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Experimental Study on Properties of Concrete Using Admixture as Penetron

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ABSTRACT

This research investigates the effects of the waterproofing admixture Penetron Admix on the fresh and hardened properties of structural concrete and assesses whether the product is suitable for use on construction projects. Many tests were conducted by the researchers by using a grade 25 control mix containing different percentages of admixtures and keeping the water content ratio constant. The results showed that Penetron Admix enhanced the properties of the concrete. Even with the small percentage increase of 0.8% dosage, there was an increase in compressive strength of 15%. The results of 28 days of curing period were significantly more than 7 days of curing for compressive strength. At a standard dosage of 0.8% increase in compaction, a factor was observed in the range of 0.92-0.98 for compaction factor value. Permeability was decreased by 79% with the standard dosage of 0.8was an increase in compressive strength of 15%. The results of 28 days of curing period were significantly more than 7 days of curing for compressive strength. A higher dosage was even more beneficial for the strength, but with a higher dosage, the cost of the concrete will also increase. An increase in workability was also observed with 2% use of admixture and the initial setting time was increased by 30 minutes and the final setting time was increased by 1 hour. At a standard dosage of 0.8% increase in compaction, a factor was observed in the range of 0.92-0.98 for compaction factor value. Permeability was decreased by 79% with the standard dosage of 0.8.

1. INTRODUCTION

Nowadays, concrete is widely used worldwide, and will indeed remain the most common construction material for still a long time to go. This is due to the numerous beneficial aspects of concrete, including its excellent technical properties and competitive price on the market. With the increasing use of concrete, we need to enhance the strength of concrete by adding various admixtures. Admixtures are ingredients other than water, aggregates, hydraulic cement, and fibers that are added to the concrete batch

immediately before or during mixing. The proper use of admixtures can confer the same benefits as those of supplementary cementitious materials in reducing the emission of greenhouse gases and in increasing the life cycle of concrete structures, thus making concrete sustainable construction material.

A. Penetron Crystalline

(Source - www.penetron.com)

The present project work introduces a new type of waterproofing admixture namely, PENETRON admixture. Penetron is a non-toxic, 3rd generation crystalline admixture in powder form that is added to new concrete during batching. Once inside the concrete, penetron admixture reduces permeability by permanently Self-healing microcracks pores and capillaries. This protects the concrete against water penetration and investigates the mechanical properties and strength of concrete with the use of special admixtures as the Penetron effect of deterioration. Even under high hydrostatic pressure. It provides projects with waterproof and durable concrete that has the ability to self-heal and seal cracks that develop during the lifetime of the concrete penetration admixture and is compatible with all commonly-used workability admixture and mix design formulations.

1.1 PENETRON CRYSTALLINE

A. Need of the Study

The use of concrete is increasing day by day. Concrete is used for many applications, including basic foundations and superstructures.
Admixtures when added to concrete not only increase the strength but also improve its properties. Hence to enhance the properties of concrete there need of using penetron admixture in constructions. Due to following reasons, there is a need to study using admixtures:

- Primarily to reduce the cost of concrete construction
- To modify the properties of hardened concrete
- To ensure the quality of concrete during mixing, transporting, placing, and curing
- To overcome certain emergencies during concrete operations.
- Improving workability, increasing or decreasing cure time, and increasing concrete strength.

2. MATERIAL AND PROPOSED METHODOLOGY

For this project, there is a need to use the concrete blocks in which the admixture penetron will be added in proportion. This block is made by using various materials like cement, coarse aggregate, fine aggregate, water, and penetron admix. Preliminary tests on aggregates, tests on fresh and hardened concrete, the making of test specimens, and the curing of the specimens are done according to standards. From the literature review carried out for this project work, it has been decided to carry out the project work entitled “To investigate the mechanical properties & Strength of concrete with the use special admixture as PENETRON.”. For this project work
The proposed methodology decided is as given below.

1. The use of penetron admix will be made by adding it to our cement and other material will be collected from the market.

2. Preliminary tests on aggregates, tests on fresh and hardened concrete, the making of test specimens, and the curing of the specimens are done according to standards.

3. The casting of concrete will be done and then on day one demoulding and curing will be done.

4. Then after 7 days, 14 days and 28 days of curing we will perform various tests on the cubes.

5. Various tests such as compressive strength, relative density, water absorption, slump test, and results of initial and final setting time will be evaluated.

6. Based on the above study, the project report will be prepared for submission work which will include the details of the above study including the result, discussion, and final conclusion.

3. CONCLUSION AND FUTURE SCOPE

The research shows that Penetron Admix;

- It is beneficial in terms of strength gain. Even the small percentage of 0.8% dosage produced an increase in strength of 15% for the characteristic 28-days strength.
- Higher dosage was even more beneficial for the strength, but with a higher dosage, the cost of the concrete will also increase.
- Increases the workability, the maximum increase being obtained at 2% dosage.
- Significantly increase the initial and final setting time of the mix when used above the standard dosage.
- Initial setting time was increased by up to 30 minutes with a dosage of 2% and final setting time was increased by up to 1 hour with the same dosage.
- Since a standard dosage of only 0.8% is usually used on construction sites, only when using a higher percentage of this admixture should retardation of the set be an issue. Increases compaction factor significantly only above the standard dosage of 0.8%. Moreover, the mixes produced were all in the suitable range of 0.92-0.98 for compaction factor value to investigate the mechanical properties and
- strength of concrete with the use of special admixture as PENETRON
- At 28 days concrete was behaving more like grade 30 than grade 25. This is a big advantage in terms of compressive strength.
- At 7 days of curing the increase in strength was observed to be 12.5% and at 28 days of curing the increase in strength was 15.9%
- Significantly decreases permeability. The standard dosage of 0.8% produced a decrease of 79% in permeability. The permeability was lowered even more with an increasing percentage of the admixture, resulting in a more durable concrete.
- Does not have a significant impact on density.
- It can be therefore concluded that Penetron Admix improves the strength and durability of concrete.

As the Penetron Admix is the world's most efficient and economic permeability reducing concrete admixture as Defined by tests of the American concrete institute, there will be more future scope for using this additive in the concrete mix. Concrete remains an extremely cost-effective and adaptable building material, and this high level of utility has driven the push for recent innovations that make its use more environmentally friendly. This study will be helpful for reducing the environmental impact of concrete by Increasing the overall durability of concrete by integrating waterproofing and resistance to chemical attack with crystalline material. All PENETRON products are completely free of volatile organic compounds (VOC) and non-toxic, making them Compatible with potable water or food-containing applications. Being a green-label certified system, PENETRON also conforms to international green building standards. Cracks that develop during the lifetime of the concrete are self-healed by PENETRON, resulting in permanent concrete prote.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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The author declares that they have no funding support for this study.

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