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## Standard Guide for Acceptance Testing Requirements for Geosynthetic Clay Liners<sup>1</sup>

This standard is issued under the fixed designation D 6495; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This guide covers guidelines for the acceptance testing requirements for geosynthetic clay liner (GCL) materials, describing types of tests, test methods, and recommended verifications.

1.2 This guide is intended to aid purchasers, installers, contractors, owners, operators, designers and agencies in establishing a minimum level of effort for product acceptance testing and verification. This is intended to assure that the supplied GCL rolls meet accepted material specifications.

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This guide cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This guide is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this guide be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this guide means only that the guide has been approved through the ASTM consensus process.*

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

~~D638 Test Method for Tensile Properties of Plastics~~ 792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

~~D 882 Test Methods~~ Method for Tensile Properties of Thin Plastic Sheeting

~~D792 Test Methods for Density and Specific Gravity (Relative Density) and Density of Plastics by Displacement~~<sup>2</sup>

~~D4595 Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method~~

~~D4632 Test Method for Grab Breaking Load and Elongation of Geotextiles~~<sup>3</sup> 1505 Test Method for Density of Plastics by the Density-Gradient Technique

~~D 5199 Test Method for Measuring the Nominal Thickness of Geosynthetics~~

~~D 5887 Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens and Handling of Geosynthetic Clay Liners~~<sup>3</sup> Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter

~~D 5888 Guide for Storage and Handling of Geosynthetic Clay Liners~~

~~D 5889 Practice for Manufacturing Quality Control of Geosynthetic Clay Liners~~

~~D 5890 Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners~~

~~D 5891 Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners~~

~~D 5993 Test Method for Measuring the Mass per Unit Area of Geosynthetic Clay Liners~~<sup>3</sup> Test Method for Measuring Mass Per Unit of Geosynthetic Clay Liners

~~D 5994 Test Method for Measuring Core Thickness of Textured Geomembrane~~

~~D 6072 Guide~~ Practice for Obtaining Samples of Geosynthetic Clay Liners

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee D35 on Geosynthetics and is the direct responsibility of Subcommittee D35.04 on Geosynthetic Clay Liners. Current edition approved June 10, 2002. Published September 2002. Originally published as D6495-99. Last previous edition D6495-01. Current edition approved June 1, 2009. Published August 2009. Originally approved in 1999. Last previous edition approved in 2002 as D 6495-02.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

D 6243 [Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method](#)

D 6496 [Test Method for Determining Average Bonding Peel Strength Between the Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners](#)<sup>3</sup>—Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners

D 6693 [Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes](#)

D 6768 [Test Method for Tensile Strength of Geosynthetic Clay Liners](#)

2.2 *United States EPA Document:*

EPA/600/R-93/182 Technical Guidance Document Quality Assurance and Quality Control for Waste Containment Facilities<sup>3</sup>

2.3 *ISO Standard:*

ISO 10318 Geosynthetics — Terms and definitions<sup>4</sup>

### 3. Terminology

3.1 *Geosynthetic Definitions:*

3.1.1 *geomembrane adhered geosynthetic clay liner (GCL), n*—~~an essentially impermeable geosynthetic composed of one or more synthetic sheets.~~—GCL product in which the clay component is bonded to a film or membrane by adhesion.

3.1.2 *geosynthetic clay liner coated GCL, n*—~~a manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetics.~~—GCL product with at least one layer of a synthetic substance applied to the GCL as a fluid and allowed to solidify.

3.1.3 *geomembrane, n*—an essentially impermeable geosynthetic composed of one or more synthetic sheets.

3.1.4 *geosynthetic clay liner, GCL, n*—factory manufactured geosynthetic hydraulic barrier consisting of clay supported by geotextiles or geomembranes or both that are held together by needling, stitching, or a chemical adhesives clay geosynthetic barrier. (1) The ISO 10318 definition of a clay geosynthetic barrier (GBR-C); according to ASTM International, a GCL is a factory assembled structure of geosynthetic materials in the form of a sheet that acts as a barrier. The barrier function is essentially fulfilled by clay. It is used in contact with soil or other materials or both in geotechnical and civil engineering applications.

3.1.5 *geotextile, n*—a permeable geosynthetic comprised solely of textiles

3.1.6 *laminated GCL, n*—GCL product with at least one film or membrane layer superimposed and bonded to the GCL by an adhesive usually under heat and pressure.

3.1.7 *multicomponent GCL, n*—GCL with an attached film, coating, or membrane decreasing the hydraulic conductivity or protecting the clay core or both.

3.1.8 *needle-punched GCL, n*—reinforced GCL manufactured using needles that punch fibers from a nonwoven through the cover and carrier geotextile as well as the clay core to bond the components together to increase internal shear strength.

3.1.9 *reinforced GCL, n*—GCL that has a discrete component to increase internal shear strength.

3.1.10 *stitch-bonded GCL, n*—reinforced GCL manufactured by stitching in which yarns or threads are passed through the cover geosynthetic, the clay core, and the carrier geosynthetic creating a directional orientation; therefore, the direction of allowable shear transfer is predetermined.

3.1.11 *unreinforced GCL, n*—GCL that does not have a discrete component to increase internal shear strength.

3.2 *Organizational Definitions:*

3.2.1 *agency, n*—in geosynthetics the organization who reviews the permit application for compliance with the agency's regulation and all quality assurance documentation before and after construction.

3.2.2 *contractor, n*—in geosynthetics the party or organization who has the responsibility for the construction of the man-made project, structure or system.

3.2.3 *designer, n*—in geosynthetics the person or organization who designs a man-made project, structure or system that fulfills the owner's/operator's requirements and meets or exceeds the minimum requirements of the agency.

3.2.4 *installer, n*—in geosynthetics the party who installs, or facilitates installation of, any materials purchased from manufacturers or suppliers.

3.2.5 *manufacturer, n*—in geosynthetics the group, corporation, partnership, or individual that manufactures a product.

3.2.6 *operator, n*—in geosynthetics the person or organization who operates the man-made project, structure or system.

3.2.7 *owner, n*—in geosynthetics the person or organization who owns the man-made project, structure or system.

3.2.8 *purchaser, n*—in geosynthetics the person, company, or organization that purchases any materials or work to be performed.

3.3 *Quality Definitions:*

3.3.1 *acceptance testing, n*—testing performed on a product to determine whether or not an individual lot of the product conforms with specified requirements.

<sup>3</sup> Annual Book of ASTM Standards, Vol 04.13.

<sup>3</sup> Available from Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

<sup>4</sup> Available from Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

<sup>4</sup> Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.