

# enviroFIX<sup>®</sup>

## X-Grades



Needlepunched & Thermally Locked Geosynthetic Clay Liner



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# EnviroFix® Geosynthetic Clay Liners

**EnviroFix® Thermal Lock™** Geosynthetic Clay Liners (GCLs) are needlepunched reinforced composites which combine two durable geotextile outer layers with a uniform core of natural sodium bentonite clay to form a hydraulic barrier.

The sodium bentonite clay utilised in **EnviroFix® Thermal Lock™** is a naturally occurring clay mineral that swells as water enters between its clay platelets. When hydrated under confinement, the bentonite swells to form a low permeability clay liner with the equivalent hydraulic protection of approximately one metre of compacted clay.

**EnviroFix® Thermal Lock™** is produced by distributing a uniform layer of the sodium bentonite between two geotextiles. Fibres from the upper nonwoven geotextile are then needlepunched through the layer of bentonite and incorporated into the lower geotextile (either a woven or a nonwoven/woven composite). This process results in a strong mechanical bond between the fabrics.

A proprietary heat treating process – the **Thermal Lock™** process – is then used to modify and more permanently lock the needlepunched fibres into place. Unique properties, including increased internal shear resistance and long term creep resistance, result from this procedure.



### Composite Linings

*EnviroFix® can completely or partially replace thick, multilift compacted clay layers in composite landfill liners and caps due to the efficiency of the high swelling natural sodium bentonite clay.*



### Liquid Containment and Canals

*EnviroFix® provides exceptional liquid containment – in reservoirs, water features, irrigation canals, as well as industrial ponds and lagoons, due to its low permeability, high internal shear strength and protective soil covering.*



### Secondary Containment

*EnviroFix® Thermal Lock™ can also be used as a secondary containment barrier in above ground tank impoundments, due to the ease of installation and simple pipe penetration construction.*



## Needlepunching Makes a Difference

By needlepunching fibres through the sodium bentonite clay layer, a completely uniform, reinforced GCL is produced – with shear strength and stability advantages important to any application.

### High Shear Resistance

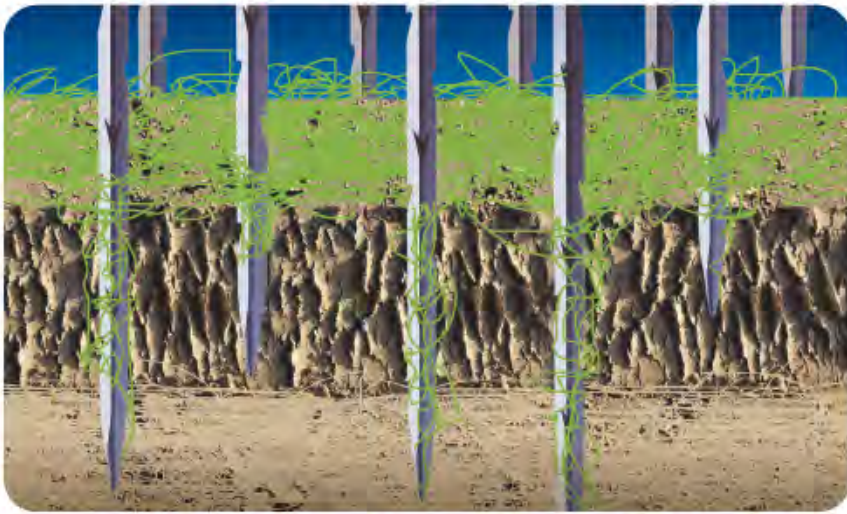
Needlepunching reinforces the otherwise weak layer of sodium bentonite clay. Unreinforced bentonite is susceptible to shear failure, even on gentle slopes. The **EnviroFix®** needlepunching process consistently reinforces the bentonite layer with thousands of high tenacity fibres that resist and transfer the shearing stresses into the encapsulating geotextiles.

### Uniform Bentonite Content

The uniform confinement provided by the fibres from the needlepunching process resists lateral migration of the bentonite clay within the **EnviroFix®** 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.

### Greater Installation Durability

During installation, the needlepunched fibres hold the bentonite in place and prevent the GCL from separating. **EnviroFix® Thermal Lock™** is more durable over a wider range of installation conditions and, because it is needlepunched, it can greatly reduce the adverse effects of premature hydration during installation.



- **Thermal Locking** enhances shear strength of needlepunched fibres.
- **High-quality natural sodium bentonite** provides low permeability.

## Superior GCL Performance

With **EnviroFix® Thermal Lock™**, the clay component is no longer the limiting factor on side slopes. You can use **EnviroFix®** to replace compacted clay layers on steep side slopes and be assured of low permeability without sacrificing slope stability. The inherent confining stress from the needlepunching also maintains the hydraulic properties of **EnviroFix®** under low confining stress applications.

## Assured Quality Control

Because **EnviroFix®** is a factory manufactured liner product, the regulated environment of the production facility allows for greater control over critical performance characteristics. The intensive **EnviroFix®** quality control programme ensures consistent hydraulic and physical properties through the latest EN-ISO and ASTM procedures. The thorough manufacturing quality control minimises the expensive and time consuming onsite quality assurance testing, which is required for compacted clay liners. **EnviroFix® Thermal Lock™** provides consistent high quality performance.

