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.

Designation: D5912 – 20

Standard Practice for (Analytical Procedure) Determining Hydraulic Conductivity of an Unconfined Aquifer by Overdamped Well Response to Instantaneous Change in Head (Slug)[1]

This standard is issued under the fixed designation D5912; 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 determination of hydraulic conductivity from the measurement of inertial force free (overdamped) response of a well-aquifer system to a sudden change in water level in a well. Inertial force free response of the water level in a well to a sudden change in water level is characterized by recovery to initial water level in an approximate exponential manner with negligible inertial effects.

1.2 The analytical procedure in this practice is used in conjunction with the field procedure in Test Method D4044/D4044M for collection of test data.

1.3 *Limitations*—Slug tests are considered to provide an estimate of hydraulic conductivity. The determination of storage coefficient is not practicable with this practice. Because the volume of aquifer material tested is small, the values obtained are representative of materials very near the open portion of the control well.

NOTE 1—Slug tests are usually considered to provide estimates of the lower limit of the actual hydraulic conductivity of an aquifer because the test results are so heavily influenced by well efficiency and borehole skin effects near the open portion of the well. The portion of the aquifer that is tested by the slug test is limited to an area near the open portion of the well where the aquifer materials may have been altered during well installation, and therefore may significantly impact the test results. In some cases, the data may be misinterpreted and result in a higher estimate of hydraulic conductivity. This is due to the reliance on early time data that is reflective of the hydraulic conductivity of the filter pack surrounding the well. This effect was discussed by Bouwer (**1**).[2] In addition, because of the reliance on early time data, in aquifers with medium to high hydraulic conductivity, the early time portion of the curve that is useful for this data analyses is too short (for example, <10 s) for accurate measurement; therefore, the test results begin to greatly underestimate the true hydraulic conductivity.

1.4 *Units*—The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard. Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard.

1.5 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.5.1 The procedures used to specify how data are collected/recorded and calculated in the standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of these test methods to consider significant digits used in analysis methods for engineering data.

1.6 This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of the practice 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 the 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 he ASTM consensus process.

1.7 *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.*

1.8 *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.*

[1] This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.21 on Groundwater and Vadose Zone Investigations.

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

***A Summary of Changes section appears at the end of this standard**

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