
CONSTRUCTING LOW COST HOUSING BY USING AUTOCLAVED AERATED CONCRETE

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Abstract :- The centre government of India has launched Pradhan Mantri Yojana which will ensure 30 million houses by 2022. On the steps being initiated to replace slums with low cost houses. Under this mission constructing the all over infrastructure of nation in many ways. So we have decide to we are contributing in this mission by constructing the low cost and light weight AAC wall. This research paper discusses the, to achieve the aim of this research as constructing AAC panels for low cost housing projects. Low cost house can be achieved by used of effective planning and project management, low cost materials economical construction technologies and use of alternate construction methods available. Various materials in construction industries to construct the wall, but only few of them have successfully implemented in low cost housing project , The clay brick are replaced with AAC panels (autoclaved aerated concrete). Autoclaved aerated concrete panals are diffusely used worldwide as a construction material both for infill panels and load bearing walls, because of their superior properties of fire resistance and thermal insulation. The usage of AAC panels reduces the cost of construction and also reduces the requirement of material such as cement and sand. The study in this paper can provide a reliable expérimantal basis for further analysis and engineering application of AAC roof panels in future.

Keywords :- AAC panles, lightweight concrete, Low cost house, material , Time

I. INTRODUCTION

Low cost housing projects are characterized by an increasing demand mainly due to urbanization. The government of India has launched various ambitious welfare and development programs in order to provide housing for all by 2022- Pradhan Mantri Awas Yojana. The. Under this scheme, affordable houses will be built in selected cities and towns using eco- friendly construction methods for the benefits of the urban poor population in India. The low cost housing technology aims to reduce construction cost by using alternatives to conventional technologies and input. Keeping this plan in mind we have done eco- friendly construction method to decide the low cost housing. We are use Autoclaved aerated concrete. Brick remain one of the most important building materials in the country. Various types of blocks can be used as an alternative to the red bricks, to reduce environmental pollution and global warming. AAC panels may be one of the solutions for brick replacement. Similar to foam concrete, AAC (Autoclaved Aerated Concrete) is one of the certified building material, which can be used for commercial, industrial and residential construction.

AAC was perfected in the mid of 1924 by the Swedish architect. AAC is a lightweight concrete building material suitable for producing concrete masonry unit like panels. AAC panels uses fly ash, cement, lime, gypsum as a main raw material and foam as a forming agent. Autoclaved aerated concrete can be used to make unreinforced, masonry type units, and also factory- reinforced floor panels, roof panels, wall panels, lintels, beam and other special shapes. It has high strength, good durability, heat preservation, sound insulation, fire proofing, impervious, good anchoring properties. Reinforced wall panels can be used as cladding systems as well as load-bearing and non-load-bearing exterior and interior wall systems. It is one kind of new type green warm preservation wall material formed through raw materials grinding, batching and mixing, pouring and foaming, quite stop and cutting, autoclave curing processes. The main objective of this paper is to give detailed study on low cost house using autoclaved aerated concrete.

II. OBJECTIVE

Under the Pradhan Mantri Awas yojana to find out an optimal construction technique which has a minimal the cost and give a minimum duration of time for low cost housing.

- To understand the technologies for construction of low cost housing.
- To reduce the time and construction cost.
- By using AAC panels improve thermal efficiency, reduce the heating and cooling load in building.

III. MATERIAL USED

3.1 Cement :- Cement is a binder, a substance used in construction industry that sets and hardens and can bind other material together. 53 grade of OPC cement are used in AAC panels.

3.2 Fly ash :- fly ash is waste industrial product used for reduction of construction cost. The density of fly ash ranges from 400-1800kg/m³. It provides thermal insulation, fire resistance and sound absorption.

3.3 Limestone :- limestone is made up of calcite aragonite. Limestone is obtained either by crushing to fine powder at AAC factory or by directly purchasing it in powder form from a merchant.

3.4 Gypsum :- Gypsum is easily available in the market and is used in powder form.

3.5 Foam :- The foam agent used to obtain foamed concrete . It is defined as air entraining agent. The foam agent when added into the mix water it will produce discrete bubbles cavities which become incorporated in the cement paste.

IV. METHODOLOGY

AAC blocks manufacturing process started initially with the collecting of raw material viz cement, fly ash, lime, gypsum and foam which are taken in the proportion given below

