Research Article
Patel Dhaval, IJPRET, 2013; Volume 2 (5): 43-51

ISSN: 2319-507X
IJPRET

INTERNATIONAL JOURNAL OF PURE AND APPLIED RESEARCH IN ENGINEERING AND TECHNOLOGY

A PATH FOR HORIZING YOUR INNOVATIVE WORK

EXPERIMENTAL STUDY ON HIGH PERFORMANCE CONCRETE BY USING ALCCOFINE AND FLY ASH - FRESH CONCRETE PROPERTIES

ABHIJITSINH PARMAR, DHAVAL PATEL

1. Assistant Professor, SVBIT, Vasan, Gandhinagar.
2. M.E. Scholar, Dept. of W.R.E., Ahmedabad, Gujarat

Accepted Date: 25/12/2013 ; Published Date: 01/01/2014

Abstract: This review assesses the degree of resilience of mangrove forests to large, infrequent disturbance (tsunamis) and their role in coastal protection, and to chronic disturbance events (climate change) and the future of mangroves in the face of global change[Daniel. M. Alongi], 3rd October, 2007. The trees of Mangroves have shown very successful results among the sea and ocean shore evolution with respect to time. In many extreme conditions Mangroves trees has limited foundries of protection over tsunamis. These limitations mainly depend on the denseness and cover of the trees, their expansions of roots and thickness, topographical factors around, the angel of incidence of the incoming waves, and the stage at which it enters the cover. The protection afforded by this shoreline of dense trees appears substantial, not only for storm-generated waves (Massel et al., 1999), winds, typhoons, surges, but also for tsunamis.

Keywords: Tsunami, Mangrove belt, Coastal regions, Tsunami resistance, Mangrove forest Density.

PAPER-QR CODE

Corresponding Author: Mr. DHAVAL PATEL

Access Online On:

www.ijpret.com

How to Cite This Article:

Patel Dhaval, IJPRET, 2013; Volume 2 (5): 43-51

INTRODUCTION

A pozzolan is siliceous or siliceous and aluminous material which, in itself, possesses little or no cementitious value but which will, in finely divided form and in the presence of water, react chemically with calcium hydroxide at ordinary temperature to form compounds possessing cementitious properties (ASTM C618).[1]

Concrete is mostly used artificial material all over the world and has played main role in development of all countries. For higher and higher requirements in last past few years many research has been done on concrete t make it more durable and higher strength. In 1970's compressive strength more than 40

Table –1 Mix Proportion of Cement, Fly ash and Alccofine

	CEMENT (%)	FLY ASH (%)	ALCCOFINE (%)
M1	70	26	4
M2	70	24	6
M3	70	22	8
M4	70	20	10
M5	70	18	12

N/mm2 known as high- strength concrete. Later 60-100 N/mm2 compressive strength classified as High-strength concrete

"High performance concrete" is used for concrete mixture which possess high workability, high strength, high modulus of elasticity, high density, high dimensional stability, low permeability and resistant to chemical attack.

As per M60 Mix design in this research the Alccofine and fine fly ash partially replaced with cement. Replacement of cement with fly ash and Alccofine of 5 proportions are shown in table - 1

Pozzolonic Reactions

This is a chemical mechanism. Reactive silica (SiO_2) of pozzolan reacts with the calcium hydroxide (CH), which is liberated during process of hydration and produces calcium silicate

hydrate (C-S-H). Due to pozzolonic reaction the larger size of crystal of Ca $(OH)_2$ converts to crystal of C-S-H, which is dense and leading to reduction of pore size.

Portland cement Reaction : $C_3S + H = C\text{-}S\text{-}H + CH$

Pozzolonic Reaction : $S + CH + H = C\text{-}S\text{-}H$

OBJECTIVES

The primary objective of this project is to study the properties of fresh and hardened high performance concrete. It consists of following point –

- To achieve desire strength of (M60).
- To find out optimum dosage of Alccofine.
- To reduce the cost of concrete by finding out the optimum dosage of fly ash.

