TECHNICAL BULLETIN – TB249

PATCHING AND RENDERING OF CONCRETE, CONCRETE BLOCKWORK & BRICKS, BEFORE TILING OR FAÇADE FINISH WATERPROOFING

Date, Thursday, 22 June 2017

INTRODUCTION & SCOPE

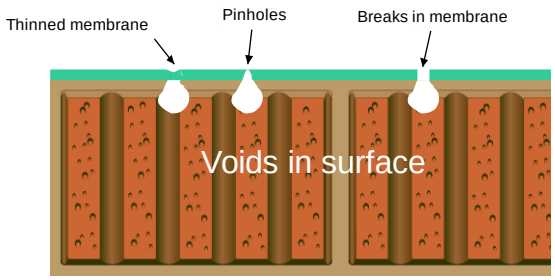
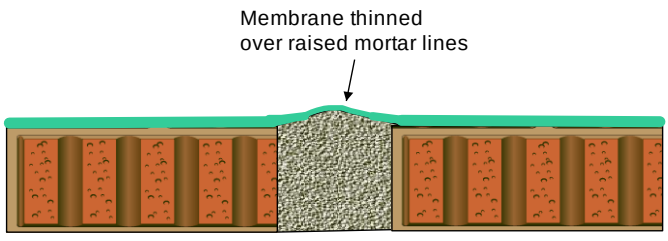
A common application request is to tile or coat a masonry walls with tiles or a waterproof coating system. The use of the combined ARDEX repair mortars and renders, with waterproofing, tile adhesives and façade coatings give options for a complete system.

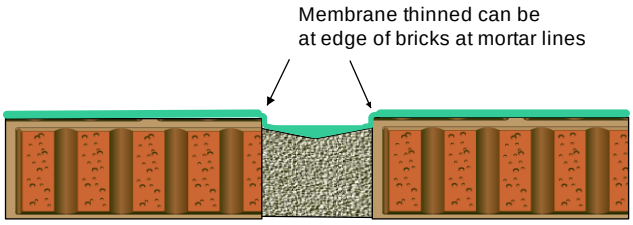
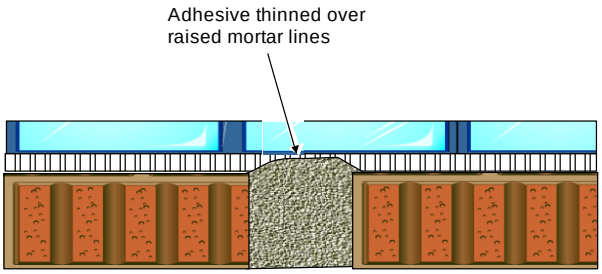
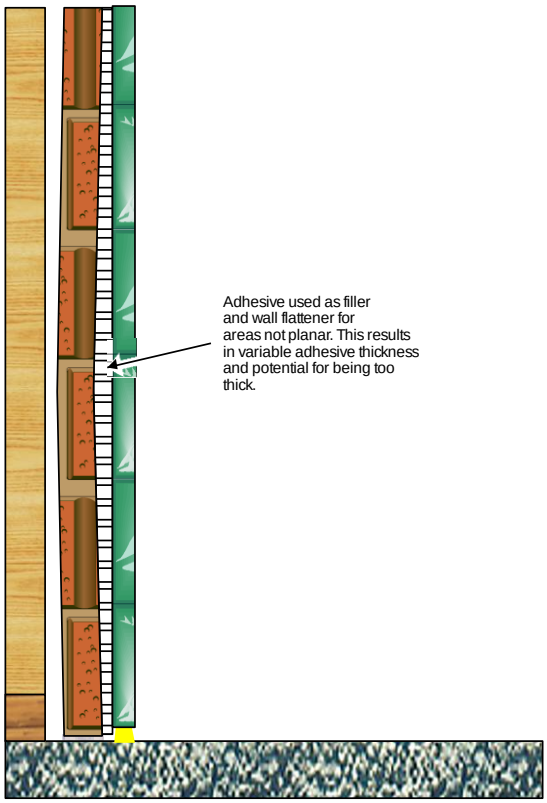
This bulletin discusses the application of ARDEX renders and repair mortars, along with appropriate membranes for tiling, and also feature finish waterproofing materials applied to facades.

