TECHNICAL BULLETIN – TB076

WATERPROOFING SYSTEMS FOR STRAW BALE CONSTRUCTION DWELLINGS

31 MAY 2013

INTRODUCTION & SCOPE

A growing trend within modern construction is the construction of dwellings from straw bales. The straw offers significant advantages particularly in relation to cost and insulative properties.

The straw bales are fixed in position and then rendered with cement, lime or earthen plaster. The render is worked into the outer surface of the bales before the final render surface finish is applied. Therefore the render is well bonded to the underlying straw substrate however the outer surface is substantially flexible.

Waterproofing of the principal structure and, in particular, the internal wet areas presents unique problems. The purpose of this bulletin is to address these problems and provide a high performance waterproofing system for this type of construction.

STRUCTURAL CONSIDERATIONS

While the render is generally well integrated with and bonded to the underlying bound straw the surface normally exhibits flexible characteristics. This presents potential problems when ceramic tiles are required in wet areas primarily because of the rigidity of the ceramic tiles.

When the straw is placed it is not necessarily totally dry and care has to be taken not to fully seal surfaces which will contain the water. The straw has to be allowed to breathe so that it can absorb and expel moisture in a similar manner to concrete and stone substrates. This becomes particularly critical when air conditioning is to be installed to avoid excessive condensation build up over the internal surfaces.

The render used is a very porous substrate and the external surfaces are likely to absorb significant quantities of water during rain periods unless they are adequately and properly treated.

INTERNAL WET AREAS TO BE TILED

Internal wet areas are likely to be tiled either immediately or at some time in the short term future. These areas will also be subjected to considerable water exposure and this would be detrimental to the underlying straw.

For this reason it is recommended that a waterproofing membrane in wet areas or areas that are likely to be coated in ceramic tiles consist of a rigid reinforced membrane system. The rigidity of the membrane system in combination with the render will provide a more stable base on which to bond ceramic tiles.

This rigid membrane structure should be complimented by a flexible membrane installed at all corners between wall to wall and wall to floor intersections. It is also recommended that the flexible membrane be extended to all wet area surfaces as a secondary membrane in the event of a weak spot fracture of the semi-rigid membrane.

For the tile installation a high flexibility ceramic tile adhesive has been recommended to accommodate any possible movement. A flexible epoxy grout completes the wet area waterproofing system.

INSTALLATION RECOMMENDATION TO INTERNAL SURFACES

PRIMARY MEMBRANE

a) All surfaces must be cleaned free from all dirt, grease, oil, loose particles and other surface contaminants prior the any product application.

b) Apply one coat of ARDEX WPM256 HydrEpoxy (thinned 50% with water) to all surfaces at a coverage rate of 5 to 6 square metres per litre. Apply using brush or roller application techniques and work well into the surface during application.

c) In not less than 15 minutes, nor more than 4 hours following the application of the ARDEX WPM256 HydrEpoxy, apply one coat of ARDEX WPM300 HydrEpoxy by brush, roller or spray techniques at a coverage rate of 3 square metres per litre. Allow to cure overnight before proceeding.

d) Apply to all surfaces to be treated another liberal coat of ARDEX WPM300 HydrEpoxy at a coverage rate of 3.0 square metres per litre. While the coating remains fluid place ARDEX Deckweb reinforcement mat over the surface and knead the cloth into the coating to wet the cloth through and remove all air pockets and creases. Only treat an area that will allow the placement of the ARDEX Deckweb while the ARDEX WPM300 HydrEpoxy remains fluid and repeat the process until the whole area is covered. Allow the coating to become scratch hard, normally overnight, before proceeding.

e) Apply to all surfaces to be treated one coat of ARDEX WPM300 HydrEpoxy at a coverage rate of 3.0 square metres per litre. Allow the coating to become scratch hard, normally overnight, before proceeding.

Essential - to be applied to all wall to wall and wall to floor intersections

f) Apply a liberal coat of ARDEX WPM155 PU membrane to a section of the joints, including wall to base and wall to wall junctions to extend to at least 150mm on either side of the joint. While the coating remains wet and fluid lay 190mm wide ARDEX Deckweb woven cloth equidistantly across the joint and knead well into the wet coating ensuring all air pockets and cloth wrinkles are removed. Only apply the membrane to a sufficient area that will allow the ARDEX Deckweb to be laid while the coating remains wet. Repeat the process until all joints have been covered. Once all the joints have been treated the first full coat of membrane can be applied.

g) Apply to all surfaces previously coated with ARDEX WPM155 PU membrane, a second coat of the same product at a coverage rate of 1 square metre per litre. This membrane coating may be applied wet on wet over the preceding coat.