## EnviroFix® is More Versatile Than Compacted Clay

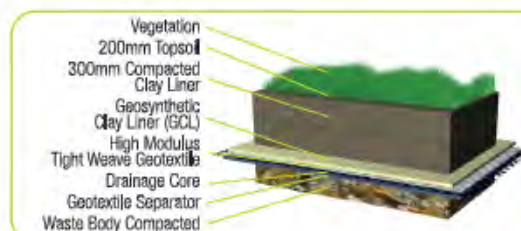
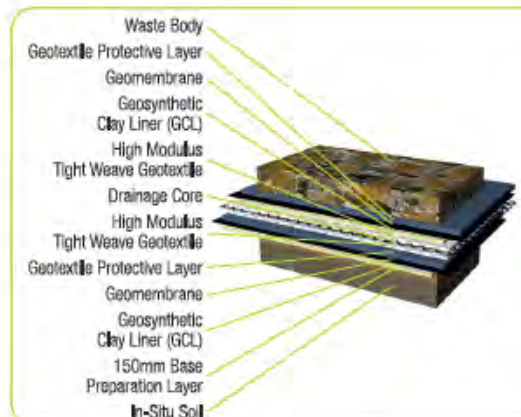
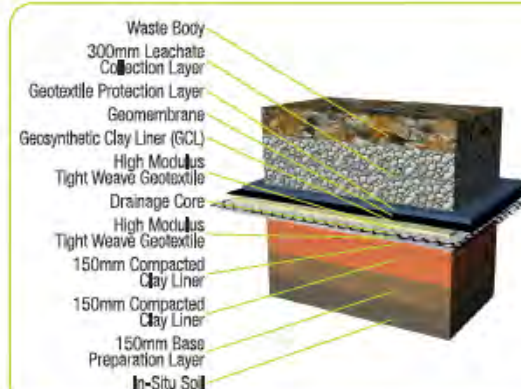
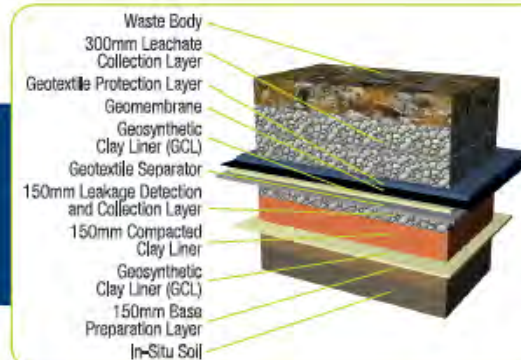
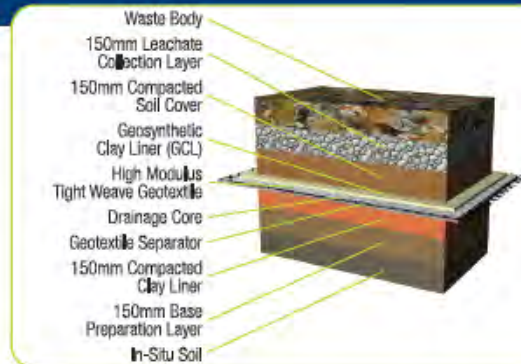
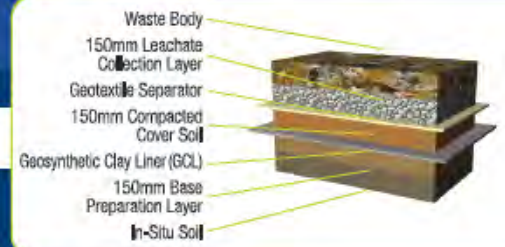
**EnviroFix® Thermal Lock™** GCLs are part of an important trend toward the combined use of geosynthetics and clay materials in containment applications. In a typical composite liner system, GCLs work synergistically with polyethylene and other geomembrane materials to maximise liner efficiency.

### Increased Airspace and Liner Efficiency

In a composite landfill liner system **EnviroFix®** can in many cases completely replace, or significantly reduce, the required thickness of the compacted clay layer. This results in less excavation and compaction, as well as increased containment volume. And, in a landfill, increased airspace means increased revenues.

### Caps and Closures

**EnviroFix®** is ideally suited for use in landfill caps and closures. Used alone, or in conjunction with a geomembrane, **EnviroFix®** is resistant to the deleterious effects of differential settlement, and with adequate soil cover desiccation and seasonal temperature fluctuations are minimised.



## Installation Basics

- To install **EnviroFix®** a steel bar is inserted through the core, and the roll is suspended from a loading frame. The roll is then either unrolled, or the free end is secured in an anchor trench and the suspended roll is slowly backed away.
- A clearly marked overlap-line is indicated on each panel edge to facilitate the correct overlap width.
- No special tools are required to cut **EnviroFix®**. A utility knife is all that is needed to cut the **EnviroFix®** panels into any configuration.
- **GCLs must be properly confined by a minimum cover soil layer before being allowed to hydrate fully. Please contact Kaytech's technical staff on this important point.**
- Detailed installation and maintenance recommendations can be found in the **EnviroFix®** Geosynthetic Clay Liner Installation Guidelines, available from any Kaytech Office or on our website at [www.kaytech.co.za](http://www.kaytech.co.za).
- Simple, cost-effective installation techniques make **EnviroFix®** Thermal Lock™ a practical alternative to compacted clay liners for a wide range of applications, including composite landfill liners, landfill caps, secondary containment, storm water and waste water impoundments, as well as canals, dams and reservoirs.
- Please consult Kaytech for the technical notes and typical drawing details regarding water features.



### **EnviroFix® Thermal Lock™ is Easy to Install**

Combining low permeability and high internal shear strength, **EnviroFix®** is an exceptionally easy to use hydraulic barrier. The wide widths, coupled with the availability of custom lengths, makes **EnviroFix®** Thermal Lock™ the most versatile GCL available.

**At Kaytech we are committed to providing you with more than GCLs – we're committed to providing the most effective and economical solution to solve your geosynthetic clay liner requirements.**



*DISCLAIMER: The application, handling and conditions of use of our products are critical and beyond our control. Information given by us in our documentation or orally, or by any employee or agent and any advice, recommendation or assistance, is given in good faith but without creating any obligation or warranty.*

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