



Eastland Building Materials Co., Ltd (one subsidiary company of Eastland International Limited) is the leading and largest supplier of AAC products in the east of China. AAC (Autoclaved Aerated Concrete) Panels and Blocks are the new building products that our company is developing and manufacturing. Our fully automatic production line and machines come from Germany with annual production capacity more than 1.6 millions Cubic Meters. Eastland AAC panels can be well used as external wall (exterior wall), internal wall (exterior wall), flooring, roofing, fencing and wall cladding etc. This material, which is steel reinforced and lightweight, can well replace traditional pre-cast concrete and bricks. Eastland AAC panels (ALC Panels) have been well used in various buildings, such hotel, school, villas, apartments, shopping mall, etc.

EASTLANDS PANELS (AAC)
Autoclaved Aerated Concrete ALC Panel Design Guide
EACC Design Version 1 2014

ALC Panel is for **Autoclaved Lightweight Concrete Panel**, which are made from sand, cement, lime and gypsum. **Eastland ALC Panel** is steel reinforced and lightweight. Eastland ALC Panels can be easily cut, drilled, screwed and grooved. Eastland ALC panels may be well used as external wall, internal wall, floor, roof, cladding, fence etc. Eastland ALC panels have been widely used in various buildings such as residential, commercial, industrial buildings and projects in China and many other countries.

Properties of Eastland ALC Panel:

- Good strength
- Lightweight
- Sound Insulation
- Heat insulation
- Anti-Vibration
- Fireproofing
- Environment friendly

Standard Thickness of Eastland ALC panels:

- 50mm, 75mm, 100mm, 120mm, 150mm, 200mm, 240mm, 250mm, 300mm

Eastland group are the leading supplier of AAC panels in east of China. We own fully automatic production lines and most advanced technology in the world. We have been exporting the panels to lots of countries for many years with very good reputation. Should you have further enquiry, please just feel free to contact with us.

Introduction

EASTLANDS PANEL (AAC) is a system of Autoclaved Aerated Concrete that may be used as the external or internal wall cladding panels for residential, commercial or industrial buildings. It may also be used for the flooring in some residential applications.

AAC consists of a combination of lime and/or cement combined with finely divided sand and other filler materials. This is cured under high pressure and temperature to provide a relatively strong, lightweight cellular structure, incorporating small uniformly distributed bubbles.



This structure results in the unique properties of lightness, high thermal resistance, workability and strength. EASTLANDS PANELS (AAC) is normally available as reinforced AAC wall and floor panels. This manual also covers the EASTLANDS BLOCKS (AAC) laid in thin-bed mortar.

Detailing

All buildings are required to be built such that:

1. The assumed support for walls (and other members) can be achieved, to resist gravity, wind, earthquake, and other loads;
2. The building is weatherproof;
3. The structure is durable, able to resist salts or any other expected corrosive materials.

Structural Supports

The connections and supporting structure must have sufficient combined capacity to transmit the horizontal in-plane and out-of-plane loads from the wall to the supports. They must also be such that the assumed action of the wall panel can be achieved. For example, if two-way action has been assumed, the connections at the top, bottom and each side must be consistent with the assumed support configuration. For top, base and sides, the connection capacities may be provided by connectors, such as proprietary ties.

Weather-Proofing

Buildings must be constructed such that they are weather proof. This may be achieved by ensuring that:

1. The EASTLANDS PANELS (AAC) (including its units and joints) do not permit the ingress of water;
2. The EASTLANDS PANELS (AAC) does not crack, due to shrinkage, footing movement or other sources of building movement;
3. The EASTLANDS PANELS (AAC) is protected by a damp-proof course from moisture and salts that otherwise would rise through the wall by capillary action; and
4. Any moisture that penetrates the building fabric through the walls, roof, openings and the like, or builds up internally due to condensation can be easily collected and concentrated by flashings and removed via protected gaps, weep holes or other means.

Ingress of Water through the EASTLANDS PANELS (AAC) and Joints

An appropriate surface coating should be applied to EASTLANDS PANELS (AAC) to prevent the ingress of water through the EASTLANDS PANELS (AAC) and its joints. Eastland recommends the application of a two-coat acrylic paint coating. Prior to the application of the coating, the joints should be pointed and any control joint sealed with flexible sealing compounds.

Damp-proof Course

AS 3700 and the Building Code of Australia Volume 2 provide rules for construction and specifications of appropriate damp-proof courses to exclude rising ground water and the accompanying salts from attacking the EASTLANDS PANELS (AAC).

Flashings, Protected Gaps, Weep Holes and Other Means of Ventilation and Drainage

Flashings, protected gaps, weep holes and other means of ventilation and drainage should be constructed in accordance with AS 3700 and the Building Code of Australia Volume 2 as appropriate.

Flashing must be secured and joints sealed with flexible sealant (e.g. silicone or similar).

