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Compressive Strength on Interlocking Concrete Blocks With Acacia Nilotica Ash and Broken Tiles

R.Vennila[1], R.Anuradha[2]*, S.Kavitha[3]

[1,3]RVS Technical Campus, Coimbatore-641402,India
[2]SNS college of Technology, Coimbatore, India

Abstract : The work aims to carry out an investigation on performance of hollow concrete masonry strengthened with replacement of cement by acacia nilotica ash and addition of tile chipset. The inner hollow portions considerably reduce the dead load. In order to get a finished surface several trial mixes were tested. The blocks were casted with and without ash and chipset and the blocks were subjected to compression test and from this compressive strength of blocks were examined.
Keywords : Interlocking, chipset, Acacia nilotica, ash.

1.0 Introduction

Concrete hollow blocks were used for masonry wall, it is of light weight and so to reduce the economy of whole structure these blocks are used as a structural materials[1]. And it is one of the precast material and gives advantages like faster speed construction, uniform quality. It acts as a thermal insulator because of their hollowness[2,3,4].

This work introduces a hollow concrete block in which the geometry of the block is so arranged that the bonding is achieved by interlocking and cement grout. The side face of block is casted in good finish, thereby reducing the plastering cost[5,6,7]. The inner hollow portions considerably reduce the dead load. The hollow portion serves as a conduit for electrical and plumbing utilities. The dimension of the interlocking hollow block is 60 x 20 x 29.8 and its weight is 53 kg[8].

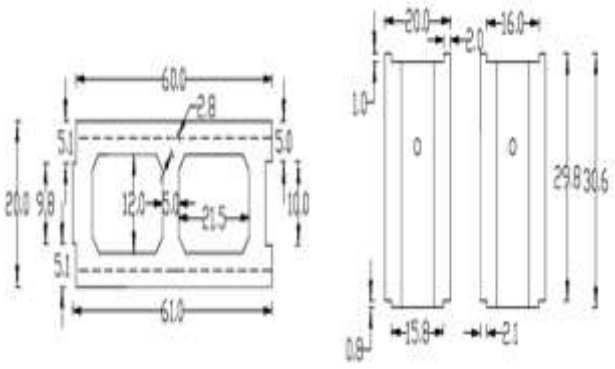


Fig 1 plan and inner vertical bonding face of interlocking hollow blocks

1.1 Scope

- To study the development of compressive strength in concrete by adding chipset.
- To provide safeguard to the environment by utilizing waste ash from acacia nilotica tree that means seemaikaruvelammaram in tamil and to reduce the water asorbtion in atmosphere.

2.0 Methodology

2.1 Collection of raw materials:

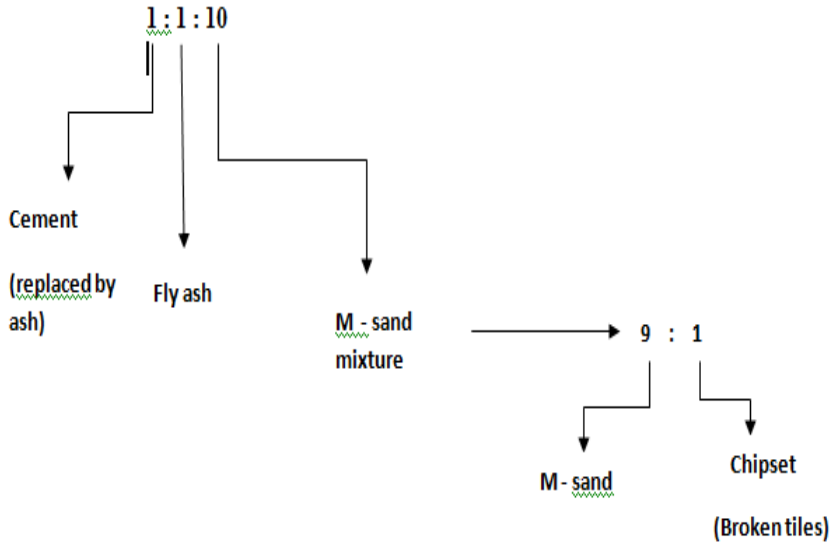
Cement, fly ash, m-sand, acacia nilotica ash, chipset (broken tiles)

