

Protective Coating for Exposed Concrete Surfaces

Protective coatings for exposed concrete surfaces have become essential elements in construction projects, especially in harsh environments or for concrete surfaces subjected to any kind of harmful attack. Ingress of moisture into concrete may cause corrosion of steel reinforcement inside it which is harmful to concrete. Durability of even good quality concrete can suffer due to persistent chemical attacks, abrasion, freezing & thawing etc., if left unprotected. That's where the relevance of protective coatings come into the picture. These coatings pose as shields between the concrete surface and the surrounding environment and protect concrete from harmful affects.

Protective coatings are usually made of resins, pigments and solvents. There are solventless protective coatings as well. It is the resin component that provides the protection while pigments impart colours. Protective properties of coatings are sometimes further modified by adding suitable fillers depending on requirements. Some examples of protective coatings are epoxy coatings, polyurethane (PU) coatings, vinyle coatings, polyester coatings and so on.

Protective coatings are quite useful for varieties of structures such as bridge decks, abutments, heavy-duty industrial floors or industrial concrete surfaces subjected to chemical attacks or harsh environment, water & waste water tanks, marine structures, manholes, masonry work, dams, retaining walls, piles and any other structure likely to come in contact with adverse environmental or climatic conditions.

Desired characteristics or qualities of protective coatings may vary from work to work. The requirements of protective coatings for marine environment may not be exactly the same for protective coatings to be used in a bridge and so on. Some important quality requirements of protective coatings for various environments are:

the protective coating should be durable.

The coating material should have waterproofing or hydrophobic properties.

It should develop strong and lasting adhesion with the concrete surface.

It should provide relentless protection against chemical and other attacks.

The coating material should have good thermal resistance, ie it should be able to withstand high temperature and fluctuations in temp.

The coating material should have good resistance to impact and abrasion.

It should have good resistance against constant exposure to UV radiations from the sun.

It should be resistant to salts (e.g. chlorides, sulphates etc.), acids, alkalis, oils, grease etc.

The concrete protective coating should be able to prevent ingress of harmful gases like carbon dioxide, hydrogen sulphide etc. and other atmospheric pollutants.

It should be non-porous, sleek and be able to prevent growth of fungus, algae etc.

It should be economical and require no or low maintenance.

Concrete protective coating should be environment-friendly.

As already mentioned, specific quality requirements of a protective coating would depend on the work for which it is to be used. Resistance to chemical attack may be an important requirement for such a coating to be applied in many industrial work while the same may not be a requirement for a coating to be applied in ordinary water tanks. At the same time durability, waterproofing etc. qualities would be common requirements for both the instances. There can be many such examples and a particular protective coating may not have all the qualities mentioned previously.

A protective coating for concrete surface usually consists of primer coat and top coat. Number of coats to be applied is as per manufacturer's or other relevant specifications. The primer should have good penetrating and adhesive characteristics. Primer also helps reducing the consumption of the top coats. There are large number of primers for diverse protective applications. An example is Silane modified Siloxane emulsion (solvent free).

Top coat material is usually acrylic emulsion. Top coat should be suitably pigmented depending upon the aesthetic requirements. Again, there are plenty of top coat materials for diverse protective needs. An example is pure aliphatic acrylic resin (water based). Compatibility of a coating to the surface of its application can be checked as per ASTM D3359.

A very important aspect of concrete protective coating is surface preparation. The surface on which the coating is to be applied needs to be well prepared to receive the same. Even a top-grade protective coating could have a shorter life if the surface is not prepared well. In fact, most protective coating failures are not due to their qualities but due to improper or lack of surface preparation.

Selection of proper method of surface preparation is quite important and depends on the type of coating, immediate environment, nature of the surface etc. Grit blasting, high pressure jetting, abrasive cleaning etc. are some of the means of surface preparation. Oil, grease, chemicals, dust, rust, loose materials, lumps or any foreign matters should

be completely removed. Blowholes, dents, honeycombs etc. are cleaned and filled with suitable substances before application of coating. In case of wet cleaning the surface is allowed to dry fully. Manufacturer's recommendations or relevant specifications are to be followed properly.

Source: <http://civilconstructionresourcez.wordpress.com/2012/02/16/protective-coating-for-exposed-concrete-surfaces/>