Code of Practice

for

Internal Wet-area Membrane Systems

(selection, design, installation)

4th Edition
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Prepared by the Waterproofing Membrane Association Incorporated
(previously the Membrane Group of New Zealand)
www.membrane.org.nz

Waterproofing Membrane Association Incorporated

The Waterproofing Membrane Association Incorporated (WMAI) is a group of companies in New Zealand who aim to set the benchmark for best industry practice for waterproof membrane systems.

All Members undertake to meet the requirements of the Rules and Codes of Practice of our Association. Membership is open to any interested party, for further information, please contact: info@membrane.org.nz or go to www.membrane.org.nz.

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This document is not specific to any particular project or waterproofing system.

The WMAI, in consultation with the New Zealand construction industry, has established this Code of Practice as the guide to best practice in the design and installation of internal wet-area waterproofing.

While the Association has taken care in preparing this document, for any particular project, compliance with the relevant requirements of the Building Act 2004 or the NZ Building Code will depend on many aspects of construction work that are outside its content.

Users must ensure that they have correctly followed this Code of Practice, and where its content includes requirements for or constraints on other aspects of a building, these requirements or constraints are met.

Document History

This document may be updated from time to time, refer to the website (www.membrane.org.nz) for the most recent update(s) of this Code of Practice (if any).

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Comments on this Code of Practice are welcome, please send comments to: info@membrane.org.nz.

Other Codes by the WMAI:

- Code of Practice for Reinforced Modified Bituminous Membrane Systems

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1. Purpose, Scope, Limitations

1.1 Purpose

The purpose of this Code of Practice is to:

1. Assist Designers to select the optimum membrane for a given situation
2. Provide the optimum design methodology for a given situation
3. Provide installation provisions that will result in building work that involves internal wet-area waterproof membrane systems meeting or exceeding the minimum requirements of relevant sub-clauses of the NZ Building Code (NZBC) clause E3, Internal moisture.

The mandatory parts of this Code of Practice are intended to ensure that building work involving internal wet-area waterproof membrane systems:

- Complies with NZBC clause E3.3.2 when installed in a space containing sanitary fixtures or sanitary appliances, and a floor waste is included where shown by this Code of Practice:
  - E3.3.2 - Free water from accidental overflow from sanitary fixtures or sanitary appliances must be disposed of in a way that avoids loss of amenity or damage to household units or other property.
- Complies with NZBC clauses E3.3.3 – E3.3.5 when the membrane provides or is used in conjunction with an over-surface finish that is easy to clean.
  - E3.3.3 - Floor surfaces of any space containing sanitary fixtures or sanitary appliances must be impervious and easily cleaned.
  - E3.3.4 - Wall surfaces adjacent to sanitary fixtures or sanitary appliances must be impervious and easily cleaned.
  - E3.3.5 - Surfaces of building elements likely to be splashed or become contaminated in the course of the intended use of the building, must be impervious and easily cleaned.
- Complies with NZBC clause E3.3.6:
  - E3.3.6 - Surfaces of building elements likely to be splashed must be constructed in a way that prevents water splash from penetrating behind linings or into concealed spaces.

The mandatory parts of this Code of Practice are also intended to ensure that building work involving internal wet-area waterproof membrane systems, and which includes a floor waste where shown by this Code of Practice, complies with the following paragraphs of Acceptable Solution E3/AS1 (Amendment 6):

> 2.0.1 If a sanitary fixture is located where accidental overflow could damage an adjoining household unit, containment and a floor waste shall be provided;

(list continues on following page)

2.0.2 Household kitchen sinks and laundry tubs that have an integrated overflow with a minimum flow rate of 0.25 l/s, do not require additional overflow provision such as a floor waste where;

a) The maximum flow rate from the taps is less than the outflow rate for that sink or tub, or

b) The water supplies to the taps for that sink or tub are fitted with proprietary flow restrictors (such as cartridges) to limit the tap flow rate to less than the outflow rate for the sink or tub;

and

2.0.3 Containment may be achieved by using impervious floor coverings which are continuous and coved or joints sealed where they meet the wall.

It is a requirement of WMAI membership that its members comply with the mandatory requirements of this Code of Practice that are relevant to their area of business.

This document provides the Waterproofing Membrane Association's recommended practices for waterproofing solutions using internal wet-area waterproof membrane systems.

It specifies requirements that will achieve compliance with relevant NZBC clauses and current Acceptable Solution provisions.

It aims to foster confidence for all parties involved in the use of wet-area waterproof membrane systems throughout their selection, design, approval and installation process. It is published with the intention of establishing and improving industry practice, performance standards, systems, materials and their application, and to ensure that public and industry confidence in the membrane industry is preserved.

Further, this Code of Practice may be used to develop recommended training criteria and set installation methodology benchmarks for the industry.

1.2 Scope

1.2.1 Wet Areas Covered

This Code of Practice is applicable to internal wet-area waterproof membrane systems, including their substrates, for bathrooms, kitchens and laundries within buildings.

Facilities such as industrial processing areas (for instance a cowshed or an industrial food making facility), or the surrounds and changing facilities of internal swimming pools or spas, are outside the scope of this Code of Practice.

For wet areas outside the scope of this Code of Practice, seek advice from a Supplier.

1.2.2 Specialist Systems

Wet-area waterproof membrane systems that will be installed in conjunction with specialist systems such as underfloor heating and sound insulation systems are covered in Section 7 of this Code of Practice.

1.2.3 Over-surface Finishes

The use of over-surface finishes is covered in Section 8 (p78), of this Code of Practice. Over-surface finishes other than those listed as suitable in Table 3 (p22) are outside the scope of this Code of Practice.

Where some other over-surface finish is required, consult with a membrane system Supplier for specific recommendations.

1.2.4 Applicators and Installers

This Code of Practice only applies to work which an Applicator that has been certified by the Supplier has been engaged to perform. The waterproof membrane systems must be installed by or under the supervision of Installers who have been trained and certified by the Supplier.

Both the Applicator (ie the company), and the Installer (ie the person or people) who carry out or supervise the work, must be certified by the Supplier.

The Applicator should provide a Producer Statement – Construction (PS3) to verify that the installation of the waterproof membrane system complies with this Code of Practice and the approved building consent documents.

ALL WATERPROOF MEMBRANE SYSTEMS MUST BE INSTALLED BY OR UNDER THE SUPERVISION OF AN INSTALLER CERTIFIED BY THE SUPPLIER OF THE WATERPROOF MEMBRANE SYSTEM, WORKING FOR A CERTIFIED APPLICATOR.

This Code of Practice is not a training manual.

Training for Installers may include, but is not limited to:

- *On-site training and supervision by certified and experienced Installers working for a certified Applicator;*
- *Training seminars provided by the waterproof membrane system Supplier;*
- *Training courses by recognised and accredited training providers.*

Only a Supplier or an appropriately accredited external training organisation can certify Installers, and only a Supplier can certify an Applicator.

1.3 Limitations

This Code of Practice does not cover the following aspects:

- The design or construction of the building structure itself.
- The installation of an over-surface finish to internal wet-area waterproof membrane systems.
- The waterproofing of enclosed exterior decks or any other situation where the membrane is exposed to external moisture.

Where this Code of Practice requires its users to consult, refer to, obtain advice from, or follow or meet the requirements of a person or organisation, the person or organisation which provides such information is responsible for ensuring its accuracy and suitability for the specific situation. Examples of such persons or organisations include waterproof membrane system Suppliers, suppliers and manufacturers of other products used in the building such as substrate or tiling products, and consultant professionals such as Engineers.

This Code of Practice does not cover any situation where the accuracy of any such information, and its suitability for a waterproof membrane system installed in accordance with other parts of this Code of Practice, cannot be demonstrated by the person or organisation which supplies it.

Components or junction details not included or shown in this Code of Practice are outside the scope of this Code.

Where such components or junction details are proposed, consult with a waterproof membrane system Supplier for specific recommendations.

This Code of Practice does not cover contractual disputes, which should be dealt with under the provisions of the contract between the parties involved.

It is not specific to any particular project and is not intended to be or to provide a project specification. However, the information will provide assistance for preparing a design and a specification for the membrane work.

1.4 Products That Are Not Waterproof Membranes

The following products may be components of or used in conjunction with a waterproof membrane system. They do not have waterproofing properties on their own and are not waterproof membranes:

- *Sealers, as their films are too thin and are discontinuous*
- *Adhesives, as these are discontinuous*
- *Grouts, as these have no waterproofing capability*
- *Grout sealers, as they rely upon the continuity of the grout*
- *Floor levelling and smoothing compounds as these are porous*
- *Coatings/paints as these are usually permeable decorative coatings, unless it is specifically stated that they are fully waterproof*
- *Concrete treatments such as colloidal silicates*

1.5 Using this Code of Practice

1.5.1 “Waterproof membrane system” refers to the wet-area waterproofing system.

1.5.2 The following descriptions of the key parties responsible for the waterproof membrane system have been used:

- “Designer” means the person or company who specifies the waterproof membrane system, its construction details, its installation methods and procedures, and who typically also prepares the related drawings, specifications and other documentation for use in a building consent application and in the building contract. This will be an Architect, an Architectural Designer, an Engineer or the Supplier.

- "Supplier" means the company that supplies the membrane system components and provides training for Applicators in the use and installation of the product range in accordance with the waterproof membrane system manufacturer's recommendations and this Code of Practice.
- "Applicator" means the contracted company, certified by the Supplier, and responsible for the installation of the specified waterproofing membrane system.
- "Installer" means the site worker employed by the Applicator company, who must work within recommended trade practices, and undergo sufficient training to ensure that the product is installed as required by the Supplier

1.5.3 Text styles indicate the following:

- Statements in normal text are mandatory.
- Statements in boxes are emphasised due to their importance. They are mandatory and must be adhered to.
- Text in italics on a grey background is WMAI commentary and is not mandatory.

1.5.4 In reading this Code of Practice, note that:

- Bullet-pointed lists are not in order of importance, and not all items may be relevant to a specific project.
- Numbered lists are generally in a process order, though some items may not apply to a specific project.
- Some pages or portions of pages are intentionally left blank to allow other related pages to be viewed together, or to allow a specific list or table to be viewed in its entirety.
- All acronyms used in any section are at the foot of the first page of each section. They are also repeated in Section 10, Definitions (p86).
- Information may be repeated in several sections so that each section is complete without necessarily requiring cross-referencing to other sections.

2. Membrane System Properties

This section describes the typical characteristics and properties of internal wet-area waterproof membrane systems available in New Zealand.

This section is written for the Designer and will also assist the Building Consent Authority.

2.0 General

The purpose of this section is to provide information on the types and properties of waterproof membrane systems.

There is a wide range of waterproof membrane systems available, with relatively common detailing when correctly installed, whether applied in a liquid or sheet form. The choice of waterproof membrane system to be used in any wet area should be made on the basis of performance and installation requirements specific to the project.

This section introduces the following, to give the optimum selection in Section 3, Waterproof Membrane System Selection (p17):

- *The relevant Standards and their requirements*
- *Waterproof membrane systems and their classification*

ALL COMPONENTS OF A WATERPROOF MEMBRANE SYSTEM INSTALLED IN A WET AREA MUST MEET THE REQUIREMENTS OF AS/NZS 4858, WET AREA MEMBRANES.

2.1 AS/NZS 4858, Wet Area Membranes

All waterproof membrane systems used with this Code of Practice must meet the requirements of AS/NZS 4858, Wet area membranes.

This Standard is performance-based and contains test requirements that waterproof membrane systems must meet, rather than prescriptive requirements for the specific composition of the membrane.

It assesses the durability of a waterproof membrane system with a pass or fail for each of the following tests:

- Effect of water immersion
- Effect of bleach immersion
- Effect of detergent immersion
- Effect of heat aging

Acronyms: AAC = autoclaved aerated concrete; PUMMA = polyurethane methylmethacrylate; PVC = polyvinyl chloride; SBR = styrene-butadiene rubber; UV = ultra-violet.

Additionally, waterproof membrane systems are assessed for:

- *Moisture vapour transmission rate*
- *Water absorption*
- *Suitability for use over certain types of substrates*
- *Acceptance of cyclic movement*

Note that resistance to cyclic movement does not have a pass/fail requirement as it is considered that this particular test is the one most critical for performance under site design conditions. It is used as an additional test for assessing classification into extensibility classes by further amplifying the extension tests into a specific movement capability.

Note also that the Standard classifies membrane systems not by chemical type but by class relating to their extensibility.

2.2 Performance Criteria

The classification of waterproof membrane systems used with this Code of Practice is the responsibility of the Supplier in accordance with NZS 4858, Section 2.3, and Tables 1 (p13) and Table 2 (p14), but selection is the responsibility of the Designer.

Suppliers must also be able to demonstrate that the surface of waterproof membrane systems with a self-finish must be easy to clean.

NZ Building Code clauses E3.3.3 – E3.3.5 require surfaces that are impervious and easy to clean, in various situations where a wet-area waterproof membrane system might be used. In most cases an over-surface finish will be used, which must be is easy to clean in order to achieve this requirement. For self-finish membranes, no over-surface finish will be used, so the membrane surface itself must be easy to clean.

Waterproof membrane systems must be selected by the Designer in accordance with Table 3 (p22), taking account of:

- The intensity of use of the space
- Compatibility with the intended types of horizontal and vertical substrates, including the anticipated movement in the substrates
- Compatibility with any overlay, tile adhesives or other components of over-surface finishes
- Construction constraints, such as difficult access, poor ventilation, or complexity of detailing in the design
- Programme constraints
- Compatibility with heating and sound insulation layers

2.3 Types of Waterproof Membrane Systems

The list below is not exhaustive, but gives a representative overview of the many types of waterproof membrane systems available in New Zealand for internal wet-area waterproofing (listed alphabetically):

- *Polyurethane hybrid water-borne: reinforcing within or needs separate reinforcing*
- *Acrylic latex (UV stable): reinforcing within or needs separate reinforcing*
- *Elastomeric sheet, eg EPDM, butyl rubber*
- *Fibreglass: polyester or epoxy* Polymer *latex (not UV stable): reinforcing within or needs separate reinforcing*
- *Polymer cement: 1-part or 2-part*
- *Polyurethane: water-borne, solvent-based, or solvent-less*
- *Polyurethane-bitumen: solvent based*
- *Polyurea*
- *PUMMA: solvent-less polyurethane*
- *Rubber sheet*
- *Rubber, including bitumen: water-borne*
- *Self-adhesive polymer modified bitumen: reinforced or unreinforced*
- *Self-adhesive polymer sheet*
- *Water-borne epoxy*

(The remainder of this page has been left blank)

Table 1: Waterproof Membrane System Types by Class

Notes: 1. For simplicity and selection/design purposes, the waterproof membrane systems have been listed as declared by Suppliers in New Zealand. 2. The definitions of the classes are based on Table 5.1 from AS/NZS 4858, Wet area membranes. 3. Class 1B, Pre-formed metal shower trays, are not relevant to this Code of Practice.	**Class 1**		**Class 2**			**Class 3**			
	1A: Rigid, resin-based	1C: Rigid, water-borne epoxies	2A: Flexible, acrylic, separate reinforcing	2B: Flexible, acrylic, reinforcing within	2C: Flexible, 2-component polymer	3A: Elastomeric, water-borne	3B: Elastomeric, solvent-based	3C: Elastomeric, flexible sheet	3D: Elastomeric, self-adhesive
Fibreglass: polyester or epoxy									
Water-borne epoxy									
Acrylic latex, UV stable: reinforced within or needs separate reinforcing									
Polymer latex, not UV stable: reinforced within or needs separate reinforcing									
Polyurethane hybrid water-borne: reinforced within or needs separate reinforcing									
Polymer cement: 1-part or 2-part									
Polyurea									
Rubber, bitumen, water-borne									
Polyurethane: water-borne, solvent-based, or solvent-less									
Polyurethane-bitumen: solvent-based									
PUMMA: solvent-less polyurethane									
Flexible sheet									
Self-adhesive modified bitumen: reinforced or unreinforced									
Self-adhesive polymer sheet									

Table 2: Classification of Waterproof Membrane Systems

(To be read in conjunciton with section 2.3.1 below)

Waterproof membrane system Class	Elongation at Break[2]	Include reinforcement if part of waterproof membrane system	Description
1. Low extensibility	10-59%	Yes	Rigid
2. Medium extensibility	60-299%	Yes	Flexible
3. High extensibility	≥300%	Yes	Elastomeric

Notes:
1. This table is reproduced from AS/NZS 4858, Wet area membranes, with the addition of the "Description" column for the purposes of this Code of Practice.
2. "Elongation at break" is the ability of a waterproof membrane system to stretch before breaking or tearing, also referred to in some documentation as the Movement Accommodation Factor (MAF).

2.3.1 Class 1: Rigid Systems

2.3.1.1 Class 1A: Resin-based (chemically-cured)

Resin-based systems (commonly called "fibreglass") are generally two-component polyester or epoxy resins combined with a reinforcing mat. Correct mixing of the two components is critical for success.

In general terms, resin-based systems are:

- *Fast-curing*
- *Intolerant of cyclic movement*
- *Susceptible to wicking*
- *Often brittle and may not bond to PVC fittings*
- *Difficult to use on a damp substrate surface*
- *Required to be carefully detailed at the wall/floor junction*

2.3.1.2 Class 1B: Metal-based (copper or stainless steel) shower trays

This class is outside the scope of this Code of Practice.

2.3.1.3 Class 1C: Water-borne Epoxies (chemically cured)

Water-borne epoxies when used as a complete multi-coat waterproof system are defined as rigid.

Another use for water-borne epoxies is as primers and/or vapour barriers used over damp substrate surfaces, in conjunction with a subsequent acrylic or polyurethane waterproof membrane system. They will assist adhesion and protect the liquid waterproof membrane system from excessive moisture during curing.

Water-borne epoxies are a good surface sealer for use over autoclaved aerated concrete (AAC) substrates.

2.3.2 Class 2: Flexible Systems

2.3.2.1 Classes 2A & 2B: Acrylic (separate reinforcing) and Acrylic (reinforcing within)

Acrylic waterproof membrane systems are water-borne coatings that are applied to substrates using up to three coats. There are many types of acrylic systems, including pure acrylic, styrene-acrylic and SBR (styrene butadiene rubber) modified acrylic.

Typically, these types of waterproof membrane systems are easy to apply and clean up, have low toxicity, and some are UV stable. They generally need to be applied over an appropriate primer and must be applied over a dry substrate.

Acrylic waterproof membrane systems can be slow curing in colder or wetter conditions, may absorb moisture, and can allow moderate levels of moisture vapour transmission. Once fully cured, re-emulsification cannot occur.

There are two broad categories of acrylic waterproof membrane systems:

- *Those requiring separate reinforcing to be added at the time of application*
- *Those incorporating reinforcing placed within the product during the manufacturing process.*

The elongation characteristics of acrylic waterproof membrane systems will be diminished by the addition of continuous fibre reinforcement, sometimes giving these Class 1 characteristics with regard to movement capability.

2.3.2.3 Class 2C: Two-component Polymer Cement

Two-component polymer cement waterproof membrane systems are widely used in relatively low movement situations. The polymer emulsion may be acrylic, styrene-acrylic, SBR latex or rubber latex. They may be reinforced at transitions or overall with polyester fleece or coated glass mesh. Reinforcement can reduce movement capabilities to Class 1 characteristics.

2.3.3 Class 3: Elastomeric Systems

2.3.3.1 Class 3A: Water-borne Polyurethane and Polyurethane Hybrids

These systems have very similar characteristics to the acrylic waterproof membrane systems of Class 2A and 2B. They will require priming and any bond-breaker must be neutral cure silicone sealant or a proprietary tape. These waterproof membrane systems will cure faster than an acrylic waterproof membrane system, usually within 24 hours.

2.3.3.2 Class 3B: Solvent-based and Solvent-less Polyurethane

Solvent-based polyurethanes have high movement characteristics. They are not generally recommended for use over damp substrates unless appropriate water-borne epoxy primers are used and must only be used with tile adhesives capable of accommodating movement. These types of waterproof membrane systems usually cure within 24 hours.

These waterproof membrane systems are generally not UV stable. Care needs to be taken with the compatibility of these waterproof membrane systems with adjoining surfaces.

Fillets should always be formed using a type of sealant that the Supplier states is compatible, which becomes part of the waterproof membrane system.

These membranes may be reinforced with polyester fleece, but this will reduce their movement capability to Class 2.

Cement-based tile adhesives are not recommended for use over solvent-based polyurethane waterproof membrane systems.

2.3.3.3 Class 3C: Flexible Sheet

Flexible sheet waterproof membrane systems are adhesive bonded and may be pre-fabricated and installed over a range of substrates.

Some are compatible with PVC drainage systems and can be permanently bonded to drainage pipes.

A multi-layer system which typically comprises a polyethylene, butyl or similar core laminated to outer layers of woven polyester to facilitate adhesion, both to the substrate and the subsequent overlay.

Heat welding and rolling or solvent/adhesive bonding can be used to bond joints.

2.3.3.4 Class 3D: Self Adhesive

Self-adhesive waterproof membrane systems are sheet products made from either an elastomeric modified bitumen or elastomeric rubber.

Such waterproof membrane systems generally have a finish texture on the upper surface which facilitates tiling, and a selvedge which enables lap jointing with pressure and gentle heat.

Note that elastomeric modified membranes will require an impermeable full cover thin bed adhesive to prevent any potential bitumen bleed.

3. Waterproof Membrane System Selection

This section describes how to select an appropriate waterproof membrane system for a specific application.

This section is written for the Designer and will also assist the Building Consent Authority.

3.0 General

The purpose of this section is to provide information to select a membrane for a given situation.

The waterproof membrane systems must be selected with in accordance with the following items, and the requirements of Table 3 (p22):

- The intensity of use of the space
- Compatibility with the intended types of horizontal and vertical substrates, including the anticipated movement in the substrates
- Compatibility with any overlay, tile adhesives or other components of over-surface finishes. Refer Section 4.7 (p60)
- Construction constraints, such as difficult access, poor ventilation, or complexity of detailing in the design
- Programme constraints
- Compatibility with heating and sound insulation layers. Refer Section 7, Specialist Systems (p74).

ALL COMPONENTS IN A WET-AREA WATERPROOF MEMBRANE SYSTEM MUST COME FROM THE SAME SUPPLIER

The following sections outline factors that must be considered when selecting a waterproof membrane system.

Wet-area waterproof membrane systems are composed of highly developed and tested chemical compounds. If there are multiple components to a system they will have been tested to ensure compatibility and there must be no substitutions.

For products that are used in conjunction with but are not waterproof membrane systems, refer to Sections 4.1 (p36) and 4.6 (p59).

3.1 Intensity of Use of the Space

The intended intensity of use of the area must be taken into account when selecting the waterproof membrane system.

- Systems intended for domestic service must only be used in spaces intended for the sole use of a single household unit.
- Systems intended for heavy-duty use may be used in any space within the scope of this document.

For instance:

- *A commercial laundry or commercial kitchen will require a more robust and chemically-resistant waterproof membrane system than that required in a domestic situation.*
- *An institutional or gymnasium bathroom facility will require a more robust waterproof membrane system than a domestic situation.*

3.2 The Substrate

The waterproof membrane system must be selected to be compatible with the substrate(s).

For instance:

- *Cementitious waterproof membrane systems may be unsuitable for use on timber or timber-composite substrates.*
- *Different substrates will have different expected or anticipated movement characteristics. The waterproof membrane system specified must be able to accommodate any anticipated movement in the substrate. If the substrate is a suspended floor, consideration must be given to service conditions, the floor system construction, and expected deflections, as rigid waterproof membrane systems are less likely to perform satisfactorily, particularly on floors subject to changing loads and deflections (such as in commercial situations, where generally Class 2 and Class 3 waterproof membrane systems are more appropriate).*
- *Different substrates will have different face characteristics, eg concrete compared to plywood, and may require different primers.*
- *The moisture content of the substrate will influence the choice of waterproof membrane system.*

In addition, Section 4.1.0.2 (p37) limits the Class of membrane that can be used on substrates where cracking is visible or anticipated.

Installation of wet-area waterproof membrane systems onto substrates other than those listed in Table 3 (p22) are outside the scope of this Code of Practice.

Where a membrane will be applied to some other substrate, consult with a waterproof membrane system Supplier for specific recommendations.

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3.3 Over-surface Finishes to Waterproof Membrane Systems

Wet-area waterproof membrane systems must either be self-finished or have an over-surface finish applied to them in accordance with Table 3 (p22). Where a self-finish is required, the Supplier's specific requirements to achieve this must be followed.

> *Some waterproof membrane systems are suitable for use without a decorative or protective over-surface finish but may require additional topcoats or surface finishing.*

Over-surface finishes other than those listed as suitable in Table 3 (p22) are outside the scope of this Code of Practice.

> *Where some other over-surface finish is required, consult with a waterproof membrane system Supplier for specific recommendations.*

Bitumen-based waterproof membrane systems must not be used under ceramic tiles, vinyl sheet or vinyl tiles.

> *The bitumen will bleed from the waterproof membrane system and affect the adhesion interface, which will result in the de-bonding of the tile, vinyl or vinyl tile, and become visible through the tile and grout lines.*

3.3.1 Compatibility with Tile Adhesives

Wet-area waterproof membrane systems and any tile adhesive must be demonstrated as compatible in accordance with AS ISO 13007.1:2014 Ceramic tiles - Grouts and adhesives, 5.2, and recommended for use together by both the membrane Supplier and the adhesive supplier.

> *Wet-area waterproof membrane systems are often over-surfaced with tiles fixed with a tile adhesive. It is imperative that the selected waterproof membrane system and tile adhesive be compatible, and it is best practice that they are from the same Supplier.*

3.4 Construction Constraints

3.4.1 Installation Conditions

Wet-area waterproof membrane systems that have particular requirements for safe handling or ventilation during their installation and curing (as specified by the Supplier) must not be specified for use in spaces where conditions will not meet those requirements.

> *Some solvent-borne urethane, acrylic or latex based waterproof membrane systems have very particular application, curing or ventilation requirements which may not be possible on all sites.*
>
> *Consider and mitigate health and safety risks when waterproof membrane systems are applied in confined spaces, for example by ensuring that there is adequate ventilation.*

3.4.2 Complexity of Detailing in the Design

For waterproofing situations in which any of the following limitations apply, a Class 2 or Class 3 liquid waterproof membrane system must be used.

> *Limited available working space, such that the width of a sheet roll cannot be accommodated for measuring and cutting, or pre-formed membrane components cannot reasonably be placed and installed;*

The membrane must be fitted or applied to complex shapes that require junctions, penetrations and corners in close proximity such that membrane adhesion or ability to hold the required shape is compromised or installation equipment cannot be properly used.

3.4.3 Horizontal and/or Vertical Installation

Where a membrane is to be applied to vertical or angled substrates as well as horizontal ones, to avoid compatibility issues, select a waterproof membrane system which can protect all substrates within the wet area to be protected.

Some waterproof membrane systems are only suitable for use on horizontal surfaces and small upstand areas, while others can be used on surfaces at any angle.

3.5 Programme Constraints

Enough time must be available for proper application and curing of the selected waterproof membrane system. Table 3 (p22) provides information on membrane selection to suit different programme constraints.

The time available for application will have a bearing on waterproof membrane system selection, particularly for contracts which involve a number of trades working to a tight programme in multiple areas.

For instance:

- *Some waterproof membrane systems may require multiple coatings over a period of days so may not be suitable if there is a tight construction programme.*
- *Other systems may be applied and cured within one working day, though usually at an increased material cost.*

3.6 Compatibility with Heating and Sound Insulation Layers

Wet-area waterproof membrane systems that will be installed in conjunction with specialist systems such as underfloor heating and sound insulation systems are beyond the scope of this Code of Practice. Commentary on such systems is provided in Section 7, Specialist Systems (p72).

Where a heating layer or a sound insulation layer is to be incorporated in a floor, the Designer must check that the Supplier of the chosen waterproof membrane system states that it is compatible with the other materials or systems to be incorporated into the floor.

3.7 Waterproof Membrane System Documentation

This Code of Practice is only for use with waterproof membrane systems where the Suppliers are able to provide technical information for the particular product, which includes:

- Documentation showing that the products meet the requirements of AS/NZS 4858, Wet area membranes, and which clearly states the class, subclass, and type of product
- A Technical Data Sheet
- A Safety Data Sheet
- Handling/installation Instructions.
- Any specific requirements for maintenance
- Documentation that demonstrates that the surface of waterproof membrane systems with a self-finish is easy to clean.

> *General maintenance requirements are described in Section 9, Maintenance (p80), but any specific requirements for the particular waterproof membrane system must be provided by the Supplier.*

Systems for which this information is not available from the Supplier are outside the scope of this Code.

The Designer must ensure that the Supplier is able to provide the above documentation, and that the documentation shows the waterproof membrane system is fit for its intended purpose and will perform as required.

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3.8 Waterproof Membrane System Selection

Table 3 below lists the appropriate waterproof membrane system for a given situation. Where there is a choice of waterproof membrane systems, other factors as outlined above must be taken into consideration.

Table 3: Waterproof Membrane System Selection Guide

Legend **A = no hazard involved** **B = some hazards involved** **C = hazard, precaution mandatory for Applicator** **D = safe to handle with limited ventilation** **E = requires some ventilation for safety and curing** **F = good ventilation required during curing period** **= recommended for use** **O = may be used, check with Supplier first** **X = not recommended** **N/A = not applicable** **– = outside the scope of this Code of Practice** **Notes** **1. May require additional topcoats or surface finishing.** **2. Caution should be exercised when using over-tiled self-adhesive sheet-applied membranes on vertical faces. Increased temperatures can cause adhesive failure between the membrane and substrate interface.** **3. Class 1B, Pre-formed metal shower trays, are outside the scope of this Code of Practice** **4. Section 4.1.0.2 (p37) limits the Class of membrane that can be**		**Class 1**		**Class 2**			**Class 3**			
		1A: Rigid, resin-based	1C: Rigid, water-borne	2A: Flexible, acrylic, separate reinforcing	2B: Flexible, acrylic, reinforcing within	2C: Flexible, 2-component polymer	3A: Elastomeric, water-borne	3B: Elastomeric, solvent-based	3C: Elastomeric, flexible sheet	3D: Self-adhesive
Intensity of use	Domestic service	O								
	Heavy duty service		X		X					
Substrate compatibility	Plywood & reconstituted wood panels & overlay	O	X		O			O		O
	Compressed sheet flooring & overlay	O	X		O					
	Fibre-cement sheet wall lining or flooring overlay								O	
	Gypsum plasterboard wall lining	X						O	O	
	Concrete, concrete masonry, cement plaster/screed									
	AAC panel or block									O
Over-surface Finishes	Self-finish possible[1]				X	X	O	O		X
	Suitable for tiling[2]	O	X		O			O	X	O
	Suitable for vinyl tile or sheet overlay						O	O	N/A	O
Construction constraints	Handling safety during application	C	A	A	A	A	A	B	A	A
	Ventilation requirement	F	E	E	E	D	E	F	D	D
	Use where design requires complex detailing	X	X		O			O	O	X
	Orientation of installation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	O	O
Programme constraints	Install in a day			X	O	X		O		
	Multi-coat	N/A						O	N/A	N/A
	Multi-coat extended dry	N/A	N/A	O	O	O	N/A	N/A	N/A	N/A
Use with specialist systems	Compatible with heating layer	O	N/A	O	O			O	O	X
	Compatible with sound insulation layer	O	O	O	O					

4. Design

This section addresses the design of the membrane and substrate and illustrates typical installation detailing.

This section is written for the Designer and Applicator and will also assist the Main Contractor and Building Consent Authority.

4.0 General

The purpose of this section is to provide information on the design and detailing of substrates and membrane installations.

4.0.1 Conformance with Documentation

This Code of Practice requires the waterproof membrane system to be designed and installed in accordance with the most recent product safety data sheet, technical data sheet, handling/ installation instructions, application manual, and any other technical document or instructions provided by the Supplier.

This includes:

- *Proceeding only when application conditions are within limits allowed by the Supplier. Application should not proceed in extremes of temperature or humidity, unless the waterproof membrane system is specifically designed for these conditions.*
- *Applying the Supplier's recommended primer for the substrate. This is necessary to ensure the satisfactory adhesion of the membrane system to the substrate.*
- *Installing all waterproof membrane system components that must be in place prior to application of the membrane, such as bond-breakers, adhesives, bandages, and other accessories, in accordance with the Supplier's handling/installation instructions.*
- *Applying the required number of layers or coats, including any separate reinforcing, in accordance with the methods and techniques required by the Supplier.*
- *Following the Supplier's requirements for achieving the required film depth.*
- *Following the Supplier's requirements for the curing of adhesives or coats, before applying subsequent layers or coats and after applying the final layer or coat.*
- *Keying the membrane surface as required by the Supplier for the intended over-surface finish (such as by broadcasting sand to the topcoat while still wet).*

Acronyms: AAC = autoclaved aerated concrete; CCA = copper chrome arsenate; LOSP = light organic solvent preservative; B2/AS1 Acceptable Solution No 1 to NZ Building Code clause B2 Durability; NZBC E3 = NZ Building Code clause E3, Internal moisture; PEF = polyethylene foam; pMDI = para-methylene-diphenyl-diisocyanate; WMAI = Waterproof Membrane Association NZ Incorporated

4.0.2 Principles of Design Detailing

All design detailing must follow the requirements set out in the following sections 4.0.2.1 to 4.0.2.6.

