

# REVIEW ON THE STUDY OF SELF CURING CONCRETE

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## ABSTRACT

Concrete is one of the most widely used construction material due to its good compressive strength and durability. Depending upon the nature of work the cement, fine aggregate, coarse aggregate and water are mixed in specific proportions to produce conventional concrete. Concrete needs curing for a minimum period of 28 days for achieve good hydration and desired mechanical properties. Any delay in curing will badly affect the strength and durability of concrete. Self-curing concrete is one type of concrete, which cure itself by retaining water (moisture content) in it, Self curing concrete is mainly used in areas where there is an acute shortage of water and the application of water curing is not possible for economic reasons. Conventionally, curing concrete means creating conditions such that water is not evaporated from the surface i.e., curing occurs 'from the outside to inside'. In contrast, 'internal curing' is allowing for curing 'from the inside to outside' through the internal reservoirs (in the form of saturated lightweight fine aggregates, superabsorbent polymers, or saturated wood fibres) Created. 'Internal curing' can be also referred as 'Self-curing.' Any negligence in curing will affect the strength and durability of concrete. Shrinkage reducing agents like Polyethylene-glycol and lightweight aggregates such as Leca, Silica fume and are used to achieve effective curing results.

**Keyword:** - Self-curing concrete, PEG-400, , compressive strength

## 1. INTRODUCTION

Self-curing concrete is one type of concrete, which cure itself by retaining water (moisture content) in it, Self curing concrete is mainly used in areas where there is an acute shortage of water and the application of water curing is not possible for economic reasons. It increases water retention capacity of mix. So many studies are done about the usage of Self curing concrete. Curing of concrete is maintaining satisfactory moisture content in concrete during its early stages in order to develop the desired properties. The self-curing process of concrete takes place from inside to outside, thus reducing the autogenous shrinkage and self-desiccation, especially for the high-performance concrete with relatively low water/binder ratio. The durability and the workability of self-curing concrete are improved, compared with conventional air-cured concrete, while the mechanical properties may be either enhanced or compromised due to the dual function of self-curing agent. Self-curing concrete has been widely applied in actual practice, mostly bridge decks and pavements.

## 2. LITERATURE REVIEW

Different studies were done in the field of self curing concrete and some of them are listed below. Researchers found that self curing concrete is an effective replacement to conventional concrete.

Mohanraj A et.al (2016) [1] Studied on "self-curing concrete incorporated with polyethylene glycol". The compressive strength of cube for Self-cured concrete is higher than of concrete cured by conventional curing method. The split tensile strength of self-cured concrete specimen is higher than that of the conventionally cured specimen. Self-cured concrete is found to have less water absorption values compared with concrete cured by other methods. Self-cured concrete thus have a fewer amount of porous.

Basil M Joseph (2016) [2] Studied on self curing concrete and PEG400 were used as a self curing agent in concrete. M20 grade of concrete is adopted for investigation. The author added 0-1.5% of PEG400 by weight of cement for M20 grade concrete from that he found 1% of PEG400 by weight of cement was optimum for M20 grade of concrete for achieve good maximum strength. The author found that the percentage of PEG400 gets increased slump as well as compaction factor also get increased.

Mousa M I et.al (2015) [3] In their study water retention and durability of concrete with or with out silica fume along with self-curing agents such polyethylene-glycol, and leca is investigated and compared to conventional concrete. The concrete mass loss and the volumetric water absorption were measured, to evaluate the water retention of the investigated concrete. significant improvement in all considered concrete properties due to the addition of 15% SF along with self-curing agents has been achieved, especially with 2% of Polyethylene-glycol which absolutely ensured the best results and good durability properties.

Shikha Tyagi (2015) [4] Studied on self-curing concrete and had use PEG400 as a self-curing agent in concrete. M25 and M40 grade of concrete are adopted for investigation. The author added 1-2% of PEG400 by weight of cement for M25 and M40 grade concrete. The author was determine that the optimum dosage of PEG400 for maximum Compressive strength was to be 1% for M25 and 0.5% for M40 grades of concrete.

