

ISSUE 518 **BULLETIN**



Wet area tile waterproofing

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■ There are significant numbers of waterproofing failures in tiled wet areas of buildings.

■ Failure is not immediately obvious and, therefore, damage to framing and substrates can be substantial.

■ This Bulletin outlines good practices for waterproofing tiles in wet areas.

1.0 INTRODUCTION

1.0.1 Failure of wet area waterproofing, particularly with tiled finishes, is a significant problem in New Zealand domestic buildings. The migration of moisture from wet areas into substrates and adjacent spaces must be prevented by applying a waterproofing system. This is vital because water damage may cause serious structural damage and remain unnoticed over a prolonged period.

1.0.2 A tiled surface with cement-based grouted joints is not inherently waterproof, so any wet area tiling must be detailed and constructed to prevent moisture getting into and behind the substrate.

1.0.3 Particular care in detailing and installation is required to overcome commonly identified problem areas especially:

- failure of waterproofing membranes typically due to insufficient curing time being allowed for liquid-applied or resin-based waterproofing membranes
- poorly detailed and installed waterproofing membranes behind tiles
- around the floor waste and shower outlets where such outlets do not have flanges or where the waterproofing is not dressed into the outlet
- penetrations through the waterproofing such as mixers or showerheads
- wall to floor and wall to wall junctions
- substrate fixing points and corners left unstopped or poorly flush stopped
- outlets or waterproofing that has already been installed being damaged by following trades
- recesses formed within the shower area
- with use of open shower designs where the amount of the space wetted during showering is significantly greater than with enclosed showers
- with the use of high-flow showerheads, removable showerheads and multiple showerheads, which all significantly increase the amount of area that is wetted.

2.0 WHAT IS A WET AREA?

2.0.1 Acceptable Solution E3/AS1 has no specific definition of a wet area but uses the terms 'subject to watersplash' and 'showers' when defining wet area requirements. It requires surfaces to be impervious and easily cleaned and gives a range of materials that are considered able to meet this requirement.

2.0.2 A description for a wet area is 'rooms or parts of rooms with sanitary fixtures and appliances where floor and wall surfaces may be subject to wetting', but this definition does not consider the amount of water that might be present.

2.0.3 One way to address this is considering the design of wet areas in terms of their exposure to water or the level of risk of water damage due to the way water is used within the space such as:

1. areas subject to frequent and heavy wetting – showers and the surroundings of open showers
2. areas subject to regular intermittent wetting – floors in bathrooms, laundries and kitchens as well as the immediate wall area around baths, basins, sinks and tubs
3. areas not normally wet that may be subject to occasional wetting or condensation.

2.0.4 When tiling in risk categories 1 and 2 (see paragraph 2.0.3), it is recommended that tiles be installed over a waterproofing system except where the substrate is steel-trowelled or polished concrete. When following E3/AS1, a waterproofing membrane is required for tiled shower enclosures where the tiles are laid over an absorbent substrate.

2.0.5 General design requirements for tiling wet areas include:

- specifying the actual tiles, adhesive and waterproofing system to be used
- showing the extent of the waterproofing on the drawings
- allowing for required falls at the design stage and showing them on the contract documents
- specifying the sealing of all penetrations through the waterproofing membrane
- locating the waterproofing directly under the tile adhesive to prevent materials behind the tiling from becoming wet
- specifying that wall and floor surfaces of concealed areas such as under a bath be sealed or waterproofed before the item is installed
- minimising penetrations through the waterproofing.

3.0 BUILDING CODE REQUIREMENTS

3.0.1 The functional requirements of clause E3 *Internal moisture* require that buildings be constructed to avoid the likelihood of:

- fungal growth or the accumulation of contaminants on linings and other building elements
- free water overflow penetrating to an adjoining household unit
- damage to building elements caused by the presence of moisture.

4.0 TILE QUALITIES

4.0.1 In wet areas, it is important that the tiles selected have low moisture absorption. E3/AS1 limits moisture absorption to a maximum of 6%. However, tiles that have a lower rate of absorption (3% or less) will be better.

