



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 9, September 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.569

Effect on Properties of Concrete by Partial Replacement of Cement by Alccofine

Beenish Reyaz¹, Syed Faizan Kirmani², Hanan Shabir³, Noman Rasool⁴, Ikhlas Ahmad⁵,
Er. Irtiza Khurshid⁶

B.E Student, Department of Civil Engineering, SSM College of Engineering, Kashmir, India^{1,2,3,4,5},

Assistant Professor, Department of Civil Engineering, SSM College of Engineering Kashmir, India⁶

Abstract: Nowadays there is a need of durable Concrete & even chemical resistance. To address this challenge Ambuja cement one of the largest manufacturers of cement in India brings to us a high performance concrete enhancer ALCCOFINE. In the present paper, effect of Alccofine on the properties of concrete has been studied. The main aim of this study is to evaluate the strength. The concrete specimens were cured under normal atmospheric temperature for 7 and 28 days and after curing compressive strength was observed. The Alccofine showed a significant increase in the compressive strength. It also provides better and smooth surface finish. The advantage of Alccofine other than strength is that it also lowers the water/ binder ratio

I. INTRODUCTION

Alccofine is basically an innovation which has happened over the years looking at how do the micro fines the product like slag and work with cements and satisfies the demand which the normal grey cement can't. Alccofine is name of the range of products which are broadly coming under the classification of micro fines and they can be either cementitious or supplementary cementitious materials. Alccofine is the special processed material based on slag of high content of glass and high reactivity. The bleans have computed on particle-size distribution is about 12000cm²/gm. which is truly making it ultrafine. Alccofine-1203 is product basically enhancing the concrete properties. And it has really proved good in terms of laboratory. Their experience had made them to believe that commonly used SCMs like fly ash, metakaline or micro silica with perfect solution to enhance the concrete, hydration process and particle-size distribution in concrete, it contains calcium oxides which after hydration turns into calcium hydroxide and improves the alkalinity of concrete and it can prevent sort mitigate the corrosion. Well alccofine-1203 is typical ground granulated blast furnace slag modified by certain chemical admixtures. So that it gives the required properties that what we have designed the concrete for the main motto was to increase the concrete's impermeability and ensure higher strength at all the stages.

II. LITERATURE REVIEW

The construction and the engineering material must meet new and higher demands as far as productivity, economy, quality and environment is concerned, they have to compete with other construction materials too like plastic steel and wood.

Alccofine is a new generation, micro fine material of particle size and is much finer than other hydraulic materials like Silica, Cement, fly ash etc. Being manufactured in India Alccofine has unique properties to enhance performance of concrete in fresh and hardened stages due to its optimized particle size distribution.

Research have been conducted in different parts of the world, to study effects of Alccofine on concrete.

ACI (AMERICAN CONCRETE INSTITUTE)

The objective of this study was to investigate that how chemical admixture such as super plasticizer and viscosity react with fresh concrete on the deformational and segregation. It also defines that without using any vibrator HPC can be filled into all corners. This study was done for developing the concrete with high filling capacity. It was found that there exists the suitable paste for improving not only the deformability but also the segregation resistance. The optimum mix 9 proportions of super plasticizer and viscosity agent was clarified for the concrete with high filling capacity.

In discussing the meaning of HPC, AICTIN AND NEVILLE (1993) defined that concrete which have high strength, high workability and high durability is known as high performance concrete. For the use of seafloor tunnels, offshore



and coastal marine structures durability is the principal characteristics for high performance concrete mixture. For the high performance concrete the principal or the important characteristics which are required are strength, dimensional stability, impermeability and high workability. In this paper an overview of the composition of concrete and its effect on the properties desired for high performance is given. In this paper a new procedure for mix proportioning is described.

MEHTA AND AITCIN (1990) stated that “In practical application of this type of concrete the emphasis has in many cases gradually shifted from the compressive strength to other properties of the material, such as high modulus of elasticity, high density, low permeability and resistance to some forms of attack”.

