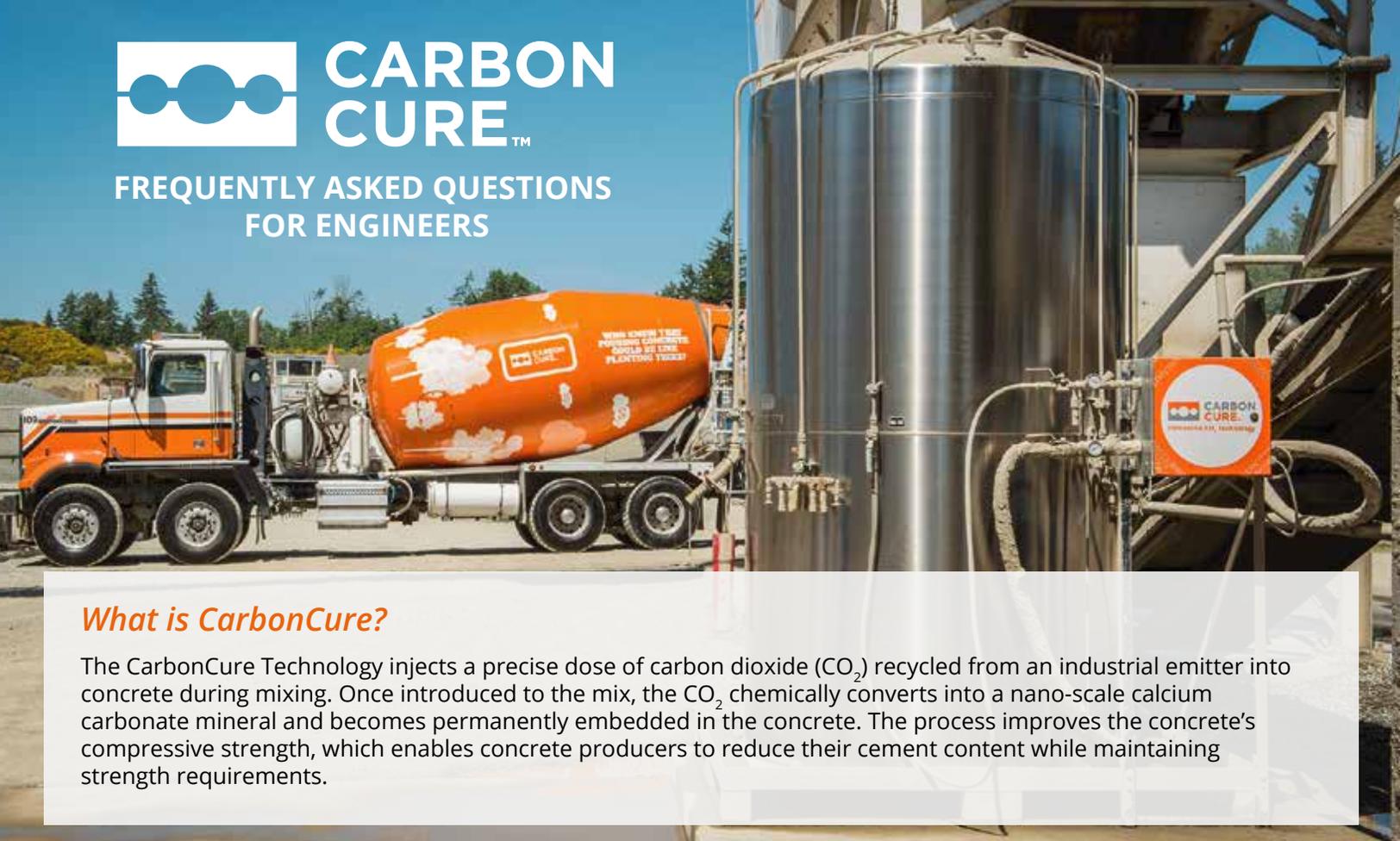


CARBON CURE™

FREQUENTLY ASKED QUESTIONS FOR ENGINEERS



What is CarbonCure?

