

ELCOSEAL™

Geosynthetic Clay Liners



**The Next Generation,
Australian Made Geosynthetic Clay Liner
Engineered For Performance in Indian conditions**



ELCOSEAL™ Geosynthetic Clay Liners (GCLs) are needle-punched reinforced composites which combine two durable geotextile outer layers with a uniform core of premium quality sodium bentonite clay to form a hydraulic barrier.

The sodium bentonite clay utilised in ELCOSEAL™ GCL's is a high grade clay mineral that swells as water enters between its clay platelets. When hydrated under confinement, the bentonite swells to form a low permeability clay layer with the equivalent hydraulic protection of approximately 1 metre of compacted clay.

ELCOSEAL™ GCL's are produced by distributing a uniform layer of the sodium bentonite between two geotextiles. High-tenacity fibres from the upper non-woven geotextile are then needle-punched through the layer of bentonite and incorporated into the lower geotextile (either a woven or a non-woven/woven composite) to provide consistent reinforcement and transfer of shear stresses to the geotextiles.

This process results in a strong mechanical bond between the geotextiles. A proprietary heat treating process — the 'Thermal Lock' process — is used to lock the needle-punched fibres into place. Unique properties, including increased internal shear resistance and long term creep resistance, result from this process.

Typical Applications

LANDFILLS

- Final cover systems
- Base liner systems (single and composite)

ELCOSEAL™ can completely or partially replace thick, multi-lift compacted clay layers in composite landfill liners and caps due to the efficiency of the high swelling sodium bentonite clay.



LIQUID CONTAINMENT

- Effluent ponds
- Landscaped ponds and wetlands
- Canal lining

ELCOSEAL™ provides exceptional liquid containment - in reservoirs and irrigation canals, as well as industrial ponds and lagoons, due to its low permeability and high internal shear strength.



SECONDARY CONTAINMENT

- Tank farms
- Cut-off trenches

ELCOSEAL™ GCL's can also be used as a secondary containment barrier in above ground tank impoundments, due to the ease of installation and reliable pipe penetration construction.



MINING

- Tailing ponds
- Mine closures

ELCOSEAL™ GCL's can reduce contaminant transport and help achieve environmental compliance in mining applications such as tailing ponds and mine closures/rehabilitation.



Properties of Bentonite

The unique swelling properties and low permeability performance of ELCOSEAL™'s sodium bentonite can be attributed to the following parameters, to name a few:

- Layer charge distribution and cation exchange capacity;
- Bentonite fluid loss;
- Bentonite swelling pressure;
- Bentonite particle size and pore size distribution;
- Clay fabric.

Refer to the ELCOSEAL™ Bentonite Technical Notes for further information.

Uniform Bentonite Content

The uniform confinement provided by the fibres from the needle-punching process resist lateral migration of the bentonite clay within ELCOSEAL™ in either the dry or hydrated state. As a result, a consistent bentonite content is preserved throughout the composite, in turn resulting in a consistently low permeability.

High Shear Resistance

Needle-punching reinforces the otherwise weak layer of sodium bentonite clay, producing a uniform, reinforced GCL. Unreinforced bentonite is susceptible to shear failure, even on gentle slopes.

The ELCOSEAL™ needle-punching process reinforces the bentonite layer with thousands of high tenacity fibres. These fibres resist and transfer the shearing stresses into the encapsulating geotextiles to provide shear strength and stability advantages important to any application.

Edge Sealing

The edges of ELCOSEAL™ GCL are overlapped to prevent loss of bentonite along the edges of the roll. This is achieved by extending the woven carrier geotextile around the edge of the GCL. This technique provides a sealed GCL edge that prevents bentonite loss along the edges which can reduce the sealing performance of the system.

Permeability Performance

When specifying GCL's, particularly in landfill applications, a historical data set that consistently exceeds specification values provides peace of mind for consulting engineers and specifiers. ELCOSEAL™ GCL's demonstrate a measured permeability performance that has been reliably better than the specification value over a considerable period of time.

Refer to the graph of ELCOSEAL™ X1000 measured permeabilities from 2002 to 2006 compared to the X1000 specified permeability.

Assured Quality Control

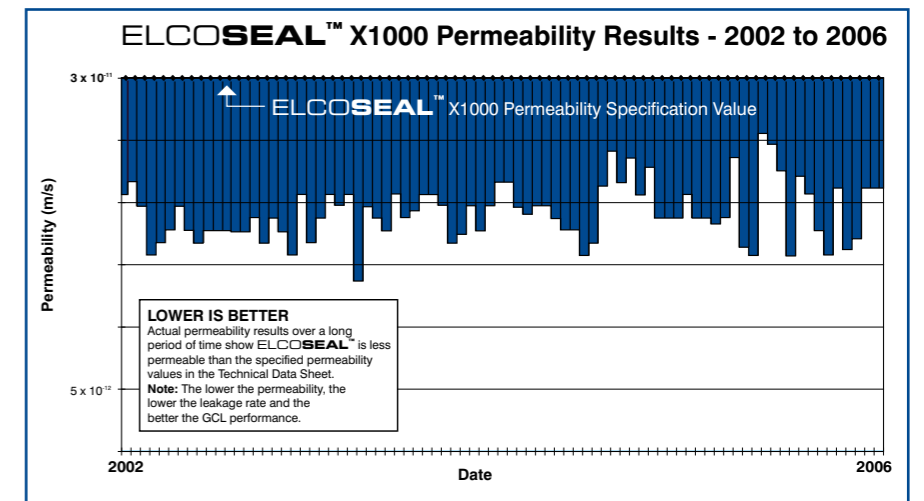
ELCOSEAL™ is a factory manufactured liner product, therefore, the controlled environment of the production facility allows for greater control over critical performance characteristics. The intensive ELCOSEAL™ quality control program ensures consistent hydraulic and physical properties through the latest AS and ASTM procedures.