The FEDERAL HIGHWAY ADMINISTRATION (FHWA) Defined that if the concrete is properly mixed, made with appropriate materials, transported, consolidated, placed and cured, the concrete which will be obtained will give excellent performance in the structure in which it is used.

HPC was defined by FORSTER (1994) in which four different criteria for different performance grades of HPC were proposed. And these criteria are further expressed in eight performance characteristics which are strength, durability, elasticity, freezing/thawing, chloride permeability, abrasion resistance, scaling resistance, shrinkage and creep. High performance concrete may require different grade of performance for each performance characteristics depending upon specific application.

Siddharth P Upadhyay Prof. M.A. Jammu Studied “EFFECT ON COMPRESSIVE STRENGTH OF HIGH PERFORMANCE CONCRETE INCORPORATING ALCCOFINE AND FLY ASH”,

In this study two different shapes of cubes were casted (Cylindrical and cubical) and their strength was compared. The author partially replaced cement with ultra-fine slag Alccofine. Compressive strength between cylindrical and cubical concrete was compared and from the comparison following conclusion were drawn:

- With Alccofine hardened properties of concrete are increased or are improved.
- There were very nominal changes after 10% replacement of Alccofine.
- Cylindrical strength of concrete increases after addition of Alccofine but always less than its cubical counterpart.

Rajesh Kumar S, Amiya K Samanta, Dilip K. Singha Roy Studied “An experimental study on the mechanical properties of Alccofine based high grade concrete”,

In this paper author concluded that Alccofine increases compressive as well as flexural strength to a large extent at 10% replacement. 7 days of compressive strength when compared and cement replaced by 10 % Alccofine, strength is increased by 25.5% and when 28 days curing has been done it is found that the flexural strength is increased by 27.6%. It acts as a filler material if the percentage of Alccofine is increased beyond that level and also it yields good workability to the concrete.

Yatin H Patel, P.J. Patel, Prof. Jignesh M Patel, Dr. H S Patel Studied” Study on Durability of high performance Concrete with Alccofine and fly ash”,

In this study author used fly ash, volcanic ash, volcanic pumice, pulverized fuel ash, blast slag and silica fume as cement replacement material. The main of this study was to have ecofriendly and economical high strength concrete. After curing, compressive strength test was carried out at 7, 28, 56 days and results shows that the compressive strength test at 7 days is excellent, between 7 to 28 days the strength gained was comparatively less and between 28 to 56 days’ strength gain is high because of fly ash in m3 proportion. And according to IS 456-2000 table 7 clause 6.2.1 fly ash in m3 proportion get acceptable strength. It is found that initial compressive strength achieved by using fly ash (22%) and Alccofine (8%) is 42.33 Mpa and 66.64 Mpa at 7 and 28 days respectively, but after 28 days’ strength gain is comparatively less.

III. MATERIALS AND METHODOLOGY

Materials

Cement:

The cement used for this project is OPC of grade 43 conforming to IS 8112:1989.

Aggregates:

Aggregates shall comply with the requirements of IS 383. Usually preference is given to natural aggregates.

Methodology

- 1 • Study of literature review.
- 2 • Collection of materials.
- 3 • Conducting the basic test of materials
- 4 • Mix design
- 5 • Conducting workability tests on different trials samples
- 6 • Conducting the experimental studies on cubes n beams
- 7 • Analysis of data
- 8 • Comparative studies with conventional concrete
- 9 • Results and conclusion.





IV. RESULTS AND CONCLUSIONS

Tests on Concrete

On materials:

- Aggregate:
 1. Specific gravity (IS: 2386 part III-1963).
 2. Water absorption (IS: 2386 part III-1963).
 3. Sieve analysis (IS: 2386 part I-1963).

