Designation: E336 – 23

Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings[1]

This standard is issued under the fixed designation E336; 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 of standards for evaluating the sound-insulating properties of building elements. It is designed to measure the sound isolation between two rooms or to estimate lower limits for sound transmission through a partition element installed as an interior part of a building. Others in the set cover the airborne sound transmission loss of an isolated partition element in a controlled laboratory environment (Test Method E90), 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/E1414M), and measurement of the normalized insertion loss of doors (Test Method E2964).

1. Scope

1.1 The sound isolation between two spaces in a building is influenced most strongly by a combination of the direct transmission through the nominally separating building element (as normally measured in a laboratory) and any transmission along a number of indirect paths, referred to as flanking paths. Fig. 1 illustrates the direct paths (D) and some possible structural flanking paths (F). Additional non-structural flanking paths include transmission through common air ducts between rooms, or doors to the corridor from adjacent rooms. Sound isolation is also influenced by the size of the separating partition between spaces and absorption in the receiving space, and in the case of small spaces by modal behavior of the space and close proximity to surfaces.

1.2 The main part of this test method defines procedures and metrics to assess the sound isolation between two rooms or portions thereof in a building separated by a common partition or the apparent sound insulation of the separating partition, including both direct and flanking transmission paths in all cases. Appropriate measures and their single number ratings are the noise reduction (NR) and noise isolation class (NIC) which indicate the isolation with the receiving room furnished as it is during the test, the normalized noise reduction (NNR) and normalized noise isolation class (NNIC) which indicate the isolation expected if the receiving room was a normally furnished living or office space that is at least 25 m^3 (especially useful when the test must be done with the receiving room unfurnished), and the apparent transmission loss (ATL) and apparent sound transmission class (ASTC) which indicate the apparent sound insulating properties of a separating partition including both the direct transmission and flanking transmission through the support structure. The measurement of ATL is limited to spaces of at least 25 m^3 where modal effects create fewer problems. With the exception of the ATL and ASTC under specified conditions, these procedures in the main part of the test method are only applicable when both room volumes are less than 150 m^3.

NOTE 1—The word "partition" in this test method includes all types of walls, floors, or any other boundaries separating two spaces including those that are permanent, operable, or movable.

1.3 The NR and NIC between two locations are always measureable and reportable though conditions present will influence how measurements are performed. With one exception (see 13.5.1), it is required that the NIC always be reported. Restrictions such as minimum room volume or dimensions or maximum room absorption are imposed for all other measures and ratings in this standard. Thus, conditions sometimes exist that will not allow NNR (NNIC) or ATL (ASTC) to be reported. Where a partition between rooms is composed of

[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.

Current edition approved Jan. 1, 2023. Published February 2023. Originally approved in 1971. Last previous edition approved in 2020 as E336 – 20. DOI: 10.1520/E0336-23.

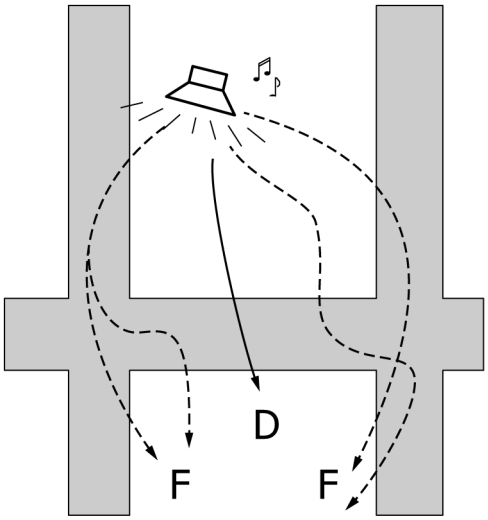

FIG. 1 Direct (D) and Some Indirect or Flanking Paths (F and Dotted) in a Building

parts that are constructed differently, or contains an element such as a door, the ATL and ASTC of the individual elements or portions of the partition are not measurable without modifications to the rooms. To evaluate the field performance of a door less than 6 m^2 in area, use Test Method E2964. The various metrics are inherently different quantities, so that NIC cannot be used instead of NNIC or ASTC to evaluate compliance with a specification when the specification is written in terms of one of those metrics that cannot be reported with the conditions present.

1.4 Annex A1 provides methods to measure the sound isolation between portions of two rooms in a building separated by a common partition including both direct and flanking paths when at least one of the rooms has a volume of 150 m^3 or more. The results are the noise reduction (NR) and noise isolation class (NIC).

1.5 This test method is intended to evaluate the actual acoustical performance between rooms in buildings. Thus, it forbids temporary modifications that influence performance. The measurement methods are useful in diagnostic situations where modifications are made. In such cases reports of results are required to clearly indicate that such modifications were made.

1.6 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.7 The text of this test method references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.8 *This standard may involve hazardous materials, operations, and equipment. 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.9 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C634 Terminology Relating to Building and Environmental Acoustics

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

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

E1414/E1414M Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

E2235 Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods

E2964 Test Method for Measurement of the Normalized Insertion Loss of Doors

E3091 Specification for Systems to Measure Sound Levels

[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.