

A Review Study on AUTOCLAVED AERATED CONCRETE (AAC) Block

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Abstract— Autoclaved Aerated Concrete (AAC) is a lightweight concrete building material cut into masonry blocks or formed larger planks and panels. Aerated concrete is relatively homogeneous when compared to normal concrete, as it does not contain coarse aggregate phase, yet shows vast variation in its properties. The properties of aerated concrete depend on its microstructure (void± paste system) and composition, which are influenced by the type of binder used, methods of pore- formation and curing. Although aerated concrete was initially envisaged as a good insulation material, there has been renewed interest in its structural characteristics in view of its lighter weight, savings in material and potential for large scale utilization of wastes like pulverized fuel ash. Many researchers have been done in the last few years however a deeper understanding is still needed to improve the quality of autoclaved aerated block in the construction industry by studying the current market behavior. The aim of this study is to get the latest information and to identify the key factors that affect on autoclaved aerated block. Data's are collected through questionnaires and distributed to respondents who work on various projects in wide areas in the charotar region of central Gujarat. Respondents were required to rate and analyze using their experience and the factors were identified from past researches, which affects the project performance and then the level is measured based on their effect. The data collected are analyzed using Microsoft Excel or Statistical Package for the Social Sciences (SPSS Statistics 17.0) software which is analytical software.

Keywords: Autoclaved Aerated Concrete (AAC)

I. INTRODUCTION

AAC (Autoclaved Aerated Concrete) was invented in the mid-1920s by the Swedish architect and inventor Johan Axel Eriksson. AAC is one of the major achievements of the 20th century in the field of construction. It is a lightweight, precast building material that simultaneously provides structure, insulation, and fire and mold resistance. AAC Blocks is a unique and excellent type of building materials due to its superb heat, fire and sound resistance. AAC block is lightweight and offers ultimate workability, flexibility and durability.

Main ingredients include fly ash, water, quicklime, cement, aluminium powder and gypsum. The block hardness is being achieved by cement strength, and instant curing mechanism by autoclaving. Gypsum acts as a long term strength gainer. The chemical reaction due to the aluminium paste provides AAC its distinct porous structure, lightness, and insulation properties, completely different compared to other lightweight concrete materials. The finished product is a 2.5 times lighter Block compared to conventional Bricks, while providing the similar strengths. The specific gravity

stays around 0.6 to 0.65. This is one single most USP of the AAC blocks, because by using these blocks in structural buildings, the builder saves around 30 to 35 % of structural steel, and concrete, as these blocks reduce the dead load on the building significantly.

AAC is a long proven material. AAC block is used in a wide range of commercial, industrial and residential application and has been in use in EUROPE over 90 years, the Middle East for the past 40 years and in America and Australia for 25 years. It's an estimate that AAC now account for over 40% of all construction in UK and more than 60% of construction in Germany. In India production of AAC block started in 1972.

This unit is proposed to manufacture AAC Blocks by consuming the Fly-Ash as one of the prime raw material. Fly-Ash, a major raw material with 70% proportion in AAC Blocks, an indispensable by-product of Thermal Power Plants, is an environmental threat across the globe. Power plants are facing an ever increasing challenge of disposal of this polluting agent

A. Benefits of AAC Blocks:

- 1) The nominal size of AAC block is 9" X 8" X 4"-12"
- 2) When compared with the volume of normal redbrick with the AAC bricks Volume of 1 AAC Brick = Volume of 7 red bricks for (9" X 8" X 4")
- 3) AAC block has a weight of 9-12 kg depending on moisture conditions. When compared with red bricks 60% of dead load on structure is decreased.
- 4) It not only decreases the dead load on the structure. It also depreciate the use of Steel and concrete in structure.
- 5) Jointing AAC bricks are economical. As mentioned 1 AAC brick = 7 bricks. For Jointing 7 red bricks with each other it requires more jointing mortar when compared with jointing one AAC block to other.
- 6) Compressive strength of AAC block is higher 5-6N/Sq.m whereas the redbrick has a Compressive strength of 3.50 N/Sq.mm
- 7) Fire resistance: They offer good fire resistance from 2 hours up to 6 hours depends on size. These blocks are highly suitable for the areas where fire safety is of great priority.
- 8) The porous nature of the AAC blocks results into enhanced sound absorption. The Sound Transmission Class (STC) rating of the AAC blocks up to 45 db. Thus, AAC blocks have been the most ideal material for the construction of walls in auditorium, hotels, hospitals, studios, etc.
- 9) Do you know Impact of Earth quake = Weight of the structure. AAC is light weight, it results in higher steadiness so it is safer and reliable than traditional red bricks.

- 10) As the AAC block is very easy to handle, manipulate and use ordinary tools for cutting the wood such as the drill, band saws, etc. could be easily used to cut and align the AAC. Moreover, the AAC blocks come with larger sizes and fewer joints. This ultimately results in faster construction work as the installation time is significantly reduced due to fewer amounts of blocks and the masonry amount involved is also lowered resulting into reduced time-to-finish.
- 11) AAC products do not contain any toxic gas substances

II. LECTURE REVIEW

AAC is a lightweight, structural, precast building material of the uniform cellular structure. It is formed by combining sand, lime, cement, gypsum, water, and an expanding agent, which forms a porous, microstructure in the concrete. At one-fifth the weight of concrete, the most solid units are easily placed and secured with a thin-bed mortar. With wood-like behavior, blocks shape easily and fasten using common woodworking tools and fasteners. The masonry- like units and reinforced panels are a part of a complete range of products that enable a structure to be built entirely of AAC (Hebel, 1998).

The entire structural shell including, basements, walls, stairs, floors, and roofs are all made from precast autoclaved aerated concrete products. AAC was used to build a seven story hotel in Atlanta in preparation for the 1996 Olympic Games

III. CONCLUSION

The Autoclaved Aerated Concrete (AAC) is a novel and one of the most suitable and sustainable building AAC materials in the present building construction industry. blocks are a result of productive use of recycled industrial waste i.e. fly ash, hence this material can be classified as a sustainable building material. The production price of AAC blocks at the manufacturing unit is from Rs. 3200/- to Rs. 3600/ per cubic meter as per the rates in India in the year 2019. The inherent properties of AAC blocks result in fast and efficient construction techniques. Hence the Autoclaved Aerated Concrete (AAC) has become an efficient building construction material which is being used in a wide range of residential, commercial and industrial buildings and it has been used in the Gulf countries for the last 40 years and in Europe for since 70 years, and in Australia and South America for the past 20 years. According to a report, the AAC blocks are used more than 60% of construction in Germany, and in England approximately 40% of all construction industry (Andrews, 2019). Since the AAC blocks use readily available raw materials in the manufacturing process, have excellent durability, are energy efficient, are cost-effective, and also can be recycled, therefore Autoclaved Aerated Concrete (AAC) can be said to be a green and sustainable building material.

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