

RESEARCH ARTICLE



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PROPERTIES OF HIGH VOLUME FLY ASH CONCRETE

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ABSTRACT

Ash is finely divided residue ensuing from the combustion of steam-powered coal and transported by the flue gases and picked up by static Cottrell precipitator. There square measure multiple advantages for the property development of the development business by mistreatment ash to extend the strength characteristics of structural members. The target of this investigation is to review the mechanical strength behaviour of High Volume ash concrete pavement block. During this study the mechanical properties square measure studied with numerous replacements with cement like 0%, 10%, 20%, 30%, 40% of ash. This protects the upper compressive strength. when put next with management combine the strength of HVFA concrete minimal impact 40%, hour at third day seven day and twenty eight day severally.

Keywords: High volume ash concrete, cement, category F sort ash, Conplast SP430

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INTRODUCTION

Cement concrete is that the most generally used construction material in any infrastructure development comes. The assembly of cement, a necessary constituent of concrete, unharness great amount of greenhouse gas into the atmosphere. These gases square measure the key contributor to the inexperienced house result and also the warming of the world, that may be a major international environmental international issue presently the world is encountering. The event and use of mineral admixture for cement replacement is growing in housing industry in the main as a result of the thought of price saving, energy saving, environmental production and conservation of resources. Mineral admixtures typically used square measure raw ash, rice husk ash, metakaolin, silicon oxide fume etc. Addition of such materials improves the concrete property. ash is finely divided residue ensuing from the combustion of steam-powered

coal and transported by the flue gases and picked up by static Cottrell precipitator. There square measure multiple advantages for the property development of the development business by mistreatment ash to extend the strength characteristics of structural members. Ash reacts with lime, a byproduct of the association of cement.

Use of cement ends up in great amount of greenhouse gas emission that ends up in environmental downside. ash that is obtained from thermal power station once more to cement reduces the value and also the downside of disposal of ash is solved .

Materials Used

The materials used for prime volume ash concrete square measure cement, fine combination, coarse combination, mineral admixture, chemical admixture and water. During this investigation, normal cement (43 Grade) was used for casting all the specimens Fineness (wt of residue) and relative

density were seven-membered and three.12 severally. Category F kind of ash is obtained from Metur power station with fineness modulus and relative density were seven.86 and 2.30 severally.

Clean and dry stream sand out there regionally are used. Sand passing through IS four.75mm Sieve are used for casting all the specimens. The fineness modulus and relative density were a pair of.89 and 2.68. The coarse combination with relative density a pair of.75 and size passing from twelve.5 to 20mm was used. Super plasticizer is employed because the chemical admixture. Conplast SP430 is predicated on Sulphonated Naphthalene Polymers and is provided as a brown liquid instantly dispersible in water. Conplast SP430 has been specially developed to offer high water reductions up to twenty fifth while not loss of workability or to provide prime quality concrete of reduced porosity.

COMBINE DESIGN

The mix composition is chosen to satisfy all performance criteria for the concrete in each the recent and hardened states. Proportioning of concrete combines will be thought to be a procedure set to proportion the foremost economical concrete mix for such sturdiness and grade for needed web site conditions. the fundamental principle of the concrete combine style is to pick the proportion of all the-ingredients the idea of the irresolute volume and taking total absolute volume of concrete 1m³. In the gift pointers, absolutely the volume of air has been thought-about as cipher as against a pair of per cent for twenty metric linear unit and 1percent for 40mm most size of combination every provided in IRC: 44-2008. the strategy given in these Guide lines is to be thought to be pointers solely, to gain a suitable product that satisfies the necessities of replacement definite quantity with development of strength with age and ensures the necessities of sturdiness. A rational combine style method ought to be used, to scale back the amount of trial tests in laboratory. Table one shows the combination proportions for numerous mixes (M0, M1, M2 and M3).

Method of Experiment: Mould for casting specimens for strength study square measure of forged iron. Oil was applied on the inner surface of the moulds of cube and cylinder. Concrete was mixed in an exceedingly cement mixer. The cube,

cylinder and prism were forged from a similar batch of concrete. The specimens were compacted mistreatment table vibratos. The check specimens were cured for seven day, and twenty eight day in action tanks. Concrete cubes of size 150mm x 150mm x 150mm were forged to check the compressive strength of concrete. Concrete cylinder of size 150mm diameter and 300mm height were forged to check the lastingness of concrete. Concrete prism of size 100x100x500mm was forged to check the flexural strength of concrete. Experimental investigations dole out on the check specimens to review the mechanical properties of HVFA concrete. All the check specimens like cube and cylinder were forged mistreatment steel moulds. The specimens were aloof from the mould once twenty four hours and cured in water. The cube specimens were used for compressive strength and cylinder specimens were accustomed study the split lastingness.

ANALYSIS PROGRAM

Slump Test: This check is performed to examine the workability of freshly created concrete. It's a term that describes the state of contemporary concrete. It refers to the convenience with that the concrete flows. It's accustomed indicate the degree of status. Slump check is that the most typically used methodology of measurement workability of concrete. The equipment for conducting the slump check essential consists of an auriferous mould within the type of a cone having the interior dimensions as beneath. Concrete into the cylinder, the surplus is far away from the highest level of the cylinder. Then the cylinder was weighted once it all the concrete was removed and once more fill by 5cm layers. Nonetheless weight this weight referred to as weight of absolutely compacted concrete.

Compressive Strength: Compression check is that the commonest check conducted on hardened concrete, part as a result of its straightforward check to perform, and part as a result of most of the fascinating characteristic properties of concrete square measure qualitatively associated with its compressive strength. The compression check is dole out on specimens cubic or cylindrical in form. The cube specimen is of the scale one hundred fifty x one hundred fifty x 150mm. attributable to compression load, the cube or cylinder undergoes

lateral enlargement because of poisons quantitative relation result. Table four shows the compressive strength for numerous mixes.

