



Designation: C634 – 22

Standard Terminology Relating to Building and Environmental Acoustics¹

This standard is issued under the fixed designation C634; 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

In some of the entries, those that are measures of physical quantities, the term is followed by several items: an abbreviation or a symbol, or both, the dimensions of quantities, the measurement units, and the part of speech. The abbreviation, where applicable, indicates the term as typically referenced. The symbol stands for the magnitude of the quantity in mathematical expressions. The dimensions of a quantity express its measure in terms of three fundamental quantities: M for mass, L for length, and T for time. Speed, for instance, is the quotient obtained when the distance an object moves is divided by the time involved. The dimensions are $[LT^{-1}]$, the negative exponent indicating division. The measurement units are consistently in SI, Le Système International d'Unités. Those still using the cgs (centimetre-gram-second) or the inchpound system of units are referred for most of the conversion factors to [IEEE/ ASTM SI 10](#). Some conversion factors are listed in Section 6 of this document for convenient reference.

The dimensions of a quantity are the same regardless of the units in which the quantity is measured. Speed has the dimensions $[LT^{-1}]$ whether it is measured in miles per hour, feet per second, or metres per second. Quantities with different dimensions are not the same. Flow resistance and specific flow resistance, for instance, are quantities of different kinds even though the names are similar. On the other hand, quantities with the same dimensions are not necessarily of the same kind. Sound energy density, for instance, has the same dimensions as sound pressure, $[ML^{-1}T^{-2}]$, but it is not a kind of sound pressure. Nor is absorption with the dimensions $[L^2]$ a kind of area.

1. Scope

1.1 This terminology covers terms, related definitions, and descriptions of terms used or likely to be used in building and environmental acoustics standards. Definitions of terms are special-purpose definitions that are consistent with the standard definitions but are written to ensure that a specific building and environmental acoustics standard is properly understood and precisely interpreted. The primary focus of this document is upon terms, definitions and descriptions found within standards under the jurisdiction of ASTM Committee E33; however, terms, definitions and descriptions that are of general interest to the field of acoustics are also included.

1.2 This building and environmental acoustics standard cannot be used to provide quantitative measures.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.

1.4 *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

[C367/C367M Test Methods for Strength Properties of Prefabricated Architectural Acoustical Tile or Lay-In Ceiling Panels](#)

[C384 Test Method for Impedance and Absorption of Acoustical Materials by Impedance Tube Method](#)

[C423 Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method](#)

¹ This terminology is under the jurisdiction of ASTM Committee E33 on Building and Environmental Acoustics and is the direct responsibility of Subcommittee E33.07 on Definitions and Editorial.

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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.

