ANSI S1.25-1991
(ASA 98-1991)
[Revision of ANSI S1.25-1978]

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AMERICAN NATIONAL STANDARD
Specification for Personal Noise Dosimeters

ACCREDITED STANDARDS COMMITTEE S1, ACOUSTICS

ABSTRACT

This Standard contains specifications for performance characteristics of personal noise dosimeters which measure the percentage criterion sound exposure. The Standard makes provision for three exchange rates: 3 dB, 4 dB, and 5 dB per doubling of exposure time. The Standard provides tolerances for the entire instrument including frequency response, exponential averaging (employing SLOW and FAST), threshold, dynamic range, and other characteristics. It specifies that these tolerances be attained by the instrument in a random incidence sound field without the presence of a person wearing the instrument.

CORRECTION NOTICE FOR ANSI S1.25-1991

PLEASE NOTE THAT 1991 IS THE APPROVAL YEAR FOR ANSI S1.25-1991 (AND NOT 1992 AS IS LISTED ON THE TOP OF SOME PAGES IN THE STANDARD). ADDITIONALLY, PARAGRAPH 8.1, PAGE 10, IN THE STANDARD SHOULD BE CORRECTED TO READ "...COMPLIES WITH ANSI S1.25-1991" INSTEAD OF "1992".

AMERICAN NATIONAL STANDARDS ON ACOUSTICS

The Acoustical Society of America provides the Secretariat for Accredited Standards Committees S1 on Acoustics, S2 on Mechanical Shock and Vibration, S3 on Bioacoustics, and S12 on Noise. These committees have wide representation from the technical community (manufacturers, consumers, and general-interest representatives). The standards are published by the Acoustical Society of America through the American Institute of Physics as American National Standards after approval by their respective standards committees and the American National Standards Institute.

These standards are developed and published as a public service to provide standards useful to the public, industry, and consumers, and to Federal, State, and local governments.

This standard was approved by the American National Standards Institute as ANSI S1.25-1991 on 24 October 1991.

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

Caution Notice: An American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication.

The American National Standards Institute, Inc. (ANSI) is the national coordinator of voluntary standards development and the clearing house in the U.S. for information on national and international standards.

The Acoustical Society of America (ASA) is an organization of scientists and engineers formed in 1929 to increase and diffuse the knowledge of acoustics and to promote its practical applications.

Published by the Acoustical Society of America through the American Institute of Physics

FOREWORD

(This Foreword is for information only, and is not a part of American National Standard Specification for Personal Noise Dosimeters, ANSI S1.25-1991, ASA Catalog No. 98-1991, [A revision of ANSI S1.25-1978].)

The initial standard, Specification for Personal Noise Dosimeters, ANSI S1.25-1978 (ASA 25-1978) contained a significant constraint, "This standard is not intended to specify a dosimeter suitable for measurement of noise that is predominantly impulsive." Developments in the state of the art responsive to requirements of regulatory agencies and contemporary practice in industrial hygiene necessitated revision of the standard to remove the constraint.

Accredited Standards Committee S1, Acoustics, has the following scope:

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

At the time this standard was submitted to Accredited Standards Committee S1, Acoustics, for final approval, the membership was as follows:

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U.S. Department of the Air Force ● R. L. McKinley

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Working Group S1/WG7, Personal Dosimeters, which assisted the Accredited Standards Committee S1, Acoustics, in the development of this Standard, had the following membership:

J. J. Earshen, *Chairman*

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Suggestions for improvements in this standard will be welcomed. They should be sent to **Accredited Standards Committee S1, Acoustics, at the Standards Secretariat, in care of the Acoustical Society of America, 335 East 45th Street, New York, NY 10017-3483. Telephone: (212) 661-9404.**

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AMERICAN NATIONAL STANDARD SPECIFICATION FOR PERSONAL NOISE DOSIMETERS

1. INTRODUCTION

Personal noise dosimeters are widely used for monitoring noise environments that may be hazardous to hearing. It is important, therefore, that a standard be available to help minimize variations between results obtained with devices of various makes and models that satisfy the standard.

A noise dosimeter is a device that integrates a function of sound pressure over a period of time and thus determines sound exposure as a percentage of a stated criterion sound exposure.

To satisfy various noise hazard criteria, A-weighted sound pressure raised to one of three different exponents is integrated over time. The exponent used is characterized in terms of a level-time exchange rate. Exchange rates of 3, 4, or 5 dB for a two-to-one change in exposure time are specified in this standard. Thus, for example, in a dosimeter having an exchange rate of 3 dB, an identical indicated result will be produced when exposure duration is halved and sound level is increased by 3 dB.

This standard follows the principles adopted for calibration of sound level meters (American National Standard Specification for Sound Level Meters, ANSI S1.4-1983). Thus the instrument is calibrated to read correctly in a random-incidence field without the presence of reflecting objects such as the wearer.

A personal noise dosimeter is frequently carried on the person with the microphone mounted on the shoulder, at the chest, or at an ear. It may also be used as an area monitor, not attached to the person. If a comparison is made between the results of a specific dosimeter when used as an area monitor and the results of the same dosimeter worn by a person who is immersed in the sound field that was monitored by the area monitor, differences are likely to be observed (Ref. 1).

2. SCOPE

This standard specifies certain characteristics of a personal noise dosimeter. It also specifies allowable tolerances of those characteristics, and it describes how those characteristics are to be verified. It provides for three different exchange rates, two frequency weightings, and two exponential averaging time constants.

NOTE: At present, the regulatory practices of the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) specify use of dosimeters having A-weighting, 5 dB exchange rate and SLOW exponential time averaging. The U.S. Department of Defense practices specify A-weighting, 4 dB exchange rate and SLOW exponential time averaging.

Other options including C-weighting, 3 dB exchange rate and FAST exponential time averaging are included to provide instrument standards to serve the needs of research and developing regulatory practices. International Organization for Standardization Standard 1999:1990 for occupational noise specifies only A-weighted sound exposure with 3 dB exchange rate and with no exponential time averaging.

This standard is intended to specify a dosimeter suitable for measurement of impulsive, intermittent, and continuous noise.

3. DEFINITIONS

3.1 Sound-Pressure Level

Twenty times the logarithm to the base ten of the ratio of the root-mean-square (rms) sound pressure to the reference sound pressure. For the purpose of this standard, the reference pressure is 20 micropascal (20 μPa = 20 μN/m^2 = 0.0002 μbar).

3.2 Sound Level

Sound-pressure level in decibels, re 20μPa, obtained by use of standardized frequency weighting and exponential time averaging.

3.3 Peak Sound Pressure

Greatest absolute instantaneous sound pressure during a given time interval.

3.4 Tone Bursts

One or more complete cycles of a sinusoidal signal. For the purpose of this standard, the tone burst signals must start and end at a zero crossing of the waveform.

3.5 Pulse Range

Difference in decibels between the peak signal level of a tone burst and the level of a continuous low level signal specified by the manufacturer for which the specifications of Sec. 5.4 are met.