AAC Blocks – Overcoming Challenges & Methodology for use.

Technical Bulletin

CHALLENGES

IS 1661 - Reference

- AAC falls under aerated concrete
- High on Suction,
- Very high on Shrinkage movement
- Should be dry to control shrinkage.

Cracks appear mostly at brick joints. Cracks are usually in straight lines or sometimes stepped / diagonal.

Why AAC Blocks Crack?

- AAC blocks are designed to be with low density for economic design of building.
- Aeration reduces density, by-products being low strength, high water absorption and very high shrinkage.

Why Aeration increases Shrinkage?

- Air increases porosity. When pores in the block receive water, they expand.
- When dried, these pores shrink.

- So, AAC expands and contracts. Although very marginal on change in length, brick binding mortar cracks due to tensile stress.

What are the sources of expansion?

- AAC blocks are produced using aerated cementitious composite, which is autoclaved. Immediately after production, AAC Blocks are usually with high moisture content.
- Materials used in production of AAC blocks, autoclaving process affect shrinkage. For example, poorly graded aggregates will have high shrinkage.
- While storing at factory / site, blocks are stacked in piles. Blocks in the outer periphery dry out well but the blocks deep inside the pile do not dry enough.
- Curing is the most important source of expansion.
- Rain water is another source.

What are the sources of Contraction?

- Sun is important source of drying.
- Wind as well, depending on Relative Humidity.

How to handle Shrinkage?

It is apt to dry out the AAC blocks sufficiently before putting them into use.

Additionally, no water shall be supplied to AAC blocks during construction.

Now, it is common sense that effective water curing affects high cracking in AAC.

Why do we see cracks through the bricks?

Diagonal cracks / cracks through bricks are due to handling of the bricks by labour. AAC blocks are poor in compressive strength; do not resist shocks when dumped from a height. They develop minor fissures internally.

Crack propagation is always through the weakest zone. Brick binding mortar will be stronger than the cracked block, so crack goes through the brick.

Therefore, we see diagonal cracks Otherwise, cracks in AAC blocks are always in straight lines. Steps may be observed, depending on weaker zones for crack propagation.

What else influences cracking in AAC?

- **Size of block**. As the size increases, cracking reduces. 4" wide blocks crack higher than 9" wide blocks due to lesser self weight.

- **Change in background.** Change in background is weak zone especially where mesh application is not possible. We see straight line cracks between junctions of columns / beams and walls with no mesh.

- **Concrete Beds.** One or two concrete beds are provided in the walls usually in AAC blocks. If such beds are provided, mesh shall be applied before plastering considering change in background.

- **Exposure**. If the wall is exposed to wind movement / heavy sun, susceptibility to cracking is high. As the height increases, due to heavy wind cracking is promoted.

- **Workmanship**. For example, cutting the bricks for electrical conduits etc shall be done carefully, without subjecting the blocks to high loads.

- **Shocks**. Due to lack of sufficient self weight, the walls move heavily even with smallest shocks. If nails are used to fix meshes at background changes before plastering, the brick binding cracks.

- **Packing / filling** materials in holes of electrical fittings etc. These also are weak zones, through which cracks appear.

- **Rain.** Always store the blocks in a shade away from rain. Ensure they are dried well before use.

- **Broken Bricks.** Bricks broken while handling are sometimes used in the masonry just to save costs. This becomes a weak zone.

METHODOLOGY

Materials

- **AAC Blocks**: Inspect the factory and observe storage conditions. Buy from reliable suppliers who store blocks away from rain. Also sufficiently dried before supplying to site.
- **Mesh**: Use fiber mesh in all junctions. Fiber mesh is flexible and can be easily applied at all junctions even if the column / beam does not flush into the wall. Also apply mesh at the concrete beds.
- **Use Self curing Mortar**: Always use self curing mortar for both brick binding and plastering.
- **Precast lintels**. Precast lintels to avoid curing after application.

Storage

Store AAC blocks on a dry platform and protected from rain. Make smaller stock piles with enough sun and air to pass through the blocks for drying.

Brick Binding

Ensure that bricks being used are dry. Moisten surface only to receive mortar. Carefully select unbroken bricks for brick binding. Any bricks with cracks / defects shall be quarantined for disposal.

Apply self curing mortar thoroughly on the full face of the block (not just only at the corners of each side). If the mortar is self curing, thickness does not matter much. However, excess thickness affects the last layer of blocks ending at the concrete slab/beam etc. The opening left for the top most (last) layer could be so small that the mason will be forced to use broken bricks, which results in a weak zone. Due this, most AAC manufacturers recommend thickness of 3-5 mm for brick binding mortar. Therefore, ensure full blocks are used always.

