ELCOSEAL®

Geosynthetic Clay Liners

Technical Data Sheet

QUALITY - SUPPORT - EXPERTISE

GEOFABRICS®

Specifications

Issue Date August 2015

ELCOSEAL® Geosynthetic Clay Liners – MARV and Typical Values

ELCOSEAL® is a New Generation Geosynthetic Clay Liner (GCL) made from quality polypropylene geotextiles and premium grade sodium bentonite powder mined in Australia. ELCOSEAL® GCL's are fibre-reinforced by needle-punching the composite across the entire surface area of the product. Unique to this product, the high tenacity fibres are then thermally-locked to ensure high long-term shear strength.

PROPERTY		TEST METHOD	MQC[1] FREQUENCY	UNITS	ELCOSEAL® GRADE			
					X800	X1000	X2000	X3000
GCL Hydraulic Properties								
Hydraulic Conductivity, k	MaxArv[2]	ASTM D5887	40,000m²	m/s	3.5×10^{-11}	2.8×10^{-11}	3×10^{-11}	2.4×10^{-11}
	Typical[3]				2.5×10^{-11}	1.9×10^{-11}	2.4×10^{-11}	1.7×10^{-11}
Bentonite Characteristics								
Bentonite Particle Size	Typical	Dry Screen AS 1289-3.6.2	Weekly	% passing 75µm % ≤ 0.5µm	≥ 75 ≥ 55	≥ 75 ≥ 55	≥ 75 ≥ 55	≥ 75 ≥ 55
Swell Index	Typical	ASTM D5890	40,000m²	mL/2g	≥ 24	≥ 24	≥ 24	≥ 24
Fluid Loss	Typical	ASTM D5891	40,000m²	mL	≤ 15	≤ 15	≤ 15	≤ 15
GCL Components - Mass								
Cover Nonwoven Geotextile Mass per Unit Area	MARV[4]	AS 3706.1	10,000m²	g/m²	220	240	240	260
	Typical				250	270	270	300
Bentonite Mass per Unit Area @ 0% Moisture Content	MARV	ASTM D5993	2,500m²	g/m²	3,700	4,000	3,700	4,250
	Typical				4,100	4,500	4,250	4,700
Carrier / Composite Geotextile Mass per Unit Area	MARV	AS 3706.1	70,000m²	g/m²	110	110	350	350
	Typical				110	110	380	380
Geotextile Configuration (Carrier / Cover)					W / NW[5]	W / NW	W+NW / NW	W+NW / NW
GCL - Mass								
GCL Total Mass per Unit Area @ 0% Moisture Content	MARV	ASTM D5993	2,500m²	g/m²	3,930	4,350	4,290	4,860
	Typical				4,460	4,880	4,900	5,380
GCL - Strength Properties								
Strip Tensile Strength (MD)[6]	MARV	ASTM D6768	10,000m²	kN/m	7	8	12	12
	Typical				10	11	15	16
CBR Strength	MARV	AS 3706.4	25,000m²	N	1,400	1,600	3,900	4,100
	Typical				2,000	2,100	4,900	5,300
CBR Elongation	MARV	AS 3706.4	25,000m²	%	10	15	30	30
	Typical				30	40	80	80
GCL - Shear Strength Properties								
Hydrated Peak Internal Shear Strength @ 10kPa Normal Stress	Typical[7]	ASTM D6243	Periodic	kPa	30	30	35	40
Hydrated Peak Internal Shear Strength @ 30kPa Normal Stress	Typical	ASTM D6243	Periodic	kPa	50	50	60	70
GCL Longitudinal Edge Treatment								
Bentonite Impregnation - Width ≥ 300mm - Typical				-	√	√	√	√
Edge Sealing Performance	Typical	ASTM STP 1308 (Mod.)[10,11]	Periodic	m/s	2.5×10^{-11}	1.9×10^{-11}	2.4×10^{-11}	1.7×10^{-11}
GCL Roll Dimensions								
Standard Roll Dimensions (Width x Length)				m	4.7 x 45	4.7 x 35	4.7 x 30	4.7 x 30
Typical Roll Mass (standard roll length). **Note:** Longer custom roll lengths are available to suit project requirements.			(Weighed every roll)	kg	1,395	1,050	960	950
GCL Spreader Bar Requirement				-	Heavy-Duty[8]	Heavy-Duty[8]	Standard[9]	Standard[9]

