

## TECHNICAL BULLETIN – TB178

### PREPARATION OF WALLS & FLOORS IN WET AREAS OF HEALTH CARE FACILITIES AND INSTITUTIONS TO RECEIVE SHEET VINYL COVERINGS USING ARDEX FLC WATERPROOF MEMBRANES AND ADHESIVES

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#### INTRODUCTION & SCOPE

The elimination of trip hazards when entering wet areas and also the shower whilst maintaining falls to floor wastes is imperative. With previous ceramic tiling systems, the minimum screed height (25mm typically) often resulted in trip hazards and steep ramps at entranceways with the obvious safety hazards of “wet sloping hard surfaces”.

Standard concrete screeds requires a minimum 15-25mm thickness, at least 1 day drying time per millimetre thickness, and often requires additional smoothing before fixing resilient flooring. An Ardex cementitious topping typically is installed from 20-30mm to a featheredge at the floor waste, and dry rapidly to allow sheet vinyl flooring to be fixed typically within 16-18 hours.

The turnaround time factor can be critical and systems are available with a range of cure times to suit project needs. For the fast tracks systems, resilient flooring can be laid as early as 1 - 1½ hours over ARDEX A45 or A55, from 16-24 hours for ARDEX K15M, and K12 New, or up to 48-72hrs for slower products such as ARDEX K005 where cost is more important than time.

The critical requirements of any floor preparation material are:-

- Must be able to dramatically reduce the need for thick sand/cement screeds to create falls to floor waste with the resultant ramps at adjoining entranceways. Note: In new construction the need for structurally formed set downs (wet areas) is no longer required.
- To maintain a waterproof system in wet areas that conforms to the Australian Building Code for Class 3 and 9 buildings to AS3740 and that is compatible with sheet vinyl coverings.
- Falls within the requirements of AS1884-2012 in section 5.2 for wet area resilient flooring.
- All products for preparing wet areas surfaces are to be readily available, reliable, easy to use and safe, offering long term guarantees, available from the one manufacturer, have rapid hardening and drying properties to allow for the most cost effective construction with quick installation times.

In this bulletin methods will be described that allow a complete system to be installed including levelling, ramps or fall forming and membranes.

#### CREATING FALLS TO WASTE

Selected ARDEX Floor levelling, repair and re-modelling cements allow the installation of rapid hardening, rapid drying cement screeds for falls to floor waste. These products can be used from a minimum thickness of a featheredge to 20mm providing the minimum required thickness to achieve falls for a typical 900 x 900mm shower floor area.

Areas adjacent to the shower can also be ramped (back to floor waste) allowing only a moderate height build up to adjoining dry areas. Trip hazards can be easily removed by ramping with the same cement into dry areas with the shallow gradient allowing easy and safe passage by users of health care facilities.



Alternately, in new construction only, the falls to floor waste (shower areas) need to be created at time of construction. Roughly created falls can be quickly, easily, and cost effectively smoothed prior to installation of sheet vinyl flooring.

Specification of this system can allow flexibility of design with the location and installation of wet areas able to be altered at any time.

*Advantage: No need for set downs or falls to waste in the structural concrete subfloor.*

### **WATERPROOF MEMBRANES**

The waterproofing standard AS3740 describes sheet vinyl flooring as water resistant rather than waterproof. This is because of the joining process of the sheets with welded joints. The difference between the two is defined in the standard as:

**Waterproof** – The property of a material that **does not allow** moisture to penetrate through it when tested in accordance with AS/NZS 4858.

**Water resistant** – The property of a system or material that **restricts** moisture movement and which will not degrade under conditions of moisture.

The significance of this distinction arises in the General Requirements of the standard where shower areas (enclosed and unenclosed) and bathrooms and laundries with floor wastes require the floor to be waterproofed, rather than be water resistant. This means that whilst vinyl flooring is water resistant, it is not waterproof and so a separate membrane system is required.

### **SURFACE PREPARATION**

1. Concrete floors must be structurally sound with all previous coatings removed, clean and free of oil, grease, wax, latex compounds, curing compounds, efflorescence, laitance, dust and all foreign matter, back to an open porous matrix of the concrete. Professional cleaning by mechanical means in line with sound building industry practices is advised. Suggested processes include diamond grinding or if large areas scarifying or shotblasting to provide a surface profile of between CSP3 to CSP7. Refer to Technical Bulletin TB041 for more details.
2. Vacuum the surface to thoroughly remove all dust, dirt and debris from surface preparation etc.