Durability

Cladding must have sufficient durability to resist erosion of the panels or blocks and to prevent corrosion of any steel reinforcement, ties, connector, lintels or fittings. AS 3700 Section 5 sets out the durability requirements for masonry units, mortar (not applicable in the case of EASTLANDS PANELS (AAC), built-in components and

reinforcement.

The performance must be met throughout the design life of the structure. Table 5.1 defines the required classifications for masonry units, mortar, built-in components and cover for reinforcement or tendons for the particular environments and positions within the structure.

AS 3700 Clause 5.2 defines the exposure environments for which the masonry and its components must be designed and Appendix E gives further explanation and examples of each environment. The associated clauses and standards referred from Table 5.1 are:

1. AS/NZS 4456.10 provides a test and means of classifying the durability of masonry units.
2. AS 3700 Appendix F provides performance requirements for built-in components and deemed-to-comply corrosion resistance of galvanising and other treatments.

3.

Panels which may be subject to salt attack must have salt resistance, determined in accordance with AS/NZS 4456.10.

Design Process

Before commencing the construction process, the Builder must ensure that the design has been carried out by appropriately qualified and experienced Architects and Engineers, accounting for the properties on EASTLANDS PANELS (AAC). The following steps are appropriate for EASTLANDS PANEL (AAC) panels:

1. Determine the acoustic requirements (if any), and whether the EASTLANDS PANEL (AAC) wall panels, floor panels, or masonry, have sufficient sound attenuation. Consider whether this needs to be augmented.
2. Using the Building Code of Australia, determine the thermal insulation requirements (if any), and whether the PANEL (AAC) wall panels or floor panels have sufficient thermal resistance. Consider whether this needs to be augmented.
3. Using the Building Code of Australia, determine the fire resistance requirements of structural adequacy, integrity and insulation (if any), and whether the EASTLANDS PANEL (AAC) wall panels, floor panels or masonry have sufficient fire resistance. For structural adequacy, the support locations, strength and stiffness must be considered.
4. Carry out structural design checks:
5. Determine the wind loads, using AS/NZS 1170.2 (or AS 4055 for detached dwellings). Determine the earthquake loads, using AS 1170.4. Determine all other structural loads and loading combinations, using AS/NZS 1170.0, 1 and 3.
6. Check the bending, shear, compression, reinforcement-anchorage and connection strength for out-of-plane loads such as wind or earthquake on walls, or permanent and imposed loads on floors.
7. Check the shear resistance and connection strength for in-of-plane horizontal loads such as wind or earthquake on walls.
8. Check the compressive capacity and resistance to concentrated loads for gravity and other vertical loads on walls. Where appropriate, check connection strength.
9. Design and detail associated items, such as lintels, roof anchorages, flashings and the like.
10. Prepare a comprehensive materials and construction specification.

Relevant Standards and Documents

1. AS/NZS 2904 Damp-proof courses and flashings
2. AS/NZS 2699.1 Built-in components for masonry construction - Wall ties
3. AS/NZS 2699.2 Built-in components for masonry construction - Connectors and accessories AS/NZS 2699.3 Built-in components for masonry construction - Lintels and shelf angles durability
4. AS/NZS 4680 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
5. AS/NZS 4534 Zinc and zinc/aluminium-alloy coatings on steel wire

6. AS 2837 Wrought alloy steels – galvanized steel bars and semi-finished products
7. AS/NZS 4792 Hot-dip galvanized (zinc) coatings on ferrous hollow sections, applied a continuous or specialised process
8. AS/NZS 4791 Hot-dip galvanized (zinc) coatings on ferrous open sections, applied by an in-line process
9. AS/NZS 4671 Steel reinforcing materials
10. AS 1397 Steel sheet and strip
11. AS 3600 Concrete structures
12. AS 2870 Residential slabs and footings – Construction

Thin-bed Adhesive

Thin-bed adhesive shall be mixed and applied in accordance with the manufacturer's instructions.

Damp-Proof Course

Damp-proof-courses shall be built into the wall in accordance with the Drawings, Building Code of Australia and relevant Standard (AS 3700). Unless stated otherwise, damp-proof-courses shall be:

1. Placed under walls to provide a continuous damp-proof barrier around the building
2. Lapped not less than 150 mm at joints
3. Projecting through the entire width of the wall and project beyond the external face
4. Stepped at changes of floor level
5. Positioned (if applicable) under the coping of any parapet more than 300 mm above adjoining roof cladding
6. Positioned (if applicable) in chimney stacks, 150 mm to 300 mm above the highest junction of roof and chimney
7. At least 75 mm above finished surface level of adjacent paved, concreted or landscaped areas that slope away from the wall
8. At least 50 mm above finished paved or concreted areas sloping at least 50 mm over the first 1 m from the building and protected from the direct effects of the weather by a carport, veranda or similar
9. At least 150 mm above the adjacent finished ground in all other cases.

