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ANSI/ASHRAE Standard 41.7-2025
Standard Methods for Gas Flow Measurement

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NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

Selecting an appropriate gas flowmeter can be a daunting task given the wide variety of operating principles, measurement precision, and costs of commercial products. Whether gas flow measurements are to be taken in a laboratory or in the field, selecting the appropriate meter should be based on the required measurement accuracy. Once a gas flowmeter has been selected, the user may need to consult with the meter manufacturer regarding installation specifics, operating range limits, calibration limits, and other similar specifics in order to obtain the expected measurement accuracy. Safety is an important consideration for all procedures involving gases, particularly regarding flammability, toxicity, and corrosiveness—wear safety glasses and other personal protection equipment.

The 2025 edition of ANSI/ASHRAE Standard 41.7 makes it easier for the higher-tier ASHRAE standards to adopt this standard by reference, updates the steady-state criteria requirements, and includes a new uncertainty example prepared in accordance with the latest uncertainty methods. This standard meets ASHRAE's mandatory language requirements.

1. PURPOSE

This standard prescribes methods for gas flow measurement.

2. SCOPE

This standard applies to laboratory and field gas flow measurement for testing heating, ventilating, air-conditioning, and refrigerating systems and components. This standard is restricted to applications where the entire flow stream of gas enters and exits the gas flowmeter in a gas-only state during data recording with the following exceptions:

a. This standard does not apply to airflow measurements at pressures within this range: –25 kPa to +25 kPa (–100 in. of water to +100 in. of water) referenced to ambient pressure. Those measurements are within the scope of ANSI/ASHRAE Standard 41.2.[1]
b. This standard does not apply to fan performance rating airflow measurements. Those measurements are within the scope of ANSI/ASHRAE Standard 51.[2]
c. This standard does not apply to gaseous-phase refrigerant mass flow measurements where the gas flow includes circulating lubricant. Those measurements are within the scope of ANSI/ASHRAE Standard 41.10.[3]

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3. DEFINITIONS

The following definitions apply to the terms used in this standard.

accuracy: the degree of conformity of an indicated value to the true value.

error: the difference between the test result and its true value.

geometrically equivalent diameter: the diameter of a circle having the same area as a noncircular gas flow area.

hydraulic diameter: four times the gas flow area divided by the perimeter of the solid boundary in contact with the gas.

measurement system: the instruments, signal conditioning systems (if any), and data acquisition system (if any).

operating tolerance limit: the upper or lower value of an operating tolerance that is associated with a test point or a targeted set point.

post-test uncertainty: an analysis to establish the uncertainty of a test result after conducting the test.

pretest uncertainty: an analysis to establish the expected uncertainty for a test result before conducting the test.

random error: the portion of the total error that varies randomly in repeated measurements of the true value throughout a test process.

steady-state criteria: the criteria that establish negligible change of gas flow with time.

systematic error: the portion of the total error that remains constant in repeated measurements of the true value throughout a test process.