ASA/ANSI S3.55-2014/Part 1 /
IEC 60318-1:2009

Reaffirmed by ANSI February 22, 2019

AMERICAN NATIONAL STANDARD

Electroacoustics – Simulators of Human Head and Ear – Part 1: Ear Simulator for the Measurement of Supra-aural and Circumaural Earphones

(a nationally adopted international standard)

Secretariat:

Acoustical Society of America

Approved on January 21, 2014:

American National Standards Institute, Inc.

Abstract
ANSI/ASA S3.55-2014 / IEC 60318-1:2009 specifies an ear simulator for the measurement of supra-aural and circumaural earphones (used for example in audiometry and telephonometry) applied to the ear without acoustical leakage, in the frequency range from 20 Hz to 10 kHz. The same device can be used as an acoustic coupler at additional frequencies up to 16 kHz.

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Accredited Standards Committee S3, Bioacoustics

Standards Secretariat
Acoustical Society of America
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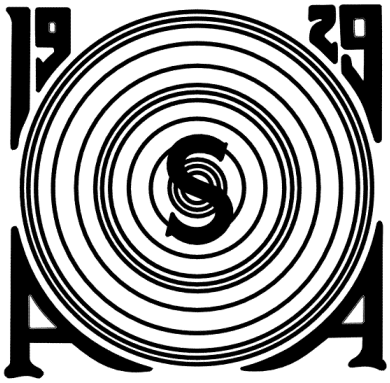

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Foreword

[This Foreword is for information only, and is not a part of the American National Standard *ANSI/ASA S3.55-2014/Part 1 / IEC 60318-1:2009 American National Standard Electroacoustics – Simulators of Human Head and Ear – Part 1: Ear Simulator for the Measurement of Supra-aural and Circumaural Earphones.* 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 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 an identical national adoption of IEC 60318-1 Ed. 2.0 b:2009 *Electroacoustics – Simulators of human head and ear – Part 1: Ear simulator for the measurement of supra-aural and circumaural earphones*, which was prepared by IEC/TC 29. However, 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.

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
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American Academy of Otolaryngology, Head and Neck Surgery, Inc. ..... R.A. Dobie
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American Speech-Language-Hearing Association (ASHA) ..... L.A. Wilber
..... N. DiSarno (Alt.)

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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

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..... K.E. Frye (Alt.)

G.R.A.S. Sound & Vibration ..... J. Soendergaard
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Hearing Industries Association ..... T.A. Victorian
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National Electrical Manufacturers Association,
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..... R. Reiswig (Alt.)

National Hearing Conservation Association ..... G.L. Poling
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National Institute for Occupational Safety and Health (NIOSH) ..... M. Stephenson
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National Institute of Standards and Technology ..... R.P. Wagner

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 ..... P. Henry
..... M. 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	K.D. Kryter	L.A. Wilber
R.F. Burkard	R.L. McKinley	W.A. Yost
	P.D. Schomer	

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	M.C. Killion	D.A. Preves
J.R. Bareham	C.B. King	G. Rasmussen
M.D. Burkhard	B. Kruger	P. Rasmussen
T.H Burns	B. Mathews	B. Schustrich
G.J. Frye	S. Nandkumar	J.K. Stewart
	V. Nedzelnitsky	

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.

American National Standard

Electroacoustics – Simulators of Human Head and Ear – Part 1: Ear Simulator for the Measurement of Supra-aural and Circumaural Earphones

1 Scope

This part of ANSI/ASA S3.55 / IEC 60318 specifies an ear simulator for the measurement of supra-aural and circumaural earphones (used for example in audiometry and telephonometry) applied to the ear without acoustical leakage, in the frequency range from 20 Hz to 10 kHz. The same device can be used as an acoustic coupler at additional frequencies up to 16 kHz.

NOTE 1 This device has alternative configurations for supra-aural earphones and different types of circumaural earphones. In practice, the alternative configurations can be realized through the use of adapters where necessary.

NOTE 2 Repeatability for supra-aural and circumaural earphones may get significantly worse above 10 kHz.

2 Normative references

The following referenced documents are indispensable for the application of this standard. 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/IEC Guide 98-3, Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
ear simulator
device for measuring the acoustic output of sound sources where the sound pressure is measured by a calibrated microphone coupled to the source so that the overall acoustic impedance of the device approximates that of the normal human ear at a given location and in a given frequency band

3.2
acoustic coupler
device for measuring the acoustic output of sound sources where the sound pressure is measured by a calibrated microphone coupled to the source by a cavity of predetermined shape and volume which does not necessarily approximate the acoustical impedance of the normal human ear

3.3
supra-aural earphone
earphone applied externally to the outer ear and intended to rest on the pinna