HAHN READY MIX

Curing: How to do it and Why it's Important

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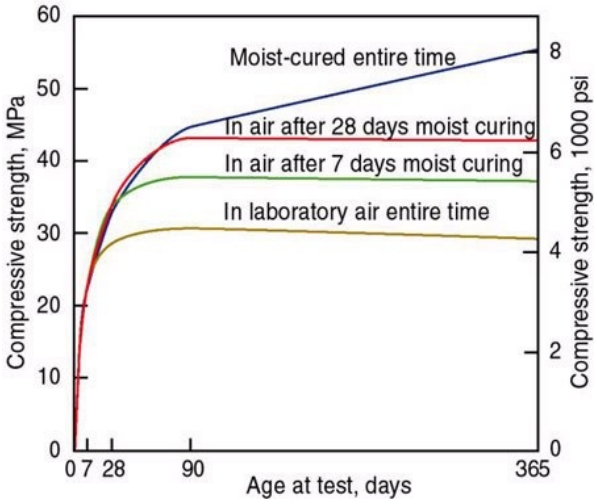
What does curing mean in concrete construction?

Curing is the important final step of the concrete construction process... it's also the one most commonly neglected by concrete contractors. It is defined as the process of ensuring there is adequate moisture, temperature, and time for concrete to gain suitable strength for it's use in service. Generally, the industry does a good job allowing for sufficient time in the curing process. Nobody wants a failure and to have to rip out concrete because traffic was allowed on a street to early, for example. Temperature is typically not a concern in the spring, summer, and fall, while much is made of protecting concrete in the winter months. (See Technical Bulletin #2). However, keeping the concrete moist is where the industry often falls short. Maintaining ample moisture in the hardened concrete is crucial for allowing C-S-H crystals to continue to grow. If no water, and therefore no hydrogen, is available, the crystals will stop growing and the concrete will not continue to gain strength.



As you can see above, as long as concrete is kept moist, it will continue to gain strength. If concrete is allowed to dry out immediately, it will result in surface strengths that are only ⅔ of the same concrete kept moist for 28 days.

What methods can we use to keep the concrete moist?

Essentially, this can be boiled down to two distinct concepts: One, provide additional water to allow moisture penetration of the concrete member; or two, use some mechanism to 100% prevent the evaporation of the moisture in the concrete mix from the time it is still plastic. This can be achieved in a number of ways:

Ponding

The most effective cure is undoubtedly ponding. This is done by building a berm or small dam to hold water that is flooded over the surface of the concrete. The water can be kept on the concrete for 7-28 days to allow maximum hydration of cementitious particles. Unfortunately, the circumstances that allow for ponding in modern construction are rarely present, and it normally is not feasible to pond on a project.

Fogging/Sprinkling

Fogging can be a curing option in some applications, such as a curing room for cylinders. It also is commonly used as a mechanism for keeping burlap wet when using a burlap cure.

Wet Burlap

Burlap curing is a common and effective way to keep concrete moist. Burlap is layered over a slab and then kept wet to provide moisture access for the concrete. Dry burlap is not an effective cure, so the burlap must be kept wet at all times. Burlap can sometimes leave discoloration on the surface of the slab where variances in moisture or folds in the burlap are reflected on the concrete.

Curing Mats

Similar to burlap, curing mats can be rolled onto a slab and wetted to provide excellent cure. The advantage of these mats are they can remain wet for 7 days without needing additional watering like burlap does. Typically they are single use and are disposed of after the curing period. Curing mats are gaining huge popularity on projects such as bridge decks.

Covering with Plastic

Covering a slab with plastic sheeting when the concrete is, erm, plastic, can prevent evaporation loss and be an effective cure. It is crucial that the edges and overlaps are taped to prevent moisture loss. Often this method results in undesirable striping on the surface of the concrete.

Curing Compounds

Probably the most versatile and useful method of curing is using a curing compound. These compounds are applied directly after finishing operations are complete and form a barrier to prevent moisture loss in the concrete. This barrier typically is UV soluble, and breaks down in approximately 28 days. After the concrete has developed sufficient strength, the compounds can be driven over, worked on, etc. while still effectively curing a slab. We prefer the pigmented wax compounds that allow one to see the coverage of the slab. Most of these are white, and after the compound has been applied, the slab should look like a clean piece of paper.

Ineffective curing application

Curing compounds do have some limitations. For example, they should not be used where any kind of topping will be applied, as the wax will interfere with bond. They also aren't great for use indoors where it may take a very long time for the compound to break down. They can be difficult to apply on windy days.

What about products that Cure and Seal?

We at Hahn Ready Mix are not the biggest fans of these combination products. A great cure is not breathable, and allows no moisture loss. A great sealer *is* breathable and allows moisture to vacate the slab. It would be difficult for a combination product to achieve both conditions. While combination products allow ease of construction and are better than nothing, we would probably suggest just doing a really effective cure in most situations if curing and sealing separately is not an option. See our tips on this matter in Tech Bulletin #4.

Curing in the Winter

Unfortunately, moisture saturation in concrete has one major weakness - freezing temperatures. Most of the time, we want to provide ample moisture for concrete to gain its maximum strength. However, that very moisture saturation can be our biggest enemy when temperatures fall below freezing. The moisture will expand when frozen and can cause scaling. When freezing temperatures are expected, we are better off *completely skipping* any moisture-related curing processes as we want the concrete to dry out as soon as possible. Focus should be on temperature protection and using admixtures to accelerate the set and

curing process. This is a major reason why exterior concrete poured in the winter has inherently lower potential and greater risk than concrete poured at other times of the year.

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