5.0 TILE ADHESIVE BEDDING

5.0.1 Most tiles used in wet areas are held in place on the wall or floor with an adhesive. The range of adhesives available means that tiles can be directly adhered to almost anything, but the manufacturer's preparation, application and curing instructions must always be followed.

5.0.2 Adhesive application methods are as follows:

- Back buttering – where the adhesive is applied evenly over the back of the tile with a flat-edged trowel to a depth slightly greater than the finished bed thickness required.
- Floating – where the adhesive is spread over the surface using the flat edge of a trowel. Adjust the amount of adhesive to allow for the porosity of the backing (for example, plywood is more absorbent than other backings), the type of adhesive, the finished bed thickness required and the type of tile. Ensure that the adhesive fully wets the surface of the substrate.
- Notched trowel – while the most commonly used method, using a notched trowel may not give the 90–100% adhesive coverage (contact area) recommended for wet area tiles.

5.0.3 BRANZ recommends that the combination method of floating and back buttering techniques is used when using adhesive to bond tiles in wet areas because it:

- ensures better quality adhesion
- provides 90–100% adhesive coverage that is recommended for wet areas
- is recommended for impervious (low moisture absorption) tiles
- is recommended for larger (over 230 mm in any direction) tiles.

5.0.4 Applying the adhesive by back buttering is required when inserting the final few tiles or inserting a specialised tile.

6.0 GROUTS

6.0.1 Grout is the material used to fill the joints between the laid tiles. Portland cement is the base for the most commonly used grouts.

6.0.2 While the tiles themselves may absorb little water, it can still readily pass through the grout in the tile joints where:

- a cement-based grout is used
- the grout is poorly installed with voids
- the grout has cracked or been damaged
- the grout has not adhered properly to the tile edge.

6.0.3 One current difficulty is that E3/AS1 refers to waterproof grout when identifying tiled finishes suitable for use in splash zones – only epoxy grout (which is considered difficult to use and is intolerant of movement) can be classified as a waterproof grout. Cement-based grouts can have additives to reduce their moisture absorption but it does not make them waterproof.

6.0.4 Grout is classed as a rigid material. However, it may be described as follows:

- **Low shrinkage:** Adding proprietary additives or polymers to cement-based grouts can reduce the curing shrinkage that occurs but will not eliminate it. There is no such material as a no-shrink cement-based grout.

- **Flexible** (the ability to accommodate vibration, impact and limited movement without cracking): As with adhesive, a flexible grout must not be used to accommodate substrate deflections or concrete shrinkage.

7.0 MOVEMENT CONTROL JOINTS

7.0.1 Movement control joints divide a tiled area into smaller bays to make it better able to accommodate the thermal or building movement or stresses that will be generated.

7.0.2 In wet areas, movement control joints are required:

- where tiled surfaces change in plane such as where surfaces abut at right angles – examples are wall to floor, internal or external corners of walls, floor to column or wall to column junctions
- where the substrate material changes
- where the type of tile used changes
- around the perimeter of the tiled area that abuts another material or surface
- where there are movement control joints in the underlying structure or substrate.

8.0 EXTENT OF WATERPROOFING

8.0.1 Designs following E3/AS1 require a waterproofing membrane behind tiles within all showers.

8.0.2 As good practice for tile finishes, BRANZ recommends the installation of a waterproofing membrane as follows:

- In bathrooms, kitchens and laundries – to all absorbent floor substrates.
- In an open shower – to all wall tiles that are within 1500 mm of a fixed showerhead or 1500 mm plus the length of the flexible hose for a removable shower. This may mean that all wall tiles up to the ceiling level within the bathroom area require a membrane. Take waterproofing membrane to ceiling where the showerhead is removable (Figure 1).
- In an open shower over a bath – to all wall tiles that are within

