Designation: D8204 – 18 (Reapproved 2022)

Standard Practice for Burial and Retrieval of Samples in a Test Pad to Evaluate Installation Effects on Geosynthetic Clay Liners[1]

This standard is issued under the fixed designation D8204; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers standardized procedures for obtaining samples of geosynthetic clay liners (GCLs) from a test pad for use in assessment of the effects immediately after installation caused only by the installation techniques. The assessment may include physical testing. This practice is applicable to GCLs only.

1.2 This practice is limited to full-scale test pads, and does not address laboratory modeling of field conditions. This practice does not address which test method(s) to use for quantifying installation damage.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

D1883 Test Method for California Bearing Ratio (CBR) of Laboratory-Compacted Soils

D2216 Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

D2487 Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

D4429 Test Method for CBR (California Bearing Ratio) of Soils in Place (Withdrawn 2018)[3]

D4439 Terminology for Geosynthetics

D5887/D5887M Test Method for Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter

D5888 Guide for Storage and Handling of Geosynthetic Clay Liners

D5993 Test Method for Measuring Mass per Unit Area of Geosynthetic Clay Liners

D6072/D6072M Practice for Obtaining Samples of Geosynthetic Clay Liners

D6102 Guide for Installation of Geosynthetic Clay Liners

D6496/D6496M Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners

D6768/D6768M Test Method for Tensile Strength of Geosynthetic Clay Liners

D6913/D6913M Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

2.2 *GRI Standard:*[4]

GRI Guide GS11 Standard Guide for Constructing Test Pads to Assess Protection Materials Intended to Avoid Geomembrane Puncture

3. Terminology

3.1 *Definitions:*

3.1.1 *geosynthetic clay liner (GCL), n*—a manufactured hydraulic barrier consisting of clay bonded to a layer or layers of geosynthetics.

3.1.2 *multi-component GCL, n*—GCL with an attached film, coating, or membrane decreasing the hydraulic conductivity or protecting the clay core, or both.

3.1.3 *sample, n*—(*1*) a portion of material that is taken for testing or for record purposes; (*2*) a group of specimens used,

[1] This practice 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 Oct. 1, 2022. Published October 2022. Originally approved in 2018. Last previous edition approved in 2018 as D8204 – 18. DOI: 10.1520/D8204-18R22.

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

[3] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from Geosynthetic Institute, 475 Kedron Avenue, Folsom, PA 19033-1208, http://www.geosynthetic-institute.org.

or of observations made, which provide information that can be used for making statistical inferences about the population(s) from which the specimens are drawn.

3.1.4 *test pad, n*—a distinct area of actual or simulated full-scale construction.

3.2 For definitions of other geosynthetics terms used in this practice, refer to Terminology D4439.

4. Summary of Practice

4.1 Damage to geosynthetic clay liners (GCLs) from installation operations may be quantified by evaluating specimens from a sample(s) exhumed from a full-scale installation. The sample(s) should be installed using project-specific procedures and materials. When project-specific materials or procedures (or both) are unknown, generally accepted, representative materials and procedures should be used and thoroughly documented and reported. Addressed within this practice are: amount of GCL sample(s) to install; procedures for installing the GCL sample(s); procedures for exhuming the GCL sample(s); procedure for obtaining control sample(s); and report preparation guidelines. The sample(s) should be retrieved immediately after installation to minimize potential aging of the GCL. Comparison of test results on exhumed and control specimens may be used to assess effects of installation. Tests to perform are not addressed herein, and will vary with the type and function of geosynthetic and project requirements.

5. Significance and Use

5.1 The ability to maintain design function (for example, barrier) or design properties (for example, peel strength, chemical resistance, etc.), or both, of a geosynthetic clay liner may be affected by damage to the physical structure of the GCL due to the rigors of field installation. The effect of damage may be assessed by analyzing specimens cut from sample(s) retrieved after installation in a representative test pad. Analysis may be performed with visual examination or laboratory testing of specimens from the control sample(s), and from the exhumed sample(s).

5.2 A uniform practice for installing and retrieving representative sample(s) from a test pad is needed to assess installation damage using project-specific or generally accepted, representative materials and procedures. Damage of a specific grade and type of GCL under specific installation procedures may be assessed with sample(s) exhumed from a full-scale test pad.

6. Procedure

6.1 *Objective*—Geosynthetic clay liner and soil placement techniques shall model the methods anticipated during construction, but may also be designed to model hypothetical conditions such as various degrees of compaction, lift heights, drop heights, equipment operations, types of fill material, or combinations thereof.

6.2 *Test Pad Configurations:*

6.2.1 The test pad configuration is an important consideration, and Fig. 1 is crafted so as to present several of the various options. In this regard, test pads are either above or below the ground surface and used either for specific design confirmation or to investigate various stone thicknesses. Typically, test pads are designed with soil coverage on top (6.3.1 – 6.3.4).

6.2.2 Lateral confinement of the cover soil should be considered during the compaction of the soils to simulate realistic site conditions.

6.3 The four test pad configurations shown in Fig. 1 (adapted from GRI Guide GS11) are described in 6.3.1 – 6.3.4 and could utilize various different GCL barrier systems (for example, GCL alone, multi-component GCL, GCL with geotextile, GCL with geomembrane, GCL with geosynthetic drainage layer, etc.).

6.3.1 *Above Ground with Uniform Cover Soil Thickness:*

6.3.1.1 This cross section is meant to confirm a given design, including the intended GCL barrier system, soil type, and soil thickness.

6.3.2 *Above Ground with Variable Soil Thickness:*

6.3.2.1 This investigative type cross section is meant to discover what minimum stone thickness is necessary to avoid puncture to the underlying GCL barrier system. The GCL system is held constant along with the soil type, but not its thickness.

6.3.3 *Below Ground with Uniform Soil Thickness:*

6.3.3.1 Unlike in the above-ground configuration, the cover soil in this cross section is restrained from lateral movement by the surrounding soil.

6.3.4 *Below Ground with Variable Soil Thickness:*

6.3.4.1 This cross section is used to discover what minimum stone thickness is necessary to avoid puncture to the underlying GCL. Unlike the above-ground configuration, however, the stone will be laterally confined, which is an advantage for thick layers of stone.

6.3.5 *GCL Without Cover Soil:*

6.3.5.1 GCL test pads can be constructed without additional cover soil, that is, only being covered by a geomembrane, to investigate moisture uptake, desiccation, panel separation, etc. Other test methods, as mentioned in 7.1, and testing procedures might be needed to be specified.

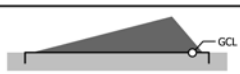
Location	Purpose	Longitudinal Cross Section
Above ground surface	Confirm a given design cross section	
Above ground surface	Investigate damage from various cover soil thicknesses	
Below ground surface	Confirm a given design cross section	
Below ground surface	Investigate damage from various cover soil thicknesses	

FIG. 1 Design of Test Pad Cross Sections