AS4654.2 – Interpretation of External Waterproofing as it applies to Melbourne, Class 1 buildings

Climate Zone: 6
Wind Class: N1
Membrane Types: Liquid Applied Class II and Class III as defined and tested in accordance with AS4858 and suitable for use relating to AS4654.1

All membranes we recommend for use are capable of servicing the conditions, namely:
- UV Stable
- Heat aging tested
- Operating Temperatures
- Bio-resistant
- Water immersion tested
- Chemical resistant

SUBSTRATE

Both builder and waterproofer need to check the substrate material in contact with the waterproofing ensuring that it shall be suitable for, and compatible with, the waterproofing membrane system. Additionally, the substrate is to be resistant to moisture damage caused by condensation forming on the underside.

NB: particleboard sheeting shall not be used, plus tile and slate underlay is un-acceptable.

Suitable substrate materials refer:
- AS3600 Concrete
- AS3700 Masonry
- AS1684 Timber
- AS2269 Plywood
- AS2908 Cellulose-cement
Falls:

The fall can be formed in the structural substrate or formed by a screed over the structural substrate, which must not be less than 1 in 100 (10mm per 1m). Falls in finishes must ensure water drains to the drainage outlet, with no water retention on the finished surface.

- NOTE: DRAWINGS NOT TO SCALE
LAYING MEMBRANES

Junctions, lap joints, seams and cold joints:

Liquid applied membranes usually don’t have a manufacturer’s description covering these issues relating to the weak points in ‘sheet’ systems. However, should the liquid applied system incorporate reinforcing fabric a lap joint, usually a min of 40mm is applicable.

Curing:

All components of the membrane system must be cured before considered ‘fit for purpose’. Considerations for liquid applied membrane systems are:

- Low temperatures, wet film thickness, relative humidity, solids content and air movement can delay curing.
- No further work should be commenced until the membrane is cured
- Premature covering of the membrane may prevent curing and lead to degradation.
- Intervals between applied membrane coatings should take into account the necessary curing times.

FILLETS

When a membrane changes from horizontal to vertical plane it requires a ‘bond breaker’ application.

<table>
<thead>
<tr>
<th>Membrane Class</th>
<th>Elongation at break</th>
<th>Min bond breaker/tape width to bridge joints opening up by 5mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>60% to 300%</td>
<td>35 mm</td>
</tr>
<tr>
<td>III</td>
<td>&gt;300%</td>
<td>12 mm</td>
</tr>
</tbody>
</table>

TERMINATION OF MEMBRANES

Upward terminations:

Height:
The membrane termination is created to prevent water entry, the finished height of the membrane should cater for the surface coverage height to prevent water, including wind driven, from flowing over the top of the membrane. In wind class N1 the termination height must be not less than 40mm

Membrane termination finishing:
The Standard is mostly concerned with sheet membranes relating to over-flashing or cover-flashing. However some points relate to liquid applied:-

Termination of a pressure seal flashing:

- Pressure seal flashing to be attached using mechanical fixings at a maximum of 150mm centres. The lap from the bottom edge of the mechanical fixing, to the bottom edge of the pressure seal flashing shall be a minimum of 15mm.
• Sealant to encapsulate the pressure seal flashing to the weatherproof wall
• There is to be a minimum of 10mm gap between the bottom of the flashing and the finished level.

Termination of overflash:

• The overflash is to be attached into the waterproof wall via a rigulet of minimum 15mm and fixed in place, inclusive of sealant
• The lap from the top edge of the sealed rigulet to the bottom of the membrane is a minimum of 75mm
• The gap between the bottom of the flashing and the finished level must be a minimum of 10mm
VERTICAL UPWARD TERMINATION – DETAIL OF OVERFLASHING

Vertical downward terminations:

Roofs:
Vertical downward terminations for roofs or similar structures using a reinforced (or sheet) membrane need to extend a minimum of 100mm from the junction.
**Parapets:**

The top edges of the membrane is to be protected by the downturn of the cavity flashing.
**Gutter Termination:**

A metal angle with a vertical leg of a minimum of 35mm is to be fixed to the substrate.

