



COMPRESSIVE STRENGTH ON SELF COMPACTING CONCRETE (SCC) USING ALCCOFINE

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Abstract:

This paper presents the results of a compressive strength on self-compacting concrete containing alccofine as a partial replacement of cement. An attempt has been made to study the fresh and harden properties of concrete. For this work M30 grade concrete was used and test was conducted for various proportions of alccofine by various percentages (5%, 10% and 15%). The compressive strength was determined at 7 and 28 days. Super plasticizer (SP) and Viscosity Modifying Agent (VMA) is used to maintain workability and homogeneity of concrete.

Keywords: Self compacting concrete (SCC), Alccofine, Compressive Strength.

1. Introduction:

Self-compacting concrete

Self compacting concrete is an innovation concrete that does not require vibration for placing and compaction. It is able to flow under its own weight, completely filling form work and achieving full compaction even in the presence of congested reinforcement. It produces resistance to segregation by using mineral fillers and special admixtures.

Alccofine

Alccofine is a new generation micro fine material of particle size much finer than other hydraulic materials like cement, fly ash, silica etc... being manufactured in India. It has unique characteristics to enhance performance of concrete in fresh and harden stages due to its optimized particle size distribution. It enhances impermeability and eliminates thermal cracks in concrete.

1.1 Literature Review:

Ansari U.S, et, al., Studied “High Performance Concrete with Partial Replacement of Cement by Alccofine & Fly Ash”. It is found that alccofine is cheaper than cement so for better strength and durability of concrete it should be promoted in Indian construction industry.



DevalSoni, et.al., Studied “Experimental Study on High- Performance Concrete with Mixing of Alccofine and Flyash” The author Concluded that-Alccofine has better performance compare to other slag materials and micro silica. It is helpful to make concrete workable.

Kongora Praveen Kumar et.al., has replaced the various proportion of ALCCOFINE with various proportion of fine aggregate to compare the parameters with normal SCC cement with this proportion mix

Nadeem Pasha et.al., used two cement replacement materials GGBS & ALCCOFINE in his experiment to maintain the homogeneity and easy placement of concrete in an congested reinforcement and in complex condition in various proportion of both material.

Yatin H Patel et.al., “Study on Durability of high performance Concrete with alccofine and fly ash” In this paper , they said that the necessity of high performance concrete is increasing because of demands in the construction industry. The author concluded that- Result show that concrete incorporating Alccofine and fly ash have higher compressive strength and Alccofine enhanced the durability of concretes and reduced the chloride diffusion.

1.2 Test methods for fresh and harden properties of concrete

Fresh properties

Slump flow test

V-funnel test

L box test

SLUMP FLOW TEST

The slump flow is used to assess the horizontal free flow of SCC in absence of obstruction. The test method is based on the test method for determining the slump. The diameter of the concrete circle is a measure of the filling ability of the concrete.

V-FUNNEL TEST

The equipment consist of a V- shaped tunnel. The V-funnel test is used to determine the filling ability (flowability) of concrete with a maximum size of aggregate 10mm. the funnel is filled with about 12 liters of concrete and the time taken for it to flow through the apparatus measured. After this the funnel can be refilled concrete and left for 5 minutes to settle. If the concrete shows segregation than the flow time will increase significantly.

L-BOX TEST

This is widely used test suitable for laboratory and perhaps site use. The test assesses the flow of concrete, and also the extent to which the concrete is subjected to blocking by reinforcement.

Harden properties

Compressive strength test

1.2.1 Laboratory Tests:

Fresh properties

Alccofine was used to replace the cement content by three various percentages (5%, 10% and 15%). The partial replacement with Alccofine was carried out for M₃₀ grade of concrete. To fulfill the requirement of SCC in fresh state and evaluate flow characteristics using slump cone, V-funnel and L-box test and to fix dosage of super plasticizer as per EFNARC guidelines and fix the dosage of water/cement ratio was needed.

Harden properties

The concrete is tested for its compressive strength after curing 7 and 28 days.

1.3 MIX DESIGN

The mixture proportion is a key factor to be considered to achieve SCC. The European federation of specialist construction chemicals and concrete system (EFNARC) provide the guidelines for development of SCC. In this method is achieved by SCC with alccofine for M₃₀ grade concrete.