- C522** Test Method for Airflow Resistance of Acoustical Materials
- C635/C635M** Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- C636/C636M** Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
- E90** Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- E336** Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings
- E413** Classification for Rating Sound Insulation
- E477** Test Method for Laboratory Measurements of Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers
- E492** Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
- E557** Guide for Architectural Design and Installation Practices for Sound Isolation between Spaces Separated by Operable Partitions
- E596** Test Method for Laboratory Measurement of Noise Reduction of Sound-Isolating Enclosures
- E756** Test Method for Measuring Vibration-Damping Properties of Materials
- E795** Practices for Mounting Test Specimens During Sound Absorption Tests
- E966** Guide for Field Measurements of Airborne Sound Attenuation of Building Facades and Facade Elements
- E989** Classification for Determination of Single-Number Metrics for Impact Noise
- E1007** Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures
- E1014** Guide for Measurement of Outdoor A-Weighted Sound Levels
- E1042** Classification for Acoustically Absorptive Materials Applied by Trowel or Spray
- E1050** Test Method for Impedance and Absorption of Acoustical Materials Using a Tube, Two Microphones and a Digital Frequency Analysis System
- E1110** Classification for Determination of Articulation Class
- E1111/E1111M** Test Method for Measuring the Interzone Attenuation of Open Office Components
- E1123** Practices for Mounting Test Specimens for Sound Transmission Loss Testing of Naval and Marine Ship Bulkhead Treatment Materials
- E1124** Test Method for Field Measurement of Sound Power Level by the Two-Surface Method
- E1130** Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index
- E1179** Specification for Sound Sources Used for Testing Open Office Components and Systems
- E1222** Test Method for Laboratory Measurement of the Insertion Loss of Pipe Lagging Systems
- E1264** Classification for Acoustical Ceiling Products
- E1265** Test Method for Measuring Insertion Loss of Pneumatic Exhaust Silencers
- E1289** Specification for Reference Specimen for Sound Transmission Loss
- E1332** Classification for Rating Outdoor-Indoor Sound Attenuation
- E1374** Guide for Office Acoustics and Applicable ASTM Standards
- E1414/E1414M** Test Method for Airborne Sound Attenuation between Rooms Sharing a Common Ceiling Plenum
- E1503** Test Method for Conducting Outdoor Sound Measurements Using a Statistical Sound Analysis System
- E1573** Test Method for Measurement and Reporting of Masking Sound Levels Using A-Weighted and One-Third-Octave-Band Sound Pressure Levels
- E1574** Test Method for Measurement of Sound in Residential Spaces
- E1686** Guide for Applying Environmental Noise Measurement Methods and Criteria
- E1704** Guide for Specifying Acoustical Performance of Sound-Isolating Enclosures
- E1780** Guide for Measuring Outdoor Sound Received from a Nearby Fixed Source
- E2179** Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors
- E2202** Practice for Measurement of Equipment-Generated Continuous Noise for Assessment of Health Hazards
- E2235** Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods
- E2249** Test Method for Laboratory Measurement of Airborne Transmission Loss of Building Partitions and Elements Using Sound Intensity
- E2459** Guide for Measurement of In-Duct Sound Pressure Levels from Large Industrial Gas Turbines and Fans
- E2611** Test Method for Normal Incidence Determination of Porous Material Acoustical Properties Based on the Transfer Matrix Method
- E2638** Test Method for Objective Measurement of the Speech Privacy Provided by a Closed Room
- E2963** Test Method for Laboratory Measurement of Acoustical Effectiveness of Ship Noise Treatments Laboratory Measurement of Acoustical Effectiveness for Marine Bulkhead and Deck Treatments
- E2964** Test Method for Measurement of the Normalized Insertion Loss of Doors
- E3090/E3090M** Test Methods for Strength Properties of Metal Ceiling Suspension Systems
- E3091** Specification for Systems to Measure Sound Levels
- E3133** Test Method for Laboratory Measurement of Floor Impact Sound Radiation Using the Tapping Machine (Withdrawn 2023)³
- E3222** Classification for Determination of High-frequency Impact Sound Ratings
- IEEE/ ASTM SI 10** Standard for Use of the International

³ The last approved version of this historical standard is referenced on www.astm.org.

System of Units (SI): The Modern Metric System

2.2 ASA/ANSI Standards:⁴

- ASA/ANSI S1.1-2013 Acoustical Terminology
- ASA/ANSI S1.4-2014, Part 1 / NAIS IEC 61672-1 Electroacoustics – Sound Level Meters – Part 1: Specifications
- ASA/ANSI S1.6-2016 Preferred Frequencies and Filter Band Center Frequencies for Acoustical Measurements
- ASA/ANSI S1.11-2014, Part 1/NAIS IEC 61260-1 Electroacoustics – Octave-Band and Fractional Octave-Band Analog and Digital Filters – Part 1: Specifications
- ANSI S1.43-1997 (R2007) Specifications For Integrating-Averaging Sound Level Meters
- ASA/ANSI S12.9-2013 Quantities And Procedures For Description And Measurement Of Environmental Sound – Part 1: Basic Quantities And Definitions

