International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 02 | Feb 2019 www.irjet.net p-ISSN: 2395-0072

EXPERIMENTAL INVESTIGATION ON INTERNAL CURING USING POLYETHYLENE GLYCOL-6000

N. Nagarathinam[1], R. Vijayalakshmi[2], C. Bavadharini[3]

[1,2]Assitant Professor, Department of Civil Engineering, Nadar Saraswathi College of Engineering and Technology, TamilNadu, Theni
[3]PG Student, Department of Civil Engineering, Nadar Saraswathi College of Engineering and Technology, TamilNadu, Theni

---

Abstract:- *Concrete curing is one of the most important process in achieving the desired properties of concrete. Proper curing is not possible in all cases to overcome this, the self-curing concept is introduced. This concept deals with distributing the extra curing water uniformly throughout the structure. The objective of the project is to investigate the characteristics of self-curing using chemical agent. The chemical agent used here for self-curing is polyethylene glycol 6000.PEG-6000 act as shrinkage reducing agent, it is also used to reduce early-age shrinkage. In this study, strength was determined by doing compressive strength test. The compressive strength were studied for different dosages of polyethylene glycol. PEG used in different ratios such as 0.5%, 1.0%, 1.5%. The optimum mix ratio is taken for casting specimens and strength characteristics will be studied. PEG is used to maintain the mechanical properties and durability of concrete.*

***Key Words*:- self-curing concrete, polyethylene glycol-6000, compressive strength**.

1. INTRODUCTION

Concrete is one of the most widely used construction material. It is very durable material which need maintenance. Curing process is done using water that is used for mix. It is found that one third of water used for construction purpose is used for curing process. To reduce the evaporation of water from concrete and to increase the water retaining capacity of concrete, self-curing concept is adopted. There are many internal curing agents available such as saw dust, water paper shred, propylene glycol, polyethylene glycol. In this study PEG-6000 is choose as an internal curing agent, because of its easy availability and low cost. PEG-6000 is added to the concrete by the percentage of cement added to it. The optimum percentage of PEG-6000 is found out. The compressive strength of self-curing concrete at 7 and 28 days were found and compared with conventional concrete.

1.1 MATERIALS

1.1.1 CEMENT

Cement acts as a binder to join the aggregate into a solid mass. It is one of the most important constituent of concrete. Portland pozzolano cement with normal consistency was used in concrete.

1.1.2 M-SAND

M-Sand is crushed aggregates produced from hard granite stone which is cubically shaped with grounded edges, washed and graded with consistency to be used as substitute of river sand because of lack of availability of river sand. M-sand is preferably using for construction activities.

1.1.3 COARSE AGGREGATE

Aggregate are inert granular materials such as sand, gravel or crushed stone that along with water and Portland cement are essential ingredients in concrete. For a good concrete mix aggregates need to be clean, hard, strong particles free of absorbed chemicals or coatings of clay and other fine materials that could cause the deterioration of concrete.

1.1.4. WATER

Water is the key ingredient which, when mixed with cement forms a paste that binds the aggregate together. The water causes the hardening of concrete through a process called hydration. Water also required triggering polymerization action when epoxy resin comes in contact with water so that crack can be bond together.

1.1.5 POLYETHYLENE GLYCOL

Polyethylene glycol is a condensation polymer of ethylene oxide and water. The general formula of PEG 6000 is HO-CH2-(CH2-O-CH2-) n-CH2-OH. It is crystalline white powder. The particle size of PEG-6000 is 0-5mm.

1.2 EXPERIMENTAL WORK

Concrete samples were prepared with M_{25} grade of concrete cube with 150*150*150 mm dimension.

1.2.1 COMPRESSIVE STRENGTH TEST

Compression testing is very common testing method that is used establish the compressive force or crush resistance of a material and the ability of the material to recover after a specified compressive force is applied and even held over a

defined period of time. The specimen size 150*150*150 are tested in compression testing machine at the completion of 7 days and 28 days.

TYPE	7 days	28 days	Remarks
CONCRETE	17.2	31.2	-
PEG 6000	17.8	31.5	Addition of 0.5%
PEG 6000	19.2	33	Addition of 1.0%
PEG 6000	18	32.1	Addition of 1.5%

1.3 CONCLUSION

Based on the project result the self curing concrete with polyethylene glycol 6000 provides higher compressive strength than conventional concrete. From the results, we concluded that the optimum percentage of PEG-6000 is 1%. Average compressive strength of self-cured concrete for dosage of 1% was higher than water cured concrete. It was found that the percentage of polyethylene glycol increases the workability of concrete.

REFERENCES

[1] ACI (American Concrete Institute) (2008) ACI 308R-01: Guide to curing concrete. American Concrete Institute, Farmington Hills, MI, USA.

[2] ASTM (2008) ASTM C642-97: Standard test method for density, absorption and voids in hardened concrete. ASTM International, West Conshohocken, PA, USA.

[3] Bentz DP, Lura P and Roberts JW (2005) Mixture proportioning for internal curing. Concrete International 27(2):35-40

[4] M.M. Kamal et al, Experimental investigation on the behaviour of normal strength and high strength self-curing self-compacting concrete. Journal of Building Engineering

[5] Magda I. Mousa et al, Self-curing concrete types: water retention and durability, Alexandria Engineering Journal 54, 565-575(Elsevier), March 2016

[6] Magda I. Mousa et al, Physical properties of self-curing concrete (SCC), Housing and Building National Research Center 11,167-175(Elsevier), March 2015

[7] Report rep041: Internal Curing of Concrete- State of the Art Report of RILEM Technical Committee 196-ICC

[8] Sung-Hoon Kanga et al, Importance of drying to control internal curing effects on field casting ultrahigh performance concrete, Cement and Concrete Research 108,20-30 (Elsevier), March 2018