On concrete:

1. Workability tests: Slum test
2. Compressive strength tests.

Water adsorption and specific gravity:

Details	Coarse aggregates	Fine aggregates
Water adsorption	0.47	1.10
Specific gravity	2.62	2.71

Table.1 Water Absorption Details

Mix Design

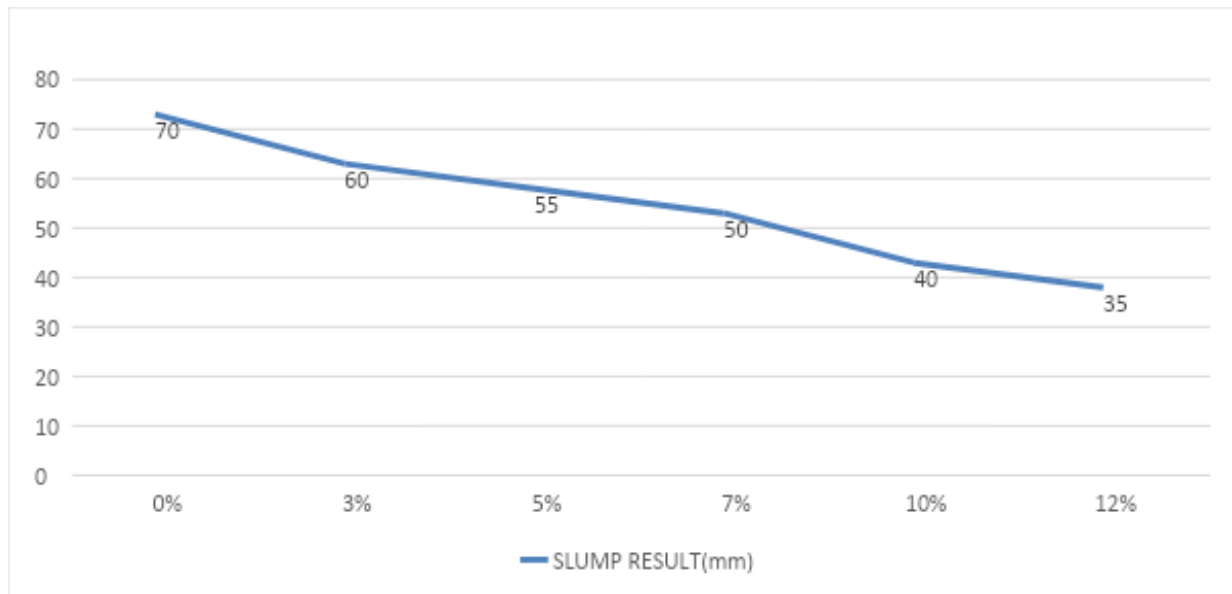
Ingredients	Quantity
Cement	437.7 kg/m ³
Water	197 lit
Fine-aggregates	459.16 kg/m ³
Coarse aggregates	688.74 kg/m ³
W/C ratio	0.45

Table.2 Mix Design Details

Slump results

Details	Slump
0% replacement	70mm
3% replacement	60mm
5% replacement	55mm
7% replacement	50mm
10%replacement	40mm
12%replacement	35mm

