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ASA Catalog 2-1980

# ACOUSTICAL SOCIETY OF AMERICA

## Catalog of Acoustical Standards

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# ACOUSTICAL SOCIETY OF AMERICA

## Standards

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The Standards Program of the Acoustical Society of America is the responsibility of ASA's Committee on Standards (ASACOS) and is executed by the ASA's Standards Secretariat, headed by its Standards Manager. The ASA's Committee on Standards, in its responsibility for the overall Standards Publishing Program of the Acoustical Society, has appointed a Publishing Subcommittee. The Standards Manager, with the advice of the Standards Director and the Publishing Subcommittee of ASACOS, is charged with execution of the Standards Publishing Program. The ASACOS Subcommittee on Publishing is constituted as follows:

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**Catalog of Acoustical Standards  
No. 2-1980**

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## AMERICAN NATIONAL STANDARDS ON ACOUSTICS

The Acoustical Society of America is the Secretariat for American National Standards Committees S1 on Physical Acoustics, S2 on Mechanical Shock and Vibration, and S3 on Bioacoustics. Standards developed by these committees, which have wide representation from the technical community (manufacturers, consumers, and general-interest representatives alike) are published by the Acoustical Society of America as American National Standards after approval by their individual standards committee and by the American National Standards Institute. The Acoustical Society of America is also responsible for the international activities of ISO/TC 43 on Acoustics, for which S1 and S3 serve as the technical advisory groups. ASA also administers the international secretariat of ISO/TC 108 on Mechanical Vibration and Shock (on behalf of the American National Standards Institute) and provides the U.S. input via the technical advisory group for ISO/TC 108, which is Standards Committee S2.

These standards are developed as a public service to provide standards useful to the public, industry, and consumers, and to federal, state, and local governments. Standards are produced in three areas: Physical Acoustics, Mechanical Shock and Vibration, and Bioacoustics, and are reaffirmed or revised every five years. The latest information on current ANSI standards as well as those under preparation is available from the Standards Secretariat.

The Standards Program of the Acoustical Society of America is the responsibility of the ASA's Committee on Standards (ASACOS) and is executed by ASA's Standards Secretariat, headed by its Standards Manager. If you wish to have further information on the Standards Publication Program of the Acoustical Society, address your inquiries to:

Standards Manager  
Standards Secretariat  
Acoustical Society of America  
335 East 45th Street  
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## WHAT'S NEW IN STANDARDS • JANUARY 1980

This is the first revision of the ASA Standards Catalog which was first published in 1979. Eight standards and one draft standard were approved in 1979 and are listed in this Catalog. A revision of the ASA Noise Standards Index has also been prepared. New publications listed in this Catalog are:

- ANSI S1.25—1978 (ASA 25) American National Standard Specification for Personal Noise Dosimeters
- ANSI S1.29—1979 (ASA 29) American National Standard Method for the Measurement and Designation of Noise Emitted by Computer and Business Equipment
- ANSI S1.30—1979 (ASA 10) American National Standard Guidelines for the Use of Sound Power Standards and for the Preparation of Noise Test Codes
- ANSI S1.35—1979 (ASA 15) American National Standard Precision Methods for the Determination of Sound Power Levels of Noise Sources in Anechoic and Hemi-Anechoic Rooms
- ANSI S1.36—1979 (ASA 16) American National Survey Methods for the Determination of Sound Power Levels of Noise Sources
- Draft ANSI S1.39 (ASA 30) Draft American National Standard Guidelines for the Preparation of Standard Procedures for the Measurement of Source Sound Emission
- ANSI S2.31—1979 (ASA 31) American National Standard Method for the Experimental Determination of Mechanical Mobility, Part I: Basic Definitions and Transducers
- ANSI S3.18—1979 (ASA 38) American National Standard Guide for the Evaluation of Human Exposure to Whole-Body Vibration
- ANSI S3.25—1979 (ASA 39) American National Standard for an Occluded Ear Simulator
- ASA STDS INDEX—INDEX TO NOISE STANDARDS  
No. 2—1980 (Revision of ASA Index 1—1976)

As standards are approved (by ANSI and ASA) and published by the Acoustical Society of America, they are announced in the *Journal of the Acoustical Society of America* (JASA) in the bimonthly Standards News Section, which is edited by George Maling and Avril Brenig. Not only new standards, but developments in the process of standardization are continually reported and updated as new technological steps are taken.

