

Waterproofing— Another Approach

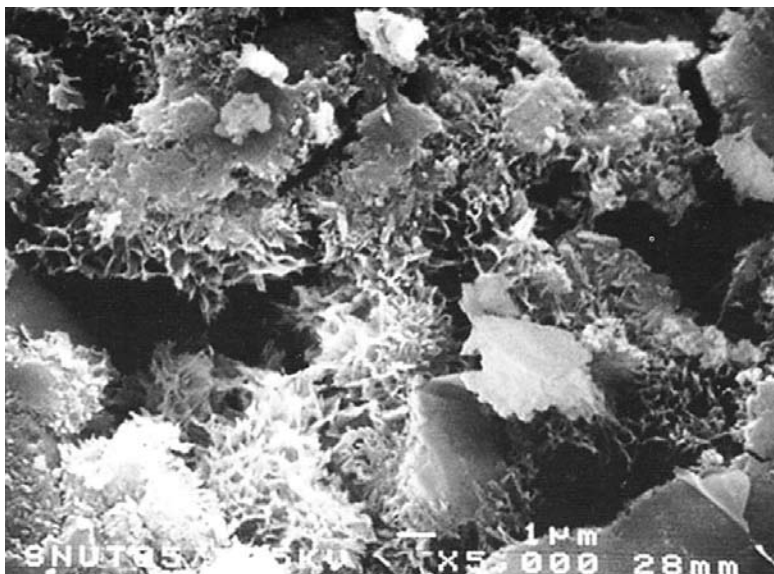
By Kevin Yuers

There are many methods available to waterproof concrete. One approach gaining acceptance involves a unique crystalline technology. Integral crystalline waterproofing (ICW) can provide a permanent, cost-effective alternative to conventional waterproofing methods.

While conventional waterproofing involves applying a coating or membrane to the concrete surface, integral crystalline waterproofing permanently seals concrete by plugging its natural pores and capillaries and preventing the movement of water through the concrete.



Magnified untreated concrete



Magnified concrete with ICW

How Does ICW Work?

Crystalline waterproofing products are supplied as a dry powder comprised of portland cement, silica sand, and special chemicals. When mixed with water, this powder forms a thick slurry that can be brush-applied on a prepared concrete surface.

When applied to concrete, the chemicals in the waterproofing slurry are absorbed into the concrete by capillary action (the natural wicking movement of liquids through a porous structure) and diffusion (the natural movement of chemical molecules). Once inside the concrete, the chemicals create a reaction that causes long, narrow crystals to form, filling the pores, capillaries, and hairline cracks of the concrete mass. By blocking passageways within the concrete, ICW crystals permanently prevent the movement of water in all directions.

As long as moisture is present, these crystals continue to grow throughout the concrete, reaching lengths of many inches over days, weeks, or months. Once the concrete dries, the chemicals sit dormant until the next dose of water causes the chemical reaction to begin again.

The ability to remain dormant and reactivate in the presence of water gives treated concrete the ability to self-seal. When new cracks form due to settling and seismic activity, water entering through these cracks reacts with the dormant chemicals, causing new crystals to form and grow to block the cracks and stop the water. Its ability to self-seal is one of integral crystalline technology's most unique and useful features.

What Other Benefits Does ICW Provide?

Aside from its self-sealing properties, ICW can offer other advantages. For instance, for best results, conventional membranes must be applied to the positive side of a leaking concrete structure—that is, the side of the source of the water. In many applications, such as blind-sided foundation walls, elevator pits, and existing basements with exterior landscaping, access to the positive side is impractical or impossible. Fortunately, because crystalline waterproofing permeates and becomes part of the concrete, it can be applied to either side of the structure.

Another key advantage of crystalline waterproofing is that it is immune to damage. Membrane systems can fail if they are scraped, punctured, or torn. Because crystalline waterproofing acts inside the concrete, the surface coating is not vital. The

majority of active crystalline chemicals migrate into the concrete within the first 28 days, meaning the surface-applied slurry can be completely removed from the surface after this time with little effect.

ICW is also permanent. While membranes can deteriorate over time, ICW chemicals remain inside the concrete, offering waterproofing and self-sealing abilities for the life of the structure.

Is ICW Suitable for Use in New Structures?

When used in the construction of new structures, ICW can generate time and cost savings. The technology can be applied to new structures using one of two methods:

Dry-Shake Method—When placing concrete slabs for a new structure, a layer of the dry powder product is shaken or spread onto the setting concrete and troweled into the surface. Because new concrete has high moisture content, the crystalline penetration is immediate and the chemical reaction and crystal growth are accelerated. Because the technology becomes part of the concrete, the surface can be finished smooth.

Admixture Method—Following the success of the dry-shake method, an ICW admixture was developed that can be applied right into the mixture before concrete is placed. This application method combines the self-sealing and damage-immune properties of the slurry application and the quick absorption of the dry-shake method. It also reduces shrinkage and improves concrete's long-term performance.

Most importantly, though, the admixture method eliminates the need for any kind of surface application at all and the admixture cost is more than offset by the cost savings realized by eliminating the time and labor required to apply a product or membrane to the surface.

How to Select an ICW Product

A number of companies offer ICW products for new and existing concrete structures. When selecting ICW products, it is important not to confuse them with products that are simply concrete densifiers or pore blockers. There are also products on the market that claim to grow crystals, which only crystallize as they dry—these products will not permeate the concrete, nor will they reactivate in the presence of water to fill cracks. Ask whether the product you are considering contains silicates, stearates, or talc—these offer temporary waterproofing at best. Finally, be sure to inquire about warranties offered by the manufacturer.

Though perhaps not seen as often as conventional waterproofing methods, ICW has been repeatedly and successfully tested and used in many projects around the world.



(Above and below) Crack repair using crystalline waterproofing



Working on concrete repairs in the Shanghai subway

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