IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Vol. 10, Issue 11, November 2020, ||Series -I|| PP 09-12

A comparative Study on the Effect of Curing on The Strength of Concrete

NeelamTripathi, Dr. RajiveChandak,
Student – M.E. (Structural Engg) Department of Civil Engineering, J.E.C. Jabalpur, M.P. India
Professor – Department of Civil Engg, J.E.C., Jabalpur M.P. India.
Received 18 October 2020; Accepted 02 November 2020

Abstract: Concrete derives its strength by the hydration of cement particles. The hydration of cement is not a momentary action but process continuing for a long time. The rate of hydration is fast to start with, but continues ever a very long time at a decreasing rate. The quantity of product of hydration and consquently the amount of get formed depends upon the extent of hydration. This paper deals with comparision of 28 days compressive strength of concrete by curing under immession, by membrane curing and steam curing. The cubes were cast and cured under three different condition of curing. The test results revealed that curing conditions significantly affect the compressive strength of concrete. The results shows that the compressive strength obtained by Immersion curing and membrane curing for 28 days of curing is approximately equal to compressive strength obtained by steam curing is 6 hours.
Key words: Immersion curing, membrane curing steam curing, compressive strength of concrete.

I. INTRODUCTION

Curing can be described ass keeping the concrete moist and warm enough so that hydration of cement can continue. Curing is being given a place of increasing importance as the demand for high quality increasing concrete increases. Curing methods divided is 4 categories :-

(1) Water Curing:-This is the best method of curing as it satisfied all the requirement of curing namely promotion of hydration, elimination of Shrinkage. Water curing can be done in the following ways: Immersion, ponding, spraying, wet covering.

(2) Membrane Curing:- Curing does not mean only application of water it also means creation of conitions for promotion of uninterrupted hydration. Quantity of provided this water is not allowed to go out from the concrete. For this reason concrete is covered with membrane which will seal off evaporation of water from concrete. Some of the materials which are used as scaling compounds are Bituminious compounds, polyethylene film, water proof paper and rubber compounds.

(3) Steam curing :- The development of strength of concrete is a function of not only time but also of temperature. When the concrete is subjected to higher temp. it acclerate the hydration process but concrete cannot be subjected to dry heat, To accelerate the hydration process the presence of moisture is a essential parameter. Steam curing is applied mostly on prefebricated element. The steam may be applied either continuously or intermitteatly. The accelerated hydration takes place at this higher temp. and the concrete product attains 28 days strength of normal concrete.

II. LITERATURE REVIEW

S. Ghana Venkatesh, Dr. M. Arun (2016) studied the effect on compressive strength of concrete by adopting different types of curing.

Gokul T (2016) observed the variation in compressive strength of concrete as per IS 10262: 2009 by adopting Immersion curing, membrane curing and steam curing.

Ankita. V. Kalbande (2017). Studied the effects on compressive strength of concreteby adopting net gunny bags curing, Immersion curing and steam curing.

Several ether researches Ajay God, JyotiNarwal (2013), AkacnAyiade Raheem(2013), Dennry Meyer (1997), Krishna Rao, M.V. Rathish Kumar, P and Azhar Khan etc. have studied the variation of compressive strength of concrete due to different types of curing.

III. EXPERIMENTAL INVESTIGATION Material used:

a) Cement : MP Birla perfect cement (PPC) is used in the experiment.

b) Fine Aggregates : River sand procured from a hereby source was used as fine aggregate in this study. Modulus of sand was 2.70 mm was used.

c) Coarse Aggregates : The properties of coarse aggregate like size, shape, grading surface texture play an important note on workability and strength of concrete. Crushed stone aggregate of nominal size of 20mm were used. The fine modulus was found to be 2.80mm.

Test : Compressive strength test is initial step of testing concrete because the concrete is primarily meant to withstand compressive stresses. Compressive strength test were carried out on 150mmx 150mmx150mm cubes with compression testing machine of 2000 kN capacity. The specimen after removal from the curing were cleaned and properly dried. The strength of concrete curved by immersion curing. membrane curing were calculated for 7,14 and 28 days. The strength of concrete for steam curing is calculated for 6 hours. The strength obtained is compared in a table.

Compression Testing Machine (200 tonne)

IV. RESULT`S AND DISCUSSION

In this experimental work, total number of 42 cubes were cast and tested. Out of these 18 cubes were tested for Immersion curing and membrane curing respect remaining 6 cubes were tested for steam curing.

