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Waterproofing tiled showers

Recent media reports have drawn attention to damage from leaking showers. Although tiles may be impervious to water, cement-based grout is not, so the waterproofing in tiled showers is crucial.

A LEAK IN A TILED SHOWER can be difficult to discover and may result in severe damage and costly repairs. The key to a tiled shower that won't leak is in the substrate and waterproofing installation.

Performance requirements

New Zealand Building Code clause E3 *Internal moisture* requires that surfaces likely to be splashed must be impervious and easily cleaned and prevent water from penetrating behind linings or into concealed spaces.

The Acceptable Solution E3/AS1 provides a range of options for linings and finishes in showers that meet the performance requirements of clause E3. These include that ceramic or stone tiles have 6% maximum water absorption, have waterproof grouted joints and are bedded with an adhesive suitable for the tiles, substrate and wet area environment. It also states that ceramic or stone tiles must be laid over a continuous impervious substrate or membrane (see Figure 1).

Information on installing tiled showers can be found in BRANZ Good Practice Guide *Tiling* 3rd edition. AS 3740-2010 *Waterproofing of domestic wet areas* also provides useful advice.

Waterproofing requirements

For enclosed showers, impervious linings and finishes such as walls must:

- be continuous
- be at least 1,800 mm high from the floor or top of an upstand
- extend at least 300 mm above the shower head. ➤

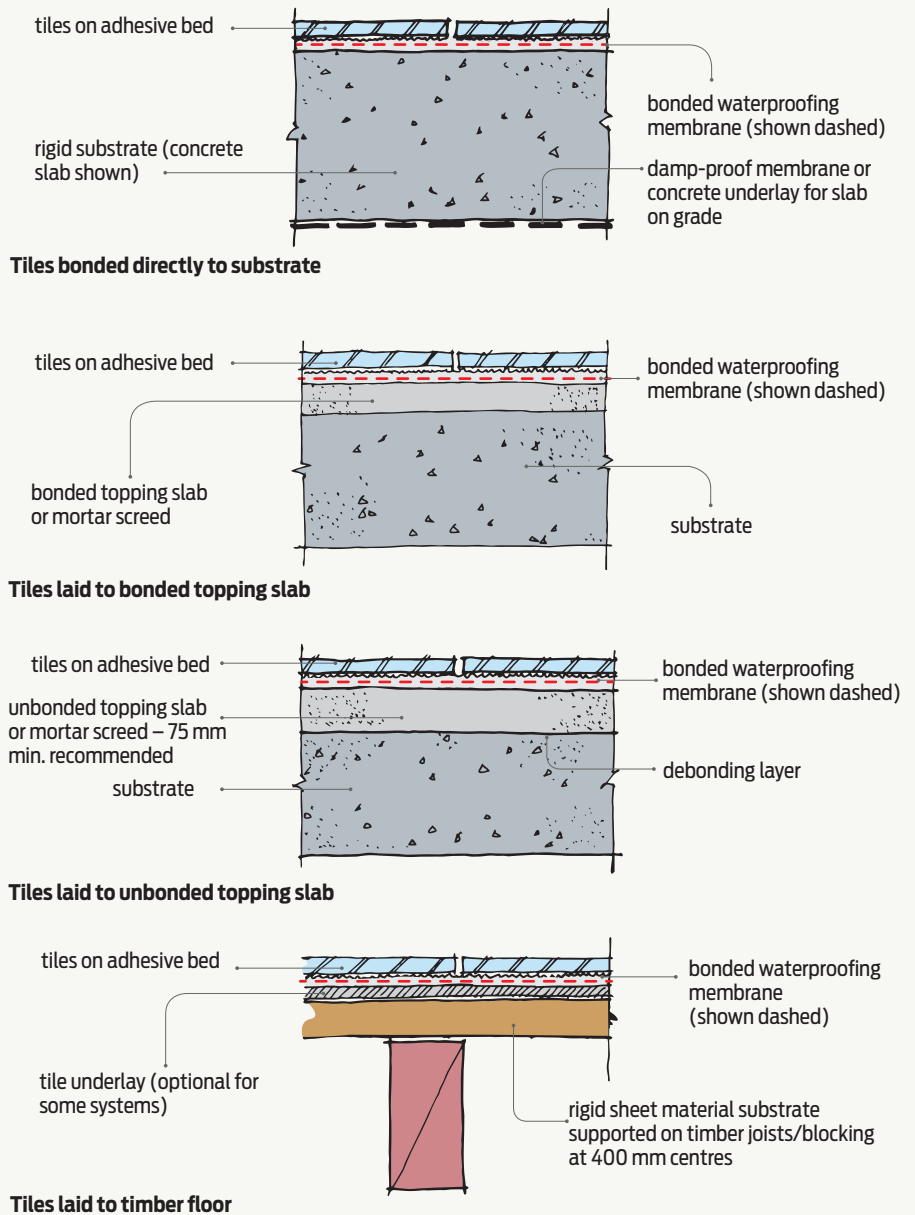


Figure 1 Locating the waterproofing membrane.