Historically, ARDEX has not recommended direct application of tile and membrane systems over brickwork and masonry because of issues with flatness and planarity, and problems with issues surface irregularities.

The presence of regularly spaced mortar lines in these walls which are either recessed or protruding above the plain, means that there is a problem with getting a continuous membrane film build. Particularly this is a problem with recessed mortar lines having a sharp block corner either side of the line, which then results in the membrane film being too thin or compromised.

In the case of tiles and particularly large format types (>250mm in side length), surface flatness becomes important for achieving a sound adhesive bed and to avoid lipping and other defects where tiles don't line up properly. A common misconception is that tile adhesives can be used as renders, and this is a mistake because thick layers of adhesive develop shrinkage which then leads to raft of problems with the tiles.

	This is a situation where voids in the underlying surface can lead to development of pinholes or thinning of the membrane / coating.
	Protruding mortar lines between the bricks/blocks result in the membrane / coating being thinned.

	This situation with recessed mortar results in either thinned membrane / coating at the block corners or thick slow drying material if the gap is filled.
	Where the mortar between the blocks protrudes, it lowers the adhesive thickness, but can also lead to lipping and flex cracking in thin tiles over the protrusion.
	The use of the large majority of ARDEX adhesives as fillers and wall smoothers is not a recommended practice. The adhesives display higher levels of shrinkage than patch mortars and correctly made renders. The shrinkage problem increases as the applied thickness increases.

QUALIFICATIONS

The following qualifications apply to this process.

- Rendered masonry has a constraint for the recommended dead load created by the tiles to be applied. ARDEX applies a load limit of 32kg/m^2 for tiling without any form of mechanical supports for rendered walls (concrete, bricks and blocks).
- Where the dead load exceeds this 32kg/m^2 limit, or the height exceeds 3m ARDEX also recommends that mechanical supports be fixed into the masonry are used to support tiles (other than for example small mosaic tiles <150mm square). The

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design of supports should be entrusted to a qualified engineer and ARDEX only provides basic information in this area, such as shown in ARDEX Technical Bulletin TB148.

- Blockwork walls have to be core filled and also contain steel re-bar which is fixed ('started') into the basal concrete slab. The concrete should be cured for the appropriate 28 day period and the excess moisture allowed to disperse. Blockwork which is not cored filled or contains voids, has a reduced facial load bearing capacity and does not readily accept the masonry anchors normally used for any required tile supports structures.
- External walls may require waterproofing prior to tiling, as do the walls of wet areas in accordance with AS3740. Walls which are also 'below grade' and face onto the soil, fill or rock walls will commonly require the use of a moisture barrier coating prior to tiling or coating (in accordance with AS2870 and/or the National Construction Code aka the 'BCA'). The moisture barrier is applied over the rendered surface, not before it, but its application does not preclude the general requirement that external below grade surfaces are waterproofed independently (i.e. by membrane sheets or coatings, but this subject is not covered in this bulletin).
- This bulletin does not cover applications for swimming pools, that is covered by ARDEX Technical Bulletin TB088.
- This bulletin does not cover application over any form of fibre-cement sheeting used for walls in any application.
- This bulletin does not cover light weight AAC blockwork or panels. They have their own specific render and patch materials.
- The renders are not classified as texture coatings or finished surface materials intended to be the final finish, either bare or sealed. This document describes the basic preparation prior to application of coatings and tiles.
- This bulletin does not go into details concerning the repair of concrete which includes protection of re-bar by coating and/or the use of anodic systems. These are specialised areas which require direct inspection, advice and system design.

SURFACE PREPARATION

The first step in the process is surface preparation of the masonry prior to the application of the render and patching materials. The normal preparation processes are mechanical preparation, but may include wet cleaning and also degrees of crack repair.

