

PROJECT PROFILE



Project: Niagara Falls, Ontario, potable water facility – repair and waterproofing of tanks, 2012 - 2013
Designer: Cole Engineering Group Ltd., Toronto, Ontario
Owner: Region of Niagara Falls, Ontario
Contractor: Kingdom Construction Limited
Installer: Devonshire Restoration and Building Services Inc., St. Thomas, Ontario

Gemite products: **Cem-Kote Flex ST, Reinforcing Fabric HD, Gem-Plast TC, Fibre-Prime**

Objective: repair and waterproofing of concrete tanks in existing water treatment facility. The facility was built in thirties. The surface of the tank concrete in this facility has experienced deep deterioration, up to 8 mm deep in some areas. These areas were repaired using **Gem-Plast TC**. Some structural new concrete has been also cast. The mechanical part of the facility is shown in Figure #1. The waterproofing system consisted of **Cem-Kote Flex ST**, reinforced with the **Reinforcing Fabric HD** over existing cracks. The metal parts (pipes) were cleaned to remove rust and protected with cement based rust-proofing **Fibre-Prime**. **Cem-Kote Flex ST** applied on walls and slab in two coats. Each coat was sprayed and brushed to achieve the membrane continuity in the total thickness of 1.6 mm (63 mils) minimum thickness. Application of **Cem-Kote Flex ST** on the tank wall is shown in Figures #2. **Fibre-Prime** and **Cem-Kote Flex ST** applied to cast iron pipes are shown in Figure 3.



Figure #1. The mechanical part of the facility



Figure 2. Cem-Kote Flex ST applied to the walls of one of the several tanks.



Figure 3. Steel pipes were rust-proofed using Fibre-Prime and then coated with Cem-Kote Flex ST.

Cem-Kote Flex ST has been used in potable water concrete tanks over 23 years, with no single bond failure. The key advantages of **Cem-Kote Flex ST** system in comparison with polymer coatings are as follows:

- **Flexibility** – with the Reinforcing Fabric NW used over drying shrinkage cracks and inherent flexibility, **Cem-Kote Flex ST** provides excellent crack bridging, much better than epoxy, vinyl-esters or flexibilized epoxies.
- **Moisture** - application of **Cem-Kote Flex ST** does not require drying of concrete prior to application or low humidity in tanks. **Cem-Kote Flex ST** is completely insensitive to moisture in concrete, surface moisture and high humidity environments.
- **Water insensitivity** - polymer membranes are very sensitive to moisture in concrete, surface moisture and high relative humidity. Most of the polymer membranes specifications call for drying concrete to 1 in depth prior to application, or application of an additional, low moisture content render, prior to application of a polymer membrane. These procedures, drying or application of the render, are very expensive. For example drying of this type of tank, would require approximately 1-2 weeks, with the cost of the heating fuel up to 1200 \$ per day.
- **Outside moisture** - **Cem-Kote Flex ST** membrane also resists water penetrating from the outside, from the negative side. It has been extensively used on both, positive and negative side waterproofing. **Cem-Kote Flex ST** membrane is insensitive to moisture which can be present at the concrete/membrane interface, either due to water vapor condensation or penetration through concrete or through cracks in concrete. The high capillary pressures developed at the interface may cause debonding of polymer membranes, but will not de-bond cement based material due to its inherent gel porosity.
- **Breathable** - **Cem-Kote Flex ST** is “breathable” and can release the water vapour from the substrate concrete. Polymer membrane is acting as vapour barriers, resulting in de-bonding problems associated with this property.
- **Ease of Application** - **Cem-Kote Flex ST** is a waterborne materials, it does not present application difficulties of “sticky” polymer resin coatings. Tools and all the equipment are easy to clean with water. Expensive organic solvents have to be used when cleaning polymer coatings **Cem-Kote Flex ST** is easy and very fast applied by spraying, unlike polymer coatings.
- **Robust** - **Cem-Kote Flex ST** is a very “robust” product in application, allowing large variations in moisture content and relative humidity, its “application window” is very wide and is tolerant to varying conditions in comparison with a very “narrow window” for application of polymer coatings. The application of polymer coatings is very risky in comparison with application of **Cem-Kote Flex ST**.
- **Low cost** - **Cem-Kote Flex ST** is considerably less expensive – only 25% of the average applied cost of polymer coatings, mainly due to application reasons explained above.

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