Designation: E90 – 09

Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements[1]

This standard is issued under the fixed designation E90; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

INTRODUCTION

This test method is part of a set for evaluating the sound-insulating properties of building elements. It is designed to measure the transmission of sound through a partition or partition element in a laboratory. Others in the set cover the measurement of sound isolation in buildings (Test Method E336), the laboratory measurement of impact sound transmission through floors (Test Method E492), the measurement of impact sound transmission in buildings (Test Method E1007), the measurement of sound transmission through building facades and facade elements (Guide E966), the measurement of sound transmission through a common plenum between two rooms (Test Method E1414), a quick method for the determination of airborne sound isolation in multiunit buildings (Practice E597), and the measurement of sound transmission through door panels and systems (Test Method E1425).

1. Scope

1.1 This test method covers the laboratory measurement of airborne sound transmission loss of building partitions such as walls of all kinds, operable partitions, floor-ceiling assemblies, doors, windows, roofs, panels, and other space-dividing elements.

1.2 Laboratories are designed so the test specimen constitutes the primary sound transmission path between the two test rooms and so approximately diffuse sound fields exist in the rooms.

1.3 *Laboratory Accreditation*—The requirements for accrediting a laboratory for performing this test method are given in Annex A4.

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:*[2]

C423 Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
C634 Terminology Relating to Building and Environmental Acoustics
E336 Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings
E413 Classification for Rating Sound Insulation
E492 Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
E966 Guide for Field Measurements of Airborne Sound Attenuation of Building Facades and Facade Elements
E1007 Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures
E1111 Test Method for Measuring the Interzone Attenuation of Open Office Components
E1289 Specification for Reference Specimen for Sound Transmission Loss
E1332 Classification for Rating Outdoor-Indoor Sound Attenuation

[1] This test method is under the jurisdiction of ASTM Committee E33 on Building and Environmental Acoustics and is the direct responsibility of Subcommittee E33.03 on Sound Transmission.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

E1414 Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
E1425 Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems
E2235 Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

2.2 *ANSI Standards:*
S1.6-1984 (R2006) American National Standard Preferred Frequencies, Frequency Levels, and Band Numbers for Acoustical Measurement[3]
S1.10 Pressure Calibration of Laboratory Standard Pressure Microphones[3]
S1.11 Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters[3]
S1.40 Specifications and Verification Procedures for Sound Calibrators[3]
S1.43 Specifications for Integrating-Averaging Sound-Level Meters[3]
S12.51 Acoustics—Determination of Sound Power Levels of Noise Sources Using Sound Pressure—Precision Methods for Reverberation Rooms[3]

2.3 *ISO Standards:*
ISO 717 Rating of Sound Insulation for Dwellings[3]
ISO 3741 Acoustics—Determination of Sound Power Level of Noise Sources—Precision Methods for Reverberation Rooms[3]

2.4 *IEC Standards:*
IEC 60942 Electroacoustics—Sound Calibrators[4]
IEC 61672 Electroacoustics—Sound Level Meters—Part 1: Specifications[4]

3. Terminology

3.1 The following terms used in this test method have specific meanings that are defined in Terminology C634.

acoustical barrier
airborne sound
average sound pressure level
background noise
damp
decay rate
decibel
diffraction
diffuse sound field
direct sound field
flanking transmission
level
octave band
pink noise
receiving room
reverberant sound field
reverberation room
sound absorption
sound attenuation
sound energy
sound insulation
sound isolation
sound level
sound power
sound pressure
sound pressure level
sound transmission level
sound transmission class
sound transmission coefficient
sound transmission loss
source room
unit

3.1.1 For the purposes of this test method, transmission loss is operationally defined as the difference in decibels between the average sound pressure levels in the reverberant source and receiving rooms, plus ten times the common logarithm of the ratio of the area of the common partition to the sound absorption in the receiving room (see Eq 5).