For those wishing to subscribe to **Standards News** or to be on the mailing list to receive timely notification of newly published standards as they are published, please write to:

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Acoustical Society of America  
335 East 45th Street  
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## SUBJECT INDEX

The scopes of American National Standards Committees S1, S2, and S3, respectively, are as follows:

### AMERICAN NATIONAL STANDARDS COMMITTEE S1, ACOUSTICS

Standards, specifications, methods of measurement and test, and terminology, in the fields of physical acoustics, including noise, architectural acoustics, electroacoustics, sonics and ultrasonics, and underwater sound, but excluding those aspects which pertain to safety, tolerance, and comfort.

### AMERICAN NATIONAL STANDARDS COMMITTEE S2, MECHANICAL SHOCK AND VIBRATION

Standards, specifications, methods of measurement and test, and terminology, in the fields of mechanical shock and vibration, but excluding those aspects which pertain to biological safety, tolerance, and comfort.

### AMERICAN NATIONAL STANDARDS COMMITTEE S3, BIOACOUSTICS

Standards, specifications, methods of measurement and test, and terminology, in the fields of psychological and physiological acoustics, including aspects of general acoustics, noise, shock and vibration which pertain to biological safety, tolerance, and comfort.

Standards on the three subjects covered by the above three American National Standards Committees, respectively, are detailed below:

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**ACOUSTICAL STANDARDS PUBLISHED BY THE  
ACOUSTICAL SOCIETY OF AMERICA**

(where an ANSI No. is given the Standard is an American National Standard)

**ASA STDS INDEX 2-1980  
INDEX TO NOISE STANDARDS**

This index contains a world-wide listing of standards which are important in the measurement and evaluation of noise. The index provides access to the key national and international standards related to noise; it does not cover government regulations which are adequately compiled elsewhere. (Revision of ASA Stds Index 1-1976.

The index classifies the standards as follows:

Primary Noise Standards and Test Codes--Methods of Noise Measurement and Rating, Instrumentation Standards--Instruments used for the Measurement and Evaluation of Noise, Other Related Standards, Terminology, Physiological and Psychological Acoustics, etc. The index contains International Standards, American National Standards, other U.S. standards, and other national standards (non-U.S.). 40 pp. ASA Stds Index 2-1980.

**ANSI S3.19-1974**

**American National Standard Method for the Measurement of Real-Ear Protection of Hearing Protectors and Physical Attenuation of Earmuffs**

This standard specifies the psychophysical procedures, physical requirements, and means of reporting results for measuring the protective and attenuation characteristics of wearable devices that are used to protect the auditory system against excessive sound. 9 pp. ASA Catalog No. 1-1975.

**ANSI S2.19-1975**

**American National Standard for the Balance Quality of Rotating Rigid Bodies**

This standard makes recommendations concerning the balance quality of rotating rigid bodies, particularly as it relates to the permissible residual unbalances as a function of the maximum service speed.

It includes a tentative classification of various types of representative rotors in which the rotor groups are associated with ranges of recommended balance quality grades. 9 pp. ASA Catalog No. 2-1975.

**ASA STD 3-1975**

**Test-Site Measurement of Maximum Noise Emitted by Engine-Powered Equipment**

This standard presents test-site measurement methods for determining the maximum noise emitted by motor vehicles, public conveyances, construction and industrial machinery, and residential and recreational devices powered by engines operating on petroleum-based fuels, coal, steam, electricity, or other sources of energy. 8 pp.

The test methods are intended for application to certification testing by the manufacturer, conformance testing by community agencies and survey testing for community noise intrusion. This standard is not intended as a basis for enforcement purposes at any location other than a qualified test site. 8 pp. ASA Catalog No. 3-1975.

**ANSI S3.17-1975**

**American National Standard Method for Rating the Sound Power Spectra of Small Stationary Noise Sources**

This standard has been prepared to provide a single number rating for the noise emitted by a small stationary noise source based on its sound power spectrum. The rating number is intended to be readily interpretable by the consumer as a measure of the unwantedness or noisiness of a sound emitted by various products which are essentially stationary as opposed to those which are essentially mobile, such as vehicles used for transportation. The rating has been designed for application to all equipment and appliances used in and around the home, such as vacuum cleaners, electric mixers, fans, blenders, electric dishwashers, electric hedge clippers and the like. The resulting single-number rating is in a form which can be related easily to the sound level of other familiar sources such as speech, automobiles, etc. 4 pp. ASA Catalog No. 4-1975.

