements, especially if you're just looking for an attractive surface, this may be all you need. Rephouse has a growing number of porous rubber floor coverings to choose from.

Next are special sealers that soak into the concrete and form crystals within the voids and channels inside the surface of the concrete. This reduces permeability and porosity of the concrete, generally restricting the flow of fluids, but not vapors, through the matrix. If the concrete is exposed, this treatment is easy and quick and just might ‘densify' the concrete enough to solve, or greatly reduce, the problem. A product like this might also assist in the bonding of adhesive which would normally fail, by lessening the amount of mineral salts, etc. the can migrate to the concrete - adhesive interface.

Finally, there are rollable epoxies and floor epoxies that can bond to wet or damp surfaces so well that they can resist the pressures (over 1000 pounds) that can build up on the surface of the concrete at the coating interface. This approach offers a simple, roll on, impermeable barrier on the inside surface of the concrete. By sealing the concrete surface, moisture, concentration, and pressure equilibriums would be reached inside the concrete which would stop the flow or movement of moisture, although not its presence.

Bond adhesion, however, is influenced by more than just moisture levels. A good, strong bond requires careful surface preparation. The surface must be clean, dust free, solid (not chalking or deteriorating), and have a good profile (microscopic peaks and valleys) to permit maximum surface contact. The presence of pre-existing coatings, sealers or grease/oil spills could preclude a good bond also.

CONCLUSION

Moisture and salts can and do migrate through concrete slabs as they seek equilibrium with the environment above the concrete. The resulting pressures and condensing water vapor can ruin rubber flooring and almost anything placed over the concrete. After-the-fact solutions include using a breathable rubber flooring system, reducing the porosity and permeability of the concrete and/or using special epoxies that can bond sufficiently well to moisture rich concrete so as to successfully resist the forces that can develop.

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