



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

This standard is issued under the fixed designation E 477; 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.

1. Scope

1.1 This test method covers the laboratory testing of 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 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.*

2. Referenced Documents

2.1 ASTM Standards:

- C 423 Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method²
- C 634 Terminology Relating to Environmental Acoustics²
- E 90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions²
- E 548 Guide for General Criteria Used for Evaluating Laboratory Competence³
- E 717 Guide for Preparation of the Accreditation Annex of Acoustical Test Standards²
- E 795 Practices for Mounting Test Specimens During Sound Absorption Tests²

2.2 ANSI Standards:

S1.1 Acoustical Terminology⁴

S1.11 Octave, Half-Octave and Third-Octave Band Filter Sets⁴

S1.13 Measurement of Sound Pressure Levels⁴

S12.31-1990, Precision Methods for the Determination of Sound Power Levels of Broad-Band Noise Sources in Reverberation Rooms

2.3 ASME Test Codes:⁵

ANSI/ASME PTC 11-1984 (R 1990) Fans

ASME MFC-3M (1989)

ASME 19.5-72

2.4 AMCA Standards:⁶

ANSI/AMCA 210-85

AMCA 300

2.5 ASHRAE Documents and Standards:⁷

ASHRAE Handbook, Fundamentals Volume (current edition), Chapter on Measurement and Instruments

ANSI/ASHRAE 41.2-1987 (RA92) Standard Methods for Laboratory Airflow Measurement

2.6 ISO Standards:⁸

ISO 3741

ISO 7235

3. Terminology

3.1 **Definitions**—The acoustical terms used in this method are consistent with Terminology C 634, ANSI S1.1, and ANSI S1.13.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 **acoustical duct liner material**—a material that has sound absorptive properties and is attached to the inside wall of a duct to attenuate the sound that propagates down that section of duct.

¹ This test method is under the jurisdiction of ASTM Committee E-33 on Environmental Acoustics and is the direct responsibility of Subcommittee E33.08 on Mechanical and Electrical System Noise.

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² Annual Book of ASTM Standards, Vol 04.06.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁵ Available from American Society of Mechanical Engineers, 345 East 47th St., New York, NY 10017.

⁶ Available from Air Movement and Control Association, 30 W. University Dr., Arlington Heights, IL 60004.

⁷ Available from ASHRAE, 1791 Tullie Circle, NE, Atlanta, GA 30329.

⁸ Available from ISO, Case Postale 56, CH-1211, Genève 20, Switzerland.