ANSI/ASA S3.55-2014/Part 5 / IEC 60318-5:2006 (MOD)
Reaffirmed by ANSI August 15, 2019

AMERICAN NATIONAL STANDARD

Electroacoustics – Simulators of Human Head and Ear – Part 5: 2 cm^3 Coupler for the Measurement of Hearing Aids and Earphones Coupled to the Ear by Means of Ear Inserts (a modified nationally adopted international standard)

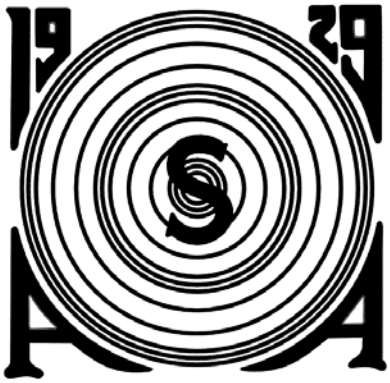
ANSI/ASA S3.55-2014/Part 5 / IEC 60318-5:2006 (MOD)

Accredited Standards Committee S3, Bioacoustics

Standards Secretariat
Acoustical Society of America
1305 Walt Whitman Road, Suite 300
Melville, NY 11747

The American National Standards Institute, Inc. (ANSI) is the national coordinator of voluntary standards development and the clearinghouse in the U.S.A. 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.



AMERICAN NATIONAL STANDARD

Electroacoustics – Simulators of Human Head and Ear – Part 5: 2 cm^3 Coupler for the Measurement of Hearing Aids and Earphones Coupled to the Ear by Means of Ear Inserts (a modified nationally adopted international standard)

Secretariat:

Acoustical Society of America

Approved on July 21, 2014 by:

American National Standards Institute, Inc.

Abstract

This part of ANSI/ASA S3.55 / IEC 60318 describes an acoustic coupler for loading an earphone or hearing aid with a specified acoustic impedance when determining its physical performance characteristics, in the frequency range 125 Hz to 8 kHz. It is suitable for air conduction hearing aids and earphones, coupled to the ear by means of ear inserts e.g. ear molds or similar devices. The sound pressure developed by an earphone is not, in general, the same in the coupler as in a person's ear. However, it can be used as a simple and ready means for the exchange of specifications and of physical data on hearing aids and for the calibration of specified insert earphones used in audiometry.

AMERICAN NATIONAL STANDARDS ON BIOACOUSTICS

The Acoustical Society of America (ASA) provides the Secretariat for Accredited Standards Committees S1 on Acoustics, S2 on Mechanical Vibration and Shock, S3 on Bioacoustics, S3/SC 1 on Animal Bioacoustics, and S12 on Noise. These committees have wide representation from the technical community (manufacturers, consumers, trade associations, organizations with a general interest, and government representatives). The standards are published by the Acoustical Society of America as American National Standards after approval by their respective Standards Committees and the American National Standards Institute (ANSI).

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.

Each of the Accredited Standards Committees (operating in accordance with procedures approved by ANSI) is responsible for developing, voting upon, and maintaining or revising its own Standards. The ASA Standards Secretariat administers Committee organization and activity and provides liaison between the Accredited Standards Committees and ANSI. After the Standards have been produced and adopted by the Accredited Standards Committees, and approved as American National Standards by ANSI, the ASA Standards Secretariat arranges for their publication and distribution.

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered and that a concerted effort be made towards their resolution.

The use of an American National Standard is completely voluntary. Their existence does not in any respect preclude anyone, whether he or she has approved the Standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the Standards.

NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this Standard.

Acoustical Society of America
ASA Secretariat
1305 Walt Whitman Road, Suite 300
Melville, New York 11747
Telephone: 1 (631) 390-0215
Fax: 1 (631) 923-2875
E-mail: asastds@acousticalsociety.org

Contents

Figures

Tables

Foreword

[This Foreword is for information only, and is not a part of the American National Standard *ANSI/ASA S3.55-2014/Part 5 / IEC 60318-5:2006 (MOD) American National Standard Electroacoustics – Simulators of Human Head and Ear – Part 5: 2 cm^3 coupler for the measurement of hearing aids and earphones coupled to the ear by means of ear inserts.* 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 a modified nationally adopted international standard (NAIS). It was undertaken as part of the revision of ANSI/ASA S3.7-1995 (R2008), Method for Coupler Calibration of Earphones, which, in addition to coupler calibration methods, contains detailed information about the audiometric ear, the 6cc coupler, and the 2cc coupler. Several years ago, IEC 60318 was reorganized into several parts, which now include the same information about the aforementioned couplers (IEC 60318, Parts 1, 3, and 5, respectively). Given that the manufacture of these couplers has changed little if at all in more than 25 years, the fact that the IEC and ANSI/ASA specifications for these couplers are essentially identical, and the fact that manufacturers of these couplers do not produce different versions of the devices to meet alternative versions of the standards, harmonization was deemed appropriate. The first step in this process has been the move of the detailed coupler specifications from the previous version of ANSI/ASA S3.7 to NAIS ANSI/ASA S3.55, Parts 1, 3, and 5, which correspond directly to their IEC 60318 counterparts. References in other standards that previously pointed to ANSI/ASA S3.7 for a particular coupler will now point to the appropriate NAIS ANSI/ASA S3.55 part instead, as these documents get revised and updated. The next revision of ANSI/ASA S3.7 will focus solely on the calibration methods for earphones, and will also point to the appropriate NAIS ANSI/ASA S3.55 part, where the detailed coupler information now resides.