Cacophonous strength: The split tension check may be a methodology of crucial the strength of concrete. The experiment consists of casting and testing of cylinder, 150mm diameter and 300mm height. Specimens were cured for seven, twenty eight days beneath water before testing. Compression testing machine having 2000kN is employed for loading. The load was applied till the cylinder splits across the diametric plane connecting the loading strips. The influence of various ratios ash of concrete specimens per split strength will be calculated. Table five shows the split strength for numerous mixes.

RESULTS AND DISCUSSION

Slump cone test results

Workability: - Workability in terms of slump

Table 1 shows the worth of slump obtained for varied mixes for M30 grade concrete created with various factors replacement of fine combination with fly ash.

Table 1: Values of workability in terms of Slump

S No:	Percentage of fly ash replacement	Slump in mm
1	0	53
2	10	57
3	20	56
4	30	55
5	40	53

Compaction factor test

Table 2: Values of workability in terms of Compaction issue

S No.	Percentage of Sand replacement	Compaction factor
1	0	0.87
2	10	0.9
3	20	0.89
4	30	0.87
5	40	0.85

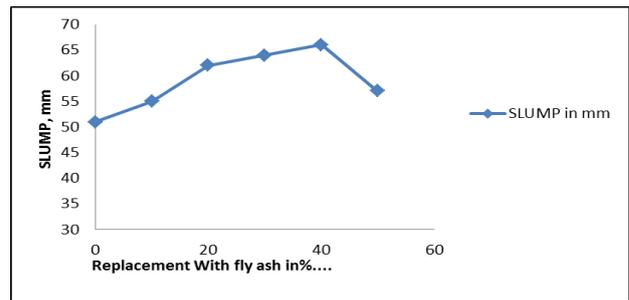


Figure 1: slump variations with fly ash

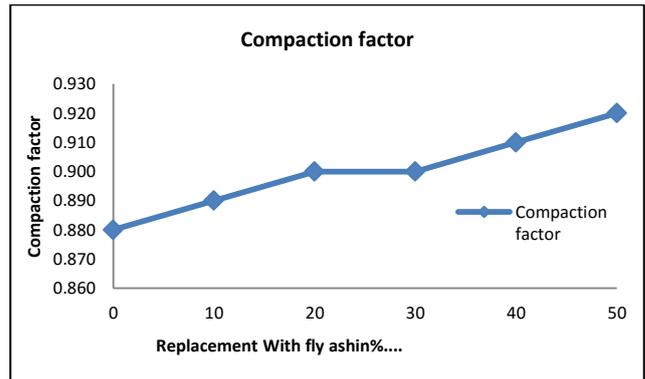


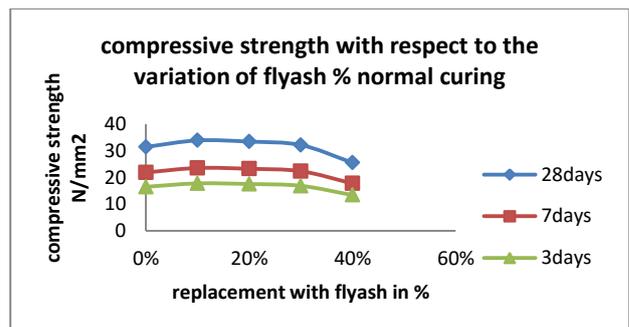
Figure 2: compaction factor variations with fly ash

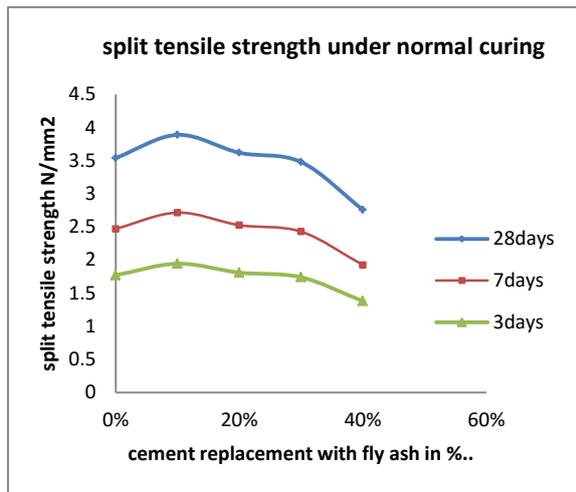
COMPRESSIVE STRENGTH

Replacement of fly ash %	Strength (N/mm ²)		
	3days	7days	28days
0	19.53	25.89	37.26
10	21.03	27.88	40.12
20	20.37	27	38.86
30	19.96	26.45	38.07
40	15.12	20.04	28.84

SPLIT TENSILE STRENGTH

S.No	Designation of mix or % replacement	Strength N/mm ²		
		3days	7days	28days
		1	0%	1.91
2	10%	2.11	2.86	4.11
3	20%	1.95	2.66	3.81
4	30%	1.94	2.64	3.78
5	40%	1.48	2.12	2.88





Conclusion

- In this investigation, the mechanical properties of HVFA concrete, and control concrete were studied and compared. The weight replacements of cement used were 50%, 60% and 70% and following conclusion are arrived.
- HVFA concrete attained lesser compressive and tensile strength when compared with OPC concrete.
- The maximum values 28 days strength of HVFA concrete with 0.34 w/b ratio was obtained with 0% replacement followed by 10% and 20% with 0.45 w/b ratio.
- The mechanical properties show that the HVFA concrete given lower strength than the control mix concrete.

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