ASHRAE® SMACNA STANDARD

Method of Testing HVAC Air Ducts

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Approved American National Standard

ANSI

Cosponsored by

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ANSI/ASHRAE/SMACNA Standard 126-2000
Method of Testing HVAC Air Ducts

(This foreword is not part of this standard but is included for information purposes only.)

FOREWORD

The standards project committee SPC 126 was formed to develop standardized methods of testing to determine the strength and durability characteristics of HVAC ducts under various loading and environmental conditions. To the committee's knowledge, no other publication covers all of the structural and durability tests as comprehensively as this standard, although individual tests are covered under other standards. The intent of this standard is to cover any duct shape and material.

A standardized set of comprehensive tests can be used to make sure products meet minimum structural requirements, as well as to allow products to be compared to each other. Such tests should simulate structural stresses that the duct will see in service and facilitate the application of safety factors. These tests include pressurizing the ductwork, applying superimposed loads, dropping weighted implements for impact or puncture, applying tension to the duct, bending flexible duct 180 degrees, temperature and humidity, and bursting or collapsing the ductwork under pressure. Leakage tests after an individual test or a series of tests may be conducted to determine the effect of a structural or durability test on a specimen. During a test or series of tests, the ductwork is observed to determine if there is degradation and permanent damage.

Pass/fail criteria are determined by the sponsoring agency, code officials, or other users of this standard. Recommended Acceptance Criteria are given in Annex C.

1. PURPOSE

This standard provides laboratory test procedures for the evaluation of HVAC air ducts.

2. SCOPE

2.1 This standard may be used to determine HVAC air duct structural strength, dimensional stability, durability, and leakage characteristics.

2.2 This standard does not cover

a. effects of aerosols, solid particulates, corrosive environments, or combustibility,
b. long-term effects,
c. seismic qualifications,
d. underground ducts,
e. plenums and equipment casings, or
f. ductwork supports.

3. DEFINITIONS

Note: Definition of terms used in this standard may be found in *ASHRAE Terminology of Heating, Ventilation, Air Conditioning, and Refrigeration.*[1] Additional terms used in this standard not found in the ASHRAE terminology manual, are defined in this clause.

accuracy (error): ability of an instrument to indicate or record the true value of a measured quantity. The error of indication, which is the difference between the indicated value and the true value of the measured quantity, expresses the accuracy of an instrument. Accuracy is usually expressed as percent of full scale.

density of standard air (ρ_s): 1.204 kg/m^3.

duct, HVAC: duct and fittings used for conveying air in residential, commercial, institutional, and industrial heating, ventilating, and air-conditioning systems.

joint: a connection of duct surface elements that is primarily intended to connect lengths of ductwork, to join intersecting ducts, or to join duct and equipment.

leakage: volumetric flow rate required to maintain a constant static pressure in a specimen.

precision: closeness of agreement among repeated measurements of the same physical quantity by the same method under the same conditions and with the same instrument.

random error: an error that causes readings to take random values on either side of some mean value. Measurements may be precise or imprecise depending on how well an instrument can reproduce subsequent readings of an unchanged input.

sealant: product used to seal longitudinal duct seams, transverse duct joints, and ductwork penetrations. Products include liquids, mastics, tapes, gaskets, heat-activated material, and mastic with an embedded fabric.

seam: a connection of duct surface elements that is primarily oriented in the direction of airflow.

sponsor: manufacturer, trade association, or other group funding, sponsoring, or requiring ductwork tests in compliance with this standard.

systematic error: an error that persists and cannot be considered due entirely to chance. Systematic error can be corrected through calibration.

transverse joint: transverse (girth) joint used to assemble duct and fittings.

4. NOMENCLATURE

A_f	=	final area, mm^2
A_i	=	initial area, mm^2
D	=	diameter, mm
L	=	length, mm
L_{rs}	=	reinforcement spacing, mm
L_{us}	=	user-specified support spacing, mm
PR	=	percent reduction, %
Q_a	=	leakage rate at actual conditions, L/s
Q_s	=	leakage rate at standard air conditions, L/s
R	=	gas constant, kJ/(kg · K)
W	=	duct width (flat surface), mm
p_b	=	barometric pressure, kPa
p_e	=	saturated vapor pressure of air at t_o', kPa
p_p	=	partial vapor pressure of air, kPa
t_o	=	dry-bulb temperature, ºC