

# Experimental Study on Partial Replacement of Cement Using Alccofine

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**Abstract-** In today's world, concrete is most popular due to its good compressive strength and durability. Alccofine is a new generation micro fine concrete material or micro fine mineral additive for concrete and mortars. It is being used as mineral admixture in a concrete mix, it contains high calcium oxide due to its ultrafine size it can be used as supplementary cementitious material(SCM).The compressive strength of high performance concrete with the replacement of cement with alccofine and fly-ash and also with natural sand to manufactured sand, the compressive strength of concrete is increases at all stages fresh and hardend due to addition of alccofine admixture. Alccofine can be directly added with the cement and provide better and smooth surface finish. Alccofine 1203 is essential in terms of reducing heat of hydration and Alccofine 1101 can be used as a grouting purpose.

**Index Terms-** Alccofine, High Strength Concrete, SCM

## 1. INTRODUCTION

The demand of better concrete is increasing day by day. Improved quality of concrete will only perform better if concrete improves workability, durability, flow ability & resistance to chemical attack/corrosion and reduce w/c ratio, heat of hydration & segregation mainly. For the fulfilment of above properties waste produced from the steel & other industries are used for effective & efficient strength & durability of concrete. Alccofine has been added into OPC which varies from 5% to 15% at interval of 5% by total weight of OPC and partial replacement of OPC by Alccofine which varies from 5% to 15% at interval of 5% by total weight of OPC of concrete. Alccofine have a series start from 1200; Alccofine 1203 is proprietary low calcium silicate based mineral additive. Controlled granulation process results in unique particle size distribution. Its latent hydraulic property and pozzolanic reactivity results in enhanced hydration process. Addition of Alccofine 1203 improves the packing density of paste component. This results in lowering water demand, admixture dosage and hence improving strength and durability parameters of concrete at all ages.

## 2. LITERATURE REVIEW

The Counto Microfine Products Pvt.Ltd CMPPL group is joint venture company of Ambuja Cement Ltd. and Alcon group Goa. It has one of the world's biggest dedicated manufacturing facilities of Microfine materials at Goa. The Alccofine first time launched in India at Kolkata. Ambuja cement Limited

(ALC) has launched two innovative products in world of concrete i.e. Alccofine 1203 & Alccofine 1101.

### 2.1 Applications of Alccofine in India

- Project first cable stayed bridge at Nagpur
- Kochi metro in Kerala Alccofine 1203 is being used
- Project Chennai metro Alccofine 1101 microfine cement grout is being used.

### 2.2 Effect Of Alccofine

Alccofine modified concrete show a better workability than other materials. As the replacement level was increased, the strength of the alccofine modified concrete increased at all ages similarly to that of the other modified concrete.

### 2.3 Strength and Durability properties of High performance concrete incorporating Alccofine

The present paper deals with the study of properties namely workability, compressive strength & durability of M60 grade HPC mixes incorporating different percentages of high reactivity alccofine by weight of cement along with some suitable super plasticizer. The result of the study indicate that the workability and strength properties of HPC mixes improved by incorporating up to desirable content 10 % by weight of cement.

## 3. METHODOLOGY

### 3.1 Materials

#### 3.1.1 Cement

Ordinary Portland Cement was used for the concrete mixture.

### 3.1.2 Fine Aggregate

Fine aggregate as per IS-383:1970 use for the concrete mixture. Before mixing of concrete fine aggregates are wash after drying for 24 hour then it will be used.

### 3.1.3 Coarse Aggregate

20 mm size of coarse aggregate was use for concrete mixture.

### 3.1.4 Binder Selection

Mostly used Ordinary Portland Cement and then only few have used Portland Pozzolana Cement(PPC) for their research because of its durability, high strength(more than 80-85% strength is achieved within 28 days as compare to that of PPC which only achieves 70-75% maximum within 28 days.

### 3.2 Exeperimental Work

We had make 30 cubes of concrete using Alccofine as admixture which usually helps in increasing strength at all stages wet and dried conditions.The cement is replaced by Alccofine with its weight of cement in percentages 10,15,20,30.In this procedure we used cement, sand, aggregate,water and super plasticizer.We have take slump cone test on the concrete and get 18-20mm slump. After casting of cubes on 28 days curing get results of compressive strength on 7 & 28 days.

#### 3.2.1 Test for compressive strength of concrete

Out of many test conducted, this is the outmost important which gives an idea about all the characteristics of concrete. For this test 150mm x 150mm x 150mm size specimens were used. The concrete cubes were tested on compression testing machine of capacity 2000 KN. The load was applied to opposite sides of specimen. The load at which concrete cubes was fail, consider as ultimate load and noted. The compressive strength was obtained by compressive strength =P/A.

Where,

P = Cube compressive load causing failure in Netwon

A = Cross sectional area of cube in mm

The average of no of specimen strength is calculated and it was taken as compressive strength of one set.

Table No

### 3.3 Advantages Of Alccofine Concrete

1. Standard cement injection equipment can be used to perform grouting.
2. Its rate of setting is very high.
3. It is Durable.

4. Flow ability of mixed is increased.

SR NO	Specimen No	Alccofine (%) by weight of cement	Compressive Strength (MPa)
1.	C1	-	60
2.	A1	10%	60
3.	A2	15%	61
4.	A3	20%	62
5.	A4	30%	60

5. It is found to be an economical solution.

6. Better working environment, no hazardous components.

**Table No 3.1 Compressive Strength Test Result For Cube Specimens**

### 3.4 Disadvantages Of Alccofine Concrete

1. Hand gloves, goggles, shall be used.
2. Avoid prolonged contact with skin and eyes.
3. If swallowed seek medical attention immediate.

### 3.5 Conventional Concrete Compare To Alccofine Concrete

**Table No 3.2 Comparision Between Conventional Concrete and Alccofine Concrete**

SR. No.	Conventional Concrete	Alccofine Concrete
1	Less durable	More durable
2	Less strength as compared to Alccofine concrete	High strength, important in respect with workability
3	Size of particle is small	Size also small in this but very small like micro particle
4	1.5% volume of cement	5% to 10% weight of cement
5	More economy	Less economy when it is add in concrete mix.

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## 5. CONCLUSION

- The conclusion from the experiment can be drawn that Alccofine being used as mineral admixture in a concrete mix increases the initial strength of the concrete than the ordinary concrete.
- The concrete posses high workability and retain the workability for sufficient time.
- Alccofine is easy to used and can be added directly with cement, ultra fine particle of alccofine provide better and smooth surface finish.
- For high strength concrete the cost of the concrete mix prepared with alccofine is lesser than concrete without alccofine.
- With alccofine hardened properties of concrete are increased or are improved.
- There were very nominal changes after 10% replacement of alccofine.

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