



## TECHNICAL BULLETIN – TB113

# NOT ALL WATERPROOFING MEMBRANES ARE THE SAME

19<sup>th</sup> July 2024

### INTRODUCTION & SCOPE

This bulletin will provide a general overview of membrane types and recommendations for tile adhesives.

### ACRYLIC MEMBRANES

These membranes are the most common type and are water based. The polymer base is a modified acrylic material and can be one or two part. One part materials are premixed and are applied directly from the container. For two part systems, the liquid part normally contains the polymer dispersion and the powder contains cement and other additives. These membranes are flexible, have low odour, and are clean up with water.

The ARDEX range has several membranes in this category; the main ones are ARDEX WPM155 Rapid Plus, and ARDEX WPM002.

These membranes are normally compatible with tile adhesives based on cement, which dry by hydration of the cement. The use of premixed adhesives, which dry by evaporation, is not recommended for dense tiles since the water cannot escape, especially where non-porous tiles are used. The adhesive remains soft, and tiles may come loose.

### POLYURETHANE MEMBRANES

#### TYPES

There are three types of polyurethane membrane;

1. The original type of polyurethane is the two pack system which relies upon the reaction of the isocyanate with a polyol. These materials are packed separately after dispersion in flammable solvents such as xylene or alcohol. The materials are mixed and then applied to the surface to form the membrane.
2. The second type of polyurethane is a one-pack system called moisture cure. These membranes rely on the reaction of the isocyanate with moisture in the atmosphere. This type is also solvent-borne. The ARDEXX product WPM157 is a moisture-cure polyurethane and is not recommended for tiling over.

The two pack and moisture cure polyurethanes can be either aromatic or aliphatic and this describes the shape of the polymer molecules. These polymer shapes alter the membrane properties. Aliphatic membranes are more U.V. resistant.

3. The third type of polyurethane is a water based system where a pre-reacted polyurethane polymer is dispersed in water. It is typically added to an acrylic based emulsion. ARDEX WPM155 Rapid Plus belongs to this class of membrane.

#### PROPERTIES

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ARDEX TECHNICAL SERVICES DEPARTMENT





### *Two pack and Moisture Cure*

Polyurethanes are noted for their chemical resistance and inertness. The surface of the two-pack and moisture-cure membranes is typically very smooth and inert. This means that adhesion by normal tile adhesives is problematic since the adhesive cannot easily form a mechanical bond and does not form any sort of chemical bond.

Depending on the formulation, testing by ARDEX has shown that whilst an initial bond can be formed to these membranes, the tensile bonds achieved by the adhesive (pull off strength) is often a marginal pass in terms of compliance with the Australian Standard. This testing indicates performance for the system when new, so the long term performance cannot be guaranteed. ARDEX has also found that where the membrane has been sand-blinded in an attempt to provide an adhesive key, the adhesive may, in fact, pull the sand out of the flexible surface, thus negating the purpose of the sand.

ARDEX has evaluated a number of non-water based polyurethane systems and has specific recommendations for those supplied by Wet Seal Australia. ARDEX does not recommend the use of its adhesives over other two pack and moisture cure polyurethanes, and users of these membranes are advised to consult the manufacturer for their recommendations.

### *Water based*

The water borne polyurethanes retain the good performance of the type in general but provide a surface which is compatible with cement based tile adhesives. ARDEX has however observed some compatibility issues in terms of bonding, with third party water based polyurethane membranes. Depending on the formulation, the handling and application is typically similar to the acrylic membranes.

## **EPOXY MEMBRANES**

### TYPES

Epoxy membranes fall into three general types: 100% solids pure epoxies, water-dispersed epoxy, and flexible epoxies. These are all two-part systems that rely on the reaction between epoxide resins and a reactive hardener, such as an amine, to form a thermosetting polymer.

100% solids resins are not commonly used, but water-based epoxies are quite common, and a number of flexible systems are available. These membranes have good chemical resistance and are quite inert when cured. The non-flexible membranes are very rigid after full curing and require special bond breaker systems, according to AS3740.

### PROPERTIES

#### *Water based emulsions*

The water based types are used for stopping rising damp in masonry, pool or pond liner membrane bases and sealing early age screeds. These types are compatible with cement based adhesives, though it is best to tile on them within a few days of installation as the polymer continues to cure and develops a hard surface after around 7 days. ARDEX has a product of this type called ARDEX WPM 300.