Additionally, the published specification values for each ELCOSEAL™ GCL grade are independently verified by a 3rd party accredited GAI-LAP laboratory on an annual basis. Refer to the Manufacturers QA & QC for ELCOSEAL™ GCL's document for further information. The thorough manufacturing quality control minimises the expensive and time consuming on-site quality assurance testing, which is required for other lining systems.

Installation Quality Control

Due to the simplicity of ELCOSEAL™ GCL deployment, specialist labour and equipment is not required for installation. Therefore, GCL installation quality control is generally less complicated than other types of lining systems.

Geofabrics Australasia is able to provide on-site assistance, in accordance with the ELCOSEAL™ Installation Guidelines, to personnel unfamiliar with the installation of ELCOSEAL™ GCL's.



Installation

ELCOSEAL™ GCL is an exceptionally easy to use hydraulic barrier. During installation, the needle-punched fibres hold the bentonite in place and prevent the GCL from separating. ELCOSEAL™ is more durable over a wider range of installation conditions, and because it is needle-punched, it can greatly reduce the adverse effects of premature hydration during installation.



Edge Impregnation

ELCOSEAL™ has bentonite impregnated longitudinal overlaps which allow simple on-site joining. This, combined with overlap witness markings 300mm from each edge of the roll, enable fast, easy deployment of GCL.

The ELCOSEAL™ bentonite edge impregnation allows high GCL installation rates to be achieved. Installation rates of up to 6,000m² per day are possible, depending on site conditions.



Manufacturing Flexibility

ELCO Solutions Pty Ltd have manufactured geosynthetics since 1978 and GCL's since 1995 at their plant in Southport, Queensland, Australia. This extensive experience enables flexibility in the manufacture of ELCOSEAL™ GCL's.

The ELCOSEAL™ manufacturing plant has the ability to produce both custom grades and non-standard roll lengths, within reasonably short lead times. The plant has the flexibility to manufacture a GCL to suit virtually any specification. ELCOSEAL™ GCL's can also be supplied in custom roll lengths to suit project specific requirements, such as long slope lengths.

ELCOSEAL™ Geosynthetic Clay Liners

ELCOSEAL™ GCL Selection Guide

GRADE	LANDFILL				HYDROCARBON SECONDARY CONTAINMENT ²			CANAL LINING			POND / DAM			CUT-OFF WALLS
	BASE LINER	CAP / COVER ¹	SIDE SLOPE		BUND FLOOR	BUND SLOPE		CANAL FLOOR	CANAL SLOPE		FLOOR LINER	SLOPE LINER		VERTICAL
			≤ 1V:3H	> 1V:3H		≤ 1V:3H	> 1V:3H		≤ 1V:3H	> 1V:3H		≤ 1V:3H	> 1V:3H	
X800	✓	✗	✓	✗	✗	✗	✗	✓	✓	✗	✓	✓	✗	✗
X1000	✓	✗	✓	✗	✓	✓	✗	✓	✓	✗	✓	✓	✗	✗
X2000	○	✓	○	✓	✗	✗	✗	○	○	✓	○	○	✓	✓
X3000	○	✓	○	✗	○	○	✓	○	○	✓	○	○	✓	✓

✓ Suggested Grade ○ Optional Grade ✗ Grade Not Fit For Purpose

NOTES:

¹ This application considers caps or covers subjected to differential settlement. If differential settlement is minimal, a lower ELCOSEAL™ grade may be substituted.

² ELCOSEAL™ GCL's used in Secondary Containment applications may require pre-hydration with fresh water prior to contact with hydrocarbons.

Contact your nearest Geofabrics Australasia office for any further information on:

- ELCOSEAL™ Installation Guidelines
- Technical Data Sheet
- GCL Technical Notes
- Bentonite Technical Notes
- Manufacturers Quality Assurance & Control for ELCOSEAL™ Geosynthetic Clay Liners
- GCL Model Specification

IMPORTANT NOTICE

The information contained in this brochure is general in nature. In particular the content of this brochure does not take account of specific conditions that may be present at your site. Such conditions include the soil composition, topography, land stability, climate, the present or proposed use of the site and adjacent lands- and many other factors. Those site conditions may alter the performance and longevity of the product and in extreme cases may make the product wholly unsuitable. Any data or specifications contained in this brochure are values obtained in our laboratory. Actual dimensions and performance may vary. If your project requires accuracy to a certain specified tolerance level you must advise us before ordering the product from us. We can then advise whether the product will meet the required tolerances. Where provided, installation instructions cover installation of product in site conditions that are conducive to its use and optimum performance. If you have any doubts as to the installation instructions or their application to your site, please contact us for clarification before commencing installation. In all cases we recommend that advice be obtained from a qualified consulting engineer before proceeding with installation. © Copyright held by Geofabrics Australasia Pty Ltd. All rights are reserved and no part of this publication may be copied without prior permission.



10 Trade Court, Molendinar, Queensland, 4214, Australia

Tel + 61 7 5563 2131 - Fax + 61 7 5563 3727 - Email - india@geofabrics.com.au

www.geofabrics.co.in