TECHNICAL BULLETIN – TB154

TILING TO AUTOCLAVED AERATED CONCRETE SUBSTRATES

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INTRODUCTION & SCOPE

Aerated Autoclaved Concrete (AAC) is more commonly known by the trade names CSR Hebel® or YTong (and various other Sino-Asia imported products). It is available in block shapes as well as in larger panels suitable for both wall and floor applications. As a lightweight construction material, it has excellent heat and sound insulation properties, is easy to shift on-site weighing approximately one quarter of the weight of conventional concrete and may be cut using hand tools.

However, this lightweight concrete has some different properties compared to conventional concrete and this bulletin outlines the procedures to use when applying tile finishes with or without a waterproofing system.

CONSIDERATIONS

Aerated autoclaved concrete has relatively low compressive strength and ***low*** shear strength compared to normal concrete. It is also relatively porous although it has low permeability (i.e. the rate at which water may pass through the product) as the pores are frequently not interconnected. However, its excellent insulation properties may be reduced if the AAC becomes saturated.

The CSR Hebel® construction manual also advises that control joints are a necessary part of the wall and floor panel systems to relieve stresses due to movement of the structural system and to control the locations where movement can occur without detrimental effects on the finishes.

The above considerations affect the application of wall and floor finishes.

- The porous nature of the AAC wall and floor panels' means that more than one priming coat is required prior to the application of bonded finishes.
- In internal wet areas, a waterproofing membrane is required over the floor areas with an applied topping to achieve the required (AS3740) falls to waste outlets.
- Wall panels must be sealed on one side only to allow the AAC material to 'breathe' and expand/contract with changes in the temperature and moisture content in the atmosphere (this applies particularly to external wall finishes).
- Internal wall surfaces are to be covered by sheet linings (plasterboard or fibre cement) to support tile finishes. Heavy (>32kg/m^2) tile finishes may adhere to the AAC but failure may occur due to the low cohesive strength of the AAC resulting in the face of the panel separating away.

- Tile finishes can be fixed to external AAC panel walls, but it is recommended that waterproofing is performed and that tile movement joints are more frequently spaced than suggested by AS3958. The reason for this is that AAC is a good insulator and tiles with greater thermal movement potential can display greater expansion and contraction over AAC surfaces. Tile dead loads need to be considered, and also the fact that external walls can have significant heights and that mechanical supports become an important factor.
- Movement joints are to be maintained over all joints formed in the AAC panel construction. This may require the waterproofing membrane system to incorporate the ARDEX Construction Detail bandage over these joints to maintain water tightness.
- The low compressive strength means the AAC may be susceptible to high point loads. The application of thin applied finishes does not eliminate this issue particularly if soft resilient floor coverings are to be applied. Hard floor finishes such as tiles will spread the load over a wider area, but care must be taken to ensure the adhesive spread is adequate under the tiles. Full coverage of the adhesive under the tiles is recommended.

PREPARATION

The AAC panel surfaces must be suitable for the application of tile finishes. This means they must be flat with all holes or voids filled using the AAC patching mortar, or a suitable ARDEX mortar system (for example ARDEX A45 indoors, A46 outdoors or WR80FR, WR100 or WR120FR renders for walls only).

Where the wall is not planar, it is recommended that it be rendered with one of the WR range renders. Priming and application for AAC is described in the relevant product datasheets. This is particularly important with large format tiles such as >400mm and the sheet porcelain tile panels 1m wide and up to 3m long.

Where a levelling layer to floors is required prior to application of a waterproofing membrane or tile finish*, apply two coats of the ARDEX Multiprime primer, allowing each coat to dry prior to application of the next, then apply ARDEX LQ92 mixed with ARDEX Abalastic (diluted 50:50 in water) to a minimum 5mm thickness. A waterproofing membrane must be applied over the levelling layer in internal wet areas prior to fixing the tiles.

*Application of smoothing cements for resilient flooring on AAC is the subject of a separate bulletin TB105.

PRIMING

Generally, all AAC surfaces to receive a waterproofing membrane and/or a tile finish are to be primed with two coats of ARDEX Multiprime water-based primer (waterproof membranes can be used with ARDEX WPM265 primer).

It is also feasible to prime with ARDEX P9 or Abaprime, however two coats may be required with the first coat diluted 1:1 with water.

Allow the first coat to dry before application of the second coat.

Panels saturated by rain, may require the use of ARDEX WPM300 or ARDEX WPM368 prior to installation of membranes to prevent blistering of the membrane. An initial coat diluted up to 20% with water can be used to penetrate more effectively into the AAC pores. The water-based primers ARDEX Multiprime and ARDEX WPM265 are not used with these moisture barriers.

