

External Cures, Internal Cures & Water Repellent Admixtures: How Do They Relate?



There are a lot of different products on the market designed for a variety of applications, and it's not always clear how they are intended to function together. In many cases they can seemingly have the same purpose and as a result are prone to being used improperly.

This Tech Tip will address the relationship between internal cures, external cures (specifically, curing compounds) and water reducing admixtures; what they are, how they work and how they function together.

What They Are & How They Work:

Internal Cure: process by which the hydration of cement continues because of the availability of internal water that is not part of the mixing water.

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Internal cures absorb “water of convenience” within fresh concrete, and slowly release it throughout the curing process in order to more fully hydrate cement. According to ACI, **internal curing is an optional process that must be used in addition to external curing.**

Curing Compound: a liquid applied to the surface of newly placed concrete that retards the loss of water and, if pigmented, reflects sunlight.

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Curing compounds form a membrane to prevent moisture loss within the top 1/4” to 3/4” of freshly placed concrete (the “cure affected zone”) to more fully hydrate cement subject to premature drying due to evaporation. According to ACI, **external curing methods are a required process that may be used alone, or along with internal cures.** Failing to use an external curing method such as a curing compound will reduce strength and durability at the substrate surface due to moisture loss, with increased plastic shrinkage (map) cracking, dusting, and scaling.

Chemical Admixture — a liquid, or dispersible powder, used as an ingredient in a cementitious mixture to improve its economy and/or properties in the plastic and/or hardened state.

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As their name implies, water-repellent admixtures improve the water-repellency of concrete in **the hardened state** (ie: after curing). **They are not a recognized curing method according to ACI.**

How They Function Together:

All three of these chemistries can work well together to improve the physical properties of cured concrete. However, only the use of an external cure (such as a curing compound) is a method required by the American Concrete Institute in order to form a barrier at the substrate surface to prevent moisture loss and cure concrete to ASTM C309 specifications.

Internal cures are an optional method to promote full hydration of cement within the concrete substrate, but do not form a barrier to evaporation within the “cure affected zone” at the surface required to properly cure concrete. Internal cures are an optional addition to external curing methods, not a replacement for them.

Similarly, a water-repellent admixture is an optional method of improving the physical properties of cured concrete but do not prevent moisture loss at the substrate surface within the “cure affected zone” required to properly cure concrete. Water-repellent admixtures are also an optional addition to external curing methods, not a replacement for them.

Tech Tips:

- An external (surface) curing method (such as a curing compound) is **required by ACI** to cure concrete to ASTM C309 specifications.
- Internal cures are an **optional** method to improve full hydration of cement within the concrete substrate.
- Water-repellent admixtures are an **optional** method to improve the physical properties of cured concrete.