NOTE 1—Sound transmission coefficient and sound transmission loss are related by either of the two equations:

$$TL = 10\log(1/\tau) \quad (1)$$

$$\tau = 10^{-TL/10} \quad (2)$$

4. Summary of Test Method

4.1 Two adjacent reverberation rooms are arranged with an opening between them in which the test partition is installed. Care is taken that the only significant sound transmission path between rooms is by way of the test partition. An approximately diffuse sound field is produced in one room, the source room. Sound incident on the test partition causes it to vibrate and create a sound field in the second room, the receiving room. The space- and time-averaged sound pressure levels in the two rooms are determined. In addition, with the test specimen in place, the sound absorption in the receiving room is determined. The sound pressure levels in the two rooms, the sound absorption in the receiving room and the area of the specimen are used to calculate sound transmission loss as shown in Section 11. Because transmission loss is a function of frequency, measurements are made in a series of frequency bands.

4.2 In theory, it is not important which room is designated as the source and which as the receiving room. In practice, different values of sound transmission loss may be measured when the roles are reversed. To compensate for this, the entire measurement may be repeated with the roles reversed; the source room becomes the receiving room and vice versa. The two sets of transmission loss values are then averaged to produce the final result for the laboratory.

4.3 Additional procedures that may be followed when testing doors are given in Test Method E1425.

5. Significance and Use

5.1 Sound transmission loss as defined in Terminology C634, refers to the response of specimens exposed to a diffuse incident sound field, and this is the test condition approached by this laboratory test method. The test results are therefore most directly relevant to the performance of similar specimens exposed to similar sound fields. They provide, however, a useful general measure of performance for the variety of sound fields to which a partition or element may typically be exposed.

5.2 In laboratories designed to satisfy the requirements of this test method, the intent is that only significant path for sound transmission between the rooms is through the test specimen. This is not generally the case in buildings where there are often many other paths for sounds—*flanking sound transmission*. Consequently sound ratings obtained using this test method do not relate directly to sound isolation in buildings; they represent an upper limit to what would be measured in a field test.

5.3 This test method is not intended for field tests. Field tests shall be performed according to Test Method E336.

NOTE 2—The comparable quantity measured using Test Method E336 is called the apparent sound transmission loss because of the presence of flanking sound transmission.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from International Electrotechnical Commission (IEC), 3 rue de Varembé, Case postale 131, CH-1211, Geneva 20, Switzerland, http://www.iec.ch.

6. Test Rooms

6.1 The test rooms shall be so constructed and arranged that the test specimen constitutes the only important transmission path between them. Laboratories must investigate their flanking limit and prepare a report as described in Annex A5.

6.2 The spatial variations of sound pressure level measured in the each room shall be such that the precision requirements in Annex A2 are satisfied at all frequencies.

6.3 *Volume of Rooms*—The minimum volume of each room is 80 m^3.

NOTE 3—See Appendix X1 for recommendations for new construction.

6.4 *Room Absorption*—The sound absorption in the receiving room should be low to achieve the best possible simulation of the ideal diffuse field condition, and to minimize the region dominated by the direct field of the test specimen. In the frequency range that extends from $f = 2000/V^{1/3}$ to 2000 Hz, the absorption in the receiving room (as furnished with diffusers) should be no greater than:

$$A = V^{2/3}/3 \tag{3}$$

where:

V = the room volume, m^3, and
A = the sound absorption of the room, m^2.

6.4.1 For frequencies below $f = 2000/\ V^{1/3}$, somewhat higher absorption may be desirable to accommodate requirements of other test methods (for example, ISO 3741); in any case, the absorption should be no greater than three times the value given by Eq 3.

NOTE 4—For frequencies above 2000 Hz, atmospheric absorption may make it impossible to avoid a slightly higher value than that given in Eq 3.

6.5 Unless otherwise specified, the average temperatures in each room during all acoustical measurements shall be in the range 22 ± 5°C and the average relative humidity shall be at least 30 %.

6.5.1 When testing specimens with temperature sensitive materials, such as systems that incorporate laminated glass, the average temperature of the specimen and in each room during all acoustical measurements shall be in the range 22 ± 2°C.

NOTE 5—The sound damping properties of viscoelastic substrates between panels (glass, metal, etc.) and of viscoelastic materials used to mount glass often depend on temperature. This requirement minimizes any effects this has on measured sound transmission loss.

6.6 During the sound pressure level and the corresponding sound absorption measurements, variations in temperature and humidity in the receiving room shall not exceed 3°C and 3 % relative humidity respectively. Temperature and humidity shall be measured and recorded as often as necessary to ensure compliance.

6.6.1 If a relative humidity of at least 30 % can not be maintained in the receiving room, users of the test method shall verify by calculation that changes in the 10 log A_0 term (see 11.1) due to changes in temperature and humidity do not exceed 0.5 dB.

