TECHNICAL BULLETIN – TB238

APPLICATION OF TILING MATERIALS AND WATERPROOF MEMBRANES TO RESIN MATRIX SHOWER BASES

January 2025

INTRODUCTION & SCOPE

The historical method for creating a shower base with falls is to lay a sand-cement screed with a slope of between 1:60 and 1:80 to waste. This base is then waterproofed and tiled to create the finished shower enclosure.

More recently there has been a rise in the use and manufacture or pre-formed shower bases which simply slot into the shower enclosure and are then notionally tiled and completed in a day or two at most.

These bases (*senso stricto* – shower bases, we are not discussing pre-made shower stall modules) are predominantly manufactured from polyester resin with fibreglass mesh, sand and carbonate filler, and range in quality from very crude productions to well-engineered bases made by companies which specialise in fibre-glass fabrications. For technical reasons, ARDEX has for many years declined to make recommendations for pre-formed shower bases because of problems with poor rigidity in the bases, limited choices of suitable primers and adhesives, and finally because of issues with hydrolytic alkali corrosion of the resin matrix.

Recent work by ARDEX has shown that there are systems that can be used to tile these bases, and this bulletin discusses the issue and systems.

BACKGROUND ISSUES

Tile adhesives

Historically the reluctance of ARDEX to provide adhesive recommendations for tiling 'plastic' or polymer shower bases because the cementitious (C class) tile adhesives, even when polymer modified, do not develop a great bond to the surface. Cement based adhesives form a bond to masonry surfaces primarily by crystal intergrowth into the masonry micro-pores. The tight and closed non-reactive surface of plastics does not permit the crystal intergrowth and so the bond formed relies on surface adhesion by any polymer additives in the tile adhesive. The resin (R class) epoxy tile adhesives, however, do bond quite well to the polymer materials, particularly when the base surface is lightly sanded, and these have more recently been recommended for the polyester type bases.

Flexibility

Polymer bases (polybases) are inherently flexible in nature and have previously not been well ribbed in their structure. This means that they were prone to bending under applied load. Over time, the flexibility of the polybase works against the tile adhesive leading to stress fatiguing and premature failure because the initial bond was always going to be lower than would be considered optimal. More recent constructions are heavily ribbed and quite rigid so that the flexibility issue is minimised.

The resin matrix

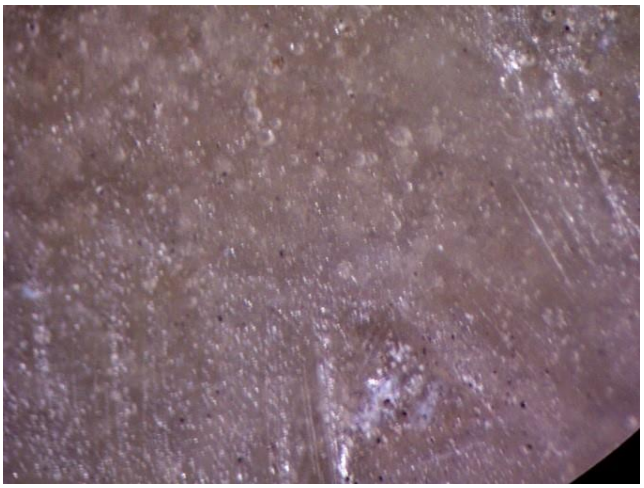
Polyester resins of the type commonly used for these shower bases have been around since before WW2 and, when combined with fibreglass matting are mostly used for boats, car parts, spas, baths, pool shells, mouldings and so on. More recently there has been an explosion in the market for these preformed shower bases, and polyester is relatively cheap and easy to use.

Polyester is a term which refers to the structure of the plastic material but is generically used for reaction resins formed from organic acids (usually aromatics) and polyols; this process is called esterification. The resin also contains a reactive liquid solvent called Styrene, which has the strong and somewhat sweet though disagreeable odour that polyester resins have when unreacted, and to a lesser extent even when catalysed and hardened. A strong odour of Styrene can indicate excess levels in the material or poor completion of the reaction.