**ANSI S1.23-1976**

**American National Standard Method for the Designation of Sound Power Emitted by Machinery and Equipment**

This standard describes a method for expressing the noise emissions of machinery and equipment in a convenient manner. The description may be by way of labels, equipment specifications, or other documentation that expresses, in quantitative terms, the noise emission of a product or device. The standard applies to all machinery and equipment which is essentially stationary in nature and for which a sound power spectrum may be determined. It is not applicable to devices which operate in conjunction with ducts and piping systems. The designation described in this standard is based on the A-weighted sound power emitted by the source. 3 pp. ASA Catalog No. 5-1976.

**ANSI S2.9-1976**

**American National Standard Nomenclature for Specifying Damping Properties of Materials**

This standard presents the preferred nomenclature (parameters, symbols, and definitions) for specifying the damping properties of uniform materials and uniform specimens where "uniform" implies homogeneity on a macroscopic scale. For reference purposes, certain non-standard damping parameters are discussed. Also included is a classification of damping test parameters. The primary purpose for this standard nomenclature is to improve communications among the many technological fields concerned with material damping. 8 pp. ASA Catalog No. 6-1976.



**ANSI S3.22-1976**

**American National Standard Specification of Hearing Aid Characteristics**

This standard is intended to meet the need for specifications of hearing and performance parameters and their tolerances. The quantities suggested for specification and tolerance are considered to be useful for specifying, selecting, or fitting a hearing aid.

This standard is limited to the specification of electroacoustical characteristics. It is felt that further study is required before standard test procedures relating to mechanical and environmental performance can be established. 7 pp. ASA Catalog No. 7-1976.

**ANSI S2.4-1976**

**American National Standard Method for Specifying the Characteristics of Auxiliary Analog Equipment for Shock and Vibration Measurements**

This standard provides a uniform terminology and format for the presentation of the performance and other characteristics of auxiliary analog equipment for shock and vibration measurements. This standard will provide the manufacturer with a format that he can use in presenting the performance of his equipment and will provide the equipment user with a standard terminology for requesting information from the manufacturer. As a result of this standard, it is expected that the user will obtain a uniform, accurate, and more precise description of the characteristics of the auxiliary equipment. 10 pp. ASA Catalog No. 8-1976.

**ANSI S3.1-1977 (a revision of ANSI S3.1-1960)**

**American National Standard Criteria for Permissible Ambient Noise during Audiometric Testing**

This standard specifies the maximum ambient sound pressure levels in an audiometer room that will produce negligible masking of pure tones presented at the reference threshold sound pressures specified in International Standard ISO 389-1975 Acoustics, "Standard Reference Zero for the Calibration of Pure Tone Audiometers," and the American National Standard S3.6-1969, "Specifications for Audiometers." 8 pp. ASA Catalog No. 9-1977.

**ANSI S3.14-1977**

**American National Standard for Rating Noise with Respect to Speech Interference**

This standard defines a simple numerical method for rating the expected speech-interfering aspects of noise using acoustical measurements of the noise. The relevant acoustical characteristics of the noise are summarized in terms of a single-valued index known as the speech-interference level. 6 pp. ASA Catalog No. 21-1977.

**ANSI S3.21-1978**

**American National Standard Method for Manual Pure-Tone Threshold Audiometry**

Pure-tone threshold audiometry is the procedure used in the assessment of an individual's threshold of hearing for pure tones. Pure-tone threshold audiometry includes manual air-conduction measurements of octave intervals from 250 through 8000 Hz and at intermediate frequencies as needed. When abrupt differences of 20 dB or more occur between adjacent octave frequencies, additional frequencies may be included at the discretion of the tester. Bone-conduction measurements may be carried out if indicated by the test requirements at octave intervals from 250 through 4000 Hz. Also, when required, masking is to be used. The purpose of this standard is to present procedures for conducting manual pure-tone threshold audiometry whose uses will minimize interest differences based on test method. 7 pp. ASA Catalog No. 19-1978.

**ANSI S1.26-1978**

**American National Standard Method for the Calculation of the Absorption of Sound by the Atmosphere**

The standard provides tables of absorption coefficients at single frequencies over the following ranges of parameters:

- frequencies, 50-10000 Hz;
- temperature, 0°-40° C
- relative humidity, 10%-100%;
- atmospheric pressure, sea level.

A method is also defined for predicting absorption loss of bands of noise.

For most practical applications encountered in engineering acoustics, including evaluation of outdoor sound propagation and sound absorption within large rooms, the conditions encountered fall within the above range, where the values of air absorption loss are expected to be accurate within  $\pm 10\%$ . In addition, the standard provides all the definitive equations necessary to compute absorption loss for conditions outside this range with potentially reduced accuracy. 28 pp. ASA Catalog No. 23-1978.