NOTE 6—Procedures for calculating air absorption are described in Test Method C423.

7. Test Specimens

7.1 *Size and Mounting*—Any test specimen that is to typify a wall or floor shall be large enough to include all the essential constructional elements in their normal size, and in a proportion typical of actual use. The minimum dimension (excluding thickness) shall be 2.4 m, except that specimens of doors, office screens, and other smaller building elements shall be their customary size. Preformed panel structures should include at least two complete modules (panels plus edge mounting elements), although single panels can be tested. In all cases the test specimen shall be installed in a manner similar to actual construction, with a careful simulation of normal constraint and sealing conditions at the perimeter and at joints within the field of the specimen. Detailed reporting and installation procedures for particular types of building separation elements are given in Annex A1.

7.2 *Office Screens*—The minimum area of an office screen specimen shall be 2.3 m^2. Testing an office screen according to this test method is only appropriate when the property of interest is sound transmission through the main body of the screen. Screens that incorporate electrical raceways may allow sound to pass through easily in this region. Such parts of an office screen shall be included as part of the specimen. For a complete test of the screen as a barrier, including the effects of diffraction and leakage, Test Method E1111 is recommended.

7.3 *Operable Door Systems*—Measurements may be in accordance with Test Method E1425 to evaluate door systems in the operable and fully sealed state, and to measure the force required to operate the door.

8. Test Signal Sound Sources

8.1 *Signal Spectrum*—The sound signals used for these tests shall be random noise having a continuous spectrum within each test frequency band.

8.2 *Sound Sources*—Sound sources shall consist of one or more loudspeakers in an enclosure.

NOTE 7—Sources should preferably be omnidirectional at all measurement frequencies to excite the sound field in the room as uniformly as possible. Using separate loudspeakers for high and low frequencies will make the system more omnidirectional. Aiming the loudspeakers into corners of the room can reduce the direct field from the loudspeaker system. An approximation to an omnidirectional speaker system can be obtained by mounting an array of loudspeakers on the faces of a polyhedron (cube, octahedron, dodecahedron, etc.). Sources in trihedral corners of the room excite room modes more effectively and laboratory operators may find that this orientation increases the low frequency sound pressure levels in the room.

8.3 *Multiple Sound Sources*—If a laboratory chooses to use multiple sound sources at different locations in the room simultaneously, they shall be driven by separate random noise generators and amplifiers.

NOTE 8—Measured values of sound transmission loss, especially at low frequencies, may change significantly when sound source position is changed. Multiple sound sources driven by uncorrelated noise signals have also been found to reduce the spatial variance of sound pressure level in reverberation rooms and thus make it easier to satisfy the requirements of Annex A2.

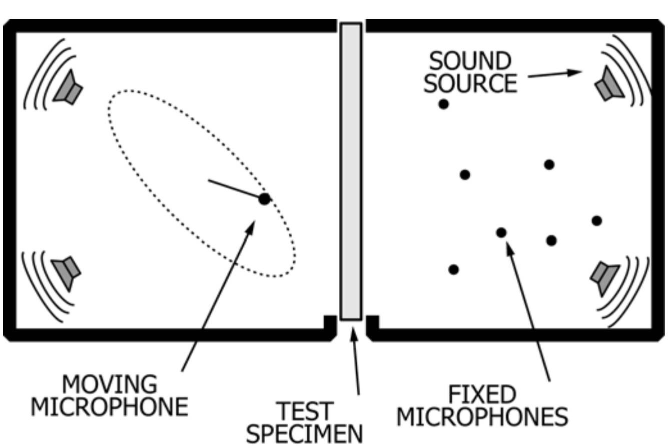
9. Instrumentation Requirements

9.1 Microphones and analyzers are used to measure average sound pressure levels in the source and receiving rooms and sound decay rates in the receiving room. Various systems of data collection and processing are possible, ranging from a single microphone moving continuously or placed in sequence at several measurement positions to several microphones making simultaneous measurements (see Fig. 1 for two examples). The measurement process must account for spatial and temporal variations of sound pressure level.