**Doors and windows onto external waterproofed areas:**

The following applies for doors and windows onto external waterproofed areas:

- Subsill flashing to be included as part of the membrane system.
- Where the internal and external finished floor levels do not allow an upturn:
  - The deck surface must fall away from the grate; and
  - The grate is to be to the width or greater than the opening
- If the fixing of the sill/subsill is required, it is to be done horizontally to an angle behind the door sill/subsill.
**Penetrations:**

Any fixings that penetrate the membrane must be sealed. The sealant is to be compatible with the surface material.

Where a backing rod is used in support of the sealant, they shall be a minimum of 12mm

**TERMINATIONS AT WALL OPENINGS WHERE INTERNAL AND EXTERNAL FLOOR LEVELS DO NOT ALLOW AN UPTURN**
METAL POST SUPPORT PENETRATION

Vertical member shall be sealed so as not to allow any ingress of water. No voids are to be found in post support other than holes for fixing points through baseplate.

150 mm lap min.

Mechanically fixed to structural system.

Sealant around base of support.

Sealant around edges of baseplate.

12 mm min.

75 mm min.

NOTE:
Prime service pipe to allow for proper adhesion between sealant and pipe interface.
Skylights:

The membrane is to be upturned at the skylight to prevent water entry to a minimum of 40mm.

MOVEMENT AND CONTROL JOINTS

Where a building or structure has construction joints, movement joints or control joints, the membrane is to be either discontinuous over the joint or continuous, to allow for the designed anticipated movement. Where continuous joint is installed, the membrane is to be unbonded for the first 100mm.
DRAINS

The membrane is to be connected to the stormwater drainage system through a down turn of membrane into the inlet.

Other connections could have a flange for the membrane to be attached.

The installation of the drain should include a sump, inlet pit, grate or cage, to minimize blockage from debris.
OVERFLOWS

The membrane must be turned into the overflow to prevent moisture from tracking behind the membrane.
**CHANGES IN DIRECTION OR UPSTANDS**

Any changes of direction for the membrane from horizontal to vertical is to follow the same criteria as expressed in MOVEMENT AND CONTROL JOINTS.

**Bond breakers** are to be used where movement between substrates is expected.

Upstands & Hobs (piers, posts, etc.) are to be treated as with the detail outlined in TERMINATION OF MEMBRANES.

**PLANTER BOXES**

The membrane is to be sealed to the drainage outlet and extend vertically to a height of 100mm above the soil or fill level.

Falls in the planter box should be a minimum of 1 to 100 (10mm per 1 m)

A suitable overflow should be provided.

Protection board should be installed to minimize root damage to the membrane.

Externally exposed walls of the planter boxes should be waterproofed to prevent failure of the internal membrane.
PROTECTION DURING CONSTRUCTION

When a membrane system is not designed to be trafficable, the membrane must be protected from damage after installation until covered or finishes are installed. Typically, protection boards, physical barriers, restricted access and elevated walkways are used.

OVERLAYING SURFACE FINISHES

Where a membrane is to be overlayed with another system (tiles, pavers, ballast, insulation, soil etc), the overlaying system shall be compatible with, and not cause damage to the membrane.

Where the topping or bedding mortar is to be bonded to the membrane, sufficient movement joints to be provided in the topping or bedding mortar to accommodate the movement over the membrane.

NOTE: for bonded finished, the movement joints are to be located above the movement and control joints in substrate.

INSPECTION AND ACCEPTANCE TEST

On the completion of the installation of a membrane system, inspection and acceptance testing must be conducted. In addition to the visual inspection, either the dry film thickness test (DFT) by non-destructive means or a controlled water test for a minimum of 24 hours duration is required.