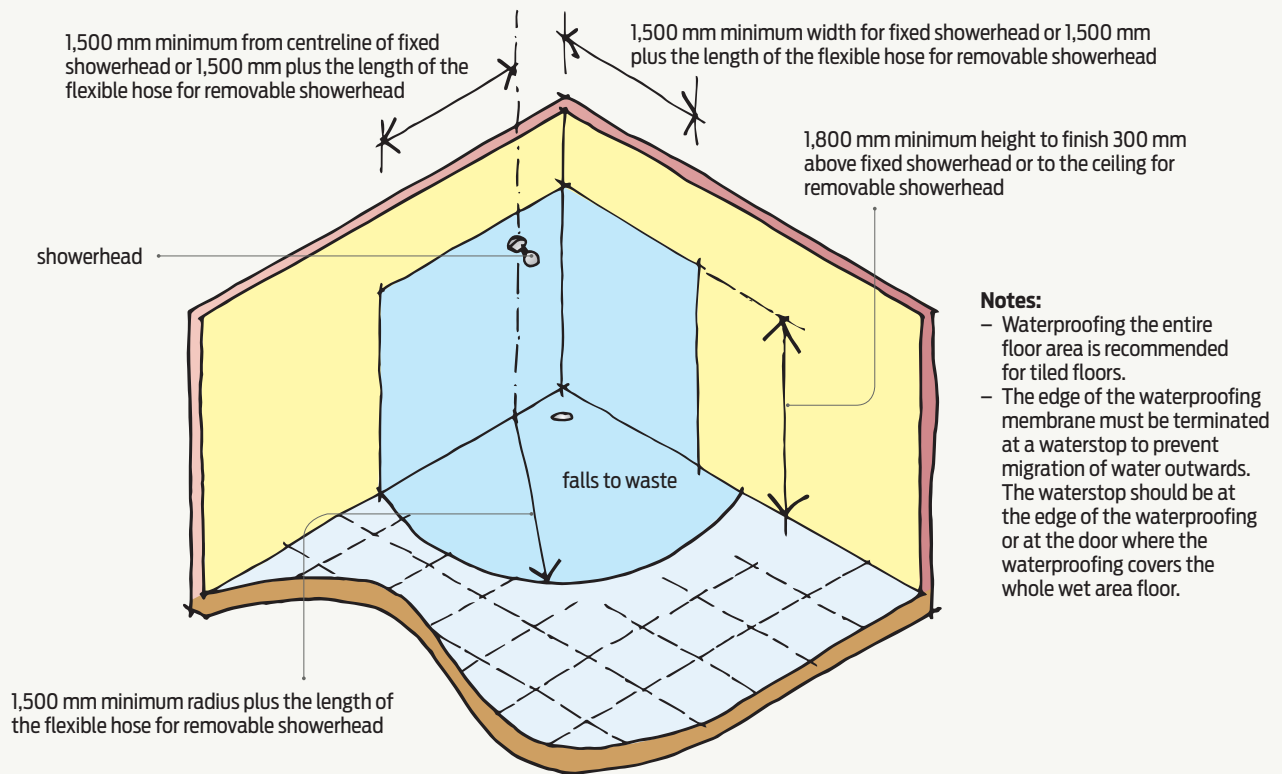


Figure 2 Extent of waterproofing to an open shower.

When the shower is not enclosed, impervious linings and finishes must extend in a horizontal radius of 1,500 mm from the showerhead (see Figure 2).

An enclosed shower with upstands must have a minimum 1:60 fall towards the floor waste. For a shower with a level access, the fall must be at least 1:50 towards the floor waste. This must extend over a radius of 1,500 mm from a point measured vertically below the showerhead or from any wall within the radius (see Figure 3).

