

Myth 1: Adding water to the mix is the only way to increase slump.

Fact: There are other, more effective ways to increase concrete slump besides adding more water.

Adding excessive amounts of water at the jobsite will increase slump, but will also reduce strength significantly. The added water dilutes the paste and increases the water-to-cementitious materials ratio (w/cm). Too much water can increase drying shrinkage, and lead to other service-related problems.

Many specifications forbid any onsite addition of water. Even so, there are other ways to increase the slump and workability of concrete. Aggregate gradation and the maximum size of the aggregate both greatly influence cement and water requirements, which affect mix workability. Water reducers and superplasticizers can also be used to increase the slump while maintaining the water-to-cement ratio. And air-entrainment can increase workability. Adding water to a mix that contains chemical admixtures will change the properties of the mix and can cause excessive slump loss, inconsistent setting, and changes in air content.

Myth 2: Specify a concrete mix by the number of bags of cement.

Fact: Mixes should be specified based on performance requirements, not just cement content.

Some in the concrete business still call out concrete mixes based on the number of bags of cement (a 6-bag mix, or a 7-bag mix), but bag counts don't accurately describe the desired properties of the concrete. But how much cement is necessary to get high-quality concrete? It depends on the intended use. To maintain economy and avoid adverse effects on workability, shrinkage, and internal temperature rise, high cement contents should be avoided. Minimum cement contents are often specified to improve durability, finishability, wear resistance, or appearance (of vertical surfaces). The most important property of concrete starts with the water-to-cementitious materials ratio.

Myth 3: Concrete is impermeable.

Fact: Even the densest concrete is somewhat porous.

Water and other substances in liquid or vapor form can pass through concrete. Depending on the overall porosity of the concrete, that can take anywhere from a few minutes to a few months. Concrete can be made less permeable and more watertight by using mix designs with a low w/cm, well-graded aggregate, chemical admixtures such as superplasticizers, and supplementary cementing materials such as silica fume or fly ash. Surface treatments, like sealers and membranes, may also be considered.

Myth 4: The higher the concrete's strength, the more durable the concrete.

Fact: Compressive strength alone does not determine the concrete's durability.

Although compressive strength is an important characteristic of concrete, other qualities can be even more important for concrete durability in harsh environments. In general, the principal causes for deterioration in concrete are corrosion of reinforcing steel, exposure to freeze-thaw cycles, alkali-silica reaction, and sulfate attack. Reducing permeability is the key to durability.

Myth 5: Calcium chloride is an antifreeze agent.

Fact: Calcium chloride is an accelerator only and not antifreeze.

Accelerators speed up the rate of hydration and strength development of concrete at early ages. Fresh concrete, however, still needs protection from freezing at least until the concrete reaches a minimum strength of 500 psi. Without that initial protection, concrete that freezes will have significantly reduced strength. To avoid cold weather placement problems, make sure the concrete is properly protected and that its temperature is maintained, following the guidance provided in ACI 306 "Cold Weather Concreting."

Myth 6: No bleed water and a successful "footprint" test mean a "thumbs up" for concrete finishing.

Fact: There is no absolute rule of thumb to determine proper finishing time.

Improper finishing can cause surface defects like blistering, dusting, crazing, and delaminating. It takes experience to know when to begin finishing operations. Relying on the old rule of thumb of a 1/4-inch footprint indentation for walk-behind and riding power trowels may not always apply, especially given different mix designs, weather conditions, and finishing tools. Relying on the absence of a sheen of water on the surface to determine when bleeding has stopped may also not be good enough. Depending on the concrete properties and environment, bleeding may still be occurring even though it isn't visible. Bleeding must be completed for the entire slab thickness before finishing operations can begin. Choosing the appropriate time to begin finishing operations takes good judgment and knowledge of the materials being used. The timing can change based on weather conditions, mix designs, placement rates, and a variety of other issues. Experienced finishers know this and take all those factors into account.

Myth7: Concrete that is flat and level after placing and finishing will remain flat and level.

Fact: Concrete will change in volume while setting, hardening, and drying.

Curling of slab edges is caused by differences in the moisture content and temperature of the top and bottom of the slab. The edges of slabs at the joints tend to curl upward when the top surface of the slab is drier or cooler than the bottom surface. A "reverse curl" occurs when the top surface is wetter or warmer than the bottom. Curling can be reduced by using techniques that minimize shrinkage differentials and the temperature and moisture-related volume changes that cause them.

Myth 8: Reinforced concrete won't crack.

Fact: Structural reinforcement does not prevent concrete from cracking due to volume change.

Concrete that is restrained from moving during volume changes may crack, since concrete is weak in tension. Many times, reinforcing steel actually causes the restraint. Structural reinforcement does not prevent cracking, but rather it holds the crack faces together. When concrete cracks, the tensile stress is transferred from the concrete to the steel, which is what allows reinforced concrete to withstand higher tensile loads than concrete alone.

Myth 9: Curing concrete means letting it dry.

Fact: Concrete needs water to continue to hydrate and gain strength.

Concrete does not harden by drying out. As long as there is sufficient moisture and favorable temperatures, the hydration of concrete will continue for quite some time. When fresh concrete does dry out (usually below about 80% relative humidity), hydration stops. If the temperature of fresh concrete approaches freezing (below 40[degrees]F), hydration slows dramatically. The need to provide moisture and an adequate temperature immediately after placement is why we cure concrete. The longer you cure concrete, the stronger and more durable it will become.

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