CRACK REPAIRS

Cracks in a masonry wall can be repaired by several means, but to some extent are dependent on whether they are structurally significant or merely objectionable to look at. Simple repair methods include:

a) Veeing out the crack mechanically, de-dusting and then filling it with a repair mortar which can be proprietary or site mixed up;
   - ARDEX BR340 or ARDEX BR345 repair mortars (minimum depth of 10mm) used with ARDEX WR prime mortar slurry coat,
   - ARDEX A46 repair mortar,
   - ARDEX A45 repair mortar (internal only),
   - Cement-sand (cement:sand 1:3) patch mix gauged with ARDEX WPM405 or ARDEX Abacrete in the mix water, and used with a bonding bridge paste,
   - Cement-sand mix gauged with ARDEX WPM300 hydrepoxy liquid which makes a water resistant mortar (1 part WPM300, 1 part cement, 1-1.5 parts 0.3mm clean dry sand and if required 1 part 2-5mm gravel),

- Epoxy screed made with ARDEX EG15 mixed 1 part with 8-10 parts clean dry sand 0.3-0.5mm. This needs to be surface blinded when wet to assist with subsequent keying.

b) Filling the cracks with an injection resin.
   - ARDEX RA88
   - ARDEX RA142
   - ARDEX RA144
   - ARDEX RA146
   - ARDEX RA56

   All the injection resins must be sand blinded when wet to promote adhesion and excess resin ground off the surface.

HOLE & DIVOT FILLING

Holes in the walls can be filled with the repair mortars BR340 or BR345 (minimum 10mm deep) used with the WR Prime mortar slurry coat.

Where there is re-bar exposed in the hole, it needs to be fully exposed front and back and de-rusted to bright metal (mechanical wire brushing). The metal is then completely coated with ARDEX BR10ZP primer. When the coating is dried, the hole internal surrounds are primed with a WR prime mortar slurry coat and filled with the patch mortar.

Voids without exposed re-bar can be filled with ARDEX A46 or ARDEX A45 used within their specified parameters.

MECHANICAL PREPARATION

The surface of the main body of the wall to be smoothed should be mechanically prepared. Methods such as surface grinding, needle scabbling and abrasive grit blasting will all generally produce a clean surface. After dry preparation, the wall must be vacuumed or thoroughly washed down to remove all dust and loose materials.

Water grit blasting can also be used to open the surface pores. High pressure water blasting must have sufficient pressure to provide a degree of surface profile. We do not recommend acid washing for surface preparation.

Any waste water from wet processes may require to be treated as contaminated waste water on construction sites. Irrespective, it should be prevented from entering drains and water ways in accordance with local regulations.

Ideally the final surface finish for concrete should be CSP2 profile, whilst blockwork and bricks needs to be clean of contaminants.

PRIMING

The priming of the surface is dependent on the type of material to be used as the render.

ARDEX Repair mortars

The ARDEX repair mortars ARDEX A45 and ARDEX A46 do not require the use of primer for normal masonry surfaces (concrete and cement blocks). Where the substrate is the highly porous and absorbent AAC (autoclaved aerated concrete), priming with ARDEX P51 can assist with the performance of the system.

ARDEX Renders

The bagged ARDEX renders WR120FR, WR60 and WR100 can be used with ARDEX WR prime in accordance with the datasheets for application over highly porous substrates such as AAC construction or porous concrete and blockwork. The dilution ratios are shown overleaf.

For most other masonry substrates recommended for ARDEX WR60, WR100 and WR120FR, priming is not usually required and the mortars are applied directly to the surface.

Recommended mixing ratios as a primer (ARDEX WR Prime/Water):

Rendering concrete walls:	1:5
Rendering AAC Blocks and Panels:	1:2

RENDERING

The following describes processes for the application of the rendering materials to the wall.

Pre-bagged ARDEX Renders

The standard ARDEX renders WR60, WR100 and WR120FR are mixed in accordance with the datasheets.

Where the final decorative surface is paint, texture coating or tiling;

ARDEX WR60 – 2 to 5mm thick,

ARDEX WR100 – 2 to 10mm thick,

ARDEX WR120FR – 2 to 12mm thick*

**The maximum thickness of WR120FR when applied by pumping is 30mm. The application of large, dense and heavy tiles onto such a thickness may require engineering advice.*

Note that tiling over the renders is only permitted where the substrate is masonry, and tiling is not acceptable over EPS foam, or fibre-cement sheet render boards.