Flashings

Flashings shall be built into the wall in accordance with the Drawings, Building Code of Australia and relevant Standard (AS 3700). Unless stated otherwise, flashings shall be:

1. Fixed with clouts to timber studs as applicable
2. Built into the external leaf of walls exposed to weather, extending across the cavity,
3. Turned up 150 mm and nailed to the frame,
4. Positioned at openings (unless they are protected by an overhang), where they shall extend
5. 100 mm past the end of opening and be turned up to prevent leakage.
6. Provided with gaps, weepholes or other means of draining condensation to the outside.

Slip Joints

Slip joint material shall be placed between walls and any supported concrete slab.

Lintels and Arch Bars

For construction using EASTLANDS BLOCKS (AAC), lintels, shelf angles and arch bars shall be built in over openings in excess of 1.0 metre accordance with the Drawings, Building Code of Australia and relevant Standard (AS 3700). For construction of non-loadbearing walls using Reinforced PANEL (AAC) where the clear height to ground level does not exceed 2.7 m, lintels, shelf angles and arch bars are not required.

Support for Panels Suspended over 2.7 m above Ground Level

If an EASTLANDS PANELS (AAC) is suspended such that the clear height to ground level exceeds 2.7 m, the panels shall be supported on 76 x 76 x 10 rolled steel angle brackets x 76 mm long, fixed at each stud by one M12 bolt per bracket. These brackets are in addition to the screw fixing to Top Hat battens described elsewhere in this manual. Refer to typical details in this manual.

Anchorage

Anchorage, including those to tie down roof structures, shall be installed at specified locations; and in accordance with the Drawings, Building Code of Australia and relevant Standard (AS 3700).

Provision for Corrosion When construction is:

1. within 10 kilometers of a non-surf coast;
2. within 1 kilometer of a surf coast; or
3. exposed to rainwater,

The ends or any cut surfaces of Reinforced EASTLANDS PANELS (AAC) shall be

sealed with anti-rust sealant specified by the manufacturer.

Provision for Timber Shrinkage

In EASTLANDS PANELS (AAC) veneer construction, a gap in accordance with schedule below shall be left between the timber frame and the top of the EASTLANDS PANELS (AAC) and at window sills, to accommodate timber shrinkage.

Location in timber framed buildings	Minimum Clearances (mm)	
	Unseasoned hardwood	Other timber frame
Sills of lower or single storey	10 mm	5 mm
Roof overhangs of single storey	16 mm	8 mm
Sills of second storey windows	20 mm	10 mm
Roof overhangs of two storey	24 mm	12 mm

Control Joints and Articulation Joints

Vertical control joints or articulation joints shall comply with the Drawings, Building Code of Australia and relevant Standard (AS 3700). Unless stated otherwise, vertical control joints or articulation joints shall be built into the wall at the following locations:

1. Centres not exceeding the following in straight continuous walls without openings For sand and rock sites (Class A) and slightly reactive sites (Class S), with little or no ground movement from moisture changes – Articulation is not required
2. For moderately reactive clay or silt sites, which can experience moderate ground movement from moisture changes (Class M or MD) and highly reactive clay sites, which can experience high ground movement from moisture changes (Class H or H-D) –
3. External face finish, rendered or painted 7.0 m
4. Internal sheeted and/or face finished 6.0 m
5. Internal rendered and/or painted 5.0 m
6. At each vertical edge of every opening greater than 900 x 900 mm
7. At the position where a wall changes height by more than 20%
8. At a change in thickness of a wall
9. At control joints or construction joints in supporting slabs
10. At the junctions of walls constructed of different materials
11. At deep rebates
12. At a distance from all corners not less than 75 mm and not greater than 3000 mm.

13. Horizontal control joints shall comply with the Drawings, Building Code of Australia and relevant Standard (AS 3700). Unless stated otherwise, horizontal control joints shall be built into the wall at the following locations:
14. At the height of the wall where the supporting structural frame becomes discontinuous for all systems
15. At the height of each floor level above the ground floor for the vertically and horizontally laid systems or at the height of every second floor above the ground floor for the vertically staggered laid system
16. Articulation and control joints shall not be placed adjacent to arches. Control joints in EASTLANDS PANELS (AAC) arches shall be saw-cut to half the depth of the EASTLANDS PANELS (AAC) unit and positioned at the centre of the arch.
17. Control joints and articulation joints, shall be 10 mm wide and shall consist of a polystyrene backing rod and a polyurethane material gunned into the joint to form a 10 x 10 mm flexible seal. The backing rod shall be placed into the EASTLANDS PANELS (AAC) at a depth, which permits the finish of the control joints to match the mortar joints.
18. Where an articulation joint is adjacent to a door or window frame, a 10 mm gap shall be provided between the edge of the frame and the EASTLANDS PANELS (AAC) to allow for movement.