Curing methods`		**Immersion curing (N/mm^2)**			**Membrane curing (N/mm^2)**			**Steam curing (N/mm^2)**
Curing in days		7	14	28	7	14	28	6 hr.
Grade of concrete	M25	21.63	26.67	32.5	19.46	25.06	31.6	32.0
	M30	26.67	36.00	38.6	25.33	34.22	36.8	37.33

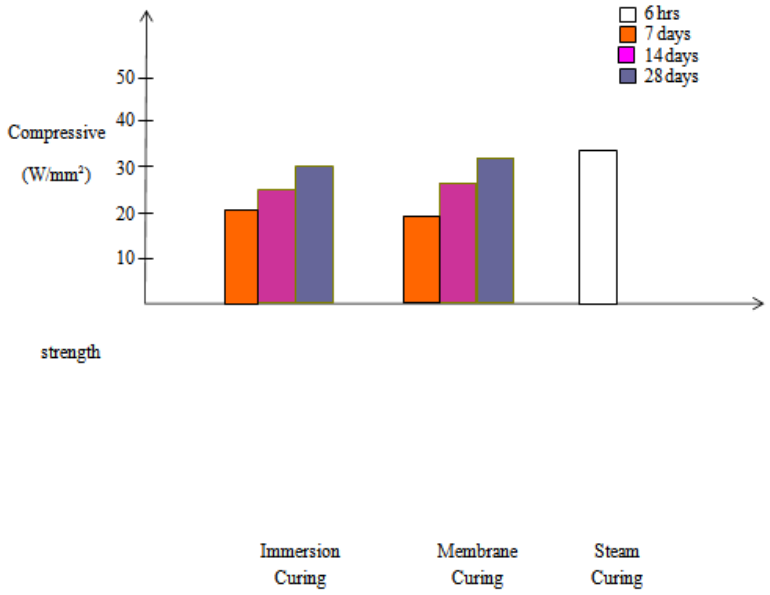

Fig-1 Average compressive strength of M25 grade of concrete for different types of curing.

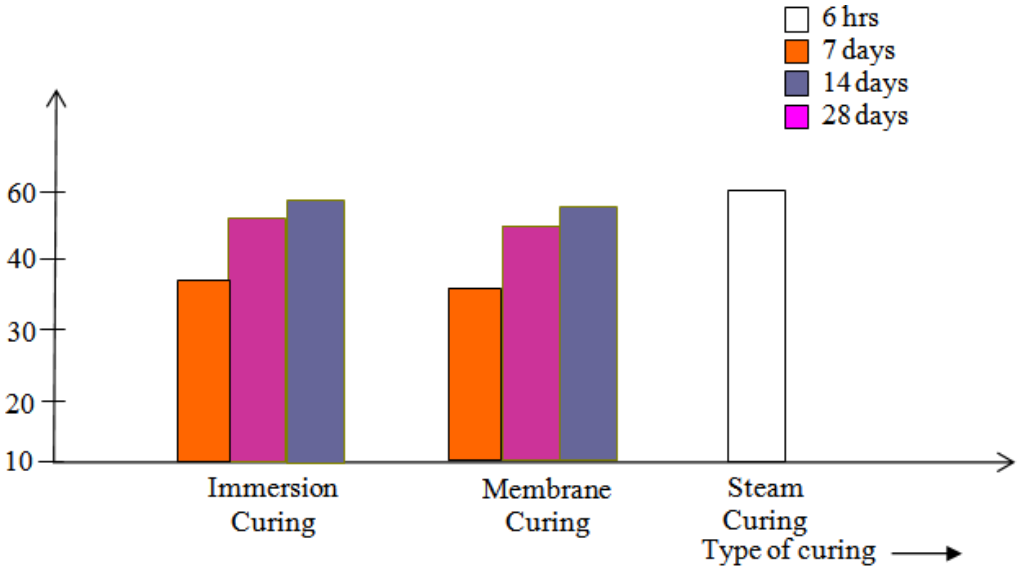

Fig-2 Average compressive strength of M30 grade of concrete for different types of curing.

VI. CONCLUSSION

From the experimental test result the following conclusion were made.

1) Different curing system haves different effects on the compressive strength of concrete.

2) The Immersion curing and membrane curing attained a avg, compressive strength of 32.5 N/mm^2 and 31.6 N/mm^2 respectively for M25 grade of concrete at the age of 28 days. At the same age. the Immersion curing and membrane curing attained a avg. compressive strength of 38.6N/mm^2 of concrete.

