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Integrally Troweled Concrete
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Defining Integrally Troweled Concrete Placement



Substrate finished with an GreenIce ITCP product, though under construction, note floor resilience

ITCP defined: “a mechanical and chemical process to consolidate the surface through a ... troweled finish for maximum containment of moisture within the slab... resulting in an architectural concrete finish options not previously available”



The GreenIce, by Green Umbrella cure system is an Integrally Trowel Concrete Placement (ITCP). It is defined as a mechanical and chemical process to consolidate the surface through a panned, combo blade, and steel troweled finish for maximum containment of moisture within the slab as curing occurs. While also allowing placement of secondary floor coverings, its surface results in a variety of architectural concrete finish options not previously available utilizing conventional finishing practices.

A Conventional Concrete Cure

Traditionally a variety of means have been used at initial and intermediate stages of placement and finishing.

Fogging, evaporation retarder, final stage curing measures, water curing, wet covering, moisture-retaining coverings, polyethylene (plastic) film, waterproof paper, and liquid membrane-forming curing compounds. The ACI-308-16* Guide to External Curing of Concrete outlines many of these.

A Mechanically Densified Cap Method

This is a hard troweled surface with alternate or non-traditional curing. A mechanically densified concrete has been proven in field studies to meet the curing requirements of holding back and maintaining internal moisture content. (Howard Kanare and Joe Nasvik, August 2010, “Making Cure Membranes in the Field*.”)

What is the Integrally Troweled Concrete Placement?

Integrally troweled concrete placement uses a two part chemical formulation; a cure & a fixative that fills the voids and closes capillaries within the slab with nano-sized silica particles. This action refines the slab surface while retaining most of the placement water, significantly minimizing volume loss, cracking and curling. This extends material life by closing capillaries within the slab, reducing surface abrasion and creating a sustainable surface profile.

The first step in the application of this cure method, is called IceStart. It is applied several times in the finishing process. This protects the surface from crusting during this phase of cure. It is creating a superior, initial near surface moisture barrier. Though it reaches a variety of depths in different substrates, testing has revealed it often is greater than 20 mm, with such depth it accomplishes several benefits.

Unlike gel forming products, Amorphous silica is one component of the products. It is characterized by being ph neutral, reactive and not hydrophilic. Because of this it travels through the natural capillaries of the concrete matrix, in fact using the pre-existing mix design water. In the near surface area that is being affected by the mechanically troweled action the cure is acting as a lapping compound that allows the trowel to mill the paste substantial smaller than conventional methods. Additionally, it is shown to provide lubrication to the matrix to allow for a tighter compression.

The net water vapor transmission rate of GreenIce concrete is about .4 grams/hr/sq meter, which compares favorably with the water retention requirements in ASTM C309 and C1315 for curing compounds, while also compliant with E-96 testing, all qualifying this as a cure process.

This ITCP system creates a surfaced membrane so closed off that it qualifies as being not only equal to any normal ACI 308 cure or ASTM 309 qualifying products, but superior.

As noted, it is not hydrophilic. So when the substrate is whetted the product will not come out of the substrate. This is unique in concrete treatments.

The second-step in the cure system is the fixative, IceStop. Once the concrete finishing is done, the fixative is applied to stop the chemical reaction and begin the hardening

process. This treatment is hydrophobic and cross links with the cure to provide an additional moisture barrier. For industrial floors not requiring a polished look finish, the application of these two treatments could be all that is necessary to cure the concrete.

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*American Concrete Institute, www.concrete.org

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***ASTM, American Society of Testing Materials, www.astm.org

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