CarbonCure™ Concrete Admixture

ASTM C 494 Type S - Cement Hydration Enhancing Admixture

Product Description

CarbonCure Technologies offers a technology to implement carbon dioxide (CO_2) utilization in the concrete industry. The CO_2 (hereafter, CarbonCure concrete admixture) is added to concrete during mixing and acts as a cement hydration enhancing admixture based on the CO_2 mineralization process. CarbonCure concrete admixture permits a reduction in the total cementitious materials content of a given concrete mixture while maintaining fresh properties, strength and durability performance, thus reducing the carbon footprint of concrete. CarbonCure concrete admixture meets ASTM C494 requirements for Type S, Specific Performance Admixtures.

Uses

CarbonCure concrete admixture is used to produce concrete mixtures with a reduced carbon footprint. Concrete shall be designed in accordance with Standard Recommended Practice for Selecting Proportions for Concrete, ACI 211. CarbonCure concrete admixture is recommended for use in both ready-mixed and precast concrete.

Benefits

The addition of CarbonCure concrete admixture to concrete mixtures can realize benefits, including:

- Concrete produced with a reduced carbon footprint
- Ability to improve both early- and late-age compressive strengths
- Optimized and better performing concrete mixtures

CO_2 Mineralization Technology

When the CarbonCure concrete admixture is injected in the fresh concrete, it chemically converts into a nano-scale calcium carbonate mineral (i.e., the CO_2 is mineralized in-situ) and becomes permanently captured in the concrete. The formation of this mineral has been demonstrated to improve the cement hydration efficiency, which is the ratio of compressive strength to the amount of cement in concrete.

Guidelines for Use

Dosage Rates: CarbonCure has a recommended dosage rate of 0.1 - 10.0 fl oz/cwt (6.25-625 g/100 kg) of cement (as distinct from total cementitious) for most applications. Dosages outside this range may be used if local testing shows acceptable performance. Pretesting is required to determine the appropriate dosage rate for desired performance. The optimum dosage rate may be influenced by other concrete mixture components, cement types, ambient temperature, mineral additives, quality and gradations of aggregates, slump of concrete, mixing equipment, job conditions, and desired performance characteristics.

Mixing: The optimum performance of the CarbonCure concrete admixture is generally obtained with a delayed dosage following the cement-water contact in the mixer. A mixing cycle of at least 30 seconds after the complete CO_2 injection in the mixture is strongly recommended.

Packaging and handling

CarbonCure concrete admixture is available in bulk and delivered by tanker truck to an on-site pressurized storage tank for dispensing by means of the CO_2 metering equipment.

CarbonCure concrete admixture must have a certified purity of 99% or above for use in this application – certification of purity compliance shall be made available upon request. CarbonCure concrete admixture safety and handling information can be found in the Carbon Dioxide safety data sheet CAS No: 124-38-9.

Dispensing Equipment

CarbonCure concrete admixture is dispensed from a storage tank of liquid CO_2 in communication with the dispensing control system. The tank and CO_2 are sourced from a local industrial gas supplier. The tank capacity is determined according to the usage and gas supplier recommendation. The dispensing control system is connected to the batching system and the CO_2 addition is fully integrated into the batch sequencing of materials that are added to the concrete mixture.

Related Documents

See MSDS for CO_2 as provided by the industrial gas supplier.

NOTE

Continuous testing by the concrete producer is strongly recommended. Since all cements and other concrete-making materials differ from source to source, and can vary over time, ongoing testing by the concrete producer is recommended for optimum CO_2 system performance, especially when changes are made to the materials or batch sequencing. Accurate concrete performance assessment requires adequate quality control practices. The CO_2 injection system performance is supported through following all recommended maintenance practices, procedures, and schedules.

CARBON CURE™

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