

CALHETA III HYDROELECTRIC POWER PLANT

Waterproofing of a new buffer reservoir with MasterSeal 6100 FX

Project:

Waterproofing of hydroelectric power plant buffer reservoir

Location:

Madeira (Portugal)

Project completed:

2020

Owner/s:

Empresa de Electricidade da Madeira

Applicator/Contractor:

ISOTEXSA / AFAVIAS

Market sector:

Water Management

Products used:

MasterEmaco S 5300

MasterSeal 6100 FX

MasterSeal 930 / 933



Our reference project at Madeira, Portugal: Waterproofing of the buffer reservoir in the Calheta hydroelectric power plant.

The background

Madeira island cannot be connected to the mainland power supply. Electric power is mainly generated by burning imported fossil fuels with renewable energy sources currently only producing around 31 % of the island's consumption.

In order to reach the target of increasing the share of renewable energy production to 50% by 2022, it was necessary to upgrade the capacity of the Calheta pump-storage hydroelectric power plant from the present 17.7 MW to 30MW. Calheta is used to store excess energy during periods of low demand and will contribute a net annual increase in production of electricity from renewable sources of approximately 79.3 gigawatt hours.

The challenge

A new reservoir located at a height of 654 m above sea level, will be used for the retention of water from the turbine for subsequent pumping to the Pico da Urze reservoir at 1345 m.

The reservoir was built using reinforced concrete slab with sprayed concrete walls.

To ensure absolute impermeability, it was necessary to apply a complete waterproofing system including a membrane and the treatment of expansion joints.

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Our solution

The waterproofing of the structure was completed using MasterSeal 6100 FX membrane spray applied with an average total thickness of 3 mm.

MasterSeal 6100 FX was used as a finishing layer for vertical surfaces, but to avoid mechanical damage from traffic, the waterproofing membrane applied on the ramps is protected by 20 cm reinforced concrete slabs.

Prior to the application of the waterproofing membrane, the sprayed concrete walls and slopes were reprofiled and levelled using MasterEmaco S 5300 structural repair mortar.

Additionally, all edges were rounded to ensure the durability of membrane. Wall to wall and wall to floor coverings were treated with MasterSeal 930 tape and bonded to the substrate using MasterSeal 933 adhesive.

Benefits to the customer

- Both MasterSeal 6100 FX and MasterEmaco S 5300 are low consumption materials. Reduced material consumption means lower material costs and transport costs from the mainland and quicker application.
- The long-term UV stability of MasterSeal 6100 FX for a durable structure
- MasterSeal 6100 FX remains elastic and maintains its crack bridging properties even when exposed to extreme temperatures, reducing the risk of cracking and the need for maintenance.
- Quick and easy application: MasterSeal 6100 FX is a continuous, fully bonded membrane that does not require seams or mechanical fixings. Fewer weak points and less downtime.
- Reduced environmental impact when compared to other liquid waterproofing membranes such as two-component elastic cementitious slurries.

Project facts at a glance

- Capacity of the reservoir: 70.450 m³.
- Storage depth of the reservoir: 20 m.
- Sprayed concrete on walls and runways: 5400 m².
- Concrete slabs and ramps: 3300 m².
- The use of MasterSeal 6100 FX saves an equivalent of up to 26 tons of CO₂ (based on the Eco-Efficiency Analysis compared to the use of alternative 2-Component cementitious waterproofing membranes) and approx. 12 tons of waterproofing material.

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