

ANSI/ASHRAE Standard 120-2008
(Supersedes ANSI/ASHRAE Standard 120-1999)



ASHRAE STANDARD

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

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NOTE

When addenda, interpretations, or errata to this standard have been approved, they can be downloaded free of charge from the ASHRAE Web site at www.ashrae.org.

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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 six research projects have used the test methods of Standard 120 to improve this database.

This revision of the standard was undertaken primarily to correct some errors in the original edition of the standard and clarify its language in places.

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. Refer to *ASHRAE Terminology of HVAC&R*¹ for the definitions of terms not shown in this section.

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.

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.

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.

static pressure: pressure that exists only by virtue of the degree of compression. If expressed as gauge 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 multi-flow 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.

total pressure: the sum of the static pressure and the velocity pressure. It is a measure of the mechanical energy per unit volume of the air. Air at rest has a total pressure equal to its static pressure.

velocity pressure: the kinetic energy of the air motion expressed in pressure units. It is always positive.

3.2 Symbols and Subscripts

3.2.1 Symbols

Symbol	Description	Units
A_n	Nozzle throat area	m^2
A_o	Orifice area	m^2
A	Cross-sectional area	m^2
C	Loss coefficient	dimensionless
C_b	Branch loss coefficient	dimensionless
C_n	Nozzle discharge coefficient	dimensionless
C_o	Orifice discharge coefficient	dimensionless
C_s	Main loss coefficient	dimensionless
c_p	Specific heat at constant pressure	J/(kg·K)