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AMERICAN NATIONAL STANDARD

Specification of Performance Measurement of Hearing Assistance Devices/Systems

Secretariat:

Acoustical Society of America

Approved on January 24, 2014

American National Standards Institute, Inc.

Abstract

This standard provides methods for evaluation of hearing assistance devices/systems (HADS) that are packaged for individual use and deliver the signal via air conduction to the user. Among the test methods described are family of response curves, output sound pressure curve for 90-dB sound pressure level input, frequency range, total harmonic distortion, noise level with no input, static and dynamic AGC characteristics, and gain control linearity. The measurements are similar to those described in ANSI/ASA S3.22-2009 American National Standard Specification of Hearing Aid Characteristics.

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ANSI/ASA S3.47-2014

Accredited Standards Committee S3, Bioacoustics

Standards Secretariat
Acoustical Society of America
35 Pinelawn Road, Suite 114 E
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Foreword

[This Foreword is for information only and is not a part of the American National Standard ANSI/ASA S3.47-2014 American National Standard Specification of Performance Measurement of Hearing Assistance Devices/Systems. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the standard.]

This standard comprises a part of a group of definitions, standards, and specifications for use in bioacoustics. It was developed and approved by Accredited Standards Committee S3, Bioacoustics, under its approved operating procedures. Those procedures have been accredited by the American National Standards Institute (ANSI). The Scope of Accredited Standards Committee S3 is as follows:

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

This standard is not comparable to any existing ISO or IEC Standard.

At the time this Standard was submitted to Accredited Standards Committee S3, Bioacoustics, for approval, the membership was as follows:

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Working Group S3/WG 81, Specification of Hearing Assistance Devices/Systems, which assisted Accredited Standards Committee S3, Mechanical Vibration and Shock, in the development of this standard, had the following membership.

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*The contributions of Michael K. Wynne as chair of the working group from 1993 until his untimely death in 2004 are gratefully acknowledged.

Suggestions for improvements of this standard will be welcomed. They should be sent to Accredited Standards Committee S3, Bioacoustics, in care of the Standards Secretariat of the Acoustical Society of America, 35 Pinelawn Road, Suite 114E, Melville, New York 11747-3177. Telephone: 631-390-0215; FAX: 631-390-0217; E-mail: asastds@aip.org.

Introduction

This standard describes definitions and measurements suitable for the specification and evaluation of Hearing Assistance Devices/Systems (HADS). HADS are a group of instruments with diverse physical configurations that are intended to facilitate hearing by providing amplification of an acoustic signal and/or improving the signal-to-noise ratio by means of a non-acoustic signal transmission method. These devices and systems include personal assistive listening devices, hearing assistance technologies, auditory trainers, large-area assistive listening systems, telephone amplifiers, alerting devices, and other similar devices. This document addresses a subset of these devices—specifically, those that transmit directly to a person via earphones, hearing aid, or implant. This standard excludes implants. In addition, this standard excludes acoustic hearing aids as HADS because they are covered under ANSI/ASA S3.22 *American National Standard for Specification of Hearing Aid Characteristics*. Some devices that contain microphone, amplifier, power supply, and receiver within a case worn behind the ear or in the ear are referred to as personal sound amplifiers (PSAP) because they are not marketed for persons with hearing loss and are not prescriptively fit based on audiometric results. Although they are not considered medical devices by the FDA, PSAPs are not addressed in this standard because they may be evaluated electroacoustically according to ANSI/ASA S3.22-2009.

American National Standard

Specification of Performance Measurement of Hearing Assistance Devices/Systems

1 Scope

This standard defines various types of HADS and describes procedures for measuring their performance characteristics. These procedures are useful for comparing the performance characteristics among various HADS. This standard addresses the measurement of the output characteristics of HADS regardless of the method of transmission. Whenever the device/system is capable of transmitting signals using two or more transmission methods, this standard requires that the output of the device/system be measured using each transmission method.

For the purpose of providing consistent product descriptions and maintaining consistent expectations for product performance for each model, this standard provides:

- guidelines for the description of the physical characteristics of HADS;
- guidelines for the description of the transmission methods used in HADS; and
- procedures for measuring electroacoustic characteristics accurately and consistently.

The electroacoustic characteristics described within this standard are measured at settings described by the manufacturer. These characteristics include:

- family of response curves (50- to 90-dB SPL input in 10 dB increments)
- output sound pressure level for 90-dB SPL input
- high frequency average output sound pressure level for 90-dB SPL (HFA-OSPL90) input
- high frequency average output sound pressure level for 50-dB SPL (HFA-OSPL50) input
- frequency range
- total harmonic distortion
- noise level with no input
- input-output characteristics
- dynamic automatic gain control (AGC) characteristics
- gain control linearity
- current drain
- immunity to EMI (refer to ANSI C63.19 and IEC 60118-13)

This standard describes measurements of output characteristics when a remote microphone arrangement is used. There are potentially multiple components to HADS (e.g., FM transmitter delivering to an FM receiver connected to a neckloop transmitting to a t-coil in a hearing aid), and several employ output transducers that cannot be measured with standard couplers.

This standard does not address measurement of hearing aids or personal sound amplifiers which can be evaluated according to procedures described in ANSI/ASA S3.22. This standard also does not describe measurements of large-area assistive listening systems that are not packaged for individual coupling to the listener's ear, telephone amplifiers, and alerting devices. The document addresses devices not worn entirely on the body. The standard also excludes measurement of implants and bone conduction devices. These devices require substantially different techniques from those described in this standard because they do not deliver signals via air conduction to the individual's ear. Some hearing aids may contain conventional amplification and wireless receivers. Conventional amplification via the local microphone should be tested by ANSI/ASA S3.22, and the wireless functionality should be tested according to this standard. Further descriptions of HADS appear in Clause 3. It is not the intent of this standard to restrict