**Draft ANSI S1.27**

**Draft American National Standard E-Weighting Network for Noise Measurement**

This standard defines a weighting characteristic designated *E*. This draft standard is issued for comment and criticism to help insure that all those who use an *E*-weighting response will be using essentially the same frequency characteristics. 3 pp. ASA Catalog No. 26. (Available only until August 1980.)

**ANSI S1.25-1978**

**American National Standard Specification for Personal Noise Dosimeters**

This standard contains specifications for performance characteristics of personal noise dosimeters which may be used to determine the noise exposure of people. The standard makes provision for two or more exchange rates, the trading of exposure duration with exposure level, to accommodate various governmental regulations. The standard provides tolerances for the entire instrument, including frequency, exponential averaging, threshold, dynamic range, and other characteristics. 8 pp. ASA Catalog No. 25-1978.

**ANSI S1.29-1979**

**American National Standard Method for the Measurement and Designation of Noise Emitted by Computer and Business Equipment**

This standard defines uniform procedures for measuring and reporting the noise emissions of computer and business equipment. The sound power produced by the equipment is determined and reported by using the noise power emission level in bels. The *A*-weighted sound pressure level at the operator's position is also reported. The standard covers general methods for installing and mounting equipment, operation of the equipment during the test, and environmental conditions during the measurements. Procedures for identifying discrete frequency components and impulsive noise are also described. 7 pp. ASA Catalog No. 29-1979.

**ANSI S1.30-1979**

**American National Standard Guidelines for the Use of Sound Power Standards and for the Preparation of Noise Test Codes**

This standard introduces a series of six standards specifying various methods for determining the sound power levels of machines and equipment. When applying these six standards to sound measurements on specific machines, it is necessary to decide which one or more of these standards is most appropriate for the purpose of the test. It is also necessary to decide on specific details for mounting and operating the machine to be tested within the general principles stated in the standards. Guidelines for making these decisions are provided in this standard. These guidelines are essential for the proper application of these acoustical measurement standards and for the preparation of specific sound test codes for various types of machines and standards and for the preparation of specific sound test codes for various types of machines and equipment. 11 pp. ASA Catalog No. 10-1979.

**ANSI S1.35-1979**

**American National Standard Precision Methods for the Determination of Sound Power Levels of Noise Sources in Anechoic and Hemi-Anechoic Rooms**

This standard describes a precision method for determination of the sound power levels of noise sources in laboratory anechoic or hemi-anechoic rooms.

The standard contains information on instrumentation, installation and operation of the source, methods for determination of the sound power level on the measurement surface, procedures for the calculation of sound power level, directivity index, and directivity factor, and techniques that may be used to qualify the laboratory facilities used for the measurements. 19 pp. ASA Catalog No. 15-1979.

**ANSI S1.36-1979**

**American National Standard Survey Methods for the Determination of Sound Power Levels of Noise Sources**

This standard describes a survey method for determination of the sound power level of noise sources in indoor or outdoor environments. The standard contains information on instrumentation, installation and operation of the source, procedures for the selection of a measurement surface, methods for the determination of sound pressure level on the measurement surface, procedures for the calculation of sound power level, and techniques that can be used to qualify the measurement environment. 12 pp. ASA Catalog No. 16-1979.

**DRAFT ANSI S1.39**

**Draft American National Standard Guidelines for the Preparation of Standard Procedures for the Measurement of Source Sound Emission**

This draft standard contains guidelines for the preparation of procedures (standards, test codes, recommended practices, etc.) for measurement of source sound emission. Included are the general questions that need to be considered by a group during development of a measurement procedure. Guidelines on the following subjects are included: prefatory material, measurement conditions, measurement operations, data reduction, preparation of a test report, and guidelines for the selection of a descriptor for sound source emission. 19 pp. ASA Catalog No. 30-1979.

**ANSI S2.31-1979**

**American National Standard Method for the Experimental Determination of Mechanical Mobility. Part I: Basic Definitions and Transducers**

This standard is the first part of a series of five standards covering the experimental determination of mechanical mobility of structures by a variety of methods appropriate for different test situations. The present Part I of this series covers basic concepts and definitions and serves as a guide for the selection, calibration and evaluation of the transducers and instruments used in mobility measurements. The material in Part I is common to most mobility measurement tasks. This document supersedes ANSI S2.6-1963(R1976).

