



Standard Specification for Sound Sources Used for Testing Open Office Components and Systems¹

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1. Scope

1.1 This specification states the requirements for sound sources used for measuring the speech privacy between open offices or for measuring the laboratory performance of acoustical components (see Test Methods E 1111 and E 1130).

1.2 The sound source shall be a loudspeaker located in an enclosure driven with an appropriate test signal.

1.3 This specification describes the sound source and method of qualifying it using a special qualification signal. Test signals required by open office test methods may differ.

2. Referenced Documents

2.1 ASTM Standards:

C 384 Test Method for Impedance and Absorption of Acoustical Materials by the Impedance Tube Method²

C 634 Terminology Relating to Environmental Acoustics²

E 1050 Test Method for Impedance and Absorption of Acoustical Materials Using a Tube, Two Microphones, and a Digital Frequency Analysis System²

E 1111 Test Method for Measuring the Interzone Attenuation of Ceiling Systems²

E 1130 Test Method for Objective Measurement of Speech Privacy in Open Offices Using Articulation Index²

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, Half-Octave and One-Third Octave-Band Filter Sets³

3. Terminology

3.1 Definitions:

3.1.1 The acoustical terminology used in this specification is consistent with Terminology C 634.

3.2 Descriptions of Terms Specific to This Standard:

3.2.1 *qualification signal*—a test signal of broadband noise or bands of white or pink noise as defined in Terminology C 634.

3.2.2 *source point*—the point at which the loudspeaker axis intersects the front plane of the loudspeaker (see Fig. 1).

4. Sound Source Specifications

4.1 *Sound Source Description*⁴—The sound source shall be a loudspeaker enclosed in a box that has a maximum dimension of 0.30 m (1 ft) on a side, to reduce spurious sound reflections.

4.2 *Directivity*—With the source driven with the qualification signal, the maximum and minimum sound pressure levels within any one-third octave band, measured at a distance of 1.0 m (39 in.) from the source point, at any angle up to and including 25° in any direction from the loudspeaker axis, shall differ by 2 dB or less.

NOTE 1—At angles beyond 25° from the loudspeaker axis, the source shall produce lower levels than within the 50° included angle.

NOTE 2—The directivity requirement may be met by using more than one loudspeaker, each one used separately to cover a different portion of the test frequency range.

5. Source Qualification

5.1 *Test Environment*—The measurements shall be carried out in a free sound field. The preferred test environment is an anechoic room with surfaces that have a minimum normal incidence sound absorption coefficient of 0.990 at all frequencies above 175 Hz as measured in accordance with Test Methods C 384 or E 1050. Alternatively, an outdoor environment may be used if it is shown that sound reflections do not influence the data.

5.2 Test Instruments:

5.2.1 The measurement microphone, amplifier, and level meter used to measure sound pressure levels shall satisfy the requirements of ANSI S1.4 for Type 1 or better sound level meters except that weighting networks are not required.

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² *Annual Book of ASTM Standards*, Vol 04.06.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁴ A sound source available from Acculab, 3201 Ridgewood Dr., Columbus, OH 43220, (or its equivalent) has been found suitable for this purpose.

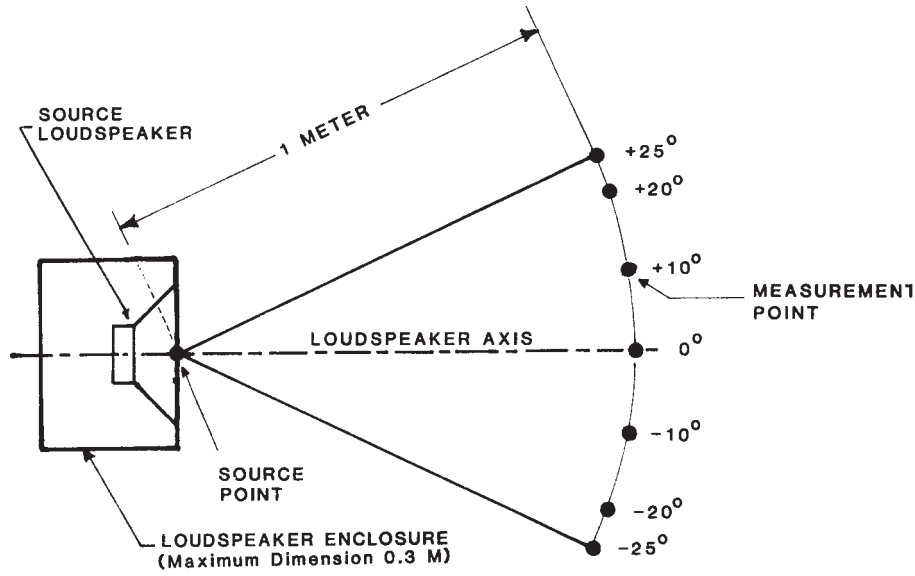


FIG. 1 Measurement Points for Sound Source Directivity

5.2.2 A free field microphone shall be used, that is, one that has its flattest frequency response for sounds arriving normal to the diaphragm.

5.2.3 One-third octave filters shall meet the requirements of ANSI S1.11 for Class III, Type R or Type E filters.

5.3 *Qualification Sound Output*—When the sound source is driven with the qualification signal, the sound output shall be adequate to maintain one-third octave-band sound pressure levels at least 10 dB above the corresponding background noise in each band at each measurement location.

NOTE 3—Sources which produce an A-weighted sound level of 70 to 90 dB at 1 m (3.3 ft) when driven with broadband noise usually meet this requirement.

NOTE 4—The background noise consists of the ambient noise and the internal noise of the measuring instruments, as defined in Terminology C 634.

5.4 *Directivity Measurement*—The directivity of the sound source shall be verified by driving the source with the qualification signal and measuring the sound pressure levels at measurement points that include those shown in Fig. 1. For

these measurements, the axis of the microphone shall be oriented along the line from the measurement point to the source point with the microphone diaphragm facing the source. This shall be carried out at each one-third octave-band preferred center frequency from 200 to 5000 Hz in accordance with ANSI S1.6. At a minimum, the data shall be obtained at seven measurement points in each of two perpendicular planes, such as the horizontal and vertical planes, at a distance of 1 m (3.3 ft) from the source point.

5.5 It is recommended that the source be qualified in this manner on an annual basis.

6. Qualification Report

6.1 A report shall be made available providing the qualification test data for sources that meet this specification.

7. Keywords

7.1 loudspeaker; open office; open office components; open office components and systems; sound; sound source directivity; sound sources

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