WATERPROOFING MEMBRANES

1) Liquid applied membranes

The following ARDEX liquid applied waterproofing membranes are fully compatible with the ARDEX tile adhesives and may be applied over the AAC concrete as well as over the sheet wall linings, or appropriate ARDEX floor levelling compounds.

- ARDEX WPM 001 Premixed Bathroom & Balcony (under-tile) membrane
- ARDEX WPM002 Bathroom & Balcony (under-tile) membrane.
- ARDEX WPM155R Modified polyurethane (under-tile) membrane.

These membranes are to be applied over the prepared and dry primed surface in accordance with the application instructions and in compliance with AS3740 and AS4654. Allow the membrane to fully cure and dry prior to proceeding.

Note: Where the membrane is to be applied over a movement joint in the Hebel substrate, the ARDEX Construction Detail Tape (see Technical Bulletin TB226) is to be incorporated into the membrane and the position of the movement joint noted so that it may be reformed through any applied bonded topping and/or tile finish. The tape uses an epoxy as the bedding material.

2) Rubber sheet membranes

The use of ARDEX Butynol system sheet membranes is also feasible. Advice should be sort from the ARDEX key account managers with regards to accredited installers.

All three types can be applied to AAC floors with turn ups; whilst ARDEX WPM750/1000 membranes can be used on fibre-cement and plasterboard internal walls as well. It needs to be recognised that the overall bonding of the system makes it less suitable for AAC walls.

Falls to drainage are normally made under these membranes and tiles adhered directly.

- ARDEX WPM750 and ARDEX WPM1000 fleece surface Butynol can be used with tiles for internal and external applications
- ARDEX Butynol (original black) can be used with tiles for external floors

The Butynol is adhered with ARDEX WA98 contact adhesive. It is recommended for AAC that an initial coat of ARDEX WA98 diluted with ARDEX WA98S solvent is applied initially, then a second undiluted coat is applied.

MORTAR TOPPINGS TO FALLS ON FLOORS

Mortar toppings may be required to provide falls to waste outlets in internal wet area floors prior to fixing the tile finishes. A mortar may consist of the following:

- Apply a slurry coat of 2 parts (by volume) of ARDEX Abacrete liquid to 3 parts cement and broom thoroughly over the membrane.
- While the slurry coat is still wet, apply a mortar consisting of 3 or 4 parts sand to 1-part cement and mixed with a solution of 1-part Abacrete liquid in 3 parts water. Screed this mortar to achieve the required falls and allow to dry. The minimum topping thickness must be 15mm.

The topping is best applied directly onto the AAC substrate with the membrane applied on top prior to adhesive fixing the tiles as this ensures positive fall to the floor wastes at all times. An acceptable alternative is to apply the membrane first with the screed over the membrane and the tiles adhesive fixed to the screed.

TILE ADHESIVES

ARDEX tile adhesives that are suitable for fixing to these various components include the following:

Group 1) Directly to the prepared & dry primed AAC substrate in ***internal dry areas only***

- ARDEX X56 (min. thickness 2.5mm – floors preferred)
- ARDEX Isoflex Two Part. (min. thickness 5mm – floors)
- ARDEX S28N ± ARDEX E90 additive (min. thickness 3mm)

- Any of the adhesives listed below in Group 2 can be used for general internal applications on non-waterproofed AAC.

These adhesives must be applied to achieve the required (continuous bed) thicknesses under the tiles to maximise the contact and distribute the loading.

Group 2) Adhering tiles to the *liquid* waterproofing membranes and/or mortar topping screeds

- ARDEX X56 (not recommended where ponding water occurs - floors)
- ARDEX Abaflex (not recommended where ponding water occurs)
- ARDEX X52 (not recommended where ponding water occurs – preferred floors)
- ARDEX X17 (general budget adhesive)
- ARDEX Optima (premium system for specialist and general usage)
- ARDEX X7 + ARDEX E90 (general mid-range adhesive, improved flexibility)
- ARDEX X18 + ARDEX E90 or ARDEX Abalastic (external walls recommended)
- ARDEX X77 ± ARDEX E90 (external walls recommended)
- ARDEX X78 ± ARDEX E90 (flow bed mortar good for floors)
- ARDEX WA100 (premium system - external walls recommended)

Group 3) Adhering tiles to Butynol sheet membranes

Black Butynol

- ARDEX Optima after cleaning surface with ARDEX WA98S

WPM750/1000

- ARDEX X18 + ARDEX E90 or ARDEX Abalastic
- ARDEX X77 ± ARDEX E90

The above adhesives may also be used to fix the tiles to the internal sheet wall linings if required. We recommend that these adhesives be applied to floors using a (minimum size) 10x10x10mm notched trowel and a 6x6x6mm notched trowel on sheet wall linings.