Extending Panels

EASTLANDS PANEL (AAC) panels may be extended up to 600 mm without a control joint by gluing additional pieces to them using thin-bed adhesive; provided both parts are supported by timber or steel battens (or similar) and the overall length between control or articulation joints does not exceed the values specified above. Where panels are extended and extension joints are continuously aligned between adjacent panels, a horizontal tool groove joint shall be placed in the render finish at the height of the extension joint.

Render and Paint Schedule

The following render and paint system shall be applied to EASTLANDS PANELS (AAC) walls. Refer to Render and Paint Specification for suitable products.

Substrate:	EASTLANDS PANEL Autoclaved Aerated Concrete (AAC)
Finish:	Acrylic-Render or Acrylic- Painted Render
Performance:	Water-resistant and vapour-permeable decorative coating, capable of bridging up to a 1 mm substrate crack.
Surface Preparation:	Clean, patch and remove any loose material. Ensure that the surface is free of all incompatible materials, such as silicone sealants. If subject to sea spray or within 1 km of a

	surf coast, wash with clean fresh water to remove all traces of salt.
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All screws shall be : Fixed in accordance with the specified number of standard fixings per panel, as per the table; - Self-drilling, hex head, coarse threaded;	
- At least 10 gauge (4.8 mm) for all Wind Classifications;	
At least Class 3 where further than 1 km from breaking surf;	
- At least Class 4 where further than 100 m (and less than 1 km) from breaking surf and fully embedded	
For applications within 100 m of breaking surf all screws and brackets shall be Grade 304 or 316 stainless steel	
Each aluminium bracket shall be fixed to the EASTLANDS PANEL (AAC) by two screws, as follows:	Fixed such that the distance to the panel edge is not less than 20 mm or more than 150mm. - Of length 10mm less than the thickness of the panel;
Each aluminium bracket shall be fixed to the structural frame by two screws, as follows	Steel Stud — 10g x 16mm long, Class 3 or 4 hex self-drilling screw
Timber Stud — 14g x 25mm long, Class 3 or 4, hex head screw, Type 17	
All studs (both steel and timber) must be spaced at 600mm and aligned with panel joints.	
Brackets shall be 70x40x3.0 aluminium angle x 50mm long and 6060-T5 alloy and temper	
Brackets shall be positioned within 150 mm of the ends of the panels	

General:

In general, all construction products are susceptible to minor damage if mishandled. Less handling means lower potential for damaged. In some instances, damage may

occur
from shipping.

For All AAC Construction Products:

- Deliver only an amount of material that can readily be installed.
- Unload panels using pallet forks (either forklift, nylon straps, slings or pallet fork on a crane cable). Consult your OSHA safety manual for "rigging" or other safety considerations.
- Storage areas should be accessible to delivery trucks and convenient to material staging areas. If possible, drop-deliver the material right to the material staging areas.
- Storage material should always be stored away from other construction activities on a flat-grade area that is not susceptible to standing water, erosion or settling.
- Keep the material covered and banded until ready for installation.

Special Considerations For Panel Construction:

- As with most precast concrete products, the panels should be set directly from the delivery trailer, if permissible.
- If the materials cannot be set directly from the delivery trailers, deliver only an amount of material that can be installed readily.
- Do not "shake-out" stored materials until they are ready to be installed. Excessive handling may cause damage. Set delivery schedule to match the erection sequence exactly.
- Most chipped corners and edges can be repaired. If any reinforcing is visible, contact an authorized AAC representative.
- All damage must be repaired using an approved structural-grade AAC patching compound developed specifically for AAC products.
- AAC panels that have surface or minor cracks are usable, but contact an authorized AAC representative when cracks continue completely through the panel.
- Stored or staged materials should always be set on flat, load-bearing, stable grade on pallets or dunnage.

Installing Eastland AAC panels

Step 1 - Check layout.

Check panel layout of approved AAC shop drawings and deliver panels to job site accordingly.



Step 2 - Unload bundles.

Unload the bundles of panels in a proper manner using approved unloading gear.

Eliminate excessive handling by storing panels nearest to where they will be installed.

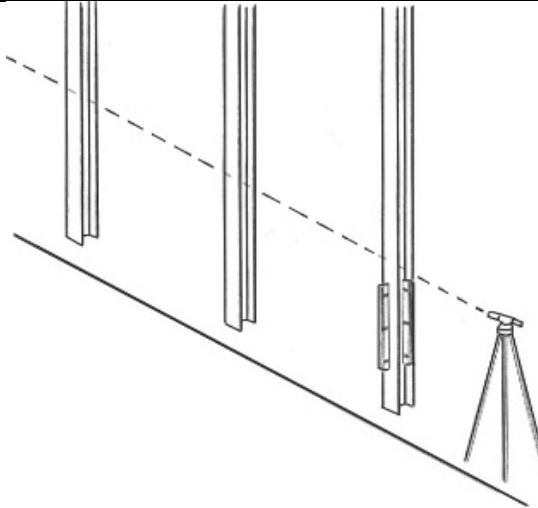
Tip

Protect the panels from rain and water saturation by leaving them on pallets and away from standing water.