9.2 *Microphone Electrical Requirements*—Use microphones that are stable and substantially omni-directional in the frequency range of measurement, with a known frequency response for a random incidence sound field. (A 13-mm (0.5-in.) random-incidence condenser microphone is recommended.) Specifically, microphones, amplifiers, and electronic circuitry to process microphone signals must satisfy the requirements of ANSI S1.43 or IEC 61672 for class 1 sound level meters, except that A, B, and C weighting networks are not required since one-third octave filters are used. All microphones used in testing according to this method shall be of the same type.

9.3 *Calibration*—Calibrate each microphone over the whole range of test frequencies as often as necessary to ensure the required accuracy (see ANSI S1.10). A record shall be kept of the calibration data and the dates of calibration.

9.3.1 Calibration checks of the entire measurement system for at least one frequency shall be made at least once during each day of testing. Make the calibration check of the measurement system using an acoustic calibrator that generates a known sound pressure level at the microphone diaphragm and at a known frequency. The class of Calibrator shall be class 1 per ANSI S1.40 or IEC 60942.



NOTE 1—This figure is not meant to be a design guide but is for illustrative purposes only. As an example, the room on the right has fixed microphones to measure average sound pressure level; the room on the left has a continuously moving microphone to measure average sound pressure level. Usually both rooms will have the same microphone system. The loudspeakers in the rooms generate the incident sound fields for the measurement of level differences or sound decay rates.

FIG. 1 Illustration Showing Conceptual Arrangement of a Wall Sound Transmission Loss Suite

9.4 *Bandwidth*—The overall frequency response of the filters used to analyze the microphone signals shall, for each test band, conform to the specifications in ANSI S1.11 for a one-third octave band filter set, class 1 or better.

9.4.1 If filtering is applied to the source signals to concentrate the available power in one test band or a few bands, the frequency range of the signal shall always be greater than the frequency range of the microphone filter.

9.5 *Standard Test Frequencies*—Measurements shall be made in all one-third-octave bands with mid-band frequencies specified in ANSI S1.11 from 100 to 5000 Hz. For sound transmission loss measurements on building facades, exterior doors or windows, or other building facade elements where the outdoor-indoor transmission class is to be calculated, the minimum frequency range shall be from 80 to 5000 Hz.

NOTE 9—It is desirable in any case that the frequency range be extended to include bauds below 125 Hz. Many applications require information on low frequency transmission loss and laboratory operators are encouraged to collect and report information down to at least 50 Hz where feasible. Note that larger room volumes are recommended when measuring at lower frequencies (see X1.2).

10. Measurement of Average Sound Pressure Levels and Room Sound Absorption

10.1 The microphone system used to obtain the average sound pressure level must satisfy the requirements given in Annex A2.

10.2 *Measurement of Average Sound Pressure Levels, L_S and L_R*—With the sound sources generating the sound field in one room, the source room, measure the space- and time-averaged sound pressure level in the source room, L_S, and in the receiving room, L_R.

10.3 *Background Noise in the Receiving Room and Associated Measurement System*—With the sound sources not operating, measure the background noise levels in the receiving room for each frequency band at the same microphone positions used to measure L_R. Make these measurements using the same microphone and analyzer gain settings as used for measurements of the received level. This accounts properly for residual noise and the dynamic range in instrumentation. At each measurement position corrections shall be made unless the background level is more than 10 dB below the combination of signal and background. (The signal is the sound pressure level due to transmission through the test specimen.) If the background level is between 5 and 10 dB below the combined level, correct the signal level using:

$$L_a = 10\log\left[10^{L_{sb}/10} - 10^{L_b/10}\right] \quad (4)$$

where:

L_b = background noise level, dB,
L_{sb} = level of signal and background combined, dB, and
L_a = adjusted signal level, dB.

10.3.1 If the output of the sound sources cannot be increased so the combined level is at least 5 dB above the background level, then subtract 2 dB from the combined level and use this as the corrected signal level. In this case, the measurements can be used only to provide an estimate of the lower limit of the sound transmission loss. Identify such measurements in the test report.

NOTE 10—Noise measured by the microphone system in the receiving room when the sound sources are not operating may be due to extraneous acoustical sources or to electrical noise in the receiving system, or both.