**Note:** Ardex considers that sand-cement screeds are inappropriate substrates for vinyl flooring. The basic reasons are related to slow drying, difficulty in obtaining a smooth surface and, also unless carefully mixed and compacted, screeds have poor strength and indentation properties in the longer term which can lead to subsequent problems with the floor. Screeds shall be removed and the systems applied to the concrete base. For more detail refer to Ardex Technical Bulletin TB159 and AS1884.

### **PRIMING BEFORE RAPID CURE CEMENT BASE**

1. Primer for standard absorbent concrete to be ARDEX P51
2. Mix ARDEX P51 1:2 with water and apply evenly with a soft push-broom. Do not leave any bare spots and remove all puddles and excess primer. Allow to dry to a clear, thin film (min., 3 hours, Max., 24 hours). Underlayment shall not be applied until primer is dry.

Note: Alternate primers for the smoothing cements in special situations include ARDEX P9, ARDEX WPM300 with broadcast sand and ARDEX WPM368.

ARDEX P9 is applied by roller onto clean surfaces. It can be used on mechanically prepared concrete, with a lesser degree of porosity than required for ARDEX P51.

ARDEX WPM300 is used as part of the moisture barrier system as described in Technical Bulletins TB006 and TB192.



ARDEX WPM368 is applied by roller and acts in an equivalent manner to WPM300 except that broadcast sand is not required. This primer/moisture barrier should not be substituted for WPM300 where the substrate is highly saturated as curing is delayed in these cases.

### SYSTEMS TO CREATE BASE AND FALLS TO WASTE

The following systems are suitable for creating falls and smoothing the surface prior to installation of the membrane. The Ultra-rapid and Rapid cure systems are intended for 'fast track' installation.

Note that these systems require protection from long term moisture exposure.

**Table 1) Ultra-rapid Cure Systems**

Product	Ardex E25	Thickness	Cure times	Advantages	Limitations
System 1.1 ARDEX A55	Nil	① Added equal volume of aggregate 2-5mm to minimise flow. Any thickness	60-90 minutes	-Very fast cure allows rapid turn around times - High strength	-Very high flow without aggregate restricts ability to create falls
System 1.2 ARDEX A45	Gauge solution is 1 volume of E25 to 2.5 volumes of water. 1 volume of gauge solution to 3 volumes of A45 powder	a) 1-5mm neat A45 b) Thickness 5mm to 30mm A45 mortar can be bulked out ① 1/3 volume 0.3-0.5mm sand 1 volume 2-5mm aggregate c) Between 30-50mm 1 volume 10mm aggregate.	90 minutes	-Very fast cure allows rapid turn around times -High strength -Good formability	-When bulk filled is stiff to mix. -Mixing large volumes creates a short working time

**Table 2) Rapid cure systems**

Product	Ardex E25	Thickness	Cure times	Advantages	Limitations
System 2.1 ARDEX K15	1.6 litres of E25 to 4 litres of water per 20kg bag	① Recommended to have added equal volume of aggregate 2-5mm to minimise flow. Any thickness	16-18 hours	-Fast cure allows rapid turn around times. -No thickness restrictions -High compressive strength	-High flow without aggregate restricts ability to create falls
System 2.2 ARDEX K12 New	1 litres of E25 to 4.5 litres of water per 20kg bag	① Recommended to have added equal volume of aggregate 2-5mm to minimise flow. Up to 35 mm without aggregate and with 2-5mm gravel for thicker layers	16-18 hours	-Fast cure allows rapid turn-around times. -High compressive strength	-High flow without aggregate restricts ability to create falls.



**Table 3) Moderate cure time systems**

Product	Ardex E25	Thickness	Cure times	Advantages	Limitations
System 3.1 ARDEX K005	a) 1 litre of E25 to 2 litres of water per 20kg bag or b) 2.5 litres of Abalastic to 2.5 litres of water per 20kg bag.	① Any thickness from 10-120mm	48 hours	-Cure much faster than screeds -High thickness possible -Reduced costs -Water resistant -Good bulk fill base for other topcoats	-Slower cure dependent on thickness -Does not feather out
System 3.2 ARDEX ARDITEX-NA	Not required	a) ARDITEX NA is suitable for ramping to drains in the one operation without filler. b) ① For thickness 10-30mm recommended to have added equal volume aggregate 2-5mm	24 hours	-Water resistant -Flexible so good for CFC floors -Easier to form without aggregate	-Softer than other smoothing cements -Maximum recommended thickness 30mm
System 3.3 ARDEX A46	NA	0-30mm	24 hours	-Good formability -Water resistant – External product	Maximum recommended thickness 30mm
System 3.4 ARDEX K301	NA	a) 2-20mm b) ① For thickness 10-30mm recommended to have added equal volume aggregate 2-5mm	48-72 hours	-Water resistant- External product -Hard surface	-Maximum thickness 20mm -Rough surface texture -Main application is wear surface

