



Standard Test Method for Open Channel Flow Measurement of Water with the Parshall Flume¹

This standard is issued under the fixed designation D1941; 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 measurement of the volumetric flowrate of water and wastewater in open channels with the Parshall flume.

1.1.1 Information related to this test method can be found in ISO 1438 and ISO 4359.

1.2 *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

D1129 Terminology Relating to Water

D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water

D3858 Test Method for Open-Channel Flow Measurement of Water by Velocity-Area Method

2.2 ISO Standards:³

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

ISO 1438 Liquid Flow Measurement in Open Channels Using Thin-Plate Weirs and Venturi Flumes

ISO 4359 Liquid Flow Measurement in Open Channels—Rectangular Trapezoidal and U-shaped Flumes

3. Terminology

3.1 *Definitions:* For definitions of terms used in this test method, refer to Terminology D1129.

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.

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

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *free flow*—a condition where the flowrate is governed by the state of flow at the crest overfall and hence can be determined from a single upstream depth measurement.

3.2.2 *head*—the height of a liquid above a specified point; that is, the flume crest.

3.2.3 *hydraulic jump*—an abrupt transition from supercritical to subcritical flow, accompanied by considerable turbulence or gravity waves, or both.

3.2.4 *normal depth*—the uniform depth of flow for a given flowrate in a long open channel of specific shape, roughness, and slope.

3.2.5 *primary instrument*—the device (in this case, the flume) that creates a hydrodynamic condition that can be sensed by the secondary instrument.

3.2.6 *scow float*—an in-stream flat for depth sensing usually mounted on a hinged cantilever.

3.2.7 *secondary instrument*—in this case, a device which measures the depth of flow at an appropriate location in the flume. The secondary instrument may also convert the measured depth to an indicated flow rate.

3.2.8 *stilling well*—a small reservoir connected through a constricted passage to the main channel, that is, the flume, so that a depth measurement can be made under quiescent conditions.

3.2.9 *subcritical flow*—open channel flow at a velocity less than the velocity of gravity waves in the same depth of water. Subcritical flow is affected by downstream conditions, since disturbances are able to travel upstream.

3.2.10 *submerged flow*—a condition where the water stage downstream of the flume is sufficiently high to affect the flow over the flume crest and hence the free-flow depth-discharge relation no longer applies and discharge depends on two head measurements.

3.2.11 *supercritical flow*—open channel flow at a velocity greater than that of gravity waves in the same depth, so disturbances cannot travel upstream, and downstream conditions do not affect the flow.

3.2.12 *throat*—the constriction in a flume.