TECHNICAL BULLETIN – TB235

PRIMERS & BONDING BRIDGES

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INTRODUCTION & SCOPE

Preparation of substrates prior to the installation of applied finishes (e.g. waterproofing membrane and/or tile finishes) generally consists of the following processes; first the substrate may be mechanically prepared to remove contaminations and/or achieve an open surface suited to the applied finish, and secondly, the surface is "primed" in preparation of the applied finish. In this context, **priming is done to make the prepared surface ready for the next process.** Unfortunately, priming is not always done and this bulletin discusses primers and bonding bridges.

SURFACE PREPARATION *(refer Ardex Technical Bulletin TB041)*

Preparation of substrates is recommended to remove any contaminant (e.g. concrete curing compounds) that may inhibit the penetration of primers and/or inhibit the primer/bonding bridge system adhering to a surface that is not as firmly bonded (e.g. dust / laitance) to the substrate as required for a secure installation. In this regard, there are Australian Standards that set the minimum tensile (pull-off) bond strength required by tile adhesives and applied systems such as waterproofing membranes or levelling cements. Thus priming over unprepared surfaces may still result in lack of adequate adhesion.

In addition to removing contaminants, surface preparation by mechanical methods can provide an open profiled or "keyed" surface that increases the penetration into solid substrates and therefore adhesion of the applied primer/bonding bridge and significantly improves the security of the overall installation.

Priming materials can be simply grouped into 2 main categories, penetrating primers and bonding bridge systems although grouping can also be done based upon the chemistry of each primer.

PENETRATING PRIMERS

Penetrating primers are typically those that are water-based (e.g. Ardex Multiprime) or solvent-based (e.g. Ardex WPM270) solutions of polymers compatible with the material to be applied over the primed surface. These are typically one part, relatively low solids content solutions that are applied by brush, roller or spray to the prepared surface. They penetrate into the open surface to bind any loose dust particles and improve the adhesion of the applied membrane and/or tile adhesive. However for maximum adhesion to be achieved, the primer must have been allowed to dry prior to application of the applied waterproof membrane and/or tile system.

As an example, standard cement based tile adhesives "adhere" to porous tiles and porous substrates by the formation of crystals from the wet cement paste into the surface pores, capillaries and surface irregularities. If the moisture in the cement paste is rapidly absorbed into porous substrates or into the body of the porous tile, the formation of the cement crystals is inhibited and the mechanical adhesion can be greatly reduced. Priming of the substrates allows the cement crystallization to occur and achieve the required adhesion by the formation of mechanical bonds..

Extremely porous substrates such as Autoclaved Aerated Concrete (AAC) (e.g. Hebel lightweight concrete) may require more than one coat of primer prior to application of waterproofing membranes and/or tile adhesives.

On the other hand, dense, highly vitrified/porcelain tiles can have such low water absorption properties as to be considered “non-porous” with no surface pores to enable the mechanical adhesion mechanism by cement crystallisation to achieve maximum bond strength. Cement based adhesives are therefore improved by the addition of suitable polymers that can adhere the surface and still achieve with adhesion performance compliant to the requirements of ISO13007.

One part, liquid applied waterproofing membranes (e.g. Ardex WPM155) form a plastic film by loss of the water (or solvent) carrier. This typically applies to the acrylic or rubber latex based membranes and the one part moisture curing type polyurethane membranes (e.g. Ardex WPM157). These are relatively high solids content systems that do not penetrate the substrate as easily as a compatible primer. However bonding of these systems to the dry primed surface achieves higher adhesion that is in excess of the minimum requirements for a tile adhesive or membrane.

While two part membranes (excluding reaction resin type membranes such as epoxy) may mix the membrane liquid polymers with a cement based powder for quicker drying, the overall effect is the same with adhesion achieved over a primed surface again greater than the minimum required for tile adhesives.

A note of caution; some waterproofing membranes (e.g. polyurethanes) are intolerant of any residual moisture in the substrate and require the use of a suitable impervious moisture barrier that will prevent that moisture rising to create bubbles in the applied membrane. Typically these moisture barriers are water-borne 2 part epoxy systems such as the Ardex WPM300 Hydrepoxy.

BONDING BRIDGES/ PRIME COATS

Many in the building industry will be familiar with bonding bridges such as the cement slurry coat used when laying tile screed beds over concrete, or the application of a water-borne epoxy coating when joining (casting) new concrete to old concrete. In these applications, the principle is a wet-on-wet application so the bonding slurry is partially penetrating into the drier substrate and partially mixing with the wet layer being applied.

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However the newer types of bonding bridge/prime coats (e.g. Ardex P9 or Ardex WPM368) are often blends of water-borne polymers that can achieve high adhesion to dense substrates without penetration into the substrate. **Provided the surface is clean and dry**, these compounds may be applied to the clean surfaces that have minimal or no mechanical preparation. Thus these newer, liquid-applied bonding bridges/prime coats dry to form an intermediary film that strongly bonds to the substrate surface with minimal or no penetration into the substrate and which is compatible with the waterproofing membrane and/or tile adhesive. An added benefit is that the dry film may act as a partial moisture barrier and resist residual moisture rising from the substrate. In other words, some film forming primers have high resistance to hydrostatic pressure and can allow the installation of waterproofing systems over damp substrates that previously required the use of an impervious epoxy primer. It is important to note that these moisture barrier type primers are not considered equal to a waterproof membrane.

One of the oldest applications of these film forming bonding bridge/prime coats (i.e. Ardex P82 primer) has been when applying levelling cements over timber or existing ceramic tile substrates. The development of these bonding bridges/prime coat systems for the installation of waterproofing membranes and/or tile finishes has been more recent. Substrates as diverse as metal, glazed tiles and even sheet timber can be coated. Some of these polymer bonding bridge/prime coat systems (e.g. Ardex WPM368) include granular materials that provide the “keyed” surface for better mechanical bonding of cement based tile adhesives.

In order to develop the bonding bridge/prime coat film, these polymer based products are relatively high in polymer content and work best with compatible polymer improved tile adhesives.

The application of waterproofing membranes, tile adhesives and to a lesser extent, levelling cements, to various substrates often includes the application over various fittings such plumbing items. These include piping made of plastic and metal as well as the floor waste outlets. Priming of these items is recommended particularly when applying liquid waterproofing membranes to ensure there are no leaks.

- For PVC (polyvinyl chloride) pipes and flanges, prime with the plumbers pink primer and let dry; ***or*** clean & scarify the surface with abrasive paper prior to the application of liquid applied membranes.
- For most metal fittings, a two pack epoxy primer is suitable after preparing the metal by degreasing and rubbing with abrasive paper to remove contaminants and oxidation products from the surface. Ensure the primer is compatible with the metal and with the membrane/ tile adhesive which may be in contact with it.
- For galvanised metal, prepare as above and use the Ardex P9 primer in lieu of the epoxy primer.
- For HDPE (high density polyethylene), PE (polyethylene) and PP (polypropylene), these are products with excellent resistance to abrasion and many chemicals, including solvents. At this stage, there is no readily available priming system for these products.

SUMMARY

Substrate preparation is the most important requirement for the application of any applied system. This requirement remains even when applying primers and bonding bridges. However the development of film forming bonding bridges allows less preparation of some (dense) substrates for a quicker overall system installation

REASON FOR REVISION - ISSUER

New bulletin

DOCUMENT REVIEW REQUIRED

24 months from review

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