For a bathroom or other wet area room with a tiled floor, laying a waterproof membrane across the entire floor and extending it up all walls for at least 150 mm is recommended. A waterstop (see Figure 4) should be provided where the membrane terminates at adjacent spaces such as doorways.

If the substrate is a sand or cement mortar or screed, the waterproof membrane should be laid over this. Cable entry points for undertile floor heating laid under the waterproof membrane must be above the flood level of the wet area.

Preparation for tiling

Correct substrate installation and preparation of tiled shower floors and walls are essential for the shower to remain fully waterproofed. Create falls during substrate installation.

.... for floors

The minimum for suspended timber floors under a tiled shower should be one of the following:

- H3.2 treated, 17 mm thick minimum, CD grade structural ply with the C face upwards (LOSP-treated ply must not be used) supported at 400 mm maximum spacings in both directions. Fix with 10 gauge, 50 mm stainless steel, countersunk screws at 150 mm centres maximum at the sheet edges and 200 mm centres maximum across the sheet.
- 20 mm thick, treated RWB, wet area grade sheet material supported at 400 mm centres maximum and installed according to the manufacturer's instructions.
- 19 or 22 mm thick sealed, fibre-cement flooring installed according to the manufacturer's instructions

- 18 mm fibre-cement compressed sheet flooring or 6 mm thick fibre-cement sheet tile underlay laid over flooring (minimum H1.2 flooring or H3 plywood) and fixed according to the manufacturer's instructions.

The substrate must not deflect more than 1/360th of the span under dead and live loads.

For example, where L = the span between joists:

if L = 400 mm

$L/360 = 400/360 = 1.1$ mm is maximum permitted deflection.

Concrete floors can have a rebate formed in the slab with the falls created using a mortar bed, or the falls can be incorporated when the floor is laid. A waterproof membrane should be laid over (not under) a mortar bed to ensure that the mortar remains dry.

Proprietary metal or acrylic tray-type shower bases over which tiles can be laid are also available. Install according to the manufacturer's instructions. They may require notching the framing or packing out the sheet wall lining material to provide the required waterproofing detail at the tray/wall lining junction.

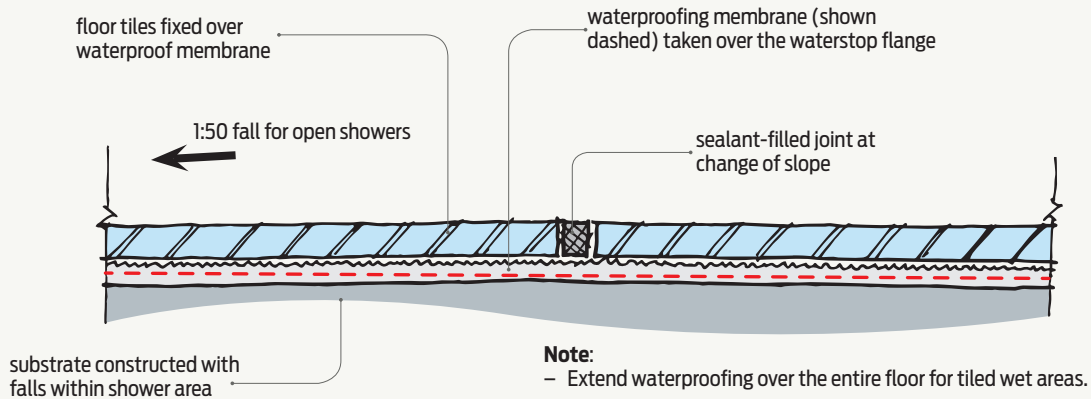


Figure 3 Level-access shower entry – falls formed in floor.

The floor outlet, either a conventional waste or a channel drain, should be specifically designed for use with a waterproof membrane and tiles. Rebate flanges into the substrate to create a flush surface so drainage is not restricted and seal the waterproofing system onto the flanges (Figure 5).

.... for walls

The wall substrate under tiles should be:

- 6 or 9 mm thick fibre-cement sheet
 - 10 or 13 mm thick wet area plasterboard
 - a proprietary waterproof sheet material such as closed-cell polystyrene insulation board with a reinforced cement polymer mortar surface.
- Fibre-cement sheet and plasterboard should be fixed with stainless steel screws at spacings recommended by the manufacturer. Fill the gap

at the junction of the base of the wall substrate with the flooring substrate with a continuous bead of sealant and apply sealant around fittings and taps where they penetrate the substrate.

Proprietary waterproof sheet materials should be fixed to the manufacturer's instructions.

