



Standard Test Method for Measurement of Soil Potential (Suction) Using Filter Paper¹

This standard is issued under the fixed designation D5298; 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 laboratory filter papers as passive sensors to evaluate the soil matrix and total potential (suction), a measure of the free energy of the pore-water or tension stress exerted on the pore-water by the soil matrix (**1**, **2**).² The term potential or suction is descriptive of the energy status of soil water.

1.2 This test method controls the variables for measurement of the water content of filter paper that is in direct contact with soil or in equilibrium with the partial pressure of water vapor in the air of an airtight container enclosing a soil specimen. The filter paper is enclosed with a soil specimen in the airtight container until moisture equilibrium is established; that is, the partial pressure of water vapor in the air is in equilibrium with the vapor pressure of pore-water in the soil specimen.

1.3 This test method provides a procedure for calibrating different types of filter paper for use in evaluating soil matrix and total potential.

1.4 *Units*—The values stated in SI units are to be regarded as standard. The inch-pound units given in parentheses are mathematical conversions, which are provided for information purposes only and are not considered 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.*

2. Referenced Documents

2.1 ASTM Standards:³

C114 Test Methods for Chemical Analysis of Hydraulic Cement

¹ This test method 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.

Current edition approved Nov. 15, 2016. Published December 2016. Originally approved in 1992. Last previous edition approved in 2010 as D5298–10. DOI: 10.1520/D5298-16.

² The boldface numbers in parentheses refer to a list of references at the end of this standard.

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.

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D1125 Test Methods for Electrical Conductivity and Resistivity of Water

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

D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D4542 Test Methods for Pore Water Extraction and Determination of the Soluble Salt Content of Soils by Refractometer

D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing

D6836 Test Methods for Determination of the Soil Water Characteristic Curve for Desorption Using Hanging Column, Pressure Extractor, Chilled Mirror Hygrometer, or Centrifuge

E230/E230M Specification and Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples

E337 Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)

E832 Specification for Laboratory Filter Papers

E1137/E1137M Specification for Industrial Platinum Resistance Thermometers

E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

E2877 Guide for Digital Contact Thermometers

3. Terminology

3.1 Definitions:

3.1.1 For common definitions of technical terms in this standard, refer to Terminology **D653**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *atmosphere*—a unit of pressure equal to 76 cm Mercury or 101 kPa at 0°C.

3.2.2 *matric suction (potential), h_m (kPa)*—in geohydrology/hydrogeology, matric suction is the difference between the pore gas pressure, u_g , and the pore water pressure, u_w , in soil; that is, $y = u_g - u_w$, which yields a positive value in either pressure FL^{-2} or pressure head, L .

3.2.2.1 *Discussion*—In most cases the pore gas is air at