The difficulty with polyester is that the ester bond is not stable to alkaline materials and is broken. This process is called de-esterification or alkaline hydrolysis. In this case the acid component reacts with the alkali to form a soluble organic salt, the polyol leaches away and the Styrene is freed.

In a tile system, the alkali attack from the free lime present in the cement-based C class tile adhesives is the problem. The result of exposure of the polyester surface to alkaline cement-based tile adhesives in damp conditions is the gradual breakdown of the plastic surface (Figures 1-3). If this goes on long enough, the tile bond breaks down because the polyester itself has decomposed, and the styrene is liberated at the same time. Any residual acid released with the styrene proceeds to attack the tile adhesive itself worsening the problem. The distinctive smell of styrene can normally be detected when the tile is removed, and this is a clear indication of attack and breakdown.

Figure 1. An example of a polyester resin shower base exposed to alkaline water for three months. A degree of corrosion is visible on the left of the sample and is visible as the white deposits.



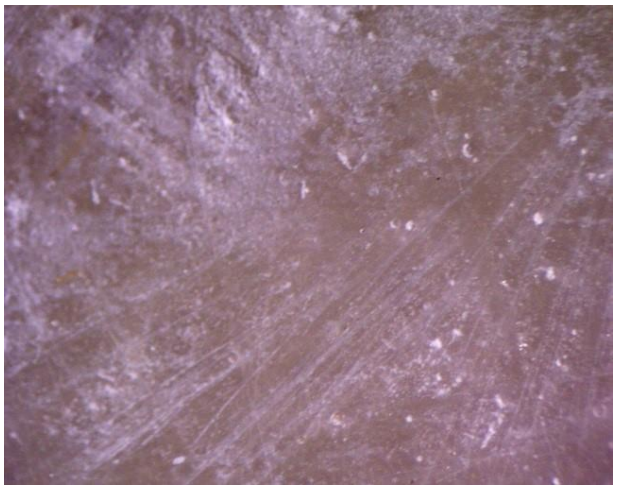


Figure 2. Surface of un-attacked polyester magnified 20x. Surface is relatively smooth, fibres embedded and air bubbles visible. Figure 3. Surface of resin after three months exposure (20x mag.). The white decomposition materials can be seen and fibres exposed by removal of resin.

Waterproofing

The composition of the base would tend to make these bases likely to be considered 'waterproof' (does not permit passage of water) as defined in AS3470-AS4858, but the matrix structure may in fact mean they are only 'water resistant' (not damaged by water) due to the presence of voids/air bubbles. This problem can be dealt with by the application of a waterproof membrane which adds to the base protection, but also improves the bond performance of the adhesive.

SOLUTION TO THE PROBLEM

The process for tiling these polybases then requires the use of flexible adhesives (with preferably C1S1 to C2S1 rating as the minimum) and a sound protective coating/primer for the surface of the base. The application of the membrane is less problematic and can be done with the same primer systems; the use of ARDEX STB Tape resolves the detailing issue between the edge of the base and the wall elements.

Recommended steps

1. The surface of the base shall be sanded over 90% of the surface to be bonded, with an abrasive of 40-60 grit to provide a surface profile equivalent to CSP1. The sanded surface should be washed clean with a solution of sugar soap or filmless detergent and water, well rinsed with clean water, then allowed to dry.
2. Where the shower base supplier has not made any specific fixing recommendations**,** the base may be bonded to the substrate (this can be done with the ARDEX WA100, RA88 or Dunlop Builders Bond, or a flexible adhesive such as ARDEX CA20P. Base vertical deflection shall not exceed 1/360th of the shower base's shortest axis.
3. Apply the primer - surface protection system chosen and allow too fully dry. The primer must be applied to provide a complete coverage, in the case of WPM300 or WPM368 at 3m^2/litre. (P9 is used where the base is to be waterproofed with WPM130 or 155 Rapid Plus before tiling).

