# **TECHNICAL BULLETIN – TB098.008**

# WATERPROOFING WATER CONTAINMENT TANKS AND RESERVOIRS

# 08/03/2019

# INTRODUCTION & SCOPE

This technical bulletin covers the treatment recommended for the internal waterproofing of concrete potable water containment tanks such as drinking water tanks and reservoirs and emergency fire water storage tanks. This recommendation is designed for structurally sound concrete tanks and reservoirs only.

Application of a coating to concrete tanks and reservoirs is a critical process – please read all information carefully before proceeding. Any inquiries or doubts should be directed to your nearest Ardex technical representative before carrying out any work.

## STRUCTURAL CONSIDERATIONS

This specification incorporates a semi-rigid membrane (<u>ARDEX WPM300</u>) and is only suitable for concrete tanks and reservoirs that are structurally sound and not likely to develop cracks or structural relative movement between the walls and base or other locations over time. The construction of the concrete tanks or reservoirs must include continuous reinforcement (for single cast structures) or reinforcing starter bars (for dual cast structures) between the base and the walls in accordance with the relevant Australian Standard.

Suspended concrete tanks or reservoirs over habitable areas must be accompanied by a structural engineer's report confirming the structural integrity of the tank or reservoir.

# **CLIMATIC CONDITIONS**

Major problems can be experienced as a result of climatic conditions during application of a tank or reservoir membrane coating when application occurs in the open.

In the case of closed tanks or reservoirs within buildings the conditions within the tank or reservoir can be at relatively low temperatures, humid and, because of small manhole entry point(s) can have very low air flow or air transfer conditions. Conditions at the surfaces to be coated should be carefully assessed with corrective measures taken prior to commencing coating application.

# Ambient Temperature

If the ambient air temperature falls below 10°C the drying rate will be severely slowed and chemical curing will cease altogether. As the temperature rises both drying and chemical curing rates will increase although the chemical curing rate will remain very slow until the temperature reaches 15°C.

No membrane coating application should take place while the <u>ambient temperature</u> is below 10°C nor while the temperature is around 10°C and is not expected to rise above 15°C for the subsequent four hours.

No membrane coating application should take place while the <u>ambient temperature</u> is equal to or above 35°C.

When applying coatings to wet or damp surfaces the temperature must be declining to avoid vapour blisters.

# SURFACE TEMPERATURE

Surface temperature is the actual temperature of the substrate surface and this can vary substantially from the ambient temperature. High surface temperatures can result in blistering of the membrane coating and lead to improper bonding with subsequent delamination between coats. The membrane coating has a very low permeability and therefore will not allow this moisture vapour to escape from the surface. The membrane coating therefore has to be set hard and well bonded prior to being subjected to the pressures of the vaporising moisture or the water vapour will simply blow the coating off the surface in the form of blisters.

Surface temperature can also affect the flow and bond strength of the membrane coating. High surface temperatures result in the water at the interface of the surface and the fresh coating evaporating rapidly reducing the flow of the membrane coating and therefore reducing the penetrating properties and bonding ability of the coating.

No membrane coating application should take place while the <u>surface temperature</u> is below 10°C nor around 10°C and not expected to rise above 15°C over the subsequent four hours.

No sealer/primer coating should take place while the <u>surface</u> temperature is equal to or above 35°C.

## **RELATIVE HUMIDITY**

Very high ambient relative humidity will result in the very slow evaporation of water from the membrane coating. Since chemical curing is retarded prior to the membrane coating drying, slow drying and chemical curing will result in conditions of high humidity.

No membrane coating application should take place while the <u>relative humidity</u> is above 90% nor around 90% and not expected to fall below 80% over the subsequent four hours unless the surface temperature is above 25°C.

In conditions of higher relative humidity increase in air flow over the surface of the coating will facilitate faster drying of the coating.

# PENDING RAIN OR SHOWERS

While the <u>ARDEX WPM300</u> membrane coating system is very tolerant to early rain or showers, the colouring pigment will be affected if exposed to these conditions prior to the membrane coating reaching initial set.

#### SURFACE PREPARATION

#### SPECIAL REQUIREMENT

Concrete surfaces need to have open pores. Pores may be sealed by overworking during finishing, wet finishing, and high wear polishing of aged concrete or other installation or service conditions. Off-form concrete and high strength concrete (>35MPa) normally results in the pores of the concrete being sealed.

The pores of the concrete may be opened to produce a porous surface finish by mechanical means of surface preparation such as abrasive blast cleaning, scarifying, scabbling or grinding. All concrete protrusions shall be ground to be smooth and level with the primary adjacent surface.



# 1. CAST CONCRETE

This section is likely to refer to the base of the tank or reservoir.

# LIGHT BROOM FINISH

All new concrete surfaces shall be finished as a light broom surface finish.

All aged concrete surfaces shall be thoroughly cleaned free from all surface contaminants including grease, oil, dirt and fungi. Cleaning shall be carried out by mechanical methods or high pressure water blasting using detergent as required.

In both instances the concrete structure must be open pored and free from all contaminants including, curing membranes, dirt, grease and oil.

### 2. OFF-FORM CONCRETE

This section is likely to refer to the walls of the tank or reservoir.

Any residual form release agent shall be removed and surfaces shall be wet or dry abrasive blast cleaned to achieve a suitable surface profile.

Any remaining protrusions and/or intrusions remaining from formwork placement shall be ground smooth.

Surfaces may then be patched, rendered or prepared for direct coating membrane application.

# 3. CONCRETE BLOCKWORK - CORE FILLED & REINFORCED

Concrete block walls should be rendered to achieve a uniform level to plane surface.

## SECONDARY PREPARATION NOTES;

#### DIRECT COATING APPLICATION

All surface imperfections, such as blow holes, surface damage, areas adjacent to intrusions, etc., should be reinstated to form a smooth even surface finish. Reinstatement shall be carried out using a mortar formulated from 1 volume of ARDEX WPM300 and 1 volume Portland cement. Up to 2 volumes of river washed sand may be used to body the mortar to fill surface imperfections. Immediately prior to placement of the repair mortar, surfaces should be coated with one coat of ARDEX WPM 300 thinned 2:1 with fresh clean water as a new to old concrete bonding bridge. The reinstatement mortar should be placed while the ARDEX WPM 300 bonding bridge remains wet or tacky.

#### **RENDERED FINISH**

A 3:1 sand cement render can be used incorporating 1 litre of ARDEX WPM405 Additive per 4 litres of water as the gauging water. Immediately prior to laying the render apply a coat of ARDEX WPM405 slurry mix formulated from one volume of ARDEX WPM405 additive and 1 volume of water mixed with 4 volumes of Portland cement as a new to old concrete bonding bridge. Only apply the bonding bridge to a small area at a time that allows the render to be laid and finished while the bonding bridge remains wet or tacky. If the bonding bridge dries before the render can be laid apply a further coat over the existing coating before continuing. Rendered surfaces shall be finished with a light broom finish.

#### INTERNAL CORNERS

Install a coving of at least 50 mm in all corners. Coving shall be carried out using a mortar and slurry coat formulated as detailed in Rendered Finish above. Immediately prior to placement of the cove, surfaces should be coated with the slurry coat as a new to old concrete bonding bridge. The cove should be placed while the slurry coat remains wet or tacky.

#### PRIMING

All surfaces shall be coated with one coat of ARDEX WPM300 (thinned 50% with water). This can also be considered as 1 part WPM300 Part A, 1 part WPM300 Part B and 1 part



water. Application may be by brush or roller and the coating should be worked well into the surface. Allow the diluted WPM300 to penetrate for not less than 15 minutes and in any event recoat with an undiluted coat of ARDEX WPM300, while the surface remains wet or tacky, at a coverage rate of 3.0 square metres per litre (wet film thickness of 0.3 mm). Allow to dry to a scratch hard film (normally overnight) before proceeding.

# TREATMENT OF CRACKS AND JOINTS

### **1. EXPANSION JOINTS**

If the tank is constructed with expansion joints or construction joints contact the nearest Ardex Office for recommended treatment procedures.

# 2. CRACKS

Structural cracks must be addressed by an engineer to stabilise the structure and structurally reinstate the crack.

Cracks resulting from plastic shrinkage of the concrete can be filled with a mix of ARDEX WPM300 and Portland cement in equal volumes, allowed to set and then stripe coated along the crack and to at least 150mm on either side of the crack with a liberal coat of ARDEX WPM300. While the ARDEX WPM300 remains wet and fluid lay ARDEX Deckweb equidistantly across the crack and knead the exposed reinforcement cloth into the coating ensuring it is fully wetted out and all creases or air pockets are removed. Care must be taken that each area coated is limited so that the ARDEX Deckweb can be laid while the coating remains wet or tacky. Immediately following the treatment of all cracks, the first coat of membrane can be applied over the remainder of the surface.

# MEMBRANE APPLICATION

#### **1. REINFORCING COAT**

After priming as above, apply a second liberal coat of ARDEX WPM300 at a coverage rate of 3 square metres per litre (wet film thickness of 300 micrometers). While the coating remains wet and fluid place ARDEX Deckweb reinforcement mat into the coating and thoroughly wet out the mat using a metal fluted roller. All creases and air pockets must be removed.

#### 2.FINISH COAT

Allow the previous coating (which contains ARDEX Deckweb) to set hard and apply to all surfaces a further coat of ARDEX WPM300 to all surfaces at a coverage rate of 3 square metres per litre (wet film thickness of 300 micrometers).

Allow the membrane to cure for a period of not less than five (5) days before filling with water and at least seven (7) days before the addition of any water treatment chemicals and/or placing a pool back into service.



#### **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.

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#### **REASON FOR REVISION**

Review and update

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