MATERIALS

Physical and Chemical Properties of Fly ash shown in table - 2and table – 3 respectively.

Table - 2 Physical Composition of Fly Ash

Sr. no	Character	Results
1	Lime reactivity , N/mm^2	8 min
2	Retention On 25 Micron Sieve	>0.5
3	Drying Shrinkage, percentage	0.06
4	Soundness by Autoclave expansion, percent	0.05
5	Compressive Strength, as percent of strength of corresponding plain cement mortar cubes	80

Table -3 Chemical Composition of Fly Ash

Sr No	Type of test	Test Method	Result obtained
1	CaO%	IS-1727	0.50
2	SiO_2%	IS-1727	67.60
3	$Al2O_3$%	IS-1727	11.30
4	MgO%	IS-1727	0.10
5	SO_3%	IS-1727	0.06
6	NaO_2%	IS-4032	0.035
7	K_2O%	IS-4032	0.005
8	Total Chloride%	IS-12423	0.008
9	Loss on Ignition%	IS-1727	2.60
10	Fe_2O_3%	IS-4031	1.15
11	TiO_2%	IS-4031	Nil
12	P_2O_3%	IS-4031	0.0002

Table-4 Physical Composition of Alccofine

Fineness (cm^2/gm)	Specific Gravity	Bulk Density (Kg/m^3)	Particle Size Distribution		
			D10	D50	D90
12000	3.11	700-900	1.5	5	9

Table-5 Chemical Composition of Alccofine Experimental program

Cao	So_3	Sio_2	Al_2O_3	Fe_2O_3	MgO	Cl
61-64%	2-2.4%	21-23%	5-5.6%	3.8-4.4%	0.8-1.4%	0.03-0.05%

Table – 6 Mix Proportions

M60	M1	M2	M3	M4	M4
CEMENT(kg)	414.4	414.4	414.4	414.4	414.4
FLY ASH(kg)	46.176	42.624	39.072	35.52	31.968
ALCCOFINE (kg)	7.104	10.656	14.208	17.76	21.312
WATER(kg)	258.5	258.5	258.5	258.5	258.5
C.A 1	755.5	755.5	755.5	755.5	755.5
C.A 2	752	752	752	752	752
Sand	173	173	173	173	173
Water	414.4	414.4	414.4	414.4	414.4

a. Slump Test

To determine the workability of concrete mix by slump test conducted by as per IS 1199-1959. The internal surface of the mould thoroughly cleaned and freed from superfluous moisture than mould placed on a smooth, horizontal, rigid and non-absorbent surface. The mould was filled in four layers, each approximately one-quarter of the height of the mould. Each layer was tamped with twenty-five strokes of the rounded end of the tamping rod. The bottom layer tamped throughout its

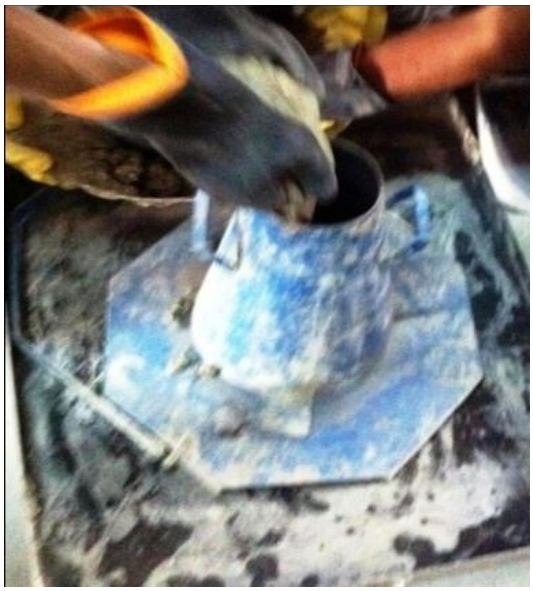

Fig – 1 Slump Test

depth. After the top layer has been rodded, the concrete was struck off level with a trowel or the tamping rod, so that the mould is exactly filled. The mould removed from the concrete immediately by raising it slowly and carefully in a vertical direction. This allows the concrete to subside and the slump shall be measured immediately by determining the difference between the height of the mould and that of the highest point of the specimen being tested.

