(IJUSE) 2017, Vol. No. 3, Jan-Dec e-**ISSN: 2454-759X, p-ISSN: 2454-7581**

ESTIMATING CONCRETE STRENGTH AT DIFFERENT TEMPERATURE BY HOT WATER CURING

ELAMURUGU.P[1] VENKATESH.V[2]

[1]M. Tech. Structural Engineering Student
Department of Civil Engineering, PRIST UNIVERSITY,
Trichy-Thanjavur Highway,Vallam, Thanjavur - 613 403
[2]Assistant Professor, Department of Civil Engineering, PRIST UNIVERSITY,
Trichy-Thanjavur Highway, Vallam, Thanjavur- 613 403

ABSTRACT

Maturity method is an advanced technique for detecting the time and temperature during the strength development of concrete by using admixtures with constant consistency.This concept shows variable curing temperature which affects the strength development of concrete.This method is subjected toaccelerated curing process which leads to non-uniform curing of concrete,This hypothesis was tested in this work with sample study.Specimens made with 1:1.5:3 ratio of cement,sand and coarse aggregate wassubjected to various temperature such as 50,55,60 after 5 hours for 1day. Compressive strength was found to be good

INTRODUCTION

In maturity method process, the curing variable temperatures are subjected under the stimulated condition that is in what basis curing is done on the concrete and how the temperature changes the concrete strength development. And this techniques is also used to identify the elapsed time during the curing process.During this process, normal as well as the high strength concrete are used. And mainly the concrete should be maintained in the condition which permits hydration of cement.On all the phases of experimental work absolutely shows the cross over effect.Therefore this paper deals with the improvisation of the maturity functions.

MATURITY ANALYSIS FOR CEMENTIOUS MATERIALS

The concept of maturity method was developed during 1950 and it evolves continuosly, then still have its inherent limitations. And those limitations are outlined in ASTM C 1074-74 C ASTM 1987 .Specimens where cured at elevated temperature for one day commercially available accelerator was added.The specific gravity of the cement and coarse aggregate is the 3.15 and 2.68 respectively under the material testing.The relationship between strength development and hydration degree was developed by ulm and coully in 1996.And the solidification theory was developed by bazant (1977) which was related to a ratio of mass to final mass.

(IJUSE) 2017, Vol. No. 3, Jan-Dec e-**ISSN: 2454-759X, p-ISSN: 2454-7581**

OBJECTIVES OF THE STUDY

The curing process was carried out by warm water method. Based on the codes all harden concrete specimens are cured at different temperatures. And the compressive strength of the concrete cubes is calculated by accelerated curing. A variable curing temperature for one day period was determined with time and temperature which affects the strength development testing is done according to the different proportions of accelerating admixtures in concrete. In this study curing temperature for both concrete and water are measured by using thermocouples in equivalent age calculation.

EXPERIMENTAL INVESTIGATION

The curing is done on the environment which affects the strength development of concrete. At early age, normal strength concrete is at peak temperature for first seven days and lower strength at later ages when compare with time. In high strength concrete effect of curing temperature for long term strength and normal strength was not same.

Admixtures are added to the concrete with dosage of 400ml and 500ml per 50kg of cement. The grade of concrete ratio for the admixtures is M20 with ratio 1:1.5:3. Casting of cubes is 10x10x10cm moulds. Commercially available Portland-Pozzolona cement (IS :1489- part-1) was used in this study the cement of specific gravity 3.15,fine aggregate specific gravity 2.68 and coarse aggregate specific gravity is 2.74.Finess modulus of fine aggregate was found to be 2.7 .The initial setting time is for about 30min and final setting time is 600mins.locally available water used for curing and mixing.

When the casting is done it should be stored in a place which is free from vibration of moist air for about 90% of relative humidity at 27°C for four hours approximately. And then cubes are lowered into a curing tank which should be immersed in at 27°C after the curing process. Testing is done at various temperatures of 50, 55 and 60 degree respectively. The specimens are tested and the values are compared with normal curing strength. Cubes aftercuring for 4hours in hot water at different temperature are tested in compression testing machine

RESULT AND DISCUSSION

The normal strength concrete results in the indication of long term strength estimated on the basis of equivalent ages which was not affect with variation of time to peak temperatures. Then the results high strength concrete is completely differ from normal strength .concrete cubes were made with addition of accelerator for 400ml and 500ml after 4hours curing in hot water at 50,55,60 degree Celsius it is tested in compression testing machine and the results are shown in table 1. From the results it is observed that normal concrete and accelerator added concrete improved the strength properties of concrete in accelerated curing

Table 1 Compressive strength of Hot water cured concrete

DOSAGE OF ACCELERATOR (ml)	AVG COMPRESSION STRENGTH AT 50 DEGREE HOT WATER CURING	AVG COMPRESSION STRENGTH AT 55 DEGREE HOT WATER CURING	AVG COMPRESSION STRENGTH AT 60 DEGREE HOT WATER CURING
0	19.63	20.14	22.47
400	21.78	23.76	25.96
500	22.14	25.23	26.55

CONCLUSION

This study concludes that the modified maturity function specifies the strength development within one day and the term which express the diffusion effect and the effect of early age temperature on long term strength. from the results it is clear than dosage of accelerator from 400ml to 500ml accelerates the concrete for different temperature .hot water curing at 50,55,60 degree improved the strength of concrete. So to improve the sudden strength of concrete hot water curing can be enhanced.

REFERENCES

1) Bazant, Z. P. 1977. “Viscoelasticity of porous solidifying material concrete.”J. Engrg. Mech. Div., 1036, 1049–1067.
2) Erdogan, T. Y. 1997. Admixtures for concrete, 1st Ed., The Middle East Technical University Press, Ankara, Turkey.
3) IS:1489(Part-1):1991. “Portland- Pozzolana Cement– Specifications”, Bureau of Indian Standards, New Delhi, India.
4) Nurse, R. W. 1949. “Steam curing of concrete.” Mag. Concrete Res.,79–88.
5) Ramakrishnan,V.and Mac Donald, C. N. 1979. “Quality control of concrete using pulse velocity and maturity concept.” RILEM On Quality Control of Concrete Structures” Stockholm.
6) Saul, A. G. A. 1951. “Principles underlying the steam curing of concrete at atmospheric pressure.”
7) Tuthill, L. H., and Cordon, W. A. 1955. “Properties and uses of initially retarded concrete”.