



Designation: D6034 – 17

Standard Test Method (Analytical Procedure) for Determining the Efficiency of a Production Well in a Confined Aquifer from a Constant Rate Pumping Test¹

This standard is issued under the fixed designation D6034; 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 describes an analytical procedure for determining the hydraulic efficiency of a production well in a confined aquifer. It involves comparing the actual drawdown in the well to the theoretical minimum drawdown achievable and is based upon data and aquifer coefficients obtained from a constant rate pumping test.

1.2 This analytical procedure is used in conjunction with the field procedure, Test Method **D4050**.

1.3 The values stated in inch-pound units are to be regarded as standard, except as noted below. The values given in parentheses are mathematical conversions to SI units, which are provided for information only and are not considered standard.

1.3.1 The gravitational system of inch-pound units is used when dealing with inch-pound units. In this system, the pound (lbf) represents a unit of force (weight), while the unit for mass is slugs.

1.4 *Limitations*—The limitations of the technique for determination of well efficiency are related primarily to the correspondence between the field situation and the simplifying assumption of this test method.

1.5 All observed and calculated values shall conform to the guidelines for significant digits and round established in Practice **D6026**, unless superseded by this standard.

1.5.1 The procedures used to specify how data are collected/recorded or calculated, in this 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 this standard to consider significant digits used in analysis method for engineering design.

1.6 *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

D653 Terminology Relating to Soil, Rock, and Contained Fluids

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

D4050 Test Method for (Field Procedure) for Withdrawal and Injection Well Testing for Determining Hydraulic Properties of Aquifer Systems

D5521 Guide for Development of Groundwater Monitoring Wells in Granular Aquifers

D6026 Practice for Using Significant Digits in Geotechnical Data

3. Terminology

3.1 *Definitions*—For definitions of common terms used in this test method, see Terminology **D653**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *well efficiency, n* —the ratio, usually expressed as a percentage, of the measured drawdown inside the control well divided into the theoretical drawdown which would occur in the aquifer just outside the borehole if there were no drilling damage, that is, no reduction in the natural permeability of the sediments in the vicinity of the borehole.

3.3 Symbols:

3.3.1 Symbols and Dimensions:

3.3.2 K —hydraulic conductivity [LT^{-1}].

¹ 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 Groundwater and Vadose Zone Investigations.

Current edition approved Jan. 1, 2017. Published January 2017. Originally approved in 1996. Last previous edition approved in 2010 as D6034–96(2010) ^{ϵ 1}. DOI: 10.1520/D6034-17.

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.

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