<table>
<thead>
<tr>
<th>Wet Film Thickness (microns)</th>
<th>Dry Film Thickness after Full Cure (microns)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>100% Solids</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>750</td>
<td>750</td>
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<tr>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>1500</td>
<td>1500</td>
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</table>
BALCONY CONSIDERATIONS

DOOR STOP DETAIL

Diagram showing the details of a door stop, including 6mm gap with backing rod and sealant, decorative cover plate, water-stop with membrane attached, and drainage holes.

Diagram showing the details of a membrane protection sheet, sill packer, allow for positive drainage, compressible perimeter joint, fillet or bond breaker, weep-hole, waterproof membrane, slip/protection sheet, 1:100 min. fall to outlet, and 100mm minimum step.
TIMBER DECKING OVER WATERPROOFED STRUCTURE

10mm x 100mm x 100mm Rubber protection pads bonded to the timber joists at 450mm centers. The protection pads are not attached to the membrane.

Vertical skirting tile fixed before the floor tile screed

Foam expansion joint

Tile

Tile screed

Reinforcement

Double layer slip sheet

Sheet floor substrate

Sheet metal angle fixed to the sheet substrate only and loosely placed against the vertical fluted polyethylene movement sheet

Metal angle bedded in polyurethane and troweled to a uniform shape

Floor joist with a maximum expected shrinkage of 8mm
AS4654.2 External Waterproofing interpretation

**BALUSTRADE**

- Water ingress into hollow posts is prevented by a welded post top.
- Post support brackets recessed into slab and watertight.
- Sheet or liquid membrane.
- Membrane terminates 25mm min. Above tile finish level.
- Post drainage holes above membrane.
- Fillets around posts.
- Non-shrink filling to recess.
- Membrane support angle allows for future gutter replacement.

- Toughened glass panels grouted into rebate using high strength non shrink grout.
- The top of the hob and the internal surface of the rebate are coated with an elastomeric membrane.
- Finished weatherproof coating.
- Primer coat.
- Polyester bandage.
- Waterproof membrane.
- Cross cavity flashing.
NOTES

BOND BREAKER PRINCIPLE

HOW A BOND BREAKER/FILLET WORKS IN FRAMED CONSTRUCTION

Flexible sealant
Closed cell foam strip over flexible fillet
The tile bed cannot extend over the fillet area
Waterproof membrane
Sheet floor substrate
Timber joist before shrinkage
Membrane and fillet stretch under the closed cell foam strip
The tile and tile bed drop 8mm
Shrinkage
Expected shrinkage across the grain = 8mm

AFTER TIMBER SHRINKAGE
SUMMARY CHECK LIST

The following is a summery check list for external waterproofing to meet and exceed the Standard AS4654.2. It is both the builder and the waterproofing contractor’s responsibility to understand and comply with the NCC and Australian Standard. This summary is a guide only.

1. Inspect and check the condition of the substrate before waterproofing:
   - Correct substrate materials installed
   - Movement Joints have been installed correctly
   - Flashings are correctly installed
   - Door sills are correctly installed
   - Plumbing and other penetrations have been correctly installed
   - Falls meet or exceed the Standard

2. Choose a Membrane system suitable for site purpose, incorporating final finishes requirements

3. Apply ‘Bond Breaker’ principle to all fillets, penetrations, vertical and horizontal joints

4. Ensure membrane system extends into drains, overflows, gutters etc. as required.

5. Install falls as required

6. Ensure all upturns and downturns extend to or exceed the Standard

7. Ensure the membrane system is working with the movement and control joints

8. Ensure the membrane system is protected and fully cured

9. Complete a final inspection, plus conduct membrane test

10. Issue a certificate of compliance that the waterproofing has met and exceeded the AS4654.2

References:
AS4654.2 Waterproofing membranes for external above-ground use. Part 2: Design and installation
MBA – NSW: Guide to External Waterproofing: Balcony Decks
Australian Institute of Waterproofing (AIW): External technical drawings