For certain applications such as dense concrete (note that mechanical surface preparation is preferred where tiling is being performed), the mixed ARDEX WR100 or WR120FR render is used with ARDEX WR primer as an additive in the *first coat*, to improve the adhesion and reduce the loss of moisture from the render into the highly porous substrate.

The mix ratio is specified on the packaging as,

Recommended mixing ratios as an additive (ARDEX WR Prime/Water):

Rendering dense substrates:	1:5

which is then used as the gauging solution.

For AAC blockwork the mesh tape is used for the block or panel joints.

The render is applied to the nominated masonry surfaces with a wooden or steel trowel to create the desired thickness (within their maximum thickness allowance parameters). The mortar is worked into the surface to achieve a good initial ‘grab’ and is then worked up to the desired thickness. In the case of the all three of the ARDEX WR series renders, the minimum thickness for tiling is 2mm.

Do not work the mortar to a shiny and dense final finish as this can affect the bond of subsequently applied materials. The datasheet describes the mortar surface before tiling as having a ‘sandy finish.

The mortar shall not be applied into or over any expansion or movement joints that are present in the wall.

Standard sand-cement render

In accordance with AS3958 and AS3700, sand-cement renders are applied to walls made of bricks and blockwork, but can also be applied to rough and irregular concrete surfaces.

The normal render used in this case is a mix of 1 part cement to 4 parts sand and ½ part of lime. AS3958.1 says this,

> For dense, strong and smooth or moderately strong and porous backgrounds, the rendering should consist of sand and Portland cement in proportions not richer than 3:1 by volume when based on dry sand. Sand is usually delivered and used in the damp state, and if no allowance is made for this, the mix, particularly if volume batched, may be richer than is desirable. Therefore, based on damp sand, the mix should not be richer than approximately 4:1 by volume (5:1 by weight).

and also this about renders.

4.5.3.2 *Procedures*

Details of some of the methods of preparation noted in Table 4.5 are set out below. The various procedures are as follows:

(a) *Brickwork (clean)* Use either thick-bed or thin-bed fixing:

(i) *Thick-bed*—brush and wash down.

(ii) *Thin-bed*—follow the adhesive manufacturer's recommendations, but this would normally require the prior application of a render coat of 4:1:½ sand, cement, lime. Allow the render coat to dry for 7–10 days then lightly brush or scratch to form a key.

While AS3700 describes an equivalent render type as an M4 as shown in this table.

TABLE 11.1

DEEMED-TO-SATISFY MORTAR COMPOSITIONS

Mortar class	Mix proportions by volume					Units for which mortar is suitable			
	Cement (GB/GP)	Masonry cement	Building lime	Sand	Water thickener (see Note 3)	Fired clay	Concrete	Calcium silicate	AAC
M1	0	0	1	3	No	✓	×	×	×
(see Note 5)	1	0	3	12	No	✓	×	×	×
M2	1	0	2	9	No	✓	×	×	×
M3	1	0	1	6	Optional	✓	✓	×	×
	1	0	0	5	Yes	✓	✓	✓	×
	0	1	0	4	Yes	✓	✓	×	×
M3	Thin-bed mortar for use with AAC (see Clause 11.4.1)								
M4	1	0	0.5	4.5	Optional	✓	✓	×	×
	1	0	0	4	Yes	✓	✓	✓	×
	1	0	0 to 0.25	3	Optional	✓	✓	×	×
	0	1	0	3	Yes	✓	×	×	×

✓ satisfactory
× unsatisfactory

NOTES:

1 Mortar mixes are designated by the proportions of their ingredients following an initial letter, the chief cementing agent being given as unity (e.g. C 1:L 0.5:S 4.5 or L 1:S3).

2 Volumes refer to materials in the dense-packed condition.

3 The water thickener referred to in this Table is cellulose based. The particular cellulose-based product used shall be suitable for this application, and used in accordance with the manufacturer's or supplier's instructions.