4. Where the membrane is to be used, apply flexible fillers in any gaps between building elements. For example, between the base and wall sheets. The recommended materials

are a combined foam rod for deeper gaps, and ARDEX ST silicone for the surface finish bond breaker. Shallower gaps can be filled with the silicone by itself. The maximum recommended gap height is 10mm, but sheet manufacturers tend to specify 6mm nominal. ARDEX STB tape is then applied over the joint equidistantly either side of the joint (see Figure 4 for an example).

5. The membrane is then applied over the primed surface and the STB Tape, making sure that the membrane build at the edge of the tape is sufficient to provide good resistance to movement. The nominal dry film thickness shall be 1mm.
6. The tile adhesives are applied to the base surface with a 10-12mm notch trowel (small mosaics <50mm may require an 8mm notch trowel).
7. The tiles are grouted with the selected C class grout mixed with Grout Booster to allow for flexibility, or the R class grouts.
8. The wall floor junction in the tiled surface requires a silicone joint, as does the joint around the floor waste.

Recommended Products

For direct tiling onto the shower bases

Primers

- ARDEX WPM300 with broadcast sand (preferred method), ARDEX WPM368

Adhesives

- ARDEX X18 + ARDEX E90, ARDEX X77 + ARDEX E90 or ARDEX Optima
- ARDEX WA and ARDEX WA100 epoxies (no priming required).

For waterproofed shower bases

Primers

- ARDEX WPM300, ARDEX WPM368 or ARDEX P9

Membranes

- ARDEX WPM155 Rapid Plus or ARDEX WPM130

Adhesives

- ARDEX X18 ± ARDEX E90, ARDEX X77 + ARDEX E90, ARDEX X56 or ARDEX Optima

Grouts for all applications

- ARDEX FG8, ARDEX FSDD or ARDEX WJ50 with ARDEX Grout Booster
- ARDEX EG15 epoxy

All products shall be used in accordance with the product datasheets.

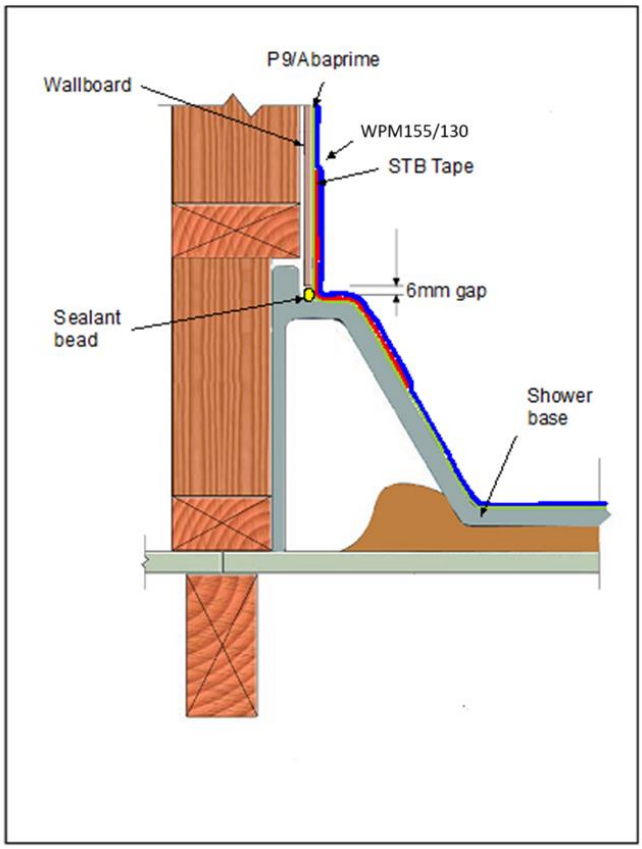


Figure 4. An example of a wall tray detail where fibre-cement sheets are placed onto a pre-formed shower base. Note STB tape over the sealant filled joint.

(Schematic modified from James Hardie internal wet area construction manual Fig. 16).

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
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