



[Description, Application and Function]

Geosynthetic clay liners (GCLs) are an established sealing product in the geoenvironmental industry. They are used in landfill caps and base liner applications under roads, railways, secondary containment for above ground tank farms, as well as within various other containment structures such as dams, canals, ponds, rivers and lakes. They are also used for waterproofing of buildings and other similar structures.

Rolled out like a carpet to provide a durable impermeable liner, geosynthetic clay liners consist of a layer of high swelling sodium bentonite, sandwiched between two geotextiles. By different techniques, manufactured GCL, Geosynthetic, is mechanically bonded by needlepunching from one nonwoven geotextile through the bentonite to the other nonwoven or woven geotextile.

Sodium Bentonite is a naturally occurring clay with hundreds of uses. Comprising mainly montmorillonite, a layered clay mineral with broad flat platelets which are ideally shaped to provide a hydraulic barrier. Sodium ions located between these platelets allow water to hydrate the bentonite in an absorption reaction that results in the bentonite's swelling characteristics. It swells when contacted with water approximately 900% by volume or 700% by weight. When hydrated under confinement, the bentonite swells to form a low permeability clay layer with the equivalent hydraulic protection of several feet of compacted clay.

This swelling allows the bentonite to seal around penetrations, giving the GCL self-sealing characteristics. During hydration, a confined layer of dry bentonite changes into a dense monolithic mass with no observable individual particles. A fully hydrated sodium bentonite layer can have a hydraulic conductivity of approximately one hundred times lower than a typical compacted clay liner (CCL).

Because of their low hydraulic conductivity, GCLs are used mainly as a replacement for thick, difficult to build, compacted clay liners to provide a barrier to liquids and gases.

Permatene supply and install a range of GCL's from light to heavy grades. These are high performance environmental liners comprised of geosynthetic carrier components integrated with a layer of low permeability sodium bentonite. The rolls are supplied in wide widths, minimizing seams. Installation is fast.

[Technical Specification of GCL]

Material Property	Test Method	Test Results
Bentonite Swell Index	ASTM-D-5890	24mL/2g min
Bentonite Fluid Loss	ASTM-D-5891	18mL max
Bentonite Mass/Area ²	ASTM-D-5993	5.0kg/m ² min
GCL Grab Strength	ASTM-D-4632	400N max
GCL Peel Strength	ASTM-D-4632	65.8N min
GCL Index Flux	ASTM-D-5887	$1 \times 10^{-8} \text{m}^3/\text{m}^2/\text{sec}$ max
GCL Permeability	ASTM-D-5887	$5 \times 10^{-11} \text{cm}/\text{sec}$ max
GCL Hydrated Internal Shear Strength	ASTM-D-5321	24kPa typical



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