

Moisture Ingress through Basement Walls Rectified with Crystalline Materials

[Excerpts from News Bulletin of ACRA (Australian Concrete Repair Association)]

1.0 Background

The walls of a basement-level archive room at a leading Victorian university in Australia were experiencing severe concrete degradation and moisture ingress due to unforeseen placement and compaction issues during initial construction. The same rectification was carried out by National Concrete Solutions, Australia.

2.0 Materials Used

Crystalline repair products were selected for reinstatement of the walls and to provide a protective barrier around steel reinforcement. Crystalline products are dry powder compounds composed of Portland cement, silica sand and many active proprietary chemicals.

Crystalline is a non-toxic, chemical treatment for the waterproofing and protection of concrete. Its primary and most distinguishing performance feature is its unique ability to generate a non-soluble crystalline formation deep within the pores and capillary tracts of the concrete. A crystalline structure permanently seals the concrete against the penetration of water and other liquids from any direction.

3.0 Methodology Adopted

Preparation for the basement wall involved the removal of existing paint and other contaminants from areas that were damaged from water ingress. Additionally, all deteriorated concrete areas were pressure-washed to provide an open capillary, clean absorbent surface, and bony and honeycombed sections were chipped out to a square-edged substrate and surface laitance was removed. The surfaces were prepared for application of crystalline coating as shown in Figure 1.



Fig. 1: Surface prepared for application of crystalline coating

Upon successful completion of surface preparation, the substrate was saturated with water and crystalline

was applied as a slurry coat to treat the exposed steel and reinstate a passive alkaline barrier around the reinforcement. A high-build repair mortar for the patching and resurfacing of deteriorated concrete was then used to repair back to contour with the surrounding concrete.

Crystalline coating was uniformly applied to all concrete surfaces with a semi-stiff bristle brush. It produced a harder finish, providing enhanced concrete durability and additional waterproofing integrity.

A dense, fully-developed crystalline structure had formed within the capillary tracts of the concrete to completely block the flow of water after application of crystalline at a depth of 50 mm into the concrete sample at 28 days (Fig. 2).



Fig. 2: Crystallization being formed for blocking capillaries

A curing compound of self-dissipating (2 - 3 days) non-film forming product was applied as a fine mist spray, both, during and after the coating to accelerate the crystalline process and assist in product curing for optimum performance.

4.0 Conclusion

The crystalline coating is most suitable for preventing moisture ingress of structures such as reservoirs, sewage and water treatment plants, underground vaults, secondary containment structures, foundations, tunnels and subway systems, swimming pools, parking structures and roof decks, etc.

The various tests such as permeability, chemical resistance, compressive strength, freeze thaw and other tests have all indicated positive results after using the crystalline product. It can also be used on all structures containing potable water.

It can also be used on negative sides. Crystalline is also well-suited for crack repair in water-retaining structures. These chemicals lie dormant until a new crack forms. Water entering through the crack reactivates the chemicals and causes new crystals to form and grow, which self-seal the new cracks and maintain a watertight seal for which it is a permanent crack repair solution. This self-sealing property is one of most unique and useful features and can often reduce long-term maintenance and repair costs.