



Designation: D 4044 – 96 (Reapproved 2002)

## Standard Test Method (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers<sup>1</sup>

This standard is issued under the fixed designation D 4044; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the field procedure for performing an in situ instantaneous change in head (slug) test.

1.2 This test method is used in conjunction with an analytical procedure such as Test Method D 4104 to determine aquifer properties.

1.3 The values stated in the SI units are to be regarded as standard.

1.4 *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:

D 653 Terminology Relating to Soil, Rock, and Contained Fluids<sup>2</sup>

D 4043 Guide for Selection of Aquifer-Test Method in Determination of Hydraulic Properties by Well Techniques<sup>2</sup>

D 4104 Test Method (Analytical Procedure) for Determining Transmissivity of Confined Nonleaky Aquifers by Overdamped Well Response to Instantaneous Change in Head (Slug Test)<sup>2</sup>

D 4750 Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)<sup>2</sup>

D 5785 Test Method for (Analytical Procedure) for Determining Transmissivity of Confined Nonleaky Aquifers by Underdamped Well Response to Instantaneous Change in Head (Slug Test)<sup>3</sup>

D 5881 Test Method (Analytical Procedure) for Determining Transmissivity of Confined Nonleaky Aquifers by Critically Damped Well Response to Instantaneous Change in Head (Slug Test)<sup>3</sup>

D 5912 Test Method (Analytical Procedure) for Determining Hydraulic Conductivity of an Unconfined Aquifer by Overdamped Well Response to Instantaneous Change in Head (Slug Test)<sup>3</sup>

### 3. Terminology

#### 3.1 Definitions: Definitions:

3.1.1 *control well*—well by which the aquifer is stressed, for example, by pumping, injection, or change of head.

3.1.2 *hydraulic conductivity*—(*field aquifer tests*), the volume of water at the existing kinematic viscosity that will move in a unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

3.1.3 *observation well*—a well open to all or part of an aquifer.

3.1.4 *overdamped-well response*—characterized by the water level returning to the static level in an approximately exponential manner following a sudden change in water level. (See for comparison *underdamped well*.)

3.1.5 *slug*—a volume of water or solid object used to induce a sudden change of head in a well.

3.1.6 *storage coefficient*—the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. For a confined aquifer, it is equal to the product of specific storage and aquifer thickness. For an unconfined aquifer, the storage coefficient is approximately equal to the specific yield.

3.1.7 *transmissivity*—the volume of water at the existing kinematic viscosity that will move in a unit time under a unit hydraulic gradient through a unit width of the aquifer.

3.1.8 *underdamped-well response*—characterized by the water level oscillating about the static water level following a sudden change in water level. (See for comparison *overdamped well*.)

3.1.9 For definitions of other terms used in this test method, refer to Terminology D 653.

### 4. Summary of Test Method

4.1 This test method describes the field procedures involved in conducting an instantaneous head (slug) test. The slug test method involves causing a sudden change in head in a control well and measuring the water level response within that control

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.21 on Ground Water and Vadose Zone Investigations.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.08.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.09