4.0.2.1 Bandages and Bond-breakers

A bond-breaker must be used where two adjacent building elements forming a substrate could move differentially from one another, to ensure the integrity of the over-lying membrane is maintained.

A bandage is internal reinforcement of the membrane itself, used in situations where the membrane could be subjected to flexural stress.

Note that:

- *A bond-breaker prevents movement stress being transferred to the waterproof membrane system.*
- *A bandage allows the membrane to withstand a localised increase in movement stress.*

Common types of bond-breakers are neutral cure silicones and purpose-made bond-breaker tapes.

Common types of bandages are preformed elastomeric compounds with fabric face or edges (for embedding in waterproof membrane system), or flexible open-weave or spun-bonded fabrics which allow for extensibility when impregnated with a liquid-applied waterproof membrane system.

The selection and installation of bond-breakers and bandages must be carried out in accordance with the waterproof membrane system Suppliers' handling/installation instructions.

The bandages which some Suppliers require to be used with some waterproof membrane systems have a backing designed to allow movement relative to the substrate.

4.0.2.2 Sealants for Use in Wet Areas

Control joint or perimeter sealants must meet the requirements of ISO11600-F-25-LM, Building construction - jointing products, and if in contact with the membrane, must be a product that the Supplier states is compatible with the membrane.

Sealants used as bond-breakers, and all assembly sealants used in other locations, must be silicone neutral cure with anti-microbial properties.

4.0.2.3 Changes of Direction

All changes in direction of substrate surfaces to which the waterproof membrane system will be applied (such as at floor to wall upstands, etc.) must be reinforced or bandaged to ensure the waterproof membrane system can be applied with no weakening and no thinning of the film thickness (for liquid-applied membranes).

Section 4.1.0 requires internal corners to have a 25 x 25mm timber fillet, CCA-treated to H3.2 or a 10mm sealant fillet, where required by the Supplier's handling/installation instructions.

4.0.2.4 Penetrations

All penetrations such as pipes, sleeves, ducts and vents must have the penetrating element installed and fixed by the relevant trade in accordance with the building consent documentation, before the waterproof membrane system is applied. The waterproof membrane system must be dressed down into wastes or drains as shown in Figure 27 (p54) and around penetrating pipes as shown or described by Fig 28 (p55).

If a penetration is made, altered or moved after the waterproof membrane system has been applied, re-application of the waterproof membrane system will be needed in the area of the penetration, to reinstate its integrity.

4.0.2.5 Control Joints

At control joints in a substrate, the joint shall be carried through to the over-surface finish (if any). For screed or plaster applied to a floor or a wall, control joints in the floor or wall must be carried through the screed or plaster and through to the over-surface finish. A control joint in a floor is shown in Fig 23 (p52).

4.0.2.6 Sealing to Fixture Rims and Edges

Waterproof membrane systems must be sealed to the rims and edges of fixtures within the wet area:

- Exposed junctions between the waterproof membrane system on a wall and the rim of fixtures such as cabinets, tubs, or wash hand basins or the edges of cabinets, shall be made watertight by sealant. However, sealant is not required along the bottom edge of wall-mounted fixtures which do not extend down to the floor (in all cases the membrane must nevertheless extend up the wall behind fixtures adjacent to walls). Sealing for the junction between a wall and a bath with surround is shown in Figs 33 and 34 (p58).
- For shower trays or baths where the rim meets a wall protected by a waterproof membrane system, secondary linings, eg an acrylic liner, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, must be provided, and must lap over the rim to allow water to drain into the shower tray or bath, as shown in Figs 31 and 32 (p57).
- Other than at shower trays and baths, the junctions between the waterproof membrane system and the base of fixtures which meet the floor, eg cabinets and vanities, must be sealed, as shown in Figs 15, 16 (p49) or 17 (p50).

It will not be practical to use a wet area waterproof membrane system in conjunction with fixtures that have a rim recessed into the wall structure, because the waterproof membrane system cannot easily be made continuous behind the recessed rim.

In these situations, acrylic liners, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, packed off the membrane-treated wall face, must be used.

The extent of membrane required by this Code of Practice may in some cases exceed the minimum requirements of the NZ Building Code for dealing with free water from accidental overflow and the effects of water splash, but it is considered good practice.

4.0.3 Floor Wastes

Where there is expected deliberate water flow, eg within shower areas, a floor waste must be provided and the floor must slope towards this. Where there could be an accidental overflow from a sanitary fixture or sanitary appliance (but no deliberate water flow), a floor waste must be provided but the floor does not need to slope.

4.0.4 Exposed Surfaces Must Be Easy to Clean

The over-surface finish applied to the waterproof membrane system, eg tiling system, or the membrane surface itself for waterproof membrane systems with a self-finish, must be easy to clean.

Fixtures must themselves have surfaces which are impervious and easy to clean when used in conjunction with waterproof membrane systems within a wet area

4.0.5 Inspection and Flood Testing

This Code of Practice requires all waterproof membrane systems to be visually inspected and flood tested on completion of the installation of the waterproof membrane system.

The waterproof membrane system must be repaired (or re-applied) as required by the Supplier for the particular waterproof membrane system being used, if the visual inspection identifies any evidence of the following:

- Uneven thickness, pin holing or bubbles.
- Breaks or creases at any junctions, changes of angle, or changes of substrate.
- Damage from other trades

Localised (or spot) repair may be sufficient for some types of waterproof membrane systems; full recoating may be required for other types.

Flood testing must be carried out before the waterproof membrane system is covered with any over-surface finish, and only after the waterproof membrane system is completed and fully cured. Flood testing shall proceed as follows:

1. Seal off any water outlet with a bung and provide a temporary water-stop at any threshold if one does not already exist.
2. Fill the area with water up to the height of the lowest threshold to the area. Water for flood testing must be from an external source, to remove any possible confusion of any water ingress.

For example, if testing a shower area, water should not be run from the shower rose.

3. Check for water loss after 12 hours.
4. Check adjacent areas and any rooms below for water-staining.
5. Ensure that a minimum 12-hour full area flood test is carried out and signed If any water damage occurs, inform the Main Contractor, repair or re-apply as required by the Supplier for the waterproof membrane system being used, and re-test.
6. off.

The WMAI recommends that the Applicator collect photographic evidence of the flood testing process as part of the quality-control process.

4.0.6 Extent of Wet-area Protection

Protection of a wet area must be provided:

- To surfaces subject to intentional water flow such as the floors and walls of shower areas; and
- To the floors of spaces containing a sanitary fixture or sanitary appliance; and
- To wall surfaces adjacent to sanitary fixtures and sanitary appliances; and
- To floor and wall surfaces likely to be splashed or become contaminated.

Where a wet-area waterproof membrane system is used to achieve this protection, this Code of Practice requires it to form a continuous barrier which:

1. For floors:
    a. For enclosed rooms, covers the entire floor surface of the room and is contained by a water-stop at all edges where an upstand against a wall cannot be formed (such as at doorways into the room, at any floor-level window sills; and
    b. Extends across the floor below wall-mounted fixtures, under sanitary fixtures such as baths and shower areas, under all sanitary appliances, and under all cabinetry.
    c. Provision must be made for an overflow within all plumbed cabinetry units separate to a floor waste to remove water from a plumbing failure to protect the cabinetry.
    d. For open plan spaces, extends a minimum of 1500mm from all water sources such as sinks and dishwashers, and covers the floor area contained by wall upstands and water-stops located to suit the extent of tiling or other over-surface finishes to the floor.
2. For walls:
    a. Within shower areas, extends vertically to the higher of 300mm above the shower rose or 1800mm above the shower floor or tray, and horizontally to the line of any fixed screen or door, or 300mm beyond the line of any curtain, or 1500mm beyond a fixed shower rose in an open shower area, or 600mm beyond the length of a hand-held shower rose in an open shower area; and
    b. Extends from floor level up behind all cabinets and all fixtures with water supplies, such as wash hand basins and vanities, and behind all sanitary appliances; and
    c. Extends at least 150mm beyond the upper edge and each side of all cabinets and all fixtures with water supplies (other than shower areas where it extends as above), and all sanitary appliances; and

This membrane might be protected by a splash-back, eg tiles, glass, timber trim.

    d. Where water supply or waste pipework passes through walls, including where plumbing fittings such as taps, mixers and spouts are wall mounted, extends at least 150 mm beyond the point where the pipe or water supply passes through the wall; and
    e. Where none of the above applies, has an upstand of at least 75mm at floor-to-wall junctions.

The waterproof membrane system must be continuous across the floor under and up the wall behind built-in sanitary fixtures and cabinets that are adjacent to walls. Where it is proposed to retrofit a waterproof membrane system into an existing space already containing such fixtures, the fixtures will need to be removed in order to install the membrane.

It will not be practical to use a wet area waterproof membrane system in conjunction with fixtures, eg some baths and shower trays, that have a rim recessed into the wall structure, because the waterproof membrane system cannot easily be made continuous behind the recessed rim. Acrylic liner, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, packed of the membrane-treated wall face, must be used.

The extent of membrane required by this Code of Practice may in some cases exceed the minimum requirements of the NZ Building Code for dealing with free water from accidental overflow and the effects of water splash, but it is considered good practice.

Refer to Section 5.6, Scheduling of Work (p63) for information on sequencing, protection of work, and repair of damage caused by other trades working in areas which contain waterproof membrane systems

ALL WET AREAS WITH A WATER SUPPLY MUST:
- **BE PROTECTED WITH A WET-AREA WATERPROOF MEMBRANE SYSTEM**
- **HAVE ALL MEMBRANE PENETRATIONS SEALED**
- **BE CONTAINED BY A WATER-STOP**
- **MAY HAVE A FLOOR WASTE INSTALLED**

The following drawings are examples of the extent of the waterproof membrane system that must be applied in various situations. Note that:

- Blue shaded areas in Figures 6-13 (p31-36) indicate the area of floor and wall covered by the waterproof membrane system. Where tiling is shown in these figures it is indicative only.
- Drawings are not to scale.
- Where the finished surface is tiled, a waterproof membrane must be installed behind the tiles, for example behind a wall-mounted water control valve as shown in Fig 29 (p56).
- Where the finished surface is an impervious lining, no membrane is required except at any wall/floor junction where the membrane must extend 75mm up behind the lining as shown in Fig 32 (p57).
- In all instances, all vertical and horizontal water penetrations must be sealed as shown in Fig 27 (p54) and Figs 29 and 30 (p56).

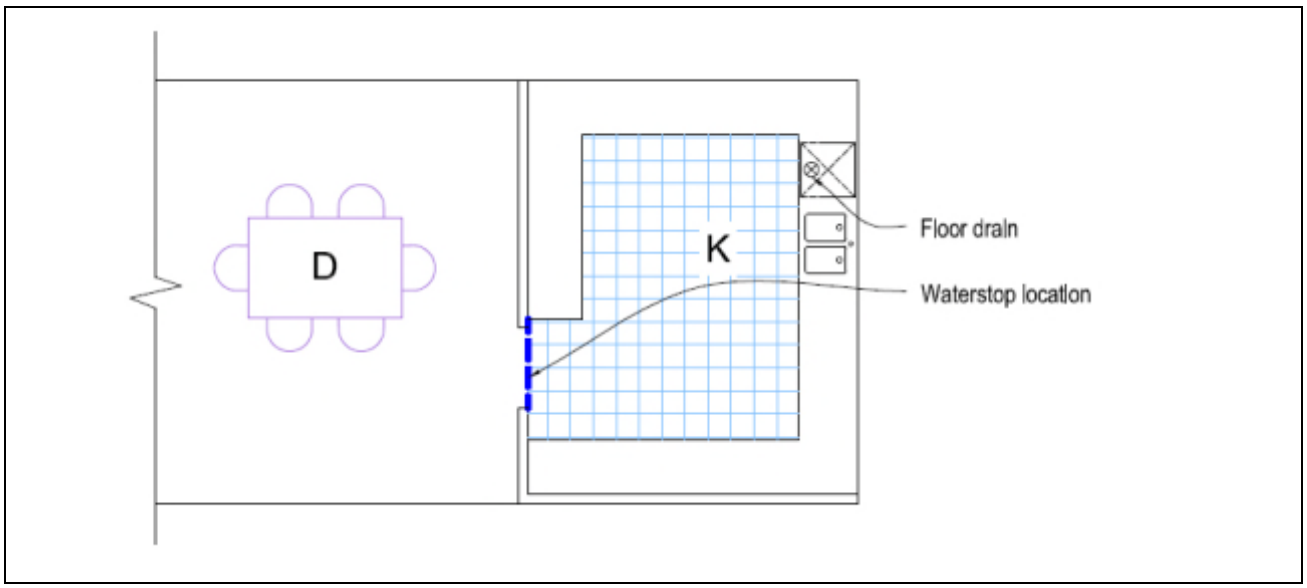

Figure 1: Extent of waterproof membrane system for separate kitchen

Notes:

1. The waterproof membrane system must extend under all plumbed cabinets and appliances.
2. The blue dotted line indicates the position of a water-stop at the boundary of the waterproof membrane system.

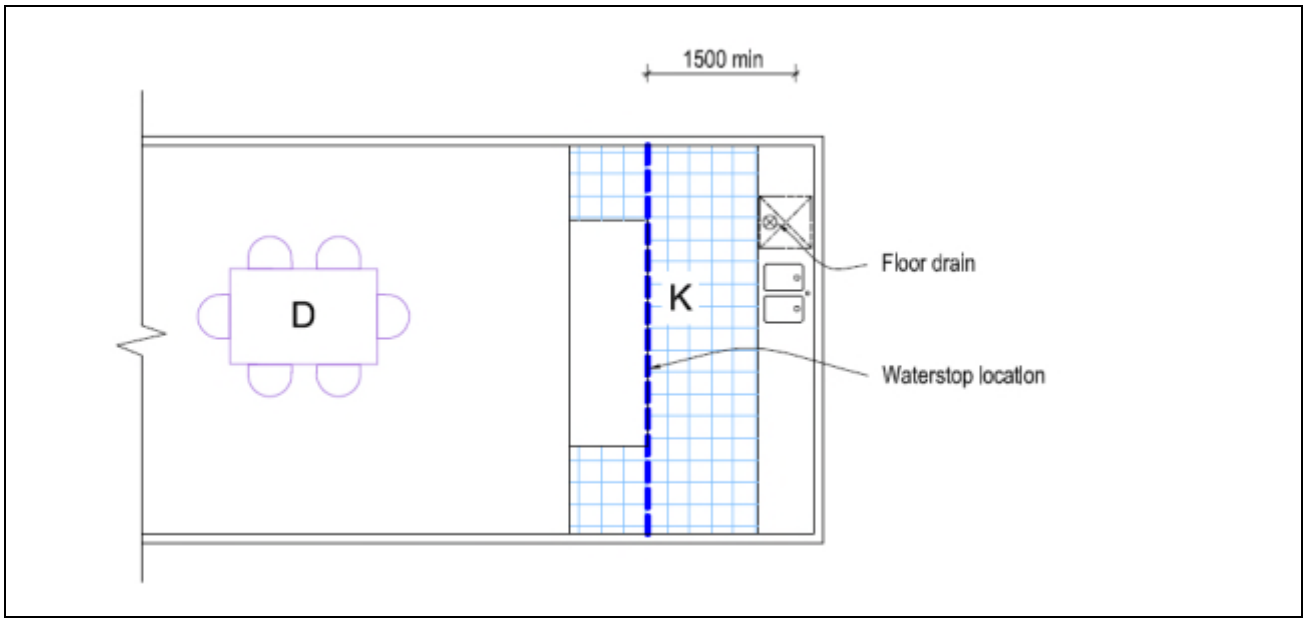

Figure 2: Extent of waterproof membrane system for island bench with sink at the back bench

Notes:

1. The extent of waterproof membrane system and thus the location of a water-stop for an island bench is dependent on several factors, primarily where the sink and dishwasher are located and the extent of the tiles in the room. The water-stop must be located a minimum of 1.5m from all water sources.
2. The waterproof membrane system should extend under all plumbed kitchen cabinets and sanitary appliances such as dishwashers, and up the wall behind.

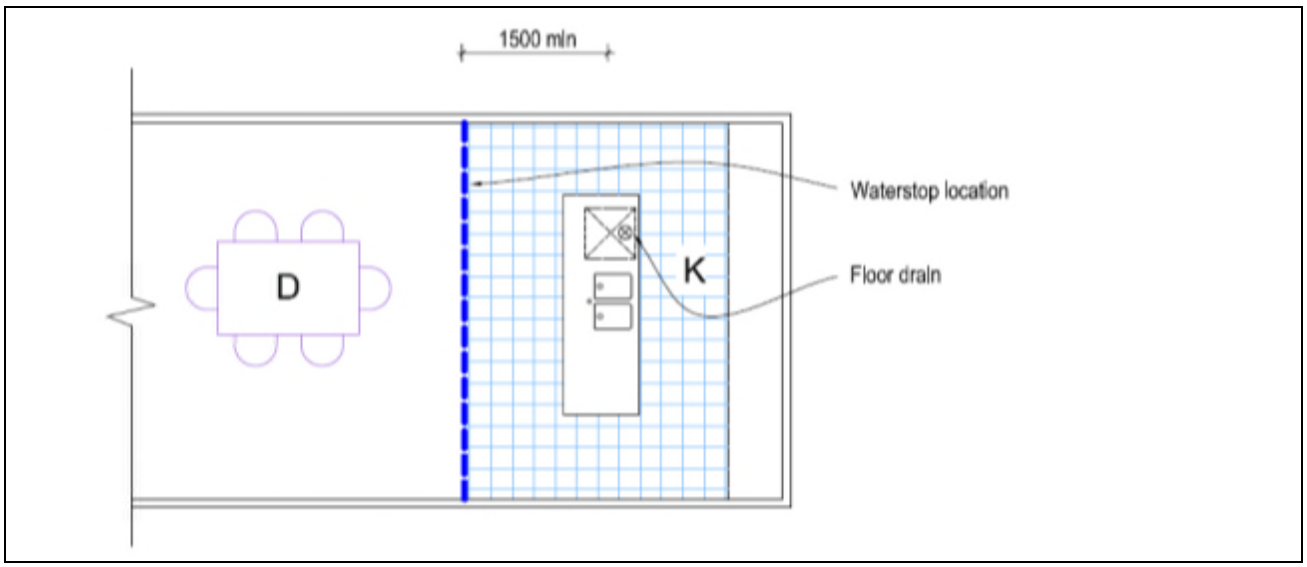

Figure 3: Extent of waterproof membrane system for an island bench with sink in the island

Notes:

1. The extent of waterproof membrane system and thus the location of a water-stop for an island bench is dependent on several factors, primarily where the sink and dishwasher are located and the extent of the tiles in the room. The water-stop must be located a minimum of 1.5m from all water sources.
2. The waterproof membrane system should extend under all plumbed kitchen cabinets and sanitary appliances such as dishwashers, and up the wall behind.

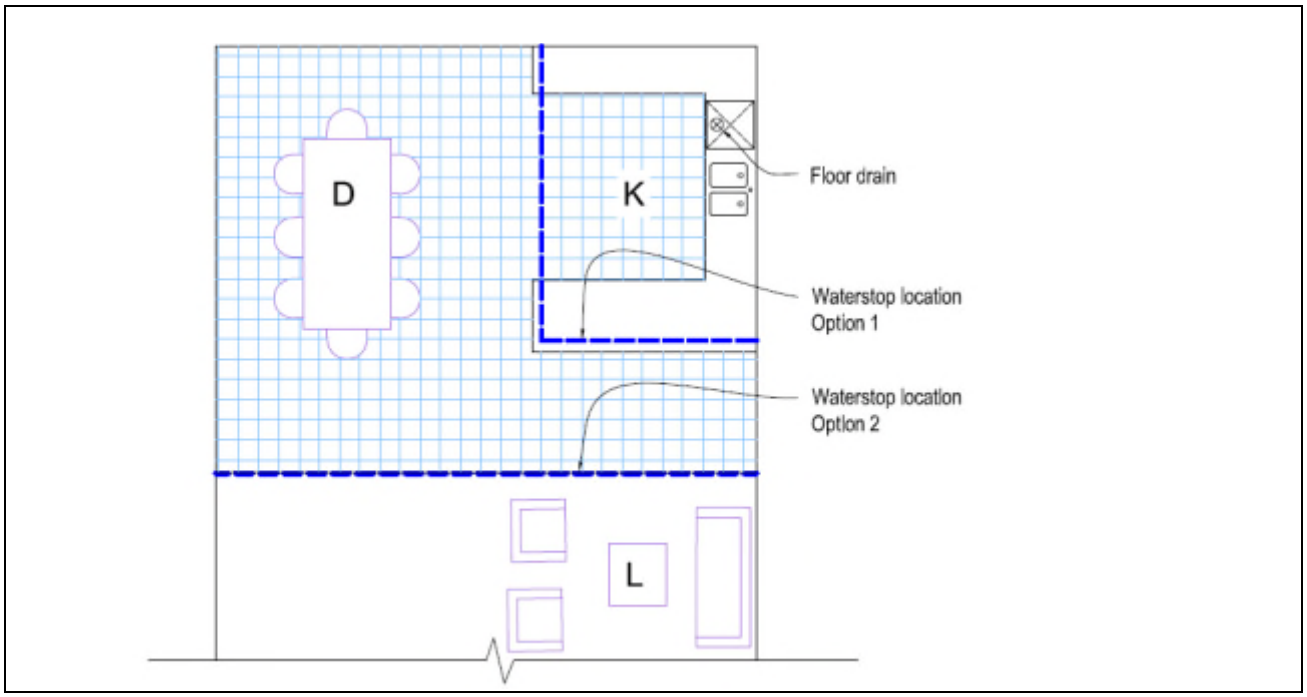

Figure 4: Extent of waterproof membrane system for an open-plan kitchen/dining/living room

Notes:

1. The waterproof membrane system should extend under all plumbed kitchen cabinets and sanitary appliances such as dishwashers, and up the wall behind.

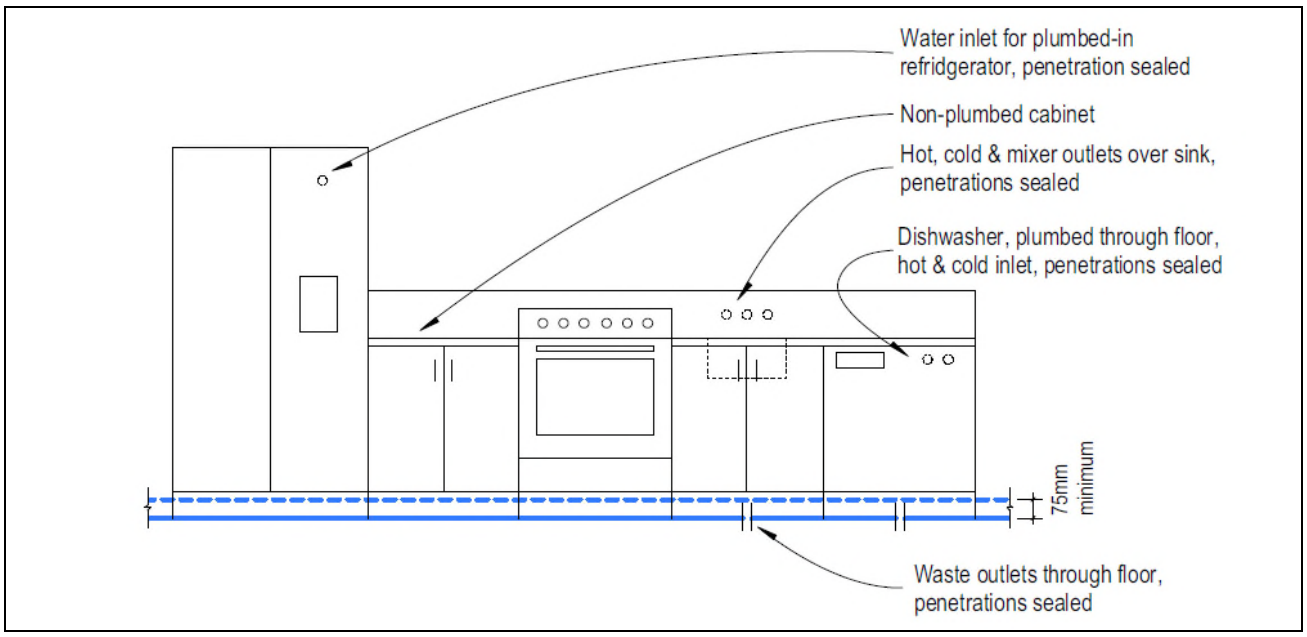

Figure 5: Extent of waterproof membrane behind kitchen cabinets

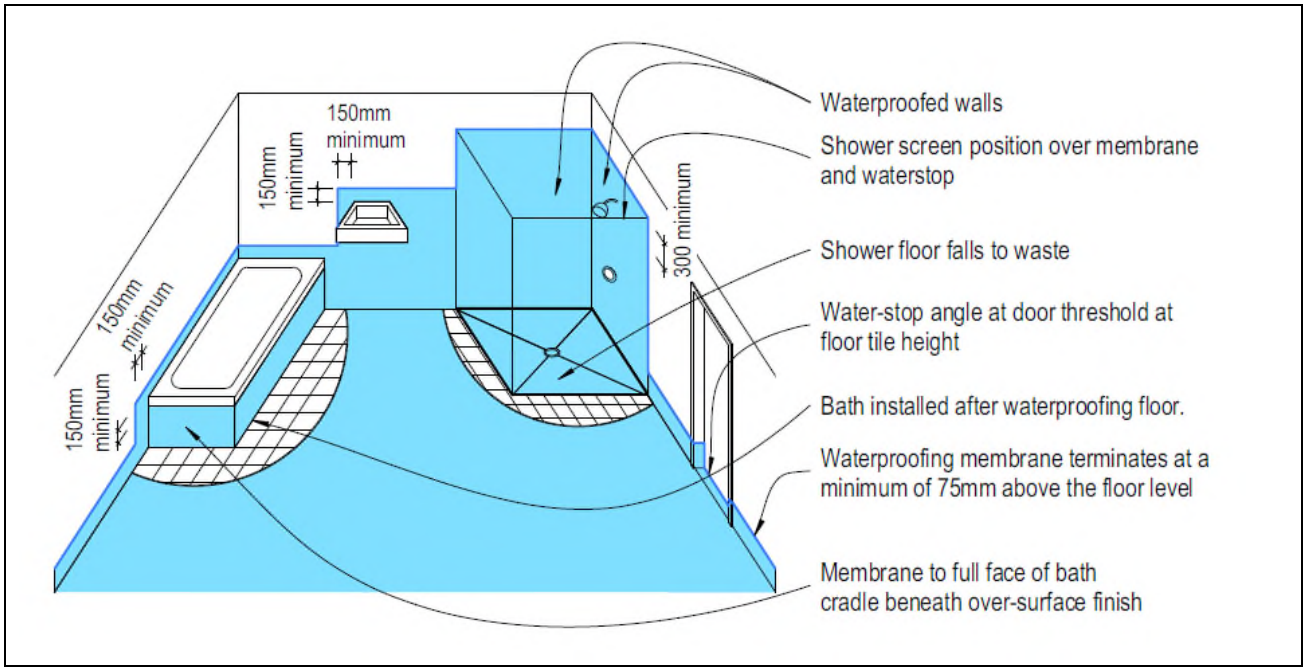

Figure 6: Typical extent of membrane in bathroom with hobless shower area

Notes:

1. Shower area shown with waterproof membrane system to provide waterproofing to floor and walls, and with rigid screen and door. Refer to Fig 10 (p33) for other options which affect the extent of membrane to shower floor, and to walls around and adjacent to the shower area.
2. Built-in bath shown. For both built-in and freestanding baths, the waterproof membrane system must extend under bath and up the wall(s) behind.
3. Refer to Fig 13 (p36) for extent of membrane if the bath has a shower over.
4. Wall-mounted wash hand basin shown. The waterproof membrane system must extend across the floor underneath all fixtures with water supplies (such as wash hand basins and plumbed vanities, whether floor- or wall-mounted), and up the wall behind.
5. Full-height membrane must be applied to all exposed faces of bath cradle, beneath any over-surface finish.
6. There is no need to apply waterproof membrane under an impervious lining.

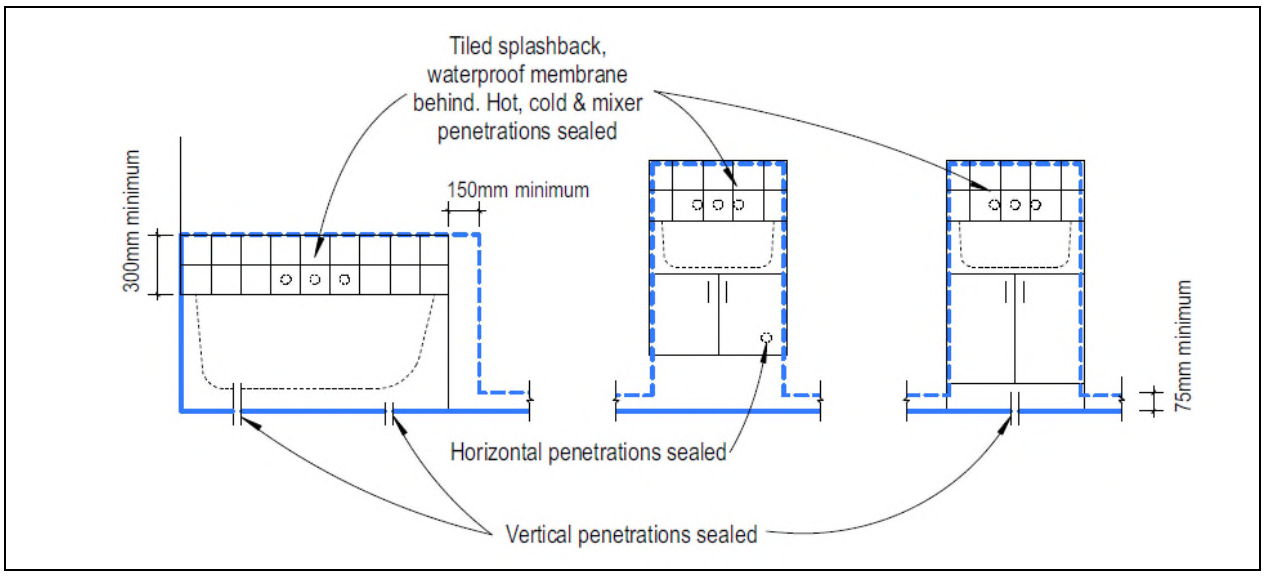

Figure 7: Extent of waterproof membrane behind bathroom fittings

Notes:

1. All hot, cold and/or mixer penetrations must be sealed.
2. For sealed plumbed cabinetry an overflow waste can allow removal of water from a plumbing failure thereby protecting the joinery unit.

