A Review Study on The Influence of Alccofine-1203 And Foundry Sand on Properties of Concrete

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Abstract- *Concrete mostly used manmade construction material in the world. Manufacturing of cement for concrete produce large amount of CO2 into the atmosphere which directly affect the global warming thus it become necessary to discover to substitute material as a place of concrete.There are lot of supplementary Cementitious materiel like fly ash, silica fumes alccofine-1203, slag powder etc. they have been affectively used as a partially replacement of cement in concrete. For high performance concrete demanding in high rise building infrastructure helping the development of concrete. The production of high strength and durability and ecofriendly concrete use for new generation supplementary Cementitious material alccofine-1203 partially replaced of cement in concrete. These new pozzolonic materials have become popular in construction industry and have brought a revolution in civil world. This paper present as overview published literatures by various researchers who have aimed to replace cement with alccofine-1203 in concrete.*

Keywords- Foundry Slag, Alccofine-1203 High Strength Concrete, Compressive Strength, Flexural Strength, Tensile Strength, Carbonation, RCPT.

I. INTRODUCTION

High strength concrete (HSC) has been widely used in civil engineering structures to reduce the size of structural elements i.e. beams and columns of high rise buildings [1]. As per ACI 363[1, 2] concrete having 28days compressive strength of more than 41 MPa is considered as high-strength concrete. Generally, super plasticizers natural pozzolana silica fume etc., are used to achieve high strength in concrete by keeping water binder ratio at lower level. Shannag [1, 3] have used natural pozzolana and silica fume to produce HSC of 69 MPa to 85 MPa at 28 days with medium workability. A Concrete with high binder material and low water cement ratio which affect workability of concrete. Due to this reason high water reducing content used in concrete.

II. MATERIAL

1. Cement: - Ordinary Portland cement of 43 grades available in local market is used in the investigation corresponding to as per IS-8112(1989). The specific gravity of cement is 3.15.

2. Aggregate: - Fine aggregate is reduced in SCC. The shape and gradation of aggregate plays a prominent role in generating self-compacting concrete. Locally available river sand conforming to zone II of IS 383:1970 is used.

3. Coarse aggregate: In this SCC small sized and limited coarse aggregates should be used so as to reduce internal stresses causing blockage. The sizes of coarse aggregate used in this mix were 10mm, 12.5mm and 20mm.

4. Water: Water used was fresh, colourless, and tasteless. Portable water free from organic compound is used in this experiment.

5. Mineral Admixture: -Chemical admixtures reduce the cost of construction, modify properties of hardened concrete, ensure quality of concrete during mixing/transporting/placing/curing, and overcome certain emergencies during concrete operations. Chemical admixtures are used to improve the quality of concrete during mixing, transporting, placement and curing.

6. Alccofine-1203: 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 age. The typical properties of alccofine-1203 are shown in Table.Typical Properties of Alccofine-1203.

S.NO.	Property	Value
1	Average particle size (Microns)	4-6
2	Fineness(cm2/gm)	12000
3	Specific gravity	2.86
4	Bulk density(Kg/m3)	600 to 700

7. Foundry sand: Foundry sand is high quality silica sand that is by product of both ferrous and non-ferrous metal casting. Foundry sand purchase high quality size specific silica sand use in moulding and casting process. Raw sand is normally high quality than the typical bank run or natural sand in fill construction site.

The shape of outer sand of mould cavity .This sand normally small amount of betonies clay acts as a binder material. Chemical binding are also use to create sand cores. These ate five different classes ferrous foundry (grey iron, steel and ductile iron) produce mostly sand. The 3,000 foundries in United States generate 6 million to 10 million tons of foundry sand per year.

