

TECHNICAL BULLETIN – TB113

NOT ALL WATERPROOF MEMBRANES ARE MADE THE SAME

16th July 2013

INTRODUCTION & SCOPE

A question frequently posed is, what ceramic tile adhesive or smoothing cement (in certain special applications) can we use over the waterproof membrane? The answer to this question lies partly in the type of membrane, and partly in the adhesive characteristics. There are a number of different types of membranes which have very different chemical and physical properties, and as a result, tile adhesives have varying performance on these materials.

In this bulletin we will have a general overview of membrane types and general 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 applied direct 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 water clean up.

The Ardex range has a number of membranes in this category, ARDEX WPM001 (Dunlop Undertile Waterproofing, Tile Power TP30), ARDEX WPM002, ARDEX WPM310 SHELTERGUARD, ARDEX WPM908 and Beaumonts BarrierFlex.

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 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 basic types of polyurethane membranes and these can be rigid or elastomeric (flexible). The rigid types are not normally encountered in tiling situations and the elastomeric variety is the one we shall look at further.

Polyurethanes are a reaction polymer system where a highly reactive organic molecule based on the isocyanate group reacts to form a continuous cross linked membrane.

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 alcohols. The materials are mixed and then applied to the surface to form the membrane.

The second type of polyurethane is a one pack system called moisture cure, and these membranes rely on the reaction of the isocyanate with moisture in the atmosphere. This type is also solvent borne. The Ardex 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 can also alter the membrane properties, and aliphatic membranes tend to be more U.V. resistant.

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

PROPERTIES

Two pack and Moisture Cure

Polyurethanes are noted for their chemical resistance and inertness. The surface of the two pack and moisture cure membranes are typically very smooth, and very inert. This means that adhesion by normal tile adhesives are 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 gives an indication of performance for the system when new, and so the long term performance cannot be guaranteed. Ardex has also found that were 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

The 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, and form a thermosetting polymer.

The 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 AS3740-2010 clause 3.13.7.

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 two products of this type, WPM300 Hydrepoxy and ARDEX WPM256 bonding bridge and primer for WPM300 in some situations.

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 is dependent 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 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 a rigid type using polyester resin and fibreglass mesh as the reinforcement. The 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 fibreglass pools and car parts.

Polyester forms a hard and impermeable surface which 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 in the process this can compromise the membrane. Due to these issues Ardex does not recommend the direct application of tile adhesives to these membranes.

One of the Wet Seal Australia systems uses polyester, but has a suitable topcoat which Ardex has tested and Wet Seal has specific tiling recommendations for (TB087).

BITUMINOUS MEMBRANES

There are a number of varieties of these membranes based on bituminous fractions, including modified membranes such as APP Modified Sheet, PU Modified Liquid Applied and Acrylic Modified Liquid Applied. The ARDEX SHELTERBIT WPM150 to WPM188 membranes are bituminous APP and ARDEX SHELTERSEAL WPM3000X is an SBS type. ARDEX WPM179 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 resulting in discolouration of grouts and possible degradation of the adhesives.

SYNTHETIC RUBBER SHEET MEMBRANES

There are a number of synthetic rubber membranes available which have been used in wet areas, but predominantly these membranes are used externally on verandahs, decks and roofs. They are fabricated from EPDM or SBR and are very durable and inert.

ARDEX BUTYNOL and ARDEX WPM750 Ecobutynol sheet membrane falls into this class of membranes. Normally these rubber surfaces have limited adhesion



capability to carry tile adhesives and Ardex only recommends the use of ARDEX OPTIMA when tiling is being considered on BUTYNOL (see TB077).

ARDEX WPM750 is a specialised membrane with a fabric face fixed on both sides and is suitable for the standard adhesives used with the liquid applied membranes.

POLYOLEFINS

A new type of sheet membrane based on polyolefin sheeting has been introduced to the Australian market. This product is called ARDEX WPM615 and is intended mainly for roofing applications. The surface of this material is not suitable for bonding of tiles and the best approach is 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 WPM001, WPM002, WPM155 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 MPP

ARDEX SUPER TILESET

ARDEX STS8 or X7 +/-ARDEX E90

ARDEX QUICKBOND

ARDEX X56

ARDEX X52

ARDEX OPTIMA.

In some situations where a floor smoothing cement may need to be applied over flexible Ardex 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 being considered.

The choice of adhesive then depends on the substrate type, kind of tile, wall or floor installation, and internal or external situation. As noted on page 1, premixed adhesives are not recommended on membranes due to extended drying times.

Where the membranes are manufactured by Wet Seal Australia, specific recommendations are available (TB087).

For the other kinds of 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 over that instead.



Always remember, Ardex membranes and tile adhesives are tested to work together as a system. Where a non Ardex membrane is in place, regardless of type, Ardex cannot guarantee the performance of its adhesives over that membrane, except where specifically tested by Ardex and found to conform to the relevant Australian Standard, and Ardex's performance criteria.

NOTE 1: Application of membranes and tiling in swimming pools, ponds and water features is a specialised application requiring specific membranes and procedures. Refer to bulletins listed in references below.

NOTE 2: During 2010 the BCA and AS3740 were cross-referenced and the contents brought in to line with each other.

REFERENCES

AS3740-2010 Waterproofing of domestic wet areas.

Surface Coatings Association (1993) Surface Coatings – Raw materials and their usage. NSW University Press. Sydney.

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

Changes to membrane available.
Changes to references.

REVIEW PERIOD

24 months from date of issue.

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