4 Refer to Clause 11.4.1 for restriction on the use of Class M1 mortar.

ARDEX takes the position that the best approach to using such a render is to add polymer liquids to them rather than necessarily use lime, to improve the performance of the render in terms of resilience, but also to increase its general adherence to the underlying substrate.

Appropriate mix designs for render are therefore:

Clean dry sand 4 parts by volume (3 parts by weight in kg)

Portland cement 1 part by volume (1 part by weight in kg)

Gauge liquid 6 parts by volume or weight

The gauge liquid contains one of the following ARDEX liquids in the appropriate ratio by volume;

ARDEX WR Prime - 1 part WR to 2 parts water

ARDEX WPM405 - 1 part WPM405 to 4 parts water

ARDEX Abacrete - 1 part Abacrete to 3 parts water

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The first step in the application of the render is to apply a bonding bridge coating to the surface.

This is a slurry like paste made from the Portland cement and the additive liquid. Bonding bridge mix designs by volume are:

ARDEX WR prime - 2 parts neat and 3 parts Portland cement

ARDEX WPM405 – 1 part WPM405, 1 part water and 4 parts Portland cement

ARDEX Abacrete – 2 parts neat and 3 part Portland cement

The slurry is mixed up thoroughly and then brushed heavily onto the surface, and whilst still wet the render mix applied to the surface with wooden or steel trowel and worked into the wet surface. It is important not to coat more of the surface than can be rendered whilst the bridge is wet and fluid.

WARNINGS

Do not apply the render coats when rain is falling or is expected to fall with several hours after the render has been applied. Rain can damage the surface but also bleed away the cement and polymer.

Do not apply render coats in hot weather or when the surface is in direct sunlight and the surface temperature rises above around 30 deg.C. In these conditions the material dries too rapidly, loses workability, tends to develop cracks and can flash dry which compromises the curing.

Drying times

The ARDEX renders are touch dry in a few hours at mild and dry conditions (23 deg.C). Colder weather will extend this time.

In general a render coat should be allowed to dry and cure for seven days before tiling is performed.

For the application of decorative finishes or membranes, a drying time of around 1 day per 2mm of thickness is required before the moisture level falls sufficiently (rainfall alters this by re-saturating the surface).

TILING

The rendered surface can normally be tiled directly, but may also require the application of a membrane where water and weatherproofing are required.

Where waterproofing is required for internal walls, the membrane used can be one of the following ARDEX WPM001, ARDEX WPM155R or ARDEX WPM002. They are used with the primers ARDEX WPM265 or ARDEX Multiprime applied to the rendered surface.

External wall waterproofing is best performed with ARDEX WPM002 used with ARDEX WPM265 or WPM270 primers.

Where the walls are subject to –ve side moisture (for example below grade walls), a moisture barrier coat comprising ARDEX WPM300 sand blinded or ARDEX WPM368 are applied to the rendered surface.

The surface can be tiled with any of the ARDEX adhesives recommended for wall applications with/without a membrane, where the adhesives are used within their design conditions with appropriate tiles.

ARDEX applies a general tile dead load limit of 32kg/m^2 for rendered surfaces. This does not account for any live loading issues associated with seismic or weather-wind zones.

COATINGS

The renders can be coated with the ARDEX finishes WPM310 Shelterguard and WPM330 Sheltercoat Façade Membrane, which are combined decorative finishes and waterproof membranes.

The WPM310 coating is used with the primers ARDEX WPM265, WPM270 or ARDEX WPM300 Hydrepoxy for damp surfaces.

The WPM330 is used with WPM270 as the primer.

The renders can also be coated with normal paints and texture finishes that are intended for masonry surfaces.

WARNING

The ARDEX renders are NOT recommended for application of clear sealers coats and are not specifically intended to be 'feature finishes' in their own right.

SEALANT JOINTS

Expansion, movement and perimeter joints can be filled with the ARDEX flexible sealants ARDEX SE or ST silicones, ARDEX CA20P silane-urethane or ARDEX RA030 and RA040 modified urethanes.

Joints are usually backed with a foam rod depending on the design of the joints.

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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