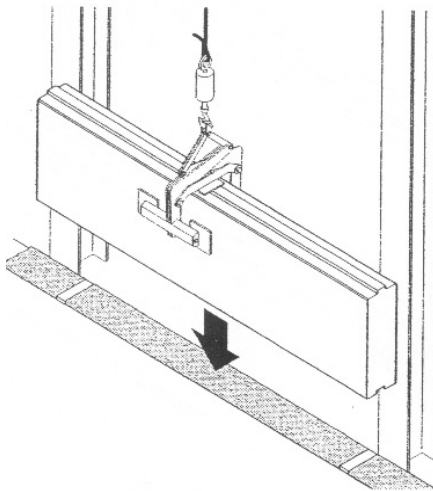


Step 3 - Check plumbness of column line.

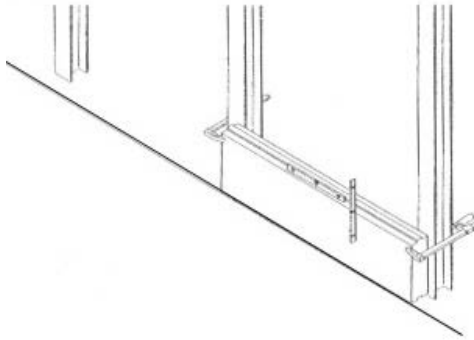
Check column line layout and plumbness. Verify layout is within industry standards. Using a level and transit, establish benchmark elevators onto the columns that will act as a control line for setting the first AAC panels

**Step 4 - Place first panel.**

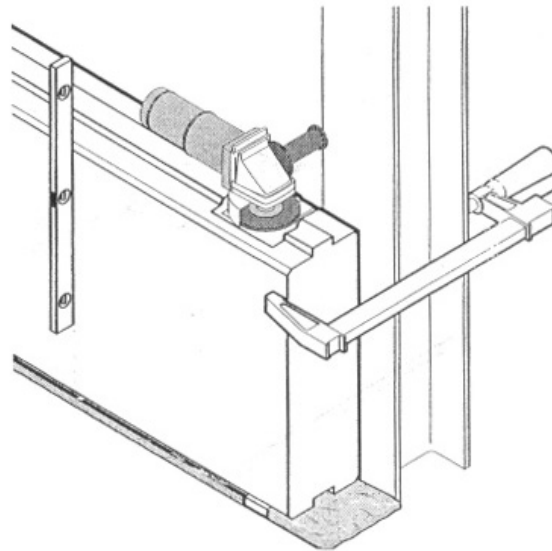
Measure down from the benchmark elevators to establish the highest point on the slab. Install the first panel, male side up, at the highest point of the slab or stem wall, on top of pre leveled shims to establish a minimum depth of setting bed. Place sand-cement mortar joint of at least 1/2 using a conventional masonry trowel (mortar to be either Ready-mix or 3:1 Sand: Portland Cement ratio) along wall line in between plastic shims or pack with non-shrink grout. Other bays will require adjusting the depth of the setting bed prior to installing the first panel



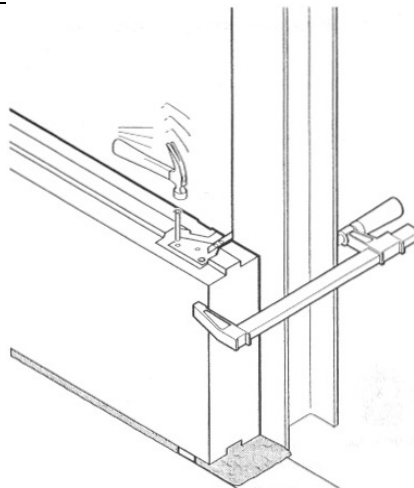
Step 5 - Check panel height and plumbness. Check the height, levelness and plumbness of the panel. Temporarily suspend loose panel with clamps. See plans and specification for allowable tolerances.