The present document (Part I of this series) has four appendices containing selected references to the literature, a discussion of the relationships between mechanical mobility and impedance, a discussion of mobility as a frequency

response function, and conversion factors from SI to conventional English units as applicable to mobility and related ratios. 17 pp. ASA Catalog No. 31-1979.

**ANSI S3.18--1979**

**American National Standard Guide for the Evaluation of Human Exposure to Whole-Body Vibration**

This guide gives numerical values for limits of exposure for vibrations transmitted from solid surfaces to the human body in the frequency range 1 to 80 Hz. It may be applied, within the specified frequency range, to periodic vibrations and to random or nonperiodic vibrations with a distributed frequency spectrum. Provisionally, it may also be applied to continuous shock-type excitation insofar as the energy in question is contained within the 1-80 Hz band.

These boundaries (defined in detail in clause 4) are given for use according to the three generally recognizable criteria of preserving comfort, working efficiency, and safety or health. The boundaries set according to these criteria are named, respectively, the "reduced comfort boundary", "fatigue-decreased proficiency boundary," and the "exposure limit." For example, where the primary concern is to maintain the working efficiency of a vehicle driver or a machine operator working in vibration, the "fatigue-decreased proficiency boundary" would be used as the guiding limit in laying down vibration specifications or in carrying out vibration control measures, while, in the design of passenger accommodations, the "reduced comfort boundary" should be considered. (Counterpart to ISO 2631.) 15 pp. ASA Catalog No. 38-1979.

**ANSI S3.25--1979**

**American National Standard for an Occluded Ear Simulator**

The physical configuration and acoustical performance of an occluded ear simulator are specified. This device is designed to simulate the acoustical behavior of that portion of the ear canal between the tip of an earmold and the eardrum, including the acoustic impedance at the eardrum of a median adult human ear over the frequency range from 100 Hz to 10 kHz. The occluded ear simulator is suitable especially for transducers which are sensitive to acoustic load. Specific physical realizations of the ear simulator are described. 8 pp. ASA Catalog No. 39-1979.

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**ANSI S1.1-1960 (R1976)**  
**American Standard Acoustical Terminology**

This standard is a reference document for acoustical terminology, including general terms used in acoustics, various types of levels used in acoustics, terms dealing with oscillation, vibration, and shock, transmission and propagation, complex parameters of linear systems, transducer and instruments, transducer parameters, recording and reproducing, and underwater sound. The standard also includes terms used in sonics, architectural acoustics, hearing and speech, music, and acoustical units. 62 pp.

**ANSI S1.2-1962 (R1976)**  
**American Standard Method for the Physical Measurement of Sound**

This standard contains techniques for measurement of sound pressure level and sound power level. The sections in the document dealing with sound pressure level measurements have been superseded by ANSI S1.13-1971 (R1976). The sections dealing with sound power level in a reverberant environment have been superseded by ANSI S1.21-1972. The sections dealing with sound power level in a free field or in a free field over a reflecting plane will be superseded by several documents now under development. 23 pp.

**ANSI S1.4-1971 (R1976)**  
**American National Standard Specification for Sound Level Meters**

This standard defines the characteristics of sound level meters used for sound and noise measurements. It details four basic types of sound level meter: type 1--Precision; type 2--General Purpose; type 3--Survey; and type S--Special Purpose. Tolerances on the response of the instrument as a function of frequency are given and a section is devoted to sensitivity, stability, checks, etc. 22 pp.

**ANSI S1.6-1967 (1976)**  
**American National Standard Preferred Frequencies and Band Numbers for Acoustical Measurements**

This standard defines preferred frequencies in hertz for octave, 1/2 octave and 1/3 octave center frequencies together with the band number corresponding to each preferred frequency. 11 pp.

**ANSI S1.8-1969 (R1974)**  
**American National Standard Preferred Reference Quantities for Acoustical Levels**

This standard defines preferred reference quantities for various acoustical levels in gases, liquids, and other media. The reference levels defined are for sound pressure level, vibratory acceleration level, vibratory velocity level, vibratory displacement level, vibratory force level, power level, intensity level, energy density level, and energy level. 10 pp.

**ANSI S1.10-1966 (R1976)**  
**American National Standard Method for the Calibration of Microphones**

In this standard, methods are described for performing absolute and comparison calibrations of laboratory standard microphones specified in American National Standard Specification for Laboratory Standard Pressure Microphones. Absolute calibration is based upon the reciprocity principle. Techniques for performing pressure (coupler) free-field, and random-field calibrations are described, including experimental procedures. The free-field and random-field calibration techniques may also be used for calibrating microphones not described in the standard above. 35 pp.

