



Standard Guide for Methods for Measuring Well Discharge¹

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1. Scope

1.1 This guide covers an overview of methods to measure well discharge. This guide is an integral part of a series of standards prepared on the in-situ determination of hydraulic properties of aquifer systems by single- or multiple-well tests. Measurement of well discharge is a common requirement to the determination of aquifer and well hydraulic properties.

1.2 This guide does not establish a fixed procedure for any method described. Rather, it describes different methods for measuring discharge from a pumping or flowing well. A pumping well is one type of control well. A control well can also be an injection well or a well in which slug tests are conducted.

1.3 This guide does not address borehole flow meters that are designed for measuring vertical or horizontal flow within a borehole.

1.4 The values stated in SI units are to be regarded as 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.* Furthermore, it is the user's responsibility to properly dispose of water discharged.

1.6 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide 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 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 the ASTM consensus process.*

2. Referenced Documents

2.1 ASTM Standards:

¹ This guide 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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D 653 Terminology Relating to Soil, Rock, and Contained Fluids²

D 1941 Test Method for Open Channel Flow Measurement of Water with the Parshall Flume³

D 4043 Guide for Selection of Aquifer-Test Method in Determining Hydraulic Properties by Well Techniques⁴

D 5242 Test Method for Open-Channel Flow Measurement of Water Indirectly at Culverts³

D 5390 Test Method for Open Channel Flow Measurement with Palmer-Bowls Flumes⁵

D 5716 Test Method to Measure the Rate of Well Discharge by Circular Orifice Weir

2.2 ISO Standard:

Recommendation R541 Measurement of Fluid Flow by Means of Orifice Plates and Nozzles⁶

2.3 ANSI Standard:

Standard 1042 Part 1 Methods for the Measurement of Fluid Flow in Pipes, 1, Orifice Plates, Nozzles and Venturi Tubes⁶

2.4 ASME Standard:

Standard MFC-3M-1989 Measurement of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi⁷

3. Terminology

3.1 Definitions:

3.1.1 *conceptual model*—an interpretation or description of the characteristics, interactions, and dynamics of a physical system.

3.1.2 *control well*—a well by which the head and flow in the aquifer is changed, by pumping, injection, or imposing a change of head.

3.1.3 *discharge*—or rate of flow, is the volume of water that passes a particular reference section in a unit of time.

3.1.4 *totalizing flow meter*—a flow meter that indicates the cumulative flow displayed as a volume. The flow rate is calculated based on the time between two readings.

3.2 For definitions of other terms used in this guide, see Terminology D 653.

² *Annual Book of ASTM Standards*, Vol 04.03.

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 04.08.

⁵ *Annual Book of ASTM Standards*, Vol 11.02.

⁶ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁷ Available from American Society of Mechanical Engineers, 345 E. 47th Street, New York, NY 10017.