

CONCRETE CONSTRUCTION

Your information resource to the concrete industry

- From: [Concrete Construction June 2013](#)
- Posted on: June 5, 2013
-

Crystalline Waterproofing

Preventing moisture intrusion from hairline cracks on tilt-up concrete panels.

By

[Vicki Speed](#)



[Crystalline Waterproofing](#)

The three-story, 65,000-square-foot Torrance Memorial Specialty Center in Torrance, Calif., designed by Gensler and constructed by 2H Construction Inc., is designed and constructed to exceed the Energy Star standards and LEED sustainability “Bronze” category.

The structure is constructed of decorative tilt-up concrete wall panels with a light sandblast finish to expose the fine aggregates in the concrete matrix. Besides aesthetics, this finish was especially selected to help reduce future maintenance, minimize the contribution of harmful products to the environment, and reduce the overall environmental footprint of the building. During a preliminary discussion about the project with the architect, Innovative Concrete Products and Marketing, a southern California-based Xypex independent representative with a background in tilt-up construction and engineering, warned about the possibility of moisture penetration associated with cracks that develop in the concrete panels.

Mike Davis, president of Innovative Concrete Products, says, “Even if they applied a premium water repellent to the exposed aggregate finish, moisture penetration is still a possibility. And even if the moisture didn’t get to the inside of the structure, calcium carbonate deposits usually form at cracks that take on water through the structure or just at the surface.”

Crystalline waterproofing

Hairline cracking is caused by several conditions including the high early strength cements often used for tilt-up panels, the loads generated on the tilt-up panels of multi-story structures, especially during tilt operations, and the normal movement of buildings over time.

After review and analysis, the architect opted to use crystalline waterproofing. Crystalline waterproofing products are made up of portland cement, very fine treated silica sand, and proprietary chemicals. The crystalline waterproofing chemicals react with unhydrated cement, the by-products of cement hydration such as calcium hydroxide—commonly called free lime—and other mineral salts within the cement matrix to form mineral-based “dendritic crystalline structures” that are insoluble in water. The formation and development of the crystals in the concrete pores, cracks, and other voids is an ongoing, active process that takes approximately two to three weeks.

As the crystals grow across the diameter of the concrete’s pores, they form a microscopic, mesh-like barrier that blocks the flow of liquids, even under extreme hydrostatic pressure.

When used in conjunction with proper building practices, such as those outlined in ACI 318, ACI 350, and ISO 19338, crystalline waterproofing improves the durability and performance of concrete structures, lowers maintenance costs, and extends the lifespan of the structure by protecting against the effects of water ingress and aggressive chemicals. The crystalline structure becomes a permanent, integral part of the concrete matrix.

Crystalline waterproofing products are produced as a coating material, admixture, and dry shake, offering the designer, specifier, and contractor the flexibility to choose the most suitable application method depending on the structure and conditions.

Put to use

In the case of the Torrance Memorial Specialty Center, the contractor used the Xypex Admix C-500 admixture to waterproof the 33,300 square feet of wall surface panels during the on-site casting process.

Davis adds, “Now even if hairline cracking in the exterior panels occurs, the integral crystalline waterproofing properties will continue to protect against water and chemical ingress.”

After sandblasting the panels, the contractor noted numerous hairline cracks that had been concealed by the surface cement paste and yet no leaking or moisture intrusion occurred in the concrete.

The three-story, 65,000-square-foot Torrance Memorial Specialty Center opened for business in mid-August 2012. It’s the new home to many Torrance Memorial outpatient care departments and private practice physician groups.