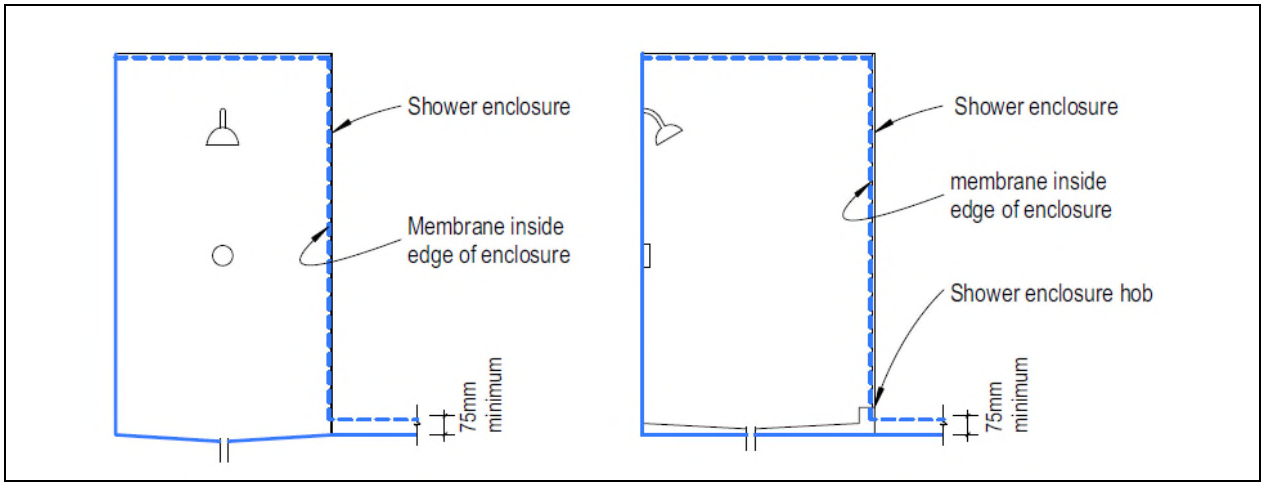

Figure 8: Extent of waterproof membrane behind shower enclosures

Notes:

1. All hot, cold and/or mixer penetrations must be sealed.

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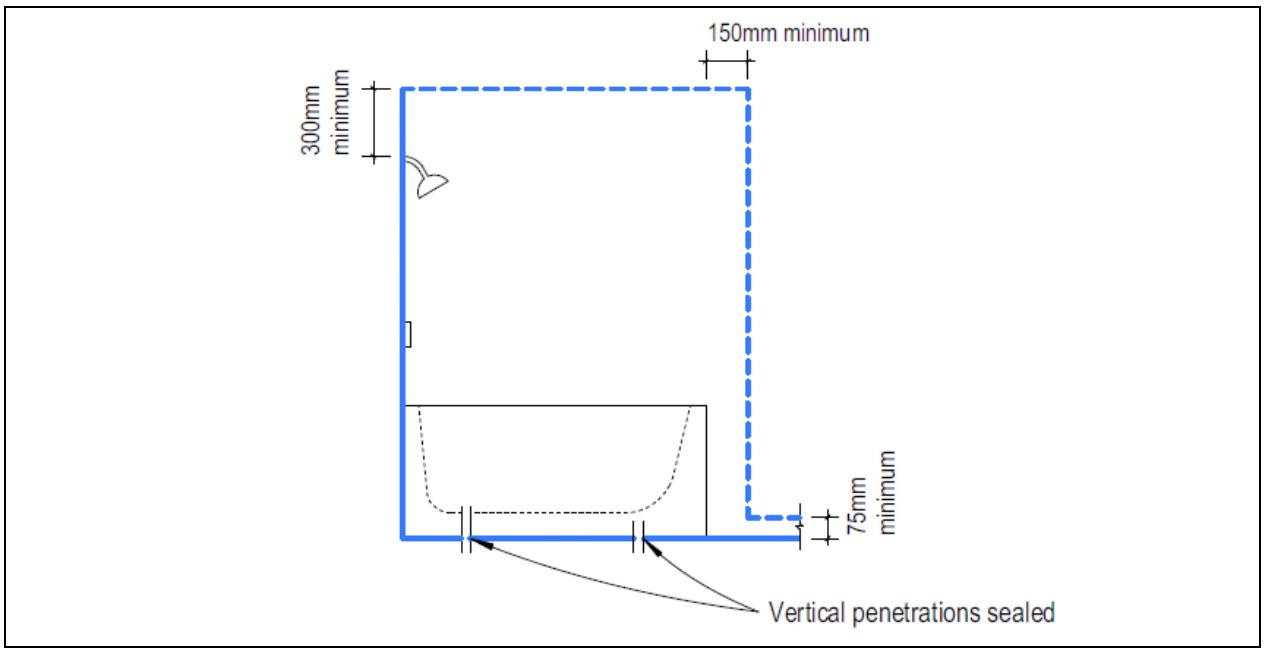

Figure 9: Extent of waterproof membrane of shower over bath

Notes:

1. All hot, cold and/or mixer penetrations must be sealed.
2. `

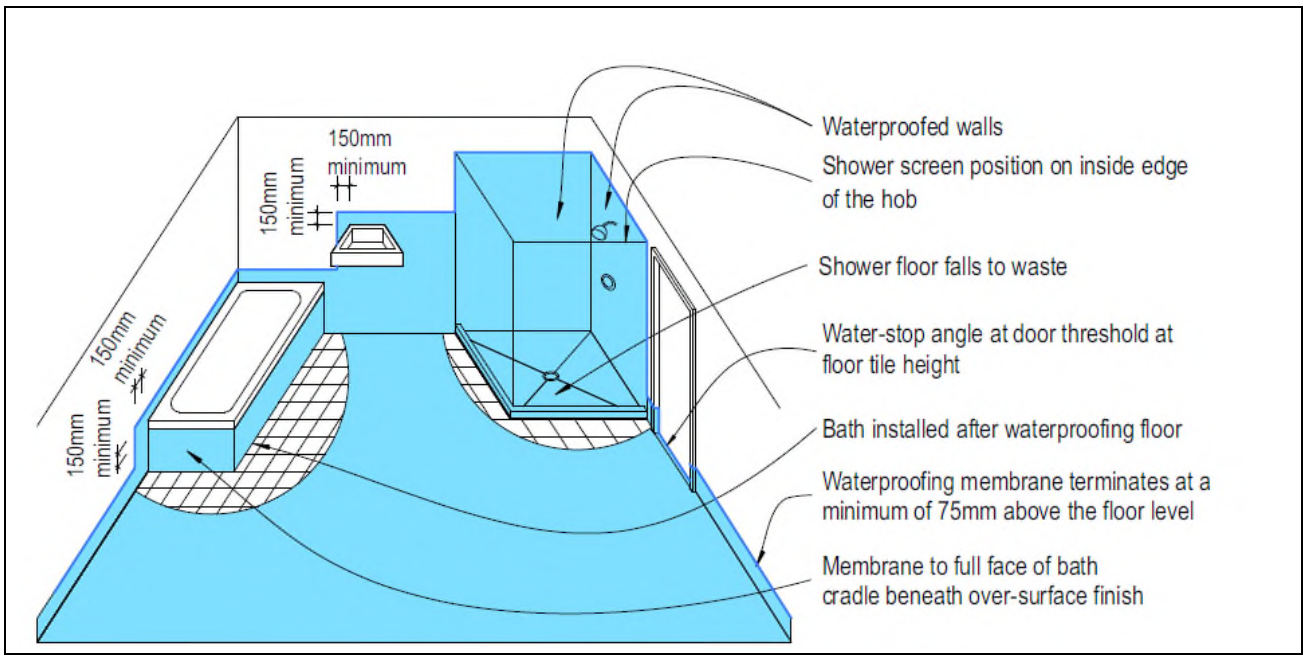

Figure 10: Typical extent of membrane in bathroom with hob to shower area

Notes:

1. Shower area shown with waterproof membrane system to provide waterproofing to floor and walls, and with rigid screen and door. Refer to Fig 10 (p33) for other options which affect the extent of membrane to shower floor, and to walls around and adjacent to the shower area.

(notes continued on next page)

2. Built-in bath shown. For both built-in and freestanding baths, the waterproof membrane system must extend under bath and up the wall(s) behind.

3. Refer to Fig 13 (p36) for extent of membrane if the bath has a shower over.
4. Wall-mounted wash hand basin shown. The waterproof membrane system must extend across the floor underneath all fixtures with water supplies (such as wash hand basins and plumbed vanities, whether floor- or wall-mounted), and up the wall behind.
5. Full-height membrane must be applied to all exposed faces of bath cradle beneath any over-surface finish.
6. There is no need to apply waterproof membrane under an impervious lining.

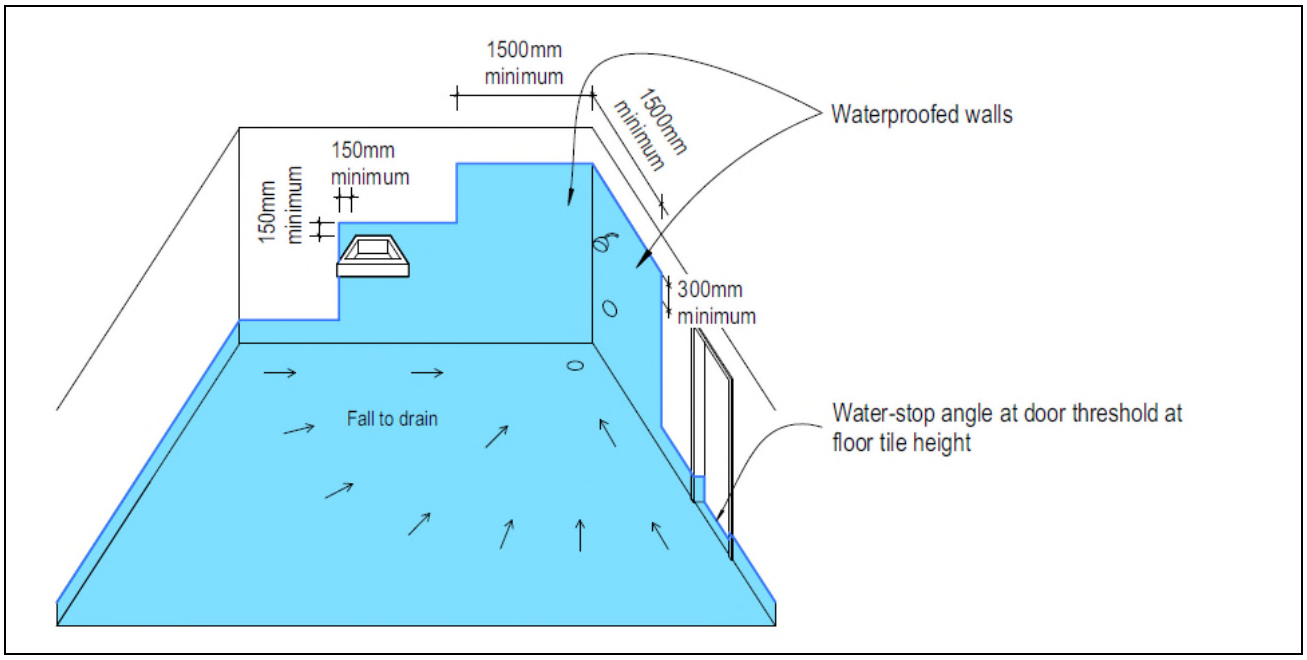

Figure 11: Typical layout of bathroom for an open shower area

Notes:

1. Fixed shower rose shown. Horizontal extent of shower-height waterproof membrane system extends 600mm beyond the maximum reach of the shower pick for a hand-held shower rose in an open shower area.
2. Wall-mounted wash hand basin shown. The waterproof membrane system must extend across the floor underneath all fixtures with water supplies (such as wash hand basins and vanities, whether floor- or wall-mounted), and up the wall behind.
3. Depending on design, the fall to the floor need only be 1500mm beyond the shower rose. Arrows are shown to indicate the direction of fall.
4. Minimum height of waterproofing to shower area walls is 1800mm above the surface of the shower floor.
5. There is no need to apply waterproof membrane under an impervious lining.

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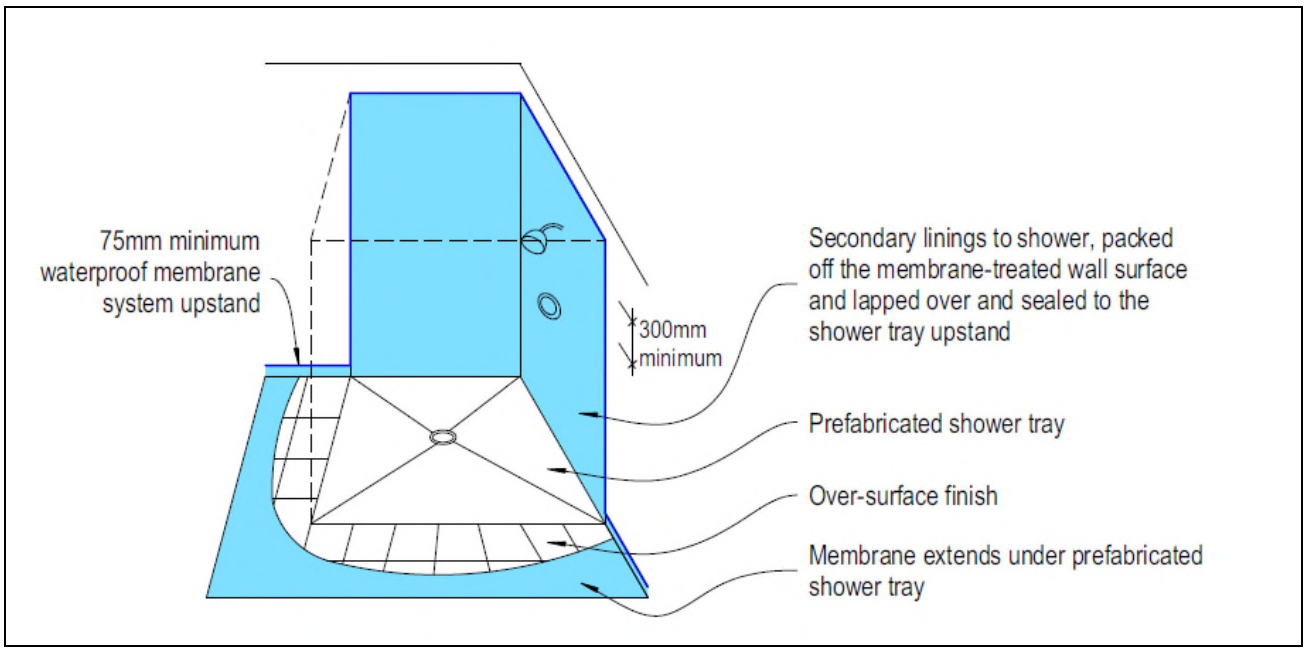

Figure 12: Extent of waterproof membrane system for shower areas

Notes:

1. Secondary linings, eg acrylic liner, self-finished sheet linings or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, must be packed off the membrane-treated wall surface, and overlap and be sealed to the shower tray upstand. The waterproof membrane system must extend under the prefabricated shower tray and up the shower area walls (and the face of any hob) behind the secondary shower linings.
2. Alternatively, the waterproof membrane system (with over-surface finish as appropriate) could be used for the shower floor and walls, with the floor substrate constructed to falls.
3. Horizontal extent of waterproof membrane system extends to line of rigid shower screen and door, or 300mm past line of shower curtain, or 1500mm horizontally from shower rose for open shower areas, or 600mm beyond the maximum reach of the shower pick for a hand-held shower rose in an open shower area.
4. Minimum height of waterproofing to shower area walls is 1800mm above the surface of the shower floor or tray.
5. There is no need to apply waterproof membrane under an impervious lining.

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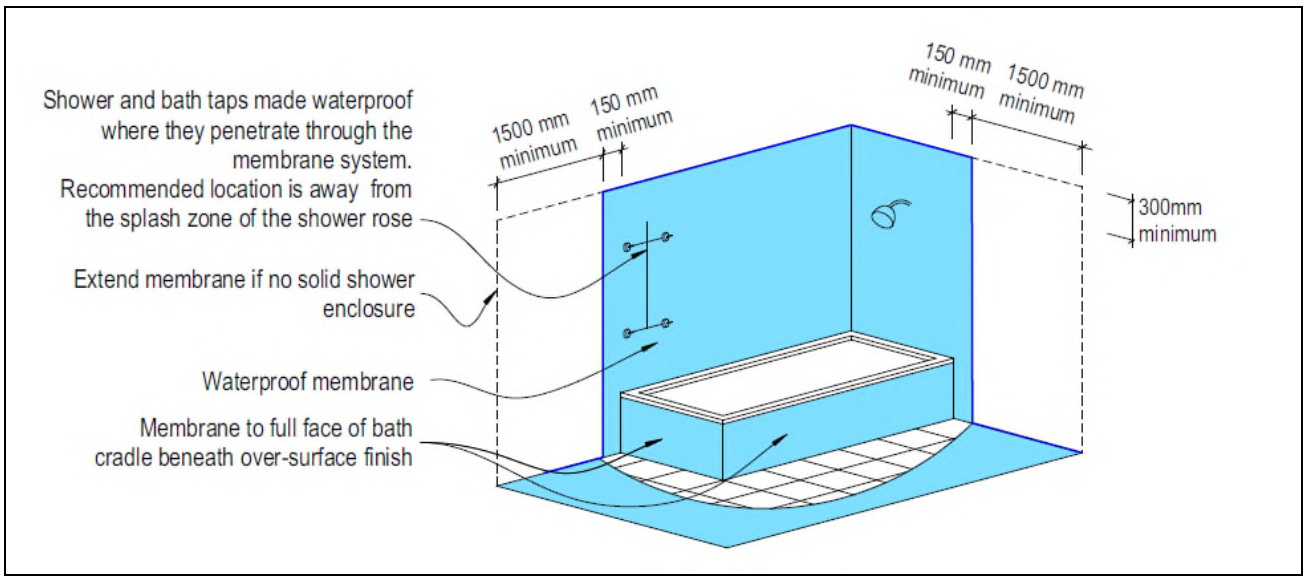

Figure 13: Extent of waterproof membrane system for bath with shower over

Notes:

1. The waterproof membrane system must extend under the bath and up the wall(s) behind the bath, and on the walls in front of the bath. Secondary linings, eg acrylic liner, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, must be provided above the bath, packed off the membrane-treated wall surface, and overlap and be sealed to the bath rim.
2. At each end of the bath, the horizontal extent of the waterproof membrane system extends to the further of:
    a. 150mm beyond the rim of the bath;
    b. 300mm past the line of any shower curtain, or 1500mm horizontally from the shower rose for open shower areas, or 600mm beyond the maximum reach of the shower pick for a hand-held shower rose in an open shower area.
3. Minimum height of waterproofing to shower area walls is 1800mm above the surface of the bath.
4. There is no need to apply waterproof membrane under an impervious lining.

4.1 Substrate Requirements

4.1.0 General

The substrate onto which the waterproof membrane system is to be laid must meet the requirements of Sections 4.1.0.1 and 4.1.0.2 for fall, rigidity and control of movement.

Sections 4.1.1 – 4.1.5 list allowable substrates and give specific requirements for each. Substrates not described in Sections 4.1.1 – 4.1.5 are outside the scope of this Code of Practice.

> *Where an existing surface must be retained for historic or aesthetic reasons, and a conventional waterproof membrane system installation cannot be incorporated, consult with a waterproof membrane system Supplier for specific recommendations.*

External corners must have an arris, chamfer, or radius to help the waterproof membrane system wrap around without stress or thinning.

Where required by the Supplier's handling/installation instructions, internal corners must have a 25 x 25mm timber fillet, CCA-treated to H3.2 or a 10mm sealant fillet.

Internal corners for some types of waterproof membrane systems in some situations do not require a timber fillet, although during membrane installation all internal corners will require bandaging and/or membrane reinforcement.

4.1.0.1 Substrate Falls

In shower areas, wet bathrooms, and any area where there is expected water flow, there must be a positive fall towards the outlet(s) under all reasonably anticipated conditions of deflection, shrinkage etc. that will occur during normal occupancy.

Falls must be formed in the substrate (or in a screed incorporated into the substrate) and not by the membrane itself.

4.1.0.2 Substrate Deflections, Movement and Cracks

For the purposes of this Code of Practice, unless cracks, deformations, or soft, damaged, crumbling or broken areas to the substrate surface are visible at the time of preparation for laying the membrane, a substrate meeting the requirements of Sections 4.1.1 to 4.1.5 can be assumed to meet the requirements of this section if:

- For sheet material substrates supported by timber framing, the building's structural system complies with NZS 3604, Timber-framed buildings, or
- For concrete masonry substrates, the building complies with NZS 4229, Concrete masonry buildings not requiring specific design, or
- For concrete slab-on-grade substrates (with or without a screed under the membrane), the slab complies with NZS 3604 or NZS 4229.

Engineering advice must be obtained on the suitability of substrates that do not meet one of these requirements, to ensure that the substrate will provide equivalent integrity, rigidity, and structural performance to one meeting the requirements of NZS 3604 or NZS 4229 as above, or to specify appropriate remedial work. This includes substrates such as suspended concrete slabs, concrete walls, substrates not supported in accordance with NZS 3604 or NZS 4229, substrates with a screed (except slab-on-grade), and substrates with visible cracks, deformations, or soft, damaged, crumbling or broken areas to the substrate surface. The provision of such Engineering advice is outside the scope of this Code of Practice.

If existing cracks are present or the Engineer determines that cracking of the substrate(s) could occur, then the class of membrane to be used must meet the following requirements:

- Where there are no visible and no probable cracks, use Class 1, 2 or 3 membranes
- Where there are no visible but probable cracks, use only Class 2 or 3
- Where there are visible and probable cracks, use Class 2 or 3 if the visible cracks are remediated, otherwise only use Class 3. The cracks must be treated as required by the Supplier's installation guide.

For an existing substrate, if floor loadings are anticipated to change then engineering advice may be required to ensure the integrity and anticipated deflection of the substrate before applying any membrane.

New buildings that do not meet the requirements of with NZS 3604 or NZS 4229 are likely to be the subject of specific engineering design, and have an Engineer already involved.

A new screed will add weight which a building's structure may not be designed to support.

For existing buildings, the absence of cracking in an existing substrate can be taken as an indication of adequate substrate performance unless design conditions are expected to change.

Engineering advice is needed to determine the cause of any cracking and whether that cause remains ongoing. Cracks due to cyclic movement will require special engineering consideration, whereas cracks due to a one-off cause such as initial permanent shrinkage may be able to be saw cut to form an even channel (where such a cut is not detrimental to structural performance) and filled with sealant.

Where substrate movement is controlled by the use of control joints, these joints must be carried through to the over-surface finish, as shown in Figure 23 (p52).

Control joints provided in substrates must be installed in accordance with:

- *The sheet substrate material manufacturer's requirements; or*
- *NZS 4229, Concrete masonry buildings not requiring specific engineering design; or*
- *Engineering advice confirming the requirements of this section will be met (for other substrates).*

4.1.1 Monolithic Floors

Concrete substrates must incorporate coves to upstands, have rounded corners, and have integral control joints. They must be laid to any required falls and have drainage outlets at low points.

Unsatisfactory concrete substrate surfaces must be mechanically repaired to a suitable standard for application of the waterproof membrane system. Grind off any nibs, clean out and fill any hollows or imperfections to provide a flush surface and skim over (if required) to improve falls or to provide a satisfactory substrate surface. Refer to the waterproof membrane system Supplier for compatible fill and skim coat products.

4.1.1.1 New Concrete Substrates

The concrete surface finish must be either U2 wood-float or U3 steel trowel finished to NZS 3114, Specification for concrete surface finishes. Refer to the Supplier for specific requirements.

Steel floated finishes may require captive blasting or grinding to permit penetration of the primer.

Sufficient drying time must elapse after concrete placing for the moisture content of the concrete to be low enough for membrane application. The Applicator must confirm this by carrying out one of the following tests:

- Instrumental testing with a hygrometer used on the surface or with in-slab probes, in accordance with BRANZ Bulletin 585, with a result of not more than 75% relative humidity @ 25°C; or
- Taping a 600 x 600mm transparent plastic sheet of approximately 100 microns thickness to the concrete and leaving for 24 hours. If there is any visible "sweating" or darkening of the concrete surface, then the area is too damp to waterproof.

Moisture content in a concrete substrate is critical as the presence of any moisture will affect the adhesion of the waterproof membrane system as discussed in Section 6.1.3 (p69).

BRANZ Bulletin 587 states that "Water evaporates from a slab on ground at a rate of around 25mm depth of concrete per month in good drying conditions (dry weather and well-ventilated spaces after the walls and cladding have been erected). This means that a 100mm thick concrete slab will take at least 4 months to dry".

This should be taken as a rule of thumb, and moisture content should be confirmed by one of the tests described above.

Even if moisture content is acceptable sooner, a minimum 28-day curing period of the concrete is necessary before waterproof membrane systems are installed.

Except for topping screeds, new concrete substrates are structural building elements in their own right and must be designed and built to the Engineer's recommendations and specifications, the NZ Building Code and requisite Standards.

The Applicator must check with the Main Contractor and confirm whether a curing compound or release agent is present or not. Any concrete curing compound or release agent must be totally removed before priming the substrate but curing compounds should not be removed until the concrete has cured sufficiently that it will not be affected by the removal. If a curative primer which is part of the waterproof membrane system is used, it does not need to be removed, but the Supplier's handling/installation instructions must be followed.

4.1.1.2 Existing Concrete Substrates

Existing concrete substrates must be prepared and cleaned as per the Supplier's specific recommendations for the particular situation.

Existing concrete may be presented in any condition from smooth and clean to highly contaminated with a variety of chemicals. For this reason, the substrate surface must be inspected prior to commencement of work to ensure that it is correctly prepared for adhesion of the chosen waterproof membrane system.

4.1.1.3 Cementitious Screeds

Where a reinforced concrete floor is to be overlaid with a concrete or plaster screed to provide falls:

- The screed must be laid and finished to a finish that meets the requirements for a U2 wood-float finish to NZS 3114, Specification for concrete surface finishes.
- The screed must be left for a curing and drying period determined in accordance with the screed manufacturer's instructions before application of the waterproof membrane system. This period will depend upon the type and thickness of the screed.

Normally, this period is at least seven days. However, screeds that are fast-hydrating and fast-drying will cure and dry in shorter times than screeds that do not have these attributes.

Where a rigid sheet flooring is to be overlaid with a cementitious screed to provide falls:

- The sheet flooring must meet the requirements of Section 4.1.2 (see below)
- The sheets must be primed, with joints bandaged
- Control joints must be provided in the screed at the perimeter and directly over any control joints in the sheet flooring beneath. Control joints in the screed must be filled with a sealant that the Supplier states is compatible.

4.1.2 Sheet Material on Floor Framing

4.1.2.0 Sheet Material Thickness and Span

All floor membrane sheet substrates must meet the requirements of Table 4.

The materials in this section are generally installed over floor framing in accordance with NZS 3604, Timber-framed buildings, although they may also be used over any framing system that enables them to meet the requirements of Section 4.1.0.2 (p37). Sheet material substrates which do not comply with Table 4 are outside the scope of this Code of Practice.

Table 4: Floor Substrate Thicknesses

Material	**Minimum Thicknesses** (nominal)
Plywood, support @ 400 x 400	18mm
Plywood, support @ 600 x 600	21mm
Compressed sheet @ 400 joists x 1200 nogs/dwangs	18mm
Reconstituted wood panel flooring @ 600 x 600	20mm

4.1.2.1 Sheet Layout and Fixings

Sheet layout and fixings are critical to providing an acceptable waterproof membrane system substrate.

- Sheets must be installed across the joists in a brick-bond pattern
- All edges of the sheets must be fully supported
- There must be solid blocking under all edges of the sheet substrate, including those that have a proprietary jointing strip
- All sheets must be butt-jointed with no visible gaps
- Each sheet must be glued and fixed with stainless steel counter-sunk screws. Any water-resistant construction adhesive can be used for all sheets except for reconstituted wood panel flooring which requires a polyurethane adhesive.
- Fixing dimensions should be in accordance with the sheet manufacturer's fixing requirements
- Screw spacing must be at a minimum of 150mm centres at the perimeter of the sheet and 200mm through the body of the sheet
- All sheets must be fixed from the centre outwards to reduce bowing

Complex falls will require additional blocking to provide full support to all full and cut sheets.

4.1.2.2 Plywood

Plywood must meet the requirements of with AS/NZS 2269, Plywood - Structural - Part 0: Specifications, and the substrate must also meet the following additional requirements:

- The stress grade of plywood substrates must be a minimum of F8
- The top surface of the plywood must be sanded and plugged, to a minimum standard of C grade

- Plywood substrates for the installation of a waterproof membrane system must be CCA-treated H3 grade, and timber accessory components must be CCA-treated to H3 or H3.2. LOSP treated substrate components, eg plywood and timber accessories such as solid timber fillets must not be used.

Some waterproof membrane systems will react with the solvent for LOSP treatments.

- The moisture content of plywood at the time of priming must not exceed 18%
- Prime all face surfaces and edges prior to sheet installation

4.1.2.3 Compressed sheet

Compressed sheet must be manufactured to meet the requirements of AS/NZS 2908.2, Cellulose-cement products - flat sheets, Type B, Category 3 or higher.

Compressed sheets are an impermeable and dimensionally stable product, made of cellulose fibre reinforced cement. The basic composition is Portland cement, ground sand, cellulose fibre and water.

Sheets must be kept dry throughout the construction process prior to installation of the waterproof membrane system.

Prime all face surfaces and edges prior to sheet installation. Edges may require a specific surface sealer. Refer to Supplier.

4.1.2.4 Reconstituted Wood Panel Flooring

Non-oriented strand board panels that are bonded with PMDI resin, are water repellent, have an average density of 680kg/m^3, are treated to H3 with a waterborne treatment not LOSP, and are suitable for use as the timber substrate under wet-area waterproof membrane systems.

The moisture content of reconstituted wood flooring at the time of priming must not exceed 16%.

All face surfaces and edges must be primed prior to sheet installation.

All reconstituted wood panels, boards or products other than non-oriented strand board as described above are outside the scope of this Code of Practice. Particleboard is not suitable for use as a new floor to any wet area.

Other reconstituted wood flooring products may be suitable but are outside the scope of this Code of Practice.

PARTICLEBOARD MUST NOT BE USED AS A NEW SUBSTRATE IN ANY WET AREA

4.1.3 Sheet Overlay on Existing Framed Flooring

This Code of Practice allows the use of a sheet overlay as the substrate for the waterproof membrane system, over an existing timber strip or particle board flooring. It does not allow the use of timber strip or particle board flooring with new floors.

This allows a membrane to be used in some existing buildings where the existing flooring does not meet the Code of Practice requirements for new flooring.

Where an existing natural timber floor surface must remain visible in a wet area for historic or aesthetic reasons, and a conventional waterproof membrane system installation cannot be incorporated, consult with a waterproof membrane system Supplier for specific recommendations.

Sheet overlays to existing timber strip or particle board flooring must be installed and fixed in accordance with the overlay supplier's instructions, and must be one of the following:

- Plywood sheet: minimum 12mm thickness; meeting the requirements of AS/NZS 2269, Plywood - Structural - Part 0: Specifications; stress grade 8; H3 CCA-treated; with top surface sanded and plugged to a minimum standard of C grade; face surfaces and edges primed prior to sheet installation; moisture content at the time of priming not to exceed 18%.
- Compressed sheet or fibre-cement sheet designed for floor overlay use: minimum 6mm thickness; meeting the requirements of AS/NZS 2908.2, Cellulose-cement products - flat sheets Type B; Category 3 or higher.
- Reconstituted wood panels: 16mm minimum thickness; bonded with PMDI resin, water repellent, with an average density of 680kg/m3, moisture content at the time of priming not exceeding 16%, treated to H3 with a waterborne treatment (not LOSP) and are suitable for use an overlay under wet-area waterproof membrane systems. Prime all face surfaces and edges prior to sheet installation.

4.1.4 Sheet Wall Substrates

4.1.4.0 General

All sheet wall lining substrates must meet the requirements of Table 5 below.

The materials in this section are generally referred to as wall lining materials and are usually installed over framing designed in accordance with NZS 3604, Timber-framed buildings, although they may also be used over any framing or support system that enables them to meet the requirements of 4.1.0.2 (p37). Sheet material substrates not in compliance with Table 5 (p43) cannot be used with this Code of Practice.

Sheet wall linings must be detailed and installed strictly according to the requirements of the substrate manufacturer.

Sheet wall linings require the use of waterproof membrane systems which are designed for flexible substrates. Use a Class 2 or 3 waterproof membrane system.

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Table 5: Sheet Wall Linings

Material	**Minimum Thicknesses** (nominal)
Water-resistant gypsum plasterboards	10mm
Fibre-cement sheet	9mm
Reconstituted wood panels	12mm
Plywood	12mm

Notes:

1. The maximum allowable stud spacing is 600mm
2. Where a sheet lining is used as the substrate, use a waterproof membrane system that is designed for a flexible substrate.
3. Where a tiled over-surface finish will be used, the sheet lining thickness and stud spacing must meet the sheet lining supplier's requirements for the proposed tile thickness, weight and maximum tile size.

4.1.4.1 Gypsum plasterboards

Where gypsum plasterboard is installed, water-resistant grade gypsum plasterboard which meets the requirements of AS/NZS 2588, Gypsum plasterboard, must be used.

Where a gypsum plasterboard substrate is used, use a waterproofing system that is designed for a flexible substrate. Use a Class 2 or 3 waterproof membrane system.

4.1.4.2 Fibre-cement sheet

Where a fibre-cement sheet is installed, sheets which meet the requirements of AS/NZS 2908.2, Cellulose-cement products - flat sheets for Type B, Category 3 or higher, must be used.

Fibre-cement sheet wall substrates require the use of a waterproofing system that is designed for a flexible substrate. Use a Class 2 or 3 waterproof membrane system.

4.1.4.3 Plywood

Where plywood is installed, it must meet the requirements of AS/NZS 2269, Plywood - Structural - Part 0: Specifications, and be stress grade F8, H3 CCA-treated, with outer surface sanded and plugged to a minimum standard of C grade, with face surfaces and edges primed prior to sheet installation, and moisture content at the time of priming not exceeding 18%.

Where a plywood substrate is used, use a waterproofing system that is designed for a flexible substrate. Use a Class 2 or 3 waterproof membrane system.

4.1.4.4 Reconstituted Wood Panels

Where reconstituted wood panels are installed, they must be non-oriented strand board sheets bonded with PMDI resin, water repellent, with an average density of 680kg/m^3, and treated to H3 with a waterborne treatment (not LOSP), and suitable for use as the timber substrate under wet-area waterproof membrane systems. The moisture content of reconstituted wood panels at the time of priming must not exceed 16%.

