Designation: ~~E1332 – 10a~~ E1332 – 16

Standard Classification for Rating Outdoor-Indoor Sound Attenuation[1]

This standard is issued under the fixed designation E1332; 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 classification is part of a set of ratings for the sound isolating properties of materials, building elements, and structures. It is based on A-weighted reduction of a transportation noise source. Other ratings include Classification E413 that rates the ability of a partition to reduce speech and other sounds within a limited frequency range, and Classification E989 that provides a rating method for comparing the impact-insulation properties of floor-ceiling assemblies.

1. Scope

1.1 The purpose of this classification is to provide a method to calculate single-number ratings that can be used for assesing the isolation for the outdoor sound provided by a building or comparing building facade specimens including walls, doors, windows, and combinations thereof, including complete structures. These ratings are designed to correlate with subjective impressions of the ability of building elements to reduce the penetration of outdoor ground and air transportation ~~noise.~~noise that contains strong low-frequency sound.[2] These ratings provide an evaluation and rank ordering of the performance of test specimens based on their effectiveness at controlling the sound of a specific outdoor sound spectrum called the reference source spectrum.

1.2 In addition to the calculation method, this classification defines some ratings not defined in other standards. Other standards may define additional ratings based on the method of this classification.

1.3 The rating does not necessarily relate to the perceived aesthetic quality of the transmitted sound. Different facade elements with similar ratings may differ significantly in the proportion of low and high frequency sound that they ~~transmit.~~ transmit and the spectra of sources can vary significantly. It is best to use specific sound transmission loss values, in conjunction with actual spectra of outdoor and indoor sound levels, for making final selections of facade elements.

1.4 Excluded from the scope of this classification are applications involving noise spectra differing markedly from ~~those described~~that shown in ~~4.1~~Table 1. Thus excluded, for example, would be certain industrial noises with high levels at frequencies below the 80 Hz one-third octave band, relative to levels at higher ~~frequencies.~~ frequencies, and any source, including some transportation sources, that does not have a spectrum similar to that in Table 1. However, for any source with a spectrum similar to ~~those~~that in ~~4.1~~Table 1, this classification provides a more reliable ranking of the performance of partitions and facade elements than do other classifications such as Classification E413.

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

1.6 *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:*[3]

C634 Terminology Relating to Building and Environmental Acoustics

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

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[1] This classification 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] This classification may be used in conjunction with Test Method E90 or Guide E966.

[3] 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.

TABLE 1 Reference Source Spectrum

One-third Octave Band Center Frequency, Hz	Sound Level, dB
80	103
100	102
125	101
160	98
200	97
250	95
315	94
400	93
500	93
630	91
800	90
1000	89
1250	89
1600	88
2000	88
2500	87
3150	85
4000	84

E413 Classification for Rating Sound Insulation
E966 Guide for Field Measurements of Airborne Sound Attenuation of Building Facades and Facade Elements
E989 Classification for Determination of Impact Insulation Class (IIC)

2.2 *ANSI Standard:*

ANSI S1.4 Part 1 – American National Standard ~~Specification for~~ Electroacoustics Sound Level Meters – Part 1 Specifications[4]

2.3 *ISO Standard:*[5]

ISO 532 Acoustics–Method for Calculating Loudness Level[4]

3. Terminology

3.1 The following terms used in this classification have specific meanings that are defined in Terminology C634: *airborne sound, decibel, impact insulation class, ~~level reduction,~~ octave band, outdoor-indoor transmission loss, sound insulation, sound isolation, sound level, sound transmission loss.*

3.2 ~~*Definitions of Terms Specific to This Standard:*~~*Definitions:*

3.2.1 *apparent outdoor-indoor transmission class, ~~AOITC(θ) ,~~ AOITC(θ), n—of a building façade or façade element,* ~~at a specified angle θ or range of angles - a~~ a single-number rating calculated in accordance with Classification E1332 using measured values of apparent outdoor-indoor transmission ~~loss.~~loss at a specified angle θ or range of angles.

3.2.2 *apparent outdoor-indoor transmission loss, ~~AOITL(θ) ,~~AOITL(θ), dB, n—of a building façade or façade element*, ~~in a specified frequency band at a specified angle θ or range of angles –~~ the value of outdoor-indoor transmission loss obtained on a test façade element as installed, ~~without flanking tests to identify or eliminate extraneous transmission paths; the AOITL is the lower limiting value of the outdoor-indoor transmission loss of the façade element.~~in a specified frequency band, for a source at a specified angle θ or range of angles as measured from the normal to the center of the specimen surface, without flanking tests to identify or eliminate extraneous transmission paths.

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

[5] Available from International Organization for Standardization (ISO), ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, http://www.iso.org.

3.2.2.1 *Discussion—*

All the sound power transmitted into the receiving room through both direct and flanking paths is attributed solely to the physical area of the test specimen. If flanking transmission is significant, the AOITL will be less than the actual OITL for the specimen.

3.2.3 *outdoor-indoor ~~level reduction, OILR(θ),~~ noise reduction, OINR or OINR(θ), dB, n—~~of a building façade, façade element, or combination of façade surfaces enclosing a room, in a specified frequency band at a specified angle θ or range of angles–the~~for a specified source angle of incidence or source sound distribution,* the difference between the ~~time-averaged exterior~~time-average free-field sound pressure level ~~which would be present~~ at the ~~façade of the room were the building and its façade not present due to a sound source at a specified angle of incidence θ or range of angles~~ exterior of a façade and the space-time average sound pressure level in a room of a ~~building.~~building exposed to the outdoor sound through that façade.