

TECHNICAL BULLETIN – TB230

CONCRETE BLOCK WALLS – TILE FINISHES

TB230.003
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Australia
2013 - 2017

Date, Thursday, 20 July 2017

INTRODUCTION

Concrete block production initially commenced using hand-mixed and individually hand-pressed methods using a wide variety of sand blends and inconsistent sand to cement proportioning. These production methods lead to blocks of inconsistent quality with variation in the block sizes due to different size moulds used by different operators, different strengths due to inconsistent wet mixes and the degree of compaction achieved by the press operators.

Over the years, the block sizes have become standardised and production is now highly automated with consistent, clean sand to cement proportions and the water content measured for each batch. The wet mix is used in multiple moulds and all are pressed together at a consistent controlled pressure to form the block shape before being loaded into an autoclave oven for at least 3 days controlled curing. Upon removal from the autoclave, the blocks are stacked on pallets for storage for short periods (~ 3-4 weeks) prior to being used. Modern production now rapidly produces a cement based construction block of reliable quality and of consistent size.

The importance of this improvement in the quality of concrete blocks is that the building industry is calling for the adhesive fixing of tiles to the surfaces of these blocks against published advice such as provided by AS3958 (clauses 4.5.3.2(ii)), which directs the concrete block walls be rendered prior to adhesive fixing the tiles with normal thin set adhesives. In the rationale of tile industry installers and builders, by eliminating the render, there are considerable cost and time savings benefits so why render?

The cement based render (also known as solid plaster) provided a flat surface true to plane that had consistent porosity, filled imperfections/voids in the surfaces of the blocks and filled/covered the mortar joints. The mortar joints between block are of slightly different composition and porosity to that of the blocks so that the render coat was used to even out these differences. Eliminating the render coat thus imposes some constraints on the adhesive fixing of tiles directly to the concrete block walls.

Where the block walls are flat, as in deviations of less than 3mm in 3m length when measured with a straight edge, and the mortar lines are flush with the blocks, then direct tiling is feasible. The larger the tile, the more critical this becomes and for tiles larger than around 400mm on the edge, the surface flatness needs to be considered carefully.

For membranes, irregular surfaces, and blowholes and voids all create potential problems for the film continuity so any surface must be flat and not full of voids and holes.

Where these criteria are not met, then surface rectification by rendering and patching is a necessity. Tile adhesives cannot reliably be used as patching materials of build-up materials because of their internal shrinkage, and in reality the maximum thickness for the majority of C Class adhesives is 6-10mm maximum.

Specifically the issues are discussed in more detail in ARDEX Technical Bulletin TB249 which gives advice on rendering and smoothing walls.

CONCRETE BLOCK WALL CONSTRUCTION

Concrete block wall construction generally is on structural concrete substrates with steel reinforcing starter rods connecting the wall to the substrate to prevent lateral movement. The reinforcing steel is continued up through the concrete blocks which are then “core filled” with a concrete mortar. This mortar fills the blocks to the top and provides additional strength to structural walls. Typical uses for concrete block walls include the

perimeter and internal structural walls of buildings as well as free-standing external retaining walls and/or dividing blade walls.

PREPARATION PRIOR TO ADHESIVE FIXING OF TILES

The mass produced concrete block may have the surfaces that are in part finished with a smooth closed surface formed as the pressed block is pushed out of the steel mould and leaving the surface as if it had been finished with a steel trowel. This surface has to be scarified for the adhesive to achieve maximum bond strength. The recommended preparation methods are mechanical such as grinding, needle gun scabbling, or high pressure wet blasting.

The mechanical preparation of the blockwork is to achieve an open pored surface free of all contaminants. Vacuum to remove any residual dust prior to proceeding.

PRIMING

The prepared surface can be primed using one of the following primer systems;

- Dry clean blockwork can be primed with ARDEX Multiprime or ARDEX P9 primers
- Damp blockwork can be primed with ARDEX WPM368 or ARDEX WPM300 (sand seeded) prior to the application of tile adhesives.
- Damp/new blockwork can be primed with the ARDEX WPM368 or ARDEX WPM300 prior to the application of ARDEX Waterproofing membranes.

Ensure the selected primer is dry prior to proceeding.

WATERPROOFING

The preferred ARDEX waterproofing membranes compatible with the ARDEX tile adhesives are the ARDEX WPM002 two part membrane and the ARDEX WPM155R Premixed Acrylic polyurethane hybrid membrane. These are applied in two coats to achieve the minimum dry film thickness recommended on the product data sheets.

TILING

ARDEX technical bulletins TB001 & TB148 provide guidelines to the adhesive fixing of large, heavy tiles to wall structures. The basic guideline is that the tiles can be fixed with adhesive where the weight of the tile does not exceed 32kg/m^2 and/or the height of the tile finish is less than 3m.

These guidelines apply to both the primed blockwork and to the ARDEX Waterproofing membranes on the blockwork.