**ANSI S1.11-1966 (R1976)**

**American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets**

The purpose of this standard for filter sets is to specify particular bandwidths and characteristics which may be used to ensure that all analyses of noise will be consistent within known tolerances when made with similar filter sets meeting these specifications. This standard is suited to the requirements for analyzing, as a function of frequency, a broadband electrical signal. For acoustical measurements, an electro-acoustic-transducer and amplifier are employed to convert the acoustical signal to be analyzed into the required electrical signal. The standard defines filter shapes for octave band, one-half octave bands and one-third octave bands. 23 pp.

**ANSI S1.12-1967 (R1977)**

**American National Standard Specifications for Laboratory Standard Microphones**

This standard describes types of laboratory microphones that are suitable for calibration by an absolute method such as the reciprocity technique described in ANSI Standard S1.10-1966 (R1976). These microphones are intended for use as acoustical measurement standards either in a free-field or in conjunction with a variety of devices such as artificial voices and couplers for calibrating earphones or microphones. Specifications for ideal microphones and for practical laboratory standard microphones are described. 11 pp.

**ANSI S1.13-1971 (R1976)**

**American National Standard Methods for the Measurement of Sound Pressure Levels**

This standard is concerned with the measurement of sound pressure levels in air under a variety of conditions. The sound to be measured is frequently undesired (that is, noise). The basic purpose of this standard is to establish uniform procedures for obtaining sound pressure level data. The standard contains guidance for the type of instrumentation to be used, the type of measurement to be made, guidelines for installation and operation of sources, techniques for measuring steady and non-steady noise, corrections to be applied on source measurements, qualification procedures for indoor environments, and techniques for reporting data. An appendix also contains techniques for the identification of prominent discrete tones. 34 pp.

**ANSI S1.20-1972 (R1977)**

**American National Standard Procedures for Calibration of Underwater Electroacoustic Transducers**

This standard establishes measurement procedures for calibrating underwater electro-acoustic transducers and describes forms for presenting the resulting data. Procedures are specified for determining the measurable characteristics of free-field sensitivity, transmitting response, directional response, impedance, dynamic range, equivalent noise pressure level, and overload pressure level. Equations are given for obtaining the derived characteristics directivity factor, directivity index, efficiency, theoretical equivalent noise pressure level, and quality factor (Q). 40 pp.

**ANSI S1.21-1972**

**American National Standard Methods for the Determination of Sound Power Levels of Small Sources in Reverberation Rooms (partial revision of ANS S1.2-1972)**

This standard describes a direct method and a comparison method for determining the sound power level produced by a source. This standard contains test room requirements, source location, and operating conditions, instrumentation, and techniques for obtaining an estimate of the mean-square sound pressure from which the sound power level of the source in octave or one-third octave bands is calculated. It is intended to provide techniques

for acoustical measurements that can be used in test codes for particular types of equipment. 24 pp.

**ANSI S2.2-1969 (R1976)**

**American National Standard Methods for the Calibration of Shock and Vibration Pickups**

This standard is designed to acquaint the user with the general principles of calibration of shock and vibration pickups and to describe concisely several standard methods which have proven to give reliable and reproducible results. Five methods are described as standard methods for the calibration of acceleration, velocity, and displacement pickups. 39 pp.

**ANSI S2.3-1964 (R1976)**

**American National Standard Specifications for a High-Impact Shock Machine for Electronic Devices**

This standard specifies procedures for the assembly, maintenance, calibration, and operation of the basic fly-weight machine. The purpose of this standard is to assure reasonably uniform performance among machines of this type. 13 pp.

**ANSI S2.5-1962 (R1976)**

**American National Standard Recommendations for Specifying the Performance of Vibration Machines**

This standard provides specifications for the presentation of information covering the characteristics of vibration machines. The intent of the specifications is to ensure the user of receiving an accurate description of the characteristics of a particular machine. Three types of vibration machines are considered: the mechanical direct-drive; the mechanical reaction type, which includes the vibration exciter and vibration machine as separate items; and the electrodynamic machine. 22 pp.

**ANSI S2.7-1964 (R1976)**

**American National Standard Terminology for Balancing Rotating Machinery**

This standard on terminology includes the collections of terms which are currently used in the United States by engineers and others to describe the physical objects and processes related to balancing rotating machinery. In Appendix A of this standard, an engineering precis is included in which the terms are related to the basic principles of balancing rotors. 21 pp.