2.2 Testing of materials:

cement	Brand: Shankar cement: 43 grade Portland pozzalana cement
	Standard consistency: 32%
	Initial setting time: 190 min
	Final setting time: 365 min
	Specific gravity:2.965
flyash	Fineness:34%
	Soundness:0.8
Fine aggregates (M- sand)	Specific gravity:2.63
	Bulkdensity:15.1
Coarse aggregates (chipset)	Fineness modulus:3.94
	Specific gravity:2.65
	Fineness modulus:6%
	Water absorption:7%

2.3 Mix proportion:

For mix ratio [2] is followed



2.4 Specimen preparation:

Materials replaced and added	**0%**	**5%**	**10%**	**15%**	**20%**	**25%**	**Total**	
							7 days	**14 days**
Cement replaced by ash	**3**	**3**	**3**	**3**	**3**	**3**	**18**	**18**
Adding broken tiles instead of chipset	**3**	**3**	**3**	**3**	**3**	**3**	**18**	**18**
Combination of both	**3**	**3**	**3**	**3**	**3**	**3**	**18**	**18**
Total number of blocks							**108**	

2.5 Adding broken tiles instead of chipset:

Proportion	**Normal chips with 0% replacement**	**Broken tiles as chipset**
Compressive strength at 7 days	15.3	17.23
	15.23	18.3
	16.23	17.8
Compressive strength at 14 days	24.36	28.3
	25.3	27.6
	26.3	29.6

2.6 Testing of specimens:

Cured specimens are tested to find compressive strength Cement replaced by ash:

Proportion	**0%**	**5%**	**10%**	**15%**	**20%**	**25%**
Compressive strength at 7 days	14.5	17.7	18.3	19.8	20.4	18.6
	14.8	17.9	18.5	19.62	20.62	18.4
	13.9	16.3	17.9	18.3	20.34	19.3
Compressive strength at 14 days	24.5	26.4	27.3	28.3	30.26	28.6
	24.6	26.3	28.56	29.46	30.2	28.3
	24.3	25.4	26.9	29.3	29.8	28.4

2.7 Combination of both:

Proportion	**0%**	**5%**	**10%**	**15%**	**20%**	**25%**
	With Broken tiles as chipset					
Compressive strength at 7 days	15.36	17.36	18.35	18.65	19.32	17.32
	15.8	17.23	18.36	18.69	19.65	17.62
	16.34	16.9	18.35	19.2	20.32	17.35
Compressive strength at 14 days	22.4	23.53	23.9	24.35	25.35	23.98
	23.65	24.35	24.86	24.96	25.34	23.45
	25.8	25.9	26.23	26.32	26.42	23.65

3.0 Conclusion:

A study of interlocking concrete blocks strengthened with broken tiles as chipset and replacing cement with ash was performed in the work.

The experimental investigation lead to maximum strength attains at 20% after that strength value decreases the following conclusions.

Cement replaced by ash:

7 days compressive strength of blocks gives 20.36 N/mm^2

14 days compressive strength of blocks gives 29.68 N/mm^2

Adding broken tiles instead of chipset:

7 days compressive strength of blocks gives 17.6 N/mm^2

14 days compressive strength of blocks gives 28.32 N/mm^2

Combination of both:

7 days compressive strength of blocks gives 19.36 N/mm^2

14 days compressive strength of blocks gives 25.34 N/mm^2

Low cost concrete is developed using waste broken tiles (obtained free of cost) and acacia nilotica ash from burning of karuvelammaram(obtained free of cost) with reduction in the use of cement, the emission of greenhouse gas into the atmosphere from concrete can be reduced. Utilization of waste tiles reduces environmental pollution. Scarcity of the aggregates for construction can also be met the use of waste tiles.

4.0 References:

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