

Go for the Cure in 2008

Have you ever heard anyone say: “That concrete was cured too much”? We haven’t either. The fact of the matter is that proper curing may well be the single most ignored phase in the concrete construction process; and it is without question one of the most critical steps in building durable concrete structures. The last time we checked, cement does not provide much benefit unless it has water available to initiate the hydration process. (Hydration is the reaction between cement and water.) And sufficient water is needed to create the required plasticity for placement. Following placing and finishing operations, sufficient humidity in the concrete structure is necessary to allow continued strength gain. It is usually in the period following placing and finishing that we lose sight of the importance of ensuring proper moisture in the concrete mixture.

One could make a case that curing is even more important in shotcrete projects, as most shotcrete mixtures will have low water content to begin with. Therefore, failure to cure properly will result in a concrete/shotcrete that will not reach its full potential in strength development, freezing-and-thawing resistance, crack-resistance, and porosity.

Just so we are on the same page, let’s define the term “curing” as it relates to concrete. ACI 116 defines curing as “action taken to maintain temperature and moisture conditions in a freshly placed cementitious mixture to allow hydraulic cement hydration and (if applicable) pozzolanic reactions to occur so that the potential properties of the mixture may develop.”

The method used for curing and the length of the curing

period will vary depending on the nature of the structure, the ambient weather conditions, and the nature of the concrete mixture. There are two methods for maintaining the required moisture: 1) apply water to the structure. Ponding of a slab or use of garden sprinklers on the structure are examples of this method; and 2) create a barrier so moisture does not quickly leave the structure. Curing compounds and visqueen are examples of materials used to create such a barrier.

The length of the curing period is extended as the ambient conditions around the structure get colder. As temperatures drop, the hydration process slows. Therefore, the curing environment must be maintained for a longer period. In very warm weather, 3 days of curing may be sufficient. In very cold conditions, 14 days of curing or more may be required. High-performance concrete and mass concrete are two types of special concretes that have more stringent curing requirements.

Mixtures containing supplementary cementitious materials will usually require a longer curing period as the supplementary materials do not begin to provide benefits until the cement particles have hydrated.

A comprehensive discussion of curing can be found in ACI 308R-01, “Guide to Curing Concrete,” available from the American Concrete Institute at www.concrete.org. It is one of those documents that should be in the library of all persons in the concrete construction industry.

Applying proper curing techniques can be the difference between success and failure in concrete construction. Make curing a priority—you and your customer will not be disappointed!