Sona K. S et.al (2015) [5] studied Internal curing technique that can be used to provide additional moisture in concrete for effective hydration of cement. The effect of variation in strength parameters i.e., compressive strength, split tensile strength, flexural strength and durability were studied for different dosage of self curing agent and compared with that of conventional cured concrete. The optimum dosage of SAP for maximum compressive strength split tensile strength, flexural strength was found to be 0.5% of weight of cement for M25 and M30. Also determine Self curing concrete was the best solution to the problems faced in the desert region and faced due to lack of proper curing.

Mousa Magda I et.al (2014) [6] The mechanical properties of self curing concrete incorporated with self curing agents is analysed. For their study, two materials were selected as self-curing agents such as pre-soaked lightweight aggregate (Leca) or polyethylene-glycol with different dosages, and the addition of silica fume was studied. The effect of different dosages of the self curing agents were analysed, and the optimum values are identified. In all cases, either 2% PEG Or 15% Leca was the optimum ratio compared with the other ratios. The improvement in the mechanical properties of self-curing concrete was high while using self-curing agent of chemical type (polyethylene-glycol) compared to aggregate type (saturated leca). The incorporation of silica fume causes additional improvement in the mechanical properties of concrete

Mousa Magda I et.al (2014) [7] The physical properties of self curing concrete incorporated with self curing agents such as pre-soaked lightweight aggregate (Leca) or polyethylene-glycol is analysed, and the addition of silica fume on the properties was studied. The concrete used polyethylene-glycol as self-curing agent, shows improved properties than concrete with saturated Leca. In all cases, either 2% PEG. or 15% Leca was the optimum ratio compared with the other ratios. Results of their study demonstrate that a significant improvement took place in the physical properties studied for self-curing concrete with poly-ethylene glycol (Ch.) as self-curing agent.

Dahyabhai, et.al (2014) [8] studied on “introducing the selfcuring concrete in construction industry”. Compressive strength of selfcuring concrete is increased by applying selfcuring admixtures. The optimum amount of PEG600 for maximum effective compressive strength was found to be 1% of weight of cement for M25 grade of concrete. The optimum amount of PEG1500 of maximum compressive strength was found to be 1% of weight of cement for M25 grade of concrete. Selfcuring concrete is the best solution to the problem faced in the desert region and faced due to lack of proper curing.

Vedhasakthi K et.al (2014) [9] studied the investigation, workability and strength characteristics of Normal Strength and High Strength Concrete, cast with the self curing agents have been studied and compared with the corresponding conventionally cured concrete. For the Normal Strength Self Curing Concrete of grade M20, M30 and M40, IS method of mix design was adopted.. Super plasticizer dosage was varied with grade of concrete. Trial dosages of 0.8%, 1% and 1.2% of the weight of cement were used for M60, M70 and M80 grades of concrete respectively. The Strength of the concrete increases significantly with the increase of self curing agent. i.e., concrete with 0.3% of PEG gives more strength than that with 0.25%.

