Factor Affecting on Use of Aerocon Blocks

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Abstract- *AAC products are offered in various shapes and sizes including but not limited to blocks, wall panels, floor and roof panels, and lintels. Use of Autoclaved Aerated Concrete (AAC) blocks in construction industry in India offers interesting proposition for various segments in the society. For a project developer it means faster and lower cost construction. For environmentally conscious it means eco-friendly products and for those who occupy buildings built with AAC blocks it means better safety and lower energy costs for cooling or heating. Primary raw material for AAC is fly ash.*

Keywords- AAC, AAC Block,Fly Ash,Inertia, Seismic Motion.

I. INTRODUCTION

Autoclaved aerated concrete is a construction material that is made in factory and available to the user in the form blocks and precast units for walls and floors. AAC Blocks are prepared without any reinforcement..Thousands of tonnes of fly ash is generated by thermal power plants everyday and its disposal is a cause of concern. Moreover, using fly ash does not harm the environment at all. In fact using fly ash takes care of issues related to disposal of fly ash. Therefore by using fly ash to produce AAC products provides a sustainable, economic and environment friendly option. At the end it all translates to a better world for future generations.

II. THE ADVANTAGES OF AEROCON BRICKS OVER CONVENTIONAL CLAY BRICKS

- Aerocon Blocks are an innovative product in the green building revolution.
- Aerocon blocks are the new blocks in walling materials, substituting conventional and environmentally unsustainable materials like clay bricks, concrete and hollow blocks.
- The raw materials used in the manufacture of these blocks are environmentally friendly and are certified green products. The basic raw materials used in production of Aerocon blocks are Cement, Fly ash, lime and water.
- Aerocon blocks can be plastered, painted, and dry lined or tiled.
- Aerocon block is extremely light, just one-third the weight of clay bricks or one-fourth the density of R.C.C. They are much easier to handle on the site.
- They are easy to install and can complete the construction procedure in a shorter span in case of scarcity of labour and in the usage of mortars. The required time to complete a building with aerocon blocks is 1/3 lesser than that of the conventional building materials.
- The edges of the blocks are such that they allow easy workability and accurate dimensioning and are easy to cut, drill, nail, shape and chase using ordinary wood working tools. Power tools can be used for rapid chasing for embedding service lines.
- Aerocon blocks can be cut virtually in any shape or angle making them extremely adaptable.
- Aerocon block covers the same area as that 14 clay bricks do enabling a faster construction results in saving of labour, time and material.
- Aerated concrete is perfect building material for any climate. It is used to build all kinds of walls: exterior and interior bearing and non-bearing walls, foundation walls, partition walls as filling agent in framework structures, wall partitions, fire division walls, etc.
- Aerocon excellent thermal properties helps in saving recurring energy costs of heating and cooling. The thermal resistance combined with the benefits of thermal mass inertia and whole wall coverage eliminates the need for additional insulation.
- Aerocon blocks are available in various sizes and shapes.They are available in three types; Infill blocks, Jumbo blocks and Thermal blocks. They are included into the category of Green Building materials because they don't emit VOC (Volatile Organic Compounds) which cause environmental pollution.
- Apart from being eco-friendly these blocks are also light weight with high thermal insulation, fire resistance, sound insulation, have strength and durability, have consistent quality control and gives a perfect finish with dimensional stability. Buildings constructed out of these blocks ensure long term sustainability and save a lot of water during the construction.
- Excluding the eco-friendly characteristics of these blocks, they are also used in construction for various other reasons. There are a number of problems involved in

acquiring the sand and bricks and also the prices of these basic materials are hiking up. As the traditional construction materials have a higher price the initiation of Aerocon blocks acts as better substitutes with affordable prices. Due to these reasons the Aerocon blocks are in great demand.

- Hence, it is one of the revolutionary materials that can be used to make the world a better, greener and cleaner place to live in. It is a revolutionary material that combines the unique properties such as durability and strength, low weight, very simple construction technology and excellent environmental performance.

III. DESIGN CONSIDERATIONS

General considerations

- AAC masonry components(block units) can be used to build load bearing or non load bearing walls.
- O-block units used to build pilasters.
- U-block units used to build bond beams and lintels.
- Control joints on AAC reinforced walls must be placed at maximum 16 ft. o.c.

3.1.1 Installation Guide

- Check foundation.
- Receiving and distribution of AAC wall units.

3.1.2 Installation requirements

- Tools
- Equipment
- Other materials
- Installing O-block for pilasters in first course

3.1.3 Laying the first course (levelling course)

- Lay the first course over a semi-dry cement mortar levelling bed- ½" to 2" thick.
- Corner blocks are laid first and the first course should be completed before second course installation.
- Once corner blocks are placed apply thin bed mortar, to the vertical joints for other blocks.
- Thin bed mortar 1/16" inch to 1/8"

3.1.4 Cutting blocks (adjustments and chases)

- A hand saw or band saw to cut the blocks to specific lengths.

