CanalMat

CETCO is a world leader in construction of high technology liners for water containment applications. CETCO liner technology is used for dam repair and construction, water storage, wastewater containment, wet lands remediation, and many other applications. CETCO has created CanalMat as an advanced technology for the special needs of canal lining applications. This product uses a unique composite construction to create a high strength self-healing geomembrane. The characteristics of CanalMat allow for easy, fast, low cost installation. CanalMat requires virtually no maintenance while preventing water losses for decades. This product can be used for new canal construction or for repair of leaking canals.

CanalMat replaces older canal lining options like concrete and plastic geomembranes. Concrete lined canals are very expensive to install. They are also subject to high maintenance cost due to cracking. Furthermore, concrete has relatively high permeability $1 \times 10^{(-6)}$ cm/sec. Plastic membranes like HDPE and PVC are lower cost than concrete, but they are subject to potentially severe leakage due to punctures and especially seam failures. With either of these older technologies water losses can be unacceptably high.

One serious problem of older liner technologies is their inability to accommodate differential settlement. The weight of a full canal exerts high loads on the base of the canal. As some spots settle at different rates, the concrete canal liner begins to seriously crack and buckle, which could potentially lead to structural failure. When plastic liners are used, the differential settlement creates high tensile forces and eventually seam failures.

CanalMat offers a new mechanism for long term canal liner security. It has a plastic component to provide near zero permeability like the geomembranes. However, this geomembrane composite is self-healing. It can be punctured with a hole over 50-mm in diameter and still self-heal. No plastic geomembrane has these self-healing properties. Furthermore, CanalMat has self healing seams that are designed to adjust to differential settlement. While tensile forces might cause catastrophic seam failure in plastic geomembrane liners, the seams do not fail with CanalMat technology. CanalMat has self-sealing overlap seams. When tensile forces are applied due to differential settlement, the CanalMat seams slip to relieve the stresses, then they re-seal. CanalMat is a flexible liner that conforms to the changes in the canal profile over time. CanalMat is also more tolerant of freeze-thaw conditions than geomembranes. Its unique composite construction allows it to maintain its integrity through freeze-thaw cycles.

There are very important advantages with this CanalMat geomembrane technology:

- Self-healing punctures over 50-mm
- Self-sealing overlap seams
- Stress relieving seams to avoid seam failure
- Fast installation
- Lower installed cost
- Virtually zero annual maintenance cost

Installation

Minimal surface preparation is needed for deploying this product. CanalMat is simply rolled out onto the compacted smooth base of the canal bottom. All sharp objects, rocks, and other debris protruding more than ½ inch (12-mm) should be removed. No specialized seam welding equipment or highly trained crews are required. The self-sealing edges are overlapped; the amount of overlap depends on panel size and degree of settlement expected. CanalMat must be in a confined environment. Typically 30-cm of soil or other similarly dense cover is applied over the CanalMat. It may be installed on damp soil, but should not be installed in standing water.

Panel Dimensions

CanalMat is available in a wide range of panel sizes. Panels are available in the following widths at variable lengths.

Panel Width

2.5 meters
3.0 meters
5.0 meters
6.0 meters

The largest panel size is 350 sqm, which creates a roll weight of about 1,100 kg. CanalMat can be produced in custom lengths to exactly accommodate the canal project requirements. Each CanalMat roll has a 100-mm plastic core and is packaged in a PE sleeve.

CanalMat Typical Properties

Total Composite Mass	> 2700 g/sqm	ASTM D 5993
Grab Strength	> 300 N	ASTM D 4632
Puncture Resistance	> 150 N	ASTM D 4833
Permeability* (D = 100 mm)	< 5 x 10^{-12} m/sec	ASTM D 5887
Thickness	> 3.0 mm	ASTM D 5199
Low Temperature Flexibility	Unaffected @ -32^{0}C	ASTM D 1970

* Index flux and permeability testing with deaired distilled/deionized water at 80-psi (551 kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Flux and permeability values above should not be used for equivalency calculations unless the pressures and gradients used represent field conditions.