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Standard Test Method for Measuring the Interzone Attenuation of Sound Reflected by Wall Finishes and Furniture Panels[1]

This standard is issued under the fixed designation E 1376; 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.

INTRODUCTION

This test method is one of a series for the measurement and evaluation of acoustical components affecting speech privacy in open-plan spaces. This test method provides a means of objectively measuring the degree to which sound reflected by furniture panels and wall finishes is attenuated.

1. Scope

1.1 This laboratory test method[2] measures the degree to which reflected sound is attenuated by the most commonly found vertical surfaces in open-plan spaces. Reflection of sound from vertical surfaces is a concern in open-plan spaces because it can reduce speech privacy. The vertical surfaces covered by this test method include wall finishes such as sound-absorbent panels, and furniture panels or screens. It does not cover such items as window finishes or furniture other than panels.

1.2 This test procedure was originally developed using the foot-pound system of units for prescribing measurement positions and distances. However, the use of SI units is preferred by ASTM. For this reason, dimensions are provided in SI units, with approximate foot-pound conversions indicated in parentheses.

1.2.1 Unless otherwise qualified, all dimensions specified in this test method shall be understood to have a tolerance of ±25 mm (±1 in.), even though the indicated approximate conversion of the numerical dimensions given will not always be accurate to this extent. All measurements shall be made in SI units or the corresponding exact foot-pound units.

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 Method[3]

C 634 Terminology Relating to Environmental Acoustics[3]

E 795 Practices for Mounting Test Specimens During Sound Absorption Tests[3]

E 1110 Classification for Determination of Articulation Class[3]

E 1130 Test Method for Objective Measurement of Speech Privacy in Open Offices Using Articulation Index[3]

E 1179 Specification for Sound Sources Used for Testing Open Office Components and Systems[3]

2.2 *ANSI Standards:*

S1.4 Specification for Sound Level Meters[4]

S1.6 Preferred Frequencies and Band Numbers for Acoustical Measurements[4]

S1.11 Specification for Octave Band and Fractional-Octave Band Analog and Digital Filters[4]

S1.12 Specification for Laboratory Standard Microphones[4]

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, see Terminology C 634. The term *source point* is defined in Specification E 1179.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *furniture panel*—a furnishing that does not extend to the ceiling, and that is used to subdivide an open-plan space

[1] This test method is under the jurisdiction of ASTM Committee E33 on Environmental Acoustics and is the direct responsibility of Subcommittee E33.02 on Open Plan Spaces.

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[2] This test method is similar to a procedure developed by the U.S. Government General Services Administration, Public Buildings Service, designated "PBS-C.2, Procedure X, Test Method for the Sufficient Verification of Speech-Privacy Potential Based on Objective Measurements Including Methods for the Rating of Functional Interzone Attenuation and NC-Background," April 1980.

[3] *Annual Book of ASTM Standards*, Vol 04.06.

[4] Available from American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

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and provide some degree of visual and acoustical privacy. Furniture panels include interlocking systems furniture and freestanding screens.

3.2.2 *interzone attenuation*—at a specified position for a one-third octave-band, the difference between the sound pressure level at a nominal reference position 0.9 m (3 ft) from the sound source and the sound pressure level at the point in question.

3.2.3 *nominal interzone attenuation*—for a one-third octave-band, at a specified position, the arithmetic mean interzone attenuation calculated using the interzone attenuation for the position in question and for two adjacent positions 0.3 m (1 ft) to either side. For example, the nominal interzone attenuation at the 3.0-m (10-ft) position is the arithmetic mean of the interzone attenuations at the 2.7, 3.0, and 3.3-m (9, 10, and 11-ft) positions. (See Fig. 1.)

