



Designation: D5889/D5889M – 18 (Reapproved 2022)

Standard Practice for Quality Control of Geosynthetic Clay Liners¹

This standard is issued under the fixed designation D5889/D5889M; 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 the manufacturing quality control of geosynthetic clay liners (GCLs), describing types of tests, the proper test methods, and the minimum testing frequencies.

1.2 This practice is intended to aid manufacturers, suppliers, purchasers, and users of GCLs in establishing a minimum level of effort for manufacturing quality control.

1.3 This practice does not address manufacturing quality assurance, product acceptance testing, or conformance testing. These are independent activities taken by organizations other than the GCL manufacturer.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

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

1.6 *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

D792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

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.

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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.

D882 Test Method for Tensile Properties of Thin Plastic Sheeting

D1505 Test Method for Density of Plastics by the Density-Gradient Technique

D4439 Terminology for Geosynthetics

D4632/D4632M Test Method for Grab Breaking Load and Elongation of Geotextiles

D5199 Test Method for Measuring the Nominal Thickness of Geosynthetics

D5261 Test Method for Measuring Mass per Unit Area of Geotextiles

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

D5890 Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners

D5891/D5891M Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners

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

D5994/D5994M Test Method for Measuring Core Thickness of Textured Geomembranes

D6243/D6243M Test Method for Determining the Internal and Interface Shear Strength of Geosynthetic Clay Liner by the Direct Shear Method

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

D6693/D6693M Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

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

2.2 *Government Document:*³

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

3. Terminology

3.1 *Definitions:*

3.1.1 *Geosynthetic Definitions:*

³ Available from U.S. Government Publishing Office, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.gpo.gov>.

3.1.1.1 *adhered geosynthetic clay liner (GCL), n*—GCL product in which the clay component is bonded to a film or membrane by adhesion.

3.1.1.2 *coated GCL, n*—GCL product with at least one layer of a synthetic substance applied to the GCL as a fluid and allowed to solidify.

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

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

3.1.1.5 *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.

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

3.1.1.7 *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.

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

3.1.1.9 *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.

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

3.1.2 *Organizational Definitions:*

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

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

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

3.1.2.4 *supplier, n*—the party who supplies material or services.

3.1.3 *Quality Definitions:*

3.1.3.1 *quality assurance (QA), n*—all those planned or systematic actions necessary to provide adequate confidence that a material, product, system, or service will satisfy given needs.

3.1.3.2 *quality control (QC), n*—a planned system of activities whose purpose is to provide a level of quality that meets the needs of users; also, the use of such a system.

3.2 For definitions of other terms, see Terminology D4439.

4. Significance and Use

4.1 GCLs must be properly manufactured in a manner consistent with a minimum level of quality control as determined by in-house testing of the final product. This practice suggests the types of tests, the methods of the testing, and the minimum testing frequencies.

4.2 It should be clearly recognized that manufacturers may perform additional tests or at greater frequency than required in this practice, or both. In this case, the manufacturer's quality control plan will then take precedence over this practice. The quoted tests and test methods in Table 1 must appear in the QC plan and the QC report.

4.3 It should also be recognized that purchasers and installers of GCLs may require additional tests or greater frequencies than called for in this practice, or both. The organization(s) producing such project-specific specification or quality assurance plan should recognize that such requirements are beyond the current state of the practice. If such a request is made by purchasers or installers, they should clearly communicate the requirements to the manufacturer or supplier during the contract decisions in order that disputes do not arise at a subsequent time.

5. Procedure

5.1 The procedure for this practice is embodied in Table 1.

5.1.1 The minimum recommended quality control tests for the manufacture of GCLs are given in Table 1. The tests are performed on the clay, the geosynthetic component material(s), and the finished GCL.

6. MQC Report

6.1 Report the following information:

6.1.1 Supplier's letter of certification or MQC data, or both,

6.1.2 Description or title of product MQC activity, or both,

6.1.3 Data of GCL production,

6.1.4 GCL roll numbers, brand name, and specific type,

6.1.5 Test results, and

6.1.6 Signature from person in charge for MQC report.

7. Keywords

7.1 geosynthetic clay liners; geosynthetics; manufacturing quality control; multicomponent GCLs; testing