**ANSI S2.8-1972 (R1978)**

**American National Standard Guide for Describing the Characteristics of Resilient Mountings**

The Guide sets forth suggestions as to subject matter and format for describing resilient mountings so that there will be a clear understanding by both the user and the manufacturer. Since the intention of this standard is to encourage better communication between the manufacturer and the user, the material in this standard should be regarded as a guide rather than a rigid specification. 12 pp.

**ANSI S2.10-1971 (R1976)**

**American National Standard Methods for Analysis and Presentation of Shock and Vibration Data**

This standard is designed to acquaint the user with general principles of the analysis and presentation of shock and vibration data and to describe concisely several methods of reducing data to a form that can be applied and used in subsequent analyses. The standard includes references to the technical literature for elucidation of applicable mathematical principles or, where ready explanations are not available in the literature, an outline of applicable principles. 28 pp.



**ANSI S2.11—1969 (R1978)**  
**American National Standard for the Selection of Calibrations and Tests for Electrical Transducers used for Measuring Shock and Vibration**

This standard identifies the calibrations, environmental tests, and physical measurements necessary to establish the suitability of commonly-employed transducers used for measuring mechanical shock and vibration. The tests and calibrations presented in this standard are intended to provide the technical information necessary for judgment as to suitability of a particular transducer design in a specific measurement application. This standard includes considerations relevant to commonly-employed electromechanical shock and vibration measurement transducers, but not to those transducers primarily designed for the measurement of acoustic or pressure phenomena. 19 pp.

**ANSI S2.14—1973 (R1978)**  
**American National Standard Methods for Specifying the Performance of Shock Machines**

The purpose of this standard is to provide specification guidance covering the characteristics of shock machines. It is intended to ensure that the potential user of a particular shock machine is provided with an adequate description of the characteristics of the machine. 48 pp.

**ANSI S2.16—1972 (R1977)**  
**American National Standard Specification for the Design, Construction, and Operation of Class III (High-Impact) Shock-Testing Machine for Lightweight Equipment**

This American National Standard describes the design and construction of a class III (High-Impact) Shock-Testing Machine. By means of this standardized design, the ability of various types of equipment to withstand shock loadings may be compared. This standard also outlines recommended test procedures, but does not attempt to establish criteria for acceptance or rejection of specimens shock-tested by the machine. Such criteria are left for the specifications which govern the apparatus tested. 20 pp.

**ANSI S3.2—1960 (R1976)**  
**American National Standard Method for Measurement of Monosyllabic Word Intelligibility**

This standard describes the procedures to be followed in conducting intelligibility tests which employ monosyllabic words lists. The purpose of this standard is (1) to specify the speech material and the methods to be used in these tests, and (2) to note the variables to be controlled during the measurement and to be evaluated in the report. 19 pp.

**ANSI S3.3—1960 (R1976)**  
**American National Standard Methods for Measurement of Electroacoustical Characteristics of Hearing Aids**

The purpose of this standard is to describe practicable and reproducible methods for determining physical performance characteristics of ear-conduction hearing aids that use electronic amplification and acoustic coupling to the ear canal by means of ear inserts, e.g., ear molds or similar devices. This standard does not apply when automatic gain control is in use. The methods specified in this standard give information on the measurement of: characteristics of the gain control (optional); effect of tone-control positions on frequency response; frequency response of the hearing aid; saturation sound pressure level in the coupler; full-on acoustic gain; effect of power-supply voltage variation on acoustic gain (optional); harmonic distortion; and battery current. The acoustical test procedure is based on the free-field technique in which the hearing aid is placed in a plane progressive wave with the earphone coupled to a standardized coupler. 15 pp.

**ANSI S3.4-1968 (R1972)**

**American National Standard Procedure for the Computation of Loudness of Noise**

This standard specifies a simplified procedure for calculating the loudness of certain classes of noise. The procedure is widely known as Stevens' Mark VI method. In the application of the procedure, it is assumed that the spectrum of the sound has been measured in terms of sound pressure level in one-third octave, one-half octave or octave bands. Each band level is converted into a loudness index and the total loudness in sones is then computed by means of an empirical formula. The total loudness thus calculated may be converted into a calculated loudness level in phons. 11 pp.

**ANSI S3.5-1969 (R1970)**

**American National Standard Methods for the Calculation of the Articulation Index**

Methods have been developed for computing a physical measure that is highly correlated with the intelligibility of speech and evaluated by speech perception tests administered to a given group of talkers and listeners. This measure is called the Articulation Index, or AI. The purpose of this standard is to prescribe procedures for computing an AI and to provide functions relating to AI and speech intelligibility scores obtained with male talkers. 24 pp.

