



**STANDARD**

**ANSI/ASHRAE Standard 120-2017**  
(Supersedes ANSI/ASHRAE Standard 120-2008)

# **Method of Testing to Determine Flow Resistance of HVAC Ducts and Fittings**

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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

First published in 1999, ASHRAE Standard 120 establishes uniform methods of laboratory testing of HVAC ducts and fittings to determine their resistance to airflow. The fitting losses, which are reported as local loss coefficients, are used to update and refine the ASHRAE Duct Fitting Database. To date, at least eight research projects have used the test methods of Standard 120 to improve this database. The significant change to this edition of the standard is that the length upstream of the test duct or fitting was increased from 10 to 15 hydraulic diameters.

## 1. PURPOSE

This standard establishes uniform methods of laboratory testing of HVAC ducts and fittings to determine their resistance to airflow.

## 2. SCOPE

**2.1** This standard may be used to determine the change in total pressure resulting from airflow in HVAC ducts and fittings.

**2.2** The test results can be used to determine duct flow losses in pressure loss per unit length. Fitting losses are reported as local loss coefficients.

**2.3** This standard does not cover interpretation of test data.

## 3. DEFINITIONS, SYMBOLS, AND SUBSCRIPTS

### 3.1 Definitions

**accuracy:** the degree of conformity of an indicated value to an accepted standard value or true value. The degree of inaccuracy is known as “total measurement error” and is the sum of bias error and precision error.

**bias error (systematic error):** the difference between the true or actual value to be measured and the indicated value from the measuring system that persists and is usually due to the particular instrument or technique of measurement. These errors can be corrected through calibration.

**confidence level:** the probability that a stated interval will include the true value. In analyzing experimental data, a level of 95% is usually used.

**duct, flexible:** any duct constructed of flexible materials, such as polymeric films, metal foils, and impregnated fabrics.

**duct, rigid:** any duct constructed of rigid materials, such as metal and fiberglass duct board.

**error:** the difference between the true value of the quantity measured and an observed value. Because the true value is

often not known, it is estimated by the mean. The difference between the mean and the observed value is often called its “deviation.” All errors can be classified as one of two types: bias error or random error.

**flow area, fitting inlet:** the measured total inside area determined at the plane(s) of the inlet connection(s). The area shall be based on physical measurements for rigid fittings and physical measurements minus twice the lining thickness for lined fittings.

**flow area, fitting outlet:** the total inside area determined at the plane(s) of the outlet connection(s). The area shall be based on physical measurements for rigid fittings and physical measurements minus twice the lining thickness for lined fittings.

**flow area, flexible duct:** the area calculated using the nominal inside dimensions supplied by the duct manufacturer.

**flow area, lined duct:** the area calculated by subtracting the cross-sectional area of the liner from the flow area of the rigid duct envelope. The duct flow area shall be calculated from measured inside dimensions of the rigid duct envelope. For fully lined ducts, the nominal area is that calculated by reducing the cross-sectional dimensions of the rigid duct by twice the nominal liner thickness. The envelope dimensions shall be measured at a minimum of three representative sections of the test duct.

**flow area, rigid duct:** the area calculated by using the average inside duct dimensions determined by measurement of a minimum of three representative sections of the duct envelope.

**precision:** the closeness of agreement among repeated measurements of the same characteristic by the same method under the same conditions.

**pressure loss:** the decrease in total pressure due to friction and turbulence. It is a measure of the mechanical energy lost by the flow per unit volume of the fluid.

**random error (precision error):** a statistical error that is caused by chance and is not recurring.

**static pressure:** pressure that exists only by virtue of the degree of compression. If expressed as gage pressure, it may be negative or positive.

**test:** a complete series of test points defining the flow behavior over a selected range of velocities.

**test air density:** the density of the air entering the test duct or fitting.

**test flow rate:** the volumetric flow rate entering the test duct or fitting at the test air density.

**test pressure determination:** a complete set of measurements required to determine the total pressure loss at a test point.

**test pressure loss:** the differential in total pressure between the inlet and the outlet sections of a test duct or across a test fitting. For test fittings, the fitting is assumed to have zero length. For multiflow fittings, the total pressure loss shall be determined for each stream separately.

**test system:** the prescribed flow rate measurement system and prescribed test setup for the duct or fitting test.