

Protec III Chem-RX

The Original Chemical Cure

The Process of Curing Concrete

Quote

Portland Cement Association

"The need for adequate curing of concrete cannot be overemphasized. Curing has a strong influence on the properties of hardened concrete such as durability, strength, water-tightness, abrasion resistance, volume stability, and resistance to freezing and thawing and deicer salts. Exposed slab surfaces are especially sensitive to curing as the top surface strength development and free-thaw resistance can be reduced significantly when curing is defective."

Cured Concrete is typically consisting of the following:

Strong Bonds - 50% tri calcium silicates (Alite)

Strong Bond - 10% di calcium silicates (Belite)

Strong Bonds - 15% calcium alumina silicates and ferrites (aluminate and

Ferrite) Weak Bonds - 25% calcium hydroxide (lime)

There are 3 practical ways to cure concrete. We will look at each one, from very expensive to very inexpensive processes and disclose their advantages and disadvantages of each.

Water Cure - Requires the forming and ability to hold water over the entire surface of the poured concrete. The use of burlap or tarps to cover the entire area is required to help keep the water from evaporating too quickly. Addition of water to the concrete surface is required periodically. This is all done in order to hold moisture in the concrete to help the hydration process.

Advantages - Allows concrete to hydrate over a long period of time. In a 100% humid environment.

Disadvantages - Extremely labor intensive and expensive. Shuts down the work site during this process. Water Cure is a process that takes about 7 days to complete, making projects take longer to complete, and costing more money. Clean-up is very labor intensive and expensive, and you will still need to treat the concrete afterward to dustproof and to protect it from freeze thaw damage because the concrete still has the 25% weak bonds in the concrete surface.

Acrylic Cure and Seals, Hydrocarbon Resin Cures - This is the process to hold moisture in the concrete in order to complete the hydration process. Two coat are required.

Advantages - Very inexpensive compared to water curing, both in labor and materials. This process allows the concrete to hydrate properly when 2 coats are applied.

Disadvantages - In places where flooring is to be applied, the membrane cure must be removed, and that removal of the membrane cure is very expensive.

In areas where poor aggregate is present, even in interior applications, where there is no exposure to freeze thaw cycles, acrylic cure and seals tend to cause the concrete to pop. In areas where poor aggregate is present, these acrylics and hydrocarbon cures speed up the popping and shaling of the concrete surface where freeze thaw conditions are present. Membrane forming cures do not breathe which traps too much moisture over a long period of time, the poor aggregates absorb this moisture and expands, causing surface popping.

There are a number of other points to consider when using these products:

1. Most membrane forming cures contain VOC's and some are extremely flammable and can be dangerous to work with.
2. Once the membrane has wore off, you still need to apply a chemical hardener to protect concrete from freeze thaw problems.

Acrylic cure and seals and hydrocarbon cures usually take a season to start to break down, in order to allow the concrete to breathe.

NOTE: Resin Cures in Canada, before the VOC laws changed, were effective in protecting the concrete surface because they broke down in 30 days, which allowed the concrete to breathe. That has all changed. The problem being, the Resin Cures are not failing like the solvent based ones did. They are tenacious in their adhesion and tend to not break down for at least 12 months.

Chemical Curing

Chemical curing transforms the poor bonds in the concrete, called calcium hydroxide, approximately 25% (the results of hydration) and converts them into strong bonds in the matrix of the concrete called CSH (calcium silicate hydrate). This process can take place as soon as the bleed water has evaporated from the finished concrete surface. This chemical reaction also blocks moisture from escaping the concrete, allowing the concrete to hydrate properly.

Advantages - Easily the least expensive option. Not only blocks moisture to hydrate the concrete, but also adds the additional hydration processes in the surface of the concrete which converts weak bonds into strong ones making the concrete more durable against popping and shaling. These weak bonds are still present under water cure and membrane cure methods, which still leaves the concrete surface exposed to the elements. With Protec III Chem RX the original chemical cure, the weak bonds are virtually eliminated. This is especially obvious in freeze thaw environments. Another advantage is where flooring is to be installed or other coatings applied, there is no membrane to strip. Protec III Chem RX has 0 VOC's, is nontoxic and dust-proofs the concrete surface. This product can be used on interior or exterior concrete.

Disadvantages - Protec III Chem RX is waterbased so care should be taken when transporting the product in below freezing environments.

Conclusion

Chemical curing concrete is becoming more important in this ever changing world of concrete. Chemical curing concrete holds moisture in the concrete during curing as other methods of curing do, however, there are two major advantages over the other methods when Protec III chemical curing is used. Protec III has the ability to let the concrete breathe and the ability to increase the hydration process, converting the weak bonds in the concrete to strong bonds and increasing resistance to concrete popping, shaling and dusting.