

technical datasheet



Cortex Geosynthetic Clay Liner

Cortex Geosynthetic Clay Liners (GCLs) are a sandwiched composite of geotextiles and bentonite clay used to provide a positive barrier to liquids in containment application.

Cortex Geosynthetic Clay Liners consist of:

- A carrier layer, which is comprised of a woven, silt film geotextile, incorporated into a non-woven, needle punched, polypropylene or high density polyethylene geotextile, forming a woven/non-woven composite;
- a natural sodium rich bentonite layer and,
- a cover layer, comprised of non woven, needle punched synthetic fibres.

The final product consists of two geotextiles, at least one of which is a needled non-woven, used to permanently sandwich a layer of high quality sodium bentonite.

Property Test Method Unit Value

Geotextile Layers

Cover Layer

Geotextile type Polyester staple fibre needle-punched nonwoven

Mass per unit area DIN EN 965 g/m² ≥ 220

Carrier Layer

Geotextile type Polypropylene woven

Mass per unit area DIN EN 965 g/m² ≥ 110

Bentonite Layer

Type Natural Sodium Bentonite (Powder)

Mass per unit area DIN EN 965 g/m² ≥ 4500

Swell Index ASTM D 5890 ml/2g ≥ 24

Water Content DIN 18121% ≤ 15

Geosynthetic Clay Liner

Mass per unit area DIN EN 965 g/m² ≥ 5000

Thickness EN 964-1mm ≥ 6

Tensile Strength (MD&CD) ASTM D4595 KN/M ≥ 10

Elongation at break (MD&CD) ASTM D4595% 10/5.0

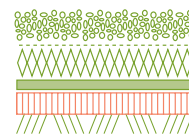
Peel Strength EN ISO10319 N/10cm ≥ 60

Permeability (Hydraulic Conductivity) ASTM-D-5887 M/Sec.

≤ KX10⁻¹¹ (K=1.0~9.9)

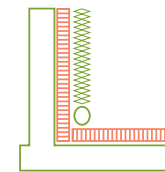
Applications

Composite Lining Systems



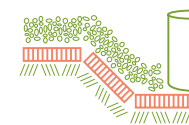
For wastes and liquids containment, the most effective liners are comprised of geomembrane/low permeability soil composites. In addition, the primary benefit of geomembrane/clay composite is derived from intimate contact of two layers. Cortex GCLs provide all of the benefits of the geomembrane/clay interface without the significant difficulties inherent in the placement of multi-lift clay liners.

Waterproof Layers



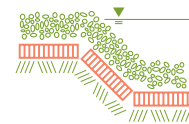
Adjacent to basement walls and other structures, Cortex GCLs provide a positive barrier to water which can accumulate behind the wall, allowing removal of the water through properly designed drain behind the wall.

Spill Containment Systems



Cortex GCLs provide an effective temporary barrier for spills from above ground tank storage of petroleum products or other potential contaminants allowing total and rapid recovery of spilled materials.

Single-component Lining Systems



Cortex GCLs can be utilised as stand alone liners for ponds containing potable or storm water (not subject to toxic containment constraints), artificial lakes, landfill cap systems, mine tailing compounds, earth dams and canal lining systems.

Geomembrane Cushion/Protective Layers



Cortex GCLs can be used as a cushion/protective layer above geomembranes, providing superior protection to thick, non-woven geotextile cushions, particularly in cases where coarse drainage, and granular drainage layers overlie the liners

Surface and Subgrade Preparation

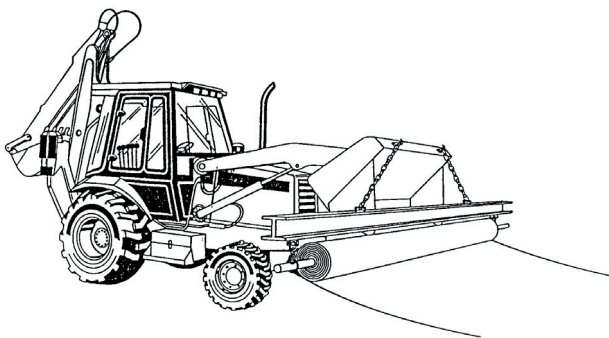
The subgrade or fill material should be free of any angular or sharp rocks larger than 2 inches (5 cm) in diameter as well as any organics or other deleterious materials. Compaction of the subgrade should be in accordance with the design specifications, or, at a minimum, to the extent that no rutting is caused by installation equipment or vehicles.

