

# Clay Bricks Vs Fly Ash Bricks In Construction

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*Abstract: India is a fast developing nation and is considered to be the leader of Developing Economies. Our presence is globally felt in all spheres. We are marching ahead with industrialization and exploring on foreign markets as well. We are also quite aware that our emphasis now is on infrastructural development as this is the fundamental thing for economic growth.*

*We have been seeing a thrust on construction activities, which started feeling the revival after demonetization. Bank rates are now coming down and it is proving to be an impetus to accelerate housing loans in the very near future. It is strongly hoped that the diminished interest rates coupled to price reduction of property promoters, will give a fillip again to the construction sector.*

*Keywords: Clay Bricks, Fly Ash Bricks, Kiln, Power Plant, Sand, Stone Dust, Lime, Gypsum etc.*

## I. SCOPE OF RESEARCH

Personal visits to the construction sites and from the secondary data available.

## II. IMPORTANCE OF BRICK

Whatever be the size, small or big, three things are considered to be the most essential ones for construction. Bricks, Sand and Water. Of these, Bricks come first. Right from basement till top of roof, bricks take the prime seat in construction without which construction activities could never take place.

Of course, with modern concrete techniques, reliance on bricks can be minimized. But, certainly, it cannot be eliminated at all. The traditional building practice relied more on bricks and the technological boom now gave way for introduction of many substitutes for bricks.

On the threshold of rapid development, our R & D activities get a full thrust for finding out more and more

substitutes, especially for the fast depleting things. This has led to the concept of Fly Ash Bricks in the use of construction activities.

## III. BRICKS ARE ESSENTIAL IN CONSTRUCTION

Bricks have aesthetics. Not only that, it offers high compressive strength.

The ability to release and absorb moisture is one of the most important and useful properties of bricks, regulating temperatures and humidity inside the structure.

Bricks are known for their excellent durability. Perhaps, it can be said that Bricks are the most durable man made structural building material, so far. [1]

## IV. HOW BRICKS ARE MANUFACTURED?

In a nut shell, manufacturing of bricks involves preparation of clay, molding, drying and burning the bricks.

## PREPARATION OF CLAY

Pure Clay is a must for getting Good Bricks. In order to get pure clay, about 200 mm depth of soil is thrown away for removing impurities. This process is called 'unsoiling'.

Then the clay is dug and spread on level ground. This is exposed to atmosphere for softening.

If any ingredient to be added to the clay, it can be done at this stage. This is known as blending of clay.

Then comes the important activity. Water is added to the clay and pressed well. The pressing will be done by feet of men or cattle for small level and pug mill is used as a grinder for large scale projects. Now the clay is suitable for molding.

The prepared clay is molded into brick shape either by hand molding or machine molding depending on the requirement. For large scale requirement, machine molding is followed.

Once the clay is molded in to the shape of a brick, it is allowed for drying, normally for a week to ten days. Moisture should be fully removed from the clay, as otherwise, it may lead to crack of bricks while burning.

The bricks are laid in stacks. A stack consists of about 10 stairs. The bricks are kept in such a way that circulation of air in between the bricks is free.

After the clay mold is fully dried up, the bricks are burned either in clamps or kiln to get hardness and strength. The temperature required for burning is about 1100 degree Centigrade.

Great deal of attention is to be given for burning the bricks. If they are burnt beyond this limit, they will become brittle and be easy to break. If it is under burnt, they will not gain full strength and there is a chance to absorb moisture from the atmosphere. Hence, burning of bricks is a very important one. [2]

## FLY ASH BRICKS

Fly Ash Bricks are gaining momentum in construction. Cost wise, it may be dearer by about 10%, but advantages are more compared to clay bricks.

According to Mr N Nandakumar, Governing Council Member of CREDAI, nearly 10% of structures that are coming up in the city are green buildings. Probably, in the next 5 years, there may be about 35% joining this bandwagon.

The use of fly ash bricks or blocks in construction is an important one for constructing ecofriendly buildings.

In fact, the Ministry of Environment has made it mandatory for all builders to use fly ash in building material if the construction falls within a 100 Km radius of a coal or lignite based thermal power plant. All buildings constructed by the Central Public Works Department including those in IIT Madras have been using only fly ash bricks.

Compressive strength tests to check the quality of fly ash bricks are performed at institutes like IIT, Anna University and other Government Engineering Colleges, said an Engineer from the Public Works Department.

## V. VIEWS ON FLY ASH BRICKS

According to Mr S Thirumalai, who runs a fly ash manufacturing unit, 'fly ash bricks are five times stronger and also less water absorbent than clay bricks'.

He further says that though fly ash brick industry has been in existence for nearly a decade now, the availability of fly ash remains an issue. Manufacturers say that a quota system is in place and it is very difficult to get fly ash. [3]

### RAW MATERIALS FOR FLY ASH BRICK

| Material                               | Mass |
|--|------|
| Fly Ash                                | 60%  |
| Sand/Stone dust                        | 30%  |
| Ordinary Portland Cement (lime+gypsum) | 10%  |
| Total formula of material              | 100% |

Table 1

It is said that fly ash loses weight when it burns at about 1000 degree centigrade due to presence of carbon and water. The weight loss happens due to carbon combustion and moisture evaporation and this is called "loss on ignition (LOI)". This is expressed as a percentage. The lower the LOI, the better will be the fly ash. As per BIS, it should not be more than 5%.

