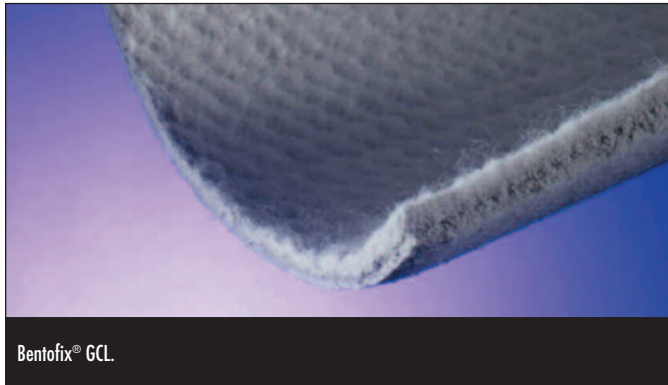


Bentofix® Fabric Encased GCLs

FABRIC ENCASED GEOSYNTHETIC CLAY LINERS (GCLs)

Bentofix® GCL is produced by distributing a uniform layer of the sodium bentonite between two geotextiles. Fibers from the upper nonwoven geotextile are needlepunched through the layer of bentonite and incorporated into the lower geotextile (either a woven or a nonwoven). 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 fibers into place.

The sodium bentonite clay utilized in Bentofix® GCL is a naturally occurring clay mineral that swells as liquid 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 several feet of compacted clay. Unique properties, including increased internal shear resistance and long term creep resistance, make Bentofix® GCL ideal for a wide range of containment lining applications.



Bentofix® GCL.

NEEDLEPUNCHING MAKES A DIFFERENCE

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

HIGH SHEAR RESISTANCE

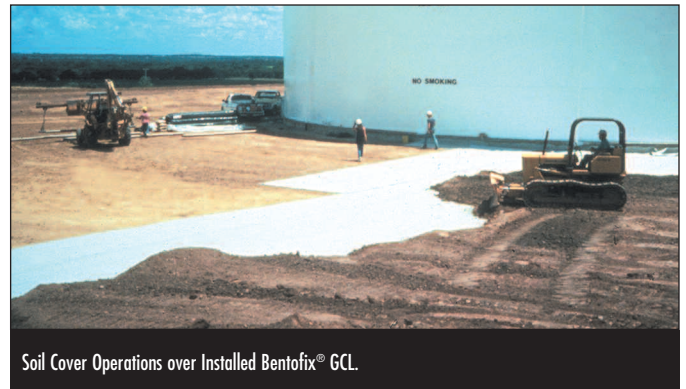
Needlepunching reinforces the otherwise weak layer of sodium bentonite clay. Unreinforced bentonite is susceptible to shear failure, even on gentle slopes. The Bentofix® GCL needlepunching process consistently reinforces the bentonite layer with thousands of high tenacity fibers that resist and transfer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

UNIFORM BENTONITE CONTENT

The uniform confinement provided by the fibers from the needlepunching process resist lateral migration of the bentonite clay within the Bentofix® GCL in either the dry or hydrated state. As a result, a consistent bentonite content is preserved throughout the composite, in turn resulting in a consistent low permeability.

GREATER INSTALLATION DURABILITY

During installation, the needlepunched fibers hold the bentonite in place and prevent the GCL from separating. Bentofix® GCL 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.



Soil Cover Operations over Installed Bentofix® GCL.

SUPERIOR GCL SLOPE PERFORMANCE

With Bentofix® GCL, the clay component is no longer the limiting factor on side slopes. You can use Bentofix® GCL 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 improves the hydraulic properties of Bentofix® GCL under low confining stress applications.



Improved Slope Stability Utilizing Bentofix® GCL.

ASSURED QUALITY CONTROL

Because Bentofix® GCL is factory manufactured liner products, the controlled environment of the production facility allows for greater control over critical performance characteristics. The intensive manufacturing quality control program ensures consistent hydraulic and physical properties through the latest ASTM testing procedures.

The thorough manufacturing quality control minimizes the expensive and time consuming on-site quality assurance testing required for compacted clay liners. Bentofix® GCL provides consistent high quality performance.



Bentofix® Deployed in a Composite Bottom Liner System.

BENTOFIX® IS MORE VERSATILE THAN COMPACTED CLAY

Bentofix® GCL is part of an important trend toward the combined use of geosynthetics and clay materials in containment applications. In a typical composite liner system, GCL works synergistically with polyethylene and other geomembrane materials to maximize liner system efficiency.

INCREASED AIRSPACE AND LINER EFFICIENCY

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

CAPS AND CLOSURES

Bentofix® GCL are ideally suited for use in landfill caps and closures. Used alone, or in conjunction with a geomembrane, Bentofix® GCL is resistant to the

deleterious effects of differential settlement and seasonal temperature fluctuations.



Bentofix® Deployed on a Landfill Closure.

BENTOFIX® IS EASY TO INSTALL

Bentofix® GCL is the widest fabric encased GCL in the industry. The widest width, coupled with available custom lengths, makes Bentofix® the most versatile GCL available.

Simple, cost-effective installation techniques make Bentofix® GCL a practical alternative to a compacted clay liner 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.



Deployment of Bentofix® GCL.

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