

Part 642 – Specifications

Chapter 3 – National Standard Material Specifications

Material Specification 595—Geosynthetic Clay Liner

A. Scope

This specification covers the quality of geosynthetic clay liner (GCL) material and workmanship.

B. General Requirements

- (1) The GCL is composed of a layer of high shrink-swell sodium bentonite sandwiched between two geosynthetics. GCL's may include a geomembrane or geofilm layer, either laminated to a geotextile-bentonite-geotextile sandwich or as one of the encapsulating layers in the GCL. The GCL material shall be manufactured by one of the following processes:
 - (i) Needle punched process by which the bentonite is encapsulated between the geotextile layers by a mechanical bonding process without the use of any chemical binders or adhesive; or
 - (ii) Adhesive process by which the bentonite is adhered to the encapsulating geosynthetic layer(s). Lock stitched to provide internal shear strength and the integrity and consistency to the thickness and unit weight of the material.
- (2) Non- or lightly reinforced GCL's intended by the manufacturer for use on flat or nearly flat areas shall not be used unless specifically allowed. The bentonite shall have the following base properties:
 - (i) a minimum of 0.75 pound per square foot of high shrink/swell sodium bentonite
 - (ii) a maximum moisture content of 40 percent, dry weight basis (in the finished GCL)
 - (iii) swell index—minimum 24 ml per 2 grams
 - (iv) fluid loss—maximum 18 ml
- (3) The GCL shall have an index flux value no larger than $1 \times 10^{-8} \text{ m}^2/\text{m}^2\text{-s}$ (for geotextile-backed GCL's) or $1 \times 10^{-9} \text{ m}^2/\text{m}^2\text{-s}$ (for geomembrane- or geofilm-backed GCL's) at 2 pounds per square inch (4.6 feet) of head, as specified.

C. Packaging and Labeling

All material shall be packaged in individual rolls of a minimum of 3.65 meters wide and with at least 22.5 meters in length on the roll. All rolls shall be labeled and in a wrapping that is resistant to UV light deterioration. The labels on each roll shall identify the length and width of the roll, the manufacturer, the product, lot number, and the roll number.

D. Testing and Quality Control

The following tests shall be performed, and the results certified by the manufacturer:

Swell index	ASTM D5890
Fluid loss	ASTM D5891

Bentonite mass/unit area	ASTM D5993
Bentonite moisture content	ASTM D2216
Index flux	ASTM D5887
Hydraulic conductivity	ASTM D5887

E. Inspection and Acceptance

No liner material shall be accepted for placement in the permanent works that has not been certified by the manufacturer as meeting all specified requirements. No liner material shall be accepted that exhibits any visible defects. The liner material shall be subject to quality assurance testing at any time before and during installation.