Where a reconstituted wood panel substrate is used, use a waterproofing system that is designed for a flexible substrate. Use a Class 2 or 3 waterproof membrane system.

4.1.5 Non-Sheet Wall Substrates

4.1.5.1 Cement Plaster

Portland cement plasters must be installed to NZS 4251 and finished to a light sponge finish.

> *Other proprietary plaster products may be suitable but are outside the scope of this Code of Practice.*

Plasters must be allowed to cure for 7 days prior to waterproofing and be dry with a surface hygrometer or moisture meter reading of “dry to paint” before the waterproofing process can begin.

> *Some fast-drying and fast-hydrating plasters can be waterproofed sooner.*

4.1.5.2 Concrete

Before the application of any waterproof membrane system, the concrete surface must be finished to NZS 3114, Concrete surface finishes - F4X (no abrupt variations or offsets). It must be free of any contaminants that might affect membrane adhesion.

Sufficient drying time must elapse after concrete placing for the moisture content of the concrete to be low enough for membrane application. The Applicator must confirm this by testing with a hygrometer, with a result of not more than 75% relative humidity @ 25°C.

Even if moisture content is acceptable sooner, a minimum 28-day curing period of the concrete is necessary before waterproof membrane systems are installed.

> *The recommended preparation is as follows:*
>
> - *Fully remove any release agent that has been used.*
> - *Ensure that the maximum moisture content is 75% relative humidity as measured by a surface-mounted hygrometer.*
> - *Ensure all surface defects and contaminants are removed and the surface is cleaned.*
> - *Fill all holes, trowel flat and true any surface imperfections with a suitable waterproof filling compound.*

Existing concrete substrates must be prepared and cleaned as per the Supplier’s specific recommendations for the particular situation.

4.1.5.3 Concrete Masonry

Concrete masonry must be installed in accordance with NZS 4210, Masonry construction: materials and workmanship.

To ensure a non-porous substrate surface suitable for the application of the waterproof membrane system, faces of concrete masonry must either:

- Be plastered over in accordance with 4.1.5.1 above

Or

- Where allowed by the Supplier’s handling/installation instructions, have mortar joints struck flush and the entire surface sealed in accordance with those instructions.

Concrete masonry left in its natural state is outside the scope of this Code of Practice.

Sufficient drying time must elapse after grouting for the moisture content of the concrete masonry to be low enough for membrane application. The Applicator must confirm this by testing with a hygrometer, with a result of not more than 75% relative humidity @ 25°C.

Even if the moisture content is acceptable sooner, a minimum 28-day curing period of the grouting of concrete masonry is necessary before any waterproof membrane system is installed.

4.1.5.4 AAC Panel or Block

AAC panels and blocks must be installed in accordance with the panel or block manufacturer's instructions.

The faces of AAC panels are inherently porous. To ensure a non-porous substrate surface suitable for the application of the waterproof membrane system, AAC panels and blocks must either:

- Be plastered over in accordance with 4.1.5.1 above

Or

- Where allowed by the Supplier's handling/installation instructions, have the entire surface sealed in accordance with those instructions.

Where a self-finish membrane will be used, all joints in the AAC must be filled and finished flush with a compatible material in accordance with the Supplier's handling/installation instructions, before the application of the waterproof membrane system.

4.2 Sound Insulation and Heating Systems

Wet-area waterproof membrane systems that will be installed in conjunction with specialist systems such as underfloor heating and sound insulation systems are beyond the scope of this Code of Practice. Commentary on such systems is provided in Section 7, Specialist Systems (p74).

The purpose of the waterproofing layer is to protect the building elements from the effects of free water.

When installing sound insulation, heating or thermal insulation layers, the following principles apply:

- *Any post-applied heating system to the substrate is usually installed above the first waterproof membrane system.*
- *Sound insulation materials or heating elements can be adversely affected by moisture, which could reduce their effectiveness.*

Designers should take this into account and, if necessary, include a second waterproofing element.

- *Sound insulation materials may break at the floor/wall junction, so the waterproof membrane system should be adequately detailed to provide continuity.*
- *Main Contractors and other trades should take care to avoid damage that will affect the waterproofing integrity of the waterproof membrane system.*

The Designer should consult with both the supplier of these systems and the waterproof membrane system Supplier to ensure compatibility, performance, and that the whole installation is correctly specified.

4.3 General Design Principles for Shower Areas

Wet-area waterproof membrane systems used in shower areas must meet the following requirements:

Shower areas are exposed to water in the normal course of use. Poor design decisions can lead to a greater risk of failure.

1. Shower floors and trays must have a positive fall towards an outlet, under all reasonably anticipated conditions of deflection, shrinkage etc. that will occur during normal occupancy. Where no wall, screen, door or curtain will be provided, the fall shall apply to the floor area within a radius of 1.5m, taken from a point vertically below the shower rose.

A prescribed fall of no less than 1:50 provides a reasonable allowance for deflections, construction tolerances, etc. with most forms of construction. Specific engineering design that takes into account calculated deflections and detailed consideration of expected shrinkages and tolerances based on the proposed construction systems and techniques, may allow a lesser prescribed fall.

2. If a hob is provided where a shower floor or tray meets the adjacent floor area and a rigid screen or door is provided, the screen or door must be positioned at the inside edge of the hob, and if the base of the screen or door prevents the passage of water flowing off the hob, the top of the hob must slope away from the screen or door. In other situations, (shower screen or door does not prevent water flowing off the hob, or curtain provided, or open shower area), the top of the hob must slope inwards toward the shower area.

Shower floors and trays may have a step-down or a hob where they meet the adjacent floor area or may have a flush threshold. The height of any step-down or hob should be appropriate for the design intentions and is outside the scope of this Code of Practice. Where shower areas are for use by people with disabilities, they should have a flush threshold.

The slope at the top of the hob is intended to ensure water runs off the top of the hob, does not pond against the base of any screen or door, and will run back into the shower area when possible.

3. For a preformed shower tray, secondary shower linings, eg acrylic liner, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, must be provided to the shower area walls and the inside face of the hob if needed. These linings must be packed off the membrane-treated wall or hob surface and overlap and be sealed to the upstand of the shower tray as shown in Fig 26 (p54). The waterproof membrane system must be continuous across the floor under the shower tray and up the walls (and inside face of the hob) behind the upstand. The membrane must be installed before the shower tray and must seal around the shower waste.
4. The minimum height of waterproof membrane systems used to protect the walls of shower areas is the higher of:
    a. 300mm above the shower rose; and
    b. 1800mm above the shower floor or tray.

    When enclosures (eg, walls, screens, doors or curtains) are used, they must be continuous from floor level or the top of the hob, to at least the same minimum height.

5. Water control valves and shower rose fittings within a shower area wall to which a waterproof membrane system is required, must be waterproofed where they penetrate through the membrane and through any secondary lining and any over-surface finish. The penetration must be detailed in a manner that allows access to enable repairs and replacement of washers or ceramic discs without damaging the wall lining or membrane. This must be done by using a proprietary flange system, which encompasses the valve or fitting body, and will trap and discharge any potential leaks through the front of the flange and down the wall lining, as shown in Figs 29 and 30 (p55).

This provides protection against damage from some plumbing leaks and avoids the need to replace shower linings when plumbing fittings require replacement. This level of protection may exceed the requirements of the NZ Building Code.

6. Windows must not be located in the wall area to which a waterproof membrane system is required.

There is a risk of water permeating through joints in the window reveal. This risk can be mitigated by designing window head, jamb and sill junctions to be impervious, sealed and durable, and using sills which fall inwards to the shower area. Details for achieving these requirements will require considerable attention and rely on careful installation and regular maintenance. They are beyond the scope of this Code of Practice.

4.4 General Design Principles for Baths

Wet-area waterproof membrane systems used under, behind and adjacent to bath areas must meet the following requirements:

Baths and their immediate surrounds are a location where internal wet-area waterproof membrane systems can be exposed to large volumes of water. Poor design decisions can lead to greater risk of failure.

1. Waterproof membrane systems must be finished to at least 150mm above the top of the bath, or higher if necessary, to ensure it extends above the point of entry through the wall of any taps, spout or other plumbing fitting.
2. If there is a shower over the bath, then all adjacent walls will require waterproofing as per the shower area requirements.
3. The bath front panel(s) of built-in baths must have a waterproof membrane system which:
   a. Extends over the full area of the bath front panels; and.
   b. Is joined into the body of the waterproof membrane system to the floor as shown in Figs 6 (p31), 10 (p33) and 13 (p36). Liquid membranes form a continuous in situ membrane and any detailing at a three-way junction detailing must be as per Suppliers' instructions and similarly at its ends is joined into the body of the waterproof membrane system to the walls.
4. For baths with showers over, the bath must have an upstand lip and secondary shower linings, eg acrylic liner, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, must be provided to the surrounding walls, these linings must be packed off the membrane-treated wall surface, and overlapped and be sealed to the bath lip as shown in Figs 31 and 32 (p57).

5. A built-in bath without a shower over must either:
   a. Have an upstand lip and be installed in the same manner as for a bath with shower over; or
   b. Be installed within a level surround, with the waterproof membrane system continuous across the top of the surround under any over-surface finish and down the wall behind the bath as shown in Figs 33 or 34 (p58).
6. Wall-mounted water control valves, spouts and shower rose fittings serving a bath area to which a waterproof membrane system is required, must be waterproofed where they penetrate through the membrane, any secondary lining and any over-surface finish. The penetration must be detailed to allow access to enable repairs or replacement of washers or ceramic discs without damaging the wall lining or membrane. This must be done by using a proprietary flange system, which encompasses the valve or fitting body, and will trap and discharge any potential leaks through the front of the flange and down the wall lining, as shown in Figs 29 or 30 (p56).

a. For both built-in and free-standing baths, the waterproof membrane system must continue down the wall behind the bath and across the floor under the bath, to provide a continuous waterproof layer. For a built-in bath, provision may be required if the bath does not incorporate its own overflow to remove water in case of a plumbing failure as shown in Figs 7 (p32) or 9 (p33).

4.5 Design Detailing

For the following drawings that show acceptable construction details, note that:

- Blue shaded areas in 3D views indicate surfaces to which the membrane is applied
- Dotted lines in 2D sections indicate the position of the waterproof membrane system.
- Where tiling is shown, it is indicative only.
- Drawings are not to scale

4.5.1 Water-stops

Water-stops must be constructed as shown in Fig 14 below.

At door thresholds, the membrane must be dressed to the base of the door jamb as shown in Figs 18-20 (p50).

Water-stops are required by Section 4.0 at edges of a wet-area waterproof membrane system where an upstand against a wall cannot be formed.

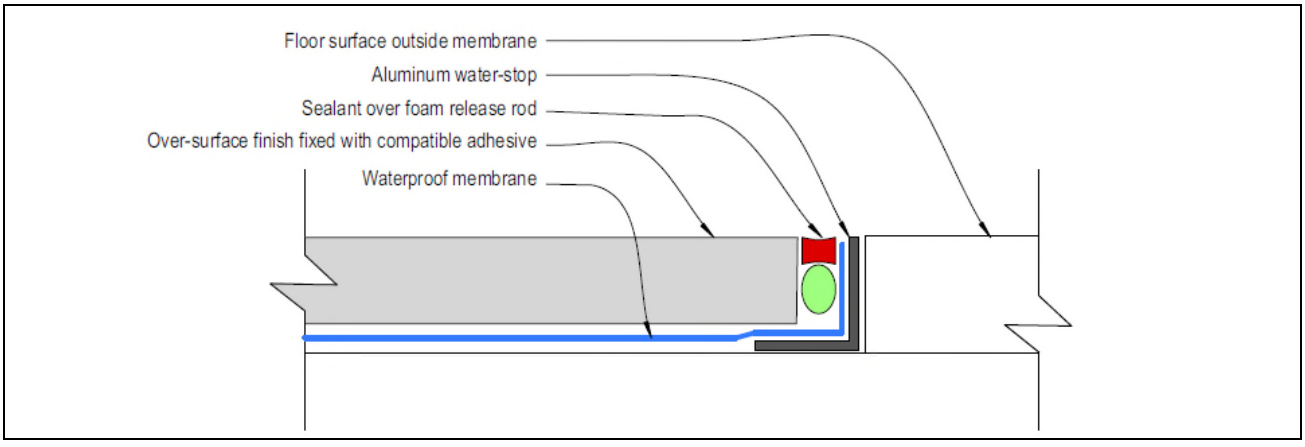

Figure 14: Water-stop at termination of waterproof membrane system

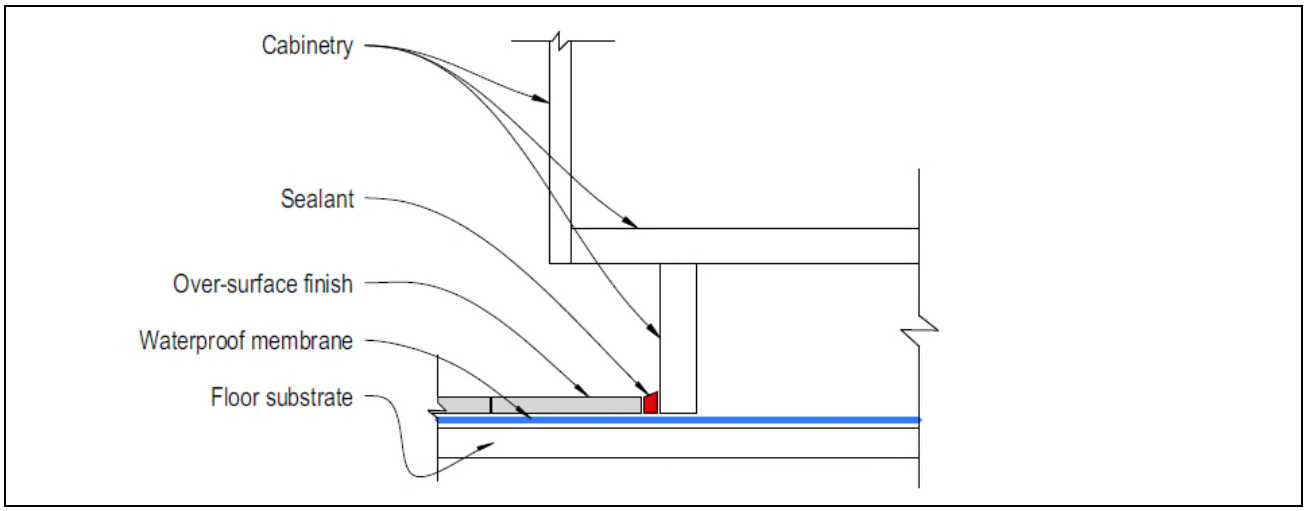

Figure 15: Waterproof membrane system installed before cabinetry

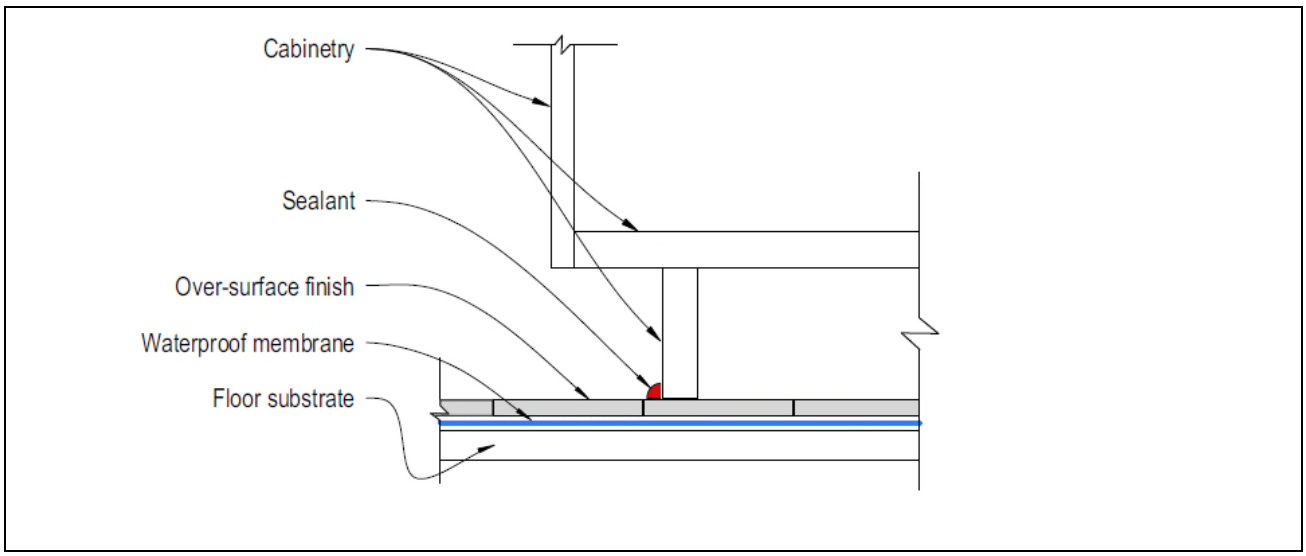

Figure 16: Tiles and waterproof membrane system under cabinet

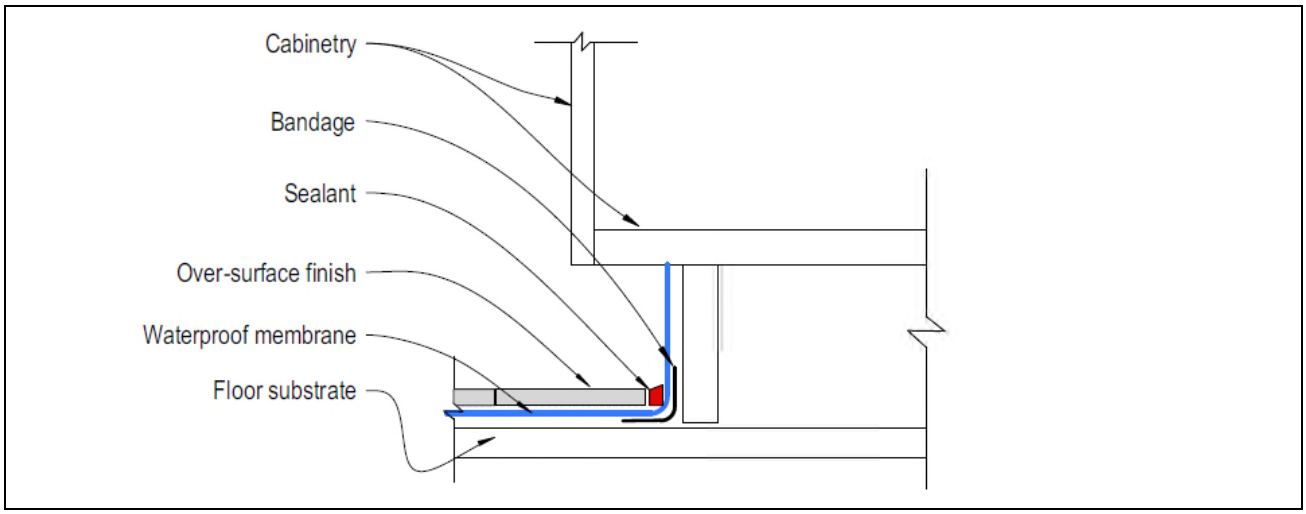

Figure 17: Waterproof membrane system installed after cabinetry

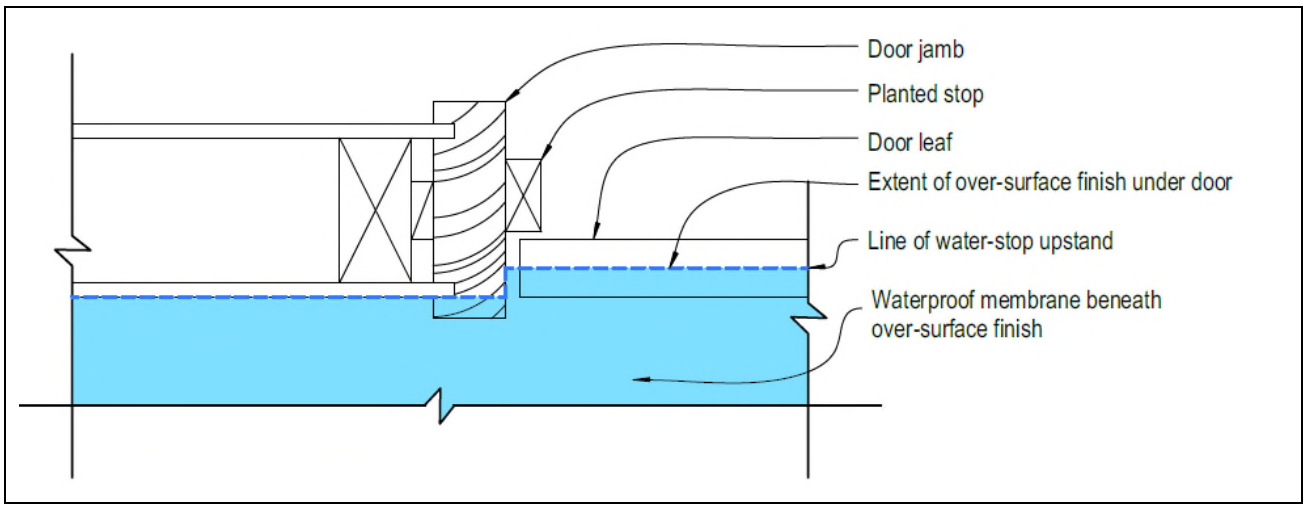

Figure 18: Plan view of water-stop under door jamb

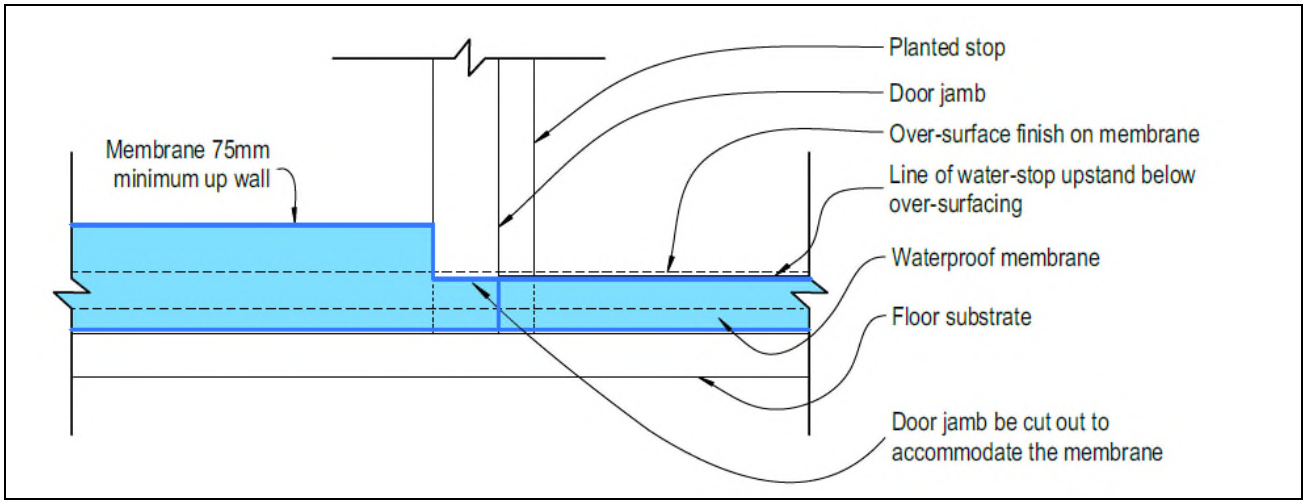

Figure 19: Elevation/edge of door jamb with water-stop under door

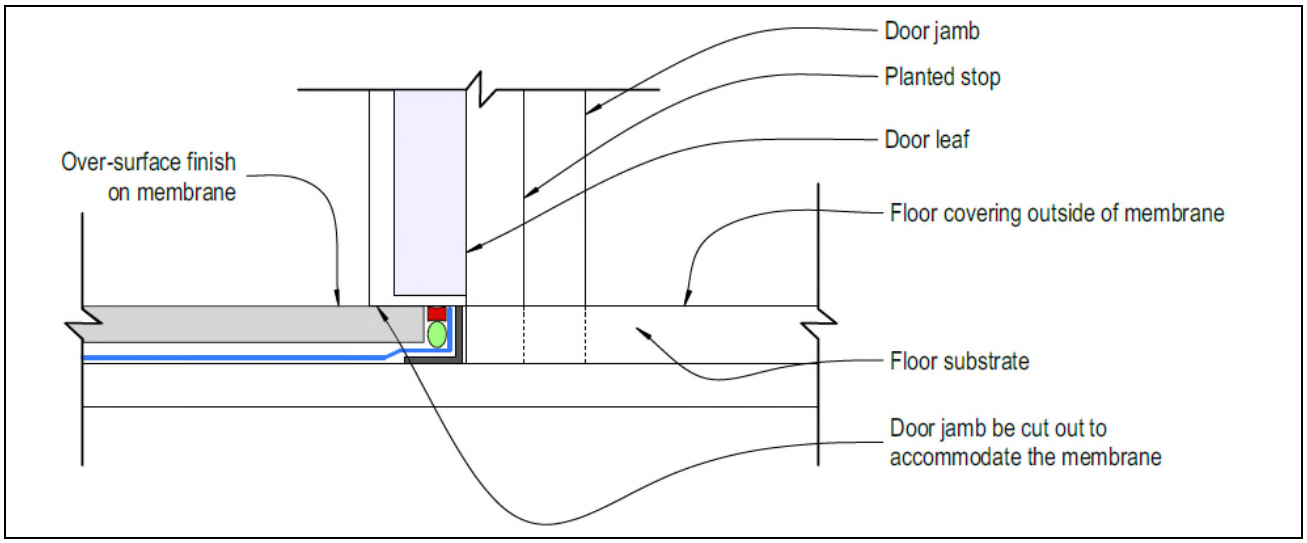

Figure 20: Face of door jamb with water-stop under door

(drawing notes on next page)

Notes:

1. Where architraves will be used, these must be fitted after the waterproof membrane and the base of the architrave must align with the top of the cut-out in the door jamb. The architrave will obscure part of the upstand of the waterproof membrane.
2. Refer to Fig 14 (p49) for construction of the water-stop.

4.5.2 Floor-to-wall Junctions

At the perimeter of the room, the waterproof membrane system must form an upstand of at least 75 mm above floor level, as shown in Fig 21 below. Where a membrane will also be provided to the wall face, this must be continuous with the membrane to the floor as shown in Fig 22 (p52).

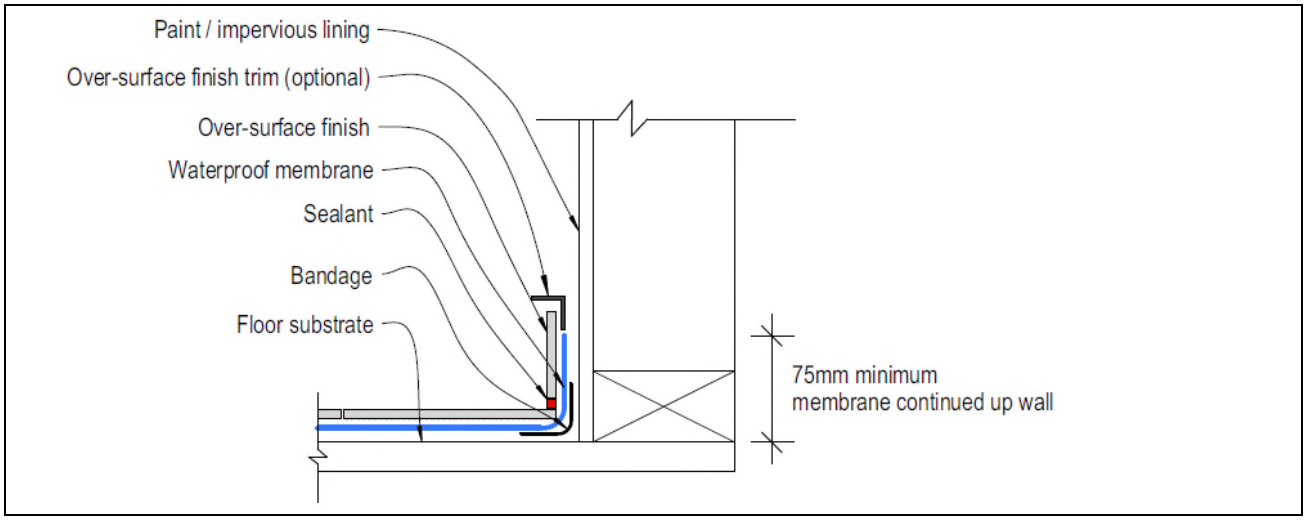

Figure 21: Waterproof membrane system behind skirting

Notes:

1. Provide a 20 x 20mm timber fillet (CCA-treated to H3.2) or a 10mm sealant fillet, where required by the Supplier's handling/installation instructions.
2. For waterproof membrane systems with a self-finish, the over-surface finish to the floor, the sealant bead, and the skirting are not required.
3. If the membrane will not also be provided to the wall face, then it must be applied to a minimum 75mm above floor level.

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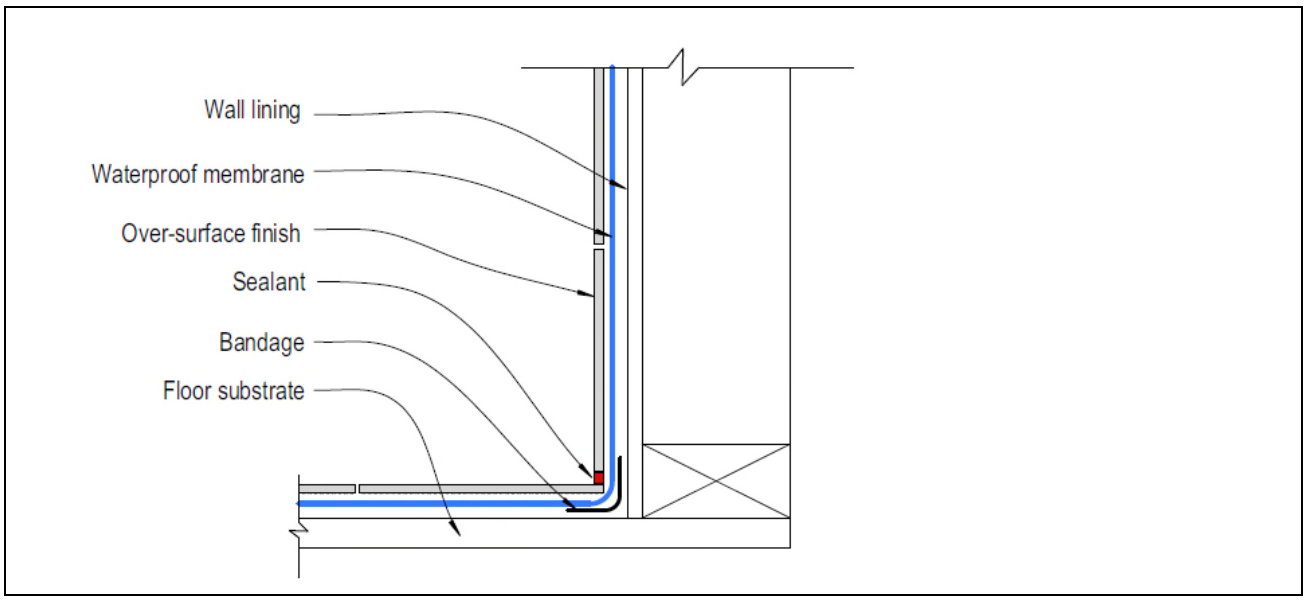

Figure 22: Waterproof membrane system behind over-surface finish to walls

Notes:

1. Provide a 20 x 20mm timber fillet (CCA-treated to H3.2) or a 10mm sealant fillet, where required by the Supplier's handling/installation instructions.
2. For waterproof membrane systems with a self-finish, the over- surface finish to the floor and wall, and the sealant bead, are not required.

4.5.3 Control Joints

At control joints in a substrate, the joint shall be carried through to the over-surface finish (if any) in accordance with Figure 15. For screed or plaster applied to a floor or a wall, control joints in the floor or wall must be carried through the screed or plaster and through to the over-surface finish.