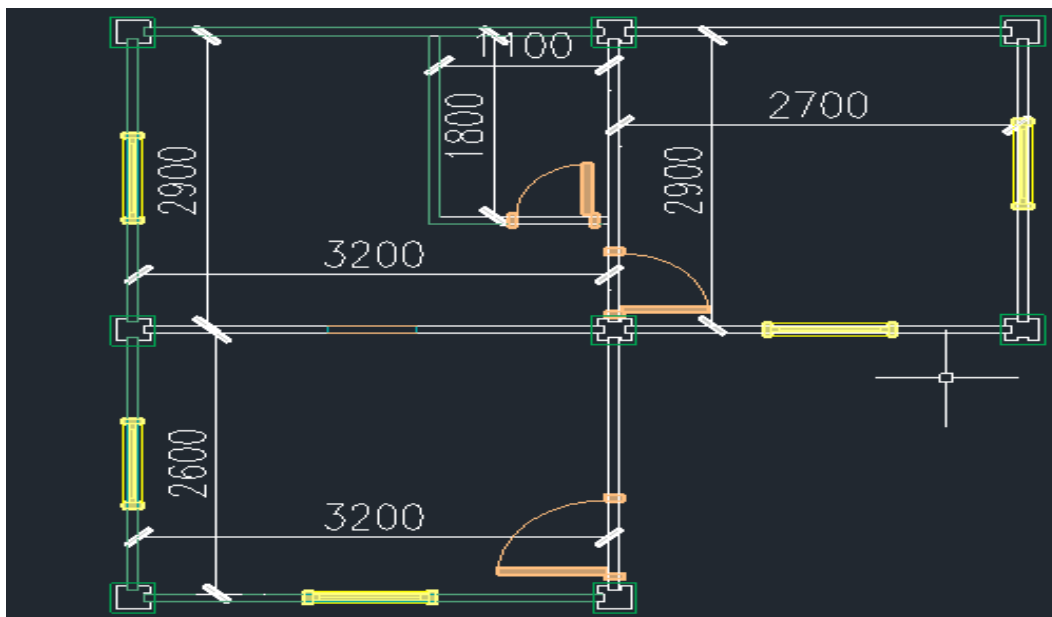
- FLY ASH:LIME:CEMENT :GYPSUM = 69:20:8:3
- Foam quantity is taken as 0.19 kg corresponding to the weight of water.
- Water ratio = 0.60-0.65

After collecting all the raw material, the succeeding stage is to prepare the cement mortar containing fly ash, lime, cement, and gypsum with the proportion specified above and corresponding water ratio as 0.60. Correspondingly, the foam is made in another container by cohering of water and foaming agent. Thenceforth, the foam is mixed with the cement mortar. One the raw material is ready. Thereafter, the paste is poured in the mould with proper vibration. The mould are of different size depending upon installed capacity like 0.54x0.15x0.013m. before casting, mould are coated with thin layer of oil. While slurry is mixed and poured into greased moulds. Usually rising and pre-curing process takes around 60-240 minutes. The required paste is kept in the mould for the period of 24 hours. Once green cake has achieved strength. After 24 hours the specimen is demould and after that proper steam curing is done for the period of 12 hours.



Fig. casting of AAC panels

4.1 PLAN OF BUILDING UNDER 27.87 sq.m



Under PMAY, the area of house is different for all categories. The plinth area of the plan is 300 sq.ft (27.87sq.m)

V. ESTIMATION AND COST

5.1 Cost Analysis of 3.2m wall of AAC panels

Sr.no.	Material	Units	Total cost (Rs)
1.	Cement	0.363kg	4.5
2.	Fly ash	1.089kg	3
3.	Lime	2.1kg	9
4.	Gypsum	0.2805kg	6
5.	Foam	0.570kg	15

	Total		50.0/-
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5.2 Estimation of building

After the estimating of building Estimation cost of 300 sq.ft plan are 3,50,569 Rs.

VI. TESTING OF PROPERTIES OF AAC PANELS

For finding out physical characteristics of AAC panels, lab test to determine the compressive strength and average value of density and moisture content of AAC panels. The experimental result are shown in Table 1

Table 1. Average value of density and moisture content

Sr.	Particular	Size	Volume	Dry weight	Moist weight	Dry density	Wet density	Moisture content
		m x m	Cum	kg	kg	Kg/m ³	Kg/m ³	%
1.	AAC PANELS	0.52X0.15X0.013	0.001014	1.33	1.461	1311.63kg/m ³	1440.82	8.96
2.		0.54X0.15X0.013	0.001053	1.386	1.517	1316.23kg/m ³	1440.64	8.63
3.		0.64X0.15X0.013	0.001248	1.540	1.671	1233.97kg/m ³	1338.94	7.02

For the compressive strength of AAC block testing on compression testing machine was undertaken. Detail of experimental observation are given in table 2.

Sr. No.	Particular	sizes	Average compressive strength (dry condition)	Average compressive strength (moist condition)
		M	N/mm ²	N/mm ²
1.	AAC panels	0.52X0.15X0.013	4.5	4.26
2.		0.54X0.15X0.013	4.72	4.21
3.		0.64X0.15X0.013	4.85	4.01

VII. RESULT

The result was found that dry density of AAC block is about 37% that of traditional brick. It was seen that there is not much increase in density of AAC block as compared to traditional brick. The actual estimating cost of normal building for 27.87 sq.m is 6,81,445Rs comparative more than the AAC panels building cost is 3,50,569Rs. It is low cost house as per the scheme of PMAY. It show reduce the cost of construction and time of work.

VIII. CONCLUSION

It is very difficult to complete the mass low cost housing project, taken up under the schemes like PMAY for mission of achieving "Housing for All by 2020 (HFA by 2022)", with conventional technology. Compressive strength of AAC blocks is comparatively more than traditional clay brick. AAC block is manufactured from and abundant natural raw materials, therefore it is extremely resources-efficient and eco- friendly. The work ability of AAC helps to eliminate waste on jobsite. The light weight property of the AAC blocks results into higher steadiness of the AAC blocks in the structure of the buildings. The earthquake is directly proportional the

weight of the building, the building constructed using AAC blocks are more reliable and safer. Density of AAC block is 1/3 that of traditional clay brick and there is no more changes in wet condition. It helps in reducing dead load of structure.

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