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A Review on the Effect of Curing Methods of Various Sources of Water on Concrete

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ABSTRACT

This research investigated the effect of different sources of water on the compressivestrength of concrete. Water samples from different sources of water were tested in thelaboratory and studied the chemical characteristics of water from various sources of water. 15×15×15 PCC cube samples were cast of ratio (1 : 2.73 : 2.80). 10% and 20% of cement is replaced by fly ash. While mixing the concrete Super plasticizer was usedas admixture named as FOSROC Auzamix 400. Suitability of a particular source of water forcuring can be checked by casting concrete cubes using water and comparing its 7 days, 14 days and 28 days strength. Canal water, tap water and RO water was taken for curing. Submerged curing method adopted to evaluate the compressive strength of concrete. Cubes were investigated after subjecting them to curing conditions. Testing indicate that submerged curing method provide best results. Sources of water used in curing have a significant impact on the compressive strength on the resulting concrete. The result shows that RO water curing had the highest compressive strength. RO water curing was the best as compared to canal water and tap water. It was concluded that RO water could be used for curing because of canel water contains more hardness and chloride in the sample of water

Keyword -*Compressive strength, concrete, effects of water quality parameters, Fly ash, Curing method.*

1 INTRODUCTION:

Water is an important ingredient of concrete. Part of water is utilized in the hydration of cement and the balanced water is required for imparting workability to concrete. Thus the quantity and quality of water is required to be looked into very carefully. The strength and durability of concrete is reduced due to the presence of chemical impurities in water. Most of the specifications recommended the use of potable water for making concrete. A practical solution would be tests for time of set and strength of concrete between the water under consideration and the water of proven quality.

What is curing ?

To “cure” concrete is to provide concrete with adequate moisture and temperature to foster cement hydration for a sufficient period, of time.

Proper curing of concrete is crucial to obtain design strength and maximum durability, especiallyfor concrete exposed to extreme environmental conditions at an early age. Others define curing as the process of controlling the rate and extent of moisture loss from concrete during cement hydration. High curing temperature (up to 212◦F or 100◦C) generally accelerates cement hydration and concrete strength gain at early age. Curing temperature below 50◦F (10◦C) are not desirable for early age strength development. When the curing temperature is below 14◦F (-10◦C) the cement hydration process may cease. Concrete needs to be kept for a longer time in formwork when cast in cold weather condition.

On the whole, the strength of concrete, its durability and other physical properties are affected bycuring and application of the various types as it relates to the prevailing weather condition in a particular locality, as curing is only one of many requirements for concrete production, it is important to study the effect of different curing method which best adapts to each individual casting process. This study presents the effects of different curing methods on the compressive strength of concrete cured for 7, 14, 21 and 28 days.

2. METHODOLOGY

A brief over view of the theoretical concepts related to determine the possibility of partially replacing cement with fly ash. The present chapter describes the various experiments and testing that have been carried out on this and the method of analysis that have been employed in this project. The first step in the project was to collect the raw materials after that mix was designed. After that, the casting was started. Samples were made, by using 10%, 20%, Replacement of cement with fly ash followed by the testing of samples at 7days, 14 days and 28days.

Preparation of Samples

All samples were prepared in the Concrete technology lab during the months of March-April. The sample is made for compression test, split tensile test and flexural test. The various steps involved in the sample

preparation process are given below.

Sieves

Different sieves as standardized by the IS code and then pass aggregates through them and thus collect different sized particles left over different sieves. A set of IS Sieves of sizes-20 mm and 16 mm were used for sieving the coarse aggregates.

Calculation for Materials

By using mass-method to determine quantity of various materials to be mixed in the planned concrete in the sample preparation process are given below. Sieve analysis helps to determine the particle size distribution of the coarse and fine aggregates. This is done by sieving the aggregates as per IS: 2386 (Part 1)-1963. In this concrete proportions have been preplanned i.e. 10%, 20% of cement is replaced by Fly ash . Also grade of concrete is decided as M40.

Mixing of Concrete

M40 mix with 1:2.73:2.80 ratio of cement, fine aggregate and coarse aggregate respectively was prepared for each sample. Different percentages of cement was replaced by fly ash. The water/cement ratio was kept as 0.45 for all mixes.

The proportioned mix was blended together by Machine, and then water was added it in small quantities. The concrete was mixed continuously by machine till the appropriate mortar consistency is reached.

Molding of Concrete

The concrete is then casted into molds. It was to be noted while opening the mould that the edges of concrete sample shall not be crushed while opening the moulds to takeout the sample. As it may bring variations in the results accordingly.

Curing of concrete Sample

After casting the specimens to moulds, they are stored in the laboratory at a room temperature for 24 hours. After this period the specimens are removed from the moulds and immediately submerged in clean, fresh water of curing water tank. The specimens are cured for 7 days, 14days and 28 days in present investigation work. Before putting to testing, the concrete samples were let to dry to remove extra moisture present.

Method of curing used

Submerged curing: The casted cubes were totally immersed inside water, throughout the curing period; the curing water was maintained at an average laboratory temperature of 28◦C (82.4◦F) to prevent thermal stresses that could result in cracking.

Strength Testing

Compressive strength is the capacity of a material or structure to withstand loads tending to reduce size, as opposed to tensile strength, which withstands loads tending to elongate. In other words, compressive strength resists compression (being pushed together). In the study of strength of materials, compressive strength analyzed independently.

A Compression Testing Machine (CTM) was used to test the compressive strength, strength of materials. The set-up and usage are detailed in a test method, often published by a standards organization. This specifies the sample preparation, analysis, etc.

3. CONCLUSIONS

1.This research was carried out to investigate the effect of different types of water quality parameters on compressive strength of concrete.

2.The Water quality parameters influence the compressive strength of the concrete if the hardness of water increases the compressive strength get decrease.

3.We determine the submerged curing is the best fitted for more result of compressive strength of concrete

4.Also we concluded that from well water, canal water and RO water source, the compressive strength is more if we used RO water for curing or we can say use potable water for curing.

5.We use the fly ash in the replacement of OPC cement in the percentage of 10 & 20, it gives the result that compressive strength of concrete get increases.

6.The fly ash is the by product and to get disposal of fly ash we need to landfill it but if we use this byproduct in our mix it get reduce disposal treatment cost and reduces harmful impact on environment.

7.If we used the water which has high PH value it gets corrode in the steel in concrete and overall strength of structure, will be decreased.

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