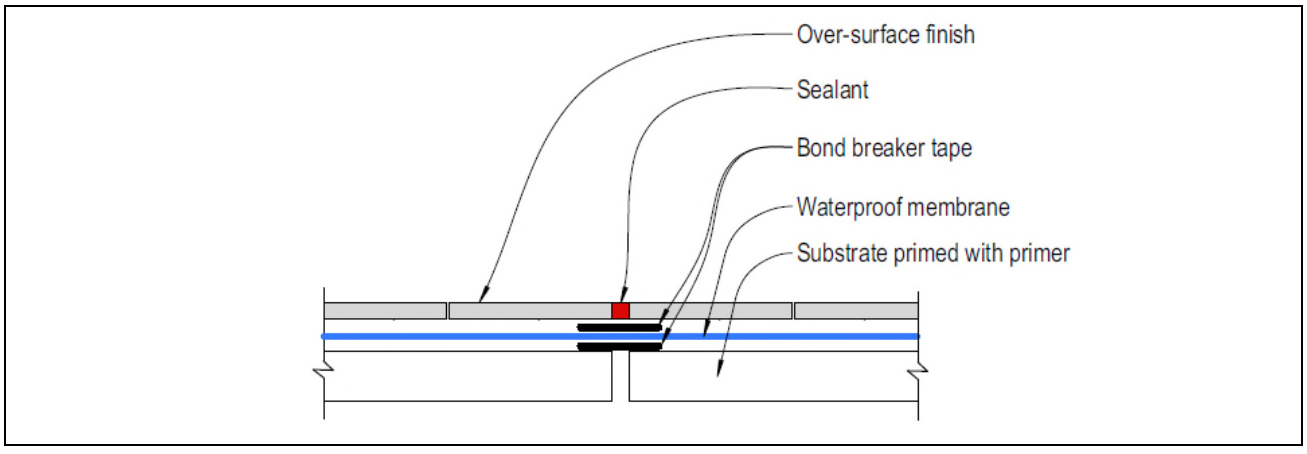

Figure 23: Waterproof membrane system over a control joint in the substrate

Notes:

1. For waterproof membrane systems with a self-finish, the over-surface finish and the sealant bead are not required.

4.5.4 Shower Area to Adjacent Floor

Where a shower floor meets the floor of the room, the junction shall be constructed as shown in Figs 24-26 as below.

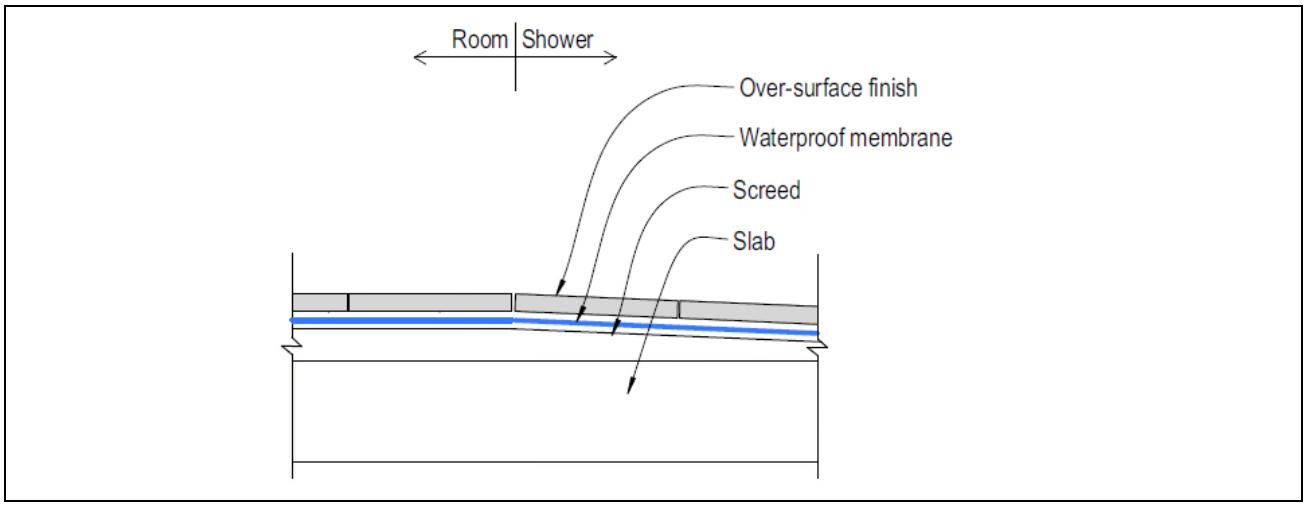

Figure 24: Typical tiled shower area with no hob

Notes:

1. Where a screed is not used to form falls, falls must be formed in the installation of the substrate itself, eg lay sheet substrates on firrings.
2. Grout lines must be positioned over direction changes in the waterproofing membrane system.

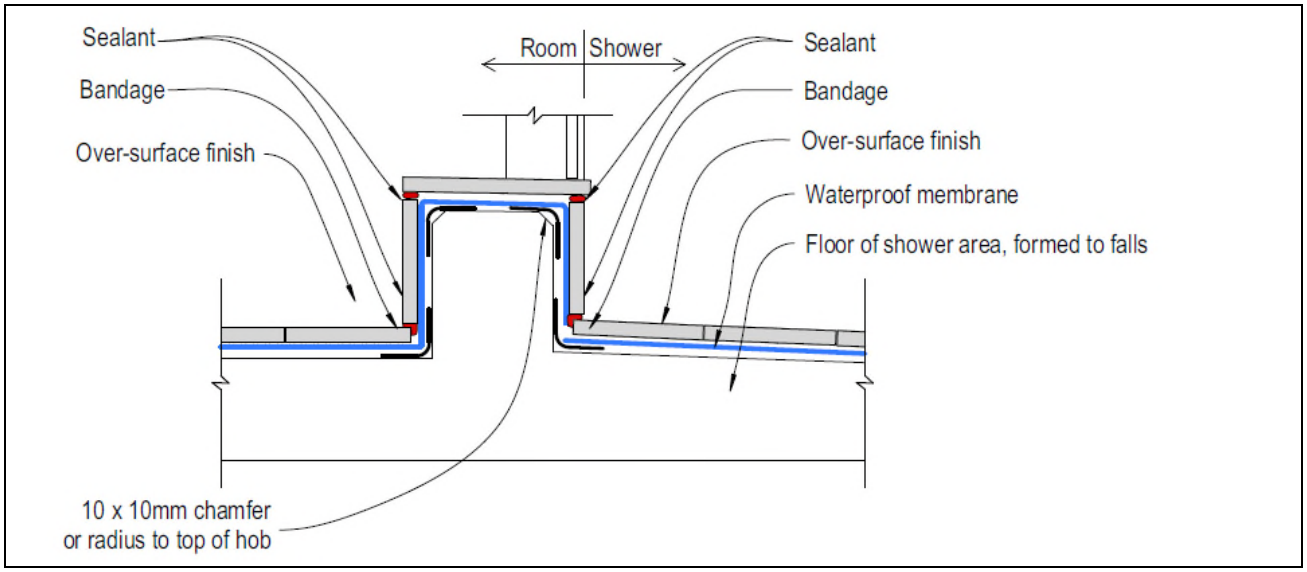

Figure 25: Typical formed shower area with integral hob

Notes:

1. The hob structure is drawn indicatively. It may be formed as part of a concrete slab or from timber framing.
2. Where a screed is not used to form falls, falls must be formed in the installation of the substrate itself, eg lay sheet substrates on firrings.
3. Provide a 20 x 20mm timber fillet (CCA-treated to H3.2) or a 10mm sealant fillet to internal corners, where required by the Supplier's handling/installation instructions.
4. Top edges of the hob must be chamfered or radiused by 10 x 10mm.

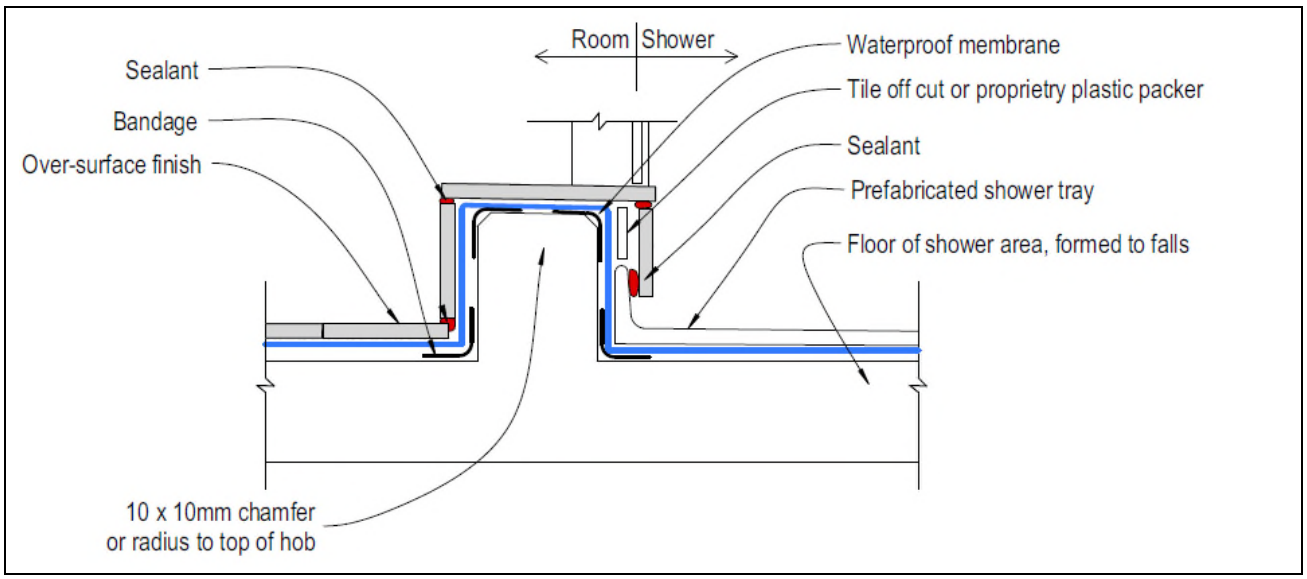

Figure 26: Typical shower area with prefabricated shower tray

Notes:

1. The hob structure is drawn indicatively. It may be formed as part of a concrete slab or from timber framing.
2. The inside (shower area) face of the hob must be packed out to accommodate the width of the shower tray rim.
3. Provide a 20 x 20mm timber fillet (CCA-treated to H3.2) or a 10mm sealant fillet to internal corners, where required by the Supplier's handling/installation instructions
4. Top edges of the hob must be chamfered or radiused by 10 x 10mm.

4.5.5 Penetrations for Piped Services

Penetrations for piped services must be waterproofed as shown in Figs 27 and 28 as below, as appropriate for the type of services.

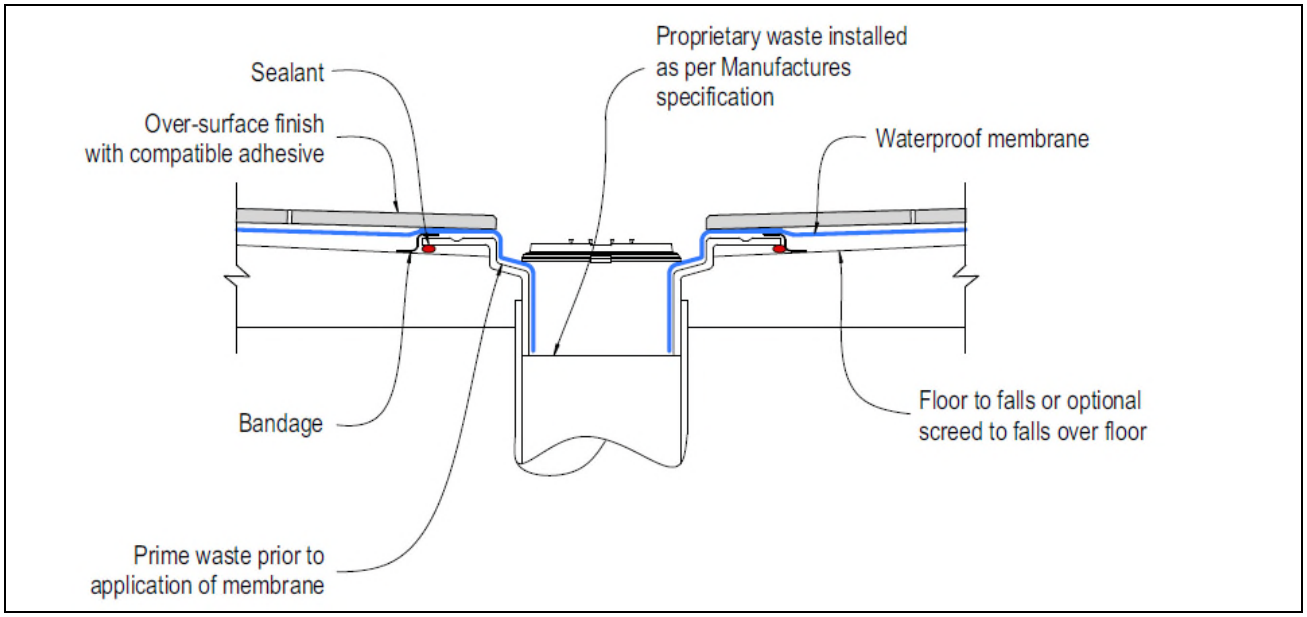

Figure 27: Waterproof membrane system into floor waste outlet

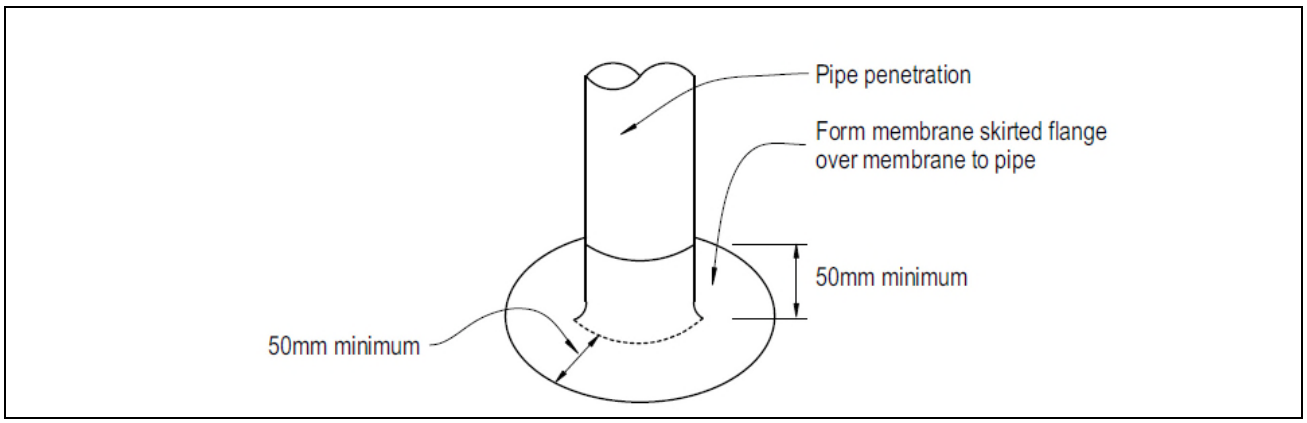

Figure 28: Pipe penetrations

Notes:

1. This figure applies to both horizontal and vertical pipe penetrations for any type of waterproof membrane system.
2. Refer to Supplier's handling/installation instructions.
3. Provide a 10mm sealant fillet, where required by the Supplier's handling/installation instructions.

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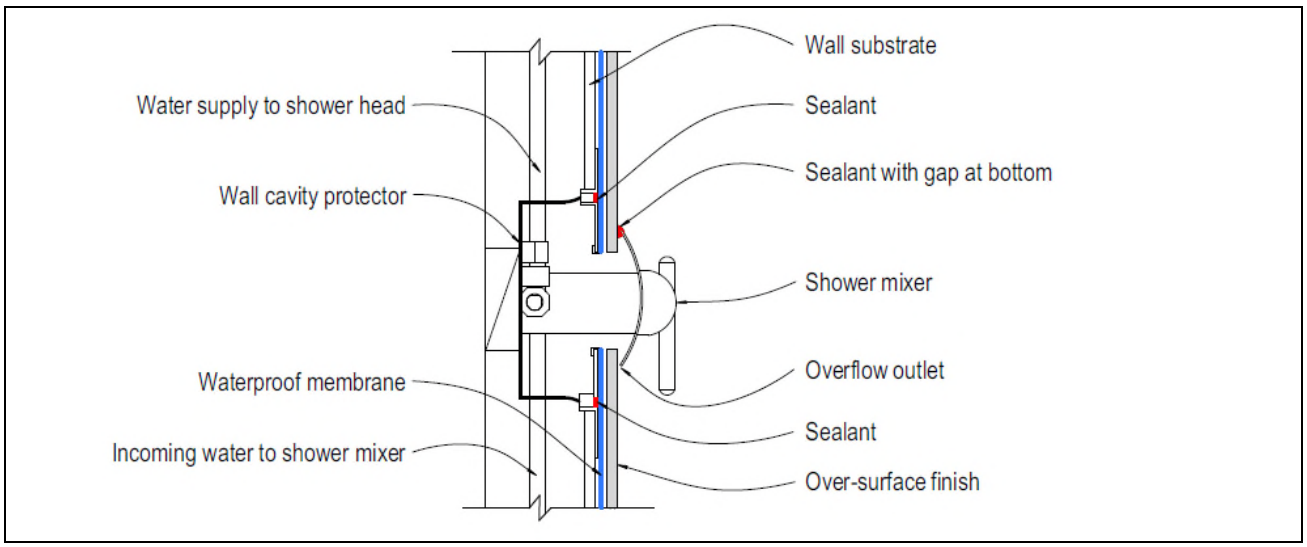

Figure 29: Waterproof membrane system around wall penetration in shower area with over-surface finish

Notes:
1. While a mixer is shown in the figure, a rose or tap would be similar

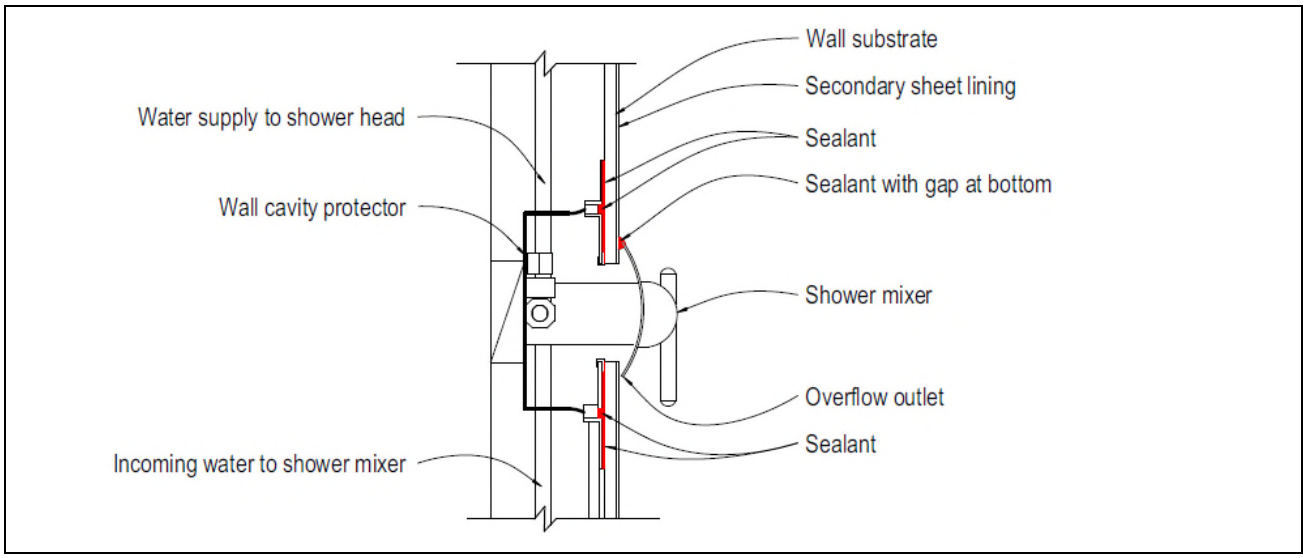

Figure 30: Waterproof sealing around wall penetration in shower area with a secondary sheet lining

Notes:
1. The incoming water supply to the shower mixer passes through side of cavity protector.
2. A mixer is shown in the figure, a rose or tap would be similar
3. Secondary linings, eg acrylic liner, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, must be provided where a prefabricated shower tray is used, packed off the membrane-treated wall surface. and overlap and be sealed to the shower tray rim.
4. Secondary sheet linings do not require a waterproof membrane.

4.5.6 Bath-to-wall Junctions

There is a wide variation to bath lip or edge designs. The Designer must consider how best to waterproof behind, around and up to the bath. If there is any doubt, contact the waterproof membrane Supplier.

Where a bath rim meets a wall and dependent on the wall over-surfacing, the junction shall be constructed as shown in Figs 31 and 32 below.

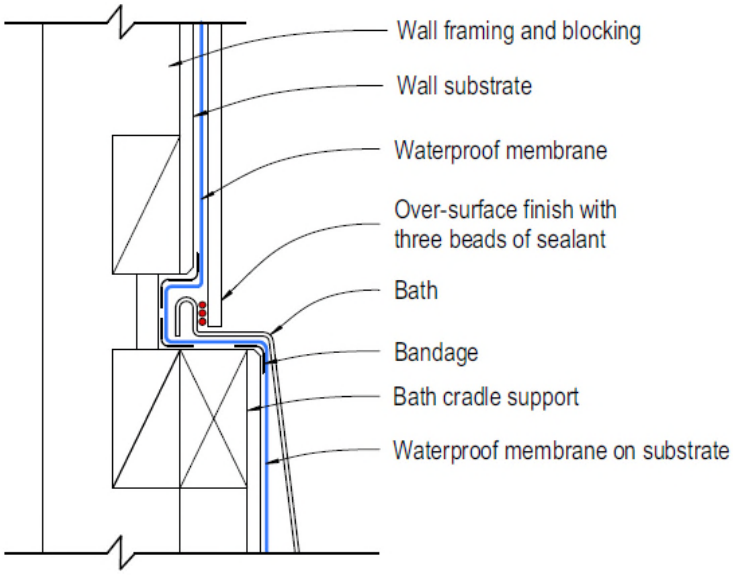

Figure 31: Bath sealed to wall, membrane behind over-surface finish

Note:

1. Where baths are sealed to the wall, the membrane must be continued down to the floor and secondary linings, eg acrylic liner, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, provided which are packed out sufficiently over the lip and silicone sealed.

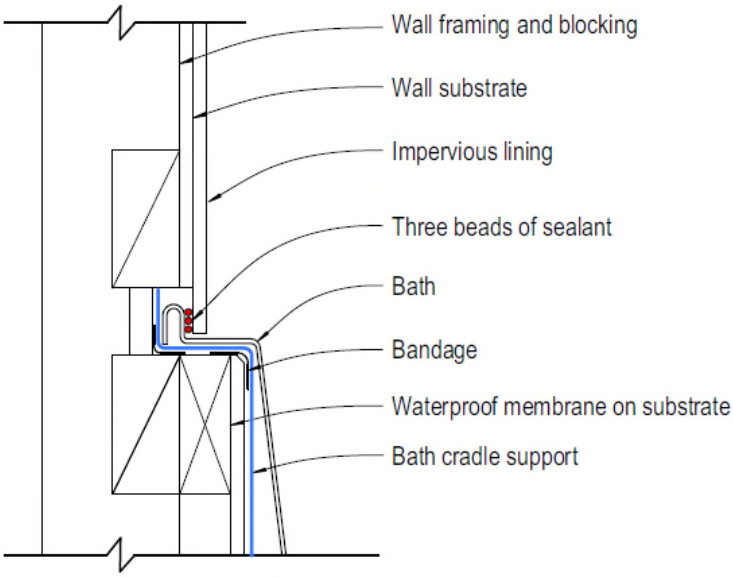

Figure 32: Bath sealed to wall, no membrane behind impervious lining

Note:

1. Where baths are sealed to the wall, the membrane must be continued down to the floor and secondary linings, eg acrylic liner, self-finished sheet linings, or sheet linings with secondary wet area membrane and any over-surface finish such as tiles, provided which are packed out sufficiently over the lip and silicone sealed.
2. A waterproofing membrane system is not required behind an impervious lining.

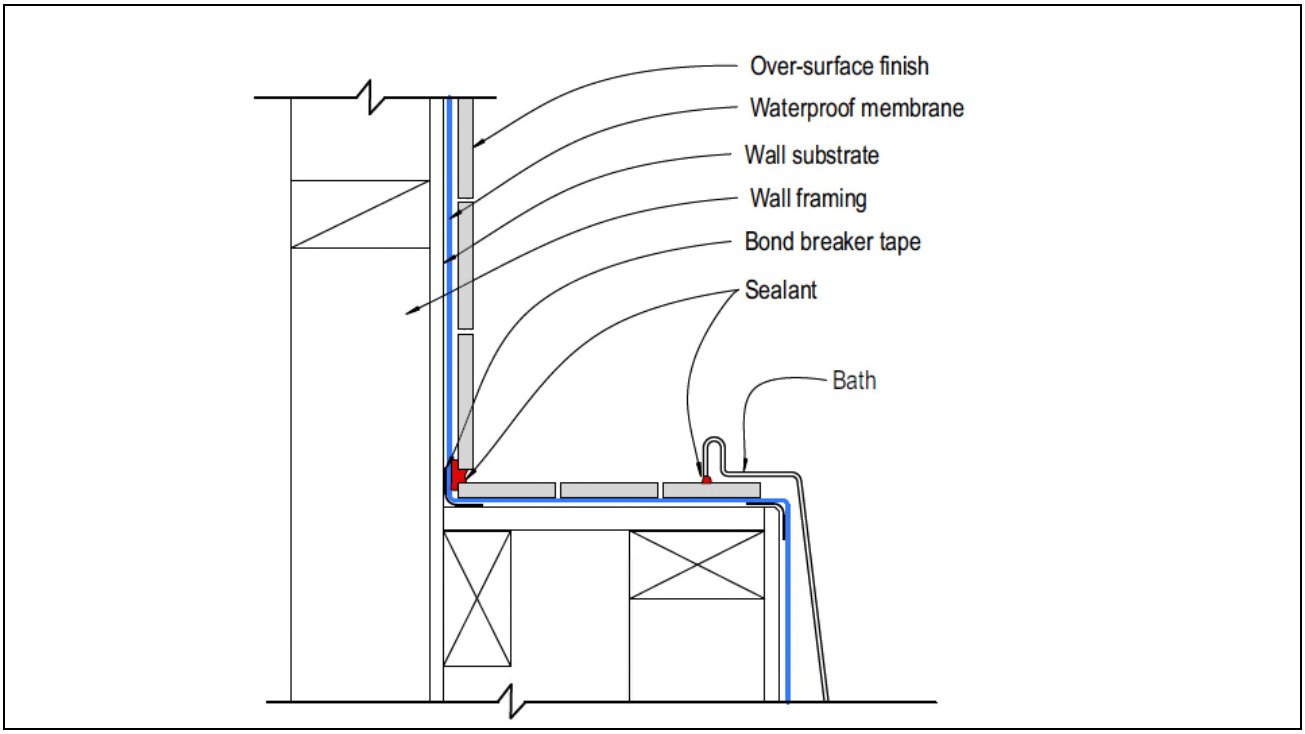

Figure 33: Bath over tiled surround

Notes:

1. Where a bath surround is required, the membrane must go over the substrate of the surround and extend down to the floor.

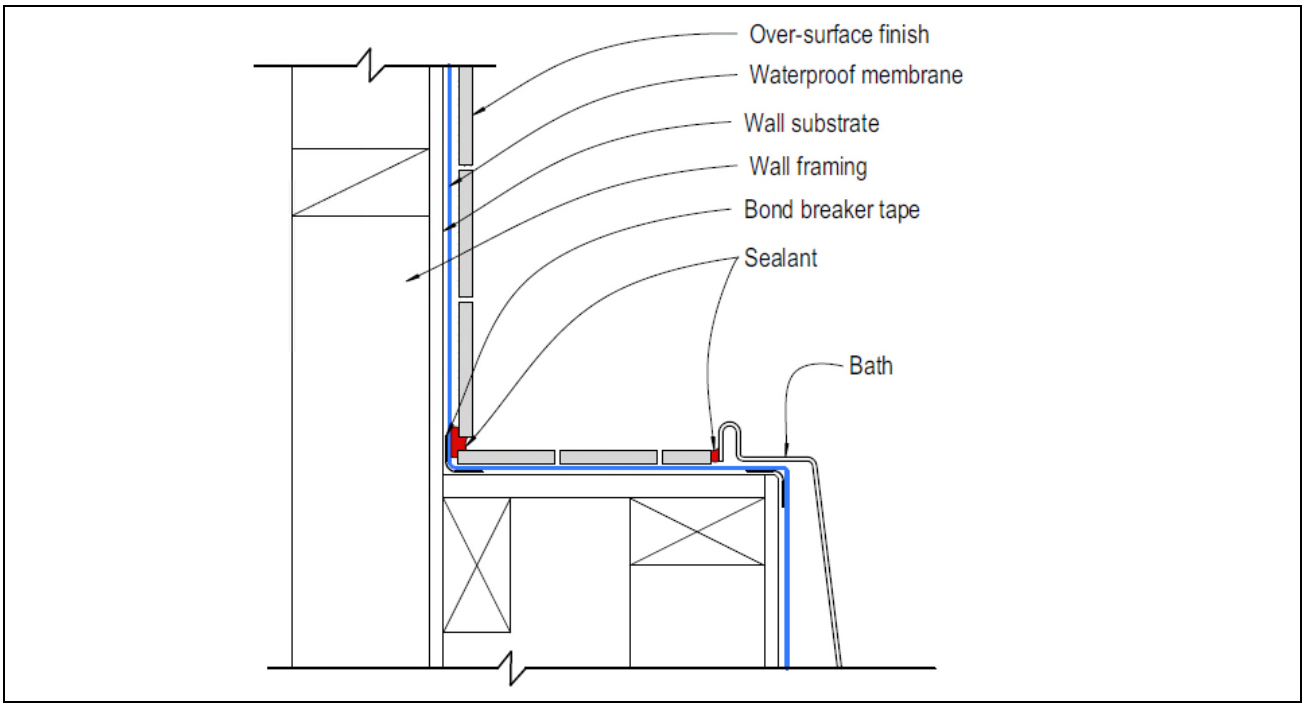

Figure 34: Bath with tiled surround

Notes:

1. Where a bath surround is required, the membrane must go over the substrate of the surround and extend down to the floor.

4.6 Over-surface Finish Requirements

The general requirements for over-surface finishes include (but are not limited to):

- Must not be able to damage membrane.
- Must not involve un-sealed penetrations through the membrane.
- All products including adhesives must be compatible with the membrane.
- The over-surface finish must be easy to clean.

4.6.1 Tiling

All tiling of wet-area waterproof membrane systems must be installed in accordance with AS 3958.1 Ceramic tiles - Guide to the installation of ceramic tiles and AS ISO 13007.1, Ceramic tiles - grouts and adhesives.

Tiles for a shower floor must be laid out to ensure that grout lines are positioned over direction changes in the waterproofing membrane system as shown in Figure 28 below.

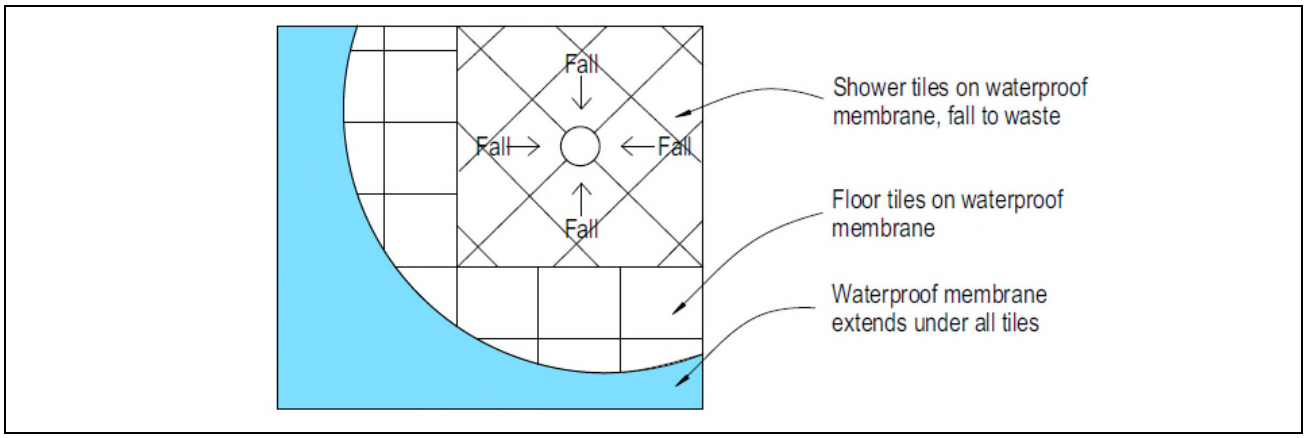

Figure 35: Recommended layout for tiles in shower areas with centre waste

Note:

1. The tile layout on a shower floor must ensure that grout lines are positioned over direction changes in the waterproofing membrane system.

The total length of cut edges of tiles which are placed at direction changes in the waterproofing membrane system should be minimised, to minimise the risk of a cut tile edge damaging the waterproof membrane system.

4.6.2 Timber overlay

To meet the requirements of this Code of Practice, all timber overlays in wet areas must be adequately treated or processed to withstand constant water immersion without degradation or dimensional change.

4.6.3 Vinyl Tile or Sheet Vinyl Overlay

Vinyl tile and sheet vinyl overlay must be installed in accordance with the vinyl manufacturer's instructions using a waterproof adhesive which both the overlay supplier and the underlying waterproof membrane Supplier state is compatible.