10.4 *Determination of Receiving Room Absorption, A_R*—Measure the mean value of the receiving room absorption at each frequency in accordance with Test Method E2235. The determination of A_R shall be made with the receiving room in the same condition as for the measurement of L_S and L_R. Specifically, the test specimen shall remain in place so its effective absorption (which includes transmission back to the source room) is included. Sound sources used for measuring A_R shall be present during the measurement of L_R, so their absorption is present during both measurements.

10.4.1 *Room Coupling*—Because the two test rooms are coupled by the test specimen, it is possible that the decay rate measurements in the receiving room will be influenced by sound energy transmitted into the source room and then back again during the decay process (**1**).[5] Decay curves may be markedly curved or have two pronounced slopes. To ensure the effect will be small the product τS must be smaller than A_S, the absorption in the source room, or A_R, the absorption in the receiving room, or d_S/d_R, the ratio of decay rates in the two rooms, must be larger than unity. The latter requirement may be met by adding absorption to the source room until no further effect is observed on the measured value of d_R.

NOTE 11—Additional absorption in the source room is required only during measurement of receiving room absorption. It shall not be present during measurement of L_S and L_R.

10.5 For estimates of the direction-averaged transmission loss it is necessary to repeat all measurements with the second room acting as the source. This results in four sets of average sound pressure levels and two sets of room absorptions corresponding to the two directions of sound transmission.

11. Calculation

11.1 For the chosen test directions), calculate the sound transmission loss at each frequency f from:

$$TL(f) = L_S(f) - L_R(f) + 10\ \log S/A_R(f) \tag{5}$$

where:

$TL(f)$ = transmission loss, dB,
$L_S(f)$ = average sound pressure level in the source room, dB,
$L_R(f)$ = average sound pressure level in the receiving room, dB,
S = area of test specimen that is exposed in the receiving room, m^2, and
$A_R(f)$ = sound absorption of the receiving room with the test specimen in place, m^2 (**1**).

11.2 When measurements are made in both directions, the final value of transmission loss to be reported shall be calculated using:

$$TL(f) = (TL_1(f) + TL_2(f))/2 \tag{6}$$

where $TL_1(f)$ and $TL_2(f)$ correspond to the two directions of measurement.

[5] The boldface numbers in parentheses refer to the list of references at the end of this standard.

11.2.1 If $TL_1(f)$ or $TL_2(f)$ is invalid (for example, because of excessive background noise) then the remaining valid measurement shall be used for *TL(f)*. Identify in the test report transmission loss values that are not averaged as required in 11.2.

11.3 If a laboratory chooses to use only one direction of measurement, then no averaging is required.

11.4 This test method specifies the use of one-third octave bands for measurement and calculation of sound transmission loss. It does not allow measurement of octave band transmission losses because these are very sensitive to the shape of the spectrum in the source room and to the details of the transmission loss characteristics of the test panel. In applications where octave band transmission loss values, TL_{oct}, are required, they shall be calculated using the expression:

$$TL_{oct,f_c} = -10\log\left[\frac{1}{3}\sum_{B=B_c-1}^{B_c+1} 10^{-TL_B/10}\right] \tag{7}$$

where:

f_c = preferred octave band mid-band frequency as specified in ANSI S1.6.

11.4.1 The summation is made over three one-third octave band *TL* values: one at the frequency f_c with band number B_c and the adjacent one-third octave bands, with band numbers $B_c + 1$ and $B_c - 1$. The octave band transmission loss values calculated from this expression approximate what would be measured if the spectrum in the source room had the same sound pressure level in each one-third octave band.

12. Report

12.1 Include the following information in the test report:

12.1.1 A statement, if true in every respect, that the tests were conducted according to this test method and that detailed test procedures, data for flanking limit tests, repeatability measurements and reference specimen tests are available on request.

12.1.2 A description of the test specimen in accordance with the requirements in Annex A1. The description must be sufficiently detailed to identify the specimen, at least for those elements that may affect its sound transmission loss, unless the test sponsor wishes to withhold information of a proprietary nature. A designation and description furnished by the sponsor of the test may be included in the report provided that they are attributed to the sponsor. If some details of the specimen construction are withheld at the sponsor's request, the report shall state this.

12.1.3 The dates of construction and testing.

12.1.4 If the test specimen is a screen, include a statement, if true, that sound transmission through raceways and other penetrations are included in the evaluation.

12.1.5 State clearly whether the transmission loss values are for a single direction of measurement or are averages of two directions.