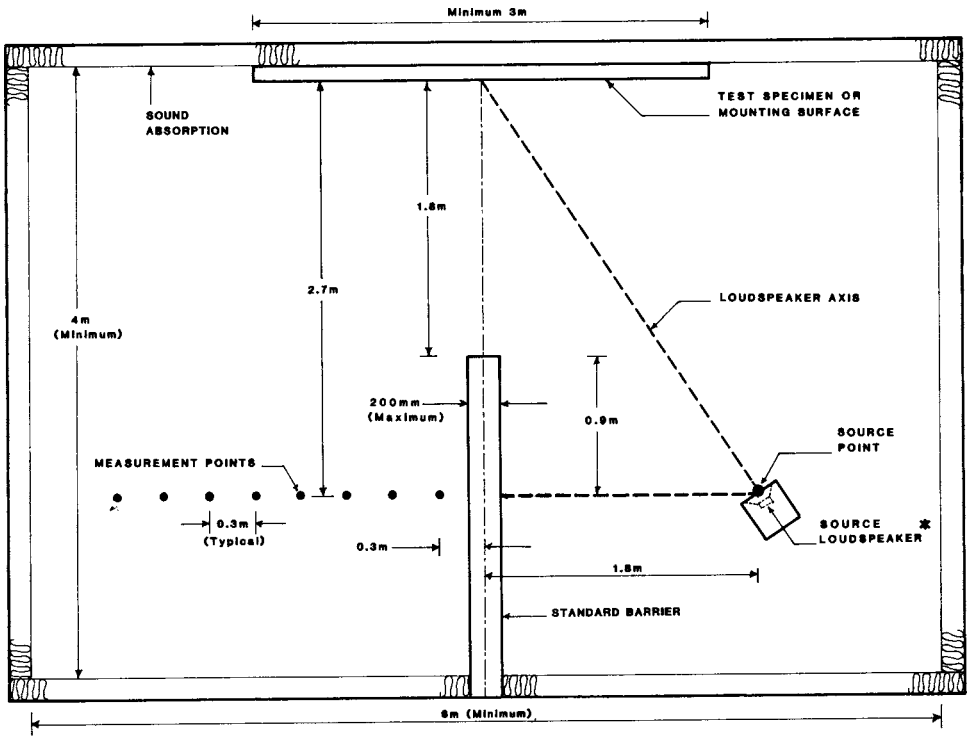
4. Summary of Test Method

4.1 The test facility is a room constructed so that sound reflections from the walls and ceiling are negligible. Sound is generated on one side of a standard barrier that extends from floor to ceiling, with a gap at the end facing the test specimen, and is partially reflected by the test specimen to reach the other side. The difference in magnitude of the sound pressure levels measured on the source and receiving side of the barrier provides a measure of to what degree sound energy reflected from the specimen is attenuated (see Fig. 1). Sound-absorbent specimens will reflect less energy around the barrier than sound-reflective specimens. Two test conditions are established in this test method. Specimens that are wall finishes are applied over a sound-reflective side wall, whereas specimens that are furniture panels are placed against a sound-absorptive side wall.

5. Significance and Use

5.1 In open-plan spaces, furniture panels are often used in lieu of full height walls to visually and acoustically separate workstations. The use of these units, compared to full-height walls, can significantly lower the degree of speech privacy or noise isolation afforded between workstations. The degree of speech privacy or noise isolation between workstations depends on many factors. Sound may travel from one workstation to another by reflecting from the ceiling elements, or from columns, walls, windows, or furniture. It may also be diffracted over or around a furniture panel, or be transmitted through it. Thus, in designing or evaluating open-plan spaces, all possible propagation paths must be considered. The provision of adequate speech privacy in open-plan spaces requires the use of an acoustically absorbent ceiling and often a masking sound system, in addition to partial height acoustical barriers.

5.2 This test method assesses the sound reflected from vertical surfaces, such as furniture panels or wall finishes. This test method does not cover the testing of window finishes or other furniture. The measurement of the performance of other open-plan components, such as ceilings, is addressed by other test methods. Test Method E 1130 is available to evaluate the overall speech privacy between workstations that results from a specific configuration of components.



NOTE 1—See Fig. 2 for measurement positions for reference levels.

FIG. 1 Plan of Test Arrangement

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