4.6.4 All other overlays

All other overlays are outside the scope of this Code of Practice.

4.7 Record of Maintenance Requirements

It is the responsibility of the Designer (who specifies the waterproof membrane system) to determine normal maintenance requirements. These must be based on the Supplier's recommendations and may also include periodic inspections of observable elements.

> *Determining the normal maintenance requirements is necessary in order to confirm that the waterproof membrane system will meet NZ Building Code requirements for durability. In typical situations, a wet area waterproof membrane system must, with normal maintenance, continue to satisfy the performance requirements of the NZ Building Code for 15 years.*
>
> *Section 9 discusses maintenance requirements and includes general maintenance requirements which can be combined with specific requirements from the Supplier of the selected waterproof membrane system.*

A list or description of the normal maintenance requirements must form part of the building consent application.

> *This allows the BCA to confirm its agreement that carrying out the maintenance tasks as listed or described, at the specified frequency, is a reasonable expectation of a Building Owner. If the waterproof membrane system will require more than normal maintenance to remain waterproof, then it will not meet requirements of NZBC clause B2 Durability.*
>
> *A copy of the maintenance list should also be provided to the Building Owner.*

5. Site Practice

This section addresses site relations, trade interactions and site safety.

This section is written for the Applicator, Installer and Main Contractor, and will also assist the Building Consent Authority.

5.0 General

The installation of internal wet-area waterproof membrane systems usually occurs within confined spaces. On-site co-ordination of all trades, scheduling and good site practice is critical for a successful installation.

5.1 Administration / Oversight

The Applicator is responsible for the quality control and the installation of the waterproof membrane system.

The Applicator should co-ordinate and oversee all aspects of the waterproof membrane system (including co-ordination with all pre- and post-work by other trades) with the Main Contractor, to ensure that the work proceeds satisfactorily, provides adequate building protection and minimises disruption to the normal building operations.

A pre-inspection or a pre-installation meeting of all parties involved with the waterproof membrane system (including, if applicable, installers of underfloor heating, sound insulation systems and over-surface finishes) must be held to identify any areas of concern. It is important to resolve and clarify any issues or project requirements, work programme and interaction with other trades, all project documentation as required, product storage, and site health and safety matters.

The Applicator must ensure that all parties are aware of and accept responsibility for the programming of the whole of the waterproofing work, including any curing processes and required curing times.

It is the responsibility of the Applicator to hand over a functioning and completely tested system. The Applicator must formally advise the Main Contractor of the cure time required before any other trade is allowed access to the area.

In the context of this and the following sections:

- The “Applicator” is the company or business entity certified by the Supplier to install its specified waterproof membrane system.
- The “Installer” is a site worker who installs the waterproof membrane system or supervises its installation on site, and who works for the Applicator (which is a company or business entity). The Installer must work within recommended trade practices, and have been trained and certified by the Supplier, to ensure that the product is installed as intended by the Supplier.
- In some instances, the Applicator and Installer might be the same person.

5.2 Project Commencement

Before commencing work, the Applicator should determine that:

- *All the building consents have been issued, and the approved specifications and detailed drawings are workable and suitable for the project.*
- *There is nothing that will compromise the Applicator's required responsibilities under this Code of Practice and the Building Act 2004.*
- *The substrate is sound, clean, cured, dry and free from any other blemish or condition that would affect proper installation and performance of the waterproof membrane system.*
- *No conditions at the site prevent the Applicator from performing in a professional and safe manner.*
- *The product to be installed is as specified in the building consent documents.*

5.3 Acceptable Information

The Main Contractor or Building Owner should make the following documents available in an accessible location on-site:

- *Consented project drawings and specifications.*
- *Any other relevant project documents.*

The Applicator should not start work unless the above documents are available. In addition, the Applicator should ensure the following documents are also available in an accessible location on-site:

Supplier's documents:

- *Suppliers product technical data sheets (TDS).*
- *Suppliers system handling/installation instructions.*
- *Product safety data sheets (SDS).*

WorkSafe New Zealand document:

- *The current version of "Confined space - Planning entry and working safely"*

5.4 Handling of Materials

Correct practice for on-site administration, handling and storage of waterproof membrane system materials prior to use includes (but is not limited to):

- *Check all materials and discard damaged or suspect rolls or containers.*
- *Check that all materials are clearly labelled.*
- *Ensure materials are stored in a dry and protected environment.*
- *Use product within the Supplier's designated shelf life. Store such materials in a cool/warm (whichever is applicable) place prior to use and discard any materials which have passed their shelf life.*
- *Protect products from water damage, exposure to heat or flame or mechanical damage.*
- *Seal all part-used pails when not in use.*

5.5 Working Conditions

Site- and project-specific working conditions are critical to the successful application of a waterproof membrane system.

Requirements include, but are not limited to:

- *Application should not proceed on unsuitable substrates.*
- *Application should not proceed in extremes of temperature or humidity, unless the waterproof membrane system is specifically designed for these conditions.*
- *The work area should not be available to other trades until application and curing of the waterproof membrane system is completed.*
- *After waterproof membrane systems have been laid, they should be protected from damage prior to the installation of tiling or other over-surface finishes.*
- *All work should meet the requirements of current version of the "Confined space - Safe working in a confined space" document from WorkSafe New Zealand.*

5.6 Scheduling of Work

The Main Contractor is responsible for scheduling all waterproof membrane system work in consultation with the Applicator and other trades, such as underfloor heating, sound insulation, and over-surface floor finishing.

The work programme must allow for all of the following, where relevant to the situation:

- *Surface preparation, curing and drying.*
- *Preparatory plumbing and electrical work.*
- *Priming/sealing of substrate.*
- *Waterproof membrane system installation and curing.*
- *Curing period before access by other trades.*
- *Potential contamination by other trades.*
- *Overlay screed and cure.*
- *Underfloor heating installation and screed system installation.*
- *Sound insulation installation.*
- *Installation and curing of second waterproofing layer, if required.*
- *Second curing period before access by other trades.*
- *Installation of over-surface finishes.*
- *Installation of plumbing fixtures, cabinets, tapware etc.*

The Applicator should not carry out any work in circumstances where preceding items are not ready to receive that work,

5.7 Care of Adjacent Surfaces

The installation of underfloor heating, sound insulation, waterproof membrane system and over-surface finishes should be planned and carried out in a manner that ensures adjacent surfaces are protected from damage and minimises disruption to other trades or normal building operations.

All damage to adjacent surfaces or any work by other trades should be notified to the Main Contractor, and agreed corrective work carried out.

5.8 Care of Completed Work

Internal wet areas are often the one space on a project where all the trades on a site will be required to carry out some work. They are often confined spaces and the workers will be in close proximity to each other and/or working on top of the completed waterproof membrane system, so the waterproof membrane system should be protected to minimise any possible damage.

5.8.1 Protection of Waterproof Membranes

To protect the waterproof membrane system from damage by other trades, whether or not an over-surface finish is yet to be applied:

- *Entry to any area containing a completed waterproof membrane system should be restricted to only the Applicator's personnel, until the installation of the waterproof membrane system has been signed off.*
- *Waterproof membrane systems on horizontal substrates should be protected by a covering with sufficient impact resistance. Plastic sheeting, tarpaulins or similar used on their own will not provide sufficient protection.*

5.8.2 Reporting and Rectifying Damage by Other Trades

All trade personnel should advise the Main Contractor and the Applicator if:

- *The waterproof membrane system is damaged; or*
- *Any pipes, drains etc. are installed, altered or moved in any area containing a completed waterproof membrane system; or*
- *Any new penetrations are made through a completed waterproof membrane system.*

In these situations, the Main Contractor will need to arrange for the Applicator to carry out appropriate rectification work to ensure that the waterproof membrane system will continue to provide the required waterproofing protection.

If any other trade penetrates an installed waterproof membrane system, for example by installing fixings or pipework, this will invalidate the warranty for the waterproof membrane system, unless the Applicator has been involved in the process. The Applicator, on becoming aware of any such penetration, should immediately advise the Main Contractor and cease any work affected by the penetration until the situation has been satisfactorily resolved.

5.9 Workmanship and Personnel

The long-term performance of the waterproof membrane system is dependent on the procedures adopted for, and the standard of workmanship in, the preparation, installation, and finish of the waterproof membrane system.

Section 1.2.3 requires that all waterproof membrane systems to be installed by or under the supervision of Installers certified by the Supplier of the waterproof membrane system and working for a certified Applicator. Installers must be equipped with the necessary equipment to carry out the work.

Installation procedures should be in accordance with the latest product safety data sheet, technical data sheet, handling/installation instructions, application manual, and any other technical document or instructions provided by the Supplier.

All work carried out should also be in accordance with the relevant sections of this Code of Practice.

5.10 Health and Safety

It is the responsibility of the Main Contractor, the Applicator, and all installers to be conversant with and to carry out the required safety procedures for the hazards affecting the site, including for their immediate surroundings and work practices.

Applicators and all installers must meet the requirements of all applicable and appropriate requirements under the Health and Safety at Work Act 2015. Refer to WorkSafe New Zealand for more information.

Required on-site safety practices and procedures specific to the installation of waterproof membrane systems include (but are not limited to):

- *Usage of protective clothing and equipment, including knee pads and suitable footwear. In particular:*
  - *Solvent-resistant gloves must be worn to reduce the risk of solvent-based products coming into contact with skin.*
  - *Respirators must be used when working with membrane systems that have high VOCs.*
- *Ensuring that first aid equipment is available on site, and that work personnel are trained in first aid procedures.*
- *Meeting the product-specific requirements as per the SDS.*

5.11 Fire Safety and Ventilation Requirements

Depending on the waterproof membrane system selected and method of application, certain provisions should be implemented to ensure safe conditions for all work site personnel.

Fire prevention in the first instance is the responsibility of the Applicator. Current industry best practice requirements include (but are not limited to):

- *Ensuring fire extinguishers are on site.*
- *Ensuring smoking is not permitted in or near the work area.*
- *Improving airflow ventilation when required.*

- *Wearing appropriate protective clothing and masks.*
- *Adoption of working procedures which ensure the safety of all personnel on site.*
- *Meeting all requirements of statutory regulations.*

5.12 Factors for Successful Site Practice

The following are suggested guidelines for the Applicator:

- *Meet with Main Contractor and other trades prior to commencing installation of the waterproof membrane system to ensure that all are aware of the scope of the works, especially where there are preceding or follow-on trades.*
- *Read all contract documents to ascertain what is specified and consented.*
- *Liaise with the Main Contractor to ensure that a sound substrate with the required falls and sufficient substrate support is provided, and that it is free from contamination.*
- *Ensure that all relevant TDS sheets and handling/installation instructions are available on site.*
- *Ensure that there is a quality-control process in place for signing off and acceptance (or otherwise) of the waterproof membrane system substrate.*
- *Ensure that the selected waterproof membrane system is appropriate for the situation as per Table 3 (p22).*
- *Ensure that certified Installers carry out or adequately supervise the personnel carrying out of the installation of the waterproof membrane system and provide adequate quality control for the installation work.*
- *Ensure that there is protection for all waterproof membrane systems from damage by other trades.*
- *Ensure that the work programme is appropriate, with the correct sequencing of other trades before and after installation of the waterproof membrane system.*
- *Ensure that all personnel are adequately trained and Installers are certified.*
- *Complete all quality-control processes and sign off the completed work promptly but without compromising on the time needed for thoroughness.*

6. Installation

This section addresses the sequencing of installation and proper application methodology and procedures.

This section is written for the Applicator, Installer, and the Building Consent Authority, and will also assist the Main Contractor.

6.0 General

Section 1.2.3 requires all waterproof membrane systems to be installed by or under the supervision of Installers certified by the Supplier of the waterproof membrane system, working for a certified Applicator:

All work should, having regard to the waterproof membrane system selected and any special features of its installation or that of the over-surface finish, be carried out in accordance with the requirements of:

- *The building consent documentation;*
- *The Supplier's latest product safety data sheet, technical data sheet, handling/installation instructions, application manual, and any other technical document or instructions provided by the Supplier; and*
- *Relevant sections of this Code of Practice.*

6.1 Pre-Installation

This section describes actions that the Applicator should complete before commencing any instalment work.

6.1.1 Pre-Installation Meeting

Before commencement of work on site, the Applicator must ensure that the overall building project is ready for the application of the waterproof membrane system. A pre-inspection meeting with all parties involved in the wet-area waterproof membrane system component of the project must be held to identify any areas of concern.

Specifically, the Applicator must obtain confirmation in writing from the Main Contractor and, where possible, from the BCA, that all requirements of the building consent documentation, specification, and conditions of contract have been met in relation to the installation of the substrate, and all relevant BCA inspections required by the building consent documentation have been passed.

Applicators should satisfy themselves that:

- *Any notified project conditions or conditions of contract relating to the waterproof membrane system have been carried out.*
- *The extent of the waterproof membrane system work is correctly established, and the waterproof membrane system installation process is correctly sequenced in the overall project programme.*

(list continues on next page)

- *Suitable and sufficient storage is available for materials and plant.*
- *Adequate water, power and other required facilities are available on site.*
- *Sufficient lighting is provided in all work areas.*
- *Suitable access is provided to the work areas.*
- *All site health and safety requirements are addressed with regard to the waterproof membrane system work.*
- *There is adequate ventilation where the waterproof membrane system is to be installed.*
- *Procedures for the daily removal of rubbish, surplus material and plant are in place and are practical to follow.*
- *Stored materials which could contaminate the substrate or affect the installation of the waterproof membrane system (such as trade waste or chemicals from other trades) have been identified and removed.*
- *The latest Technical Data Sheets, Safety Data Sheets and handling/installation instructions for the proposed waterproof membrane system are provided.*
- *There is an agreed rectification procedure should the waterproof membrane system be damaged.*

Applicators should obtain confirmation from the Main Contractor that from the time that the installation of the waterproof membrane system is completed and signed off, the Main Contractor accepts responsibility for the protection of the waterproof membrane system.

6.1.2 Substrate Inspection

A critical factor in the successful application of a waterproof membrane system, apart from the waterproof membrane system itself, is the substrate. This includes the substrate structure which gives it support, the substrate surface to which the waterproof membrane system is fixed, and the preparation of that surface face.

THE APPLICATOR MUST INSPECT THE SUBSTRATE AND NOTIFY THE MAIN CONTRACTOR IN WRITING OF ANY DESIGN OR CONSTRUCTION FAULTS OR DAMAGE TO THE SUBSTRATE.

ALL CONCERNS MUST BE RECTIFIED BEFORE THE APPLICATOR COMMENCES WORK IN THAT AREA.

The substrate is the material upon which the waterproof membrane system is to be applied. It must be able to:

- *Withstand point and working loads.*
- *Withstand movement stress.*
- *Provide adequate falls to drains for the expected service conditions.*

The substrate surface preparation is critical to the successful installation and performance of the waterproof membrane system, as the service life of the waterproof membrane system is dependent on the quality of the adhesion between the substrate surface and the waterproof membrane system itself.

To avoid potential faults and failures, the Applicator should check at least the following (listed in no particular order):

- *The substrate provides sufficient falls to outlets.*
- *There are a sufficient number of outlets within the wet area.*
- *The substrate is correctly installed and fastened.*
- *The substrate is suitable for a wet area and the proposed waterproof membrane system.*
- *The substrate surface is smooth, with no nibs or hollows.*
- *All changes in direction of surfaces where the waterproof membrane system is applied are filleted where required by the Supplier's handling/installation instructions, and reinforced or bandaged, to ensure the waterproof membrane system can be applied with no weakening or thinning of the film thickness.*
- *All penetrations such as pipes, sleeves, ducts and vents have been installed in accordance with the building consent documentation to the extent necessary before application of the waterproof membrane system.*

6.1.3 Substrate Surface

If the substrate is concrete, any curing compounds or release agents used will interfere with the adhesion of the waterproof membrane system. The Applicator should obtain a statement from the Main Contractor at the pre-installation meeting, advising if a curing compound or release agent has been used. Any curing compound or release agent must be removed prior to the Installer commencing work on site but curing compounds should not be removed until the concrete has cured sufficiently that it will not be affected by the removal.

The moisture content of the substrate can inhibit the adhesion or curing of the waterproof membrane system. The maximum allowable moisture content at the time of applying the waterproof membrane system is as follows:

- *Plywood substrates: 18%*
- *Reconstituted wood panel substrates: 16%*
- *Concrete substrates: 75% relative humidity @ 25°C. If not tested instrumentally, an accepted method of determining moisture presence for concrete floor substrates is to tape a 600 x 600mm transparent plastic sheet of approximately 100 microns thickness to the concrete and leaving for 24 hours. If there is any visible "sweating" or darkening of the concrete surface), then the area is too damp to waterproof.*

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6.1.4 Substrate Surface Preparation

When the substrate is accepted by the Applicator as suitable to commence work, the substrate surface should be prepared as required by the Supplier of the waterproof membrane system to be used.

The substrate surface must generally be dry, clean, and free of any contaminants, concrete splashes or nibs, dust, holes, protruding nails or screws, and any other protrusions not shown in the building consent documentation. External corners must have an arris, chamfer, or radius to help the waterproof membrane system wrap around without stress or thinning.

The substrate must be primed with the Supplier's recommended primer to ensure the satisfactory adhesion of the waterproof membrane system to the substrate.

Where there is a delay between priming of the substrate and installation of the waterproof membrane system, it may be necessary to clean and re-prime the substrate surface in keeping with the Supplier's handling/installation instructions prior to proceeding with installation of the waterproof membrane system.

6.1.5 Equipment

The Installer should ensure the correct equipment and tools needed for the installation of the proposed waterproof membrane system are available (including but not limited to):

- *Depending on the application method: brushes, rollers, spray guns, compressed air equipment*
- *Lighting equipment if there is insufficient existing light*
- *Ventilation equipment if there is insufficient ventilation*
- *Fire-fighting equipment*

6.1.6 Materials

The waterproof membrane system materials themselves must be suitable for their intended use. Before commencing any application, the Installer should:

- *Check the product documentation to ensure that the correct materials have been supplied.*
- *Ensure all components required for the complete system are available on site, including substrate surface preparation and repair materials, bond-breakers bandages, reinforcement and keying materials.*
- *Ensure the primer is compatible with both the substrate and the waterproof membrane system. All products in a system must come from the same Supplier.*
- *Check that all materials are within their shelf life.*
- *Check that all new containers are un-opened.*
- *If a liquid-applied waterproof membrane system is to incorporate separate reinforcing, ensure the correct reinforcement materials have been supplied.*

During application, the Installer should:

- *Ensure any multi-component materials are mixed as per the Supplier's specification. Mix immediately before use and apply the material within its stated working life.*
- *Discard any material past its working life.*
- *Comply with the Supplier's requirements for curing and inter-coat times.*

6.2 Installation Procedure

The installation of the waterproof membrane system commences when the Applicator accepts that the substrate is ready for its application.

As part of the quality-control process, the WMAI recommends that the Applicator collect photographic evidence of all bond-breakers at time of priming, and of any flood testing.

6.2.1 Primers

The Applicator should ensure that the primer is compatible with both the substrate and the waterproof membrane system. Note that a waterproof membrane system can require different primers for different substrates within the same area.

- *Porous substrates generally require a single-component penetrating primer. Porous substrates are typically plywood, reconstituted wood panels, compressed sheet, fibre-cement sheets, concrete, plaster, etc.*
- *Non-porous substrates generally require a thin solvent or etching type primer and are typically plastics and metals.*

Care must be taken to ensure primers are not applied over any previously applied bond-breaker. If this happens, the wet primer must be wiped off before it cures.

6.2.2 Bond-breakers and Bandages

A bond-breaker or a bandage prevents substrate movement stress being transferred to the waterproof membrane system.

- *Common types of bond-breakers are neutral cure silicones and purpose-made bond-breaker tapes.*
- *Common types of bandages are preformed elastomeric compounds with fabric face or edges (for embedding in the waterproof membrane system), or flexible open-weave or spun-bonded fabrics which allow for extensibility when impregnated with a liquid-applied waterproof membrane system.*

The WMAI recommends that the Applicator collect photographic evidence of all bond-breakers at time of priming, as part of the quality-control process.

6.2.3 Application of the Waterproof Membrane System

There are many factors which contribute to the successful application of the waterproof membrane system (including but not limited to):

- *Good coordination and agreement between the Applicator and the Main Contractor, with regard to penetrations through the waterproof membrane system, and pre- or post-work by other trades.*
- *Making all penetrations before the waterproof membrane system is applied. If a penetration is made after the waterproof membrane system is applied, re-application of the waterproof membrane system will be needed in the area of the penetration, to reinstate its integrity.*
- *Protecting the waterproof membrane system from access by other trades, both while its installation work is in progress and after its completion.*
- *Rigorously following the Supplier's recommended times for curing (both time to re-coat and time for full curing, taking into account the prevailing atmospheric conditions.*
- *Following the Supplier's recommended application procedures throughout the installation of the proposed waterproof membrane system.*
- *If using a liquid-applied system, ensuring it achieves the film build required by the Supplier's handling/installation instructions.*
- *Broadcasting sand to the topcoat while it is still wet if the Supplier recommends doing so, to provide a keying profile for the application of the intended over-surface finish.*
- *Ensuring the waterproof membrane system provides a continuous seamless waterproof membrane system which is dressed up around pipes, at floor to wall upstands, to water-stops and to the base of door jambs; down into wastes; and correctly finished to access holes, angled flanges and other elements.*
- *Ensuring that areas where waterproof membrane systems have been freshly applied are barricaded to prevent access by any trade, until the waterproof membrane system is fully cured and its installation has been signed off.*

6.3 Post-Installation

After installation of the wet-area waterproof membrane system, there are certain practical steps that an Applicator should take before handing the work site back to the Main Contractor for the next trade.

6.3.1 Visual Inspection

Visually inspect the waterproof membrane system for any evidence of:

- *Uneven thickness, pin holing or bubbles.*
- *Breaks or creases at any junctions, changes of angle, or changes of substrate.*
- *Damage from other trades.*

If any damage is identified, repair as required by the Supplier for the waterproof membrane system being used. Localised (or spot) repair may be sufficient for some types of waterproof membrane system, but full recoating may be required for other types.

6.3.2 Flood Test

The Applicator should carry out flood testing before the waterproof membrane system is covered with any over-surface finish, but only after the waterproof membrane system is completed and has been allowed to fully cure for the time specified by the Supplier.

Flood testing should use water from an external source, to remove any possible confusion with water ingress from plumbing fittings within the area. For example, if testing a shower area, water should not be run from the shower rose.

The WMAI recommends that the Applicator collect photographic evidence of the flood testing process as part of the quality-control process.

The procedure for flood testing is as follows:

1. *Seal off any water outlet with a bung and provide a temporary water-stop at any threshold if one does not already exist.*
2. *Fill the area with water up to the height of the lowest threshold to the area. Water for flood testing must be from an external source, to remove any possible confusion of any water ingress.*
3. *Check for water loss after 12 hours.*
4. *Check adjacent areas and any rooms below for water-staining.*
5. *If any water damage occurs, inform the Main Contractor, repair or re-apply as required by the Supplier for the waterproof membrane system being used, and re-test.*
6. *Ensure that a minimum 12-hour full area flood test is carried out and signed off.*

6.3.3 Defects Liability

Any defects that are identified in the waterproof membrane system and the subsequent over-surface finish during the contract period or Defects Liability Period are the responsibility of the respective applicators.

These obligations extend to the end of the Defects Liability Period, the length of which will have been stated in the contract documents and in any defects list. The Building Owner must read these documents be aware of the Defects Liabilities Period and be aware of its maintenance obligations thereafter.

These Defects Liability Period requirements do not limit any written or implied warranties or legal obligations concerning the waterproof membrane system.

7. Specialist Systems

This section discusses the planning and installation of underfloor heating and sound insulation systems, installed either alone or together.

This section is written for the Designer and Applicator and will also assist the Main Contractor.

Detailed installation information should be obtained from an acoustic and/or HVAC Engineer.

7.0 General

The overall design of the heating and/or sound insulation system will vary depending upon the nature of the heating and/or sound insulation. The Designer should consult with the suppliers of these systems, and with the waterproof membrane system Supplier to ensure compatibility, performance, and that the whole installation is correctly specified.

Before any installation work commences on underfloor heating or sound insulation systems, or on over- surfacing finishes, the specialist system installer and the waterproof membrane system Applicator should co-ordinate their work processes to ensure that all systems can be installed without damage to the others.

Note that underfloor heating may require some electrical work that could impact on the waterproof membrane system, and also that the installer of any such system should be either suitably qualified, registered and licensed, or have their work signed off by a registered and licensed electrician.

7.1 Waterproof Membrane Systems Over or Under Heating or Sound Insulation Layers

The first waterproof membrane system should protect the structure of the building. A second waterproof membrane system may be required to protect sound insulation layers and heating systems to ensure that these function appropriately. In general, saturated sound insulation layers will not reduce noise transmission, and additionally, wet sound insulation and heating layers can harbour mould, fungi and bacteria.

Wet areas can be a highly complex combination of waterproofing, heating, sound insulation and decorative flooring systems. The Designer, Main Contractor and waterproof membrane system Applicator should consult with the appropriate experts in the nature and function of heating and/or sound insulation layers.

The wet area must be waterproofed. Evaluate the risks and consequences of leaks, particularly in multi-storey dwellings or apartments.

Minimum design considerations include:

- *The sound insulation system must comply with clause G6 of the NZ Building Code when used to prevent undue noise transmission from other occupancies or common spaces to the habitable spaces of household units.*
- *The heating/sound insulation system must not impact on the efficacy of the waterproof membrane.*
- *The first waterproof membrane system is often applied directly to the substrate.*
- *Waterproof membrane systems can be damaged by deflection if placed above complex sound insulation and heating layers.*
- *A second layer of waterproofing may be installed to isolate and protect sound insulation and heating layers.*
- *The layout of wet-area set downs must be well-detailed. The integrity of the waterproofing system should not be compromised by height constraints in multiple layer systems or adjacent floor coverings.*
- *An alternative design would be to install a recessed concrete floor and an isolating sound insulation layer followed by a screed. A waterproofing system would then be placed over this, then a screed to fall, and tiles would be installed. This means that the sound insulation layer would be integral with the structure, and the waterproofing system would still waterproof the structure.*

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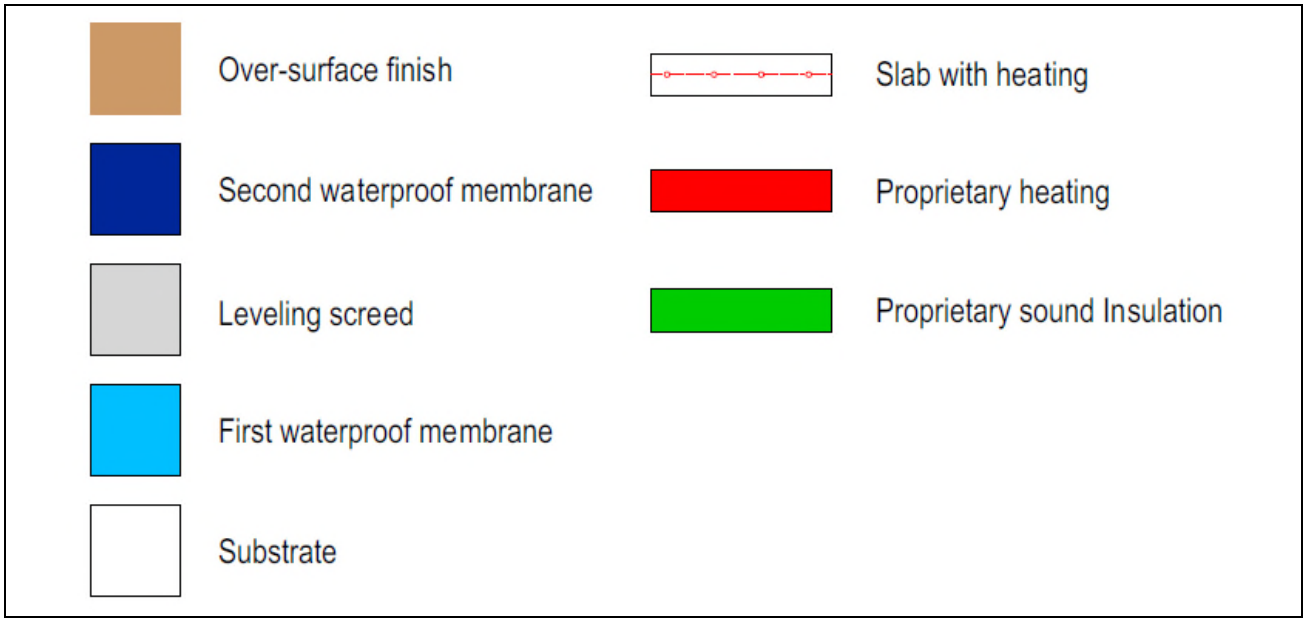
7.2 Illustrative Drawings of Sound Insulation and Heating Layers

The drawings below show examples of best practice installation methods for multiple layer system wet-area floors. They first provide waterproofing to the structure and may also utilise a second waterproof membrane system layer to protect other components.



Key to layers for Figures 36-42

Notes:

1. Not all layers are used in each installation figure as shown below
2. The numbers delineate the installation sequence

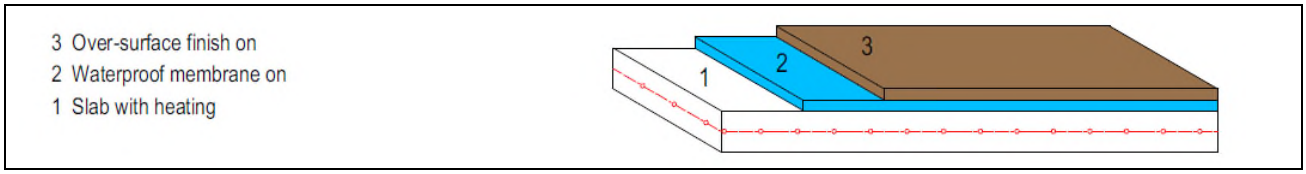


Figure 36: Heating in slab, no fall

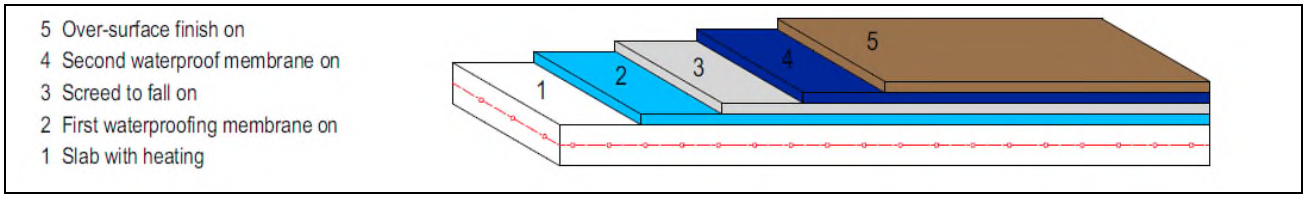


Figure 37: Heating in slab, screed to fall

6 Over-surface finish on
5 Second waterproof membrane on
4 Proprietary heating on
3 Screed to fall on
2 First waterproofing membrane on
1 Substrate

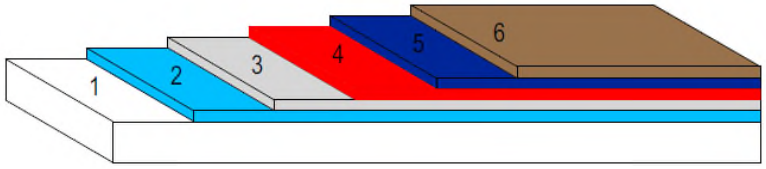


Figure 38: Heating on slab, screed to fall

5 Over-surface finish on
4 Waterproof membrane on
3 Leveling screed (if required) on
2 Proprietary sound insulation on
1 Substrate

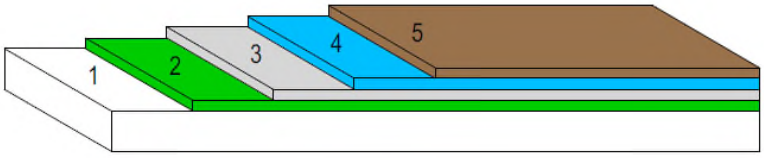


Figure 39: Sound insulation layer only, if installed on a new slab

6 Over-surface finish on
5 Second waterproof membrane on
4 Leveling screed on
3 Proprietary sound insulation on
2 First waterproofing membrane on
1 Substrate

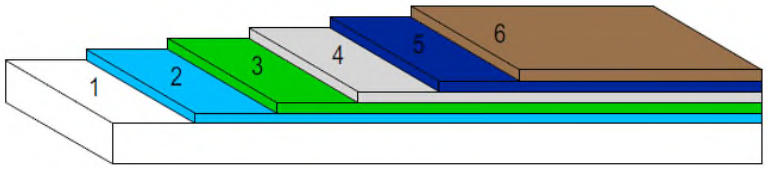


Figure 40: Sound insulation layer only, if installed on an existing slab

7 Over-surface finish on
6 Second waterproof membrane on
5 Proprietary heating on
4 First waterproofing membrane on
3 Leveling screed on
2 Proprietary sound insulation on
1 Substrate

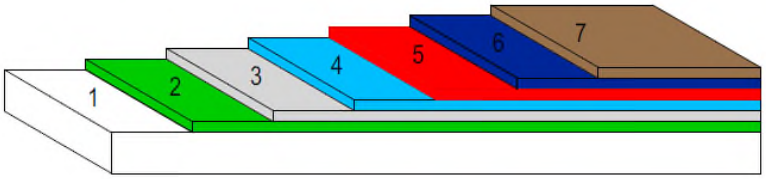


Figure 41: Heating and sound insulation layers, if installed on a new slab

7 Over-surface finish on
6 Second waterproof membrane on
5 Proprietary heating on
4 Leveling screed on
3 Proprietary sound insulation on
2 First waterproofing membrane on
1 Substrate

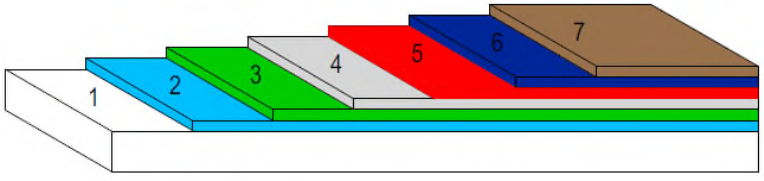


Figure 42: Heating and sound insulation layers, if installed on an existing slab

8. Over-surface Finishes to Waterproof Membrane Systems

This section covers tiles or other finishing materials used as over-surface finishes to waterproof membrane systems.