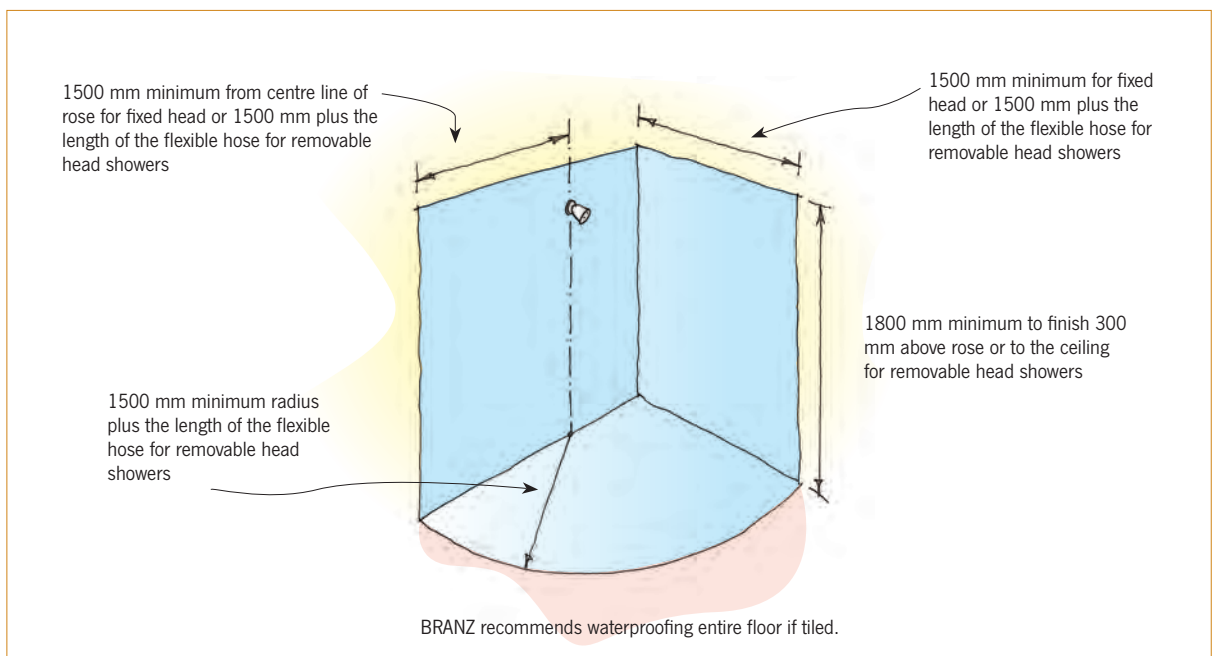


Figure 1: Open shower waterproofing, from E3/AS1.

