



Designation: E 1222 – 90 (Reapproved 1996)^{€1}

Standard Test Method for Laboratory Measurement of the Insertion Loss of Pipe Lagging Systems¹

This standard is issued under the fixed designation E 1222; 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} NOTE—Keywords were added editorially in June 1996.

1. Scope

1.1 This test method covers the measurement of the insertion loss of pipe lagging systems under laboratory conditions.

1.2 A procedure for accrediting a laboratory for purposes of this test method is given in Annex A1.

1.3 *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

2.2 ANSI Standards:

S1.4 Specification for Sound Level Meters³

S1.6 Preferred Frequencies and Band Numbers for Acoustical Measurements³

S1.11 Specification for Octave Band and Fractional-Octave-Band Analog and Digital Filters³

3. Terminology

3.1 *Definitions*—The acoustical terms used in this test method are consistent with Terminology C 634.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *pipe lagging system*—an arrangement of noise insulating materials used to cover a pipe to reduce noise radiating from it.

4. Summary of Test Method

4.1 Noise is produced inside a steel pipe located within a

reverberation room using band-limited white noise as a test signal. The noise must be produced by a loudspeaker or acoustic driver located at one end of the pipe. Average sound pressure levels are measured within the reverberation room for two conditions, one with sound radiating from the bare pipe and the other with the same pipe covered with a lagging system. The insertion loss of the lagging system is the difference in the sound pressure levels measured with sound radiating from the bare and lagged pipe, with an adjustment for changes in room absorption due to the presence of the lagging system. The results may be obtained in a series of 100-Hz wide bands or in one-third octave bands from 500 to 5000 Hz. Using 100-Hz wide bands will improve the signal-to-noise ratio in the reverberant room. This is frequently necessary when measuring specimens having high insertion loss.

5. Significance and Use

5.1 The insertion loss of a pipe lagging system depends upon the lagging system materials, the method used to apply the materials, the pipe wall thickness, the size and shape of the bare and lagged pipe, and the mechanisms causing noise radiation from the pipe. Insertion losses measured using this test method should be used with some caution. In the laboratory, measurements must be made under reproducible conditions, but in practical usage in the field, the conditions that determine the effective insertion loss are difficult to predict and they may lead to slightly different results. Insertion losses measured with this test method can be used successfully for acoustical design purposes. Insertion losses measured with this test method are most useful for pipes and lagging systems which are similar to those used in the laboratory configuration.

5.2 This test method may be used to rank-order pipe lagging systems according to insertion loss or to estimate the field insertion loss of pipe lagging systems installed in the field.

5.3 This test method assumes that pipe wall stresses resulting from different methods of supporting the test pipe in the laboratory do not have a significant effect upon the measured insertion loss.

5.4 Pipe lagging systems typically have small insertion loss, and sometimes negative insertion loss, at frequencies below 500 Hz. The results obtained at frequencies below 500 Hz may be somewhat erratic. Sound sources used with this test method

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