Test results of slump test given in table no-3.

b. Flow Test

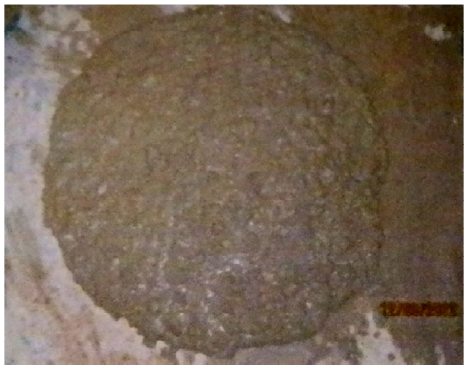

Fig – 21 Flow Test

To determine the workability of concrete mix by Flow test wasconducted as per IS 1199-1959. The mould was placed in

centred on the table and filled in two layers, each approximately one-half the volume of the mould. Each layer

was rodded with 25 strokes of a straight round metal rod 1.6 cm in diameter and 61 cm long, rounded at the lower tamping end. The strokes was distributed in a uniform manner over, the cross-section of the mould and shall penetrate into the underlying layer. The bottom layer was rodded throughout its depth. After the top layer has been roddd, the surface of the concrete was struck off with a trowel so that the mould is exactly filled. The excess concrete which has overflowed the mould was removed and the area of the table outside the mould again cleaned. The mould was immediately removed from the concrete by a steady upward pull. The table was then be raised and dropped 12.5 m, 15 times in about 15 seconds. The diameter of the spread concrete the average of six symmetrically distributed caliper measurements read.

c. Compacting Factor Test

Fig – 3 Compaction Factor Test

The concrete was placed gently in upper hopper, using the hand scoop. The hopper was filled level with its brim and trap

-door was opened so concrete falls in to lower hopper. Than the trap door of second hopper was opened and concrete was allowed to fall in cylinder. The excess concrete above the top of cylinder was removed by towel. The weight of concrete was measured and compare that with the weight of concrete was fully compacted in same cylinder. And the ratio of both known

as compaction factor. Result of compacting factor test is given in table no-5

Test results

Table – 7 test results

Proportions	M1	M2	M3	M4	M5
Slump (mm)	209	204	207	203	198
Compaction Factor	0.98	0.975	0.963	0.961	0.957
Slump Flow Dia.(mm)	605	602	604	593	591

Results of slump test, compaction factor test and slump flow test are shown in table - 5

DISCUSSION

- The workability measured in terms of compaction factor, decreases with the increase of the replacement level of the fine aggregates with the pond ash.
- It can be due to extra fineness of pond ash as the replacement level of fine aggregates is increased.
- To improve workability of concrete plasticizers are required.

CONCLUSIONS

- The workability is reducing with increase of Alccofine content in concrete because of more fineness of Alccofine.

REFERENCES

1. Mehta, P.K. (1987). "Natural pozzolans : Supplementry cementing materials in concrete". CANMET Special Publication 86: 1-33.
2. K.aniraj S.R. and Havangi V.J.(Aug 1999). 'Geotechnical Characteristics of Fly ash soil mixture' Geotechnical Engineering Journal, 30 pp 129147
3. Ajay pathik, A.N Vaysa Rao, Cyrus Dordi "Microtechnology for high performance concrete" - Oct 2011.
4. Predicting the compressive strength of ground granulated blast furnace slag concrete using artificial neural network Cahit Bilim a, Cengiz D. Atis b, Harun Tanyildizi c, Okan Karahan- May 2008
5. IS 456 -2000, 'Plain and Reinforced Concrete code for Practice.
6. IS 10262- 2009, 'Recommended Guidelines for Concrete Mix Design.