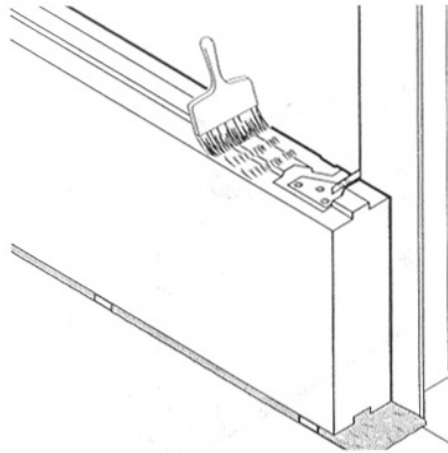
Step 6 - Notch each end of the panel. Notch ends of each panel with grinder/saw to receive anchors



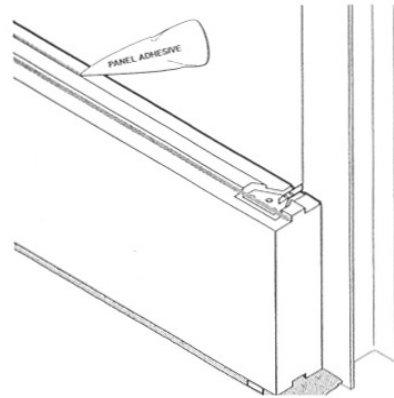
Step 7 - Place and secure anchor. Place anchor according to AAC shop drawings and specifications into the notch at each end of the panel and hammer tube nails through all of the nail holes to secure. This must be accomplished before the next panel is set.



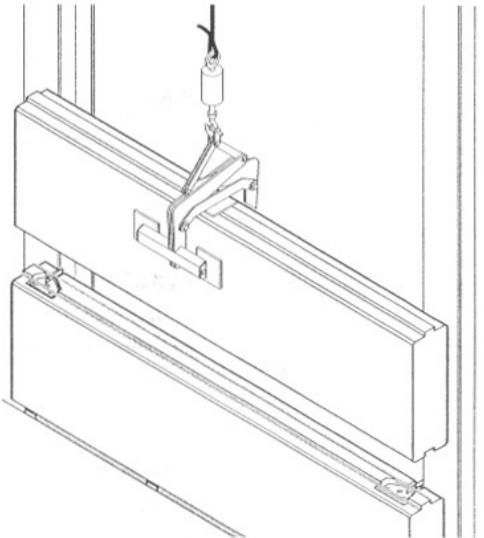
Step 8 - Before setting the next panel.
Release panel clamp and remove all dust particles from the top of the installed panel and the bottom of the next panel with a brush.



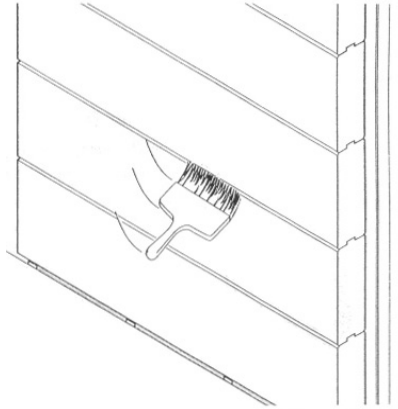
Step 9 - Apply panel adhesive between panels if specified.
Apply beads of a recommended panel adhesive to the top of the installed panel as per specifications and/or shop drawings.



Step 10 - Install the second panel.
Align the ends and groove of the second panel with the ends and tongue of the first panel and set into place. Repeat Steps 5 - 9 for the subsequent panels in accordance with AAC shop drawings.



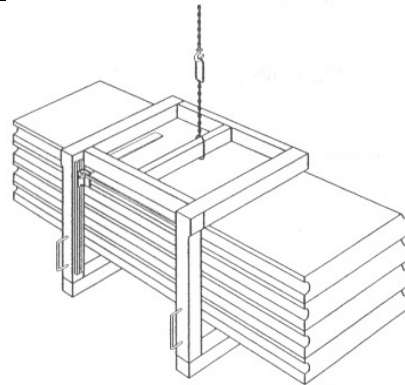
Step 11 - After installation.
After panels are installed, clean all horizontal and vertical joints with a brush and apply exterior joint sealers in accordance with AAC instructions



Eastland floor panel system installation process.

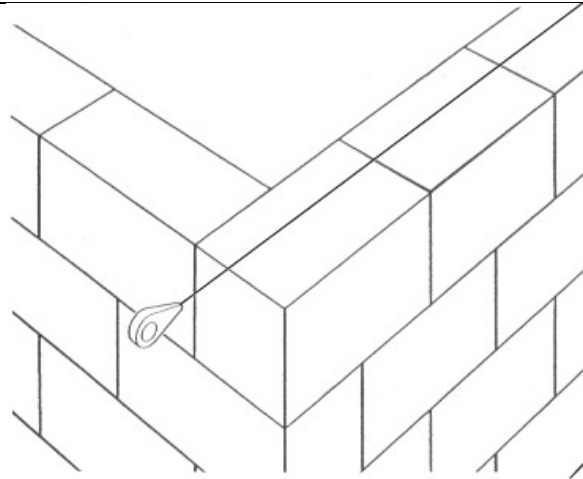


Step 1 - Unload Bundles.
Unload bundles of panels in proper manner using approved unloading gear. If panels must be stored, place them in a clean area without standing water that is close to where work will begin.

