



Standard Test Method for Laboratory Measurements of Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers¹

This standard is issued under the fixed designation E477; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

ε¹ NOTE—Equations 9 and 10 were editorially corrected in September 2015.

1. Scope

1.1 This test method covers the laboratory testing of some of the acoustical properties of sound attenuating devices including duct liner materials, integral ducts, and in-duct absorptive straight and elbow silencers used in the ventilation systems of buildings. Procedures are described for the measurement of acoustical insertion loss, airflow generated noise, and pressure drop as a function of airflow.

1.2 Excluded from the scope are reactive mufflers and those designed for uses other than in ventilation systems, such as automobile mufflers.

1.3 This test method includes a provision for a simulated semi-reflective plenum to fit around thin-walled duct and silencer test specimens, since the acoustical environments around such thin-walled specimens can affect the measured insertion loss.

1.4 This method tests the performance of the specimen in well-defined and controlled conditions. If the specimen is installed in the field in any different manner, the results may be different. This standard does not provide estimating procedures for determining the actual installed performance of the specimen under field conditions.

1.5 The values stated in SI units are to be regarded as standard. The values in parentheses are provided for information only.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

¹ This test method is under the jurisdiction of ASTM Committee E33 on Building and Environmental Acoustics and is the direct responsibility of Subcommittee E33.08 on Mechanical and Electrical System Noise.

Current edition approved June 1, 2013. Published August 2013. Originally approved in 1973. Last previous edition approved in 2006 as E477 – 06a. DOI: 10.1520/E0477-13E01

2. Referenced Documents

2.1 ASTM Standards:²

C634 Terminology Relating to Building and Environmental Acoustics

2.2 ANSI Standards:³

S1.1–1994(R2004) Acoustical Terminology

S1.11–2004(R2009) Specification Octave, Half-Octave and Third-Octave Band Filter Sets

S1.43–1997(R2007) Specifications for Integrating-Averaging Sound Level Meters

S12.5–2006/ISO 6926:1999(R2011) Requirements for the Performance and Calibration of Reference Sound Sources Used for the Determination of Sound Power Levels

S12.51–2012/ISO 3741:2010 Acoustics-Determination of Sound Power Levels of Noise Sources Using Sound Pressure-Precision Method for Reverberation Rooms

2.3 ASHRAE Documents and Standards:⁴

2009 ASHRAE Handbook, Fundamentals, Chapter 36, Measurement and Instruments

ANSI/ASHRAE 41.3–1989 Standard Method for Pressure Measurement (plus errata dated 5 January 1998)

2.4 NAIMA Documents and Standards:⁵

Fibrous Glass Duct Liner Standard, Publication AH124, Third Edition, 2002

3. Terminology

3.1 *Definitions*—The acoustical terms used in this method are consistent with Terminology C634, and ANSI S1.1.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, <http://www.ashrae.org>.

⁵ Available from North American Insulation Manufacturers Association (NAIMA), 44 Canal Center Plaza, Suite 310, Alexandria, VA 22314, <http://www.naima.org>.