



Designation: D5389 – 93 (Reapproved 2019)

Standard Test Method for Open-Channel Flow Measurement by Acoustic Velocity Meter Systems¹

This standard is issued under the fixed designation D5389; 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 the measurement of flow rate of water in open channels, streams, and closed conduits with a free water surface.

1.2 The test method covers the use of acoustic transmissions to measure the average water velocity along a line between one or more opposing sets of transducers—by the time difference or frequency difference techniques.

1.3 The values stated in SI units are to be regarded as the 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Section 6.

1.5 *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.*

2. Referenced Documents

2.1 ASTM Standards:²

[D1129 Terminology Relating to Water](#)

[D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water](#)

[D3850 Test Method for Rapid Thermal Degradation of Solid Electrical Insulating Materials By Thermogravimetric Method \(TGA\)](#)

¹ This test method is under the jurisdiction of ASTM Committee [D19](#) on Water and is the direct responsibility of Subcommittee [D19.07](#) on Sediments, Geomorphology, and Open-Channel Flow.

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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.

[D3858 Test Method for Open-Channel Flow Measurement of Water by Velocity-Area Method](#)

2.2 ISO Standard:³

[ISO 6416 Liquid Flow Measurements in Open Channels—Measurement of Discharge by the Ultrasonic \(Acoustic\) Method](#)

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this standard, refer to Terminology [D1129](#).

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *acoustic path, n*—the straight line between the centers of two acoustic transducers.

3.2.2 *acoustic path length, n*—the face-to-face distance between transducers on an acoustic path.

3.2.3 *acoustic transducer, n*—a device that is used to generate acoustic signals when driven by an electric voltage, and conversely, a device that is used to generate an electric voltage when excited by an acoustic signal.

3.2.4 *acoustic travel time, n*—the time required for an acoustic signal to propagate along an acoustic path, either upstream or downstream.

3.2.5 *discharge, n*—the rate of flow expressed in units of volume of water per unit of time. The discharge includes any sediment or other materials that may be dissolved or mixed with it.

3.2.6 *line velocity, n*—the downstream component of water velocity averaged over an acoustic path.

3.2.7 *measurement plane, n*—the plane formed by two or more parallel acoustic paths of different elevations.

3.2.8 *path velocity, n*—the water velocity averaged over the acoustic path.

3.2.9 *stage, n*—the height of a water surface above an established (or arbitrary) datum plane; also gage height.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.