3) From the experimental values it can be concluded that the optimum strength of concrete for compressive strength was achieved by adopting immersion curing method.

4) But as immersion curing is not practically possible the strength is being compared with membrane curing which is practically done in site.

5) Since the variation in results, while compared to all three methods of curing are very closed to the actual value and also the results of steam curing can be obtained within 6 hours. it is strongly recommended to use in prefabrication industry to obtain quick results and reduce the expenses.

6) Steam curing of 6mm products the compressive strength of concrete equivalent to compressive strength obtained by 28 days of Immersion curing.

REFERENCE

[1]. **Ajay God, JyotiNarwal, VivekVerma, Devender Sharma and Bhupinder Singh,** "A Comparative Study on the Effect of Curing on the Strength of Concrete -,International Journal of Engineering and Advanced Technology (IJEAT), Volume-2, Issue-6, ISSN: 2249 — 8958, August 2013.

[2]. **Akeem Ayinde Raheem , Aliu Adebayo Soyingbe and Amaka John Emenike,,** "Effect of Curing Methods on Density and Compressive Strength of Concrete", International Journal of Applied Science and Technology, Vol. 3 Issue - 4, 2013.

[3]. **Denny Meyer,** "A Statistical Comparison Of Accelerated Concrete Testing Methods", Journal of Applied Mathematics & Decision Sciences, vol. 1, Issue-.2, pp 89-100 ,1997.

[4]. Reliability of accelerated curing techniques for speedy design of concrete mixes — An appraisal of IS 9013:1978 code.

[5]. **Krishna Rao, M..V, Rathish Kumar, P, and Azhar Khan, NI**, "A study on the influence of curing on the strength of a standard grade concrete mix-, Architecture and Civil Engineering, Vol. 8, Issue- 1, pp. 23 — 34, 2010.

[6]. **Abalaka, A.E, and OkoliO .G,** "Influence of curing regime on strength development of grade C60 concrete" , International Journal of Modern Engineering Research (TIMER), Vol.3, Issue.2,, pp-709-714. March-April.2013.

[7]. **Safiuddin , Raman S. N, and. Zain, M**, "Effect of Different Curing Methods on the Properties of Microsilica Concrete", Australian Journal of Basic and Applied Sciences, vol.1, Issue-.2, pp 87-95, 2007.

[8]. **All H. Hameed,** -The effect of curing condition on compressive strength in high strength concrete", ISSN 1999-8716 Vol. 02 , pp. 35-42,2009.

[9]. **Krishna Reddy, K.V.,** "A comparative study on methods of curing concrete influence of humidity", International Journal of Engineering Research and Applications (HERA) ISSN: 2248-9622 Vol. 3, Issue 3, pp.1161-1165, May-Jun 2013.
[10]. IS 10262:2009 Concrete mix proportioning — guidelines.
[11]. **James,O, Ndoke, P.N., and. Kolo S.S** "Effect of different curing methods on the compressive strength of concrete", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 — 8958, Volume-2, Issue-6, August -2013.
[12]. The Effect of Curing Condition on Compressive Strength in High Strength Concrete **Ali H. Hameed** in ISSN 1999-8716 Vol. 02 , pp. 35-48 , June 2009 Printed in Iraq.
[13]. A Comparative Study on the Effect of Curing on the Strength of Concrete **Ajay Goel, JyotiNarwVivekVerma, Devender Sharma, Bhupinder Singh.**
[14]. A Comparative Study on Methods of Curing Concrete -Influence of Humidity by **Dr. K.V.Krishna Reddy** on International Journal of Engineering Research and Applications (IJ ISSN: 2248-9622 Vol. 3, Issue 3, May-Jun 2013, pp.1161-1165 1161.
[15]. Effect on Concrete by Different Curing Method and Efficiency of Curing Compounds - A Review **Nirav R Kholia, Prof Binita A Vyas, Prof. T. G. Tank** on International Journal of Advanced Engineering Technology E-ISSN 09763945 IJAETNol. IV/ Issue II/April-June, 2013/57-60.
[16]. Effect of Different Curing Methods on the Compressive Strength of Concrete by **O. James, P.N.Ndoke and S.S. Kololnternational** Journal of Engineering and ced Technology (HEAT) ISSN: 2249 - 8958, Volume-2, Issue-6, August 2013 401.

NeelamTripathi, et. al. "A comparative Study on the Effect of Curing on The Strength of Concrete ." *IOSR Journal of Engineering (IOSRJEN)*, 10(11), 2020, pp. 09-12.