

FLY ASH AS ESSENTIAL BUILDING BLOCK FOR THE FUTURE

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Abstract:

This study centered on brick that is made up of nearly 100% fly ash. The way is assembled uses system hardware like those used as earth production lines. Other good attributes of the debris block was examined. They include security quality, modulus of burst, ingestion limit, starting rate of assimilation and sturdiness. These estimations of these attributes for fly fiery remains blocks are amazing and have surpassed those relating to earth block. In addition, fly powder blocks have been created with rosy shading like dirt block. The new blocks have been given the name fly ash bricks.

Keywords: Hardware, debris, Fly ash, ingestion limit, fly fiery.

INTRODUCTION

Brick Production

The process of manufacturing of bricks from clay involves preparation of clay, molding, and then drying and burning of bricks. The bricks are building materials which are generally available as rectangular blocks. The bricks do not require any dressing and brick laying is very simple compared to stone masonry.

Manufacturing Process of Bricks

There are four different operations involved in the process of bricks:

1. Preparation of clay
2. Molding
3. Drying
4. Burning

(Ministry of environment and forest, 1999).

Fly ash bricks and comparison with clay bricks

Fly ash bricks are hitch well improved quality bricks used for construction of brick mansory structures. They are used as replacement for normal clay bricks and has better properties than it. Fly ash bricks competitive in comparison to the conventional clay bricks and provide enormous indirect benefits. The utilization of fly ash bricks results in conversion of natural resources as well as protection of environment.

The important composition of ash brick are;

1. Fly ash
2. Cement
3. Sand
4. Water

(Kumar V.M and Khara P.S., 2003)

Table 1: Items of difference in the production process and expected to make cost difference:

	Common Load Bearing clay Bricks	Load Bearing Fly ash Bricks
Factory Location	On site of raw materials	Anywhere, preferably on site of coal power station.
Excavation needed	Required	None
Raw materials qualities	Varies daily	Consistent
Raw materials needed per 1000 bricks	4-5 tonnes of clay and shale	2.75 tonnes of fly ash
Raw materials wastage per 1000 bricks	1.7-2 tonnes of clay and shale	None
Grinding of rocks	Required	None to grind
Mixing Dry materials	Required	None
Additive (subjected provisional confidentiality)	None	Required @ 0.2L/100kg
Drying Green units	7 days	3 days
Temperature of firing the units	1000C - 1300C	1000C - 1300C
Length of firing time	1-7 days	Few hours

Table 1: Summarize the different in the manufacturing process between the clay bricks and fly ash bricks.

Aim of Study

To prove that fly ash is an essential building block for the future.

Objectives;

- 1) To prove that fly ash bricks has advantage over traditional clay bricks.
- 2) To ascertain the disadvantages of fly ash over traditional clay bricks.
- 3) To enlighten the public on the importance of both fly ash and clay bricks.

Testing Process for fly ash bricks

A good number of tests were carryout on fly ash bricks in order to compare their qualities as load bearing bricks with those made from clay. The Indian standard IS 12894:2002 were applied in all he tests reported here. Commercially available bricks that are known to be among the best in the Indian market were tested and compared to the results from fly ash bricks. The results are shown in Table 1: Comparison of dimension.

Sample No:	Clay Brick (mm)	Fly Ash Brick (mm)
1	210X95X55	220X105X65
2	205X95X60	230X110X70
3	205X95X60	225X115X70
4	200X96X60	230X110X65
5	210X95X60	225X115X70

DIMENSION COMPARISON

BRICK STRUCTURE COMPARISON



Figure 1: Fly ash brick broken brick structure



Figure 2: Clay brick broken brick structure

DURABILITY OF BRICKS

Imperviousness to salt assault was assessed by Indian standard IS 12894:2002. A zero misfortune in mass after 15 cycles of presentation to absorbing and drying sodium sulfates arrangements was recorded. This outcome was superior to that of earth blocks which had a slight mass misfortune after 15 cycles of salt introduction. This test, in spite of the fact that utilizes sodium sulfates, and in this way is an immediate sign of the material used to oppose cycle of solidifying and defrosting.

INITIAL RATE OF ABSORPTION AND ABSORPTION CAPACITY

Two essential properties of building blocks are initial rate of assimilation (IRA) and the ingestion limit. The IRA is of awesome significance for the laying of the blocks and holding with the mortar. A high IRA brings about too snappy drying of the mortar and subsequently debilities the mortar and diminishes its adherence to the block. Then again if the IRA is too low, the surface of the block contiguous the mortar would not retain the abundance water and would bring about the exceptionally powerless layer of the mortar that would not have infiltrated enough into the surface cleft and pores of the block (Lingling, X., 2002).

The property of aggregate ingestion limit is additionally essential for the execution of the block. A high retention brings about powerlessness to volume changes that would bring about breaking the blocks and basic harm in structures. It additionally would prompt splitting in the case of solidifying and defrosting of the water inside the pores. Too little ingestion, however, is likewise not craved. This is on the ground that rain water, instead of getting incompletely consumed by the block, would tend to keep running off rapid towards the joints and may discover its way into the working joint and in addition, lessen the toughness of the mortar joints.

