AAC BLOCKS VS CONVENTIONAL BLOCKS
What makes them Greener?
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• AAC means autoclaved aerated concrete, a new generation walling material
• Invented by a Swedish Architect - Johan Axel Eriksson mid 1920
• AAC is made with major materials such as fly ash, cement, lime and an aerated agent.
• AAC replaces clay bricks which are environmentally unsustainable
• Being aerated, it contains 50 - 60% of air, leading to light weight and low thermal conductivity
• AAC has properties such as light weight, high strength and high thermal and sound insulation
• AAC can withstand up to 4 hours of direct fire exposure.
• AAC panel design offers buildings a protection up to 8 on a Richter’s scale.
• AAC blocks are dimensionally accurate

INTRODUCTION - AAC
The above characteristics of AAC is helpful in green housings and saves fertile lands and a solution for fly ash disposal

ATTRIBUTES OF AAC

<table>
<thead>
<tr>
<th>ATTRIBUTES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture resistant</td>
<td>Lasts long</td>
</tr>
<tr>
<td>Sound insulation</td>
<td>Improved interior with reduced noise pollution</td>
</tr>
<tr>
<td>Thermal conductivity</td>
<td>Comfortable interiors &amp; improved energy efficiency; 0.12 W/mK</td>
</tr>
<tr>
<td>Dimensional stability</td>
<td>Dimensionally accurate &amp; easy to handle (can cut, chop, drill &amp; shape)</td>
</tr>
<tr>
<td>Fire resistance</td>
<td>Fire resistant</td>
</tr>
<tr>
<td>Air tightness</td>
<td>Air tightness</td>
</tr>
<tr>
<td>Easy workability</td>
<td>Use of standard tools to cut, saw, chisel, drill &amp; shape</td>
</tr>
<tr>
<td>Global efficiency</td>
<td>Can take all type of finishes</td>
</tr>
<tr>
<td>Sustainable design</td>
<td>Reduced foundation load of the building by 20%, reduces power consumption by 3%</td>
</tr>
</tbody>
</table>

WHY AAC BLOCKS ARE GREENER

1. Recycled content
   AAC uses fly ash about 60 to 75% (fly ash is a waste product generated from thermal power stations)
2. Resource efficient manufacturing process
   • AAC Blocks uses less power (reduces power consumption by 27%)
   • Zero waste (All the recycled material is used in the process)
3. Raw materials sourcing
   • Fly ash - From power plants and cement plants located nearby: 100-150km
   • Reduced transportation cost - saves fuel
4. Reusable
   • AAC Blocks - Broken blocks can be reusable
   • Actual wastage at site less than 2%
5. Durable
   • Cementitious material - lasts life long
6. Repair, maintenance and finishing
   • Minimal wear and tear over prolonged use
   • AAC blocks requires substantially less of plaster or surface treatment (consumption of cement is 52% per CuM compared to clay bricks)
   • Minimal maintenance due to resistance to weathering and better surface levels’ smoothness
   • Can take all types of surface finishes and economizes on their consumption

RESOURCE EFFICIENCY

FREE CONSTRUCTION
WHY AAC BLOCKS ARE GREENER

INDOOR AIR QUALITY

1. Non-Toxic
   - AAC blocks do not emit fumes
   - No irritants during manufacture, installation and while in use

2. Minimal chemical emission
   - Zero VOC
   - No petrochemical derivatives
   - Less CO2 emission

3. Inhibit growth of microbes
   - Do not absorb moisture from atmosphere

4. Better air quality
   - Good working atmosphere

ENERGY EFFICIENCY

THERMAL INSULATION

- Depends upon thermal conductivity, K value
- Measure of the ability of the material to transmit heat
- Lower the value higher the thermal insulation
- Higher thermal insulation makes interiors comfortable

THERMAL INERTIA

- Depends on material characteristics
  - Combination of thermal conductivity, specific heat and mass
  - Delays the rise of temperature by 2 to 3 hours
  - Reduces the effect of peak outside temperatures

