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Research Paper

An Experimental Investigation on Internal Sealing of Self Curing and Self-Compacting Concrete Using Higher Molecular Weight of Poly-Ethylene Glycol

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ABSTRACT: *The purpose of this study is to determine the strength of self-curing and self-compacting concrete by adding poly ethylene glycol PEG4000 to the concrete at concentrations of 0.1, 0.5, and 1 percent by weight of cement. The goal of the experimental programme is to investigate the workability, compressive strength, and water retention capacity of the material. On fresh concrete, the Slump flow test, J ring test, L box test, and V Funnel test were performed to assess its workability. For the investigation, two self-compacting concrete mixtures were considered. Other goals included comparing the effects of Polyethylene glycol (PEG) on different grades of SCC and determining the best dosage for each grade. Based on the findings of the experimental programme, the following conclusions on the usage of PEG-4000 in self-compacting concrete with low and high w/c ratios might be drawn. The addition of PEG-4000 to SCC with a low w/c ratio enhances water retention, and the optimum dosage is found to be 0.1 percent.*

KEYWORDS: *Curing; PEG-4000; Workability; Water Retention Capacity; SCC.*

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I. INTRODUCTION

In this present work we focused on the self-curing and self-compacting curing concrete by the maxing of PEG-4000 with the specified proportion. Also in this work we check the properties of concrete such as workability, strength, water retention capacity by different methods of evaluation [1]. The detail information about every topic are as follows:

1.1 Curing

Curing is the process of keeping concrete at a suitable moisture content and temperature for a period of time after it has been placed and finished in order for the necessary qualities to develop. The importance of proper concrete curing cannot be overstated [2]. Restoring impacts the properties of solidified cement. Appropriate relieving will build toughness, strength, water snugness, scraped area opposition, volume security, and protection from freezing and defrosting [5,13]. Nonetheless, great restoring isn't generally useful much of the time. Relieving activities ought to guarantee that satisfactory measure of water is accessible for concrete hydration to happen. Legitimate restoring of substantial designs is critical to meet execution and toughness prerequisites. In ordinary relieving this is accomplished by outside restoring applied in the wake of blending, putting and completing [6]. Self-restoring or inward relieving is a strategy that can be utilized to give extra dampness in cement to more viable hydration of concrete and diminished self-parching [3].

1.1.1 Conventional Curing Methods:

1. Maintaining the presence of mixing water during the early hardening period.
2. Accelerating strength gain by supplying heat and additional moisture to the concrete [7].

1.2 Self-compacting concrete

Self-compacting concrete is simply concrete that can flow into the formwork without segregation, filling every corner equally and entirely by its own weight without the need of vibration or other [4] energy during placement. Self-compacting concrete does not exist in a conventional form. In this way every self-compacting concrete must be intended for the specific design to be developed. To build up a suitable combination extent for a self-compacting concrete the exhibition necessities should be characterized considering

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the primary conditions like shape, measurements, support thickness and development conditions [8]. The development conditions incorporate strategies for moving, setting, completing and relieving. The particular necessity of self-compacting concrete is its ability for self-compaction, without vibration, in the new state [12]. The profoundly liquid nature of SCC makes it appropriate for putting in troublesome conditions and in segments with clogged support. Utilization of SCC can likewise help limit hearing-related harms on the worksite that are incited by vibration of cement. Another benefit of SCC is that the time needed to put enormous segments is impressively diminished [9].

II. MATERIALS

SCC's mix proportions differ from standard concrete's in that the former contains more powder and less coarse material. Furthermore, SCC uses higher levels of high range water reducers (HRWR, superplasticizers) and a viscosity modifying agent (VMA) in tiny dosages.

- POWDER MATERIALS – The joining of powder can build the volume of the glue, henceforth upgrading deformability, cohesiveness and steadiness of cement.
- ADMIXTURE – SCC constantly consolidates synthetic admixtures – specifically, a high reach water lessening admixture (HRWRA) and some of the time, consistency adjusting specialist (VMA).
- The HRWRA- helps in accomplishing brilliant stream at low water substance and VMA diminishes draining and improves the steadiness of the substantial combination. A successful VMA can likewise cut down the powder necessity and still give the necessary steadiness. [10]

The different materials used in this investigation are:

1. Cement
2. Fine aggregate
3. Coarse aggregate
4. Polyethylene Glycol (PEG-4000)
5. Polycarboxylate Ether (superplasticizer)
6. Fly Ash
7. Silica Fume
8. Water

Table No. 1: Material required for Mix A

SR. NO.	MATERIAL	QUANTITY(Kg/m^3)	QUANTITY FOR 9 CUBES(Kg)	MIX PROPORTION
1	CEMENT	500	18	1
2	FINE AGGREGATE	800	28.80	1.6
3	COARSE AGGREGATE	775	27.90	1.55
4	FLY ASH	110	3.96	-
5	SUPERPLASTICIZER	6	0.216	-
6	WATER	190	6.84	0.38
7	DENSITY	2421		
8	PEG-4000	0%, 0.1%, 0.5%,1% by weight of cement		

Table No. 2: Materials Required for Mix C

SR. NO.	MATERIAL	QUANTITY(Kg/m^3)	QUANTITY FOR 9 CUBES(Kg)	MIX PROPORTION
1	CEMENT	360	16	1
2	FINE AGGREGATE	860	38.24	2.39
3	COARSE AGGREGATE	788	35.04	2.19
4	FLY ASH	250	11.04	-
5	SUPERPLASTICIZER	3.6	0.16	-

6	WATER	198	8.80	0.55
7	DENSITY	2449.60		
8	PEG-4000	0%, 0.1%, 0.5%,1% by weight of cement		

III. METHODOLOGY

IV. FINDING A NUMERYCAL SOLUTION AND APPENIXES

V. FAPPEDIX: MATLAB CODES

VI. SIMULATION DOUBLE PANDULUM

VII. CONCLUSION

A very limited work is reported from this area having the benefits of both self-curing as well as self-compaction. The future for this kind of cement is extremely splendid because of shortage of gifted labor, non-motorization of development industry, plentiful accessibility of development materials accessible for minimal price. The properties of this kind of cement, whenever found acceptable would be an incredible advance in substantial innovation ordering the benefits of both inward restoring just as self-union.

After analyzing the results obtained from the experimental programme, the following conclusions could be made regarding the use of PEG-4000 in case of self-compacting concrete with low as well as high w/c ratios.

Also Following Conclusion made from this research work:

1. Increasing the rate measurement of PEG-4000 expands the weight reduction for lower w/c proportion. Subsequently lower dose showing better water maintenance for lower w/c proportion.
2. Increasing the PEG-4000 dose reduces weight loss at greater w/c ratios. As a result, increased dose results in improved water retention for greater w/c ratios.

Compressive strength of SCC with lower w/c proportion improves with the expansion of PEG4000 and is practically identical to wet relieving. Subsequently PEG-4000 incorporation ends up being gainful. The ideal PEG dose at lower w/c proportion was discovered to be 0.1%.

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