

Comparison of Autoclaved Aerated Concrete Blocks with Red Bricks

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Abstract — The concept of "resources saved are resources generated" need to be stressed for efficient energy utilization. Residential buildings right from their stage of construction interact with environment and harm it. The construction materials used in buildings cause pollution during their manufacture. Sustainable development which means fulfilling the needs of present generation without overlooking the needs and aspirations of future generations, need to be stressed in today's world. In this paper we aim to show a comparative study between Red Bricks and AAC Blocks and their effects on the environment. Bricks are one of the traditional building material that are being used widely in construction industry and AAC Blocks are one of the newly adopted building material.

Index Terms— Red bricks, Autoclaved Aerated Concrete (AAC) Blocks, sustainable development.

I. INTRODUCTION

The most pressing demand for human beings in present time is to guarantee our future generation with at least same quality of natural resources that we are endowed with today. Human beings continuously interact with environment and its harmful effects are well known to us.

Resources are the gifts provided by nature so that human beings can satisfy their needs. They are of two types, Renewable resources which can be regenerated and replenished after usage in a short time period like the wind, hydro energy and the Non-renewable resources are the ones which once used cannot be regenerated. Renewable resources are affable with environment but their conversion to useful forms of energy is costly whereas even though the usage of non renewable resources causes pollution and deteriorates the environment but present technology enables them to be used at an alarming rate which has led to their diminished quantities. The need of the hour is sustainable development which leaves our future generations with enough resources to satisfy their needs as well. Whereas the technology to exploit renewable energy is under scrutiny, the available non-renewable resources should be judiciously used.

Bricks which form an extremely important part of the Indian construction industry have many drawbacks. The brick kilns cause air pollution which not only affects humans but also vegetation and agriculture. Large amount

of carbon dioxide and other harmful gases lead to the menace of global warming and climate change. Also the precious soil used for brick making could be better used for agriculture and thus providing food security to the increasing population.

This preference is now being given to greener and efficient building materials and Autoclaved Aerated Concrete is one such green material. It not only uses the waste material like fly ash but also provides adequate strength to structures.

II. MANUFACTURING

A. Raw Materials Used in the Manufacture of AAC Blocks

- **Cement** : Portland cement is generally preferred over other types of cements.
- **Water** : Potable water should be used which must conform with the general requirements of the concrete.
- **Fly Ash** : It is usually a by-product of thermal power plants and is an important raw material in the manufacture of AAC Blocks.
- **Quick Lime**: Lime powder required for AAC production is obtained either by crushing limestone to fine powder at AAC factory or by directly purchasing it in powder form from a vendor.
- **Gypsum**: Gypsum is easily available in the market and is used in powder form. It is stored in silos.
- **Aluminium Powder**

B. Procedure :

- **Dosing, Mixing, Pouring and Pre-Curing**: Lime and cement are dumped into the pouring mixer and fly ash slurry is fed by an automatic control system to the mix. Aluminium is measured and a beaten suspension is put into pouring mixer directly. The adequate temperature of the slurry should be reached before pouring. After pouring the mould with slurry is kept in a pre-curing room for 2-3 hours. During this time the aluminium powder will

react to release hydrogen, which expands the volume of the slurry and makes it solid cake like.

- **Cutting and Grouping:** The cake will be transferred to cutting position and the blocks will be cut by longitudinal and transverse cutters. After cutting the blocks are transferred for grouping.
- **Curing:** The blocks are cured properly through steam curing or water curing which helps the AAC Blocks to attain desired strength. The blocks are stored at a proper place for usage after curing

III. DETAILS OF BLOCKS

A. AAC Blocks

Dimensions : 625 X 240 X 150 mm
Supplier : Stellar Ventures Private Limited
Batch No. 57

B. Red Bricks

Dimensions : 220 X 110 X 70 mm
Supplier : Kohinoor Bhatta Company

2.	64.8	36
3.	63.5	36
4.	64	35
5.	65	36
6.	62.3	36
7.	64.3	37
8.	66	35
9.	62.6	36
10.	61.5	37
Average	63.92	36

IV. TEST PERFORMED

The following tests were performed on the brick samples and AAC bricks. 15 sample AAC Blocks were taken out of which 5 were tested for density, and 10 blocks were tested for compressive strength.

The Indian Standard IS 5454 : 1976 'Method for sampling of clay building bricks (first revision)' is referred for the various tests performed on bricks.

The following tests were performed on the samples.

1. Density
2. Compressive Strength test

V. OBSERVATIONS

Table 1: Compressive Strength

S. No.	Compressive Strength (Kg/cm ²)	
	Red Bricks	AAC Blocks
1.	65.2	36

Table 2: Dry Density

S. No.	Dry Density (Kg/m ³)	
	Red Bricks	AAC Blocks
1.	1700	611
2.	1750	611
3.	1700	611
4.	1800	611
5.	1700	611
Average	1730	611

Table 3 : Cost

Type of Brick	Cost (per m3)
AAC Block	2949
Red bricks	2620

VI. CONCLUSIONS

1. Fly ash constitutes one of the most important raw material for AAC Blocks, which is a waste product obtained from thermal power plants. This results in efficient utilization of the waste. Whereas, in the manufacture of Red Bricks, precious top soil is used.
2. The dry density for AAC Blocks is less than that of Red Bricks which reduces the dead load on the structure.
3. Using AAC Blocks results in considerable cost reduction as it covers a greater distance in lesser number of cubes.
4. Being lighter than the Red Bricks, labour required is also lesser and the speed of completing the work is better in case of AAC Blocks.
5. The compressive strength of Red Bricks is higher than that of AAC Blocks resulting in greater strength.

6. Eco-Friendliness – In the manufacture of AAC Blocks , no smoke is given out while Red Bricks emit smoke containing harmful gases like carbon di oxide that are harmful to the environment.
7. The cost of a per cubic metre of AAC Block is Rs 2949 and cost of brick per cubic metre is Rs 2620.
8. The ease of working is better in AAC Blocks than Red Bricks.
9. The AAC Blocks can be cast in any shape and size in any density whereas it is not feasible in Red Bricks.
10. Using of AAC Blocks ensures less joints and thus gives more safety to the structure during earthquakes.

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