Recommended for all other wet areas

h) Apply one coat of ARDEX WPM155 PU membrane to all surfaces at a coverage rate of 1 square metre per litre. Allow the coating to cure overnight before proceeding. This membrane coating can be applied in conjunction with the second coat of the preceding section.

i) Apply to all surfaces previously coated with ARDEX WPM155 PU membrane, a second coat of the same product at a coverage rate of 1 square metre per litre. Allow this coating to cure for 48 hours prior to proceeding.

j) Mix ARDEX Optima ceramic tile adhesive in accordance with the instructions on the packaging and spread the adhesive using a 10mm notched trowel to achieve full coverage at a bed thickness (after tile installation) of at least 1.5mm. Only apply the adhesive to a small area at a time to allow the tiles to be placed and positioned before the adhesive forms a surface skin.

k) Place the tiles into the adhesive and work in well to ensure a 100% coverage of the underside of the tile, and that no voids remain. Floor tiles shall be laid with joints not less than 3.0 mm. All surplus adhesive remaining on the face of the tiles or in the tile joints after fixing shall be removed before it sets. Allow to dry for 24 hours before grouting.

l) Mix ARDEX FG-8 grout with a blend of 80% ARDEX Grout Booster and 20% water to achieve a workable consistency, apply the grout using a suitable rubber squeegee and work well into the joints to totally fill the joints. Only grout a small area at a time to allow for the removal of excess grout from the surface of the tiles and the joints using a damp sponge or damp cloth.

m) Finally buff tiles with a dry cloth to remove remaining grout skim and finish the surface in a professional tradesman like manner.

INTERNAL SURFACES NOT TO BE TILED

Areas that are to be finished in a plaster surface prior to painting rather than tiling may need to be waterproofed particularly in wet areas such as bathrooms, laundries and kitchens. Since the straw will likely retain water vapour at all times, it is recommended that the membrane be applied at the interface of the plaster finish and the structural render.

EXTERNAL EXPOSED SURFACES

External façade surfaces such as walls and fascias must be sealed against water ingress while allowing the transmission of water vapour, that is, the substrate must be allowed to breathe. Internal surfaces that have been waterproofed have been sealed with a low permeability membrane system which allows only a minimal transfer of water vapour necessary for living comfort so it is essential that the straw be allowed to breathe to the exterior.

INSTALLATION RECOMMENDATION FOR EXTERNAL SURFACES

a) All surfaces should be thoroughly cleaned free from all surface contaminants such as dirt, grease, oil, etc. as well as loose dust or cementitious particles.

b) Apply to all surfaces one coat of ARDEX WPM 270 solvent based primer at a coverage rate of about 6 square metres per litre. Coverage rate will vary depending on the porosity of the structural render applied. Allow this primer to dry which normally takes about 30 - 60 minutes.

c) Before any surface contamination of the primer occurs apply one coat of ARDEX WPM310 at a coverage rate of approximately 3 square metres per litre and allow to dry overnight.

d) Apply a second coat of ARDEX WPM310 at a coverage rate of 3 square metres per litre.

e) The surface finish of the ARDEX WPM310 can be varied by selection of the application equipment. The following provides an indicative guide although it is recommended that trials be carried out prior to application to achieve a finish to suit personal preferences:

i) Semi-Smooth light ripple effect
1st and 2nd coat applied using a long nap (12-15mm) roller

ii) Low profile texture
1st coat using a medium texture (spaghetti) roller
2nd coat using a long nap (12-15mm) roller

ii) Medium profile texture
1st coat using a long (12-15mm) nap roller
2nd coat using a medium texture (spaghetti) roller

iv) High profile texture
1st and 2nd coat using a medium texture (spaghetti) roller

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 about 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
Review and update

NSW 02 9851 9100, **QLD** 07 3817 6000, **VIC** 03 8339 3100, **SA/NT** 08 8406 2500, **WA** 08 9256 8600
New Zealand (Christchurch) 643 384 3029

Web: http://www.ardex.com email: technicalservices@ardexaustralia.com