- 1) Where Ardex smoothing cements have been bulk filled with aggregate, a final coat of neat smoothing cement is required to remove the rough and lumpy surface that bulk filled layers have. After the base coat has cured a coat of ARDEX P51 primer diluted 1:2 with water is applied to the surface and allowed to dry for approximately 3 hours.
- 2) It may be necessary to install pins in the concrete (adjusted by a string line) to act as a guide when installing floor-levelling cements. The gauge water/ E25 mix quantity can be adjusted down slightly to adjust workability as a screed.
- 3) An alternative method is to place a circle of foam tape approximately 300-400mm from the floor waste, and then to apply the bulk-fill from the wall to the outer edge of the foam tape. When the bulk-fill is cured the tape is removed and the final section



from the hardened edge to the waste it laid with the smoothing cement or patch mortar without aggregate.

### PLACEMENT WITH FALLS TO FLOOR WASTE

The bulk filled smoothing cements can be screeded or trowelled to the required fall or gradient (between 1 in 60 and 1 in 80), with an approximate minimum thicknesses of typically 8mm-10mm.

Where using neat ARDEX A45 and ARDEX A46 trowellable mortars, falls can be formed easily with a hand trowel.

Where using the neat smoothing cements, ARDEX K12 New, ARDITEX NA or ARDEX K301, the amount of fall that be created is restricted by the maximum build height that can be achieved.

Allow the mortar to harden to "FINGER TIGHT" then proceed to shape the mortar to the required fall to provide a flat finish by shaving or grinding the surface with a trowel blade or similar tool.

### WATERPROOF PROTECTION COATING FOR LEVELLING CEMENT

The application of the ARDEX membrane when installed in showers shall be continued as per AS3740 and AS1885-2012:

- up the internal corners to a height of 1.8 metres and 40mm either side of the junctions, assumed that walls are water resistant construction (this does not preclude full water proofing of walls if desired)
  - up wall surfaces for a minimum height of 150mm
  - above the bath level for 150mm
  - for floors of un-enclosed showers out to a minimum distance of 1500mm from the shower head
  - For floors with wastes, over the whole floor.
1. The recommended membrane for heavy duty applications and where more chemically aggressive vinyl adhesives are to used shall be ARDEX WPM002.
  2. For less demanding applications ARDEX WPM155 can be used in its place. However, it needs to be recognised that WPM155 is somewhat slower to cure than WPM002.

**NOTE: The ARDEX WPM155 Rapid film thickness as stated on the product datasheet for typical applications must not be used. The final dry film thickness for WPM155(R) when used in place of WPM002 shall be 1.0mm or greater. The use of STB Tape is also not recommended due thickness problems and potential show through and Deckweb must be used in its place.**

3. Allow the base coat of topping to harden and dry, see recommended cure times in tables, before applying the waterproof protective coating
4. The smoothing cement surface should be primed with ARDEX WPM265 Water Based Primer or ARDEX P9 (preferred primers for WPM002 or WPM155), but other suitable options based on product availability include ARDEX P51 diluted to 1:2 with water, ARDEX WPM300 or with ARDEX MULTIPRIME.
5. A bead of elastomeric sealant (e.g. neutral cure silicone) or bond breaking tape is applied as a bond breaker to the following areas:
  - Floor - wall junction
  - Expansion joints, floor/wall junction within shower trays
  - Joins in flooring and other places where movement is expected



6. Build enhancing elastic fabric scrim to carry the membrane over all joints and around penetrations to be ARDEX Deck Web 190mm wide.
7. The waterproof membrane shall be installed as per the product Technical Data sheet to all finished surfaces.
8. Allow the ARDEX WPM002, to cure for at **least** 4 hours at 23°C/50% RH, prior to the installation of the ARDEX FEATHER FINISH.
9. ARDEX WPM155 should be allowed to cure for at least 18-24 hours before application of ARDEX FEATHER FINISH.
10. Where the vinyl is turned up the walls, details such as coves are required and the fairing coat must be continued up the height of the membrane and then overlapped onto the wall construction to produce a smooth transition.

Note: Where ARDEX WPM155 has been used instead of WPM002, it is not as resistant as the cement containing WPM002 where solvent based contact adhesives are used (can result in transient softening of the membrane).

Ardex cannot offer guarantees for installations over non-Ardex membranes unless tested by Ardex for compatibility.

