

# Study of Self Curing Concrete Using Peg-400 in PPC

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**ABSTRACT:** As curing is most important process in concreting and it requires large amount of water, an alternate approach is taken to reduce the water requirement and to increase its strength properties than conventional concrete. So we go for PEG-400 as an admixture to attain internal curing of concrete. In this method hydration is done by locking the water content added for mixing from evaporation and by forming a thin film over it. PEG-400 is added in the ratios 0.5%, 1%, 1.5% and 2% in the weight of cement. Since PEG-400 is soluble in water it can be added along with water in mixing process. The optimum results are obtained by adding 1.5% PEG-400 to the weight of cement. By using this cost for concreting is also reduced. Hence self-curing can be an alternate method for conventional curing methods.

## I. INTRODUCTION

Curing of concrete is defined as providing adequate moisture, temperature and time to allow the concrete to achieve the desired properties for its intended use. Self-curing or internal curing is a technique that can be used to provide additional moisture in concrete for more effective hydration of cement and reduced self-desiccation. Evaporation in the initial stage leads to plastic shrinkage cracking and at the final stage of setting it leads to drying, shrinkage and cracking. Curing temperature is one of the major factors that affect the strength development rate. In addition to the normal concrete mix, some additional compounds in proper dosage and materials such as fly ash are used to increase the durability and strength of concrete mix.

### 1.1 Methods of self-curing:

Currently, there are two major methods available for internal curing of concrete. The first method uses saturated porous lightweight aggregate in order to supply an internal source of water, which can replace the water consumed by chemical shrinkage during cement hydration. The second method uses Poly Ethylene Glycol (PEG) which reduces the evaporation of water from the surface of concrete and also helps in water retention.

### 1.2 Significance of Self-curing:

When the mineral admixtures react completely in a blended cement system, their demand for curing water (External or Internal) can be much greater than that in a conventional Portland pozzolanic cement concrete. When this water is not readily available, significant autogenous deformation and (early age) cracking may result. Due to the chemical shrinkage occurring during cement hydration, empty pores are created within the cement paste leaving to a reduction in its internal relative humidity and also to shrinkage which cause cracking, internal warping and external deflection.

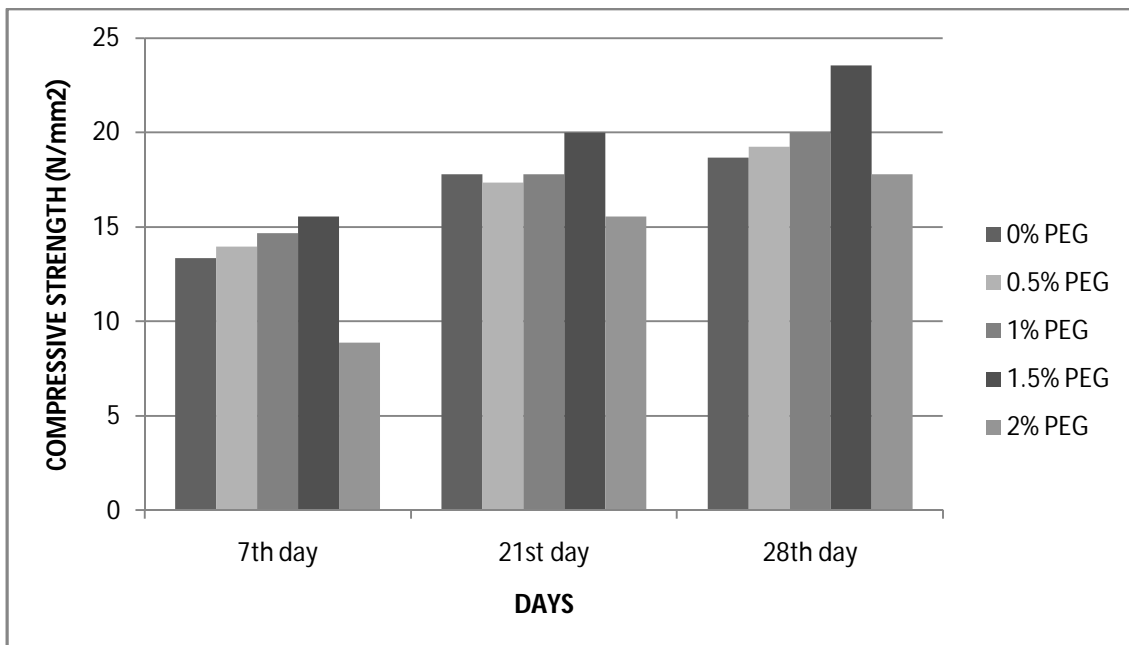
## II. MECHANISM OF SELF-CURING

Continuous evaporation of moisture takes place from an exposed surface due to the difference in chemical potentials between the vapours and the liquids phases. The polymers added in the mix mainly form hydrogen bonds with water molecules and reduce the chemical potential of the molecule which in turn reduces the vapours pressure thus reducing the rate of evaporation from the surface.