12.1.6 A table of sound transmission loss values rounded to the nearest decibel for the frequency bands required in 9.5 and any other bands measured. These data may also be presented as a graph.

12.1.7 Identify data affected by flanking transmission (Annex A5) or background noise.

12.1.8 The temperature and humidity in the rooms during the measurements.

12.1.9 The volumes of the source and receiving rooms.

12.1.10 *Single Number Ratings:*

12.1.10.1 *Sound Transmission Class*—If single number ratings are given, the sound transmission class described in Classification E413 shall be included.

NOTE 12—The weighted airborne sound reduction indexes described in ISO 717 have a similar purpose to STC. These may also be given.

12.1.10.2 *Outdoor-Indoor Transmission Class*—Where the test specimen maybe used as part of a facade of a building, the Outdoor-Indoor transmission class shall be included. This single number rating is intended to rate the effectiveness of building facade elements at reducing transportation noise intrusion. The rating is described in Classification E1332.

13. Precision and Bias

13.1 *Precision*—Measurements at one laboratory show that the repeatability standard deviation for complete rebuilds of wood joist floor ranged from about 1.5 to 3.5 dB in the frequency range 125 to 4 kHz. This repeatability includes normal variations in materials but minimal changes in construction techniques. The repeatability standard deviation for re-installation of a concrete slab was about 4.5 dB at 100 Hz and below, about 3 dB from 125 to 630 Hz, and about 1.5 dB above 630 Hz. Repeatability for this test method depends on the specimen type and not enough data have been collected to allow more specific statements. From round robin testing on copies of the reference specimen described in Specification E1289, it has been determined that the reproducibility standard deviation is 2 dB or less at all frequencies from 125 to 4000 Hz. Further information can be found in reference (**2**).

13.2 *Bias*—There is no bias in this test method since the true value is defined by the test method.

14. Keywords

14.1 airborne sound transmission loss; flanking transmission; sound transmission coefficient; sound transmission loss; transmission loss

ANNEXES

(Mandatory Information)

A1. PREPARATION AND DESCRIPTION OF TEST SPECIMENS

A1.1 *Scope*:

A1.1.1 This annex gives requirements for the preparation, installation and aging of test specimens and the description of the specimen and materials in the test report. The various types of assemblies and materials are categorized and dealt with in separate sections.

A1.1.2 The intent of fully describing the test specimen is that, given only the test report, some other laboratory would be able to construct a specimen that would be practically identical.

NOTE A1.1—The use of sketches and photographs to clarify descriptions of specimens is highly recommended.

A1.2 *Construction*:

A1.2.1 The test specimen may either be built into a suitable frame, which is then inserted in the test opening, or built into the opening itself. Specimens shall be built in accordance with usual construction practice except that extra control procedures may be necessary to ensure maintenance of the specified dimensions. The type of installation and the steps in constructing the specimen (for example, plastering techniques) shall be reported in detail.

A1.2.2 A description of the method of installation of the specimen in the test opening, including the location of framing members relative to the edges, and the treatment of the junction with the test opening shall be given in the test report. The use and type of caulking, gaskets, tape, or other sealant on perimeter or interior joints shall be carefully described.

A1.2.3 The specimen size, including thickness, and the average mass per unit area shall always be reported.

A1.2.4 The curing period, if any, and the condition of the specimen as tested (shrinkage, cracks, etc.) shall be reported.

A1.2.5 *Composite Construction*—If a test specimen includes more than one type of building material, the requirements for each type shall be satisfied. For example, for a concrete block wall or a concrete floor slab to which plaster is applied, the requirements for masonry and plaster must be satisfied.

A1.3 *Aging of Specimens*:

A1.3.1 *Aging*—Unless otherwise noted below, all aging shall be at a room temperature from 18 to 24°C and a relative humidity from 40 to 70 %.

A1.3.2 Test specimens that incorporate materials for which there is a curing process (for example: adhesives, plasters, concrete, mortar, damping compound) shall age for a sufficient interval before testing. Aging periods for certain common materials are specified in this annex. Manufacturers may supply information about curing times for their products.

A1.3.3 In the case of a specimen incorporating one or more materials whose aging characteristics are not known, repeated tests shall be made to determine when the specimen has stabilized. These repeated tests should be made every few days until for three consecutive tests the change in the one-third octave band sound pressure levels at each test frequency is