#### **FINISHING COAT FOR DIRECT FIXING OF VINYL – FEATHER FINISH**

The flexible smooth cement shall be ARDEX FEATHER FINISH (or ARDEX FINE FINISH).

The purpose of the finishing coat is to improve performance of tack-off type water based adhesives, to provide some protection for the membrane surface, and to hide the rough texture of the membrane to prevent show through.

1. FEATHER FINISH to be mixed 2 parts powder to one part water with an Ardex mixing paddle and electric drill.
2. Apply FEATHER FINISH mortar using a 1.6 to 2.4mm notched trowel, then smooth using a flat trowel to provide a flat/smooth porous surface. This can be done as a single coat which is trowelled smooth, but application of a second coat after the first has dried is more effective.

*The required minimum thickness for floors to be 1.5mm*

*The recommended minimum thickness for walls is 1.0mm*

3. The fairing coat can be used to cover the edge of the membrane and provide a wedge shaped transition on the walls where the vinyl is turned up.
4. Allow the FEATHER FINISH smoothing coat to dry thoroughly before proceeding with installation of resilient vinyl sheeting (minimum 3 -6 hours at 20 C).

#### **FINISHING COAT FOR DIRECT FIXING OF VINYL – ARDITEX NA**

In some situations a thicker build is required and in this case ARDITEX NA can be installed over the membrane. ARDITEX is also more resistant to solvents than a thinner layer of FEATHER FINISH provides, so can give extra protection where contact solvent adhesives are in use.

1. The self-smoothing latex based underlayment shall be ARDITEX-NA.
2. Install ARDITEX-NA at a minimum thickness of 3mm to the dry waterproof membrane and allow to dry thoroughly (minimum 24 hours) prior to the installation of vinyl finishes.

Note that ARDITEX-NA cannot be run up walls and in this case a coat of FEATHER FINISH is required to smooth the wall areas.



## FLOORING ADHESIVES

The resilient flooring can be installed one of a number of adhesive products; however the adhesives used must comply with the floor covering manufacturer's recommendations for appropriate types.

The most moisture resistant adhesive used is typically a two part epoxy adhesive, however they have poor initial grab which can lead to problems at some types of floor waste. Water based acrylic adhesives are subject to moisture damage when the vinyl joints leak, and also require correct tack off time. Solvent based contact adhesives provide fast grab, but can be long term moisture sensitive, depending on the solvent type may affect the membrane, and may not be recommended by floor covering manufacturer.

Adhesive systems for the vinyl installation would include:

1. Bonding the vinyl to the floor and walls with ARDEX AF142 fast grab adhesive with 1.6mm notch trowel, making sure the product has correctly tacked off before laying the vinyl to prevent moisture being trapped.

The use of ARDEX AF172 and AF178 may also be feasible when used with ARDEX SpeedTech adhesive catalyst spray.

2. The area around the welded vinyl joints on the floor bonded with ARDEX AF545 epoxy adhesive. This adhesive can also be used to bond the whole area of the floor.
3. The plastic floor waste turndown and the area within ~100mm can be have the coverings bonded with the contact adhesive ARDEX AF675. To prevent solvent damage to the membrane the contact adhesive must correctly tack off before the covering is placed.
4. Where mouldings and fittings are to be bonded to the walls (typically where the vinyl finishes on the turn up) or the corner covings, ARDEX AF675 can be used, again allowing the correct tack off time.
5. Mouldings or skirting trim can also be bonded with ARDEX CA-20P silane adhesive and sealant. The adhesive can be activated faster by misting with water before placing the piece to be bonded. This adhesive is not designed as fast grab, and heavier items may require support, but is solvent free.

## DAMP SLABS

Where the concrete subfloor has a moisture content that exceeds the requirements of AS1884, the floor shall be treated with ARDEX WPM300 as per Ardex Technical Bulletin TB006 or TB192 (or Ardex WPM368).

When following TB006, please note that not all smoothing cement listed in the systems above can be used with ARDEX P82 primer.

## TIMBER FLOORS

These systems are not considered suitable for use over timber based floors. Whilst it is possible to waterproof floors made of particle board and plywood, strip timber floors are classified as not suitable under the standard.

## SAND-CEMENT SCREEDS

For cost reduction reasons, sites are being specified with sand-cement type screeds in the wet areas as the base. They covered under AS3958, for the purposes of application and design. These screeds have a number of issues which can make this a false economy. In particular the screeds have to be mixed cement rich and heavily compacted so the minimum strength requirements of 20MPa in compression, and the more critical 1.5MPa in tension can be achieved. Commonly this does not occur and the longer term performance is questionable. A second issue is the slow drying time of screeds (1mm per day) compared to engineered cements, and the final problem is that any irregularities cannot be corrected by application of the a liquid smoothing cement.