This section is written for the Designer and for the trade(s) whose work follows that of the waterproof membrane system Applicator and will also assist the Main Contractor.

8.0 General

Unless the Supplier of a waterproof membrane system stipulates that it is self-finishing, wet-area waterproof membrane systems are not trafficable and cannot be left exposed without any over-surface finish. They are designed to be an underfloor or under-wall waterproof membrane system and are required to be protected from damage by laying a flooring or wall surface material over the waterproof membrane system.

The Designer should check that the proposed over-surface finish is suitable and compatible with the waterproof membrane system.

8.1 Over-surface Finish Products

The suitability and selection of over-surface finish products in wet areas is outside the scope of this Code of Practice.

This section describes how over-surface finish products should interact with the wet-area waterproof membrane system. The selection and design of any over-surface finish or finished flooring itself is the responsibility of the Designer.

8.1.1 Tiles

There are several design options when tiling over waterproof membrane systems, eg including under tile heating or sound insulation layers. These considerations should be made when selecting finishes and materials.

Considerations when selecting and installing ceramic tile finishes include:

- *Tile: tiles are available in many types. Each has different degrees of porosity, and different types of adhesive are required for different types of tile.*
- *Adhesive: when tiling over a waterproof membrane system, the primary consideration is the adhesive and the method of curing. Use an adhesive that cures by hydration or chemical reaction when tiling over a waterproof membrane system with low porosity tiles, as it is highly unlikely that a dispersion/emulsion adhesive will achieve full cure. Use adhesives from the Supplier of the waterproof membrane system to ensure compatibility of materials.*

- *Adhesive coverage: Full bond embedding is critical as this eliminates any air voids under the tiles for water to sit in. Follow the adhesive manufacturer's instructions. Note that AS 3958.1, Guide to the installation of ceramic tiles, specifies minimum adhesive coverage in wet areas.*
- *Grouting: Cement-based grouts are not waterproof and allow water and moisture to migrate through. Grout sealers can make the grout water- and stain-resistant, but do not make the grout waterproof. Epoxy grouts contain no cementitious material so are less likely to stain, discolour or allow water ingress.*

8.1.3 Timber

Timber is best installed as a floating timber floor on a sound insulation layer. If installed by adhesive fixing, direct stick it to the waterproof membrane system or direct stick to a screed over the waterproof membrane system. Flexible polyurethane adhesives are commonly used.

Do not use any mechanical fixings which will penetrate the waterproof membrane system, as these will destroy its integrity.

8.1.4 Vinyl Tiles

Vinyl tiles are installed by direct stick adhesive fixing to the waterproof membrane system or direct stick to a screed over a waterproof membrane system. The adhesive must be a solvent-less water-borne latex or acrylic adhesive.

Vinyl tiles include vinyl planks or strips.

8.1.5 Sheet Vinyl

Wet-area waterproof membrane systems are not required under sheet vinyl as sheet vinyl with heat- or chemically-welded joints is, of itself, classified as impervious and easy to clean, by E3/AS1. The sheet vinyl is installed by adhesive fixing to the substrate or to a screed.

If a waterproof membrane system is installed under sheet vinyl, then the sheet vinyl must be installed by direct stick adhesive fixing to the waterproof membrane system or direct stick to a screed over the waterproof membrane system.

The sheet vinyl suppliers' instructions must be followed.

9. Maintenance (or "through-life care")

This section addresses the care and maintenance of wet areas where waterproof membrane systems have been installed, including hardware and over-surface finish materials.

This section is written for the Building Owner and will also assist the Designer and Applicator.

9.0 General

In New Zealand, the NZ Building Code normally requires that waterproof membrane systems, with normal maintenance, be durable for at least 15 years. If over-surfaced, the serviceable life of the waterproof membrane system should also be no less than the expected life of the over-surface finish.

Access to the waterproof membrane system once an over- surface finish is installed is usually not possible.

Risk management for the building should include regular inspection and maintenance of the whole of the wet area and its associated hardware, as an important part of avoiding future problems. This section of this Code of Practice covers contract requirements, good housekeeping and recognition of "tell-tale" signs of possible problems developing, the importance of more detailed maintenance inspections, and any resultant maintenance work. It acknowledges that such maintenance work could include replacement when the waterproof membrane system reaches the end of its natural life.

9.1 Contract Requirements

For typical building contracts, some contractual provisions continue to operate for certain periods after the completion of work on site and occupancy of the building. Investigation of any suspected problems, and any necessary repair work during these periods will be the subject of the relevant contractual provisions.

9.1.1 Defects Liability Period

Liability for defects in the period immediately following Practical Completion is normally defined within the contract documents for the construction (or alteration) of the building.

These obligations extend until the end of the Defects Liability Period, the length of which will have been defined in the contract documents and stated in any defects list.

The Building Owner should have read these documents and be aware of the Defects Liabilities Period and should also be aware of its maintenance obligations thereafter.

9.1.2 Notifications During Warranty Period

During any warranty period relating to the waterproof membrane system, the Building Owner has a duty of care to promptly notify the person who provided the warranty, on becoming aware of:

- *Mechanical damage caused to the waterproof membrane system*
- *Damage to the over-surface finish*
- *Building alterations, extensions or movement*

Prompt notification is vital to not only rectify a problem, but to reduce any consequent water ingress.

Failure to do so may void any warranties or insurance cover.

The person who provided the warranty may be the Main Contractor, Applicator, Supplier or tile layer/over-surface finish applicator.

Examples of warranties that may be in place include:

- *A product warranty offered by the Supplier.*
- *A specific warranty that the Main Contractor provides as a requirement of the building contract.*
- *An implied warranty that the Main Contractor provides because it is required by Section 362I of the Building Act 2004 for a residential building contract.*

9.2 Use and Care of Wet Areas

9.2.1 Housekeeping

Regular and on-going care is required for all wet areas as part of normal use, whether the waterproof membrane system has a self-finish surface or is over-surfaced with another product. Regular care is normally carried out by or on behalf of the occupier.

The minimum care in a wet area includes:

- *Scrub, wash and rinse the surface regularly*
- *Treat any mould infestation immediately*
- *Keep drains free of debris build-up*
- *Remove any ponding water, and inform the Building Owner if this is a recurring issue*

9.2.2 Ongoing Inspections

Ongoing regular inspections followed by preventative maintenance are required for all wet areas.

The frequency of inspections will depend upon the frequency of usage of the area.

For waterproof membrane systems that are over-surfaced, regular inspections should be carried out to identify any damage to or deterioration of the over-surface finish through normal wear and tear, aging of products, building stress or mechanical damage, such as:

- *Sealants that have deteriorated, become cracked or lost adhesion*
- *Popped or damaged tiles or other over-surface finishes*
- *Damaged or eroded grouting for tiled finishes*

For waterproof membrane systems that have a self-finish surface, regular inspections should be carried out to identify any damage to or deterioration of the waterproof membrane system itself through normal wear and tear, aging of products, building stress or mechanical damage, such as:

- *Damage to the waterproof membrane system surface (tears, cracking, rippling, crazing, bubbling etc);*
- *Damage to any welded seams (tears, cracking, rippling);*
- *Damage at drain surrounds or pipe penetrations;*
- *Whether liquid-applied waterproof membrane systems show signs of surface wear and deterioration and require resurfacing, due to ongoing use and the elapsed time since its installation or previous resurfacing work.*

Regular inspections should also look for other issues that can affect the waterproof membrane system, including:

- *Shower mixers and/or their connections discharging water down the wall surface, between the surfaces of multi-layered construction systems, or within the wall itself;*
- *Taps and/or their connections discharging water under or behind cabinets, baths etc;*
- *Waste outlets and/or their connections discharging below shower trays, baths and cabinets.*

Also, regular inspections should check spaces under and adjacent to the wet area and, if the space is above ground floor, check the space or ceiling directly underneath, for any signs of the presence of water.

9.3 Preventative Maintenance

9.3.1 Maintenance Inspections

In addition to ongoing inspections, more detailed maintenance inspections should be carried out biennially. The complete surface must be systematically checked and all areas requiring attention should be noted.

If a problem is identified, an Applicator certified by the waterproof membrane system Supplier and/or the over-surface finish applicator should be used, who will know how to carry out a thorough inspection and the potential problem areas at which to look.

9.3.2 Maintenance Inspection Checklist

The inspection must be thorough, any areas of concern recorded and the Applicator and/or over-surface finish applicator be advised with a request for rectification work be carried out.

The following is a suggested minimum checklist:

1. *General area: examine the whole of the general area and note any areas of concern with the substrate, the waterproof membrane system, and any over-surface finish, recording the extent and type of concern.* ☐
2. *Over-surface finish: check that the complete wall and floor finish is not cracked, delaminating, rippling or coming apart at joints, or for any damaged, cracked, eroded or otherwise suspect grout, and for popped, lifted, damaged or loose tiles etc.* ☐
3. *Self-finish membrane: check that the membrane surface is not cracked, delaminating, rippling or coming apart at joints, and that it is not worn or eroded,* ☐
4. *Substrate: check for depressions or deflections in the substrate, and if found, contact the Building Owner to discuss further investigation and remedial work.* ☐
5. *Ponding: if standing water is a frequent occurrence, contact the Building Owner to discuss further investigation and possible remedial work as there could be an underlying substrate issue that requires attention.* ☐
6. *Sealants: inspect all sealants to ensure that they are fully adhered and not cracked, torn or damaged, and are performing as required.* ☐
7. *Membrane perimeter and changes of direction: check in areas where movement or stress is likely or suspected, for ruptures or delamination of the waterproof membrane system or over-surface finish material.* ☐
8. *Water-stops: check the upstand angle is performing as required and the membrane is in good condition, including at its ends where it meets the adjacent walls, door trim or fixtures.* ☐
9. *Hobs: check that the over-surface finish and waterproof membrane system are in good condition. Check any mechanical fastening of shower screens and doors to ensure no moisture ingress points.* ☐
10. *Penetrations: inspect the waterproof membrane system around each penetration to ensure that upstands, downturns, boots, and sealants are intact and not ruptured, and adhering and performing as required.* ☐
11. *Control joints: check control joints to ensure all associated and nearby components are undamaged and appear to be functioning as required (see also items 2, 3 and 6 above as appropriate).* ☐
12. *Wastes: ensure that they are not blocked or clogged (see also item 10 above).* ☐
13. *Inside building: check spaces under and adjacent to the wet area. If any staining, dampness or other signs that would indicate moisture penetration are identified, contact the Building Owner to discuss further investigation and remedial work.* ☐

9.3.3 General Considerations for Maintenance Work

Maintenance work should only be carried out after the type and extent of work needed has been noted and the underlying causes of any problems have been identified. The intention of maintenance work should be to restore the wet-area waterproof membrane system, and any over-surface finish, to their original condition and to ensure their continuing performance.

Often, if maintenance work is required, this will be due to factors unrelated to the performance of the membrane itself, for instance building movement. However, an exposed waterproof membrane system (ie one with a self-finish) will require regular re-surfacing as part of its normal maintenance requirements.

Maintenance work to a waterproof membrane system that has been over-surfaced is impossible unless the over-surface finish material in the affected area is removed in its entirety. The over-surface finish material should be reinstated once the maintenance work to the waterproof membrane system has been completed and water-tested.

Once any over-surface finish has reached the end of its natural life, maintenance inspections may have identified issues that require its replacement (or partial replacement). Replacement of the waterproof membrane system at the same time may be prudent. A self-finish waterproof membrane system may similarly require replacement (or partial replacement) when maintenance inspections reveal it has reached the end of its natural life. In this document, the term "maintenance" includes replacement in these situations.

All maintenance work should be carried out using materials, accessories and standards of workmanship etc. compatible with the whole original installation and any over-surface finish. Where practical, the original waterproof membrane system Applicator and/or over-surface finish applicator should be engaged to carry out the required work.

9.3.3.1 Maintenance of Over-surface Finishes

If the maintenance inspection of an over-surface finish reveals the need for maintenance work, contact the over-surface finish applicator for the appropriate maintenance work to be carried out.

Also ask the waterproof membrane system Applicator to check the integrity of the waterproof membrane system and if necessary to carry out appropriate maintenance work to reinstate the membrane to its original condition before the over-surface finish is re-applied.

Where the following situations are identified, the appropriate maintenance work to over-surface finishes should include:

- *Tiles popped or damaged: remove tiles and, after inspection and maintenance work to the underlying membrane, replace damaged tiles, re-bed then re-grout;*
- *Grouting damaged, cracked, eroded or otherwise suspect: remove grout and, if any concerns about the underlying membrane, also remove tiles to enable membrane inspection and maintenance work needed, then re-install tiles and re-grout;*

(This list continues on the next page)

- *Sealants not adhering, cracked, torn or damaged, or not performing: remove and, if any concerns about the underlying membrane, also remove over-surface finish to enable membrane inspection and maintenance work needed, then reinstate over-surface finish and install new sealant (if necessary select more appropriate sealant);*
- *Other components appear damaged or do not appear to be functioning as required: remove components that are damaged or in the area where apparently not functioning (including over-surface finish if necessary), confirm detailing is appropriate for the situation, carry out inspection and maintenance work to the underlying membrane if necessary, then replace damaged components and reinstate, including work to sealants, and to tiles and grout or other over-surface finishes, as above.*

9.3.3.2 Re-surfacing of Exposed Liquid-applied Waterproof Membrane Systems

Where an exposed liquid-applied waterproof membrane system (ie one with a self-finish) requires re-surfacing, it should be carried out only with compatible materials. The original Designer, Supplier and Applicator should all be consulted before any such work is carried out and where practical, the original Applicator should be engaged to carry out the required work, especially if the entire waterproof membrane system requires re-surfacing.

The recoating work requires the following steps:

1. *Apply a recommended moss, mould and lichen treatment solution;*
2. *Scrub, wash or water-blast clean at low pressure to leave a sound surface;*
3. *Repair the waterproof membrane system installation as required, to the Supplier's recommendations;*
4. *Apply the required number of coats of the protective coating specified by the Supplier.*

9.3.3.3 Other Maintenance Work to Waterproof Membrane Systems

Where a maintenance inspection reveals other work is needed to a waterproof membrane system, the appropriate steps will depend on the type of waterproof membrane system, the Supplier's requirements, whether the original waterproof membrane system can be stripped back or removed, whether it is feasible to form laps and joints where old waterproof membrane systems meet new work, and whether or not there is an over-surface finish.

The original Designer, Supplier and Applicator should all be consulted before any such work is carried out and where practical, the original Applicator should be engaged to carry out the required work.

10. Definitions, Acronyms, and Terminology

This section contains definitions of terms and expansions of acronyms as specifically used in this Code of Practice, shown in normal text to indicate mandatory content of the Code of Practice. In some cases, these entries may have slightly different meanings elsewhere in the building sector.

It also contains some commonly used industry terminology, and explanations of their usage or importance in normal industry practice, shown in italics with a grey background to indicate that it is WMAI commentary. In some cases, these entries do not appear in this Code of Practice but are nevertheless relevant to the industry.

Term	Definition
AAC	Autoclaved aerated concrete
Acceptable Solution	A solution that must be accepted as meeting the requirements of the NZ Building Code *Compare: Verification method; Alternative solution.*
Access hole	A penetration hole for an item of tapware in a wall, whose diameter is oversized to allow access to the tapware connections, for servicing and replacement purposes. *A flange plate is used to cover the access hole and is usually supplied as part of the tapware.* *The oversized diameter of the access hole is often a requirement of tapware manufacturers under their warranty conditions.*
Acid etch	*The use of an acid to cut away and remove the surface of concrete to provide a profiled surface for improved adhesion.*
Acrylic latex	Water-borne dispersion resins made by polymerisation of acrylic monomers, such as ethyl acrylate and methacrylate.
Adhesion	The strength of bonding of two materials. Failure will result in a fracture at the interface between the two materials. *Compare: Cohesion.*
Adhesive	A material that holds two other materials together by surface attachment or bonding.
Adhesive bonding	A method for bedding and adhering waterproof membrane systems on to substrates where an adhesive is applied to the substrate and the membrane is then laid into the adhesive. *Systems containing heating or sound insulation materials may have these layers adhesive bonded where they are incorporated in the system.*
Adhesive failure	The failure of two materials to remain adhered together. Failure will result in a fracture at the interface between the two materials. *Compare: Cohesive failure*
Aging	The physical effects on materials from being exposed to an environment for a period of time.
Alligatoring	*Cracking of a surface, eg of a liquid-applied waterproof membrane system, producing a pattern of cracks similar to an alligator's hide.*
Alternative Solution	*A solution that is compliant with the NZ Building Code but is not part of an Acceptable Solution or Verification Method.* *Compare: Acceptable solution; Verification method.*
Ambient temperature	*The temperature of the surroundings, eg of the room or air.*
Angle fillet	*Refer Fillet.*

Term	Definition
Application rate	*The quantity (mass, volume or thickness) of material to be applied per unit area.* *The application rate is the inverse of the coverage rate: these terms are often used interchangeably.*
Application personnel	*Refer: Installer*
Applicator	A company or business entity certified by the Supplier to install its specified waterproof membrane system. *Compare: Installer*
AS/NZS	Joint Australian and New Zealand Standard.
Assembly sealant	A sealant used for installation of fittings, hardware, and finishing. It must be a neutral cure anti-microbial silicone sealant.
B2/AS1	Acceptable Solution No 1 to NZ Building Code clause B2 Durability. *Building work carried out in accordance with B2/AS1 is deemed by Section 22 of the Building Act 2004 to meet the performance requirements of NZ Building Code clause B2.* *See also: Acceptable Solution, (NZ) Building Code.*
Backer rod	A closed-cell foam rod inserted in a joint to be sealed, to prevent adhesion to the back of the joint and to regulate the depth of sealant.
Bandage	A bandage is internal reinforcement of the waterproof membrane system itself, used in situations where it could be subjected to flexural stress. A bandage may have a backing designed to allow movement relative to the substrate, in which case the bandage also acts as a bond-breaker. *Common types of bandages are preformed elastomeric compounds with fabric face or edges (for embedding in waterproof membrane system), or flexible open-weave or spun-bonded fabrics which allow for extensibility when impregnated with a liquid-applied waterproof membrane system.*
Bandage flashing	Refer: Over-flashing
BCA	Building Consent Authority
Blister	*Refer: Bubble*
Blocking	Specifically placed framing element(s) between structural members to support fittings or sheet joints. *See also: Dwang*
Bond-breaker	A material or system used to prevent adhesion between two elements to accommodate structural movement and reduce stress on those elements.
Bond strength	*The force per unit area necessary to rupture a bond.*
Bonding	Refer: Adhesion.
Bonding agent	*A chemical substance applied to a substrate to enhance a bond between it and a subsequently applied layer in a waterproof membrane system.*
Boot	A pre-formed component shaped to seal around a penetrating element and to lap with the waterproof membrane system.
Bridging	*Spanning of a waterproof membrane system across a juncture in the substrate without support to the waterproof membrane system.*
Bubble, Bubbling	The formation of an enclosed pocket of vapourised water or solvent trapped between the substrate and the waterproof membrane system or between impermeable layers within the waterproofing membrane system and an over-surface finish.

Term	Definition
Buckle, Buckling	*Refer: Rippling.*
(The) Building Act 2004	The principal legislation dealing with building controls in New Zealand. *The Building Act 2004 sets out the rules for the construction, alteration, demolition and maintenance of new and existing buildings in New Zealand.*
(NZ) Building Code	The regulations made under Section 400 of the Building Act 2004.
Building Consent Authority (BCA)	A person whose name is entered in the register referred to in Section 273(1)(a) of the Building Act 2004. *For a building project, the BCA is usually the city or district council within whose district the land on which a building is proposed or built. Under the Building Act 2004, a BCA:* *- issues building consents (except consents subject to a waiver or modification); and* *- inspects building work for which it has granted a building consent; and* *- issues notices to fix; and* *- issues code compliance certificates; and* *- issues compliance schedules.*
Building Owner	The person who commissions the building work of which the waterproof membrane system is a part. *The Building Owner may have an interest in all or only part of the building, and there are a number of forms which that ownership may take (including through a lease or tenancy agreement in some cases).* *The Building Owner usually lets a contract to a Main Contractor for all the building work, and the Main Contractor lets sub-contracts for the work of each trade (including a sub-contract with the Applicator). In some cases, the Building Owner may be the Main Contractor.*
Butt joint	An edge to edge joint, formed between two separate sections of material, in which the components are butted together and do not overlap or interlock. *Compare: Seam joint*
Butyl rubber	A rubber-like material produced by copolymerizing isobutylene with a small amount of isoprene. *Butyl rubber can be blended with other elastomeric materials to make sealants and adhesives or manufactured into sheets.*
Butyl tape	*A self-adhesive fabric finished sealing tape that uses a butyl-based adhesive. Butyl tape is often used at substrate joints including at internal corners to upstands.*
CCA	Copper chrome arsenate
CCC	*Code Compliance Certificate.*
Capillary action	*The movement of a liquid by surface tension, when in contact with two closely spaced parallel surfaces.*
Cavity protector	A device used at an access hole in a wet area wall lining to control any water from a leaking item of tapware and safely discharge it into the wet area without it entering the wall cavity

Term	Definition
Ceramic tile	A tile made from clay or a mixture of clay and other materials, which can be glazed or unglazed, and is fired at a temperature sufficiently high enough to produce specific properties and characteristics. This Code of Practice uses the term "ceramic tile" to include both porcelain and non-porcelain ceramic tiles. Some other publications use the term "ceramic tile" to refer only to non-porcelain ceramic tiles. *Compare: Porcelain tile*
Chalking	*The degradation or oxidisation of a surface, eg of an exposed waterproof membrane system, caused by weathering, generally resulting in the formation of a powdery, friable (chalk-like) layer on the surface.*
Coated fabric	*A fabric that has been impregnated or over-coated.*
Code Compliance Certificate (CCC)	A certificate issued by a Building Consent Authority under Section 95 of the Building Act 2004.
Cohesion	*The strength within a material to stay as a whole. Failure will result in a fracture within the body of the material.* *Compare: Adhesion.*
Cohesive failure	*The failure of a material to remain as a whole. Failure will result in a fracture within the body of the material.* *Compare: Adhesive failure.*
Cohesive strength	*The internal strength of a material to remain as a whole.*
Cold lay, Cold laid	*The application of liquid-applied or sheet-applied waterproof membrane systems where no heating process is involved.*
Compressed sheet	A structural sheet material made of compressed fibre cement (CFC) and installed over joists as a structural floor, usually with ceramic tile finishes.
Condensation	The change of state of water vapour or other gas to a liquid as the temperature drops or the gas pressure rises, or the liquid droplets thus produced, eg on a cold surface or suspended in cold air.
Contact adhesive	*An adhesive which, after initial drying, will stick to itself on contact. Contact adhesives are used by spreading adhesive on each surface, allowing it to dry, then bringing the surfaces together.* *They are often used to bond one or more components of a waterproof membrane system to the substrate.*
Control joint	A joint designed to prevent damage by accommodating movement between building elements. Also known as an expansion joint.
Copolymerisation	*A chemical reaction that results in the combination of two or more dissimilar monomers to produce large, long-chain molecules, which are copolymers.*
Cove, Coving	*To install a material around an interior angle and thus provide a continuous installation around the junction where two surfaces meet, eg where the edge of a waterproof membrane system to a floor is turned a short distance up the wall.* *A fillet may be used to provide solid backing behind the interior angle.* *See also: Fillet.*
Coverage, Coverage rate	The surface area which a specific quantity of a particular liquid-applied material can cover. *The coverage rate is the inverse of the application rate: these terms are often used interchangeably.*

Term	Definition
Crack	The line of a separation or fracture along which a material's surface has split without breaking apart. *A crack is caused by induced stress in the material, which may be related to dimensional instability or structural movement.*
Creep	*A permanent deformation in a material that occurs under sustained stress, which remains even if the cause of stress is removed.* *Creep may occur in a waterproof membrane system where the bonding to the substrate is compromised by excessive movement due to temperature changes, loading or some other cause of substrate stress.*
Cure, Curing	The solidifying and hardening of a material which is applied in a fluid of soft state, eg as a liquid or slurry, which occurs through chemical changes that take place shortly after it is applied. The curing process may continue for some time after the material becomes hard to the touch. *Curing is often incorrectly described as "drying". However, despite some materials curing due to reactions that take place when the presence of a liquid component has been reduced through evaporation, curing always involves a chemical reaction rather than simply the evaporation of water or some other liquid.* *Compare: Drying; Hydration*
Cured concrete	*Concrete in which the hydration reaction between water and cement has proceeded to the stage that the concrete has attained its intended design strength.*
Curing compound	A product applied to the surface of fresh concrete to retard the evaporation of moisture so that sufficient water remains available to react with the cement, and full hydration of the cement takes place.
Curing time, Curing period	The time required to complete curing, eg of a liquid-applied waterproof membrane system, at a specified temperature and/or humidity.
Damp-proof course (DPC)	*A narrow strip (generally up to 300mm wide) of durable vapour barrier placed between building elements to prevent the passage of moisture from one element to another.*
Damp-proof membrane (DPM)	*A sheet material, coating or vapour barrier, having a low water vapour transmission, and used to prevent water and water vapour movement through concrete in contact with the ground.*
Damp-proofing	*The treatment of a surface or building element to resist the passage of water in the absence of hydrostatic pressure.*
Defects Liability Period	A period (immediately following Practical Completion) stipulated in a construction contract (or sub-contract) during which any defects or unsatisfactory performance is the responsibility of the Main Contractor (or sub-contractor) to correct. See also: Maintenance
Degrade, Degradation	A deleterious change in the chemical structure, physical properties or appearance of a material.
Delaminating, Delamination	Separation of one layer from another, including separation of a waterproof membrane system from its substrate, or separation of an over-surface finish from a waterproof membrane system.
Department of Building and Housing (DBH)	*In July 2012 the former Department of Building and Housing became incorporated into the Ministry of Business, Innovation and Employment.* *See also: Ministry of Business, Innovation and Employment.*

Term	Definition
Designer	The person or company who specifies the waterproof membrane system, its construction details, its installation methods and procedures, and who typically also prepares the related drawings, specifications and other documentation for use in a building consent application and in the building contract. This could be an Architect, an Architectural Designer, an Engineer or the Supplier.
Determinations	*A determination is a legally binding ruling made by the Ministry of Business, Innovation and Employment (MBIE) about matters of doubt or dispute to do with building work. MBIE can make a determination about whether a building or building work complies with the Building Code; or about a council's decision when exercising certain powers under the Building Act 2004, including on a building consent, a notice to fix, or a code compliance certificate (CCC).*
Dew Point	*The temperature below which condensation will occur, because the air is saturated with moisture. The dew point varies depending on the absolute moisture content of the air. At dew point, condensation will form on any surface at a lower temperature than the air and in contact with it.*
Dimensional stability	The ability of a material to maintain its original dimensions (length, width and thickness) when exposed to changing environmental conditions, eg temperature or humidity, over time.
Direct stick	Adhesive fixing of an over-surface finish (or any finish material) directly to a waterproof membrane system (or a previously installed surface) without mechanical fixings and without an intermediate layer.
Discontinuous	Unable to form a permanently continuous film over a surface under conditions of normal use, eg may be applied as a film but that film is often not full coverage, can be thin, or can be porous. Discontinuous materials are not waterproof.
Domestic Service	Used only in spaces intended for the sole use of a single household unit.
DPC	*Refer: Damp-proof course.*
DPM	*Refer: Damp-proof membrane*
Drainage flange	*The perimeter flange of a preformed floor waste outlet (or shower waste outlet). For floors (including shower area floors) protected by a waterproof membrane system, the waterproof membrane system must be dressed across the flange and down into the waste. The drainage flange may or may not be recessed into the substrate, depending on the situation.*
Drying	The evaporation of water or a solvent from a material. *Compare: Curing; Hydration*
Durable	Resistant to wear and decay.
Durability	The ability to withstand expected wear and tear under the particular environmental conditions that occur in use. *NZ Building Code clause B2 Durability requires building elements to continue to satisfy other NZBC performance requirements, with only normal maintenance, for certain minimum time periods that depend on how the elements are used in the building.* *See also: B2/AS1.*
Dwang	A short (usually horizontal) member fixed between vertical framing timbers. Also known as nogging. *See also: Blocking*

Term	Definition
E3/AS1	Acceptable Solution No 1 to NZ Building Code clause E3 Internal moisture. *Building work carried out in accordance with E3/AS1 is deemed by Section 22 of the Building Act 2004 to meet the performance requirements of NZ Building Code clause E3.* See also: Acceptable Solution, (NZ) Building Code.
Edge tear strength	*The maximum force that a flexible sheet material will withstand at its edge before it will tear. Standard test methods can be similar in action to tearing a sheet of paper in half* *See also: Tensile strength.*
Efflorescence	*The formulation of crystalline deposits, generally whitish in colour, on the surface of concrete, mortar, grout joints or another porous (and usually cementitious) material. It forms when moisture within the material dissolves salts, then migrates to the surface and evaporates, leaving a coating of the salts on the surface.*
Elastomer	A material made from a polymer that will deform under stress and return to its original shape when the stress is released. *The elasticity of a polymer may vary with conditions such as temperature. Its properties within the range of in-use temperatures will be relevant to its performance in building work.*
Elastomeric	Having the properties of an elastomer.
Elongation at break	The extent to which a waterproof membrane system will stretch before breaking or tearing, also referred to in some documentation as the Movement Accommodation Factor (MAF).
Embedding	The process of impregnating reinforcement felt, fabric, or mat with the liquid components of a liquid applied waterproof membrane system in the course of its installation. OR The installation of an object (such as a sheet membrane or a tile) into an adhesive bed.
Epoxy	A class of synthetic, thermosetting resins that produce tough, hard, chemical-resistant products used in Class 1 waterproof membrane systems, and in primers, coatings, adhesives and grouts.
EPS	*Expanded polystyrene.*
Expanded polystyrene (EPS)	*A type of foamed polystyrene manufactured using a mould to contain small foam beads, where heat or steam is then applied to the mould, which causes the small beads to expand and fuse together. This manufacturing process does not completely form a closed cell product, as there can often be voids between each of the beads where they are not touching one another.* *Compare: Extruded polystyrene.*
Expansion joint	*Refer: Control joint*
Exposed waterproof membrane system	*A waterproof membrane system that is directly trafficable within the wet area and does not have an over-surface finish.* *See also: Self-finish.*
Extruded Polystyrene (XPS)	*A type of foamed polystyrene manufactured through an extrusion process, where plastic resin and other ingredients are combined with a blowing agent and continuously extruded through a die. This produces a closed cell rigid foam product which is rigid and impervious to water.* *Refer Expanded polystyrene.*

Term	Definition
Fabric	A woven or non-woven material of organic or inorganic filaments, threads or yarns. *Fabrics can be used for reinforcement for some waterproof membrane systems and flashings.*
Fall	A graded and shaped surface that directs water off the surface, eg to an outlet.
Fast-hydrating screed	Cementitious screeds with either additives or high alumina cements, used to give fast initial cure and relatively quick time to complete hydration. *See also: Non-hydrating screed*
Fibre-cement sheet	A composite sheet material made of sand, cement and cellulose fibres.
Fillet, Angle fillet	A material placed to form a concave junction at an interior angle where two surface planes meet.
First waterproofing layer	The waterproofing layer that is applied first in a multiple-layer system (such as a specialist system that may include a sound insulation layer and/or heating system). It protects the structure.
Flashing	A component, formed from a rigid or flexible waterproof material, that drains or deflects water from a junction, penetration or perimeter edge of a system intended to exclude water, eg a cladding system or a waterproof membrane system. *See also: Bandage flashing; Gusset; Over-flashing; Perimeter flashing; Under-flashing; Vertical flashing*
Flexible sheet	A pre-made elastomeric sheet material, which must be heat or adhesive bonded to form an impenetrable joint.
Flood test	A procedure of controlled retention of water over the installed membrane to determine the effectiveness of waterproofing.
Floor waste	An outlet located at the low point of a graded floor or in a level floor, designed to receive accidental or intentional discharges or overflow.
Glass mesh	A woven or non-woven glass fibre mesh used for reinforcement within a waterproof membrane system to maintain dimensional stability.
Grout	A particularly fluid form of concrete (or a concrete-like material) used to fill gaps (such as tile joints or the cells of hollow concrete masonry).
Guarantee	*A promise to provide a particular remedy if certain conditions are met. The terms warranty and guarantee are often used interchangeably.* *See also: Implied warranties; Warranty*
Gusset	*A flashing to a three-dimensional corner junction in a waterproof membrane system.* *See also: Flashing*
Handling/installation instructions	Instructions provided by the Supplier of the waterproof membrane system covering the recommended handling and installation procedures for the products which make up their system.
Hardener	*A reactant or a catalyst in the chemical reaction that occurs during curing of a material which is applied in a fluid of soft state, eg as a liquid or slurry, which is mixed with other components at or immediately before application, and which makes the final material hard and durable.* *See also: Curing*
Heat welding	A method of melting and fusing together separate sections of a material (such as the adjoining or overlapping sheet edges in some sheet-applied waterproof membrane systems) by the application of heat (generally in the form of hot air) and pressure. *Also known as fusing.*

Term	Definition
Heavy duty service	Used in spaces intended for more intensive use than by a single household unit.
Hob	The upstand between the perimeter of a shower area and the adjacent floor of the room in which it is located. *A shower screen and/or door is usually installed on the hob.*
Household unit	A household unit: (a) means a building or group of buildings, or part of a building or group of buildings, that is— (i) used, or intended to be used, only or mainly for residential purposes; and (ii) occupied, or intended to be occupied, exclusively as the home or residence of not more than 1 household; but (b) does not include a hostel, boarding house, or other specialised accommodation.
HVAC Engineer	An Engineer who designs heating, ventilation or air-conditioning systems.
Hydration, Hydrating	The process in which water reacts with other chemicals (such as Portland cement) to form a binder which hardens or solidifies a product, eg concrete. Also, the completion of that reaction.
Impact resistance	The ability to resist damage, eg puncturing, from falling objects, application equipment, foot traffic, etc.
Impervious lining	A continuous lining that does not allow the passage of moisture.
Implied warranty	A warranty that is not stated explicitly in writing but is required by law. *The Building Act 2004 requires certain implied warranties to form a part of all contracts for residential building work between a building contractor and a client (but not between a subcontractor and a Main Contractor).* *See also: Guarantee; Warranty*
Installer	An Installer is a site worker who installs the waterproof membrane system or supervises its installation on site, and who works for the Applicator (which is a company or business entity). The Installer must work within recommended trade practices, and have been trained and certified by the Supplier, to ensure that the product is installed as intended by the Supplier.
Interface	The common boundary where two surfaces or materials meet or touch.
Joint	The line along which two parts are joined to each other. *Adhesive joints typically require the parts to be in contact, with the adhesive spread over the contacting surfaces before they are brought together.* *Sealant joints typically require the parts to have a gap or formed space between them, into which sealant is placed to form a bead of specific cross-sectional dimensions.*
Joint Australian and New Zealand	A Standard developed or adopted by Standards New Zealand in partnership with Standards Australia and approved as a New Zealand Standard and as an Australian Standard.
Laminate	*To bond two or more layers of material together to make a single product, or the product so formed.*
Lap	That part of a waterproof membrane system or flashing component where one part or component overlaps and is bonded to another adjacent part or component.

