

UNIT IV**TECHNIQUES FOR REPAIR AND PROTECTION METHODS****4.1 CORROSION ELIMINATORS**

Cement paste normally provides a highly alkaline environment that protects embedded steel against corrosion. Concrete with a low water/cement ratio, well compacted and well cured, has a low permeability and hence minimizes the penetration of atmospheric moisture as well as other components such as oxygen, chloride ion, carbon dioxide and water, which encourage corrosion of steel bar.

In very aggressive environments, the bars may be coated with special materials developed for this purpose. Coating on reinforcing steel, therefore, serves as a means of isolating the steel from the surrounding environment. Common metallic coatings contain galvanizing zinc. High chloride concentration around the embedded steel corrodes the zinc coating, followed by corrosion of steel.

Hence, this treatment is used for moderately aggressive environments. For high corrosive atmospheres caused by c

hloride ions from the de-icing salts applied to protect against sodium chloride and calcium chloride, usually near seashores, epoxy coating is applied to protect steel reinforcing bars from corrosion. Such bars have acceptable bond and creep characteristics. The coat normally applied is 150 μm thick. The reinforcement is epoxied in the factory itself, where the steel rods are manufactured. Such reinforcement is known as fusion-bonded epoxy coated steel. Steel manufacturers also manufacture CTD bars with better corrosion resistance, termed as Corrosion Resistance Steel (CRS). The performance of the CRS CTD bars is better in resisting corrosion compared to plain CTD bars. However, the use of CRS CTD bars will only delay the process of corrosion. It will not prevent corrosion once for all.

Polymer Resin based Coating

These are generally of two types,

1. Resins blended with organic solvents and

2. Solvent free coating

Solvent-based coatings are subdivided into single and two component coatings. The coatings on drying produce a smooth dense continuous film that provides a barrier to moisture and mild chemical attack of the concrete. Because of the resistance to moisture penetration, staining, and ease of cleaning, they are preferred for locations of high humidity and those in which a lot of soiling occurs.

Most products are low solids content materials which require multiple coats to produce a continuous film over concrete, since the materials are thermoplastic, and have a significant degree of extensibility they are capable of bridging minor cracks which may develop in the concrete surface if they are applied in sufficient thickness. The number of coats required depends on the surface texture, porosity and the targeted dry film thickness. Although some of the newer products have some moisture tolerance, enabling them to be applied over damp surfaces, in normal usage they should be applied over dry surfaces. Due to their relative impermeability to water vapor, they could blister when applied to concrete surfaces with high moisture content or where the opposite surface of the concrete is in constant contact with moisture. Careful control of wet film thickness is therefore necessary during application.

Two component polymer coatings consist of a solution of a compounded polymer with or without solvent and a reactive chemical component called the curing agent hardener or catalyst. The materials are usually mixed just prior to use in accordance with the manufacturer's instructions. When using two components polymer based coatings the following items are of importance to the application of the materials.

1. Most products are supplied as a kit containing the two components in the required proportions. Therefore, in order to realize the full potential of the product the correct mix ratio of the two components must be used.
2. To ensure a complete reaction of the two components they must be mixed thoroughly.
3. Some two component material requires an induction period of 15 to 40 min after mixing. Therefore, such products cannot be used immediately after mixing.
4. Viscosity reduction by the use of thinners should be resorted to only after the manufacturers are consulted.

5. The storage temperature of solvent based coatings is not critical. They should be stored at a temperature 16 to 32°C just prior to use.