Best practice is to cast precast lintels and be installed in place.

For concrete beds, curing may be eliminated raising the concrete grade up by 2 levels. For example, if M30 concrete is to be poured in the concrete beds, use M40 with PolyCarboxylic Ether admixture as per manufacturer's recommendations. Eliminating curing affects ultimate strength by 20%, but will be fine as per the requirement. Similar procedure shall be followed if lintels are cast-in-situ.

Ensure that top layers of the concrete bed are rough while casting to receive the mortar layer from the blocks.

Use rubber mallet to fix blocks of the top layers.

Allow at least 3 weeks of drying of the brick binding before application of plaster. At this stage, some cracks may appear at the joints yielding to shrinkage movement of blocks.

Check for cracks to see if any blocks have completely dislodged and can be removed by hand. Remove such loose blocks and scrape the dead mortar in the hole and the block. Check if the block has no damage and can be reused. Apply fresh mortar thoroughly over the face and reinstall the brick using rubber mallet. This shall be left for drying for 2-3 weeks. Repeat the process of crack inspection.

If due to any reason, half blocks have to be used in the top layers, neatly cut the blocks to required size before application into the wall. Do not use broken bricks.

Ensure water does not reach the blocks in the whole process. Due to uncontrollable reasons like rain etc, if the wall becomes damp, leave it for 2 months of drying. External plaster shall be done only after 2 months of cessation of rains.

Declare the wall is ready to receive plaster if there are no dislodging blocks.

Pack all the gaps etc., in the electrical conduits with mortar prepared using RenderCon 'Super'.

Mesh application & Spatter Dash Coat

Use Fiber Mesh of 8" width in all junctions. It is flexible and gets into all the junctions, even if the column / beam do not flush into the wall. Do not use nails to fix the mesh. Mortar may be applied on the mesh, which is self curing.

Use a spatter dash coat with RenderCon 'Super'. The mix ratio shall be 1:3, highly flowing and watery. The dosage of 'Super' remains constant, at 1 sachet for every bag. Apply this all over the surface of the wall including the mesh to cover a thin layer of 2-3mm.

Leave it to dry for 1-2 days.

Final Coat

Use RenderCon '5S' to obtain water repellence (Rain Water) on the external plaster with 1:4 ratio.

Use RenderCon 'Super' for all the internal plaster with 1:4 or 1:5 ratio.

Curing has to be strictly eliminated on the plaster.

Ensure thickness is not less than 15mm and not more than 40mm in each coat. As far as possible, complete the plaster in single coat.

Read RenderCon Technical Datasheets for more details on application of plastering.

Checklist

Prepare a check list to follow all the above as per site conditions. A sample is attached herewith.

RENDERCON
ADVANCED CONSTRUCTION PLASTER

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AAC BLOCKS - CHECK LIST BEFORE PLASTERING

Site: Check1 Date: Check2 Date:

Block No: Floor: Flat No: Room: Wall: East/West / North/South

Description	Check 1	Check2
Has Leeway of minimum 3 weeks is left before plastering for drying of AAC Blocks?		
Ensured curing is not done for brick binder?		
a) No water is reaching the bricks / brick binder		
b) If accidently water is reached, leeway of 2 months is ensured?		
All full bricks are used in the wall? (Avoid using broken bricks)		
a) Applied fiber mesh over the layer where half bricks are used.		
Bull marks to cover at least 15mm of plastering is applied?		
Any Dislodged bricks in the wall?		
a) Dislodged bricks removed, scraped of dead mortar and reapplied?		
Top layer of bricks properly laid (without using broken bricks and looking fine?)		
a) Defective layer of loose bricks removed and neatly cut bricks are installed?		
b) If correction is done as above, Leeway of 3 weeks is left before plastering?		
Any minor cracks in the brick binder? (Many Cracks / 1 or 2 small cracks)		
Electrical conduits were fixed?		
a) All Gaps are filled with RenderCon 'Super' mortar 1:4 or 1:5?		
b) Leeway of 2-3 days is left before plastering?		
Fiber Mesh of 8" is installed in all junctions including		
a) Beam / column junctions that do not flush into the wall?		
b) Concrete bed and brick wall?		
c) If the conduit junction etc. is overly cut and more filling is done?		
Spatter dash coat with 'Super' is done with 1:3 ratio (1 sachet per bag of cement)?		
a) Leeway of 1-2 days is left before plastering?		
Final coat is done as per required mix ratio (1 sachet per bag of cement?)		
For External Plastering RenderCon '5S' is being used for rain water repellence?		

Tick / Write Date / Write NA (Not Applicable)

(Signatures):