2.3 Other Standards:

- IEEE P260.4-2018 IEEE Standard for Letter Symbols and Abbreviations for Quantities Used in Acoustics
- ASME B1.20.1-2013 (R2018) Pipe Threads, General Purpose, Inch
- 2017 ASHRAE Handbook Fundamentals, Chapter 37, Measurement and Instruments
- ISO 9614-1:1993 Acoustics — Determination of Sound Power Levels of Noise Sources Using Sound Intensity — Part 1: Measurement at Discrete Points
- ISO 9614-2:1996 Acoustics — Determination of Sound Power Levels of Noise Sources Using Sound Intensity — Part 2: Measurement by Scanning
- ISO 9614-3:2002 Acoustics — Determination of Sound Power Levels of Noise Sources Using Sound Intensity — Part 3: Precision Method for Measurement by Scanning
- ISO 15186-1:2000 Acoustics — Measurement of Sound Insulation in Buildings and of Building Elements Using Sound Intensity — Part 1: Laboratory Measurements
- ISO 16283-1:2014 Acoustics — Field measurement of sound insulation in buildings and of building elements — Part 1: Airborne sound Insulation
- ISO/TR 25417:2007 Acoustics — Definitions of basic quantities and terms
- IEC 61043 Ed. 1.0 b:1993 Electroacoustics — Instruments For The Measurement Of Sound Intensity — Measurements With Pairs Of Pressure Sensing Microphones
- IEC 61094-4 (1995) Measurement Microphones Part 4: Specifications for Working Standard Microphones

3. Significance and Use

3.1 *Definitions*—Terms and related definitions given in Section 4 are intended for use uniformly and consistently in all building and environmental acoustic test standards in which they appear.

3.2 *Definitions of Terms Specific to Each Standard:*

3.2.1 As indicated in Section 4, terms and their definitions are intended to provide a precise understanding and interpretation of the building and environmental acoustic test standards in which they appear.

3.2.2 A specific definition of a given term is applicable to the standard or standards in which the term is described and used.

3.2.3 Different definitions of the same term are acceptable provided each one is consistent with and is not in conflict with the standard definition for the same term, that is, the general concept the term describes.

3.2.4 If a standard under the jurisdiction of ASTM Committee E33 specially defines a term, i.e. provides a definition different in any way from what is given in Section 4 of Terminology C634, that standard shall list the term and its description under the subheading, *Definitions of Terms Specific to This Standard*.

3.2.4.1 *Discussion*—The mandatory language of section 3.2.4 is consistent with the mandatory language from §E2 of Form and Style for ASTM Standards (April 2020) and with the ASTM Committee E33 bylaws in place when this standard was published; it reflects a situation that exists, it does not prescribe anything.

3.3 Definitions for some terms associated with building and environmental acoustic issues and not included in Terminology C634 are found in ISO/TR 25417 or IEEE P260.4. When discrepancies exist, the definition in Terminology C634 shall prevail.

4. Terminology

4.1 Terms and their standard definitions within the scope of this standard are given in Section 4 in alphabetical order. Appendix X1 contains the definitions of terms from the “Definitions of Terms Specific to This Standard” sections from all standards under the jurisdiction of ASTM Committee E33.

4.2 Discussions associated with definitions are printed directly under the appropriate definition. The date following each definition or discussion indicates the year of introduction or of latest revision of that particular definition or discussion.

4.2.1 *Discussion*—If the year of introduction or last review of the term and its definition or discussion is unknown, the year stated indicates the year the definition or discussion was brought into compliance with this paradigm.

4.3 If the exact term sought by the user cannot be found in 4.4, it is possible that the term may exist within Section 5, Compound Terms.

4.4 *Terms and their Definitions:*

acoustic impedance, $Z[ML^{-4}T^{-1}]$, (mks acoustic ohm or Pa·s/m³), *n*—of a surface, for a given frequency, the complex quotient obtained when the sound pressure averaged over the surface is divided by the volume velocity through the surface. The real and imaginary components are called, respectively, **acoustic resistance** and **acoustic reactance**.

$$Z = R + jX \quad (1)$$

where:

R = the real component of acoustic impedance, and
X = the imaginary component of acoustic impedance.

(2021)

acoustical barrier, *n*—contiguous objects such as solid walls, buildings, or earthen berms that substantially block the direct

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