Fig-1: Foundry sand

Table-1: Property of FS

Property	ASTM Standard	Foundry Sand with Clay (5%) FS#1	Foundry Sand without Clay FS#2
Bulk density	C29	60-70	80-90
Moisture content (%)	D2216	3-5	0.5-2
Moisture content (%)	D854	2.5-2.7	2.6-2.8
Dry density	D698 Standard Proctor	110-115	100-110
Optimum moisture content (%)	D69	8-12	8-10
Permeability coefficient (cm/s)	D2434	10^{3}-10^{7}	10^{-2}-10^{-6}

III. TEST ON CONCRETE

- **Compressive strength test –**
  - The compressive strength of all mix was measured with cube specimen of size 150mm.these specimens were tested after curing for 7, 14, 28 days respectively.
  - IS code-516:1959
  - Test can be performed on both CTM and UTM.
- **Tensile strength test –**
  - The_tensile strength test is done for cylindrical specimens of diameter 150mm and length 300mm.
  - Test can be performed on CTM and UTM both.
- **Flexural strength test-**
  - This test is performed for concrete beams.

- Dimension of the beam is (700*150*150) mm.
- The test is performed on FTM.

IV. RESULTS AND DISCUSSION

Workability test: The shape and texture of aggregate affect the fresh concrete fly ash rounded in shape rounded aggregate increase the workability of the concrete but of concrete reduce strength of concrete. While angular aggregate less workability but increase strength.

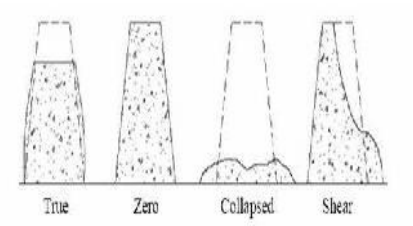

Fig-2: Workability test

Table-2: Slump Value

Trial mix	Workability (slump in cm)
Control mix	27.20
Mix 1	28.00
Mix 2	28.70
Mix 3	24.50

V. CONCLUSION

- The ternary blended concrete produced by adding different mineral admixtures may increase the strength of concrete which are partially replaced in cement concrete like bottom ash and alccofine-1203.
- The slump results indicates that the maximum slump was attained for 20% of bottom ash and 10% of alccofine-1203 replaced in cement and 30% of blast furnace slag in fine aggregate**.**
- The experimental results reveals that the maximum compressive strength achieved for 7 and 28 days are 29.17 and 51.32 N/mm2 by 20% of bottom ash and 10% of alccofine-1203 replaced in cement and 30% of blast furnace slag in fine aggregate.
- Compressive strength of standard concrete with various trail mixes is comparatively increasing more than that of conventional concrete.
- Besides achieving economy in construction, by increasing the strength of the structure, using eco-friendly material to develop the standard concrete which may greatly increase the durability and strength of structures and provides a massive structures which does not effect by natural disaster and damages less to the structures.

REFERENCES

[1] Swami, R.N., Sami A.R. Alli and Theodorakepoulos D.D, Early strength fly ash concrete for structural application, ACI Material Journal, Sept-Oct (1983) 414-422.
[2] Tarun R. Naik and Bruce W. Ramme, High strength concrete containing large quantities of fly ash, ACI Materials Journal, March-April (1989) 111-116.
[3] Maslehuddin, M., Al-Mana, A.I., Shamim, M. and Saricimen, H., Effect of sand replacement on the early age strength gain and long term corrosion resisting characteristics of fly ash concrete, ACI Materials Journal, Jan-Feb (1989) 58-62.
[4] Jaturapitakkul C and Cheerarot R (2003), Development of Bottom Ash as Pozzolanic Material, Journal of Materials In Civil Engineering, Jan-Feb.pp.4853.
[5] IS: 12269-1987, Bureau of Indian standards, New Delhi, India, 53 grade Ordinary Portland Cement- specification.
[6] IS: 383-1970, Bureau of Indian standards, New Delhi, India, Specifications for Coarse and fine aggregates.
[7] IS: 10262-2009, Bureau of Indian Standards, Mix design guidelines and Specifications for casting of specimens.
[8] IS: 516-1959 , Methods of tests for Compressive strength concrete (eleventh reprint, April 1985), Bureau of Indian standards, N Delhi.