3.1.5 Placing control joints in first course

- These are vertical joints taken through the full wall thickness, and from bottom to top.
- 3/8" to ½" thick.
- Maximum spacing between control joints should be 15 ft.

3.1.6 Laying the subsequent courses

- For subsequent courses use only thin bed mortaring on all joints between AAC blocks.
- Minimum overlapping of vertical joints between layers should be 4".
- Metal strip ties should be placed every two courses at – 1) connection of secondary walls to main walls – 2) connection of walls to concrete columns.

3.1.7 Control joints in subsequent layers

- V-shaped metal strips should be set at every two courses unless there are two pilasters on both sides of control joints and less than 2" from the joint.
- Once the wall is built fill the gap using backer rod and seal with caulking.
- Fill up pilasters by pouring concrete.

3.1.8 Building on site lintels using U-blocks

- Install temporary supports before putting U-blocks in place apply thin bed mortar to the vertical joints.
- Once U-block are set, place rebars according to construction drawings and with concrete.

3.1.9 Installing U-blocks to build bond beams

- Lay U-block course applying thin bed mortar on all joints.
- At each pilaster location, drill a hole in the bottom side so the vertical bars can be attached in the bond beam.
- Before pouring concrete place rebar and anchor bolts according to construction drawings.

3.1.10 Utilities installation after the walls are built

- For electrical conduits and piping installation, a chase is cut using an electrical router or a chasing tool.
- When required depth of chase is bigger than maximum depth recommended, additional O-blocks

are used to lodge the pipes or interrupt wall continuity.
- After installation, the chase are filled with repair mortar or cement sand mortar.

3.1.11 Renders

- Surface patching: Rasp block joints and other areas where AAC surface is out of plane.
- Surface must be cleaned using a scrub brush and any loose or damaged material be removed.
- A rubber float is commonly used to smooth the wall surface.
- Fiber glass mesh: This should be installed directly over one layer of render in all control joints, around windows, doors and utility locations.

3.1.12 Finishes

- AAC masonry walls can be finished with stucco , acrylic texture coats, or a combination of both, also laminated stones, ceramic or clay tiles, concrete pieces and ornamental products.

IV. RAW MATERIAL PREPARATION AND STORAGE

The first step of AAC production is grinding of silica rich material (sand, fly ash, etc) in ball mills. For different materials, different processing is adopted, such as dry grinding (into powder), wet grinding (into slurry) or mixed grinding with quicklime (CaO). There are two methods for mixed milling.

One is dry mixing to produce binding material, and the other method is wet mixing. Since most quicklime is agglomerate, it should be crushed and then grinded. Gypsum is normally not ball milled separately. It is grinded with fly ash or with quicklime, or it could be grinded with the same miller for quicklime in turn. Other supplementary and chemicals are also have to be prepared. Raw material storage assures the continuous production and material stability.

The continuous production guarantees the non-stop & on-time supply, and the material stability guarantees the quality of products, since the raw material might come from different sources, with different qualities. Raw material preparation & storage is the pre-step for proportioning batching. This pre-step guarantees the raw material meet the standard for AAC production, and it is also finishes the storage, homogenization and aging process. It is the basic process that assures the smooth production and production quality.

V. DOSING AND MIXING

Maintaining ratio of all ingredients as per the selected recipe is critical to ensure consistent quality of production. This is accomplished by using various control systems to measure and release the required quantity of various raw materials. A dosing and mixing unit is used to form the correct mix to produce Autoclaved Aerated Concrete (AAC) blocks. Fly ash/sand slurry is pumped into a separate container. Once the desired weight is poured in, pumping is stopped. Similarly lime powder, cement and gypsum are poured into individual containers using screw conveyers. Once required amount of each ingredient is filled into their individual containers control system releases all ingredients into mixing drum.

Mixing drum is like a giant bowl with a stirrer rotating inside to ensure proper mixing of ingredients. Steam might also be fed to the unit to maintain temperature in range of 40-42o C. A smaller bowl type structure used for feeding Aluminium powder is also attached as a part of mixing unit. Once the mixture has been churned for set time, it is ready to be poured into molds using dosing unit. Dosing unit releases this mixture as per set quantities into molds for foaming.

Dosing and mixing process is carried out continuously because if there is a long gap between charging and discharging of ingredients, residual mixture might start hardening and choke up the entire unit. In modern plants, entire dosing and mixing operation is completely automated and requires minimum human intervention.

This entire operation is monitored using control systems integrated with computer and CCTV cameras. As with any industrial operation, there is provision for human intervention and emergency actions integrated inside the control system.

VI.CONCLUSION

As a construction system, AAC provide significant environment and other benefits for the building owner. The short and long term effect of using AAC compared to many other materials results in lower energy consumption, reduced operating costs, greater safety and comfort, and a healthier and more trouble – free building. These features provide a better investment for building owner and for environment.

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