#### *Flexible epoxies*

These are solvent less two part systems which when cured are not rigid. The bond of adhesives onto these types varies.



### *100% Solids Solvent Free*

These are not commonly used as membranes, are chemically inert, and tend to dry with shiny hard surfaces. Adhesion depends on abrading the surface to a rough finish which may compromise the membrane qualities, or broadcasting sand onto the surface when still sticky to provide a bond surface. ARDEX does not recommend the application of its adhesives over this type of membrane. In some circumstances smoothing cements can be applied over sand blinded epoxies of this type.

## **POLYESTER MEMBRANES**

These membranes are rigid, using polyester resin and fiberglass mesh as reinforcement. Polyester is a two-part system based on a resin formed from an acid anhydride and a polyol dissolved in styrene (which gives it the distinctive smell) and with a peroxide catalyst to cause the resin to harden. This is the same resin used for fiberglass pools and car parts.

Polyester forms a hard and impermeable surface that is fairly chemically inert and can be difficult to get an adequate mechanical bond to. It may be necessary to roughen the surface to achieve a bond, but this can compromise the membrane. Due to these issues, ARDEX does not recommend directly applying tile adhesives to these membranes.

## **BITUMINOUS MEMBRANES**

Several varieties of these membranes are based on bituminous fractions, including modified membranes such as APP Modified Sheet, PU Modified Liquid Applied, and Acrylic Modified Liquid Applied. The ARDEX WPM 150 to WPM 188 membranes are bituminous APP and ARDEX WPM 3000X is an SBS type. ARDEX WPM 179 is a latex bitumen membrane. ARDEX does not recommend the application of its tile adhesives over these membranes.

Issues with these membranes can include the bleeding of light hydrocarbon fractions over time, which results in discolouration of grouts and possible degradation of the adhesives.

## **SYNTHETIC RUBBER SHEET MEMBRANES**

There are several synthetic rubber membranes available that have been used in wet areas, but these membranes are predominantly used externally on verandas, decks, and roofs. They are fabricated from EPDM or SBR and are very durable and inert.

ARDEX BUTYNOL, ARDEX WPM 712, ARDEX 715, and ARDEX 717 sheet membranes fall into this class of membrane. These surfaces normally have limited adhesion capability to tile adhesives, and ARDEX only recommends using ARDEX OPTIMA when tiling is considered on BUTYNOL Black.

ARDEX WPM 750 and ARDEX WPM 1000 are specialised membranes with a fabric face fixed on both sides and is suitable for the standard adhesives used with the liquid applied membranes.

## **POLYOLEFINS**

A different type of sheet membrane based on polyolefin sheeting once was introduced to the Australian market by ARDEX. This product was called ARDEX WPM 615 and was intended mainly for roofing applications. The surface of this material was not suitable for the bonding of



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tiles, and the best approach was to apply a self-supporting screed and tile onto these sheet membranes if required.

## CONCLUSIONS

For tiling applications over acrylic and water borne polyurethane or epoxy membranes such as ARDEX WPM002, WPM155 Rapid Plus or WPM300 (after sand seeding).

ARDEX recommends the use of cement based adhesives. Suitable products include.

ARDEX X77

ARDEX X78

ARDEX ABAFLEX

ARDEX X10

ARDEX X18

ARDEX QUICKBOND

ARDEX X52

ARDEX OPTIMA.

*Tiling over synthetic rubber sheets such as ARDEX WPM 750 and ARDEX WPM 1000 can be done with the above tile adhesives, but the substrate must be carefully considered. For example, ARDEX X 10 is not suitable on particleboard, but ARDEX OPTIMA is suitable.*

In some situations where a floor smoothing cement may need to be applied over ARDEX liquid applied membranes, 3mm of ARDEX ARDITEX NA or ARDEX FEATHER FINISH can be used. However, it is normal practice to apply the smoothing cement or bulk fill under a membrane where tiling is considered.

For unidentified membranes, the following options are possible solutions –

- Remove the membrane and use one compatible with the tile adhesives.
- Place a self-supporting sand cement screed over the membrane and tile it over that instead.

### **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.

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