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Standard Practice for OPEN CHANNEL FLOW MEASUREMENT BY ACOUSTIC MEANS¹

This standard is issued under the fixed designation D 4408; 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 measurement of flow rate of water in open channels, streams, and closed conduits that are not flowing full.

1.2 This practice is applicable to flow rate measurement in all size channels and conduits. However, limitations of applications apply in some cases (see Section 6).

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Applicable Documents

2.1 ASTM Standards:

D 1129 Definitions of Terms Relating to Water²

D 3857 Practice for Measurement of Water Velocity in Open Channels by Acoustic Means²

D 3858 Practice for Open-Channel Flow Measurement of Water by Velocity-Area Method²

2.2 ISO Standards:

ISO 555 Liquid Flow Measurement in Open Channels—Dilution Methods for Measurement of Steady Flow—Constant Rate Injection Method³

3. Terminology

3.1 *Descriptions of Terms Specific to This Standard:*

3.1.1 *acoustic path*—the straight line between

the centers of two acoustic transducers.

3.1.2 *acoustic path length*—the face-to-face distance between transducers on an acoustic path.

3.1.3 *acoustic transducer*—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.

3.1.4 *acoustic traveltime*—the time required for an acoustic signal to propagate along an acoustic path, either upstream or downstream.

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

3.1.6 *line velocity*—the downstream water velocity averaged over an acoustic path.

3.1.7 *measurement plane*—the plane formed by two or more parallel acoustic paths at different elevations.

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

3.1.9 *velocity sampling*—means of obtaining line velocities in a measurement plane that are suitable for determining flow rate by a velocity-area integration.

¹ This practice is under the jurisdiction of ASTM Committee D-19 on Water and is the direct responsibility of Subcommittee D19.03 on Sampling of Water and Water-Formed Deposits, and Surveillance of Water.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ Available from 1 Rue de Varembe, Case Postale 56, CH-1211, Geneva 20, Switzerland.