**ANSI S3.6-1969 (R1973)**

**American National Standard Specifications for Audiometers**

The audiometers covered in this specification are devices designed for use in determining the hearing threshold level of an individual, in comparison with a chosen standard reference threshold level, primarily for the purpose of identification of hearing deficiencies of the individual. The standard places general requirements on earphones, head bands, shock hazard and warm-up time and in addition describes requirements for both pure tone audiometers and speech audiometers. 22 pp.

**ANSI S3.7-1973**

**American National Standard Method for Coupler Calibration of Earphones**

This standard specifies and describes earphone couplers that are in current use, together with their capabilities and limitations, and presents method for the coupler calibration of earphones. Most of these methods are applicable to precision point-by-point determination or to automatic data recording. The methods provide a simple, convenient and reproducible means for determining the acoustical output of earphones. Each of the couplers described in the standard has been designed for use with a specific class of earphone. When so used, the couplers have acoustic input impedances which, over a limited frequency range, are approximately equal to the corresponding impedances of the average human ear under the specified conditions. 32 pp.

**ANSI S3.8-1967 (R1978)**

**American National Standard Method of Expressing Hearing Aid Performance**

This standard specifies an averaging method for arriving at a single number for the gain and output of a hearing aid. It also specifies that a response curve having a specific scale ratio be displayed with the average gain number, and describes a method for stating the frequency range of an aid. It supplements ANSI 3.3-1960 (R1976), ANSI Methods for Measurement of Electroacoustical Characteristics of Hearing Aids. 7 pp.

**ANSI S3.13—1972 (R1977)**

**American National Standard Artificial Head-Bone for the Calibration of Audiometer Bone Vibrators**

The purpose of this standard is to specify the mechanical impedance characteristic of an artificial headbone that would be incorporated into devices used in calibrating audiometer bone vibrators. The standard also specifies the vibrator tip size and shape, as well as the static force of application for which the standardized mechanical impedance characteristics apply. The characteristics of an interim head-bone device presently used for audiometer bone-vibrator calibration are stated in the Appendix and corresponding interim reference threshold levels are given. 12 pp.

**ANSI S3.20—1973 (R1978)**

**American National Standard Psychoacoustical Terminology**

This standard is a comprehensive exposition of terminology used in psychoacoustics. The standard incorporates many of the existing definitions in American National Standards and recommendations of the International Organization for Standardization, and, insofar as possible, it is consistent with the current draft of the physiological and psychological acoustics section of the International Electrotechnical Vocabulary. 67 pp.

**ANSI S3-W—38-1960**

**The Effects of Shock and Vibration on Man**

This report, a review of the effects of shock and vibration on man, covers a very broad scope. It deals with three problems: (1) the determination of the structure and properties of the human body considered as a mechanical as well as a biological system; (2) the effects of shock and vibration forces on this system; and (3) the protection required by the system under various exposure conditions and the means by which this protection is to be achieved. Standards Committee on Bioacoustics, S3, recommends dissemination of the report as pertinent background and reference material on human vibration research, until such time as more definite guidance on permissible vibration exposure can be provided through a standard. 55 pp.

**ANSI Z24.21—1957 (R1978)**

**American National Standard Method for Specifying the Characteristics of Pickups for Shock and Vibration Measurement**

This standard provides specifications for the presentation of information covering the characteristics of vibration and shock pickups. The intent of these specifications to ensure that the user receive a clear-cut and accurate description of the characteristics of a particular vibration pickup. 19 pp.

**ANSI Z24-X-2**

**The Relation of Hearing Loss to Noise Exposure**

This report on the relationship between hearing loss and noise exposure was published in 1954 and is available for historical purposes only. The report covers continuous exposure to steady noise, intermittent exposure to steady noise and intermittent exposure to non-steady noise. 61 pp.

**ANSI STANDARDS PLANNING PANEL ON NOISE ABATEMENT AND CONTROL**  
**Assessment of and Recommendations for Standards for Noise Abatement and Control**

This report, prepared in March 1978 by the ANSI Standards Planning Panel on Noise Abatement and Control, contains a critical summary of the status of and needs for standardization in noise exposures, abatement, and control, with particular emphasis on activities related to environmental and occupational noise. It also presents a plan for developing needed standards. 36 pp.

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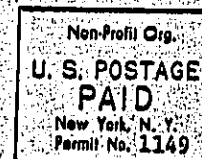
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