The CarbonCure Technology injects a precise dose of carbon dioxide (CO₂) recycled from an industrial emitter into concrete during mixing. Once introduced to the mix, the CO₂ chemically converts into a nano-scale calcium carbonate mineral and becomes permanently embedded in the concrete. The process improves the concrete's compressive strength, which enables concrete producers to reduce their cement content while maintaining strength requirements.

How does CarbonCure impact sustainability?

The most sustainable principle of design is to construct buildings that are built to last. Concrete is crucial for the development of sustainable buildings, as it provides the strength to build tall, resilient, well-insulated structures. With CarbonCure, designers and engineers can capitalize on these unique qualities of concrete they rely on - but now with a reduced carbon footprint.

On average, 25 lbs of CO₂ per cubic yard of concrete are saved using the CarbonCure Technology.

How does CarbonCure affect fresh or hardened properties?

Aside from an increase to compressive strength, the addition of CO₂ at an optimized dose using the CarbonCure Technology has a neutral impact on the fresh and hardened properties of concrete, including durability, workability, pump-ability, density, pH, freeze-thaw, temperature, texture or color.

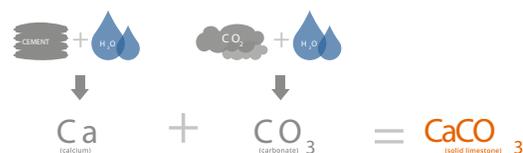
How does CarbonCure impact durability?

CarbonCure, in collaboration with leading educational institutions, conducted extensive durability testing that states: "Concrete durability test results indicated that the carbon dioxide process did not compromise the expected durability performance of the treated concrete. Carbon dioxide is a viable admixture to improve concrete performance."

Please see *Properties and durability of concrete produced using CO₂ as an accelerating admixture* by Sean Monkman in *Cement and Concrete Composites*.

What is the chemistry behind the process?

CO₂ introduced into concrete in an aqueous state reacts with calcium (Ca²⁺) ions from the cementitious material to form nano-sized calcium carbonate (CaCO₃) particles.



If cement content is reduced, does that affect the yield?

No, concrete producers replace cement content with the appropriate volume of sand to maintain yield.

How is the CO₂ sourced?

CO₂ is sourced from emitters by industrial gas suppliers, who collect, purify and distribute the CO₂. CO₂ is used for a number of different applications, including carbonated beverages. In most circumstances, there is no net benefit to the environment as the CO₂ eventually returns to the atmosphere. Conversely, CO₂ injected into concrete chemically converts to a mineral and will never re-enter the earth's atmosphere.

Does the addition of CO₂ affect pH?

Research conducted by CarbonCure Technologies in collaboration with leading educational institutions has shown that injecting CO₂ using the CarbonCure Technology does not affect the pH of the pore solution of mature concrete.

Can concrete made with CarbonCure be used with rebar?

Yes, concrete made with CarbonCure can be used with rebar. Atmospheric CO₂ is known to cause rebar corrosion. Conversely, CO₂ injected into concrete chemically converts into a calcium carbonate mineral within minutes. There is no residual CO₂ in the mix by the time the concrete arrives at the construction site, and therefore no potential for rebar corrosion.

What happens to the CO₂ at the end of the building's life-cycle?

Once introduced into concrete, the CO₂ chemically converts into a calcium carbonate mineral. This mineral is permanently bound within the concrete. If that concrete became demolished at the end of its life-cycle, there is no risk of CO₂ "escaping" as the CO₂ no longer exists. In this instance, it would simply become crushed up gravel.

Can CarbonCure be used on my commercial project?

Please confirm with your local concrete supplier whether CarbonCure is available in the region that your project is located. The biggest challenge to incorporating CarbonCure on a commercial development are prescriptive concrete specifications, such as minimum cement content and maximum water/cementitious ratio. The National Ready Mixed Concrete Association recommends that structural engineers consider performance-based spec alternatives to improve the concrete's quality and sustainability, and to potentially reduce project costs.

For guidelines on writing better concrete specifications, please see www.nrmca.org.