ENERGY EFFICIENCY

LIGHT WEIGHT

1. Energy efficient building shell/walls
   - K value of Blocks is 0.12W/m-k
   - Indoors remain cooler during summer and warm during winter
   - K value of Clay Bricks is 0.84 and Concrete is 2.0

2. Minimise electric loads
   - Reduces AC loads due to low K value

3. Energy efficient systems
   - Product installation, tools, surface finish, maintenance all uses minimal energy

AFFORDABILITY

- AAC Blocks - Overall wall system costs are not higher than conventional systems
- AAC blocks offers more carpet area
- Faster construction - faster returns on investment (Speed up construction by up to 30%)
- Life time living costs are lower - due to energy saving, lower maintenance etc. (Reduces power consumption by 27%, Steel & Cement savings by 18% & 12% respectively, eliminates termites, rodents, pests & fungal growth)

MATERIAL EFFICIENCY

1. Resource conservation
   - Reduced use of cement mortar, plaster for application
   - Reduced Steel (18%) and Cement (12%)
   - Faster construction - saves money and labor (rapid construction by 30%)

2. Reuse and minimal wastage
   - Breakages/Wastages are minimal

WATER CONSERVATION

- Consumption of water within the process
- Efficient use of water and water recycling
- AAC Blocks need less water for curing due to less no of joints — reduction around 30%

Specification for AAC blocks – IS 2185 part 3

<table>
<thead>
<tr>
<th>S. No</th>
<th>Density in Oven dry condition</th>
<th>Compressive Strength, Min</th>
<th>Thermal Conductivity in Dry Condition, W/m K</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kg/m3</td>
<td>N/mm2</td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>405 to 550</td>
<td>2.0</td>
<td>0.21</td>
</tr>
<tr>
<td>(b)</td>
<td>551 to 650</td>
<td>4.0</td>
<td>0.24</td>
</tr>
<tr>
<td>(c)</td>
<td>651 to 750</td>
<td>5.0</td>
<td>0.30</td>
</tr>
<tr>
<td>(d)</td>
<td>751 to 850</td>
<td>6.0</td>
<td>0.37</td>
</tr>
<tr>
<td>(e)</td>
<td>851 to 1000</td>
<td>7.0</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Note:
1. AAC blocks confirming to IS 2185-1991 with less or greater than 0.42 may be permitted at a cost of 20% more or 10% less as per need
2. AAC Blocks conforming to IS 2185-1991 may be permitted at a cost of 20% more in cement content ranging to 0.42 to 0.50
3. The drying shrinkage shall be not more than 0.05% for Grade 1 blocks and 0.10% for Grade 2 blocks
**Manufacturing of conventional clay bricks**

- **Drying**
- **Burning**

**Manufacturing process of AAC Blocks**

- **Storage silos**
- **Batch mixing**
- **Control system (PLC)**
- **Dosing**
- **Pre-curing**
- **Cutting**
- **Autoclaving**

**Energy and Environment:**

The product helps towards the energy and environment in the following ways:

- Utilization of fly ash in the product helps to solve the disposal problems and save the fertile lands used for clay brick manufacturing.
- Utilization of fly ash leads to the reduction in the cement consumption in the product. 1 MT of cement - 1 MT of CO₂, hence leading to the reduction of greenhouse gases.
- The reduced consumption of cement implies the preservation of coal (natural resource) and the same can be made available for producing energy.
- The blocks require less than 1/3 times energy compared to conventional clay bricks.
Comparison of AAC blocks with clay bricks