1.3.1 REPRESENTATION OF TABLE AND FIGURE INFORMATION

TABLE 1: MIX RATIO

MIX	MIX 1	MIX 2	MIX 3
	Kg/m ³	Kg/m ³	Kg/m ³
Cement	399	378	357
Fine aggregate	880	879	880
Coarse aggregate	781	780	780.6
Alccofine	21	42	63
Water	208	208	208
Super plasticizer	8	8	7

Table 2: Fresh properties of SCC with Alccofine

Types	Alccofine 5%	Alccofine 10%	Alccofine 15%
Slump flow test	680mm	700mm	660mm
V-funnel test	7.60sec	7.40sec	7sec
L-box test	0.89	0.90	0.92

Table 3: Harden properties (7 days)

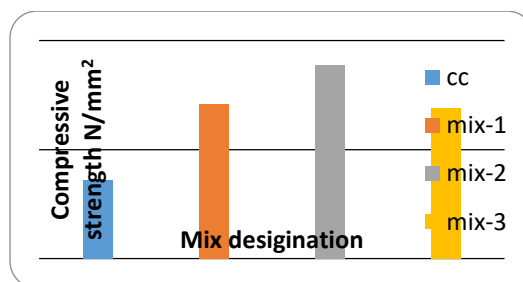
Test	Mix 1 (Mpa)		Mix 2 (Mpa)		Mix 3 (Mpa)	
Compressive Strength	36.8	37.1	38.72	38.88	37.30	36.92
	37.3		39.3		36.20	
	37.2		38.64		37.28	

Table: 4 Harden properties (28 days)

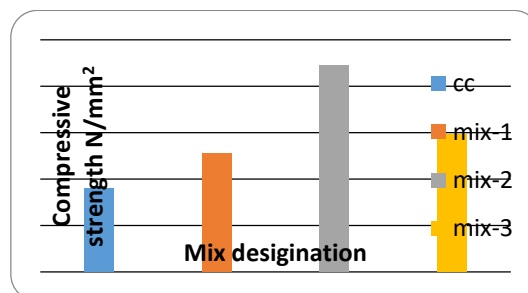
Test	Mix 1 (Mpa)		Mix 2 (Mpa)		Mix 3 (Mpa)	
Compressive Strength	42.1	43.1	46.72	46.92	47.3	46.88
	43.2		47.3		46.2	
	43.3		46.64		47.28	

1.4 VARIATION OF COMPRESSIVE STRENGTH

Graph 1: SCC with Alccofne (7 days)



Graph 2: SCC with Alccofne (28 days)





References

- [1] “Alccofine “by Counto Micro fine products Pvt.Ltd. (A joint venture with ambuja cement Ltd andalcon developers)
- [2] Devinder Sharma, Surab Gupta, Ashish Kapoor, Anu Sharma “A review on alccofine – a new generation microfine concrete materials for high strength concrete”. National conference on sustainable infrastructure development pp.68-75, Feb.2015
- [3] Gerdic Zoran, Despotovic Iva, Toplic-curcie Gordana,properties of self compacting concrete with different types of additives, Architecture and Civil engineering, volume 6, Issue 2, pages 173-177,2008
- [4] “Indian standard plain and reinforced concrete code of practice”. IS 456:2000, Burea of indian standards, New Delhi.
- [5] I.S 383-1970 –Specification For Coarse and Fine Aggregate from Natural Source Of Concrete.
- [6] IS 10262 -2009. Recommended guidelines for concrete Mix design.
- [7] I.S 383-1970 –specification for coarse and fine aggregate from natural source of concrete
- [8] M.S. shetty – concrete technology
- [9] Swampy,(Feb 1999), “Role of Slag in the development of durable and sustainable High Strength Concretes” proceedings of International Symposium on concrete technology for sustainable development in the 21s century, Hyderabad, pp 186-121
- [10] The European Guidelines for Self Compacting Concrete-EFNARC, May 2002
- [11] Abhijitsinh parmar, Dhaval patel, “utilization of pond fly ash as a partial replacement in fine aggregate with using fine fly ash and Alccofine in HSC hards concrete properties,”ISSN:2321-9939,January
- [12] Praveen Nayak S, Narashimha “They compare the properties of concrete made with alccofine used as supplementary cementing materials” Volume: 10, Issue: 8, August 2014
- [13] Sanjeev Sharma “Study of ALCCOFINE 1203 in high Volume Fly ash concrete as floor matrial” 2010.
- [14] Saurav, Ashok kumar Gupta, “ Experimental study of strength relationship of concrete cube using ultrafine slag Alccofine “, International journal of scientific and engineering research, Volume 5, Issue 5, May-2014 ISSN 2229-518
- [15] Suthar sunil B,K.Shah, study on strength Development of High strength concrete containing Alccofine and fly ash volume 2,Issue 3, March 2013 ISSN -2250-1991.