This standard is a modified national adoption of IEC 60318-5 Ed. 1.0 b:2006 *Electroacoustics – Simulators of Human Head and Ear – Part 5: 2 cm^3 coupler for the measurement of hearing aids and earphones coupled to the ear by means of ear inserts* which was prepared by IEC/TC 29, Electroacoustics. In conformance with ANSI and IEC rules, the words "this part of ANSI/ASA S3.55 / IEC 60318" replace the words ""this part of IEC 60318" where they appear in the IEC document, decimal points were substituted in place of the decimal commas used in IEC documents, and American English spelling is used in place of British English spelling. (Note that Figures 2 and 3 provided by the IEC were not revisable and decimal commas are used.) All other additions and modifications are shown in a **bold blue font within a blue box** and are identified as U.S. Modifications.

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

C.J. Struck, *Chair*
Vacant, *Vice-Chair*

S.B. Blaeser, *Secretary*

Acoustical Society of America ..... C.J. Struck
..... M.D. Burkhard (Alt.)

American Academy of Audiology ..... C. Schweitzer
..... T. Ricketts (Alt.)

American Academy of Otolaryngology, Head and Neck Surgery, Inc. ..... R.A. Dobie
..... L.A. Michael (Alt.)

American Industrial Hygiene Association ..... T.K. Madison
..... D. Driscoll (Alt.)

American Speech-Language-Hearing Association (ASHA) ..... L.A. Wilber
..... N. DiSarno (Alt.)

Beltone/GN Resound ..... S. Petrovic

Council for Accreditation in Occupational Hearing Conservation (CAOHC) ..... L.D. Hager

ETS – Lindgren Acoustic Systems ..... S. Dunlap
..... D. Winker (Alt.)

Etymotic Research, Inc. ..... M.C. Killion
..... J.K. Stewart (Alt.)

Food and Drug Administration ..... S-C Peng

G.R.A.S. Sound & Vibration ..... B. Schustrich
..... J. Soendergaard (Alt.)

Hearing Industries Association ..... A. Bopp
..... M. Jones (Alt.)

National Electrical Manufacturers Association,
Signaling Protection & Communication Section (NEMA – 3SB) ..... J. McNamara
..... R. Reiswig (Alt.)

National Hearing Conservation Association ..... G.L. Poling
..... R. Danielson (Alt.)

National Institute for Occupational Safety and Health (NIOSH) ..... M.R. Stephenson
..... W.J. Murphy (Alt.)

National Institute of Standards and Technology ..... R.P. Wagner
..... S. Fick (Alt.)

National Park Service ..... M. McKenna
..... K. Fristrup (Alt.)

Natus Medical, Inc. ..... Y. Hekimoglu

Ocean Conservation Research ..... M. Stocker

Starkey Laboratories ..... D.A. Preves
..... T.H. Burns (Alt.)

U.S. Air Force ..... R.L. McKinley
..... B.D. Simpson (Alt.)

U.S. Army Aeromedical Research Lab ..... W.A. Ahroon

U.S. Army CERL ..... D.K. Delaney
..... M.J. White (Alt.)

U.S. Army Research Laboratory, Human Research and Engineering Directorate ..... A. Scharine
..... M.A. Ericson (Alt.)

University of Cincinnati Animal Audiology Clinic/Bioacoustics Lab ..... P.M. Scheifele
..... D.K. Brown (Alt.)

Individual Experts of the Accredited Standards Committee S3, Bioacoustics, were:

J.R. Bareham	A.J. Campanella	C.J. Struck
A.J. Brammer	R.L. McKinley	L.A. Wilber
R.F. Burkard	P.D. Schomer	W.A. Yost

Working Group S3/WG 37, Couplers, Ear Simulators, and Earphones, which assisted Accredited Standards Committee S3, Bioacoustics, in the development of this standard, had the following membership:

C.J. Struck, Chair

M. Alexander	G.J. Frye	D.A. Preves
J.R. Bareham	C.B. King	J. Soendergaard
T.H Burns	B. Kruger	J.K. Stewart
	B. Mathews	

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, 1305 Walt Whitman Road, Suite 300, Melville, New York 11747. Telephone: 631-390-0215; FAX: 631- 923-2875; E-mail: asastds@acousticalsociety.org.

American National Standard

Electroacoustics – Simulators of Human Head and Ear – Part 5: 2 cm^3 coupler for the measurement of hearing aids and earphones coupled to the ear by means of ear inserts

1 Scope

This part of ANSI/ASA S3.55 / IEC 60318 describes an acoustic coupler for loading an earphone or hearing aid with a specified acoustic impedance when determining its physical performance characteristics, in the frequency range 125 Hz to 8 kHz. It is suitable for air conduction hearing aids and earphones, coupled to the ear by means of ear inserts e.g. ear molds or similar devices.

The sound pressure developed by an earphone is not, in general, the same in the coupler as in a person's ear. However, it can be used as a simple and ready means for the exchange of specifications and of physical data on hearing aids and for the calibration of specified insert earphones used in audiometry.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61094-4, *Measurement microphones – Part 4: Specifications for working standard microphones*

ISO 389-2, *Acoustics – Reference zero for the calibration of audiometric equipment – Part 2: Reference equivalent threshold sound pressure levels for pure tones and insert earphones*

BIPM/IEC/ISO/IUPAC/IUPAP/OIML:1995, *Guide to the expression of uncertainty in measurement (GUM)*

3 Terms and definitions

For the purposes of this part of ANSI/ASA S3.55 / IEC 60318, the following terms and definitions apply:

3.1
acoustic coupler
cavity of predetermined shape and volume which is used for the calibration of an earphone in conjunction with a microphone to measure the sound pressure developed within the cavity

3.2
effective volume
equivalent volume of air of the acoustical compliance of the coupler formed by the cavity and the microphone at a frequency of 250 Hz