Use of Bituminous Geomembrane (BGM) In Water Storage Reservoirs

Bertrand Breul
Technical Manager, Civil Engineering / Axter, France, speaker

In his capacity as the Global Technical Director for Axter Coletanche Inc., Bertrand Breul brings 20 years of Engineering experience with over 13 years in the Geosynthetic industry. He has been instrumental in the development of standards and certifications for Coletanche worldwide.

Overseeing training, research and development and quality control has given Bertrand a unique perspective on how the market perceives and reacts to Coletanche not only in North America but within all regions in which Axter conducts business.

Bertrand was the Managing Director for Canada based in Montreal, QC for over a decade. In this role he was responsible for all technical and sales/marketing functions for Axter Coletanche Inc. This experience affords clients in North America a broad range of industry and market related expertise.
Man-made water storage reservoirs provide a simple and economic way to store large volumes of water.

However

Reservoirs have operational challenges that must be addressed, including:
- Water losses due to evaporation
- Water losses due to infiltration to the soil
- Variation of water level in the reservoir
- Need for periodical cleanup
- Project lifetime

To select a membrane to waterproof a reservoir the designer should consider the following:
- Is it suitable to store water?
- What are its mechanical properties (tensile and puncturing strength)
- Will the membrane be covered or will be left exposed?
- How will the water level in the reservoir vary?
- What are the installation conditions (temperature, wind)?
Description of BGM

A BGM is a multi-layered composite where each component serves a different purpose.

BGM Internal structure

- Anti-root film
- Impregnation with elastomeric bitumen
- Glass fleece
- Impregnation with elastomeric bitumen
- Non-woven geotextile
- Sand
A BGM provides the following features that are of interest for use in waterproofing a water reservoir:

- Has a high puncture and tensile resistance
- Has excellent resistance to weathering, particularly to UV radiation.
- Is durable in both exposed and covered conditions
- Is easy to install and repair
- Is certified under ANSI NSF/61 for use in drinking water systems
Recent Examples of BGM Application

- Estanques Pirque, Pirque, Chile
- Roza Reservoir, Washington, USA
- Bel Air Reservoir, Maryland, USA
**Key Information**

- **Location**: Pirque, Chile, South America (about 75 km SE of Santiago)
- **Capacity**: 1,500,000 m³ (397 million gallons) in six ponds
- **Purpose**: Storage of raw water from the Maipo river.
- **BGM used**: 480,000 m² of a 4,00 mm-thick membrane
- **Construction**: Mid 2018 – End of 2019

**Estanques Pirque – Project Layout**
Estanques Pirque – Lining Scheme

Estanques Pirque - Slopes
Estanques Pirque - Bottom

Estanques Pirque – Aerial View
**ROZA Reservoir, USA**

- **Location:** Sunnyside, Washington, USA
- **Capacity:** 1,890,000 m³ (500 million gallons)
- **Purpose:** Roza is a regulation reservoir for irrigation and human use.
- **BGM used:** 220,000 m² of a 4,00 mm-thick membrane
- **Construction:** 2017
Roza Reservoir – Panel layout

Special 100-m long rolls manufactured for this project.

Roza Reservoir – Lining completed

Credit: Rotschy, 2017
Roza Reservoir – Filling process

Bel Air Reservoir, USA
Key Information

* **Location:** Bel Air, Maryland, USA

* **Capacity:** 340,000 m³ (90 million gallons)

* **Purpose:** Storage of raw water from the Winters Run river

* **BGM used:** 67,600 m² of a 5,60 mm-thick, high friction angle membrane

* **Construction:** 2018

Bel-Air Reservoir – Embankments
Bel-Air Reservoir – Lining Complete

Credit: Hallaton, 2019

Bel-Air Reservoir – Filling Process

Credit: Hallaton, 2019
Bel-Air Reservoir – Aerial view

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BGM has proven to be a cost-effective solution to waterproof water storage reservoirs based on:

* Certification under ANSI NSF61 for Drinking Water Systems Components
* UV resistance eliminates the need for soil covers or other protections.
* Ability to receive asphalt pavement or concrete slabs directly on top of the membrane to allow mechanical cleanup of the reservoirs if required.
* Durability under exposed and covered conditions
* Easy installation even under adverse weather conditions (-45°C to + 45°C)

Conclusions

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Thank you!

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