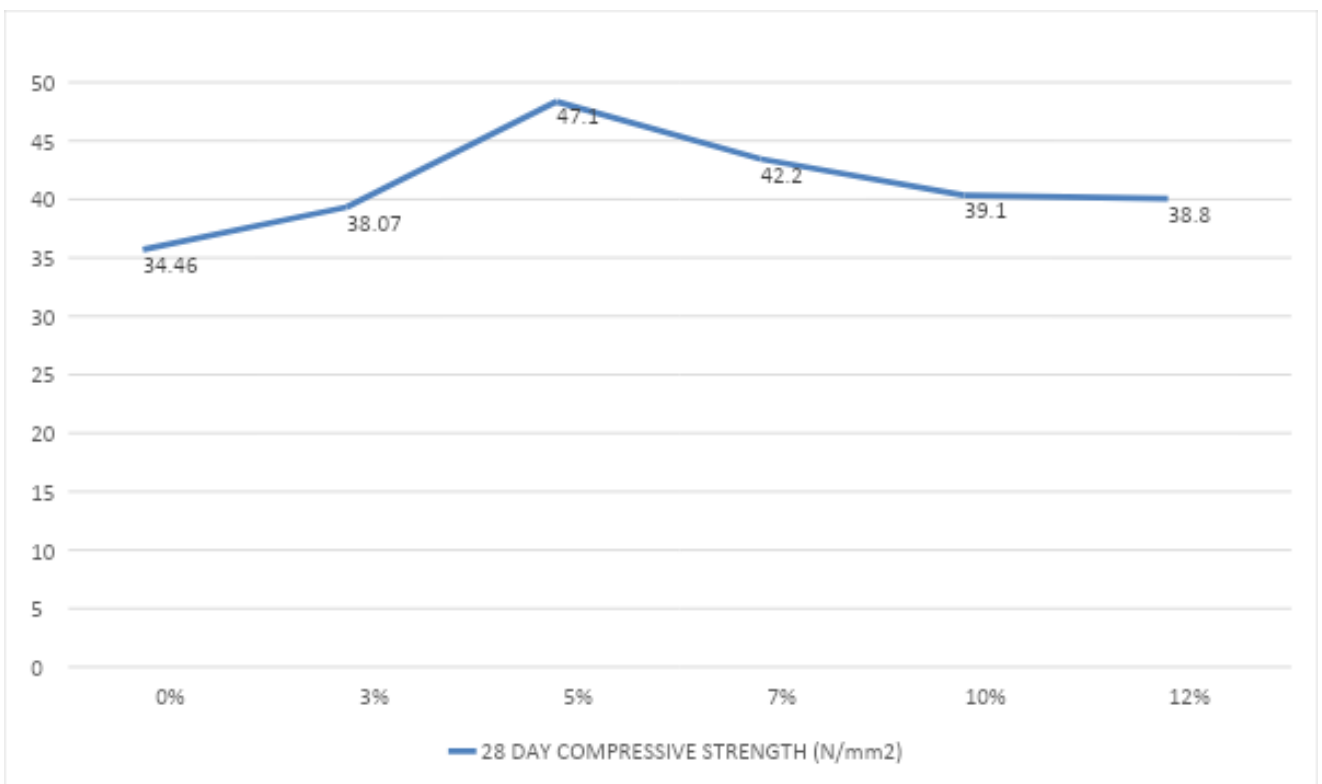
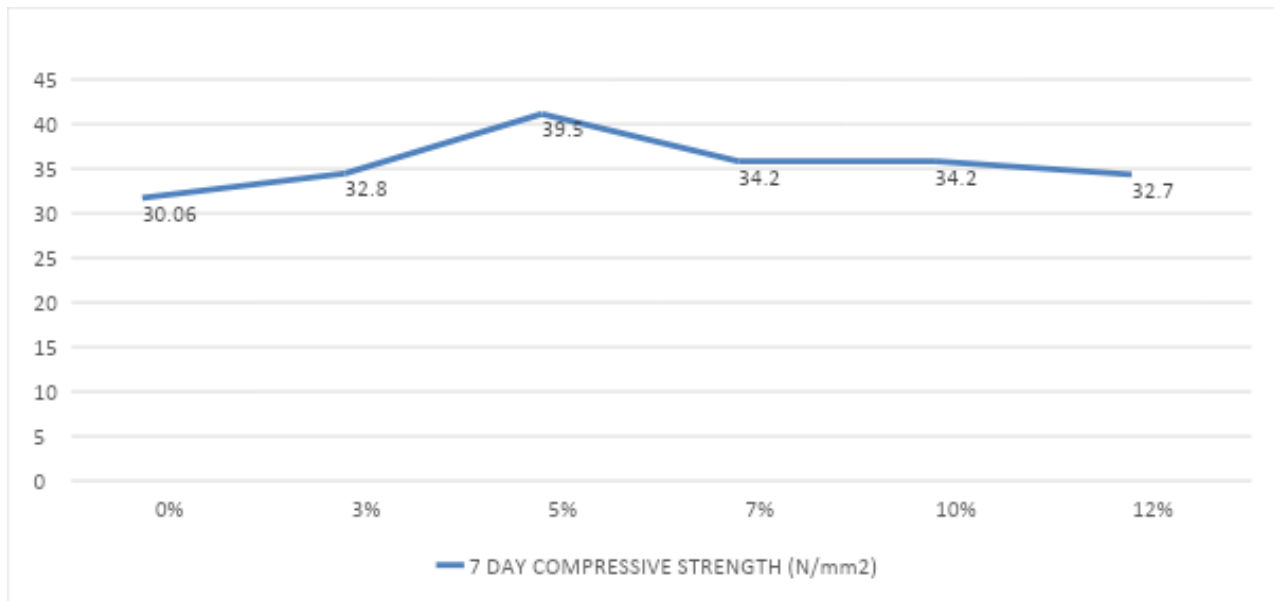
Table.3 Slump Test Results



