Designation: G51 – 95 (Reapproved 2012)

Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing[1]

This standard is issued under the fixed designation G51; 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 a procedure for determining the pH of a soil in corrosion testing. The principle use of the test is to supplement soil resistivity measurements and thereby identify conditions under which the corrosion of metals in soil may be accentuated (see G57–78(1984)).

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

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

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

G57 Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method

3. Significance and Use

3.1 Information on pH of soil is used as an aid in evaluating the corrosivity of a soil environment. Some metals are more sensitive to the pH of their environment than others, and information on the stability of a metal as a function of pH and potential is available in the literature.[3]

4. Apparatus

4.1 *pH Meters*—A portable, battery-powered pH meter is necessary for field measurements. Most instruments can also function as a high-impedance voltmeter. An LCD display is preferred for its readability in a bright, outdoor environment.

4.2 *Calomel and Glass Electrodes:*

4.2.1 Use a saturated calomel reference electrode or its equivalent in the pH determination. A few crystals of solid potassium chloride should always be present within the chamber surrounding the calomel to assure that the solution is saturated under the conditions of use. The design of the electrode must permit the formation of a fresh liquid junction between the solution of potassium chloride and the buffer or test soil for each test and allow traces of soil to be readily removed by washing.

4.2.2 A glass electrode of rugged construction is required. The performance of the glass electrode is satisfactory if it furnishes the correct pH value (±0.1 pH unit) for standard buffered solutions.

4.2.3 A combination electrode consisting of a saturated calomel reference electrode and a glass electrode (4.2.1 and 4.2.2) combined as a single electrode is acceptable. However, the requirements outlined above are equally applicable to the electrodes used in this combination unit.

4.3 *Subsurface Probe*—When pH measurements below the surface of the soil are required, it is necessary to use a probe of suitable length which will allow measurements to be made at the depth of interest. This probe consists of a glass electrode or a combination electrode in a rubber housing at the end of a plastic tube. One type of probe is illustrated in Fig. 1.

4.4 *Soil Thermometer*—Some pH electrodes have temperature compensation built in as part of the pH electrode, but most

[1] This test method is under the jurisdiction of ASTM Committee G01 on Corrosion of Metals and is the direct responsibility of Subcommittee G01.10 on Corrosion in Soils.

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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.

[3] Pourbaix, M., Atlas of Electrochemical Equilibria in Aqueous Solutions, Pergamon Press, 1966.