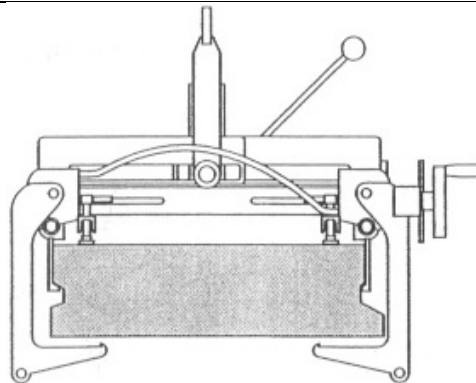


Step 2 - Layout bearing lines.
Using tape measure, layout and chalk the bearing (overlap) lines on top of AAC walls using detail drawings approved for construction.

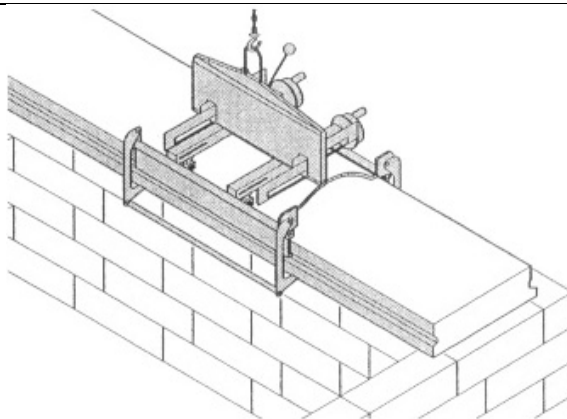
Make sure all bearing, top-of-wall surfaces are level.
Rasp or sand down high spots. Fill low spots with shims.

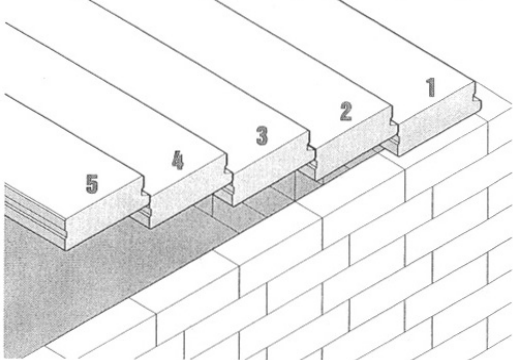
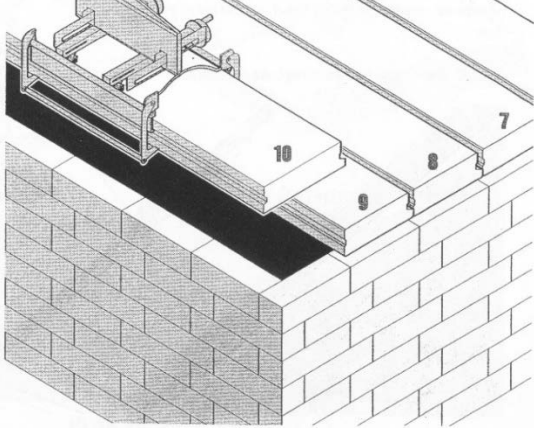


Step 3 - Attach panel lifting gear.
Place panels in a flat position with topside up. Attach approved panel lifting gear (slings, forks, or clamps) to the first panel. Be sure to observe manufacturer's proper attachment procedures and safety guidelines.

