

BENTOMAT® CLT-20

GEOSYNTHETIC CLAY LINER

DESCRIPTION

BENTOMAT CLT-20 GCL is a reinforced geosynthetic clay liner (GCL) consisting of a layer of sodium bentonite between a woven and a nonwoven geotextile, which are needle-punched together and laminated to a 20-mil (0.5 mm) double-sided textured HDPE geomembrane.

The geomembrane component of BENTOMAT CLT-20 GCL is compliant with the GRI-GM-13 specification for HDPE geomembranes, adjusted for thickness.



TESTING DATA

PHYSICAL PROPERTIES			
MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY	REQUIRED VALUES
Bentonite Properties¹			
Bentonite Swell Index	ASTM D5890	1 per 50 tonnes	24 mL/2g min.
Bentonite Fluid Loss	ASTM D5891	1 per 50 tonnes	18 mL max.
Textured HDPE Geomembrane Properties²			
Thickness ³	ASTM D5994	50,000 ft ² (5,000 m ²)	20 mils (nominal) 19 mils min. average
Asperity Height ⁴	ASTM D7466	50,000 ft ² (5,000 m ²)	15 mils min. average
Tensile (Break) Strength ⁵	ASTM D6693	200,000 ft ² (20,000 m ²)	30 lbs/in min. average
Tear Strength	ASTM D1004	400,000 ft ² (40,000 m ²)	14 lbs min. average
Puncture Strength	ASTM D4833	400,000 ft ² (40,000 m ²)	30 lbs min. average
Finished GCL Properties			
Bentonite Mass/Area ⁶	ASTM D5993	40,000 ft ² (4,000 m ²)	0.75 lb/ft ² (3.6 kg/m ²) min.
GCL Tensile Strength ⁷	ASTM D6768	200,000 ft ² (20,000 m ²)	45 lbs/in (70 N/cm) MARV
GCL Peel Strength ⁷	ASTM D6496	40,000 ft ² (4,000 m ²)	3.5 lbs/in (6.1 N/cm) min.
GCL Hydraulic Conductivity ⁸	ASTM D5887	Periodic	5 x 10 ⁻¹⁰ cm/s max.
GCL Hydrated Internal Shear Strength ⁹	ASTM D6243	Periodic	500 psf (24 kPa) typical

Notes:

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

² Geomembrane property tests performed by the geomembrane manufacturer before shipment to CETCO's GCL production facilities. Geomembrane component complies with the physical, mechanical, and durability requirements of the GRI-GM-13 specification for HDPE geomembranes, adjusted for a 20-mil thickness.

³ Of the 10 thickness readings, 8 out of 10 must be ≥ 18 mils (-10%), and the lowest individual reading must be ≥ 17 mils (-15%).

⁴ Of the 10 asperity height readings, 8 out of 10 must be ≥ 10.5 mils, and the lowest individual reading must be ≥ 7.5 mils.

⁵ Average of 5 test specimens in the machine direction.

⁶ Bentonite mass/area reported at 0% moisture content.

⁷ All GCL tensile strength testing is performed in the machine direction using ASTM D 6768. All peel strength testing is performed using ASTM D 6496. Upon request, tensile and peel results can be reported per modified ASTM D 4632 using 4-inch grips.

⁸ ASTM D5887 Index flux and hydraulic conductivity testing with deaired distilled/deionized water at 80 psi (551 kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. ASTM D 5887 testing is performed only on a periodic basis because the geomembrane is essentially impermeable. The GCL component alone (without the geomembrane) has a hydraulic conductivity of 5 x 10⁻⁹ cm/s.

⁹ Peak value measured at 200 psf (10 kPa) normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

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