



TECHNICAL NOTE

PRESERVING MARINE STRUCTURES WITH DEEP PENETRATING SEALER (DPS)

There is a common misconception that high quality concrete will not deteriorate in a marine environment. All concrete deteriorates in seawater no matter how strong or how high the cementitious content unless it is sealed and protected from the environment.

The major causes of deterioration are Chloride and Sulphate ingress. In addition, dissolved chemicals from industrial outfalls and abrasion from waterborne solids further deteriorate the structures. A recent survey of marine structures carried out in Hong Kong revealed that structures only three years old were already deteriorating.

Sulphates present in contaminated seawater soften the concrete surface, gradually reducing the cover to the steel as the surface delaminates. However the main cause of deterioration is caused by the ingress of chlorides.

In the splash zone above the high tide mark, salt crystallization within the outer surface of the concrete will cause it to spall.

Chlorides penetrate the concrete by absorption and gaseous diffusion. Once they penetrate to the reinforcement they form Ferric Chloride by chemical action with the steel. Deterioration can be rapid, as localized pitting corrosion can occur in addition to overall corrosion of the steel bar. Chlorides can also easily pass into the structure through microcracks caused by thermal contraction, drying shrinkage and restraint of movement.

It is therefore essential to protect the concrete from the ingress of Chlorides and Sulphates in order to enhance its long-term durability.

This is best achieved in new structures by spraying the concrete with two coats of Deep Penetrating Sealer soon after removal of the formwork.

DPS is also useful for treating repaired concrete against deterioration.



APPLICATION

1. When carrying out a repair works, first wash the surface of the exposed concrete with fresh water and then apply a single coat of DPS.
2. Protect the area from salt spray and as soon as the DPS is dry apply a bond coat to the concrete surface, using Repair Mortar Overlay from Evercrete.
3. For optimum results the bondcoat should be a 1:1 mixture of cement and an acrylic polymer such as Repair Mortar Overlay.
4. Acrylic polymer is also useful to add to the repair mortar in order to make it waterproof for better adhesion to the concrete and reinforcement.
5. After casting the repair area in either concrete or mortar (depending on the volume of the repair), apply two coats of Deep Penetrating Sealer to the repair surface. Allow 24 hours between coats. Wash any salt water off the surface before application of the second coat.

Because of the possibility of incipient anode corrosion, where the steel in the concrete adjacent to the repair may corrode because of the potential difference between the treated and the untreated steel, we would recommend treating the concrete surface adjacent to the repair with DPS upto a distance of approximately once metre from the repair.

The life of marine structures treated with DPS is greatly enhanced because the ingress of Chlorides and other aggressive chemicals are virtually eliminated.