

## Rethinking the Cure of Concrete Floors

*Craig Coppersmith, P.E., VP Technical Sales & Marketing*

The Standard for measuring the effectiveness of curing compounds has historically been ASTM C 309, "Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete." The test procedure for this specification measures the moisture loss of a test specimen that has a wood float finish and utilizes a liquid membrane-forming compound. While this Standard has proven to be an effective measure to gage acceptable curing products for concrete, developments in the placement/finish of concrete and advancing technologies of concrete chemicals have paved the way for innovative perspectives on curing of concrete, particularly as it pertains to industrial floors.

The advent of the laser screed and ride-on power trowels for the placement and finish of concrete floors has become a typical installation procedure for many contractors. In particular, these pieces of equipment



are commonly used to install concrete floors on projects with very large foot-prints, such as industrial/manufacturing facilities, distribution centers/warehouses, and big box stores. The developments in power trowel techniques using steel blades to create a hard steel troweled finish have dramatically changed the surface condition of these floors, compared to the wood float finish described and required per ASTM C 309. The surface condition of these finished slabs is harder and "tighter" than the wood float finish that had been common in the past. In fact, independent testing has confirmed that steel trowel finished floors can achieve nearly 25 percent less moisture loss through the slab surface compared to a wood float finish, strictly based on the finishing method alone. It is important to note that this test was conducted on a test specimen that was steel trowel finished by hand, which was theorized to yield conservative results.

As the installation methods for steel troweled floors have improved and been refined, so have the developments and innovations with concrete chemicals to improve the performance and longevity of these types of floors. Nox-Crete Duro-Nox, a penetrating, water based, sodium silicate, was developed to densify, harden, and seal concrete. Duro-Nox, when applied to the surface of the concrete, penetrates the capillaries of the concrete and reacts with the free lime (Calcium Hydroxide) in the concrete. This reaction minimizes the size and quantity of the capillaries, significantly improving the abrasion resistance and surface hardness of the concrete. It also reduces the porosity of the concrete, acting as an effective sealer. These improved performance properties of the concrete have become critical as the demands on floor slabs have increased.

With the acceptance of Duro-Nox as a floor hardener and sealer, an additional benefit of the product was realized. When applied shortly after the hard steel troweling of the slab, Duro-Nox performs as an effective curing compound for concrete as well. The chemical reaction that densifies and seals off the capillaries at and near the surface of the concrete, also performs as an effective cure, when combined with the benefits of the steel troweled finishing method.

Today, Duro-Nox is frequently used as an effective hardener, sealer and cure for many steel troweled slabs. The use of concrete floor hardeners as a cure has been accepted and approved by leading consultants and designers within the flat slab industry and has exhibited impressive results. Strictly speaking, sodium silicate floor hardeners (such as Duro-Nox) do not meet the water retention criteria as defined by ASTM C 309 (per the standard, the test is to be performed on a wood float finish and the curing compound must be membrane forming, which sodium silicate floor hardeners are not). However, Duro-Nox has a proven track record on numerous projects when used as a cure, densifier, and sealer. In addition, internal testing of Duro-Nox used as a cure on hard steel troweled finished concrete floors indicates it can meet the water retention properties required to effectively cure concrete, except under the most severe of environmental conditions. As the concrete industry evolves, Nox-Crete remains at the leading edge of the industry providing high quality and innovative products. Nox-Crete continues to test and research Duro-Nox in multiple applications and all other Nox-Crete products.