



STUDY OF STRENGTH IMPROVEMENT BY ADDITION OF ALCCOFINE IN CONCRETE

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Abstract: In this current scenario of construction practice, new materials are used as an additive High performance concrete. Alccofine is one such additive that has been designed for use in in order to increase the compressive strength and durability of concrete. Alccofine is primarily composed of low-calcium silicates that are processed and obtained through controlled particles size distribution (PSD). Compared to cement, the particle size distribution and specific gravity of Alccofine is higher and lower, making it more suitable as a crucial cement additive. In this work, it is proposed to study high performance based on Alccofine concrete with different proportions. M40 class of concrete is planned to study their mechanical properties such as compressive strength, flexural strength, Split tensile strength of concrete and others durability properties. For all tests, standard experiments are performed for determination properties as per Indian standards. The results are presented and discussed. The test was conducted by adding Alccofine about 0%, 5%, 10%, 15%, 20%, and 25% of cement increases strength.

Index Terms - Alccofine, calcium silicates, compressive strength, flexural strength, split tensile.

I. INTRODUCTION

The most important building construction materials are cement materials and it is very difficult to replace cement with any other material, it will continue to have the same importance in the future. Construction and engineering materials should fulfill all the Requirements of the user in terms of productivity, economy, quality and environment, which should compete with others construction materials such as plastic, steel and wood. The durability of concrete means that it should have resistance to weathering, chemical attack or any other process deterioration. Durable concrete will retain its original shape quality and serviceability when exposed to the environment.

These materials include traditional Portland cement and other cementitious materials such as Alccofine. Alccofine is either combined in a cement or in cement concrete mixes. Cement materials used in concrete are fine mineral powders generally used for binding all the materials. When this material is mixed with water, they chemically react to form a strong solid mass, that binds the aggregate particles together to make concrete

Alccofine is a new generation, microfine particle size material and which is more finer than others cementitious materials such as cement, fly ash, silica, etc made in India. Alccofine has unique properties to increase the "concrete performance", to increase the workability of the concrete, and it act as a pore filling material in concrete which reduces voids.

of five years. The time series monthly data is collected on stock prices for sample firms and relative macroeconomic variables for the period of 5 years. The data collection period is ranging from January 2010 to Dec 2014. Monthly prices of KSE -100 Index is taken from yahoo finance.

II. AIM

To study and understand the behavior of concrete after addition of alccofine to it. Find the compressive strength of concrete after addition.

III. OBJECTIVE

- To find out the optimum dose of percentage of Alccofine required for Compressive Strength.
- To find properties of material by experimental observations.
- To design the mix portion with addition of Alccofine to the conventional cement in various percentage.
- To determine the compressive strength of the concrete with addition of Alccofine.

IV. PROBLEM STATEMENT AND SELECTION OF PARAMETERS

As part of this project, we will study the properties of fine aggregate, coarse aggregate and cement. Design of M40 grade of concrete according to IS 10262:2019. Concrete cubes of 15x15x15 cm will be casted and tested for 7 and 28 days of compressive strength.

V. LITERATURE REVIEW

1) **BLN Sai Srinath^{ETA} (2020)**

This research was to study the effect of alccofine on strength ordinary grade concrete mixes cement replacement with Alccofine. IS 10262-2019 guidelines have been adopted to design M30, M40, M60 grade concretes mix proportions. The tests were conducted to explore the high strength concrete M60 grade concrete properties with Alccofine at 5%, 10%, 15%, and 20% replacement. Compression testing was done at 7 days and 28 days. Alccofine was having 6- micron individual particle size which it will act as a pore filling material in concrete. The results found that at 15% replacement of Alccofine produced the maximum compressive strength, and it acted as a filler material as fine aggregates and gave good workability to the concrete.

2) **G. Srinivasan. (2020)**

This paper is to determine the compressive strength of the partially replacement of Alccofine 1203 in concrete. The materials like OPC, river sand, 20mm -12.5 mm aggregate were used for making of concrete with desired mix proportion, to obtain high performance concrete mix of M50 to be cast in the form of cubes. So after testing the compressive strength was 52N/mm² by replacing 10% of cement with alccofine. The test recorded that the Alccofine material increases the strength only at the addition of 10% replacement of cement. From the experimental results, when compressive strength compare to control mix, the A10 mix is improved by 6.5 %.