The outcomes acquired of the IRA and the aggregate ingestion limit with regards to Fly Ash Bricks demonstrates fantastic execution potential in laying and solidness. The straight forwardness and productivity of laying blocks are especially identified with the IRA property which likewise influence the vital property of cling to the mortar. Because of the significance of bond attributes, a progression of bond tests was led on fly cinder blocks and ordinary earth blocks (www.commerce.state.il.us).

SOUNDNESS TEST

In this test, the two bricks are taken and they are struck with each other. The bricks should not break and a clear ringing sound should be produced.

Clay bricks create the metallic sound.

Fly ash bricks do not create the metallic sound.

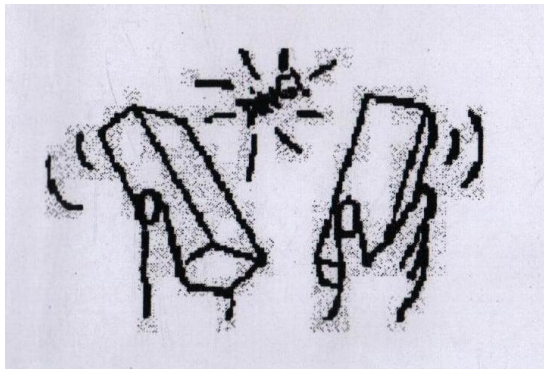


Figure 3: Soundness test

ABSORPTION TEST

Procedure:

- Select mud blocks and fly fiery debris blocks indiscriminately.
- Dry the example in a drying broiler at a temperature of 110°C to 115°C for

24hrs.

- Remove the bricks from the broiler and cool them to room temperature and acquire its weight W_1 (kg).
- Immerse the five blocks totally in water at $27^{\circ} \pm 2^{\circ}\text{C}$ for 24hrs.
- Remove the example and wipe out any hints of water with a soggy material and measure the example inside three minutes after its expulsion from water. Give its weight a chance to be W_2 (kg).
- Water absorption capacity is far as rate by weight is given by. $W_2 - W_1 \times 100$ _____
 W_1 1
- Take the average value of water absorption capacity.

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Table 2: Water absorption test

Sample No	Clay Bricks (%)	Fly Ash Bricks (%)
1	11.043	21.357
2	9.515	22.711
3	7.876	20.733
4	10.220	17.191
5	11.332	22.857

AVG:	9.997	20.969
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COMPRESSIVE STRENGTH TEST

Procedure:

- Take a specimen of block and get its measurement.
- With the assistance of measurements compute cross-sectional zone of blocks.
- Place the sample of blocks between the jaws of compressive testing machine.
- Apply the heap step by, on the block till splits are occurring in the block.
- When splits are seen on blocks stop the machine and measure connected load and note down it.



Figure 4: Compressive strength test

Table 3: Compressive strength test

Sample No	Clay Brick (N/mm²)	Fly Ash Brick (N/mm²)
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1	8.914	14.258
2	10.132	13.689
3	9.624	14.332
4	8.168	12.467
5	10.344	11.224
AVG:	9.436	13.194

Advantages of Fly ash bricks over clay bricks

- Fly ash bricks are lighter in weight
- Fly ash bricks are less costly than clay bricks.
- Fly ash bricks are made of waste materials which come from the combustion of coal in thermal power plants.
- Clay bricks are made of clay which is collected from fertile land or the topsoil.

CONCLUSION:

This study is all about fly ash as an essential building block for the future; The results are characteristic of the acceptable execution of fly fiery remains block as load bearing component. This sort of blocks uses 100% fly power without blending with mud and shale. In the event that accordingly gives an expansive scene to the transfer of fly powder in an extremely proficient, valuable and productive way. The mechanical properties of fly fiery remains blocks have surpassed those of the standard load bearing mud blocks. Striking among these properties are the compressive quality and the elasticity. Compressive quality was 24% superior to great mud quality mud blocks. Elasticity was about three times the incentive for standard mud blocks. Compression between the bond quality of fly fiery remains blocks to mortar and that of similar formed and usually utilized strong dirt blocks demonstrated that the fly slag blocks have a security that is 44% higher than the standard mud blocks. There is confirmation that the micro-structural highlight of the surface of fly fiery debris blocks is portrayed by a rougher surface' than that of earth-blocks. This trademark is accepted to be in charge of the expanded bond quality with mortar. The resistance of the blocks to rehashed cycles of salt introduction demonstrated zero loss of mass and showed fantastic imperviousness to sulfate assault. The thickness of fly cinder blocks is 28% not as much as that of standard mud blocks. This lessening in the heaviness of blocks results in a lot of reserve funds among which are sparing in the crude materials and transportation expenses and sparing to the customer, that outcome from expanded number of units and decrease in the heaps on auxiliary components. The procedure of make of fly cinder blocks shows unmistakably that there is much sharing to be done amid the making of blocks. These funds emerge principally from the consistency of the crude material and the diminishment in terminating time and in addition from getting rid of entire procedures of

mining, transporting, blending and granulating, that are important on account of the dirt and shale-based blocks. The study was able to enumerate some of the advantage of fly ash over clay which includes: being lighter in weight and also cheaper than clay which makes it better essential building block for the future.

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