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Standard Test Method for Measuring the Interzone Attenuation of Furniture Panels Used as Acoustical Barriers[1]

This standard is issued under the fixed designation E 1375; 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 relevant acoustical characteristics of one component of the open-plan space, furniture panels used as acoustical barriers.

1. Scope

1.1 This test method covers the measurement of the interzone attenuation of furniture panels used as acoustical barriers in open-plan spaces to provide speech privacy or sound isolation between working positions.[2]

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.

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

[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 United States Government General Services Administration, Public Buildings Service, designated "PBS-C.2, 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, August 1972."

[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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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 point, the arithmetic mean interzone attenuation calculated using the interzone attenuation for the point in question and for two adjacent positions 0.3 m (1 ft) to either side. (See Figs. 1 and 2.) For example, in Fig. 1, 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.

4. Summary of Test Method

4.1 The test facility is a room constructed such that sound reflections from the walls and ceiling are negligible. The test specimen is a furniture panel arranged as an acoustical barrier, that is, arranged such that it blocks the direct path of sound from the sound source to the measuring microphones. Sound generated by the sound source on one side of the furniture panel under test reaches the other side chiefly by diffracting over its top edge. A potential secondary path is transmission through the panel. The differences in sound pressure levels measured on each side of the furniture panel provide a measure of its effectiveness as an acoustical barrier.

5. Significance and Use

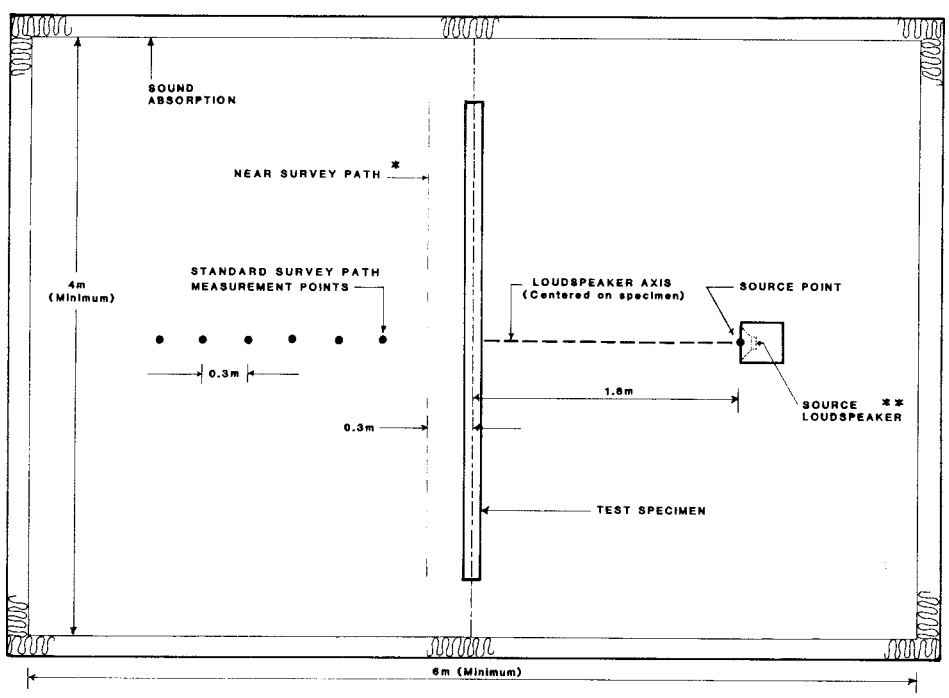
5.1 In open plan spaces, furniture panels are often used in lieu of full height walls to visually and acoustically separate workstations. The use of these units, compared to full-height walls, can significantly lower the degree of speech privacy or noise isolation afforded between workstations. The degree of speech privacy or noise isolation depends upon many factors. In travelling from one workstation to another, sound may be reflected from the ceiling system, may be diffracted over or around intervening furniture panels that act as acoustical barriers, may be transmitted through the furniture panels, or may be reflected around the panel by furniture or fixed constructions, such as walls or columns. Providing adequate speech privacy in open-plan spaces requires the use of an acoustically absorbent ceiling and often the use of controlled background masking sound, in addition to partial height acoustical barriers.

5.2 This test method measures one of the relevant acoustical properties of one component of the open office environment: the effectiveness of furniture panels as acoustical barriers. The method measures the degree to which sound is diffracted over the top edge and transmitted through the panel. Other test methods deal with the evaluation of the degree to which reflected sound is attenuated by open-plan components, such as the ceiling system, furniture panels, and wall finishes. Test Method E 1130 is available to evaluate the overall speech privacy between workstations that results from a specific configuration of components.

6. Apparatus

6.1 A sound source meeting Specification E 1179 is required.

6.2 Microphones shall meet the requirements in ANSI S1.12.



NOTE 1—See Fig. 2 for near survey line measurement positions.
NOTE 2—See Fig. 3 for measurement positions for reference levels.

FIG. 1 Plan of Test Arrangement

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