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"A comparative study between AAC and CLC blocks as an possible alternative to conventional bricks."

[1]Prof. Pooja Thombare, [2]Mr. Rukshay Katkar, [3]Mr. Rohit Telang, [4]Mr. Vijay Shelke , [5]Mr.Prasad Dorge

Assistant Prof. Department of Civil Engineering Parvatibai Genba Moze College of Engineering, India

Abstract

Conventional clay brick is the most common infill material used in the construction of RC buildings. However, nowadays different innovative and environment-friendly infill materials that can be used in place of bricks are gaining more popularity day by day. i.e., AAC Blocks. Traditionally, since masonry is a non-structural element its influence in a building under seismic loading is often neglected but some studies have shown that infill wall panels play a significant role in the case of earthquakes. In order to assess the effect of brick and AAC infill walls, the seismic behavior of a hypothetical G+6 storey RC building is studied. Here, the seismic analysis is carried out by response spectrum analysis, and infill walls are modelled using the equivalent diagonal strut method. Structural Engineering software CSI ETABS (Extended3D Analysis of building System) Version:18.0.2 is used. Primary objective of this study is to compare the results of storey displacement, storey drifts, bending moments, axial andshear force to find out how much cost can be saved by considering the infill influence under the seismic forces and how effective AAC blocks are compared to conventional clay brick.

1. INTRODUCTION

Mostly in India clay brick is used for wall cladding. Clay bricks are easily available, mass produced, affordable and thoroughly tested modular building material. They posses high load bearing capacity and durability.Concrete Blocks are made from cement, sand, fly ash, water and etc. They are porous than clay bricks and must be sealed to prevent water penetration. They are lightweight than clay bricks.The AAC blocks and CLC blocks different building blocks are recently emerged in our construction industry.In practice the better choice of adaptation of suitable wall units is made by comparison on their engineering properties.

1.1 Aim:- A comparison between Autoclaved Aerated Concrete (AAC) Blocks and Cellular Lightweight Concrete (CLC) Blocks as an alternative to Conventional Bricks based on their properties like density, Compressive strength, Water absorption, Thermal conductivity, fire resistance, etc. and economic aspects and select best alternative to conventional bricks

1.2 Problem Statements:- Find out the best alternative to conventional bricks from AAC block and CLC block. To reduce the use of agricultural soil top layer as raw material of conventional bricks. On the basis of objective of study.

1.3 Keywords

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1. Development of the cracks
2. Less impact strength
3. Less tensile strength

1.3 Objective

- To compare manufacturing process clay brick, AAC Blocks and CLC Blocks.
- To compare engineering properties of bricks like Bulk density, Compressive strength, Water absorption, Thermal conductivity, etc.
- To compare construction cost of brickwork by clay brick, AAC block and CLC block.
- To suggest best between AAC and CLC as alternative to conventional brick.
- compressive strength, flexural strength, flexural toughness, steel fibers, young modulus

2. METHODOLOGY

- Compare clay bricks, AAC block and CLC block with respect to engineering properties like water absorption, dry density, compressive strength, weight comparison, thermal efficiency and economic aspect.
- Water absorption: Defined as the amount of water absorbed by a material and is calculated as theratio of the weight of water absorbed to the weight of the dry material.
- Bulk density:

Density is also known as unit weight of material defined as the ratio of mass per unit volume. Brick density is animportant parameter. Density indicates the weight of the brickwork.

Compression Strength:

Compressive strength determines the load-carrying capacity of a material or an element. Compressive strength ofbricks is the capacity of brick to resist or withstand under compression when tested on Compressive testing machine [CTM]. The Compressive strength of a material is determined by the ability of the material to resist failure in the form of cracks and fissure.

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Fig .Compression testing Machine

3. Figure and Table

Sr.no	Bricks/ Bolcks	water absorption
1	Red brick	10.79%
2	AAC	10.58%
3	CLC	8.72%

Steel Fiber

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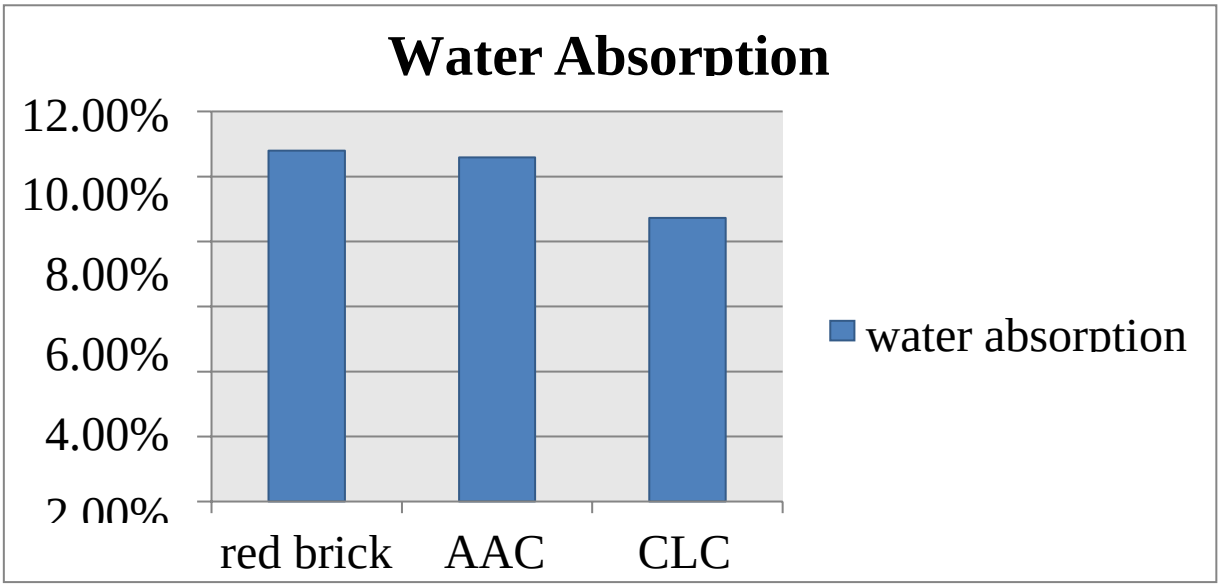