The waterproofing membrane must cover the sealant around each penetration (see Figure 6).

Range of waterproofing systems

Waterproofing systems available for interior tiling include a range of liquid-applied systems such as:

- liquid-applied polymer (acrylic) gels or pastes
- styrene butadiene co-polymer latex admixtures (SBRs)
- liquid-applied acrylic or latex-modified two-part cementitious coatings

- one-part waterborne elastomeric moisture-cured polyurethanes
 - glass fibre-reinforced resins.
- Reinforcing such as fibreglass, polyester mesh or chopped strand microfibre may be incorporated into the waterproofing material.

Also available are sheet waterproofing systems such as:

- polyvinyl chloride (PVC) sheet material
- chlorinated polyethylene (CPE) sheet material
- SBS (styrene butadiene styrene) – modified rubberised asphalt material.

Applying the waterproof membrane

All waterproofing systems will require application according to the manufacturers' instructions by a specialist applicator for the warranty to be valid. ➤

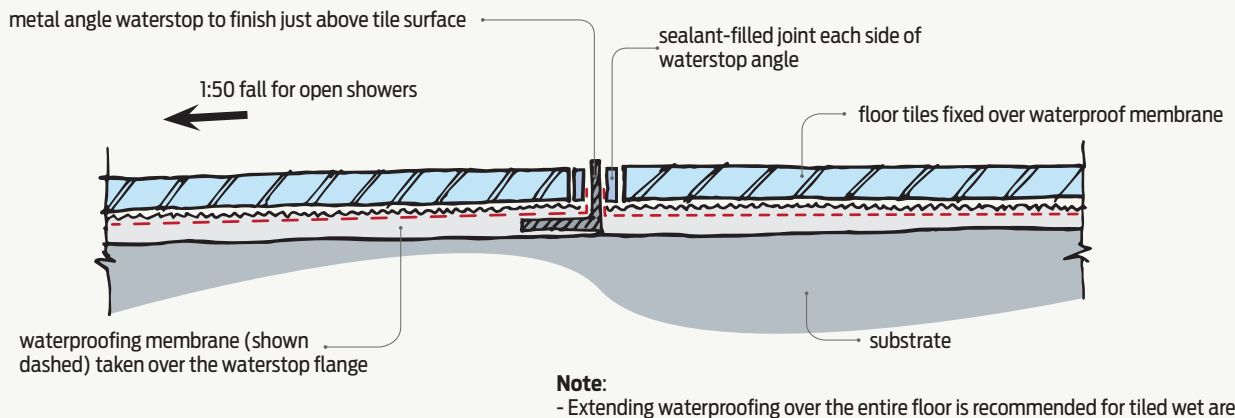


Figure 4 Waterstop detail – falls formed in floor.

Liquid-applied membranes

Before applying liquid-applied membranes, prime as required using a primer recommended by the manufacturer.

Membranes must be applied according to the manufacturer's specified number of coats to achieve dry film thickness and allowed to **fully cure** between coats and before flood testing (generally at least 24 hours at 20°C). Don't apply heat to speed the curing process as it may cause the membrane to skin while remaining uncured below the skin. Ensure the membrane has adhered to the outlet flanges.

Glass fibre-reinforced resins are less flexible than other liquid-applied membranes, so they must have a rigid substrate. Bond breakers may be required at changes of direction.

Sheet systems

Flexible, welded sheet materials may require priming to aid adhesion. They are typically 1–1.5 mm thick and supplied in 900 mm wide sheets. They generally need to be installed with 50 mm side laps and 50 mm end laps. Joints, junctions and corners are heat welded, and the membrane is heat welded to flange outlets. The wall sheet must overlap the floor sheet upstand.

They have advantages in that there is no drying or curing time, so tiles can be laid immediately and they can span small cracks in the substrate.

Protect and test

Protect all waterproofing material from damage before laying tiles. Once installed and cured as necessary and before the tiles are laid, carry out a flood test to ensure that the whole area is fully waterproofed.

Tiling and grouting

Select a tile adhesive that is compatible with the waterproof membrane, and ensure that tiles and grout are compatible. Spread the grout diagonally across tiles, forcing it into all joints. Remove excess grout with a damp sponge.

