Designation: D5891 – 02

Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners[1]

This standard is issued under the fixed designation D5891; 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 test method covers an index method that enables the evaluation of fluid loss properties of a clay mineral film deposited on a filter paper from a 6 % solids slurry of clay mineral at 100-psi (-kPa) pressure as a measure of its usefulness for permeability or hydraulic conductivity reduction in geosynthetic clay liners (GCL).

1.2 This test method is adapted from American Petroleum Institute drilling fluid specifications for bentonite.

1.3 Powdered clay mineral is tested as produced; granular clay mineral should be ground to 100 % passing a 100 mesh U.S. Standard Sieve with a minimum of 65 % passing a 200 mesh U.S. Standard Sieve with the whole ground product used for testing.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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]

2. Referenced Documents

2.1 *ASTM Standards:*[3]

D1193 Specification for Reagent Water

E1 Specification for ASTM Liquid-in-Glass Thermometers

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E725 Test Method for Sampling Granular Carriers and Granular Pesticides

2.2 *API Standards:*

API RP 131, Recommended Practice for Laboratory Testing of Drilling Fluids[4]

API Specification 13A, 4, 14th ed. for Drilling Fluid Materials[4]

3. Terminology

3.1 *Definitions*— For definitions of terms used in this test method, refer to API Standards and ASTM definitions for GCL products.

4. Significance and Use

4.1 Clay mineral is the functional component of GCL that reduces the hydraulic conductivity of industrial waste or ground water through the liner.

4.2 Clay mineral quality can vary significantly and effect the hydraulic conductivity of the GCL composite. This test method evaluates a significant property of clay mineral that relates to performance.

5. Apparatus

5.1 *Laboratory Balance*, 100 g capacity, ±0.01-g accuracy and precision.

5.2 *Weighing Paper*, or small weighing dish.

5.3 *Graduated Cylinder*, 500 ± 5-mL graduated TD (to deliver) with 10-mL subdivisions, Class A volumetrically calibrated; 10 ± 0.1-mL graduated cylinder, graduated TC (to contain) with 0.1-mL subdivisions.

5.4 *U.S. Standard Sieve*, 100 mesh, 200 mesh, and automated sieve shaker.

5.5 *Mortar and Pestle or Laboratory Hammer Mill*, for grinding clay mineral to required particle sizing.

5.6 *ASTM Calibration Immersion Thermometer*, 0 to 105 ± 0.5°C (see Specification E1).

5.7 *Mixer*—11 000 ± 300 rpm under load with single sine-wave impeller approximately 25 mm (1.0 in.) in diameter[5] (mounted flash side up). The impeller shall be replaced when it weighs a minimum of 5.1 g, from an original weight of about 5.5 g. New blades will be weighed prior to installation in order to ensure conformance to manufacturing criteria. Mixer speed

[1] This test method 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] When bentonite is removed from a GCL product for testing, it may include adhesives that can influence test results.

[3] 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.

[4] Available from American Petroleum Institute (API), 1220 L. St., NW, Washington, DC 20005-4070, http://www.api.org.

[5] For example, Sterling Multimixer Model 9B with 9B29X impeller blades available from Fann Instrument Co., P.O. Box 4350, Houston, TX 77210, has been found suitable for this purpose.