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Standard Guide for Measuring the Saturated Hydraulic Conductivity of Paper Industry Sludges[1]

This standard is issued under the fixed designation D7243; 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 Paper industry sludges are industrial by-products derived from wastewater treatment operations at plants associated with the manufacturing of paper. These sludges typically consist of clay and organic matter. They may also contain low levels of inorganic and organic contaminants and can be rich in microbes. Traditionally, paper industry sludges have been disposed in municipal solid waste landfills or solid waste monofills. However, in the interest of sustainability, applications are being developed where sludges can be used beneficially. One application is using sludge to construct hydraulic barriers (for example, for use in a landfill cap). Such applications generally require that the hydraulic conductivity of the sludge be measured.

1.2 Compacted paper industry sludges generally behave like soils and are amenable to geotechnical testing methods. However, several of their attributes require special attention during testing. Compacted industry sludges generally are highly compressible due to their organic component. Thus, their hydraulic conductivity can be more sensitive to the effective stress and hydraulic gradient applied during testing than most soils. The microbes in paper sludge can also produce gas during testing, confounding testing methods.

1.3 This guide is intended to supplement ASTM D5084, Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter. The purpose of the guide is to provide additional guidance on issues relevant to testing sludges using Test Methods D5084. The guide applies to specimens compacted in the laboratory using procedures such as those described in Test Methods D698 and D1557 or undisturbed specimens collected from the field using procedures such as Practice D1587 or Practice D7015.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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.* This standard contains a hazards section regarding the use of biocides (Section 10).

1.6 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document 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 ASTM standard 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 document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D698 Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft^3 (600 kN-m/m^3))

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

D1587 Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes

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

[1] This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.04 on Hydrologic Properties and Hydraulic Barriers.

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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.

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