Prior to deployment of the Cortex geosynthetic clay liner, the subgrade should be final graded to fill all major voids or cracks and proof rolled to provide a smooth surface for the installation of the liner. The surfaces to be lined should be smooth and free of debris, roots and angular or sharp rocks larger than 1 inch (2.5 cm) in diameter.

Minor variations in the subgrade surface are tolerable; however, no sharp irregularities should exist. Installations over other geosynthetic materials requires no additional surface preparation.

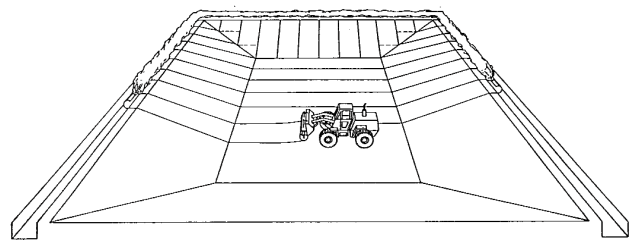
GCL Handling and Placement

Depending on the type of subgrade at the site, the typical equipment used for deployment may range from an extendible boom forklift to a front end loader or backhoe. Suspending the Cortex GCL roll using a spreader bar and a core pipe through the core will facilitate deployment and will prevent damage to the panel edges caused by the suspending chains or straps.



Flat-bladed vise-type grips may be used by labourers for handling, but are not required. Cortex GCL may be cut with a sharp utility knife, scissors, or with a battery-powered rotating blade cutter. Panels of GCL should be installed with the white nonwoven surface facing down in order to maximise friction against the subgrade. Cortex GCL rolls are wound at the plant so that they naturally unroll with this orientation.

Methods of deployment will vary based on site-specific conditions such as slope angle, berm widths, the type of project, the type of subgrade surface, and the subgrade preparation. As a general guideline, all seams should run parallel to the direction of the slope. Flat areas require no particular orientation; however, attention should be paid to the overlap orientation to prevent seam displacement during cover placement.



Deployment should proceed from the highest elevation to the lowest to facilitate drainage in the event of precipitation. Cortex GCL may be deployed by pulling the material from a suspended roll, or by weighing down one end of the roll end and then allowing it to unroll as the installation equipment slowly moves backwards along the intended path of deployment.

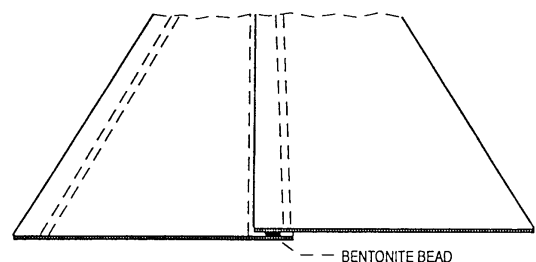
Seaming Procedures

Cortex GCL seams are formed with a Volclay sodium bentonite enhanced overlap. Cortex GCL has been engineered so that when properly installed and hydrated, a small amount of internal sodium bentonite will extrude through the edges where overlaps exist; however, secondary seaming measures are also recommended to insure that a continuous seal is achieved between panels.

A minimum of a 6-inch to 9-inch overlap should exist at all seam locations. A lap line as well as a match line have been printed on the Cortex GCL panel edges at 6 and 9 inches respectively, to ensure the proper overlap is achieved.

The Cortex GCL panels should be adjusted to smooth out any wrinkles or creases between adjacent panels, leaving a proper seam where the overlapping panel covers the lapline of the underlying panel but leaves the matchline exposed.

Any native soil and debris should be removed from the contacting Cortex GCL surfaces to ensure seam integrity. The overlapping panel edge should be pulled back and granular sodium bentonite similar to that used in the GCL itself should be poured continuously along all seams and lap areas from the panel edge to the 6-inch lapline, at a minimum application rate of one-quarter pound per lineal foot (one bag per roll of GCL). Granular bentonite is supplied with each shipment of GCL for these purposes and for other detail work as required.



