New Edge Waterproofing Technologies ADO's Innovative Products and Systems for Protecting Concrete Structures

Concrete is the most used human-made material worldwide. It is used twice as much as all other materials combined together. Concrete is very popular as it is multipurpose, has unique engineering properties, is cost effective and its ingredients are easily available. Concrete is durable. It is a strong material, which has a long lifespan and it can be moulded into any shape and size when freshly mixed. In spite of great advancements made in concrete technology today, the ability to produce high quality concrete for waterproof structures is still evolving.

It is a prerequisite of modern building materials that they should have such characteristics that structures, for which they are used, would reflect desirable utility properties. Durability is defined as the ability of building materials to fulfill required functions for certain duration of time under the action of definite factors. The necessary requirements for durable structures are fulfilled when all parameters like performance, strength and stability are fulfilled, during the entire lifetime without substantial reduction of its utility and excessive unforeseen maintenance costs.

A significant concern is to protect properly concrete structures against the damaging effect of dampness. A faulty waterproof protection of a building leads to destructive process that considerably decreases its durability. Engineered protection of the concrete structures against the harmful action of dampness is a major economical and technical problem found universally.

Sources of Dampness of Structures

Dampness of a structure may be caused by water coming from various sources, such as:

- Technological water / System water
- Ground water
- Rainfall
- Sorption dampness
- Condensation of water vapour on the surface of or inside the element
- Flooding water, etc.

Waterproofing

Waterproofing is a method by which a structure/surface is made resistant to damage caused by water. By waterproofing we mean formation of an impervious barrier/layer, which is technically designed to prevent water from entering or escaping from various sections of building structures. Internal areas that require waterproofing include bathrooms, shower recesses, laundries and toilets, kitchens, basements, etc. While external areas that require waterproofing include roofs, planter boxes, podiums, balconies, retaining walls, swimming pools, etc.

Protection Science

Concrete structures submitted to damp and water activity may be protected in different ways. The following waterproof protections are normally used:

1. Surface Protection
2. Structural Material Protection
3. Protective Covers / Layers

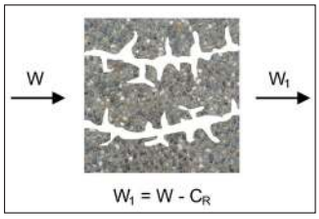
Resistance of Concrete [CR] against the flow of damp/ water [W] is considered as an important property of concrete for determining suitable protection of a concrete structure. Also to be noted that resistance of concrete [CR] is not sufficient for suitable protection of concrete structure against moisture. Hence, it has become a necessity to use additional solutions for proper protection of concrete. This protection mechanism is illustrated below:

W = the density of in-flowing stream of moisture (water)

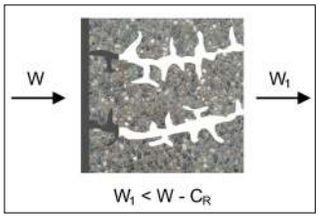
W1 = the density of out flowing stream of moisture (water)

CR = Resistance of Concrete

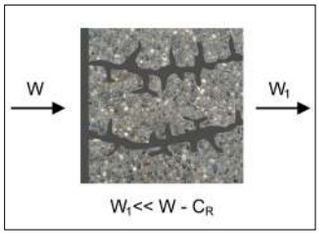
Normal Concrete Without Additional Protection (Fig 1):



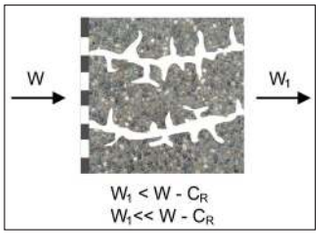
Concrete With Surface Protection (Fig 2):



Concrete With Structural Material Protection (Fig 3):



Concrete With Protecting Covers (Fig 4):



Structural Material Protection

Case Study: CONVAC PLUS Application @ Town Hall, Kolkata

CONVAC PLUS powered by PPS Technology is a waterproofing additive in a semi liquid form for mortars and concretes. It is a Cement Property Enhancer but does not modify the setting time, the hardening time, but increases the final strength of cement mixtures.

