

Using CreteDefender P2 as a Cure

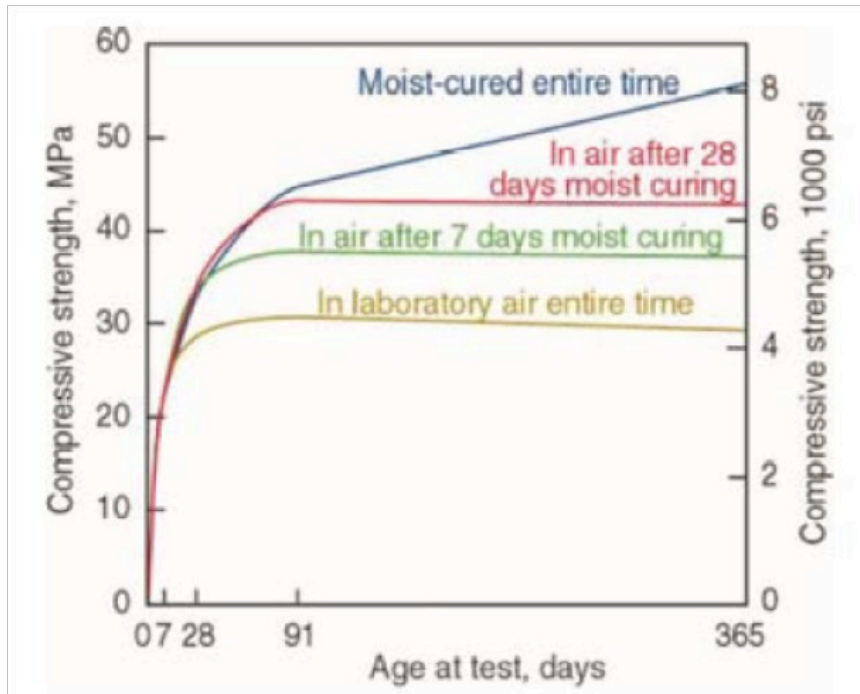
CreteDefender P2 is a water-based, reactive silicate product, with a proprietary blend of surfactants and catalysts. This high-performance pore blocker and hardener can be applied as soon as the bleed water is gone and the surface is not marred by foot traffic. Much discussion has been raised concerning using 'densifiers' as a curing agent. And much advancement has been made in the development of these products. Do keep in mind that the ACI Guide to External Curing of Concrete, quoted in part below, contains mostly references to studies performed in the 1940's, 50's, and 60's. The most recent study references are from 2001.

At the beginning of the ACI 308R-16 *Guide to External Curing of Concrete*, curing is described in this way:

“Curing is an action taken to maintain moisture and temperature conditions in a freshly placed cementitious mixture to allow hydraulic cement hydration and, if pozzolans are used, pozzolanic reactions to occur so that the potential properties of the mixture may develop.”

It is the formation of Calcium Silicate Hydrate (C-S-H) as concrete cures, or 'hydrates', that creates most of the required properties of properly cured concrete: hardness, density, low permeability, and compressive strength. CreteDefender P2 works by penetrating into the capillaries and voids left in concrete as bleed water exits. Once in the concrete, our P2 formula reacts with the free lime to form more Calcium Silicate Hydrate (C-S-H). The reaction fills the open pores and shuts down liquid water transmission. This process holds in water that would normally evaporate in the early stages of curing.

By making the water that would normally evaporate in the early stages available for continued hydration, CreteDefender P2 meets ACI's definition of curing. Evidence of the continued hydration is drawn from the fact that CreteDefender P2 improves concrete's compressive strength and reduces drying shrinkage significantly, even when compared to moist-cured samples.



**Figure 1: Compressive Strength as a Function of Age
for a Variety of Curing Conditions (ACI 308R-16)**

By providing a permanent barrier to water migration, P2 maintains curing indefinitely. This means the all of the internal water continues to be made available for hydration until it is consumed or an equilibrium state is achieved when P2 is used. The use of P2 provides a continuous curing environment, as opposed to membranes, which degrade over time, and ponding, which cannot be continued indefinitely. Figure 1 above shows the percentage of strength gain associated with various curing methods. CreteDefender P2 will allow concrete to generally follow the “moist-cured entire time” trendline with values that are typically 7-16% higher.

ASTM C309 membrane-forming curing compounds were developed as a solution to the need for a time-saving alternative to water ponding. They are widely recognized as providing “adequate” curing, but are not seen as equal to water ponding or water-saturated coverings. CreteDefender P2 becomes a permanent part of the concrete while membranes and water ponding are temporary. The objective of curing is to allow the concrete to meet performance parameters; P2 produces those performance parameters at a rate equal to or better than moist curing.

CreteDefender P2 will continue to actively seek out free lime as it develops in the concrete—for 6 months or more. So, the notion that there is not enough free lime developed in the early stages of curing for the silicates to be effective is simply not applicable.

As well, its chemical reaction forms a densified barrier that reduces shrinkage, reduces cracking and reduces hairline checking. Further, the passage of carbon dioxide is unhindered thus leading to subsequent carbonation (and subsequent hardening of the concrete).

Because P2 penetrates into the concrete, it does not form a surface membrane. Therefore, the ASTM test methods and specifications (ASTM C309 and ASTM C1315, respectively) do not apply to CreteDefender P2.

Specification Guidance for Designers

ACI 308.1-11 *Specification for Curing Concrete* section 1.1.2 *Exclusions* allows designers to stipulate special curing procedures not covered by the specification. We invite you to try our innovative and reliable P2 for your new concrete pours—saving steps, which saves time, and getting the permanent protection that P2 provides against salt and chloride intrusion, freeze/thaw cycles, spalling, flaking, dusting...

The Journal of American Science, in 2012 in their abstract titled ***“Utilization of Sodium Silicate Solutions as a Curing Compound of Fresh Concrete”***, conducted stringent tests on the effectiveness of Sodium Silicate solution as a concrete cure. They were comparing the results against the same testing of oil based curing materials. Their conclusions were:

- Sodium Silicate solutions provide continuous film on the concrete surface and retain moisture or promote proper cement hydration in freshly placed concrete.
- The water absorption, the volume of solid content and spreading rate allowed for concrete curing and achieved the same compressive strength of oil based curing material.

INSTRUCTIONS FOR APPLICATION AS A CURE:

P2 can be applied to the concrete once it is possible to walk across the surface without leaving any imprint. Spray or roll a consistent amount, applying enough product to saturate the surface without any puddling. Broom the product into the surface, spreading it evenly. Keep the surface wet for 20 minutes. If any areas begin to dry before 20 minutes have elapsed, apply more product. Ideally a three-man crew would be used to apply—one spraying the initial product, one brooming it in, and another spot spraying as it dries.

Allow the product to dry for at least 6 hours before applying a second coat, in the same manner as the first coat. Much less product will be used for a second coat.