

Use of Waste PVC Flex Banner in Building Construction Material

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Abstract— Flex banner have combination of Poly Vinyl Chloride (PVC) and fibres. Flex banners have resistivity to temperature and rain water and have a property to made it possible to develop a wide range of properties in flexible PVC. This has been responsible for the growth of flexible PVC over the years. Unfortunately, used flex banners became a part of municipal solid waste and increase over the years. Waste flex banners contribute carcinogenic materials in leachate. The manufacture, use, and disposal of PVC, causes substantial and unique environmental and human health hazards. Across the world, governments, companies, and scientific organizations have come to recognize the hazards of PVC. PVC Flex Banner are used in large quantity for various advertising purposes. These banners are made in various steps which are Ethylene and Chlorine gas production, Feedstock production, Polymerization, Compounding or Formulation, Moulding. After the manufacturing of flex and their usage, these flex are to be disposed, which is the main problem. As these flex are non-biodegradable and when burnt it emits various harmful gases which is a hazard to the environment. The present research work seek the scope of used flex in building construction material like Bricks. It was found that in burnt clay bricks addition of fly ash did not affected the compressive strength by large difference it increased till the concentration reached to 2.5% and then decreased with the further increase in flex concentration. The bricks made by adding shredded flex showed positive results in increase in the performance.

Keywords: Flex, poly vinyl chloride (PVC), banner

I. INTRODUCTION

Since 40 years, polyvinyl chloride plastic (PVC) has become a significant building material. The Global vinyl production now accounts for more than 30 million tons per year, the major part of which is directed to building applications, furnishings and electronics. The manufacturing, usage, and disposal of PVC includes substantial and unique environmental and human health hazards. Across the whole world, governments, companies, and scientific organizations have come aware the hazards of PVC. In Europe, government has banned certain PVC uses for environmental reasons, and several countries have ambitious programs to reduce PVC

use. There are various communities which have PVC avoidance policies, and dozens of green buildings have been built with very little or no PVC materials. Firms in a variety of industries have conveyed measures to reduce PVC consumption and are making use of or producing alternative materials in a variety of product sectors, including building materials. Reusing the PVC flex banner will reduce the accumulation of waste PVC in the environment which is harmful to the nature and environment. These banners can be used in building construction material, which is discussed in this article.

II. METHODOLOGY

Material used in this research are, Earth clay to make burnt clay bricks. Fly ash, lime and sand dust to make fly ash clay bricks. and Flex banner, they are mainly used for advertizing purposes, after their usage they are dumped in landfills, these flex are then collected from the landfills, shops, colleges. After their collection these flex are then taken to the plant where these flex are shredded by flex chipper shredder. Size of the flex ranges from 3mm to 15mm in this research work size of the chips ranges from 3 mm to 6 mm. In this research work two types of bricks are manufactured which are burnt clay bricks and fly ash bricks. Manufacturing of these bricks in which shredded flex are introduced, in burny clay bricks flex is introduced by total weight of soil from 0.5% to 5% as interval of 0.5%. fly ash bricks are made up of Fly ash (55%), Lime (40%) and sand (5%) and this mix flex banner by total weight of mix from 0.5% to 5% as interval of 0.5%. In this research test like compressive strength, Efflorescence Test and water absorption test are performed.

III. RESULT & DISCUSSION

In this section properties of both Fly Ash bricks and Burnt Clay Bricks are compared. Below given table shows the comparison of the properties of both types of bricks for same concentration of shredded flex. Both the bricks showed same type of results as water absorption capacity got decreased when increase in flex concentration was done. Compressive strength of both the bricks increased upto certain percentage of flex in both the bricks but it decreased when more than 3% of flex was added.

