

# Treating Dampness with Crystalline Waterproofing System

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**Abstract:** Buildings fit structurally give us the developed ranges of urban areas, towns in which we guarantee our natural surroundings. One of the significant elements of working (from a sturdiness perspective) is to reject or be impervious to extreme dampness ingress. However the issue of dampness is confronted at each family unit, business and mechanical level. Building materials, for example, blocks, solid, mortar, timber and so forth have moisture content, which under typical conditions is not hurtful to the execution of the structure. The ascent in the dampness content in these materials to a level where it gets to be noticeable or cause decay of the structure is a genuine problem. Dampness and mold in homes is connected with expansions in a few wellbeing impacts including upper respiratory issues, trouble breathing, asthma, bronchitis, and skin inflammation. These malicious impacts can be stayed away from using crystalline waterproofing technology, which viably enhances the toughness and lifespan of solid structures, in this way decreasing long haul wellbeing dangers. This paper demonstrates the use of crystalline waterproofing technique to reduce the health risk due the presence of dampness and subsequent mold formation.

**Keyword:** Dampness, Waterproofing, Crystalline, Health Risk

## I. INTRODUCTION

There is a need to control moisture in both new and existing construction because of the significant health consequences that can result from dampness and mold.

### *Effect Of Dampness On Structures*

- As a result of dampness moisture travels through the walls and ceilings causing problematic aesthetic appearance .
- In case of plaster containing lime moisture causes softening and crumbling of plaster.
- Causes efflorescence and sometimes dampness can cause disintegration of bricks, stones, tiles etc.
- The flooring might loose its adhesion when moisture enters through the floor.
- Timber fittings when coming in contact with damp walls can deteriorate as result of crumbling, buckling etc.
- Dampness can be dangerous in places of electrical fitting resulting of short circuit.
- Promotes growth of termites.

- Metal fittings get corroded with the presence of moisture.

## II. WATERPROOFING AS A CURE TO DAMPNESS

Water proof is referred to as a system which can resist the ingress of water under hydrostatic pressure. Waterproof products can be taken under water or submerged in water without the fear of getting the product damaged.

## III. REQUIREMENTS FOR WATER-PROOFING SYSTEM/MATERIAL:

The water-proofing material/system should possess following basic requirements:

- Be watertight and should have physical stability.
- Have strong adhesion with the substrate.
- Good resistance to abrasion cracking.
- Withstand expansion and contraction of the substrate due to thermal and other causes preventing cracking and warping stresses.
- Be resistant to UV radiations.
- Retain breathing capability of substrate material.
- Resistant atmospheric chemicals, mild acids and alkalies.
- Be easy to apply.
- Resistant algae, fungus and other microbial attacks
- Be cost effective.
- Be easy to maintain (local repair, cleaning etc.)

## IV. TYPES OF CONVENTIONAL WATER-PROOFING SYSTEMS DEVELOPED OVER THE YEARS[1]

- Brick Bat Coba System (Fig 1)



Figure 1

- Bituminous Treatment (Fig 2)



Figure 2

- Metallic Sheet Wrapping (Fig 3)



Figure 3

- Polyurethane Based Waterproofing Treatment
- Epoxy Based Water- proofing System
- Box Type Waterproofing

Some modern techniques in water-proofing:

- Flexible Membrane Waterproofing System[2]



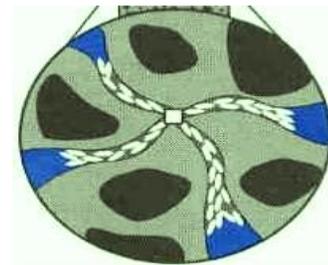
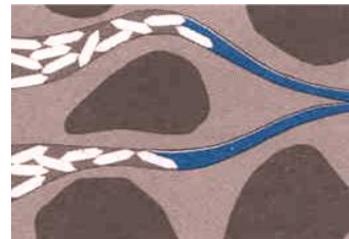
- Crystalline Waterproofing System

V. CRYSTALLINE WATERPROOFING SYSTEM[3]

Crystalline technology improves the durability and performance of concrete structures, lowering their maintenance cost and extending their lifespan by protecting them against the effect of aggressive chemicals. These high performance qualities result from the ways in which the crystalline technology works, when used with concrete. Crystalline Technology waterproofs and improves the durability of concrete structures by filling and plugging the

pores, capillaries and micro-cracks with a non-soluble, highly resistant crystalline formation. In the crystalline waterproofing process the crystalline material applied to the concrete as an admixture or a surface coating travels through the concrete with the help of two mechanisms: Osmosis and Brownian motion (diffusion). Like in plants where the leaves consisting of guard cells carries out photosynthesis and growth of the plant through osmosis, in the same manner crystalline process also adopts the process of osmosis.