Rate analysis for brickwork by using "Red Brick" (230 x 110 x 70 mm)				
Material	Quantity	Rate	Per Unit	Amount (Rs.)
Brick	456	8.5	No.	3876
Cement	1.54	300	Bag	462
Sand	0.22	1200	Cum	264
Total				4602
Rate Analysis of Labour				
Labour	Quantity	Rate	Per Unit	Amount
Mason	2	600	Day	1200
Mazdoor	2	400	Day	800
Bhisti	1	350	Day	350
Total				2350
Cost of brick wall construction per cubic meter (m3).				Rs.6952/ Cum.

Table 4.11 Rate Analysis of Clay brick

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4. Result:-

4.2.1 Compressive Strength Test

Clay Bricks:

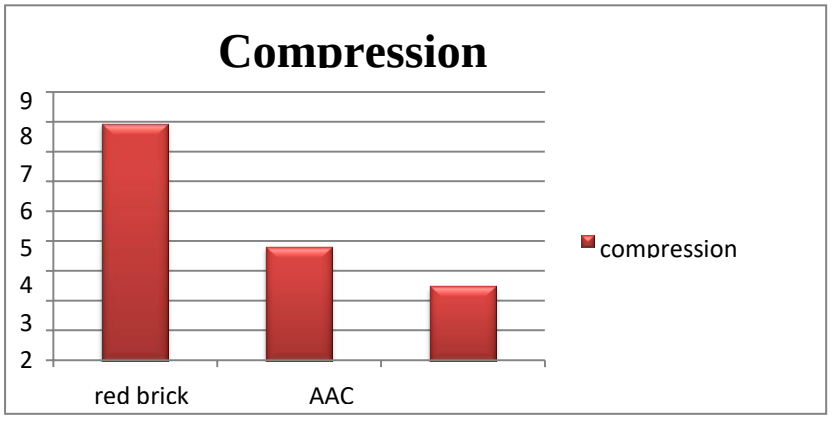
Brick no	Size (cm) L x B	CompressionLoad (KN)	Compression strength(N/mm2)
1	23 x 10	175	7.608
2	23 x 10	166.7	7.247
3	23 x 10	182.9	7.952
4	23 x 10	205.7	8.943

Table 4.1 Compressive Strength Test of Clay brick. The Compression strength of Clay Bricks = 7.937 N/mm2 AAC Block:

Brick no	Size (cm) L x B	CompressionLoad (KN)	Compression strength (N/mm2)
1	15.04 x 14.99	89.052	3.95
2	15.03 x 15.01	86.856	3.85
3	14.99 x 15.04	82.063	3.64
4	15.04 x15.01	85.107	3.77

Table 4.2 The Compression strength of AAC Block TheCompression strength of AAC blocks = 3.80 N/mm2

The Compression strength of CLC blocks = 2.492 N/mm2



Graph 4.1 The Compressio n strength

4.2.2 Water Absorption Test

Clay Bricks:

Brick no	Water Absorption(%)
1	10.05
2	11.03
3	10.72
4	11.36

Table 4.4 Water absorption of Clay bricks Average water absorption Clay bricks= 10.79%

5. Conclusion:-

Clay bricks are used for so many years even more than a millennium in the construction filed, it has own limitations too. This makes an impact to go for the alternative blocks in the construction industry.

As per the study the following conclusions are as shown below:

1) Compressive strength of AAC blocks is comparatively greater than the CLC blocks, hence AAC block are more suitable for walls in RCC framed building and it is good alternative to clay brick on the basis of compressive strength.

2) Dry density of AAC blocks is lesser than the red brick and CLC blocks. Hence structural cost of building reduces.

3) The drawback of AAC block is water absorption greater as compare to Red brick and CLC blocks.

4) AAC and CLC gives thermal insulation is good in case of AAC and CLC wall because of better compacted joining mortar and lesser joints.

5) Construction cost of AAC wall is 4 to 5 % more in compare to CLC block. But overall cost of construction of AAC wall is less because of its lesser weight.

6) Hence AAC is better choice than CLC and good alternative to Red Brick.

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