Specimen	% Weight of Shredded Flex	Compressive strength (MPa)		Water Absorption (%)		Efflorescence (%)	
		Fly Ash Bricks	Burnt Clay Bricks	Fly Ash Bricks	Burnt Clay Bricks	Fly Ash Bricks	Burnt Clay Bricks
S01	0	4.67	3.66	17.90	22.7	Nil	Slight
S02	0.5%	5.79	3.85	14.16	21.8	Nil	Slight
S03	1%	5.8	3.88	14.93	20.62	Nil	Slight
S04	1.5%	6.38	3.95	16.16	21.02	Nil	Slight
S05	2%	6.7	4.01	12.1	22.6	Nil	Slight
S06	2.5%	6.96	4.2	16.16	23.92	Nil	Slight
S07	3%	3.96	3.94	12.16	15.18	Nil	Slight
S08	3.5%	3.79	3.81	10.99	15.71	Nil	Slight
S09	4%	2.62	3.59	13.73	16.12	Nil	Slight

S10	4.5%	2.6	2.95	15.3	15.98	Nil	Slight
S11	5%	2.65	2.73	12.1	17.49	Nil	Slight

Table 1: Comparison of Properties of Fly Ash Bricks and Burnt Clay Bricks

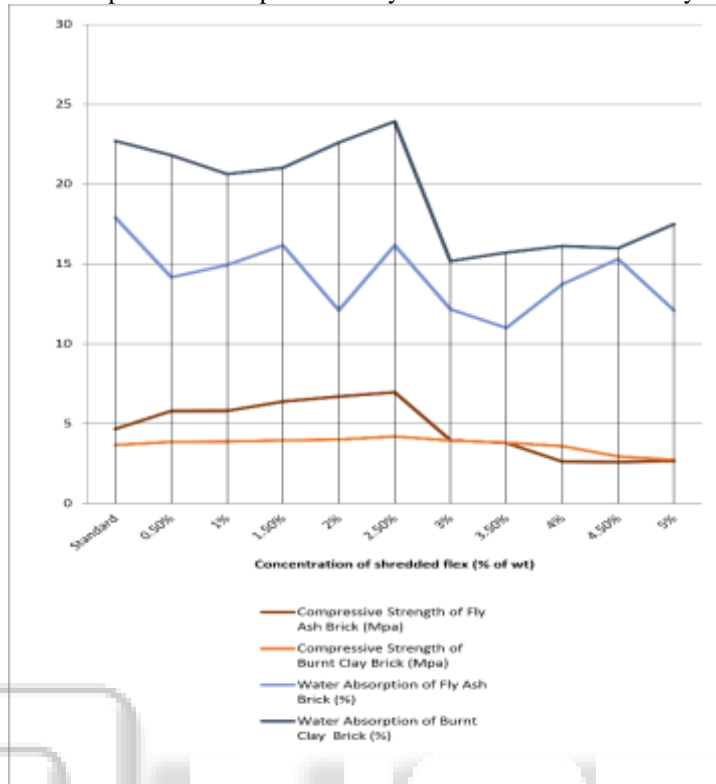


Fig. 1: Comparison of Properties of Fly Ash Bricks and Burnt Clay Bricks

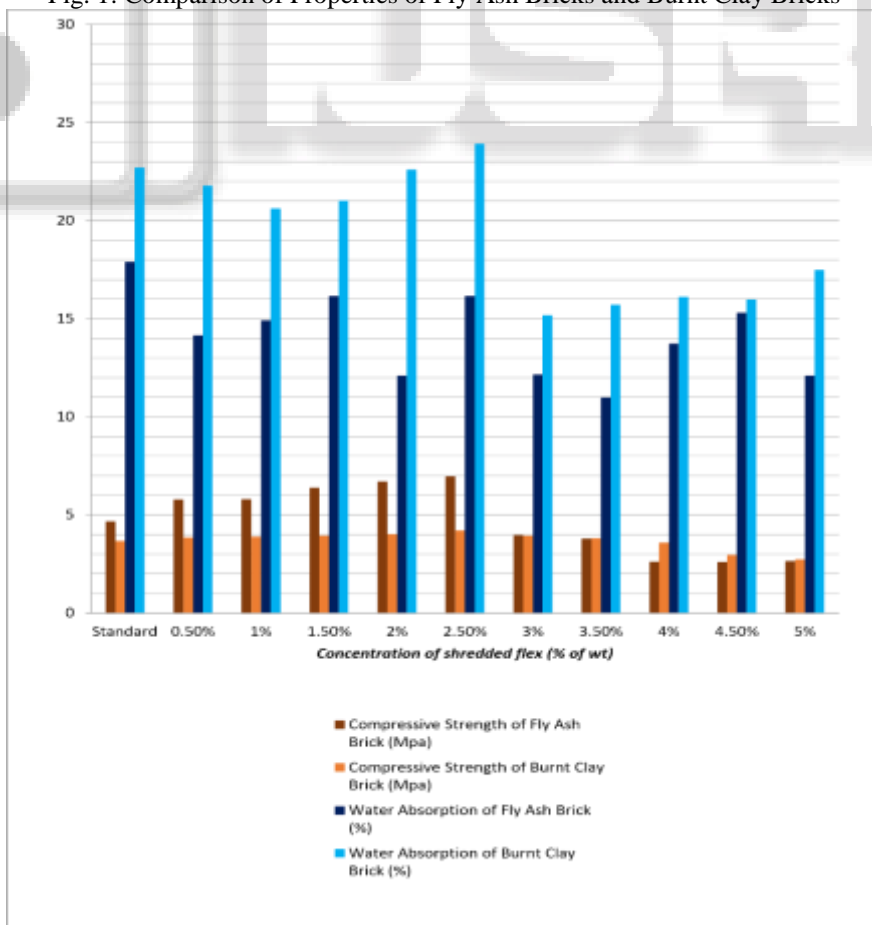


Fig. 2: Comparison of Properties of Fly Ash Bricks and Burnt Clay Bricks

IV. CONCLUSION

In the present study, shredded flex is used for partial replacement of material used in fly ash bricks of 4.5 MPa strength and in common burnt clay bricks of 3.5 MPa strength. The bricks are prepared using these materials and tested in lab- compressive strength, water absorption test and efflorescence test are carried out. Using Shredded flex in varying percentage starting from 0.5% to 5% of weight of material. The following conclusions are drawn from the present study:

- 1) In fly ash bricks by increasing the percentage of shredded flex the compressive strength increases till the concentration of flex is 2.5%. After the further increase in flex concentration, compressive strength decreases. In water absorption there is decrease in water absorption capacity when the flex is added, when the concentration of flex was 2% water absorption capacity was least. 2% of concentration of flex was the optimum percentage of flex to use it in fly ash bricks.
- 2) In fly ash bricks weight of the bricks were measured and then it was compared with the weight of standard brick. It was found that weight of bricks decreased till 3.5% after this it did not varied with much difference. Cost of manufacturing of one fly ash brick made by mixing shredded flex is determined. It was found that its cost was approximately the same as fly ash and lime content were reduced due to addition of shredded flex.
- 3) In burnt clay bricks addition of fly ash did not affected the compressive strength by large difference it increased till the concentration reached to 2.5% and then decreased with the further increase in flex concentration. Water absorption capacity was effected by the concentration of flex it reduced drastically when the concentration of flex reached 3%. Optimum percentage of flex here was 3%.
- 4) In burnt clay brick it was found that weight of bricks decreased as the concentration of flex increased. Cost of manufacturing of one burnt clay brick made by mixing shredded flex is determined and it was found that its cost was Rs0.50 more than the standard bricks.
- 5) Both the bricks showed same type of results as water absorption capacity got decreased when increase in flex concentration was done. Compressive strength of both the bricks increased upto certain percentage of flex in both the bricks but it decreased when more than 3% of flex was added.

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