3) **Mohyuddin Nazirahmed Vadaliwala^{ETA} (2020)**

In this study, they present the development of ready-mixed concrete using Alccofine. In studio to produce M30 class concrete. Mix design is done as per IS: 10262:2019. In this comparative study take Alccofine 5%, 10%, 15% and 20% of the total weight of the concrete. Addition of this percentage in specific see what percentage is more suitable for concrete and what percentage gives high performance. And after checking the compressive strength, bending strength and tensile test. Review this test for 7 days, 14 days, 28 days. From the result, it can be observed that the compressive strength of concrete when using alccofin is more than comfortable concrete. From the result, it can be observed that at 28 days the compressive strength of concrete is 34 N/mm².

4) **Malvika Gautam^{ETA} (2017)**

In this article, the effect of alccofine on properties of concrete were reviewed. The main goal of this the study is to evaluate the strength or we can say high performance of concrete containing cementitious materials (SCM) such as Alccofine. In this paper literature of various researchers who have investigated durability of high performance concrete with Alccofine are reviewed. Due to the requirements in the construction industry, the need for high-quality concrete is also increasing. Over the past few years, the efforts that have been made for improvement in concrete properties indicate that cement replacement materials along with minerals and chemicals additives can improve strength and durability properties of concrete.

5) **Siddharth P Upadhyay & Prof. M. A. Jamnu (2014)**

This research presents the compressive strength of high-performance concrete with replacement of Alccofine cement and fly ash as well as natural sand manufactured sand. The need for high-quality concrete is growing requirements in the construction industry. Efforts to improve the properties of concrete above the last few years suggests that materials replacing cement together with mineral and chemical substances admixtures can improve the strength and durability of concrete The addition of Alccofine shows properties that soon gain the strength, shows long lasting power. A ternary system, which is ordinary Portland cement-alccofine fly ash, has been found to increase the compressive strength of concrete at all ages. Compared to concrete made only with fly ash and Alccofine. This document presents the compressive strength of high-performance concrete with replacement of cement the need for high-quality concrete is growing requirements in the construction industry. The concrete samples were cured under normal wet curing under normal atmospheric temperature. The compressive strength was determined to be 3, 7 and 28 days.

6) **J Sajeer Kumar^{ETA} (2019)**

This paper is to determines the compressive strength of the partially replacement of Alccofine 1203 in concrete. The materials like OPC, river sand, 20mm -12.5 mm aggregate were used for making of concrete with desired mix proportion, to obtain high performance concrete mix of M50 to be cast in the form of cubes. So after testing the compressive strength was 52N/mm² by replacing 10% of cement with alccofine. The test recorded that the Alccofine material increases the strength only at the addition of 10% replacement of cement. From the experimental results, when compressive strength compare to control mix, the A10 mix is improved by 6.5 %.

7) B. Sagar & M.V.N Sivakumar (2020)

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VI. CONCLUSION

This study will presents the study of on effect of Alccofine on compressive strength of concrete. Alteration in the early strength gaining property and long term strength properties will be studied. The increase in early strength at 7 days was observed for 20 % addition of alccofine against the estimated early strength. Alccofine concrete was found to increase the compressive strength of concrete on all stages.

VII. REFERENCES

1. BLN Sai Srinath , Chandan Kumar Patnaikuni , Santhosh Kumar B. , Balaji K.V.G.D and Kode Venkata Ramesh : Strength effect of alccofine on ordinary and standard grade concrete mixes. International Journal of Advanced Technology and Engineering Exploration, Vol 9(86)
2. G.SRINIVASAN : Study on Alccofine Based High Performance Concrete . Associate Professor, Department of Civil and Structural Engineering, Annamalai University, Annamalainagar, TamilNadu, IOP Conf. Series: Materials Science and Engineering 993 (2020) 012040 IOP Publishing doi:10.1088/1757-899X/993/1/012040
3. Mohyuddin Nazirahmed Vadaliwala, Nirmal S. Mehta, Hiral V. Patel : EFFECT OF ALCCOFINE ON MECHANICAL PROPERTY OF CONCRETE, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 07 e-ISSN: 2395-0072
4. Malvika Gautam, Dr. Hemant Sood: Effect of Alccofine on strength characteristics of Concrete of different grades. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 p-ISSN: 2395-0072
5. Siddharth P Upadhyay* Prof. M.A.Jamnu : Effect on compressive strength of high performance concrete incorporating alccofine of international academic research for multidisciplinary Impact Factor 1.393, ISSN: 2320-5083, Volume 2, Issue 2, March 2014
6. J Sajeiv Kumar, Moka Eswar, K Aditya Subramanian, P Bhuwaneshwari: Strength characteristics of Alccofine Bsed Light weight Concrete. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 p-ISSN: 2395-0072
7. Sagar, M.V.N Sivakumar :An experiment and analytical study on Alccofine based High Strength Concrete. International Journal of Advanced Technology and Engineering Exploration, Vol 9(86)