If necessary, use a larger size notched trowel and/or butter additional adhesive directly onto the back of each tile in accordance with the recommendations of AS3958.1-2007 in clause 5.6.2. In general tiles that exceed 250mm are used with a 10mm notch trowel, 300mm with a 12mm notch trowel and 400mm and above with a 12mm notch trowel + buttering of the tile.

When laying the tiles, occasionally remove tiles and check that the adhesive layer is fully covering the back of each tile, there should be no voids in the adhesive layer. The preferred method is the 'Tarver Method' as described in AS3958 where the tiles are placed on the adhesive bed and sheared backwards and forwards across the notch lines. Creation or leaving of voids behind the tiles leads to the development of efflorescence in external situations due to water being trapped behind the tile.

EXTERNAL WALLS

It is recommended that external walls are waterproofed prior to tiling to reduce the risk of saturation of the AAC behind the tile surface. The preferred membrane is ARDEX WPM002. The placement of extra supporting brackets is recommended where the deadload exceeds 32kg/m^2 or the height exceeds 2.5 metres. The types of supports should be designed by a qualified engineer, and the support anchors recommended by the AAC suppliers as being suitable. CSR describes in detail the various sorts of fasteners used with Hebel in Part 5 of the Technical Manual.

Due to the thermal properties of the AAC, and the current usage of dark coloured large format tiles, it is recommended that the tile movement joints spacing be reduced from that in AS3958, recommended in 5.4.5.3, as 3-4.5m spacing for vertical joints and horizontally at storey changes. Another approach is to fill the 'grout' joints with flexible sealant thereby creating a series of closer joints which take up the differential movements.

The adhesives suitable for external walls should be C2S1 or S2 rated and the preferred systems from Group 2 are;

- ARDEX X18 + ARDEX E90 or ARDEX Abalastic (external walls recommended)
- ARDEX X77 ± ARDEX E90 (external walls recommended)
- ARDEX WA100 (external walls recommended)

ARDEX WA100 is a structural epoxy adhesive, suitable for stone tiles.

GROUT

The tile finishes may be grouted using the ARDEX cement based, coloured grouts such as the ARDEX FG8, ARDEX FSDD or the ARDEX WJ50 wide joint grout.

These cement-based grouts are to be mixed with the ARDEX Grout Booster as this additive provides more flexibility to the grouts and increased performance compared to standard cement-based grouts.

ARDEX FG8 grout is recommended for use in joints between tiles from 1 to 8mm wide.

ARDEX FSDD grout is recommended for use in joints between tiles from 1 to 4mm wide.

ARDEX WJ50 wide joint sanded grout is recommended for use in joints between tiles from 5 to 50mm wide.

Internal floors and walls can also be grouted with ARDEX EG15 where a more resistant epoxy grout is required.

MOVEMENT JOINTS

Movement joints are required in the tile finishes in accordance with the recommendations of AS3958-2007 and as recommended by the AAC panel manufacturer.

This means all movement joints in the AAC substrate must be maintained in the tile finish and be a minimum of 6mm wide. Deep joints are to include a backer rod of closed cell polyethylene or similar (non-absorbent) material so the flexible sealant maintains the recommended thickness to joint width ratio of 1:2 (i.e. the width is twice the sealant thickness)

ARDEX SE silicone sealant is recommended for most movement joints in wall and floor tile finishes. This sealant is suitable for installation in sanitary areas and is also UV stable for external applications.

Stone tiles that can mark should be jointed with ARDEX ST silicone.

Movement and transmitted joints can also be filled with ARDEX RA030 and ARDEX RA040 modified polyurethane sealants.

References:

CSR Hebel® Panel Systems

CSR Hebel® Powerfloor system

CSR Hebel ®Powerwall system

CSR Hebel Technical Manual Part 5: Proprietary fixing & brackets and surface finishes.

ARDEX Technical Bulletins TB105 and TB226.

ARDEX DATA SHEETS for the nominated waterproofing membranes, tiles adhesives, mortar additives, sealant and grout systems.

IMPORTANT

This Technical Bulletin provides guideline information only and is not intended to be interpreted as a general specification for the application/installation of the products described. Since each project potentially differs in exposure/condition, specific recommendations may vary from the information contained herein. For recommendations for specific applications/installations contact your nearest ARDEX Australia or ARDEX New Zealand Office.

DISCLAIMER

The information presented in this Technical Bulletin is to the best of our knowledge true and accurate. No warranty is implied or given as to its completeness or accuracy in describing the performance or suitability of a product for a particular application. Users are asked to check that the literature in their possession is the latest issue.

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