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# Durability Analysis of M20 Grade Crystalline Concrete - A Review

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**Abstract:** Concrete is a homogeneous mixture of cement, sand and aggregates with the addition of water for curing purposes. Due to this composition concrete is often susceptible to damage and deterioration from the ingress of moisture and other deleterious chemicals. These problems can be resolved by the implementation crystalline capillary pore-blocking technology. In these papers plain cement concrete is alternated with a fixed percentage of crystalline waterproofing agent. Tests are carried out for checking the durability of the concrete. First test is Compressive Test and second test is Flexure Test.

**Index Terms:** Crystalline waterproofing, pores, Capillary action, Compressive Test, Flexure Test.

## I. INTRODUCTION

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. To check the extent up to which the formation of the crystals has taken place and is assisting in making the concrete waterproof need to be checked through a certain methodology. In this study the water permeability of the crystalline waterproofing system has been checked. The crystalline waterproofing system involved both the application of both admixture as well as coating mechanism.

Integral Crystalline Waterproofing blocks the movement of water through the concrete by plugging or blocking the natural pores, capillaries and micro cracks, and concrete its own waterproofing barrier. This stands in contrast to more conventional means of waterproofing, which usually involves applying a coating or coated to the concrete surface. The result of these technology the structure with reduced cracking, self-sealing and waterproofing abilities which provides a powerful defense against water and resist corrosion of reinforcing steel.

## II. LITERATURE REVIEW

A. *Mazen J. Al-Kheetan, Mujib M. Rahman, Denis A. Chamberlain [2018]*

Concrete cubes were produced, 16 for the control mix, 4 cubes treated with 1% admixture, 16 cubes treated with 2% admixture, and 4 treated with 8% admixture. Cubes were cured in a water bath for different periods before tests were carried out.

2% cementitious admixture to concrete gave a boost to strength values from day 7 to day 28, where an increase of 37% in strength was achieved in that period. Where as untreated concrete attained an increase of 11% during the same period.

B. *Jirí Pazderka, Eva Hájková [2016]*

21 specimens were prepared for the test – 3 pieces for each tested time

period. The crystalline admixture was added directly to the mixing water before mixing the other components in (in amount of 2% of cement weight). The results have shown that the compressive strength of the concrete with a crystalline admixture (added in an amount of 2%) and the compressive strength of the specimens from concrete without admixture were different after 28 days.

C. *Yong Zhang, Xiuli Du, Yue Li, Fumin Yang, Zhanguo Li [2018]*

Various properties of the researched and prepared capillary crystalline waterproofing coating conform to the requirements of II type CCCW C property indexes in the standard, wherein the wet substrate bonding strength reaches 1.8MPa, the 28d seepage resistance reaches 1.3MPa, the 56d secondary seepage resistance reaches 1.4MPa, and the 28d seepage resistance ratio reaches 325%.

D. *Pavel Reiterman, and Jiri Pazderka [2016]*

The depth impact of crystalline coating and its evolution in time was studied in the performed experimental program. The motivation was to assess the sealing effect of the present modern solution applicable as an additional protection of Sub-surface concrete structures. The results of the tests presented in the paper have confirmed that the crystalline coating (Xypex) is able to change the concrete structure at a specified depth under the cured surface. This process resulted in the creation of the waterproof concrete structure.



E. R Vijayalakshmi, D. Dinesh Babu, M. Mathivanan, J. Sandeepkumar, V. Boopathiraja[2018]

Fly ash, GGBS, Silica fume, Rice husk ash can be added as a

partial replacement of the use of Fly ash with addition of crystalline waterproofing agent gives low strength at 28- days. GGBS replaces partially, it gives very good results and a greener approach in construction and sustainable development. In addition of crystalline waterproofing agent, it gives better strength. Cement replacement up to 10% with silica fume leads to increase in compressive strength, for

M30 grade of concrete. The use of rice husk ash with addition of crystalline waterproofing agent gives poor strength at 28-days.

F. Guozhong LU, Weixuan ZHAO and Dewei DAI[2015]

The type and adding amount of cement has a great influence on cementitious capillary crystalline. High strength is achieved by adding Portland cement of amount of 60percent. Coating crack resistance and strength can be significantly increased by reasonable grading of quartz sand.

The synergy of admixture and dispersible powder can inhibit the alkaline overflow of sodium, and improve the performance of anti-reversion alkaline. Coatings prepared have good advantages of self-healing and environmental protection, which indicators have reached or exceeded the standards of GB18445-2001. It is a kind of good performance cementitious capillary crystalline waterproofing coating.

### III. CONCLUSION

- A. Increase in strength is observed on a greater extent in cementitious admixture concrete than untreated concrete.
- B. Seepage resistance increases.
- C. The results of the test have confirmed that crystalline waterproofing is able to change the concrete structure at a specified depth under cured surface.
- D. The addition of crystal amount has a greater influence on cementitious capillary crystalline.
- E. Coating crack resistance can be increased.
- F. Beneficial for under water concrete structures.

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