Term	Definition
Licensed Building Practitioner (LBP)	A building practitioner whose name is, for the time being, entered in the register established and maintained under Section 298(1) of the Building Act 2004.
LOSP	Light organic solvent preservative
Low temperature flexibility	*The ability of the waterproof membrane system material to remain flexible at low temperature.*
Main Contractor	The person, company or body that contracts the Applicator to install the waterproof membrane system. *The Main Contractor is in charge of the site and has individual contracts with each trade contractor (including the Applicator).* *The Main Contractor is usually contracted to the Building Owner to provide all the building work and lets sub-contracts for the work of each trade.* *In some cases, the Building Owner may be the Main Contractor.*
Maintenance	Those activities which, in the normal course of events, are necessary to keep a building element in a condition in which it will continue to perform as originally intended. In this document, the term "maintenance" includes replacement at the end of the natural life of a waterproof membrane system, or at the time of replacement of the over-surface finish. *From the time of Practical Completion, maintenance is the responsibility of the Building Owner, although any remedial work found to be necessary during the Defects Liability Period) is the responsibility of the Main Contractor or Applicator.* *A list or description of the normal maintenance requirements for the waterproof membrane system, based on Section 9 of this Code of Practice and specific requirements of the Supplier, must form part of the building consent application, and should be provided to the Building Owner.* *See also: Defects Liability Period.*
MBIE	The Ministry of Business, Innovation and Employment
Microbiological resistance	*The ability of a material to resist attack and degradation by various air and soil borne micro-organisms.*
Ministry of Business, Innovation and Employment (MBIE)	The Ministry of Business, Innovation and Employment is the over-arching regulator of New Zealand's building system. Its Building System Performance (BSP) branch provides policy and technical advice on New Zealand's building system, rules and standards, and implements building legislation and regulations to meet New Zealand's current and future needs. It is the department of State that, with the authority of the Prime Minister, is responsible for the administration of the Building Act 2004. It was formed in July 2012, bringing together the Department of Building and Housing, the Ministry of Economic Development, the Department of Labour and the Ministry of Science and Innovation.
Mosaic tiles	*Small tiles which, for ease of application. are supplied in a pre-fixed array on a standard-sized sheet or mat, which is then installed as a single unit*
Multiple layer system	A waterproof membrane system comprising of multiple stages or layers.
Nog, Nogging	Refer: Dwang
Non-hydrating screed	*Non-cementitious screeds which use proprietary chemical formulations which give the screed fast curing and drying times.* *See also: Fast-hydrating screed*

Term	Definition
Non-oriented strand board	A sheet material formed by adding adhesives and then compressing layers of wood strands (flakes) in non-specific orientations.
NZBC	New Zealand Building Code See also: (NZ) Building Code
Open shower area	A shower area that is open on one or more sides, extending in an arc on the open sides 1500mm from the shower rose, where the water is not contained within the shower area.
Organic	Being or composed of hydrocarbons or their derivatives originating from plant or animal matter.
Oriented strand board	A sheet material formed by adding adhesives and then compressing layers of wood strands (flakes) in specific orientations.
Over-flashing	*A flashing that is installed subsequent to, and covers or overlaps, the main section of a system intended to exclude water, eg a cladding system or a waterproof membrane system.* *See also: Flashing* *Compare: Under-flashing*
Over-surface finish	An overlaid finish of sheet material or tiles.
Particleboard	A type of reconstituted wood panel, which is usually cheaper, denser and more uniform than conventional wood. *This Code of Practice does not allow the use of particleboard as a new substrate in any wet area.* *See also: Reconstituted wood panels.*
PEF	*Polyethylene foam.*
Perimeter flashing,	*A flashing used at the perimeter of a system intended to exclude water, eg a cladding system or a waterproof membrane system.*
Penetration	A building component (such as a pipe or the body of a tap) that passes through both the substrate and the membrane.
Permeable	Able to allow the passage of fluids through itself.
Pigs ear	~~*An edge retention bar to prevent loss of growing medium in a green roof installation. (this defn to be replaced by the one below*~~ *A corner fold in a sheet membrane to create an internal corner without any cutting of the membrane.*
Plinth	A building component, formed as a support element projecting from the plane of the waterproof membrane system, which is protected by the waterproof membrane system.
Plumbed cabinetry	*Plumbed cabinetry includes any cupboard, cabinet, or bath cradle which contains a water source.*
PMDI	Polymeric methylene-diphenyl-diisocyanate.
Polyester fabric	*A woven or non-woven fabric used for either membrane reinforcement or as an adhesion surface on some sheet membranes.*
Polyethylene foam	*A stable thermoplastic foam made up of ethylene monomers linked together.* *Polyethylene foam is often supplied as a strip (used as a bond-breaker for sealants or mortar fillings), or a rod (used as a backer rod in a sealant joint)* *See also: Backer rod; Bond breaker.*
Polyurethane	An elastomeric polymer being a combination of a polyol and an isocyanate or blocked isocyanate.

Term	Definition
Polyurethane hybrid	A chemical or physical mixture of polyurethane and acrylic dispersions to provide a material which exhibits properties combining the best characteristics of each polymer type.
Polyurethane methylmethacrylate (PUMMA)	A hybrid of polyurethane polymer for elastomeric characteristics and methylmethacrylate polymer for speed of cure and early re-coatability in a wide range of atmospheric conditions.
Polyvinyl chloride (PVC)	A synthetic thermoplastic polymer prepared from vinyl chloride.
Ponding	The excessive accumulation of water which does not freely drain away from low-lying areas on a surface.
Porcelain tile	*A type of ceramic tile with very low porosity. Porcelain tiles can be glazed, polished or unglazed. Also known as vitrified tile.* *Compare: Ceramic tile*
Positive fall	A fall which is measurably steeper than a truly flat surface. See also: Fall.
Post-installation inspection	*An inspection at completion of the installation of a system, for sign off and handover to the Main Contractor.*
Post-installation maintenance	*Refer: Maintenance.*
Pot life	*Refer: Working life.*
Practical Completion	The stage of work in a building contract at which the work is completed to the extent defined in the conditions of contract as achieving Practical Completion. *The stage at which Practical Completion is achieved may vary from one contract to another, depending on the particular conditions of contract being used.*
Pre-installation inspection	*The inspection of the substrate and its face by the Applicator prior to application of the membrane.*
Primer	A liquid material applied to the substrate prior to the main components of a waterproof membrane system, to enhance adhesion of the waterproof membrane system.
Producer Statement	Formal statements supplied by or on behalf of (i) an applicant for a building consent, or (ii) by or on behalf of a person who has carried out building work, that can be accepted by a Building Consent Authority as verification that certain work will be or has been carried out in accordance with nominated performance requirements of the NZ Building Code. *In considering whether to accept a producer statement, a council will normally assess the credentials of the author to ensure that person has the appropriate experience and competence in their particular field of expertise and make their own inspections of the building work.* *There are currently four types of Producer Statement, all with generally widespread council acceptance. They are known as:* *- PS 1 – Design* *- PS 2 – Design review* *- PS 3 – Construction (often used by the installers of proprietary systems)* *- PS 4 – Construction review.*
Product Certificate	*A certificate issued under Section 269 of the Building Act 2004 that a Building Consent Authority must accept as establishing compliance with the NZ Building Code.*
Proprietary	A standard catalogue item that can be used directly “off the shelf”.

Term	Definition
PS 3	A Producer Statement type 3 – Construction See also: Producer Statement
PUMMA	Polyurethane methylmethacrylate
Puncture resistance	*The extent to which a material (such as a waterproof membrane system) can withstand the force of a sharp object without perforation.*
PVC	Polyvinyl chloride
Quality assurance	The process of ensuring work undertaken is carried out in accordance with all the relevant requirements.
Quality control	The provision of quality assurance utilising measureable steps against pre-determined standards. *For the installation of waterproof membrane systems, the quality-control process involves pre-determined steps which will confirm that the work carried out on site has followed the Supplier's handling/installation instructions.*
Quarry tiles	*Tiles of a type made by extruding wet (plastic) clay through a mould and firing at high temperature, to form tiles that are dense and naturally coloured.*
RBW	Refer: Restricted building work
Re-coat time	The minimum time before which a further coat, eg of a liquid-applied product, can be applied at a specified temperature and/or humidity.
Re-cover	Refer: Re-surface.
Re-surface	To install a new and compatible surface over an existing waterproof membrane system. *Re-surfacing is a form of maintenance work which in some situations will be necessary for a waterproof membrane system to continue to perform as originally intended, eg to apply new coat(s) over an existing liquid-applied waterproof membrane system in order to extend its life.*
Reconstituted wood panels	Flat panels formed from wood, eg strands, fibre, or particles, combined with an adhesive resin and other additives, to which heat and pressure is applied. Also known as composite wood panels. *Reconstituted wood panel products include oriented strandboard, non-oriented strandboard, fibreboard, particleboard (chipboard), and hardboard, all of varying densities.* *Some of these panel options are bonded with durable PMDI resin adhesive and are treated to hazard class H3. These products can be suitable as floor substrates when they form internal structural platform floors and also as wall substrates where waterproof membrane systems are to be applied.*
Reflection cracks	*Cracks in the waterproof membrane system that follow a crack pattern or sheet layout in the substrate underneath. Also known as transmission cracks.*
Reinforced	Strengthened by the addition or incorporation of one or more reinforcing materials which impart tensile resistance. *See also: Reinforced within; Separate reinforcing.* *Compare: Unreinforced.*

Term	Definition
Reinforced within	Fibre reinforcement placed within a waterproof membrane system product during the manufacturing process, either mixed into a liquid product (for a liquid-applied system) or as part of a reinforced sheet (for a sheet-applied system). *Compare: Separate reinforcing*
Relative humidity (RH)	The ratio of the weight of moisture in a given volume of air at a particular temperature to the saturated (maximum) weight of water vapour that the same volume of air could hold at the same temperature, expressed as a percentage.
Release agent	A chemical product used to prevent the adhesion of freshly placed concrete to its formwork.
Release tape, Release strip	*A tape with specific properties that is installed over a junction in a substrate to act as a bond-breaker under the membrane.* *See also: Bond-breaker.*
Resilient	Able to resume its original size and shape after deformation, such as stretching, twisting, compression or indentation. .
RH	Relative humidity
Restricted building work	Restricted building work is residential design, construction or alteration work that requires a building consent and involves or affects a home's: primary structure, weathertightness, or design of fire safety systems (for small and medium sized apartments and townhouses). LBPs must do or supervise this work.
Rippling	Upward displacement of a waterproof membrane system due to movement in the substrate or substrate structure, resulting in elongated ripples (or "tents") in its surface.
Safety Data Sheet (SDS)	A data sheet provided by the supplier of any product which is a hazardous substance. It provides comprehensive information on the product affects health and safety in the workplace and how to manage these risks. It must explain how the substance should be safely used, stored, transported and disposed of; provide first aid information, information about the personal protective equipment that a person handling the product should wear and what to do in the event of an emergency, such as a spill or fire.
SBR	Styrene-butadiene rubber
Screed	A thin layer of material (usually cementitious) applied to a floor to form a smooth level surface or a surface with a specific fall.
Screeding	The process of striking off excess concrete to bring the top surface of the concrete to the proper elevation and, in some cases, to a particular finish achieved by the same process. OR The process of overlaying a structural floor with a screed.
SDS	Safety Data Sheet
Sealant	A viscous paste-like material that is used to fill and seal cracks and joints.
Silicone sealant	A category of sealant, containing silicone.
Sealer	A liquid-applied film installed to the surface of a material to prevent the entry of water-borne and other contaminants, or as a primer which prevents the absorbance of liquid components of a subsequently applied product. *A sealer is not a waterproof membrane system.*

Term	Definition
Seam joint	*A joint formed by mating two separate sections (or panels) of a material that are in the same plane.* *Seam joints in membranes can be made in a variety of ways, including adhesive bonding, hot-air welding, solvent wipe, adhesive tape, sealant, etc.*
Second waterproofing layer	A waterproofing layer which may be installed over water-sensitive elements in a multiple-layer system (such as a specialist system that includes a sound insulation layer and/or heating system), where those elements will be installed above the first waterproofing layer.
Self-adhesive	A product that is supplied with one side already coated with an adhesive so that it will stick to other surfaces. *A self-adhesive waterproof membrane system will adhere to the substrate and to itself at overlaps without the use of additional adhesive.*
Self-finish	A product whose final surface finish is inherent to the product itself and to which no further finishing product(s) need be applied. *A self-finished waterproof membrane system does not require an over-surface finish such as tiling.* *See also: Exposed waterproof membrane system.*
Selvedge, Selvage (alternative spelling)	The longitudinal edge of a membrane sheet which has been specifically manufactured in a way that allows for the formation of a fully bonded lap. Also known as a selvage.
Separate reinforcing	Glass or synthetic fibre mesh applied as a separate reinforcing layer during the application process for a waterproof membrane system. *Compare: Reinforced within*
Sheet	A material that is provided and installed in broad flat pieces. *Sheet-applied waterproof membrane systems are supplied in roll form.*
Sheet corner detail - internal	*A gusset to an internal three-dimensional corner.*
Shelf life	The length of time a material can be stored before use and still retain its properties.
Shower area	An area within a wet area affected by water from a shower rose, including a shower over a bath.
Shower enclosure	*Walls, screens, doors or curtains that enclose a shower area by confining the spread of water to within the enclosure.*
Shower base	*The finished floor to a shower area, which may be formed in situ or be a pre-formed shower tray.*
Shower pick	A handheld shower rose attached to the end of a flexible or extendable hose (typically used with a slide rail).
Shower rose,	A shower water outlet. The outlet might be fixed (either to the wall or ceiling rose), or a handheld shower pick.
Slip layer	*Refer: Bond-breaker.*
Slip resistant	*Having an adequate level of frictional resistance to the movement of an object across its surface, to reduce the likelihood of slip for pedestrians using reasonable care on the walking surface under expected use conditions.*

Term	Definition
Solvent	A liquid in which another substance is dissolved (or is able to be dissolved). *Solvents are used to dissolve film-forming constituents in the manufacture of liquid-applied products. The solvent evaporates after application and does not become part of the film.*
Solvent-less	A liquid material which contains no solvent of any kind, ie 100% solids
Solvent welding	A process in which a liquid solvent is used to chemically weld or join together separate sections of a material (such as the adjoining or overlapping sheet edges in some (usually thermoplastic) sheet-applied waterproof membrane systems).
Sound insulation layer	A layer of resilient material used to provide impact sound insulation within a floor that is protected by a wet-area waterproof membrane system.
Specifier	*Refer: Designer.*
Spun-bonded fabric	A type of non-woven fabric formed from continuous bonded fibre filaments.
Substrate	The material to which a waterproof membrane system is applied. *See also: Substrate structure; Substrate surface.*
Substrate structure	The structural element(s) which directly support the substrate and to which it is fixed.
Substrate surface	The face of the substrate to which the membrane is to be directly applied.
Sump	*A chamber which is installed at the lowest point of a surface (such as a floor, drainage channel or roof) to collect water, and which is usually equipped with a means of removing that water (such as an outlet or a pump). Some types of sump incorporate features to intercept and retain silt, gravel and other debris.*
Supplier	The company that supplies the waterproof membrane system components and provides training for Applicators in the use and installation of the product range in accordance with the waterproof membrane system manufacturer's recommendations and this Code of Practice. Usually a New Zealand-based company.
Surface sealer	A penetrating sealer which minimises the porosity of the surface to which it is applied. *A surface sealer can be used to prepare an AAC substrate for the application of a waterproof membrane system.*
Synthetic rubber	*Any of several elastic substances resembling natural rubber, prepared by the polymerization of butadiene, isoprene, and other unsaturated hydrocarbons.*
TDS	Technical Data Sheet
Technical Data Sheet (TDS)	A document advising of products' current methods of use, areas of use, mechanical and physical properties, and limitations.
Tensile strength	*The maximum tensile force that a flexible sheet material will withstand before it breaks under standard test conditions. Standard test methods can be similar in action to gripping a piece of tissue paper at opposite ends with two hands and pulling the hands apart till the tissue splits.)* *See also: Edge tear strength.*
Tenting	*Refer: Rippling.*
Termination	The anchoring and sealing of the edge of a waterproof membrane system.
Terracotta tile	*Baked tile of variable colour and water absorption. Usually unglazed, terracotta tiles have very high-water absorption capacity and generally require a sealer to prevent staining.*

Term	Definition
Three-way junction	*A junction between two elements in one plane and one element in another plane.*
Through-cure	*The complete curing of a liquid-applied waterproof membrane system throughout its thickness to the point that no further curing reaction can occur.*
Transmission cracks	*Refer: Reflection cracks*
Under-flashing	*A flashing that is installed prior to, and covered or overlapped by, the main section of a system intended to exclude water, eg a cladding system or a waterproof membrane system.* *See also: Flashing* *Compare: Over-flashing*
Unreinforced	Not specifically containing or incorporating reinforcing materials which impart tensile strength. *Compare: Reinforced*
UV	Ultra-violet
VOC	Volatile organic compound
Vapour barrier	Sheet material or coating having a low water-vapour transmission and used to minimise water-vapour penetration in buildings.
Vapour migration	*The movement of water vapour from a region of high vapour pressure to a region of lower vapour pressure.*
Ventilation	The movement of fresh air into a working or building space.
Verification Method	*A method by which compliance with the Building Code may be verified.* *Compare: Acceptable Solutions.*
Vertical flashing	*A flashing used at a vertical junction, eg a wall junction within a shower area.*
Volatile organic compound (VOC)	An organic chemical compound that has low water solubility and high vapour pressure under normal indoor atmospheric conditions of temperature and pressure. They easily form vapours and can impact the health of people who are exposed to them.
Warranty	A promise from a manufacturer, supplier or Main Contractor that certain conditions will be met, eg that a product and/or workmanship will be of a particular standard or perform as intended for a particular length of time, and that any breach will be remedied by either repair or replacement of the defective product or work. *The terms warranty and guarantee are often used interchangeably.* *See also: Guarantee; Implied warranties*
Water absorption	The relationship of the weight of the water absorbed by a material specimen subjected to prescribed immersion procedure, to the weight of the dry specimen, expressed as a percentage.
Water permeable	*Able to allow the passage of water through itself.*
Water vapour transmission	A measure of the rate of transmission of water vapour through a material under controlled laboratory conditions of temperature and humidity
Waterproof, Waterproofing	The complete and total resistance of a building element to the ingress of any moisture.
Waterproof adhesive	An adhesive suitable for constant water immersion.

Term	Definition
Waterproof membrane system	A combination of elements that are required to achieve a waterproof barrier as required by this Code of Practice, eg primer, liquid or sheet applied components of the waterproof membrane system, bond-breakers and sealants
Waterproof membrane system manufacturer	The company that produces the membrane components and may provide recommended methods for its installation, to ensure product performance. *The waterproof membrane system manufacturer may not itself sell or market products in New Zealand. This function is normally performed by licensed or nominated Suppliers.*
Water-resistant	The property of a system or material that restricts moisture movement
Water-resistant adhesive	An adhesive suitable for use in wet areas but not where subject to constant water immersion
Water-stop	A termination of a horizontal waterproof membrane system which does not occur at a junction with a wall, utilising a vertical extension of the waterproofing system forming a barrier to prevent the passage of moisture beyond the area protected by the membrane.
Wet area	An area within a building supplied with water from a water supply system and includes (but is not limited to) bathrooms, shower areas, laundries, sanitary compartments, kitchens, shower rooms
Wicking	*The action of water moving through a material or a narrow gap by capillary action.*
WMAI	Waterproof Membrane Association Incorporated
Working life	The length of time after mixing a multi-component material for a waterproof membrane system, until the material cannot be properly worked (or applied) to produce an acceptable result, as stipulated by the Supplier.
XPS	*Extruded polystyrene*

Appendix 1: Related Documents, Standards, Legislation and Websites

The following documents relate to this Code of Practice. Readers should ensure that they access the latest versions of all related documents, including amendments, if any.

- *In the case of New Zealand and joint Australian/New Zealand Standards, these can be viewed on the Standards New Zealand website at www.standards.co.nz;*
- *In the case of other documents, these can be accessed through the list of websites set out in Section A1.4 below.*

A1.1 New Zealand, Australian, Joint (AS/NZS) or International Standards

Agency	Code	Year	Title
AS/NZS	1604.3	2004	Specification for preservative treatment – plywood
AS/NZS	2269	2012	Plywood – Structural
AS/NZS	2588	1998	Gypsum plasterboard
AS/NZS	2908.2	2000	Cellulose-cement products – flat sheets
NZS	3101	2006	Concrete structures standard – the design of concrete structures
NZS	3109	1997	Concrete construction
NZS	3114	1987	Specification for concrete surface finishes
NZS	3602	2003	Timber and wood-based products for use in building
NZS	3603	1993	Timber structures standard
NZS	3604	2011	Timber framed buildings
NZS	3640	2003	Chemical preservation of round and sawn timber
AS	3740	2010	Waterproofing of wet area within residential buildings
AS	3958.1	2007	Ceramic tiles - Guide to the installation of ceramic tiles
NZS	4203	1992	General structural design and design loadings for buildings
NZS	4210	2001	Masonry construction: materials and workmanship
NZS	4251.1	2007	Solid plastering - Cement plasters for walls, ceilings and soffits
AS/NZS	4858	2004	Wet area membranes
AS	4992	2004	Ceramic tiles - Grouts and adhesives
AS ISO	13007.1	2014	Ceramic tiles - grouts and adhesives

A1.2 International Standards

- EN 12004:2001, Adhesives for tiles – definitions and specifications
- ISO 9001:2000, Quality management systems
- ISO11600-F-25-LM, Building construction - jointing products

A1.3 Other Documents

- IB33 Specification and Production of Concrete Surface Finishes, Cement and Concrete Association of New Zealand, www.cca.org.nz
- New Zealand Building Code, the Ministry of Business, Innovation and Employment, www.mbie.govt.nz, with specific reference to clause E3, Internal Moisture
- Build Magazine article on embedded floor heating systems, http://www.buildmagazine.org.nz/articles/show/embedded-floor-heating

A1.4 Related Websites

- American Society for Testing and Materials – www.astm.org
- Building Research – www.buildingresearch.org.nz
- British Standards Institute – www.bsi.co.uk
- Canadian General Standards Board – http://www.pwgsc.gc.ca/cgsb/
- Cement and Concrete Association of New Zealand – www.cca.org.nz
- Commonwealth Scientific and Industrial Research Organisation (Australia) – www.csiro.au
- Deutsches Institut Für Normung – www.din.de
- European Committee for Standardization – www.cenorm.be
- European Union of Agrément. Also known as the European Union for Technical Approvals or Union Européenne pour L'Agrément Technique dans la Construction – www.ueatc.eu
- International Union of Laboratories and Experts in Construction Materials, Systems and Structures – www.rilem.org
- Joint Accreditation System of Australia and New Zealand – www.jas-anz.com.au
- Ministry of Business, Innovation and Employment, www.mbie.govt.nz
- New South Wales Master Builders - www.mbansw.asn.au
- New Zealand Legislation – www.legislation.govt.nz
- Site Safe – www.sitesafe.org.nz
- Standards Australia – www.standards.org.au
- Standards New Zealand – www.standards.co.nz
- Waterproofing Membrane Association Inc. – www.membrane.org.nz

A1.5 New Zealand Legislation

- Building Act 2004, www.legislation.govt.nz
- Health and Safety at Work Act 2015, www.legislation.govt.nz

Appendix 2: About the WMAI

The Waterproof Membrane Association NZ Incorporated (WMAI) is a free association of people in the industry who represent membrane Suppliers, marketers, Applicators and other persons or entities with an interest in the use and installation of membrane products.

All members of the WMAI undertake to meet the requirements of the Rules and Codes of Practice of the WMAI, which is a condition of membership. Additionally, it is a requirement of membership that all Members ensure that all agents acting on their behalf are fully conversant with the provisions of this Code of Practice.

This Code of Practice does not apply to contractual disputes. Disputes over contractual rights and obligations should be dealt with under the provisions of the particular contract between the parties. It is not the purpose of this Code of Practice to alter contractual rights or obligations between parties - any such disputes should be referred to the courts/ an arbitrator or other dispute resolution body.

Adherence to WMAI Codes of Practice in no way reduces the Members' responsibilities to meet the requirements of the Commerce Act 1986, the Fair Trading Act 1986, or any other legislative requirements including the Building Act 2004, and the NZ Building Code, and all subsequent amendments.

Appendix 3: About WMAI Codes of Practice

Based on the collective experience of membrane Suppliers, Applicators and Designers, this Code of Practice has been published with the intention of maintaining and improving the performance standards of waterproof membrane systems, materials and their application.

The purpose of this Code of Practice is to define and set best practice in the use and installation of waterproof membrane system products.

WMAI Codes of Practice reflect the WMAI's commitment that waterproof membrane systems and all other materials and installation methodologies associated with the waterproof membrane system must maintain a high standard in order to ensure that public and industry confidence in the membrane industry is preserved.

WMAI Codes of Practice are intended for use in New Zealand by all sectors of the building industry to provide best trade practice guidelines for the selection, design and installation of waterproof membrane systems for general commercial applications and otherwise for residential buildings.

The required minimum properties of materials are listed and relevant test methods are referenced. Specific performance limits where applicable are included to assist in the specification of waterproof membrane systems.

Sponsors

Façade Testing NZ Limited (FTNZ) is pleased to support the Waterproof Membrane Association Inc. in the development and publication of this Code of Practice for Interior Wet Area Membranes. FTNZ is an IANZ accredited test facility proudly providing independent testing services to the New Zealand construction industry for membrane or weathertightness testing, or testing of windows, curtainwalls and facades to a range of New Zealand and international Standards.

For more information on FTNZ, visit www.ftnz.co.nz or call 0508 127 127.

Whilst Winstone Wallboards Ltd is pleased to be a funding partner of the publication of this Code of Practice for Internal Wet Area Membranes as a guide document setting best practice in waterproof membranes, this does not constitute endorsement for all the practices contained therein. We recommend that all wet area building products and systems are designed and applied in strict accordance with the relevant Manufacturer's recommendations.

For more information on Winstone Wallboards Ltd and their product range, visit www.gib.co.nz or call 0800 100 442.

Helfen Limited is happy to support the development and publication of this Code of Practice for Internal Wet Area Membranes. Helfen Limited is a building surveying company providing a range of building-related services throughout New Zealand. We offer a range of specialist services including building surveying, expert witness, remedial design, façade testing, architectural drafting and project management services.

For more information about Helfen Limited, visit www.helfen.co.nz or call 04 388 8666.

Laminex New Zealand® has been proudly supplying **Strandfloor®** and **StrandfloorH3.1®** to the New Zealand building industry since 2009. Both Strandfloor® and StrandfloorH3.1® are BRANZ appraised and meet the requirements of the New Zealand Building Code. **StrandfloorH3.1®** is specifically for use as a flooring panel in wet areas. Laminex New Zealand® offers residential and commercial solutions for all interior spaces, from **Strandfloor®** structural flooring, wall linings, through to, benchtops, cabinetry, and commercial joinery.

For more information on Laminex New Zealand and their product range, visit www.laminexnz.co.nz or call 0800 303 606.

MultiPanel NZ Limited is pleased to support the development of the Code of Practice for Internal Wet Area Membranes. MultiPanel is a lightweight building panel used in applications such as building and construction marine, landscaping, caravans, signage, transport, and refrigeration. It is commonly used for modular home facades, bulkheads, eaves, external cladding, waterproof flooring substrate and wall linings for wet areas. Thinner panels allow for creativity in designing curved elements.

For more information on MultiPanel, visit www.multipanel.nz or call 0800 685 847.

WMAI Ordinary Members

Allco Waterproofing Solutions Ltd

Allnex NZ Ltd

Ardex NZ Ltd

Bostik NZ Ltd

Equus Industries Ltd

Hitchins NZ Ltd

Jaydex International Ltd

PW Systems Ltd

Sika NZ Ltd

Viking Group Ltd

WMAI Associate Members (this list needs to be revised)

- Access Gunac Auckland
- Adhesion Sealing Ltd
- Allan Tong Ltd
- Andrews Property Services
- Aquaproofing Ltd
- Auckland Integrity Waterproofing
- Auckland Waterproofing Services Ltd
- Australian Waterproofing
- AWL Ltd
- Builders Plastics Contracting
- Cantec Services Group Ltd
- Central Roofing Ltd
- Complete Coatings Ltd
- Eric Wiig Ltd
- GMR Holmac
- GMR Holmac Ltd
- Grand Protec Ltd
- Gunac Christchurch Ltd
- H2 Off Ltd
- Hirise 2017 Ltd
- ILD NZ Ltd
- Intersafe Waterproofing Ltd
- MPM Waterproofing Ltd
- Mulford Holdings Ltd
- Perfect 4 U Ltd
- Sansom Construction Services Ltd
- Superior Waterproofing 2000 Ltd
- SWP Commercial Ltd
- Terracon Industries Ltd
- Titus waterproofing Ltd
- Torch -On Waterproofing Ltd

WMAI Consultant Members

- Australian Institute of Waterproofing
- Canterbury Waterproofing
- Concrete Doctors Ltd
- Dunedin Roofing Systems
- Ezyseal Waterproofing Ltd
- Specialised Roofing Systems Ltd