Granolithic screeds perform better, but a suitable mix of sizes in the sand-aggregate blend is not always available.

## REFERENCES

AS3740-2010/12 Waterproofing of wet areas within residential buildings.

AS/NZS4858-2004 Wet area membranes

AS1885-2012 Floor coverings—Resilient sheet and tiles—Installation practices.

Ardex Technical Bulletin TB012D; Systems for Preparation of Walls & Floors in Wet Areas of Health Care Facilities to Receive Sheet Vinyl Coverings, Ardex FLC and Membranes.

## GLOSSARY

**AS3958.1-2007** Ceramic tiles

Part 1: Guide to the installation of ceramic tiles.

**Bond breaker** – A system that prevents the membrane bonding to the substrate, bedding or lining.

**Bulk filled** – A liquid or paste smoothing cement which has had aggregate or coarse sand added to it to add bulk and alter the handling properties (usually to reduce flow).

**Feather edge** – where the smoothing cement is wedged down a fine and thin transition, typical 1mm or less in thickness.

**Finger tight** – The mortar is firm to touch and does not easily deform or slump, but is still soft enough to work and shape with a trowel or a dampened trowel.

**Granolithic topping** – A type of “sand”-cement screed where the sand is actually a mixture of sand (0.05-2mm size) and fine gravel between 2-5mm normally which is mixed with cement and laid in the same sort of way as a normal sand-cement screed. The range of particle sizes makes these screeds stronger than the typical fine sand only screeds.

**Leveller**– also called smoothing cement, floor levelling cement, topping or the standard term underlayment. These are typically poured liquids but can also be mortar pastes.

**Mechanical method**-As defined in AS1884-2012 is,

“1.3.15 Mechanical means

*‘Mechanical means’ is the process of surface preparation performed by application of applied physical forces to the substrate surfaces to remove contamination. For the purposes of installations on concrete this refers to the use of diamond grinders, scarifiers and captive shot blasters. For smaller areas this can include chippers and nail gun type scabblers. When installations are to be performed on timber floors ‘mechanical means’ refers to floor sanders. Regardless of the means used the final process in a mechanical preparation is vacuum cleaning.”*

**Moisture Barrier** - This term refers to a waterproofing membrane which is used to prevent rising moisture from the substrate. It can be either liquid water or water vapour. These can fall under AS4858/AS740 or AS2870.

**Resilient flooring** – Sheet and tile coverings in all forms which includes flexible PVC, semi-rigid PVC, linoleum and rubber.

**Waterproof membrane** – The term membrane is the general covering name for all sorts of waterproofing, but in this case is taken to mean flexible membranes compliant with AS4858 and designed to stop water from above the flooring penetrating.

**Wet areas** – An area within a building supplied with water from a water supply system, which includes bathrooms, showers, laundries and sanitary compartments and excludes kitchens, bar areas, kitchenettes or domestic food and beverage preparation areas. (From AS3740-2010).





**IMPORTANT**

This Technical Bulletin provides guideline information only and is not intended to be interpreted as a general specification for the application/installation of the products described. Since each project potentially differs in exposure/condition specific recommendations may vary from the information contained herein. For recommendations for specific applications/installations contact your nearest Ardex Australia Office.

**DISCLAIMER**

The information presented in this Technical Bulletin is to the best of our knowledge true and accurate. No warranty is implied or given as to its completeness or accuracy in describing the performance or suitability of a product for a particular application. Users are asked to check that the literature in their possession is the latest issue.

**REASON FOR REVISION**

Removal of K10. Addition of FINE FINISH. Clarification of WPM155 film thickness. Addition of glossary.

**REVISION REQUIRED**

24 months from issue

**Technical Services** 1800 224 070. email: [technicalservices@ardexaustralia.com](mailto:technicalservices@ardexaustralia.com)  
Australia <http://www.ardexaustralia.com>

**NSW-HO** 61 2 9851 9100, **QLD** 07 3817 6000, **VIC** 03 8339 3100, **SA/NT** 08 8406 2500, **WA** 08 9256 8600  
**Customer Service and Sales** 1300 788 780

**New Zealand** Christ Church 64 3373 6900, Auckland 9636 0005, Wellington 4568 5949  
**Technical Inquiries NZ** 0800 2 ARDEX New Zealand <http://www.ardex.co.nz>

Web: Corporate: <http://www.ardex.com>