## VI. ADVANTAGES OF FLY ASH

It reduces dead load on structures due to its light weight.

Due to high strength, practically no breakages during transportation.

These bricks do not require soaking in water for 24 hours. Just sprinkling of water before use is enough. [4]

## VII. POINTS IN FAVOUR OF FLY ASH BRICKS USAGE

Fly Ash Bricks are environment friendly.

They have higher compression strength compared to the conventional Clay Bricks.

Though presently it is marginally costlier, with the passage of time, cost will come down.

Fly Ash Bricks have lesser decay rate compared to the clay bricks.

Clay Bricks are made by top soil erosion, which is considered as a threat to environment safety. Also, Clay has all nutrients for good agriculture and non use of clay means a support to good agriculture.

It is a known fact that clay brick is not nature friendly. [5]

## VIII. MAHARASHTRA, THE PIONEER

Maharashtra currently produces about three million tonnes of fly ash every year of which only about 60% is used, while the rest is dumped and becomes a major cause of pollution.

In order to save the state from pollution hazards due to dumping of balance 40% of fly ash, the Government has ordered that it is mandatory for all new buildings to use materials containing fly ash.

Fly ash or coal dust is the ash produced in small dark flecks due to the burning of powdered coal during electricity generation and is harmful to health and environment. It can however be used in construction industry in making concrete and bricks.

A Senior Official with the state Public Works Department said that “we have made it compulsory for all new constructions in the vicinity of 300 Kilometers of any power plant in the State to use building construction material having fly ash.

Fly Ash can typically make about 15 – 20% of concrete mix and is said to enhance the structural stability.

The Government has also made it mandatory for the thermal power plants to bear the transportation costs themselves within a distance of 100 Kms and after which on equal sharing basis between the plant and the user. [ 6 ]

#### A BRIEF COMPARISON

| Fly Ash Bricks  | Clay Bricks  |
|---|--|
| Lighter in Weight   | Heavier in weight  |
| Fly Ash Bricks are less porous  | Clay Bricks are more porous  |
| This is made by using byproducts of thermal power plant. Hence, environment friendly. | This is leading to extensive loss of fertile soil leading to devastating environmental hazard. |
| As surface is even and joints are thinner, no plastering required, normally.          | As the surface finish is not even, plastering is necessary.                                    |

Table 2

From the above comparison, it is ideal to use fly ash bricks as they have the twin benefits of cost and safety.[7]

#### IX. CONCLUSION

- ✓ From the sites visited, it was observed that all the sites use only clay bricks.
- ✓ The reason is that they find it easier to get clay bricks even at short notice.
- ✓ The Masons prefer only the conventional red clay bricks as this has become part and parcel of their profession.
- ✓ Even after expressing the benefit of Fly Ash Bricks, they still aver their views only.
- ✓ Some masons made an off the record expression that whatever be the technical superiority attributed to fly ash bricks by statistical data, whether it is actually so over conventional bricks is a million dollar question.
- ✓ In one site, a Maistry (Chief Mason) openly said that he detests fly ash bricks and claimed that “sengal is a sengal which has no equal” (which means that conventional red clay bricks are the only ones meant for construction and nothing else).

- ✓ While this is only a pure psychological assertion, the underlying truth is that working people like only the conventional red brick.
- ✓ One builder said that while he wanted to try the fly ash bricks, he faced stout resistance from his team and hence given up that idea.
- ✓ Another builder said that though he was receptive to the idea of fly ash bricks, the availability issue stalled his decision. Presently, supply of fly ash bricks is very poor. Price is also another issue, as it is more than the conventional red bricks, by about 15%.
- ✓ The small traditional builders do not want to take any risk by venturing into a ‘new material’ as a substitute for bricks]

#### X. RECOMMENDATIONS

- ✓ It is necessary that the builders are to be made aware of the Fly Ash Bricks and its uses and benefits over the conventional clay bricks.
  - ✓ More than enactments, it is the wide spread advertisement and information inculcation that will only popularize the concept of fly ash bricks.
  - ✓ The conventional masons have their own doubts on this. The action required is to dispel this unwanted fear from their minds. In fact, the operating people should give support and recommend for fly ash bricks. Their mind set should be unbiased.
  - ✓ As the large companies have dealership to promote their products, government can also think in terms of having a ‘tie up’ with some leading construction companies, to promote fly ash bricks in their construction.
  - ✓ Availability is scarce in one place (Tamil Nadu) and redundant in another place (Maharashtra). A smart via media can be found out so that availability is not a constraint anywhere in India.
  - ✓ Logistics Support play a very dominant role in any activity. The Thermal Plants can enter into logistics agreement with lorry owners (as is done in the case of LPG) to ensure hassle free availability of fly ash bricks.
  - ✓ The Thermal plants can have free delivery for a particular distance and shared freight rates over and above that. This will definitely give a positive impact in the minds of builders.
  - ✓ The need of the hour is ‘mass communication’. The concept of fly ash bricks is to be popularized not only to builders, but also to general public. In fact, some purchasers have reservation about the fly ash bricks and they show resistance for use of same in their construction. This is certainly to be overcome.
- Pricing of fly ash bricks should be lesser than the conventional clay bricks. Definitely, the price advantage will take the idea to the front in the minds of conventional people.

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