



Designation: D3154 – 14 (Reapproved 2023)

Standard Test Method for Average Velocity in a Duct (Pitot Tube Method)¹

This standard is issued under the fixed designation D3154; 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 measurement of the average velocity of a gas stream for the purpose of determining gas flow in a stack, duct, or flue. Although technically complex, it is generally considered the most accurate and often the only practical test method for taking velocity measurements.

1.2 This test method is suitable for measuring gas velocities above 3 m/s (10 ft/s).

1.3 This test method provides procedures for determining stack gas composition and moisture content.

1.4 The values stated in SI units are to be regarded as standard. The inch-pound units given in parentheses are for information only.

1.5 This test method is applicable to conditions where steady-state flow occurs, and for constant fluid conditions, where the direction of flow is normal to the face tube opening of the pitot tube employed in the method. The method cannot be used for direct measurement when cyclonic or swirling flow conditions are present.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *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.*

¹ This test method is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.03 on Ambient Atmospheres and Source Emissions.

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2. Referenced Documents

2.1 ASTM Standards:²

D1071 Test Methods for Volumetric Measurement of Gaseous Fuel Samples

D1193 Specification for Reagent Water

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D3195 Practice for Rotameter Calibration

D3631 Test Methods for Measuring Surface Atmospheric Pressure

D3685/D3685M Test Methods for Sampling and Determination of Particulate Matter in Stack Gases

D3796 Practice for Calibration of Type S Pitot Tubes

D6522 Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers

E337 Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures)

E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

2.2 EPA Standards:³

EPA-600/9-76-005 Quality Assurance Handbook for Air Pollution Measurement Systems. Vol I. Principles

EPA-600/4-77-027b Quality Assurance Handbook for Air Pollution Measurement Systems. Vol III. Stationary Source Specific Methods

2.3 ASME Performance Test Code Standards:⁴

PTC 19.10-1968 Flue and Exhaust Gas Analysis

PTC 19.10-1981 Part 10, Flue and Exhaust Measurements: Instruments and Apparatus

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 U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

⁴ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.