

Penetron Application in the Milan Water Treatment Plant

Description

In 1972, the municipality committee in Milan approved the construction of a series of purification plants to treat the river waters on the outskirts of Milan. However, the first plant at Nosedo was constructed more than 30 years later.

Scheduled for completion in the autumn of 2004, the most important plant will complete the purification of the water supply process. This plant will drain the water of Southern Lambro with a catchment area for 1,000,000 inhabitants.

The municipality of the Riviera Romagnola region considers the Lambro River that flows through the city of Milan to be the main cause of pollution into the Po River, the Adriatic Sea and the Romagnola region.

Milan will no longer be without a water treatment plant. This plant will improve the quality of life of its citizens.

The contract was awarded to CMB of Carpi, a prominent Italian construction company, who began construction early in the year 2002.

DITRON s.r.l., was brought in to solve the impermeability problem in the delivery and suction tunnels of the Lambro River. The first part was treated with the Penetron System. Upon completion the managing engineers considered its performance excellent and decided to use the Penetron system for the treatment of all the purifying basins as well. The total area was about 120,000 m².

Altogether, the total surface covered with Penetron was about 150,000 m² with a product consumption of about 250,000 kg.



Why use Penetron?

Penetron is a surface applied, permanent, in-depth concrete waterproofing material, which consists of common cement, quartz sand and multiple activating chemicals.

The activating chemicals enter the concrete through diffusion, and react with the various chemicals and moisture in the concrete to form insoluble needle-like crystals that seal the capillaries and cracks. This process is effective with or against water pressure.

In this project, Penetron was used as a substitute for the traditional epoxy-bitumen materials (specified in the contract) to waterproof and protect concrete against sewage.

The following arguments were used to convince the technical management of the Milan municipality and the contractor, CMB, to use Penetron.

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| PERMANENT | Penetron becomes an integral part of the concrete, forming a complete body of strength and durability |
| STRENGTHENS | Penetrates and seals concrete's capillary tracts and shrinkage cracks, and seals cracks of up to 0,4 mm |
| DURABILITY | The total waterproofing and chemical-resistance properties remain intact even if the surface is damaged |
| WATERPROOFS | Completely effective against high hydrostatic head pressure |
| PROTECTS | Resists chemical attack (PH3-11 constant contact, PH2-12 period contact), and protects reinforcing steel |
| BREATHES | Permits concrete to breathe, eliminating water vapor buildup and leaving the concrete completely dry |
| NON-TOXIC | Safe for use on potable water tanks |
| APPLICATION | Ease of application, labor-cost effective |

The Penetron system was applied in three different ways on this project; by spraying (on vertical surface), by brush and by dry shake (on horizontal surface) on different parts of the water treatment plant.

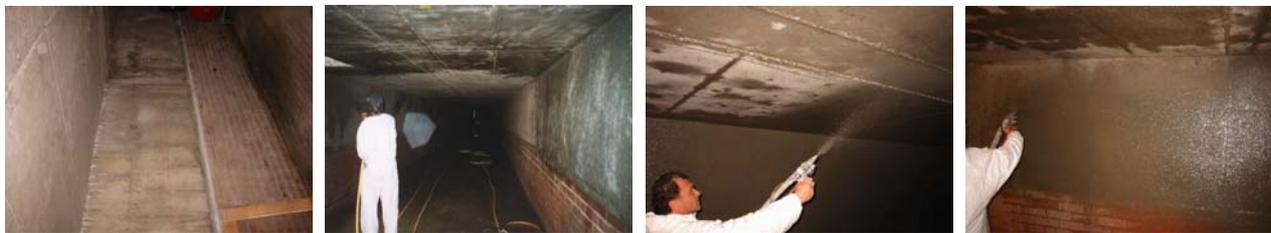
In addition, Penecrete mortar was used together with Penetron for waterproofing concrete "bugholes", repairing spalled and damaged areas, patching some tie holes, and filling of routed out cracks.

Spray Application

In this project, Penetrator was applied by spray on the vertical and top surface of the abduction canal, on the vertical surface of the tanks, and on the surface of different small canals between the tanks.

- The extremely dense concrete (45-50 N/sq.mm) specified had an extremely smooth surface and required a sandblast treatment to make sure it had an open capillary system.
- Due to the density of the concrete surface, the extremely hot weather and very low humidity, a number of wetting cycles were necessary prior to the application of the Penetrator system.
- For the same reasons, curing (a light misting) began as soon as the Penetrator coating had hardened sufficiently.

Spray Application on the Surface of the Abduction Canal



before application

spray application

spray on top

spray on wall

Spray Application on the Vertical Surface of the Different Tanks



sandblast

cycle of watering

spraying

after spray

Brush Application

Penetrone was applied by brush on the hardened concrete floor of the tanks.

- The extremely dense concrete (45-50 N/sq.mm) specified had an extremely smooth surface and required a sandblast treatment to make sure it had an open capillary system.
- Due to its density, extremely hot weather, and very low humidity of the concrete surface, many wetting cycles were necessary before the application of the Penetrone system.
- For the same conditions, curing began as soon as the Penetrone coating had hardened sufficiently so as not to be damaged by using a light water misting for the first day.

Brush Application on the Hardened Concrete Floor of the Tanks



Dry-shake Application

Penetrone was applied by dry shake on the fresh concrete floor of the tanks prior to finishing.

Dry-shake Application on the Fresh Concrete Floor of the Tanks



pouring concrete



mixing Penetrone with quartz sand



dry shake with quartz sand



finishing



finishing



dry shake after 1 day

Repairing Concrete

Penecrete mortar was used together with Penetrone for waterproofing concrete “bugholes”, repairing spalled and damaged areas, patching some tie holes and filling routed out cracks.

Repairing Concrete with Penecrete

