

Geosynthetic Clay Liners

Geosynthetic Clay Liners (GCL's)

GCL's are sodium bentonite and geotextile/geomembrane composite liners engineered for a variety of containment applications. The sodium bentonite is imbedded and needle punched within the durable geotextile/geomembrane layers to create a thin hydraulic barrier, which is resistant to bentonite migration. Because of the self-healing bentonite base, they offer more economic and functional advantages than traditional compacted clay liner construction.

GCL's are proven in the harshest of environmental conditions. With their high shear strength and low hydraulic conductivity, they are crucial components in most landfill and mine applications.



Common Applications

- Landfills
- Mine Reclamation
- Heap Leaching
- Canals
- Agricultural Waste
- Wetlands and Streams
- Highway and Civil
- Secondary Containment

Material Advantages

- Resistant to freeze/thaw cracking that is common in compacted clay liners
- Easily installed without the need of specialized machinery or technicians
- Allows more space to be utilized in landfills
- Several composite designs are available for use in varying applications and differing slope angles



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GEOSYNTHETIC CLAY LINERS (GCL)

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY ft ² (m ²)	BENTOMAT® ST CERTIFIED PROPERTIES	BENTOMAT® CL CERTIFIED PROPERTIES	BENTOMAT® DN CERTIFIED PROPERTIES
Bentonite Swell Index ¹	ASTM D 5890	1 per 50 tonnes	24 mL/2g min.	24 mL/2g min.	24 mL/2g min.
Bentonite Fluid Loss ¹	ASTM D 5891	1 per 50 tonnes	18 mL max.	18 mL max.	18 mL max.
Bentonite Mass/Area ²	ASTM D 5993	40,000 ft ² (4,000 m ²)	0.75 lb/ft ² (3.6 kg/m ²) min	0.75 lb/ft ² (3.6 kg/m ²) min	0.75 lb/ft ² (3.6 kg/m ²) min
GCL Grab Strength ³	ASTM D 4632 ASTM D 6768	200,000 ft ² (20,000 m ²)	90 lbs (400 N) MARV 22.5 lbs/in (40 N/cm) MARV	120 lbs (530 N) MARV 30 lbs/in (53 N/cm) MARV	150 lbs (660 N) MARV 37.5 lbs/in (66 N/cm) MARV
GCL Peel Strength ³	ASTM D 4632 ASTM D 6496	40,000 ft ² (4,000 m ²)	15 lbs (65 N) min 2.5 lbs/in (4.4 N/cm) min	15 lbs (65 N) min 2.5 lbs/in (4.4 N/cm) min	15 lbs (65 N) min 2.5 lbs/in (4.4 N/cm) min
GCL Index Flux ⁴	ASTM D 5887	Periodic	1 x 10 ⁻⁸ m ³ /m ² /sec max	1 x 10 ⁻⁹ m ³ /m ² /sec max	1 x 10 ⁻⁸ m ³ /m ² /sec max
GCL Hydraulic Conductivity ⁴	ASTM D 5887	Periodic	5 x 10 ⁻⁹ cm/sec max	5 x 10 ⁻¹⁰ cm/sec max	5 x 10 ⁻⁹ cm/sec max
GCL Hydrated Internal Shear Strength ⁵	ASTM D 5321 ASTM D 6243	Periodic	500 psf (24 kPa) typical 6,500 psf (311 kPa) typ @ 10,800 psf	500 psf (24 kPa) typical	500 psf (24 kPa) typical 6,500 psf (311 kPa) typ @ 10,800 psf

Notes:

1 Bentonite property tests performed at a bentonite processing facility before shipment to Manufacturer's GCL production facilities.

2 Bentonite mass/area reported at 0 percent moisture content.

3 All tensile strength and peel strength testing is performed in the machine direction using 4 inch grips per modified ASTM D 4632. Results are reported as minimum



Bentomat ST is a reinforced GCL consisting of a layer of sodium bentonite between a woven and a nonwoven geotextiles, which are needlepunched together.



Bentomat CL is a reinforced GCL consisting of a layer of sodium bentonite between two geotextiles, which are needlepunched together and laminated to a thin flexible membrane liner.



Bentomat DN is a reinforced GCL consisting of a layer of sodium bentonite between two nonwoven geotextiles which are needlepunched together.



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