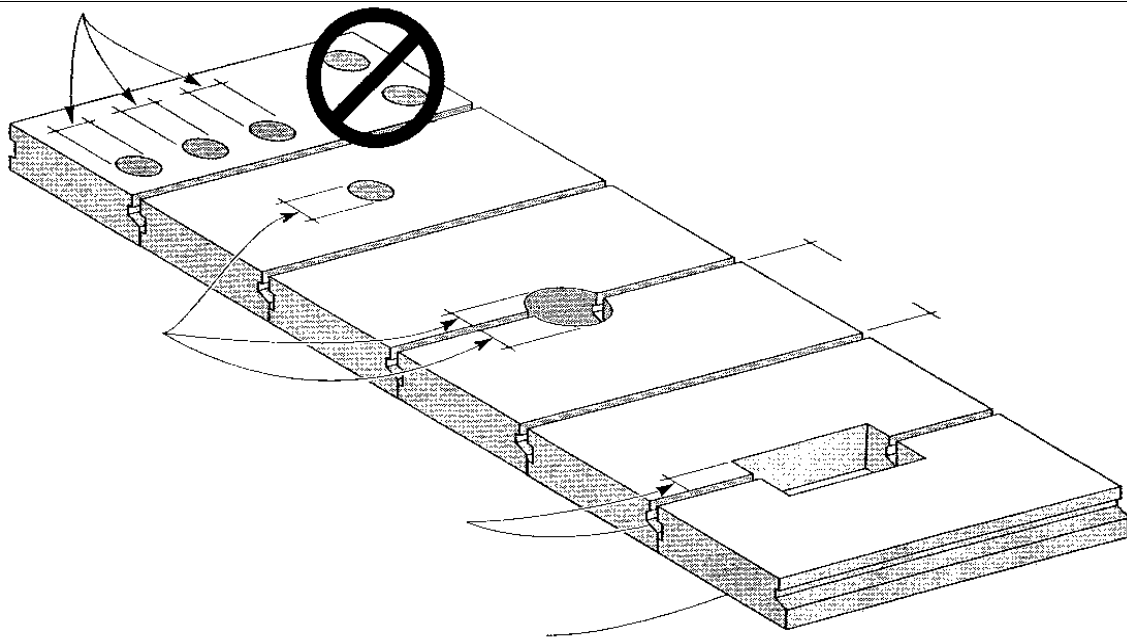


Step 4 - Place first panel.
The first floor panel is lifted, placed and adjusted into exact alignment along bearing lines. One worker is required to steady and guide each end of the panel.



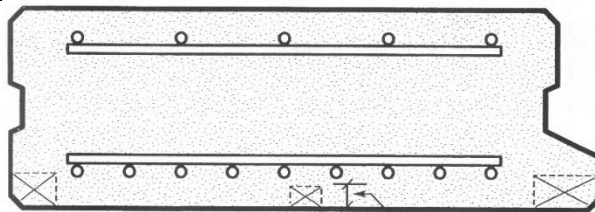
<p>Note the direction of the tongue and position number of the panel. Maintain minimum bearing according to drawings.</p>	
<p>Step 5 - Repeat for remaining panels. Lay the remaining panels ensuring that each one is seated firmly beside the preceding one</p>	
<p>Step 6 - Placing last panel. The correct lifting gear will greatly assist placement of the last panel. Special procedures may be required if other lifting devices are used (i.e. slings or ropes).</p>	

Floor penetrations guide

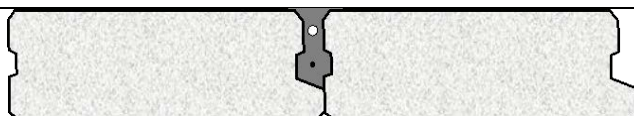


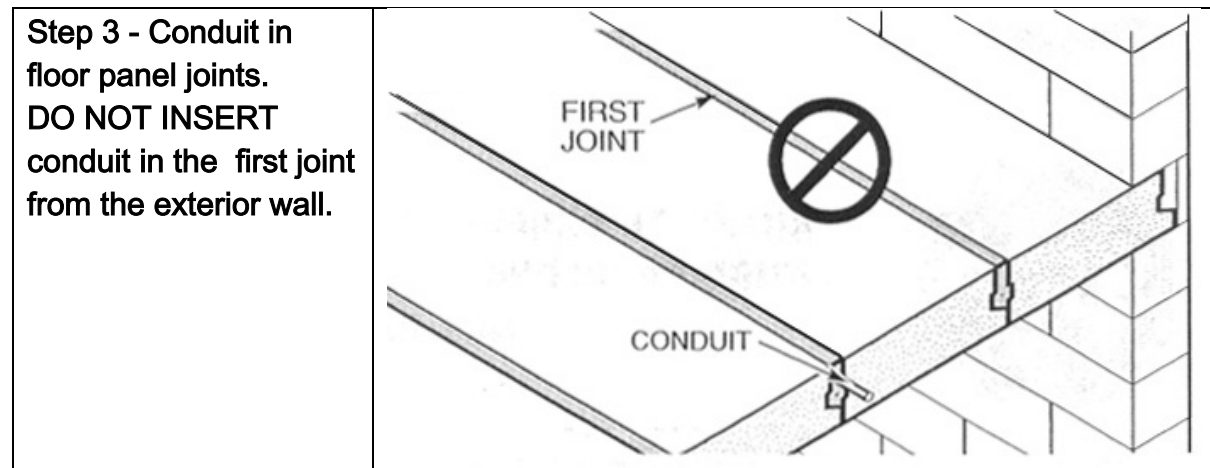
Routing Channels

Step 1 - Routing bottom of floor panels.
 The underside of floor panels may be routed to a depth no greater than 2cm in the middle or no greater than 3.5cm on the sides. Stop if reinforcing becomes exposed.



Step 2 - Top of floor panels.
DO NOT ROUT the topside of panels. Place conduit in the panel joints





Disclaimer

The design of a wall or flooring system requires the services of professional consultants. This document has been prepared a general source of information and to provide general guidance to those consultants it in no way replaces the services of a professional consultant a relevant engineers designing the project.

Eastland therefor accept no liability for the use of this guide.