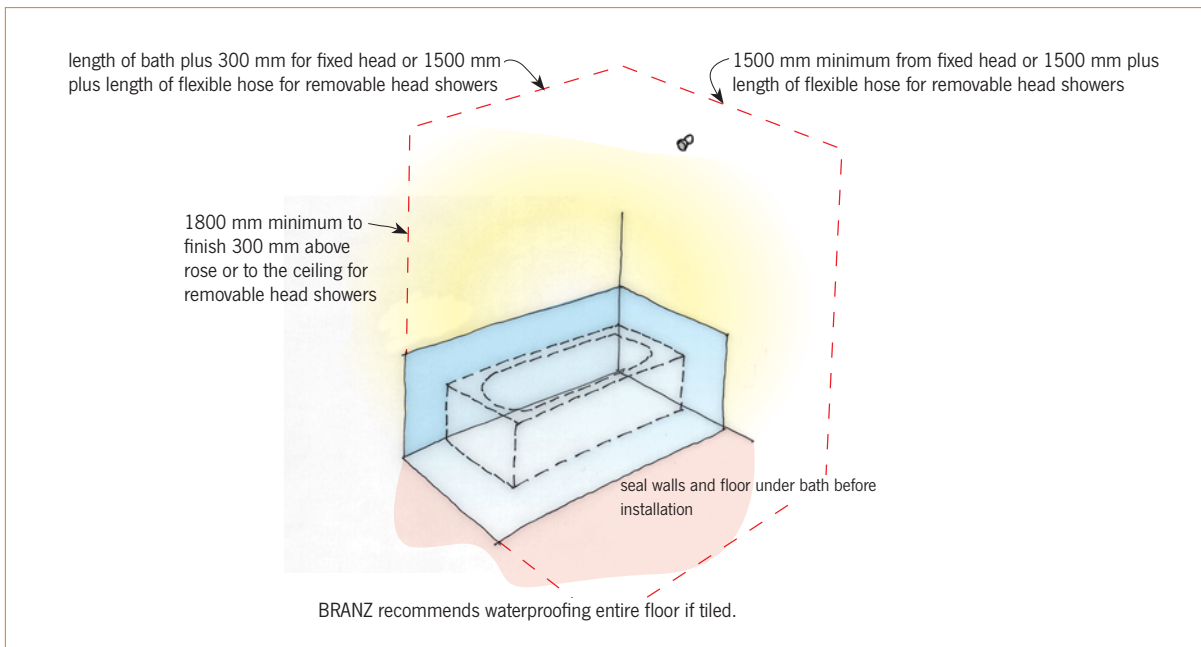


Figure 2: Open shower over bath waterproofing, from AS 3740.

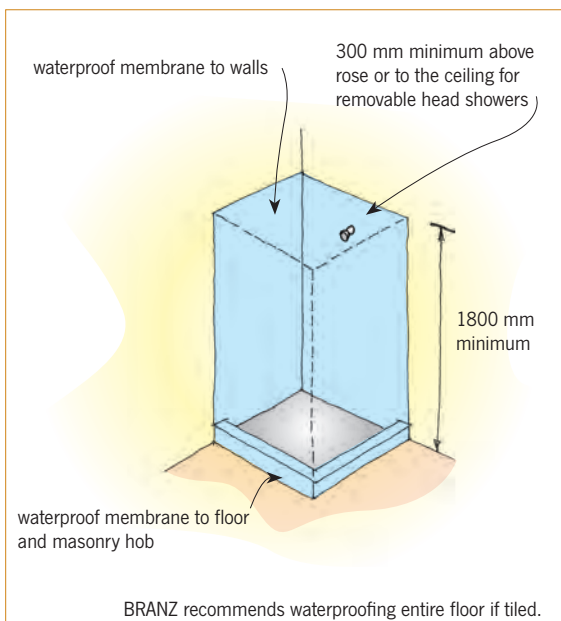


Figure 3: Enclosed shower waterproofing (with rigid shower screens and doors), from E2/AS1.

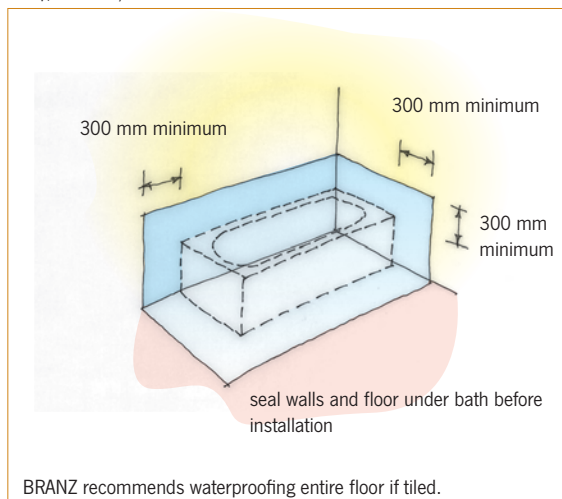


Figure 4: Waterproofing around a bath (no shower over), from AS 3740.

the dimensions given in Figure 2.

- In enclosed showers – to all floor and wall tiles. Where a removable showerhead is specified, take the waterproofing to the ceiling level (Figure 3). While E3/AS1 considers a loose shower curtain to be an enclosure, BRANZ recommends that such a shower be considered as open because of the amount of water that can spray around the edges.
- In high-risk splash zones around baths, basins and laundry tubs as shown in Figures 4 and 5.

8.0.3 Where tiles are laid over an impervious floor substrate such as concrete, the detail must ensure the continuity of the waterproofing membrane at the junction between the wall and the floor. Figure 6 gives one option.