Due to the unique and innovative formulation, CONVAC PLUS gives hardened mortars and concretes excellent impermeability in beating and counter thrusting water (more than four bars); therefore, it is highly recommended for internal/external plasters and concretes and also to make foundations.

Using CONVAC PLUS as an integral waterproofing product, it is possible to waterproof the entire thickness of concrete, thus shielding it from an attack of aggressive and polluted waters and protecting the steel reinforcements of the complete structure.

Successful Application of CONVAC PLUS for repair and restoration work of Town Hall, Kolkata, in October, 2015:

The Town Hall, Kolkata, the city's most famous and a major architectural landmark, was built in 1813 by architect & engineer Maj. Gen. John Garstin in a Roman-Doric style. At the time, it was used by the European community for social gatherings.

We were approached for a complete waterproofing solution for this structure. A successful waterproofing treatment was conducted in the Town Hall's basement. The results were really well appreciated. CONVAC PLUS stands out from the rest because of its exceptionally easy and user friendly application. And, our experienced technical team along with the applicator and masons conducted the application work perfectly.

Town Hall, Kolkata: Application Work in Progress

Town Hall, Kolkata: Successful Application of Convac Plus

CONVAC PLUS is an optimal and complete waterproofing solution for each project. Its application makes waterproofing, from the basement to the roof, simpler. It is important to remember that to ensure good waterproofing, concrete must be properly planned. It should have a dosage of cement not lower than 300 kg/m^3. It is then that CONVAC PLUS becomes highly effective. The intrusion of foreign bodies such as wood, soluble materials, porous materials and loose stones in concrete may jeopardize the structure's impermeability.

Unlike many "ready-to-use" products available in the market, CONVAC PLUS makes plasters easily applicable to further masonry work and its high adhesive nature lowers rebound loss. It is important to note that no further subsequent treatment is allowed after a structure is treated with silicone solutions, but plasters done with CONVAC PLUS make other surface treatments possible without any problems.

We can confidently say that until now, no single integral waterproofing compound is available in the market which is 100% waterproof unlike CONVAC PLUS, which provides 100% water proofing & damp proofing properties to any construction. It has emerged as the ultimate and the preferred choice as it gives complete solution, is cost effective and chances of failure are reduced considerably. Both CONVAC PLUS and CONVAC are an innovative and first of its kind patented product system, which act against waterproofing and damp proofing during and after construction.

Also, it is quite surprising that many people have not fully appreciated the benefits that liquid applied waterproofing membranes can provide over conventional membrane systems like bituminous, EPDM, APP, PVS Sheets, etc.

By liquid applied systems, it implies products that come in liquid form, which are single or multi component, applied cold (without any necessary pre heating) and serve as protective coatings. These products are usually either acrylic, polyurethane, bituminous or some hybrid combination of all stated.

Liquid applied systems offer the following key benefits over conventional membrane systems:

- **Flexibility:** They are very flexible to apply; especially when faced with various obstacles on rooftops such as antennas, satellite dishes, solar panels, mobile towers, water tanks, etc. They can be easily coated around any obstacles.
- **Easy to install:** They are very simple to install even for non professionals. This significantly reduces the labour cost of waterproofing.
- **Easy repair/renewal:** Quick patch work can be performed quite easily if required. It is also trouble-free to recoat old coatings whereas damaged membranes may require complete removal and / or new installation.
- **Monolithic:** These coatings can be applied in one piece, which means no risk of water entering between the seams.

However, no analysis of liquid applied systems would be complete without mentioning the potential disadvantages of poor surface preparation. In order for proper bonding to take place between the coating and the substrate, the substrate must be clean and porous in nature; otherwise there will always be the risk of de-bonding of the coating from the substrate.

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