NOTES

1. **MQC** = Manufacturing Quality Control – an ongoing system that monitors and tests materials during manufacture to ensure compliance with certification documents and contract specifications.
2. **MaxARV** = Maximum Average Roll Value – a MaxARV is defined as the Mean or Typical values plus 2 standard deviations. Mathematically, it is implied that 97.5% of the results of the tested specimens will be less than the MaxARV. A MaxARV provides a confidence level of 97.5%. **NOTE** – in reference to GCL Permeability, **LOWER IS BETTER**.
3. **Typical** = A typical value is the arithmetic mean of a set of results. This implies that 50% of the tested specimens will typically exceed this value and 50% will typically not meet this value.
4. **MARV** = Minimum Average Roll Value – a MARV is defined as the Mean or Typical values less 2 standard deviations. Mathematically, it is implied that 97.5% of the results of the tested specimens will exceed the MARV. A MARV provides a confidence level of 97.5%.
5. **W**= Woven, **NW**= Nonwoven.
6. **MD** = Roll Machine Direction.
7. **Peak Value** reported at 10kPa or 30kPa normal stress. [The reported values are not intended to replace site specific internal shear or interface friction testing required for design].
8. **Heavy-Duty WLL** (Working Load Limit) = 1,400kg.
9. **Standard WLL** (Working Load Limit) = 1,000kg.
10. **Reference** - Daniel, D.E. Trautwein, S.J. and Goswami, P.K. 1997. Measurement of Hydraulic Properties of Geosynthetic Clay Liners Using a Flow Box, Testing and Acceptance Criteria for Geosynthetic Clay Liners, ASTM STP 1308, p. 196-207.
11. **Modification Reference** - Kendall, P.M., Austin, R. A. 2014. Investigation of GCL Overlap Techniques Using a Large Scale Flow Box, 7th International Congress on Environmental Geotechnics, 3B-3, p. 746-753.

OTHER LITERATURE AND TECHNICAL INFORMATION AVAILABLE

Literature can be sourced from the Geofabrics website or by contacting your nearest branch

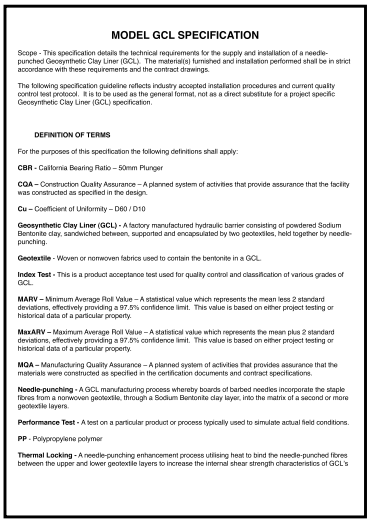
General Information

ELCOSEAL®
Installation Guidelines

Manufacturers Quality
Assurance & Control Manual

GCL Technical Notes

Bentonite Technical Notes



MODEL GCL SPECIFICATION

Scope - This specification details the technical requirements for the supply and installation of a needle-punched Geosynthetic Clay Liner (GCL). The material(s) furnished and installation performed shall be in strict accordance with these requirements and the contract drawings.

The following specification guideline reflects industry accepted installation procedures and current quality control test protocol. It is to be used as the general format, not as a direct substitute for a project specific Geosynthetic Clay Liner (GCL) specification.

DEFINITION OF TERMS

For the purposes of this specification the following definitions shall apply:

CBR - California Bearing Ratio – 50mm Plunger

CQA – Construction Quality Assurance – A planned system of activities that provide assurance that the facility was constructed as specified in the design.

Cu – Coefficient of Uniformity – D60 / D10

Geosynthetic Clay Liner (GCL) - A factory manufactured hydraulic barrier consisting of powdered Sodium Bentonite clay, sandwiched between, supported and encapsulated by two geotextiles, held together by needle-punching.

Geotextile - Woven or nonwoven fabrics used to contain the bentonite in a GCL.

Index Test - This is a product acceptance test used for quality control and classification of various grades of GCL.

MARV – Minimum Average Roll Value – A statistical value which represents the mean less 2 standard deviations, effectively providing a 97.5% confidence limit. This value is based on either project testing or historical data of a particular property.

MaxARV – Maximum Average Roll Value – A statistical value which represents the mean plus 2 standard deviations, effectively providing a 97.5% confidence limit. This value is based on either project testing or historical data of a particular property.

MQA – Manufacturing Quality Assurance – A planned system of activities that provides assurance that the materials were constructed as specified in the certification documents and contract specifications.

Needle-punching - A GCL manufacturing process whereby boards of barbed needles incorporate the staple fibres from a nonwoven geotextile, through a Sodium Bentonite clay layer, into the matrix of a second or more geotextile layers.

Performance Test - A test on a particular product or process typically used to simulate actual field conditions.

PP - Polypropylene polymer

Thermal Locking - A needle-punching enhancement process utilising heat to bind the needle-punched fibres between the upper and lower geotextile layers to increase the internal shear strength characteristics of GCL's

GCL Model Specification

AUSTRALIA

MELBOURNE (03) 8586 9111	SYDNEY (02) 8785 8800	NEWCASTLE (02) 4951 2688	COFFS HARBOUR (02) 6653 5706	PERTH (08) 6305 0561	ADELAIDE (08) 8162 5855
BRISBANE (07) 3279 1588	TOWNSVILLE (07) 4774 8222	BUNDABERG (07) 4155 9968	GOLD COAST (07) 5594 8600	HOBART (03) 6273 0511	DARWIN 0407 523 669

NEW ZEALAND

AUCKLAND (64 9) 634 6495	HAMILTON (021) 732 178	NAPIER (021) 916 736	CHRISTCHURCH (64 3) 349 5600

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