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Cortex Geosynthetic Clay Liner (cont)

Anchoring Procedures

Anchor trenches may be excavated in a number of ways, depending upon the size of the project and the maneuvering area available at the top of the slope. The preferred methods are to use a ditch trencher (set to the specified depth) or a small backhoe equipped with a bucket of appropriate width.

Cortex GCL should be placed in the trench such that the end of the panel covers the entire trench floor but does not extend up the rear wall.

The size of the anchor trench depends on site-specific criteria such as the soil type and general condition, the angle and length of the slope, as well as the thickness and type of proposed cover materials. In any case, anchor trench backfill should be well compacted to prevent water intrusion or ponding and to prevent liner pullout.

When using Cortex GCL in conjunction with other geosynthetic materials, the GCL may be put in a separate trench or placed as otherwise specified by the engineer.

Penetration Sealing

For sealing around penetrations, a small notch should be made around the circumference of the pipe, into the subgrade. Bentonite of GCL should then be packed around the pipe in the notch and on adjacent areas so that the pipe is encased by a pure bentonite seal.

The Cortex GCL panel should then be placed over the penetration and slit into a "pie" configuration where the pipe is to protrude. This procedure will create a snug fit between the Cortex GCL and the pipe once the laps are trimmed.

More sodium bentonite should then be spread around the cut edges of the GCL against the pipe and over adjacent areas.

To complete the detail, a collar of GCL should be cut in a manner similar to that made on the main panel and fit around the pipe, with additional sodium bentonite applied into any gaps that may remain.

When Cortex GCL is used above or in conjunction with other geosynthetic materials, notching below the liner may not be possible. In these cases, sprayable bituminous coatings may be applied around the penetrations and any other critical areas. All other penetration sealing steps should be followed to ensure a watertight seal is produced.

Structure Sealing

Another critical area in an installation is the attachment or sealing of Cortex GCL to foundation walls, drainage outlets or concrete structures. Sealing panel edges against a wall or foundation is accomplished with the use of pure sodium bentonite.

To start, a small notch should be made against the edge of the object to be sealed. The notch should be packed full of bentonite. The Cortex GCL panel is then brought up to the structure and trimmed to fit against the wall of the structure as shown. Care must be taken to ensure that the GCL is kept directly against the structure as the cover material is applied.

Once hydrated, the GCL bentonite seal will allow for settlement or other stresses that may tend to pull the GCL from the edge.

Protective Cover

The protective cover should be composed of well graded soils, sands or crushed gravel free of sharp edged stones larger than 1 inch (2.5 cm) in diameter. Cover should be spread by low ground pressure equipment.

A minimum cover thickness of 12 inches should be kept between heavy equipment and the liner at all times. No vehicles should drive on the Cortex GCL until proper cover has been placed to the specified depth. Once the proper depth of cover soils have been applied, compaction equipment may be used.

Care should be taken to push materials upslope wherever possible and to avoid pinching or shifting the liner by making sharp turns or sudden stops.

Damage

Rips or tears may be repaired by completely exposing the affected area, removing all foreign objects or soil, and by then placing a patch over the damage, with a minimum overlap of 12 inches on all edges.

Accessory bentonite should be placed between the patch and the repaired material at a rate of a quarter pound per lineal foot of edge spread in a six-inch width.

If damage occurs on a slope, the same basic procedure should be used; however, the edges of the patch should be fastened to the repaired liner with contact cement, epoxy, or some other construction adhesive, in addition to the bentonite-enhanced seam.

Activation

For fresh water applications, the water to be contained will activate the Cortex GCL. If highly contaminated or non-aqueous liquids are to be contained, however, the GCL must be prehydrated with fresh water for 48 hours prior to use. Approximately one-quarter gallon of fresh water per square foot is necessary for prehydration. Prehydration may be accomplished by flooding the impoundment, using a sprinkler system, or by natural rainfall. In landfill applications, the leachate is typically sufficient to hydrate the Cortex GCL.

Maintenance

No regular maintenance of Cortex GCL is necessary under normal operational conditions. Should damage occur to the liner, the damage repair guidelines should be followed. Should unusual conditions exist or should the normal repair procedure not be possible, contact our relevant Sales Engineer for further recommendations

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