Compressive Testing

Details	0%	3%	5%	7%	10%	12%
	29.7	31.5	35.1	34.6	32.8	31.1
7TH DAY	31.1	31.7	38.6	36.4	35.5	30.6
	30.06	32.8	39.5	34.2	34.2	32.7
Average	30.48	32.04	37.7	35.1	34.2	31.46
	36.4	37.3	45.3	41.7	36.8	38.6
28TH DAY	34.2	38.2	47.1	43	40.4	42.6
	32.8	38.6	48.8	41.3	40	35.1
Average	34.46	38.07	47.1	42.2	39.1	38.8

Table.4 Summary of compressive strength.



V. CONCLUSION

The paper presents a review on effect of Alccofine on properties of concrete. It was found that partial replacement of cement by Alccofine shows an early strength gaining property. Alccofine concrete was found to increase the strength on all ages. As Alccofine is used with super plasticizer it also reduces the Water demand from the experimental survey it was observed that the result of Alccofine material increase the strength in compression to a large extent at approximately 5% replacement level of cement. It is seen that 7 day compressive strength of cement when compared between control-mix and cement replacement by 5% Alccofine an increase of 23.2% is observed. So it is highly



recommended to utilize the Alccofine material after checking its durability studies.

REFERENCES

1. Saurabh Gupta, Dr. Sanjay Sharma, Er. Devinder Sharma³ “A review alccofine a supplementary cementitious material, IJMMTER Vol. 3
2. Saurav, Ashok Kumar Gupta, “Experimental study of strength relationship of concrete cube and concrete cylinder using ultrafine slag Alccofine” International Journal of Scientific & Engineering Research, Volume 5, Issue 5, May-2014 102 ISSN 2229-5518
3. Siddharth P Upadhyay Prof. M.A. Jamnu “Effect on compressive strength of high performance concrete incorporating alccofine and fly ash” ISSN, Volume 2 Issue 2
4. Yatin Patel, Dr. B.K. Shah, „Study on durability of high performance Concrete with alccofine and fly ash, (1998) IJSRD Vol.1 Issue (2013)
5. Alccofine” By Counto Micro fine Products Pvt. Ltd.(A joint venture with ambuja cement ltd and alcon developers).
6. M.S. Pawar, A.C. Saoji, “Effect of Alccofine on Self Compacting Concrete” The International Journal of Engineering and Science (IJES), Volume 2 ||Issue|| ||Pages|| 05-09||2013|| ISSN(e): 2319 – 1813 ISSN(p): 2319 – 1805
7. Manisha M. Magdum, Dr. V. V. Karjinni “Influence of Mineral Admixture (Alccofine-1203) On the Properties of Hybrid Fiber Reinforced Concrete”
8. Rajesh Kumar, Dilip k. Singha “An experimental study on the mechanical properties of alccofine based high grade concrete” International Journal of Multidisciplinary Research and Development
9. Ansari U.S, Chaudhri I.M, Ghuge N.P, Phatangre R.R. “High Performance Concrete. With Partial Replacement of Cement by ALCCOFINE & Fly Ash”
10. Deval Soni Suhasini Kulkarni Vilin Parekh “Experimental Study on High- Performance Concrete, with Mixing of Alccofine and Flyash” Vol.: 3 | Issue: 4 | May 2013 ISSN -2250-1991
11. Prasanna T.M, Sandya D.S, Arjun B-2015, “Experimental Study on Development of Normal Strength Concrete and High Strength Concrete Using Alccofine.



**Impact Factor:
7.569**



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details