

# Autoclaved Aerated Concrete block (AAC) - A revolutionary construction material

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## Abstract

Autoclaved aerated concrete (AAC) blocks are diffusely used worldwide as a construction material both for infill panels and load-bearing walls, due to their superior properties of fireside resistance and thermal insulation. The appliance and use of such technology in seismic prone areas, however, still requires further verification of the expected structural performance. The very low weight of this material and its high deformability (low value of Young modulus in compression) tends to scale back inertia forces on the building induced by the seismic motion. On the opposite hand the masonry compressive strength of AAC, although its variability is extremely limited, is quite low compared to other traditional masonry types

**Keywords:** Low weight, AAC, Seismic motion, Construction material, load bearing

## INTRODUCTION

Autoclaved aerated concrete is a lightweight, precast, foam concrete building material suitable for producing concrete masonry like blocks. They are made of quartz sand, calcined gypsum, lime, cement, water and aluminum powder, AAC products are cured under heat and pressure in an autoclave. AAC also provides structure, insulation, and fire- and mold-resistance. AAC might be used for both interior and exterior construction, and may be painted or coated with plaster compound to guard against the elements, or covered with siding materials such as veneer brick. ACC blocks are quick and easy to install, these materials can be routed, sanded, or cut to size on site using standard power tools with carbon steel cutters

## METHODOLOGY

- Firstly, raw material for 1 cubic meter for AAC Block is taken, the raw material used are fly ash, gypsum, lime, cement and water.
- For 1 cubic meter AAC Block, 450kg of fly ash, 50kg of lime, 100kg cement and 30% water is added in the mold.
- These ingredients are half filled in the mold, and the rest half is to be expanded
- For the expansion process few chemicals are added in the mixture. The chemicals added are 5gram sodium dichromate, aluminum powder of 400grams and soluble oil of 500grams



Fig. 1 Mixture filled in mould

- When everything is added in mold, it is then kept for steam curing for 12 hours.



**Fig.2 Steam curing**

- After curing, its then sent for cutting process with help of mechanical cutter into the desired size.



**Fig.3 Cutting Machine**

#### **RAW MATERIALS utilized in THE MANUFACTURE OF AAC BLOCKS**

- The following raw materials are utilized in the manufacturing process of AAC blocks
- Cement : hydraulic cement is usually preferred.
- Water : Potable water should be used which should conform with the overall requirements of the concrete.
- ash : A by-product of thermal power plants and is a crucial staple within the manufacture of AAC .
- Quick Lime: Lime powder is obtained either by crushing limestone to fine powder at AAC factory or by directly purchasing it from the market.
- Gypsum: Gypsum is definitely available within the market and is employed in powder form. it's stored in silos.
- Aluminium Powder

## 1 USES OF AAC BLOCKS

AAC Blocks are highly thermally insulating concrete-based material used for both interior and exterior construction. Besides AAC's insulating capability, one among its advantages is quick and straightforward installation, because the fabric is often routed, sanded, or move size on site using standard power tools with carbon steel cutters

AAC is compatible for high-rise buildings and people with heat variations. High-rise buildings constructed using AAC require less steel and concrete for structural members because of its low density. The mortar needed for laying of AAC blocks is reduced thanks to the lower number of joints. The material required for rendering is also lower due to the dimensional accuracy of AAC. The increased thermal efficiency of AAC makes it suitable to be used in areas with extreme temperatures, because it eliminates the necessity for separate materials for construction and insulation, leading to faster construction and cost savings.

Even though regular cement mortar is often used, most of the buildings erected with AAC materials use thin bed mortar in thicknesses around 3.2 millimeters (1/8 in), counting on the national building codes. AAC materials are often coated with a stucco or plaster compound to protect against the weather, or covered with siding materials like brick or vinyl

## ADVANTAGES

1. Light weight: - They are 3 to 4 times lighter than traditional bricks which makes it more suitable and easier to transport.
2. Easy Workability: - Blocks can be easily cut, drilled or nailed for any usable requirements.
3. Faster Construction: - Reduces construction time by 20%, these blocks are easily installable.
4. Minimum wastage: - AAC blocks have negligible wastage of 5%, which leads in Block utilization.
5. Fire Resistant: - AAC Blocks are non-combustible and fire resistant up to 1600 degree Celsius.

## DISADVANTAGES

1. AAC Blocks are non-load bearing material, hence can be used for partition walls.
2. Cost per unit of the brick is high
3. AAC blocks requires more care as compared to clay bricks while transporting and handling

## CONCLUSIONS

Autoclaved Aerated Concrete block is different from conventional concrete within the mix materials and properties.

- Though the compressive strength of Autoclaved Aerated concrete is a smaller amount than that of concrete, AAC blocks possess many beneficial factors like lower density, enhanced thermal and sound insulation and reduced dead loads.
- Hence, it's a perfect alternative for traditional wall brick or stone materials due to its environmental impact and eco- friendly features.
- As AAC blocks have low weight, it also helps in faster construction and simply transportable.
- AAC blocks does have few drawbacks, but there are maximum advantages, hence AAC blocks should be used instead of burnt clay bricks.

## REFERENCES

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