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**ANSI/ASHRAE Standard 41.7-2021**  
**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](http://www.ashrae.org/technology).

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## FOREWORD

*This 2021 revision of ASHRAE Standard 41.7 includes an update of the steady-state criteria for recording data. This standard meets ASHRAE's mandatory language requirements.*

*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.*

## 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 ASHRAE Standard 41.2.
- b. This standard does not apply to fan performance testing airflow measurements. Those measurements are within the scope of ASHRAE Standard 1.
- 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 ASHRAE Standard 41.10.

## 3. DEFINITIONS

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

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

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

**geometrically equivalent diameter:** the diameter of a circle having the same area as a rectangular 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.

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

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

**targeted set point:** a specific set of test conditions where the required gas mass flow rate is known and has an associated operating tolerance.

**test point:** a specific set of test operating conditions for recording data where the measured required gas mass flow rate is unknown and has an associated operating tolerance.