Crystalline as a coating material has to be applied on a wet surface having an open capillary system which helps in developing a suction mechanism and also gives path to the crystalline chemical towards the capillary pores. The capillary pores consist of water molecules behave like a solvent just like in most of the biological cases where water is generally a solvent. The crystalline chemical will behave like a solute of higher concentration and by process of osmosis the water (solvent) will move towards the crystalline chemical (solute). This chemical reaction of crystalline material and the by- product of cement hydration in concrete in the presence of water (solvent) will result in the formation of silicate crystals through the microstructure of concrete where ever moisture is present. The water (solvent) will leave behind temporary vacuum thereby eliminating vapor pressure. This would pull the crystal inwards till balance is achieved. The formation of crystal silicates in the capillary pores will remain dormant until there is any presence of moisture in the future. Whenever more water is encountered in the capillary, the process will be resumed. Crystalline waterproofing system does not remain as a coating but becomes an integral part of the concrete. The progressive movement of the white colored crystals is diagrammatically shown in a simplified sketch. The blue channels represent the saturated Capillaries and the white color crystals depict the active components of the crystallization material.



## VI. IMPLEMENTATION OF CRYSTALLINE WATERPROOFING MATERIAL

Crystalline waterproofing material can be applied to the concrete in two stages:-

- During the construction stage
- Post construction stage[4]

### A. *During The Construction Stage*

Crystalline material can be applied as an admixture to the concrete at the batching plant. The percentage of crystalline admixture can be varied depending on the area of application. Generally the crystalline content is two to three percent depending on the Portland cement content [5]. An important aspect to consider while designing admixture and their usage in concrete is that to verify that all the concrete elements i.e. superplasticizers, air entrainers or water reducers are compatible with the crystalline admixture.

### B. *Dry shake application of crystalline material*

Waterproofing of basement slabs or floors can be achieved by sprinkling powder on the surface of the slabs with the help mechanical spreaders with concrete already placed, consolidated and leveled. The powder is then worked into the surface of the slabs with a trowel. The crystalline material in the form of powder penetrates into the concrete slab after a period of 15-30 days.

### C. *Post Construction Stage*

The crystalline waterproofing coating materials are mixed with water at a ratio of five parts powder to two parts water by volume for brush application, and five parts powder to three parts water by volume for spray application. These ratios can be altered depending on the site conditions and the application of the material.

Curing the crystalline waterproofing coating will begin as soon as it has hardened sufficiently so as not to be damaged by a fine spray. Under normal conditions, the treatment will be ready for moist curing two to three hours after application. This is accomplished by misting with a fog spray of clean water at least three times a day for two to three days to prevent premature drying. After a period of 15 days the testing procedure to check the permeability characteristics of concrete can be started.

## VII. CONCLUSION

One of the most common factors of deterioration of building elements with respect to its durability is the ingress of moisture or dampness in the structure with the passage of time. Dampness is not only harmful for the building itself but also for the inhabitants of the building. So it is very important to make a building waterproof. Waterproofing of structure of the building can be effectively achieved with the implementation of crystalline waterproofing system. The crystalline system cures the concrete from the inside and the concrete itself acts as a barrier to any passage of moisture and thereby minimizing the generation of dampness to a great extent.

## VIII. REFERENCES

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Passed B.E.(Civil) from HBTI,Kanpur and M.E. and PhD from Punjab Engineering College, Chandigarh. More than thirty years experience in teaching, preparation of teaching-learning packages,consultancy in repair and rehabilitation of structures and curriculum design and oraganizing national conferences. Co-authored many publications such as Data Book in Hydraulics, text book on Building Repair And Maintenance Management . Developed modules and manuals on Consruction, Operation and Maintenance of Tube wells, Repair, Maintenance and Rehabilitation of Structures, Condition survey of R.C.C. structures, Environmental Pollution Control and Management,and has also developed many video programmes. Guided about fifty M.E. thesis and guiding nine PhD students,presented/published about fifty research papers and authored large number of professional reports.



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