### III. TESTING AND TABULATION

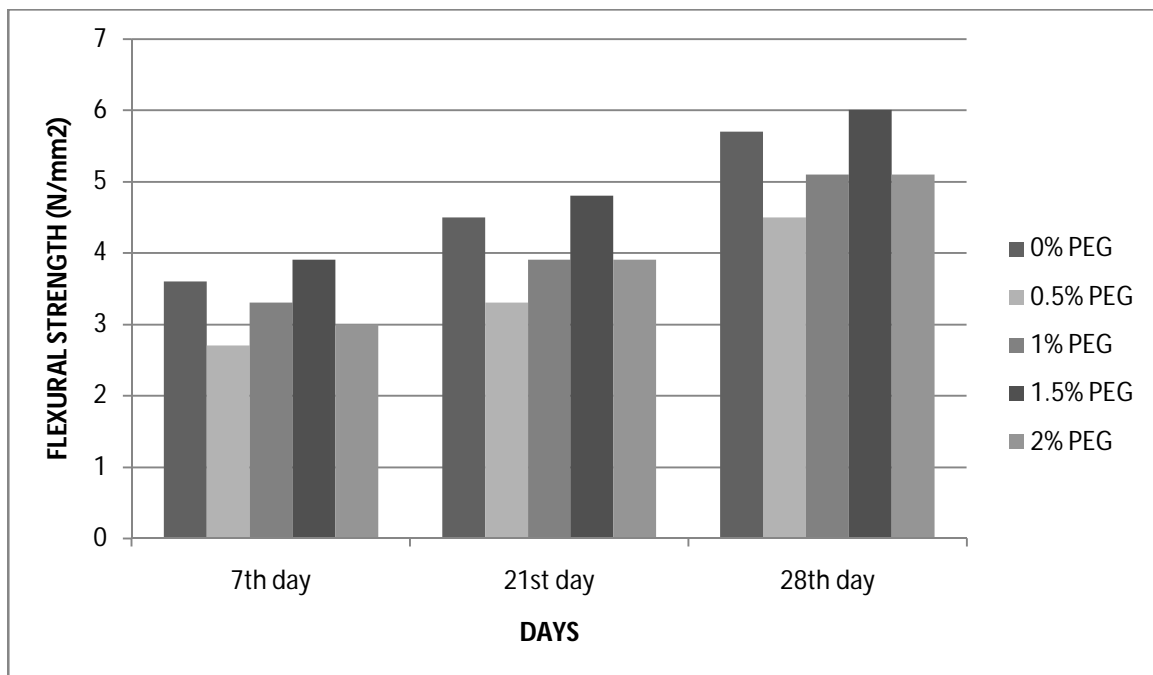
#### 3.1 COMPRESSIVE STRENGTH:

% of PEG	7 <sup>th</sup> Day	21 <sup>st</sup> Day	28 <sup>th</sup> Day
0%	13.33	17.78	18.67
0.5%	13.97	17.33	19.25
1%	14.67	17.78	20
1.5%	15.56	20	23.56
2%	8.89	15.56	17.78



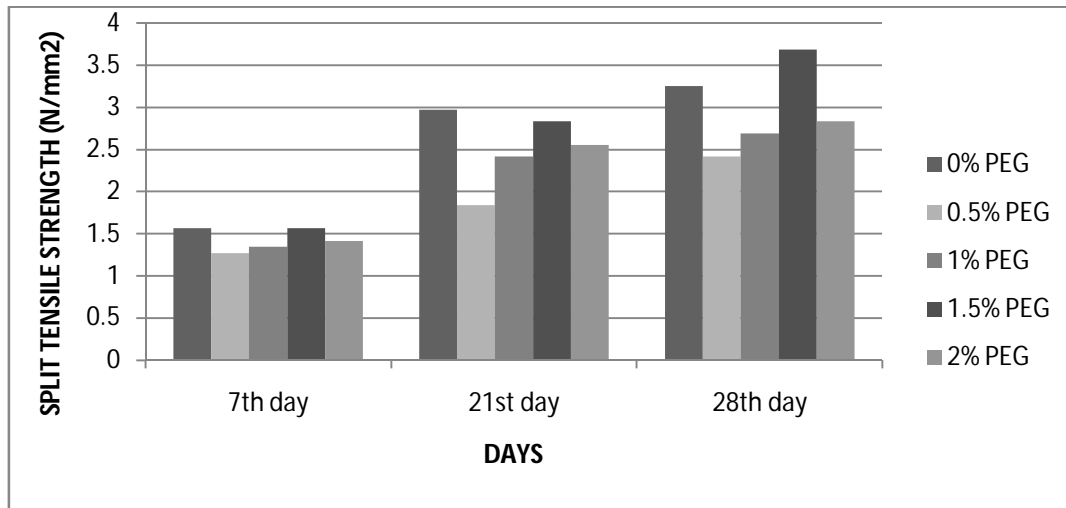
**3.2 FLEURAL STRENGTH TEST:**

% of PEG	7 <sup>th</sup> Day	21 <sup>st</sup> Day	28 <sup>th</sup> Day
0%	3.6	4.5	5.7
0.5%	2.7	3.3	4.5
1%	3.3	3.9	5.1
1.5%	3.9	4.8	6
2%	3	3.9	5.1



**3.3 SPLIT TENSILE TEST:**

% of PEG	7 <sup>th</sup> Day	21 <sup>st</sup> Day	28 <sup>th</sup> Day
0%	1.56	2.97	3.25
0.5%	1.27	1.84	2.41
1%	1.34	2.41	2.69
1.5%	1.56	2.83	3.68
2%	1.41	2.55	2.83



#### IV. RESULTS AND CONCLUSION

- The strength of self-curing concrete with optimum dosage of PEG 400 the maximum strength was found to be 1.5% for M20 grade concrete.
- The strength and durability properties of internally cured concrete with PEG 400 gives better result compared with external cured concrete.
- The cost requirement is also low in internal curing when compared with external curing.
- Future studies are needed in self-curing using different materials to make it more easy to use.

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