



STANDARD

ANSI/ASHRAE Standard 41.2-2018
(Supersedes ANSI/ASHRAE Standard 41.2-1987)

Standard Methods for Air Velocity and Airflow 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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FOREWORD

This 2018 revision of the 1987 edition of Standard 41.2 (reaffirmed in 1992) incorporates air velocity measurements in addition to airflow measurements, and the scope has been broadened to include field test measurements in addition to laboratory measurements. New sections have been added regarding the test requirements, measurement uncertainty calculations, and test report. Several airflow measurement methods have been included in addition to those found in the previous edition. Nozzle airflow measurement test requirements and calculations have been updated.

This revision meets ASHRAE's mandatory language requirements. Users of this standard seeking to measure fan airflow rates should also reference ASHRAE Standard 51/AMCA 210, which is used for determining a fan's aerodynamic performance in terms of airflow rate, pressure developed, power consumption, air density, speed of rotation, and efficiency.

1. PURPOSE

This standard prescribes methods for air velocity and airflow measurement, including consideration of density effects.

2. SCOPE

This standard applies to air velocity and airflow measurement for testing heating, ventilating, air conditioning, and refrigerating systems and components at pressures within the range

of -25 to $+25$ kPa (-100 to $+100$ in. of water) referenced to atmospheric pressure.

3. DEFINITIONS AND SYMBOLS

3.1 Definitions

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

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

geometrically equivalent diameter: the diameter of a round duct having the same area as a duct that is not round.

hydraulic diameter, D_h : four times the airflow area divided by the perimeter of the solid boundary in contact with the air.

measurement system: the instruments, signal conditioning systems, and data acquisition system.

sample size: the number of individual measured values in a sample.

test chamber: an airflow measuring apparatus that has a chamber diameter that is greater than twice the unit under test (UUT) duct diameter or geometrically equivalent diameter.

test duct: an airflow measuring apparatus that has a constant diameter throughout its length except for transition portions at one or both ends.

test point: a specific set of test conditions and tolerances for recording data.

true value: unknown, error-free value of a test result.

uncertainty: a measure of the potential error in a measurement or experimental result that reflects the lack of confidence in the result to a specified level.

unit under test (UUT): equipment that is the subject of airflow or air velocity measurements.

3.2 Symbols and Subscripts. Table 3-1 lists symbols and subscripts that appear in this standard.

Table 3-1 Symbols and Subscripts Used in Standard 41.2-2018

| Symbol | Description | Units (SI) | Units (I-P) |
|--------|---|------------------|-----------------------------|
| A | area of cross section | m^2 | ft^2 |
| C | nozzle discharge coefficient | dimensionless | |
| C_p | constant-pressure specific heat | $J/(kg \cdot K)$ | $Btu/(lb_m \cdot ^\circ F)$ |
| C_v | constant-volume specific heat | $J/(kg \cdot K)$ | $Btu/(lb_m \cdot ^\circ F)$ |
| D_E | geometrically equivalent diameter | m | ft |
| D_h | hydraulic diameter | m | ft |
| d | nozzle throat diameter | m | ft |
| d_f | fringe spacing | m | ft |
| d_L | largest nozzle throat diameter in a multiple-nozzle chamber | m | ft |
| f | coefficient of friction | dimensionless | |
| f_d | drag force | N | lb_f |
| f_D | Doppler burst frequency | s^{-1} | Hz |