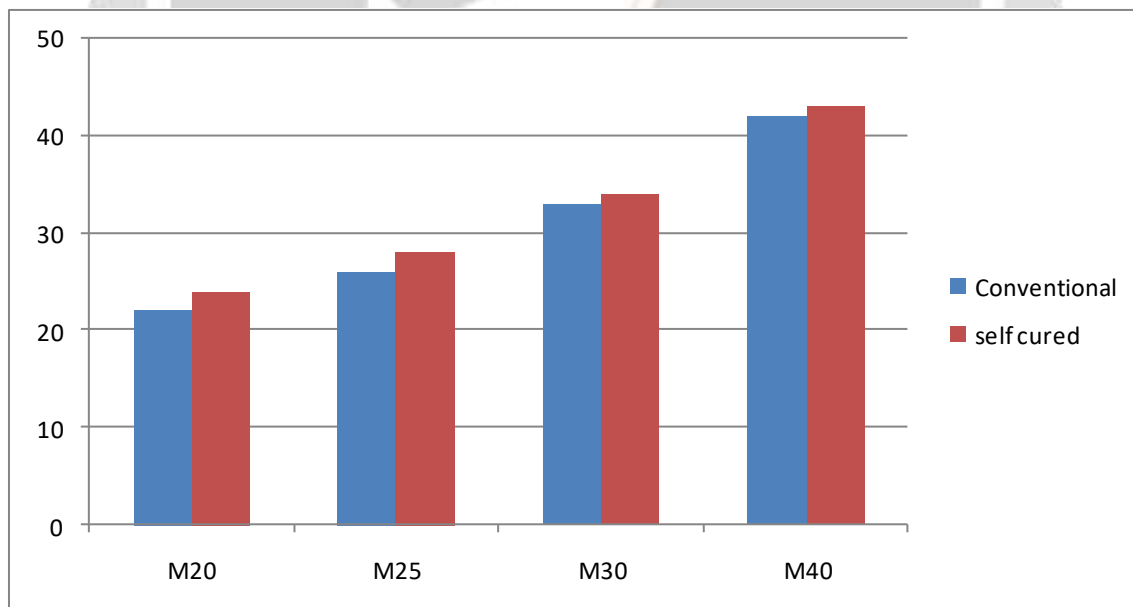
.Manoj Kumar, D. (2013 ) [10] Studied on self curing with Super absorbent polymer was used as selfcuring agent. M40 grade of concrete is adopted for investigation. Water retention for the concrete mixes incorporating a self curing agent is higher compared to conventional concrete mixes. As found by the weight loss with time. The optimum is 0.3 % addition of SAP leads to increase of mechanical strength. Compressive strength of selfcured concrete for the dosage of 0.3% was higher than water cured concrete. Split tensile strength of selfcured concrete for dosage of 0.3% is higher than water cured concrete. Flexural strength of selfcured concrete is lower than conventionally cured concrete. Performance of the selfcuring agent will be effected by the mix proportions. There was a increase in the strength for dosage from 0.2to 0.3 % and later reduced. Selfcured concrete using SAP was more economical than conventional cured concrete

,El-Dieb (2007) [11 ] studied water retention of concrete using water-soluble polymericglycol as self-curing agent. Concrete weight loss and internal relative humidity measurements with time were carried out, in order to evaluate the water retention of self-curing concrete. The water transport through the concrete is analysed by measuring permeable voids%, water sorptivity ,absorption%, and water permeability. The water transport through self-curing concrete is evaluated with age and compare with normal concrete.

Dhir RK et.al (1994) [12] the feasibility of self curing concrete by adding water-soluble chemicals which reduce water evaporation in the concrete, making it self-curing Among the set of chemicals most suitable one which provide self curing property was determined. The main property of the self curing agent was that they form hydrogen bonds between water molecules and an -OH group on a polymer molecule and reduce the water evaporation from the surface.

### 3. RESULTS AND DISCUSSION

Chart 1 below shows the comparison between compressive strength of Self cured concrete & Conventionally cured concrete. The results show that there is increase in compressive strength in case of self-cured concrete specimens when compared to other concrete specimens



**Chart-1:** 28 day compressive strength of self cured concrete and conventionally cured concrete

### 4. CONCLUSIONS

Based on the literature review, the following could be concluded from the study inspite of the scattering of test results:

- 1 Water retention for the concrete mixes incorporating self-curing agent is higher compared to conventional concrete mixes, as found by the weight loss with time.
- 2 Self-curing concrete resulted in better hydration with time under drying condition compared to conventional concrete.
- 3 Water transport through self curing concrete is lower than air-cured conventional concrete.
- 4 Slump value increases with increase in the quantity of PEG
- 5 Self curing concrete is the answer to many problems faced due to lack of proper curing.

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