

## Use of Alccofine 1203 in Concrete Roads

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### Abstract

Now a day there is need of more durable concrete, pump able and even chemical resistance. To address this challenge Ambuja cements one of the largest manufacturers of the cement in India association with the world's leading cement manufacturer Holcim has entered into the joint adventure with Counto Microfine Products Pvt. Ltd. A company who has the knowledge and specialization in working with microfine slag in their endeavour to innovate and improve, to the customers, Ambuja cement brings to you a high performance concrete enhancer ALCCOFINE. In the present paper, the effect of alccofine on properties of concrete has been studied. The main aim of this study is to evaluate the strength or we can say high performance of concrete containing supplementary cementitious materials (SCM) such as Alccofine. The concrete specimens were cured under normal atmospheric temperature for 3, 7, 28 days and after curing Compressive strength characteristics were observed and also the flexural tests were conducted on the beams cured under normal conditions and tested on 7 and 28<sup>th</sup> days. The alccofine shows an early strength and increases the workability.

**Keywords:** Alccofine, slump, Compressive strength, Flexural Strength, water absorption,

### 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 microfines 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 12000cm<sup>2</sup>/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 solutions 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.

### Research Objective

The alccofine-1203 is to be used as a partial substitute to the cement (OPC). The research also includes perusal the behavior of alccofine-1203 used in concrete mix of rigid pavement. It also analyzes the results of workability, compressive strength, and flexural-strength. To compare the engineering properties of conventional concrete and alccofine concrete mix, and also to study the effects of alccofine for fresh properties and harden properties.

### Materials and Methodology

#### Materials

Cement:

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

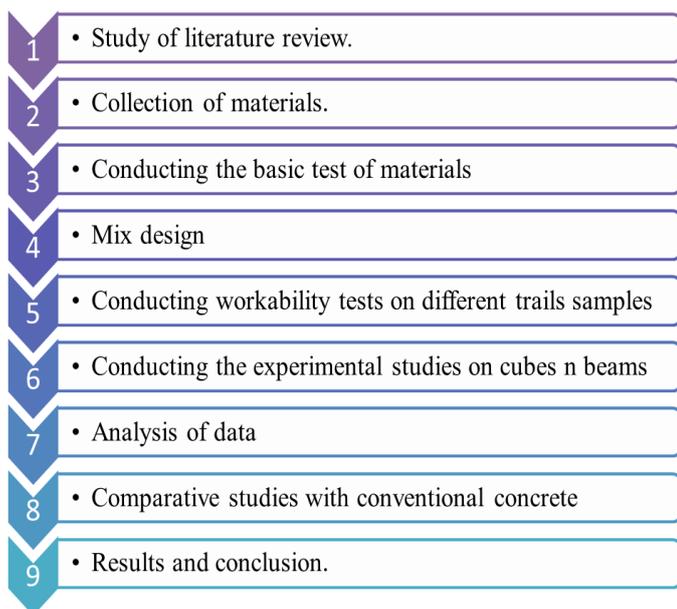
Aggregates:

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

Admixture:

The admixture used was "Masterglenium sky 8233" of BASF.

## Methodology



## 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:

- Workability tests: Slum test
- Compressive strength tests.
- Flexural strength tests.

## Mix Design

**Table.1 Mix Design Details**

| Ingredients       | Quantity                 |
|-------------------|--------------------------|
| Cement            | 395 kg/m <sup>3</sup>    |
| Water             | 158 lit                  |
| Fine-aggregates   | 771.4 kg/m <sup>3</sup>  |
| Coarse aggregates | 1258.6 kg/m <sup>3</sup> |
| W/C ratio         | 0.4                      |
| Admixture         | 0.4%                     |

## Results and Discussions

### Water adsorption and specific gravity:

**Table.2 Water Absorption Details**

| Details          | Coarse aggregates | Fine aggregates |
|------------------|-------------------|-----------------|
| Water adsorption | 0.88              | 1.01            |
| Specific gravity | 2.854             | 2.75            |

## Slump results

**Table.3 Slump Test Results**

| Details         | Slump |
|-----------------|-------|
| 0% replacement  | 80mm  |
| 5% replacement  | 65mm  |
| 10% replacement | 76mm  |
| 15% replacement | 79mm  |

## Compressive Testing

**Table.4 Summary of compressive strength.**

| Details              | 0%    | 5%    | 10%   | 15%   |       |       |       |       |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 3 <sup>rd</sup> day  | 22.00 | 21.40 | 26.00 | 26.81 | 28.44 | 28.88 | 30.20 | 30.95 |
|                      | 23.30 |       | 26.67 |       | 30.22 |       | 31.55 |       |
|                      | 18.88 |       | 27.77 |       | 28.00 |       | 31.11 |       |
| 7 <sup>th</sup> day  | 30.66 | 30.50 | 32.22 | 31.48 | 37.70 | 32.66 | 35.55 | 36.87 |
|                      | 31.60 |       | 30.00 |       | 28.80 |       | 37.30 |       |
|                      | 29.30 |       | 32.22 |       | 31.11 |       | 37.77 |       |
| 28 <sup>th</sup> day | 40.00 | 40.47 | 48.88 | 48.06 | 48.88 | 48.29 | 43.55 | 48.51 |
|                      | 42.30 |       | 49.77 |       | 47.11 |       | 53.33 |       |
|                      | 39.11 |       | 45.55 |       | 48.88 |       | 48.88 |       |

## Flexural Testing

**Table.5 Summary results of the flexural-strength .**

| Details              | 0%   | 5%   | 10%  | 15%  |      |      |      |      |
|----------------------|------|------|------|------|------|------|------|------|
| 7 <sup>th</sup> day  | 3.31 | 3.03 | 3.75 | 3.66 | 3.94 | 4.00 | 4.43 | 4.40 |
|                      | 2.69 |      | 3.56 |      | 4.14 |      | 4.13 |      |
|                      | 3.11 |      | 3.67 |      | 3.94 |      | 4.66 |      |
| 28 <sup>th</sup> day | 4.97 | 4.91 | 6.50 | 6.06 | 6.01 | 6.11 | 6.18 | 6.29 |
|                      | 4.70 |      | 5.43 |      | 6.20 |      | 6.47 |      |
|                      | 5.08 |      | 6.26 |      | 6.13 |      | 5.22 |      |

## Conclusion

- The study says that there is increase in strength with auxiliary of cement by alccofine and there, is significant increase in the workability with 0.4% addition of admixture.
- There is rapid gain in compressive-strength in initial days of curing i.e. third day testing and seventh day testing and the flexural test results have been remarkable values for 28<sup>th</sup> day testing.
- There is not much variance between the strength for replacement by 5%, 10%, and 15% by alccofine for both compressive-strength and flexural-strength.
- As alccofine is used with super plasticizer it reduces water demand. There no considerable increase in final 28<sup>th</sup> day tests results but there is swift gain in initial strength.
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