The nominated tile adhesives are all polymer improved cement based products with C2S1 ratings

- ARDEX X77+ E90
- ARDEX X18+E90
- ARDEX Abaflex
- ARDEX STS8W+E90
- ARDEX Optima for more critical applications
- ARDEX S28N+E90 for dry internal applications

Where **natural stone** tiles are to be fixed directly to the prepared blockwork, the above cement based tile adhesives may be used although the ARDEX WA100 two part epoxy R Class adhesive is recommended, particularly where the stone is considered to be moisture sensitive.



ARDEX Technical Bulletin TB010 discusses moisture sensitivity of natural stone. ARDEX WA100 may also be used with glazed ceramic and porcelain tiles if required. **Priming** of the prepared wall is **not** required when using this adhesive.

The mixed adhesive is spread on the wall surface using a notched trowel. AS3958 has guidelines regarding the minimum trowel size to use when fixing different size tiles.

- 200 x 200mm tiles – use a 8mm notched trowel
- 250 x 250mm tiles – use a 10mm notched trowel
- 300 x 300mm tiles – use a 12mm notched trowel
- 400 x 400mm and larger size tiles – use a 12mm notched trowel + back buttering of tile.

The standard guidelines regarding the recommended **minimum** contact coverage of the tile adhesive to both the tile and the substrates are as follows:

- Internal residential walls - 65%
- Commercial and Industrial walls – 80%
- External Walls – 90%.

The recommended installation method is to apply the adhesive so that all the adhesive lines are parallel across the face of the wall. Each tile is placed into the adhesive and, while pressing firmly, is slid up and down across at least the width of one line. The objective is to create as high a coverage as possible, since this reduces the risk of efflorescence and other bond problems developing.

This action collapses the lines of adhesive together and achieves full coverage between the back of the tile and the substrate. The adhesive should be at least 3mm thick behind the tiles. Allow the adhesive to dry for 24 hours prior to grouting.

GROUTING

After the adhesive has dried for 24 hours, the tiles may be grouted with ARDEX grouts.

- ARDEX FG8 sanded grout for joints from 1-8mm wide in most tile finishes.
- ARDEX FS-DD unsanded grout for joints from 1-4mm wide in polished tile finishes.
- ARDEX WJ50 sanded grout for joints 5 to 50mm.

These cement based grouts may be mixed with ARDEX Grout booster where increased adhesion to the tile is required with increased resistance to water penetration to reduce to potential for efflorescence.

ARDEX WA or ARDEX EG15 epoxy grouts may also be used in some wall tile applications where an impervious grout is required. Generally however, these are intended for internal applications, and typically for commercial installations.

MOVEMENT JOINTS

Movement joints are to be included in the tile finish based on the recommendations of AS3958. This normally means joints are to be located horizontally at every storey rise in the wall, vertically at not more than 3.5m intervals across the wall, and around any penetration or fixture on the wall. However additional factors, such as black tiles on fully exposed walls may require these movement joints to be at closer intervals to accommodate thermal movement. Movement joints are to be raked free of adhesive and grout residues prior to filling with ARDEX ST silicone sealant. Backing rods may be required in joints between thick tiles to maintain the recommended ratio of the sealant thickness at half the joint width.

EFFLORESCENCE

Efflorescence is the migration of soluble salts (i.e. chemical compounds) from cement based materials such as the concrete blocks, including the core fill concrete, cement mortars / renders, cement based tile adhesives / grouts that are exposed to frequent periods of wetting and drying. These soluble salts are leached out of the cement based materials and are brought to the surface where the water evaporates and the salts are deposited, typically as calcium carbonate. It can occur on internal wall surfaces as well as

on external walls provided there is source of moisture sufficient to dissolve these soluble salts.

The most effective way to control efflorescence, particularly on external walls, is to prevent moisture getting into the wall structure. Damp courses in the lower part of the wall control rising damp, waterproofing membranes that are compatible with the tile adhesives can be applied to the wall surfaces, and additives (such as ARDEX WPM405) can be included in the render coats to reduce the penetration of moisture although these are not as effective as an applied membrane.

However, the most frequent entry point for moisture is at the tops of exposed wall where there is no capping of any sort to prevent water penetration into the core filling of the blockwork. The core fill concrete may contain voids due to incomplete filling where water may collect so the efflorescence continues well after the last wetting of the wall by rainfall.

Then the final consideration is that the adhesive contact coverage must be continuous and not leave interconnecting voids where water can be trapped and moved behind the tiles. The adhesive **MUST** be notched horizontally along the face of the wall, and not fanned or notched vertically.

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 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.

REASON FOR REVISION

Modifications to the text to bring bulletin into line with the newer TB249. Some modifications to products listed by inclusion of EG15, S28N and STS8W.

DOCUMENT REVIEW REQUIRED

36 months from issue

Technical Services 1800 224 070. email: technicalservices@ardexaustralia.com
Australia <http://www.ardexaustralia.com>

NSW-HO 61 2 9851 9100, **QLD** 07 3817 6000, **VIC** 03 8339 3100, **SA/NT** 08 8406 2500, **WA** 08 9256 8600
Customer Service and Sales 1300 788 780

New Zealand Christ Church 64 3373 6900, Auckland 9636 0005, Wellington 4568 5949
Technical Inquiries NZ 0800 2 ARDEX New Zealand <http://www.ardex.co.nz>

Web: Corporate: <http://www.ardex.com>



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