9.0 WATERPROOFING SYSTEMS

9.0.1 The most commonly used tile waterproofing systems for internal wet area use are:

- liquid-applied polymer (acrylic) gels or pastes
- polyurethanes

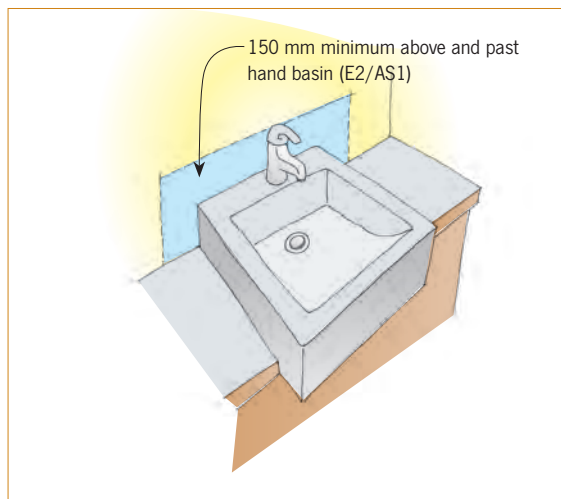


Figure 5: Waterproofing around a basin.

- acrylic modified cementitious waterproofing
- glass fibre-reinforced resins
- bitumen-based peel and stick membranes.

9.0.2 There are also a range of metal or acrylic trays designed for floor use under a mortar bed or directly under the tiles within a shower enclosure.

9.0.3 For all waterproofing, it is recommended that a 'system' be used to ensure compatibility – that is, the primer, waterproofing, sealants and adhesive are suitable for use together or come from the same supplier.

9.0.4 Acrylic waterproofing systems for use under tiles are liquid-applied waterproofing in one- or two-part formulations.

Generally for acrylics:

- a minimum of two coats is needed to achieve the recommended dry film build of (typically) 1 mm
- corners and junctions must be reinforced – reinforcing the body of the membrane depends on the system being used
- priming is generally required
- they must be fully cured before tiling – particularly at corners where there is generally a thicker film build.
- temperature during application must be within 10–30/35°C
- can be trowel or roller applied
- a bond breaker at a change in direction, for example, wall to floor.

9.0.5 One-part polyurethane coatings:

- require priming
- have a finished dry film thickness of 0.6–1.3 mm depending on the system being used
- can be roller, brush or trowel applied
- require full curing before tiling
- require application temperatures within the 10–30°C range
- offer solvent and water-borne options
- are chemical curing by reacting with moisture in the air.

9.0.6 Liquid-applied two-part (powder and polymer solution) cementitious coatings:

- require priming
- are a chemical set and can be quicker setting in cool/humid conditions
- must be cured before tiling
- can be applied by trowel or roller
- have a finished dry film thickness of between 1.2–2 mm depending on the system being used
- may contain fibre reinforcing.

9.0.7 Site-applied two-part fibreglass reinforced resins generally:

- are 1.5–2 mm thick depending on the system being used
- require double meshing at junctions to allow the membrane to accommodate any stresses, therefore corner detailing is critical
- can cure within 24 hours at 23°C but are slower to cure in cooler temperatures
- require that tile adhesives are compatible with the resins
- are less flexible so require a rigid and inflexible substrate.

9.0.8 Self-adhesive SBS modified asphalt/bitumen:

- requires priming
- must be protected from UV
- is typically 1–1.5 mm thick, 900 mm wide and has a 50 mm side lap and 150 mm end lap
- requires detail tape to prepare junctions and liquid mastic to edges
- can be applied within an application temperature range of 7–49°C
- has no drying or curing time
- can bridge small cracks.

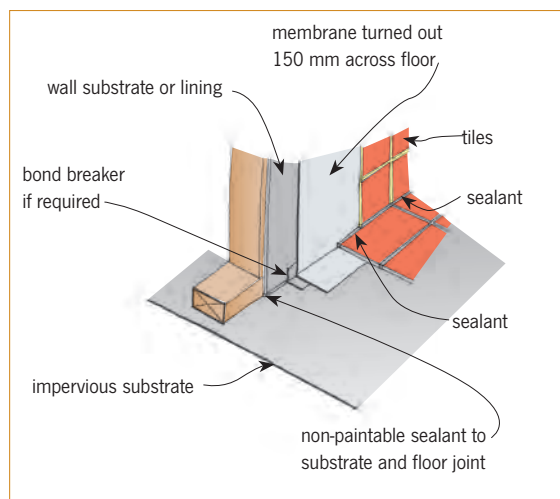


Figure 6: Wall to floor junction where floor impervious (e.g. steel-trowelled concrete).

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