<table>
<thead>
<tr>
<th>S. No</th>
<th>Parameter</th>
<th>AAC BLOCKS</th>
<th>CLAY BRICKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Soil consumption</td>
<td>Uses fly ash which is a thermal power plant waste product &amp; thus no consumption of top soil</td>
<td>One sq ft of carpet area with clay bricks will consume 1 kg of coal</td>
</tr>
<tr>
<td>2</td>
<td>Fuel consumption</td>
<td>One sq ft of carpet area with AAC blocks will consume 0.77 bags of cement</td>
<td>One sq ft of carpet area with clay bricks will consume 1.44 bags of cement</td>
</tr>
<tr>
<td>3</td>
<td>CO₂ emissions</td>
<td>One sq ft of carpet area will emit 12.0 Kg of CO₂</td>
<td>One sq ft of carpet area will emit 1.5 Kg of CO₂</td>
</tr>
<tr>
<td>4</td>
<td>Production facility</td>
<td>State-of-the-art factory facility</td>
<td>Unhealthy working conditions due to toxic gases</td>
</tr>
<tr>
<td>5</td>
<td>Sizes</td>
<td>600 x 200 x 75, 100, 125, 150, 175, 200, 225 mm Dimension variation are within ± 1.5mm</td>
<td>190(L)x90(W)x90/40mm(H) (modular) 230(L)x110(W)x70/30mm(H) (non-modular). Dimensionally not accurate As per IS 1077-1992</td>
</tr>
</tbody>
</table>

Comparative Properties among Various Products

<table>
<thead>
<tr>
<th>S. No</th>
<th>Feature</th>
<th>AAC Blocks</th>
<th>Clay Bricks</th>
<th>Fly Ash Bricks</th>
<th>Solid Concrete Blocks</th>
<th>Hollow Concrete Blocks</th>
<th>CLC Light Weight Blocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Density</td>
<td>550 kg/cum</td>
<td>1800 kg/cum</td>
<td>1700 kg/cum</td>
<td>2500 kg/cum</td>
<td>1500 kg/cum</td>
<td>800 kg/cum</td>
</tr>
<tr>
<td>2</td>
<td>Thermal Insulation</td>
<td>Very Good</td>
<td>Average</td>
<td>Average</td>
<td>Average</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>Noise Insulation</td>
<td>Very Good</td>
<td>Average</td>
<td>Average</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Compressive Strength</td>
<td>3 Mpa</td>
<td>Quality can vary</td>
<td>4 Mpa</td>
<td>8 Mpa</td>
<td>6 Mpa</td>
<td>3 Mpa</td>
</tr>
<tr>
<td>5</td>
<td>Environmental Impact</td>
<td>Ultra Positive</td>
<td>Very negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Very positive</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Usability</td>
<td>Easy to cut, Easy to handle</td>
<td>low strength; easy to break; High strength; difficult to cut, easy to handle</td>
<td>difficult to break, not easy to handle</td>
<td>difficult to break, not easy to handle</td>
<td>knowing into how it is, very difficult, easy to handle</td>
<td>Easy to cut, Easy to handle</td>
</tr>
<tr>
<td>7</td>
<td>Availability</td>
<td>Increasing</td>
<td>Decreasing in urban areas</td>
<td>Available with less suppliers</td>
<td>Easily available</td>
<td>Easily available</td>
<td>Availability increasing</td>
</tr>
<tr>
<td>8</td>
<td>Efflorescence</td>
<td>Absent</td>
<td>Generally present</td>
<td>Absent</td>
<td>Absent</td>
<td>Present</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Structural savings</td>
<td>Less</td>
<td>High structural reinforcement required</td>
<td>High structural reinforcement required</td>
<td>High structural reinforcement required</td>
<td>High structural reinforcement required</td>
<td>High structural reinforcement required</td>
</tr>
<tr>
<td>10</td>
<td>Walling &amp; Ceiling Solutions</td>
<td>Light-Weight, High-Strength AAC Blocks</td>
<td>Versatile Dry Walls with Endless Possibilities</td>
<td>Take Carpet Floors - The Magical Transformation of Floors</td>
<td>Wall your Ceiling Tile for a Cut Above the Rest</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank You