WATERPROOFING OF SWIMMING POOL WITH LIQUID COLD APPLIED POLYURETHANE RESIN. EXPOSED OR COVERED WITH TILES.

A) Introduction

This document describes two different systems for the waterproofing of a swimming-pool containing chlorinated water (exposed membrane and membrane covered with tiles). A seamless thick elastomeric membrane is created, cold-liquid applied, able to bridge over fissures and also to resist continuous contact with chlorinated water (if waterproofing membrane is exposed). This system is valid for a new concrete pool, in order to prevent the occurrence of leaks in the future and also for the refurbishment for an old concrete pool with already some leaks that should be repaired.

B) Description of the main materials

B.1) Primers and preparation of the surface

HUMIDITY PRIMER

Two component waterborne resin, free from mineral fillers and plasticizers, very high content of resin. Applied as a primer over porous concrete surfaces with the objective to seal the porosity of the surface before the application of the first IMPERMAX QC/ST or IMPERMAX 2K M layer. Could be applied over surfaces with moisture up to 6%-8%. It could be accelerated to reduce its curing time at low temperatures (Epoxy Accelerator). Roller applied.

TECNOCEM

Tecnocem is a three component waterborne epoxy-cement system designed to be applied over a porous (concrete) surface with high moisture content or over surfaces with negative hydrostatic pressures. The purpose of this coating is to obtain a regular smooth base that offers protection against a hydrostatic negative pressure. Self-levelling. Over vertical walls should be applied with a thickening additive (about 1%). 2 kg/m2, 1 mm. thick is able to resist up to 10 bars.

B.2) Creation of the main waterproofing cold liquid applied membrane

IMPERMAX ST

Single component polyurethane resin, moisture cured, semi-thixotropic (ST for semi thixotropic). Solvent based. Designed to create a thick, seamless, and elastic waterproofing membrane with outstanding capacity to bridge over

fissures. Curing time could be reduced with either Pur Cat Additive or Super Accelerator PU. 1 kg/m2 per layer maximum. Roller applied.

IMPERMAX QC

Single component polyurethane resin, moisture cured, semi-thixotropic and containing an accelerator that lets the resin gets dry very fast even at low temperatures (QC for quick curing). Solvent based. Designed to create a thick, seamless, and elastic waterproofing membrane with outstanding capacity to bridge over fissures. Curing time could be further reduced if the product is to be applied in very adverse climate conditions with the Super Accelerator PU. 1 kg/m2 per layer maximum. Roller applied.

IMPERMAX 2K M

Two component polyurethane resin, totally solvent free. It has got quite low thixotropy, so over a vertical surface should be used with the Thickening Additive (powder form). Designed to create a thick, seamless, and elastic waterproofing membrane with outstanding capacity to bridge over fissures Curing time could be reduced with the Accelerator for PU 2K. Several kg/m2 can be applied in a single layer (horizontal surface). Roller applied.

B.3) Protective top coat

PAINTCHLORE

Single component polyuretane resin, with very good scratch, wear, chemical (chlorine in combination with slightly acidic PH in a swimming-pool), UV and outdoors resistance. Able to resist continuos contact with water that contains chlorine concentrations up to 15 mg/liter. Solvent based, clear, mineral filler and plasticisers free. Could be coloured with a suitable colour paste (at about 20%). Applied as a protective top coat over the IMPERMAX ST/QC & IMPERMAX 2K M membrane. Roller and/or airless applied. A final, diluted airless applied layer (over a previous Paintchlore roller applied layer) permits a more aesthetical finish. Gloss finish, however a final thin layer with Matting additive could be applied if a matt finish is required. Could be mixed with Antislip Additive (Fine or Coarse) to obtain an anti skid finish.

A) Description of the application process

Concrete surface to which the coating is to be applied must be completely cured, dry, smooth, cohesive, clean, free from loose particles, laitance, mosses, old coatings, greases, oils, silicones or other contaminants which may affect the

adhesion of the system. Surfaces must be also free from physical defects and provide a continuous supporting for the application of the system.

Vertical walls should be coated firstly, afterwards proceed with horizontal surfaces.

<u>The steps of the system are:</u>

0- Repair the surface: Repair cracks (Rayston Flex), fill cavities, smooth the surface, remove poorly adhered parts on the surface…

1- Primer:

1.1: If it is a concrete porous surface (moisture in the surface up to 6-8%), apply 1 coat of about 0,3 kg/m2 of Humidity Primer.

1.2: If it is a pool with hydrostatic negative pressures or moisture content in the surface is larger than 6-8%, apply a first layer of Tecnocem (at least 2 kg/m2). Use of Thickening additive (1%) will avoid sagging over the vertical surfaces. Afterwards apply a layer of Humidity Primer as described in section 1.1

Over surfaces different from concrete (metal, GRP, glazed tiles...), other primers may be used.

2- Reinforcement of singular points: cracks, joints, corners, passing pipes, drains...Apply a first thin layer of Impermax ST/QC and reinforce with the geotextile GEOMAX. The Rayston Fiber 150 grams/m2 or the self adhesive strip Butyl Tex could also be used.

3- Creation of the main waterproofing membrane.

Start the treatment over the vertical walls.

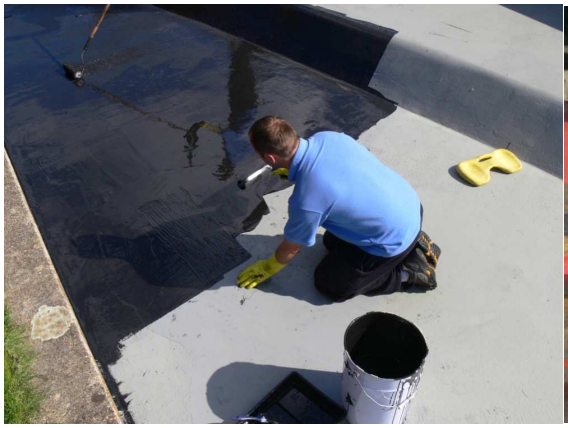
Over the vertical surface:
Impermax ST/QC: 3 layers of 0,7 kg/m2
Impermax 2K M: 2 layers of 1 kg/m2 + 1-3% Thickening additive. If reinforced with Geomax, Thickening Additive is not needed.

Reinforcement of the first layer of resin the entire surface with either Rayston Fiber 150 (just for Impermax ST/QC) or with Geomax will prevent the resins from sagging and will let to create a higher quality waterproofing membrane with a homogeneous thickness.

Over the horizontal surface:
Impermax ST/QC: apply two layers of 1 kg/m2 per layer.
Impermax 2K M: apply 1 layer of 2 kg/m2.
Reinforcement of the first layer of resin the entire surface with either Rayston Fiber 150 (just for Impermax ST/QC) or with Geomax will let to create a higher quality waterproofing membrane with a homogeneous thickness.

Use always spiked roller on freshly applied resin for the purpose of releasing trapped gas and avoiding the formation of blisters.






4- Finishing

4.1) Liquid applied waterproofing membrane left exposed, protected with a top coat: Paintchlore + Colour Paste (normally blue similar to RAL 5015):
Vertical surface: 3 layers of Paintchlore + Colour Paste, 0,15 kg/m2 and afterwards 2 layers 0,15 kg/m2 of clear Paintchlore.

Horizontal surface: 2 layers of Paintchlore+Colour Paste, 0,25 kg/m2 and 1 layer of Paintchlore (clear), 0,25 kg/m2.

Cleaning the recently applied last layer of IMPERMAX ST/QC and IMPERMAX 2K M with and strong solvent (MEK, Xylene or Rayston Solvent) is normally right enough before applying Paintchlore.

If at least the last layer of Paintchlore is applied with an airless machine, the final aesthetical result will be better (smoother finish, less pinholes, more coating homogeneity, etc). When clear Paintchlore is airless sprayed must be checked that becomes transparent after curing a few minutes and not hazy. If it is hazy it means that there is air trapped in the product, so it is needed to dilute more the resin with a suitable solvent (Rayston Solvent that is xylene, free of alcohols and moisture) and apply a thinner layer.

Direct contact between chlorinated water could damage the color of the Paintchlore coating, if colored.

If the swimming-pool does not contain chlorinated water, Colodur (and Colodur with color paste) could be used instead of Paintchlore.

4.2) Swimming-pool covered with tiles
If the waterproofing membrane is covered with tiles, in order to increase the adhesion of tiles over this surface: Apply a final thin layer of IMPERMAX ST/QC or IMPERMAX 2K M), about 0,25 kg/m2. On freshly applied resin broadcast quartz sand (0,3-0,8) until saturation (3-4 kg/m2).
Excess of quartz sand will be removed by brush or preferably with a vacuum cleaner after the resin gets dry. So a rough surface is created.

A class C2 flexible cementitious tile adhesive is recommended.

4.3) Other types of finishes (non exposed membrane)

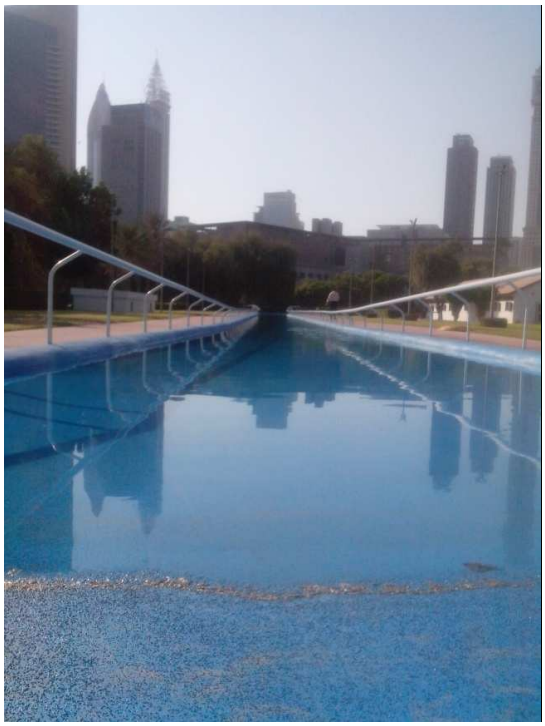
Pavistone system (decorative aggregates bind with a single component aliphatic polyurethane resin) applied over the IMPERMAX ST/QC or IMPERMAX 2K M waterproofing membrane.


B) Some Advices:

Never apply any layer of the system (specially the top coat) at very high air temperatures or when the surface is too hot.
Wait between 7-10 days before filling the pool with water. Protect from wind, pollen, air pollution and dust, specially the first 6-12 hours.
Don't use chlorine in powder form or tablets directly in the pool. Better use Skimmers.

Keep always the pool filled with water (if exposed membrane).

High chlorine concentration in water may attack colored exposed Paintchlore (also IMPERMAX QC/ST and IMPERMAX 2K M) and cause some discoloration. Krypton Chemical cannot accept any complaints from discoloration that is due to chemical attack by chlorination of the water.



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