Apply a suitable sealant at the junctions between horizontal and vertical tiles. Also apply additional sealant around the tops and sides of fittings and tap flanges, leaving a drainage slot over the tiles at the bottom edge. Finally, adding a proprietary clear sealer to grout will reduce moisture absorption. ◀

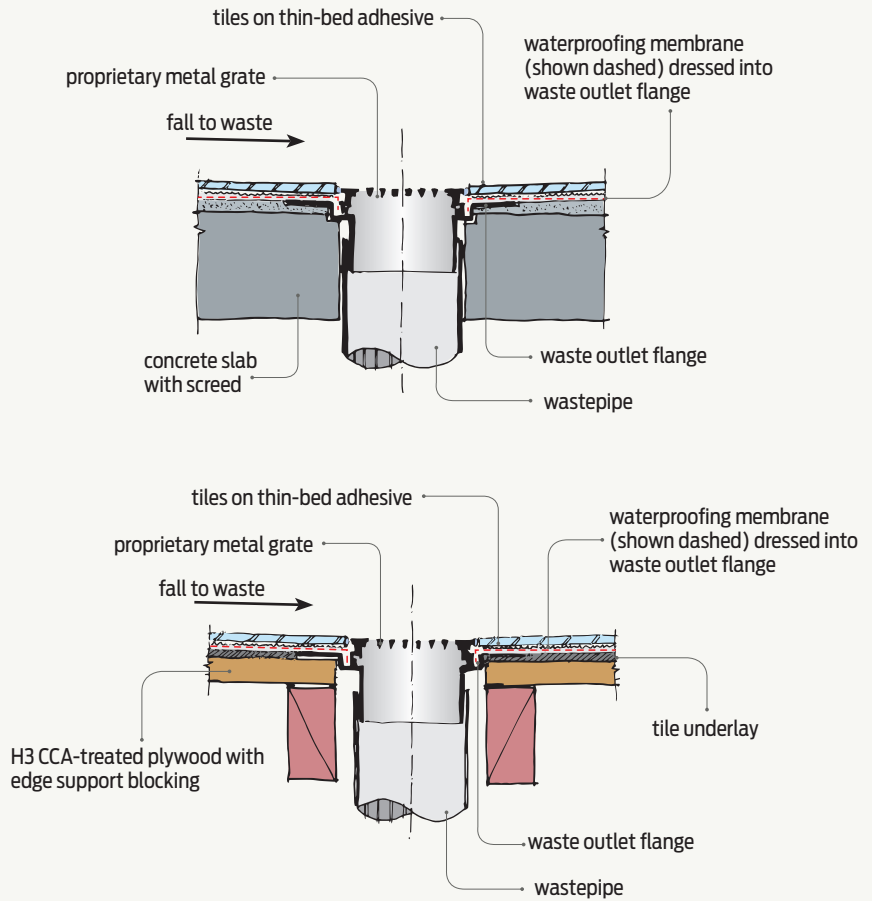


Figure 5 Dressing the membrane to the floor outlet.

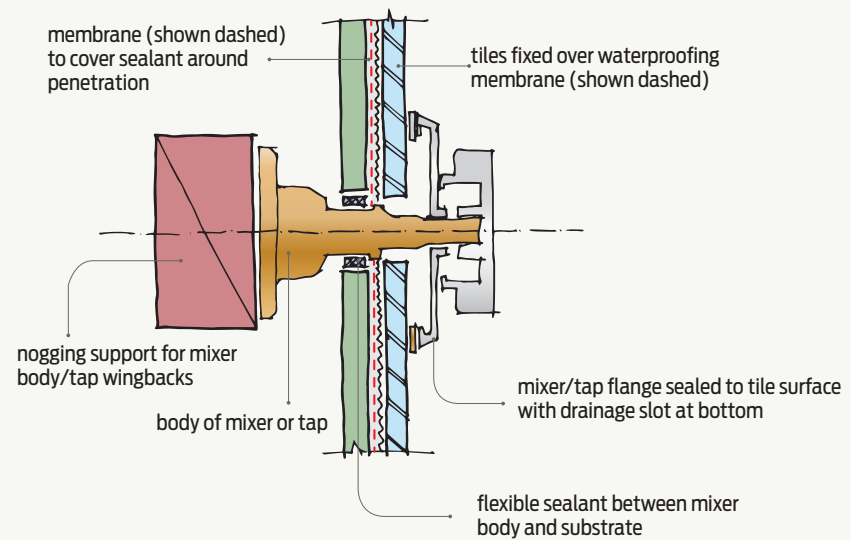


Figure 6 Sealing penetrations through wet area tiling.