ANSI/ASA S12.53-2011/Part 1 / ISO 3743-1:2010
(a revision of ANSI S12.53-1999/Part 1 / ISO 3743-1:1994)

AMERICAN NATIONAL STANDARD

Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering methods for small movable sources in reverberant fields – Part 1: Comparison method for a hard-walled test room

(a Nationally Adopted International Standard)

ANSI/ASA S12.53-2011/Part 1 / ISO 3743-1:2010

Accredited Standards Committee S12, Noise

Standards Secretariat
Acoustical Society of America
35 Pinelawn Road, Suite 114 E
Melville, NY 11747-3177

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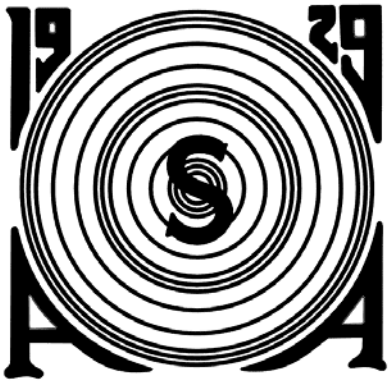

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Part 1: Comparison method for a hard-walled test room

(a nationally adopted international standard)

Secretariat:

Acoustical Society of America

Approved March 1, 2011 by:

American National Standards Institute, Inc.

Abstract

This part of ANSI/ASA S12.53 / ISO 3743 specifies methods for determining the sound power level or sound energy level of a noise source by comparing measured sound pressure levels emitted by this source (machinery or equipment) mounted in a hard-walled test room, the characteristics of which are specified, with those from a calibrated reference sound source. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source, in frequency bands of width one octave, is calculated using those measurements. The sound power level or sound energy level with A-weighting applied is calculated using the octave-band levels.

AMERICAN NATIONAL STANDARDS ON ACOUSTICS

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).

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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.

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Acoustical Society of America
ASA Secretariat
35 Pinelawn Road, Suite 114E
Melville, New York 11747-3177
Telephone: 1 (631) 390-0215
Fax: 1 (631) 390-0217
E-mail: asastds@aip.org

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Foreword

[This Foreword is for information only, and is not a part of the American National Standard ANSI/ASA S12.53-2011/Part 1 / ISO 3743-1:2010 American National Standard Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields Part 1: Comparison method for a hard-walled test room.]

This standard comprises a part of a group of definitions, standards, and specifications for use in noise. It was developed and approved by Accredited Standards Committee S12, Noise, under its approved operating procedures. Those procedures have been accredited by the American National Standards Institute (ANSI). The Scope of Accredited Standards Committee S12 is as follows:

> *Standards, specifications, and terminology in the field of acoustical noise pertaining to methods of measurement, evaluation, and control, including biological safety, tolerance, and comfort, and physical acoustics as related to environmental and occupational noise.*

This standard is a revision of ANSI S12.53/1-1999 / ISO 3743-1:1994, which has been technically revised.

This Standard is identical to International Standard ISO 3743-1, Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields Part 1: Comparison method for a hard-walled test room, which was prepared by Technical Committee ISO/TC 43 Subcommittee SC 1, Noise. However, in conformance with ANSI and ISO rules, the words "American National Standard" replace the words "International Standard" where they appear in the ISO document, decimal points were substituted in place of the decimal commas used in ISO documents, and American English spelling is used in place of British English spelling.

The ANSI or ANSI/ASA equivalents for the ISO standards in the ISO 3740 series and other referenced nationally adopted standards are given below:

- ANSI S12.5 / ISO 6926 is an identical national adoption of ISO 6926;
- ANSI/ASA S12.50/ISO 3740 is an identical national adoption of ISO 3740;
- ANSI/ASA S12.51/ISO 3741 is an identical national adoption of ISO 3741;
- ANSI/ASA S12.53/Part 1/ISO 3743-1 is an identical national adoption of ISO 3743-1;
- ANSI/ASA S12.53/Part 2/ISO 3743-2 is an identical national adoption of ISO 3743-2;
- ANSI/ASA S12.54/ISO 3744 is an identical national adoption of ISO 3744;
- ANSI S12.55/ISO 3745 is an identical national adoption of ISO 3745;
- ANSI S12.56/ISO 3746 is an identical national adoption of ISO 3746; and
- ANSI/ASA S12.57/ISO 3747 is an identical national adoption of ISO 3747.

At the time this Standard was submitted to Accredited Standards Committee S12, Noise for approval, the membership was as follows:

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R.D. Hellweg, *Vice-Chair*

S.B. Blaeser, *Secretary*

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U.S. Department of Transportation ..... A. Konheim

U.S. Naval Surface Warfare Center - Carderock ..... M. Craun

Université du Québec ETS ..... J. Voix
..... F. Laville (Alt.)

Individual Experts of Accredited Standards Committee S12, Noise, were:

P.K. Baade	R.D. Hellweg	R.J. Peppin
E.H. Berger	W.W. Lang	J. Schmitt
B.M. Brooks	D. Lubman	P.D. Schomer
A.J. Campanella	D. Michaud	L.C. Sutherland
K.M. Eldred	N.P. Miller	W.R. Thornton
L.S. Finegold	W.J. Murphy	L.A. Wilber
R.D. Godfrey	M.A. Nobile	G.E. Winzer

Working Group S12/WG 23, Determination of Sound Power, which assisted Accredited Standards Committee S12, Noise, in the development of this standard, had the following membership.

B.M. Brooks, Co-Chair
J. Schmitt, Co-Chair

M.C. Black	K. Cunefare	M.A. Nobile
S. Bly	R.D. Hellweg	M. O'Connell
A.J. Campanella	A.T. Herfat	P.D. Schomer
D.A. Collings	S. Keith	J. Weinstein
	G.C. Maling	

Suggestions for improvements of this standard will be welcomed. They should be sent to Accredited Standards Committee S12, Noise, 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 American National Standard is a national adoption of one of the series ISO 3740[1] to ISO 3747[7], which specify various methods for determining the sound power levels and sound energy levels of noise sources including machinery, equipment and their sub-assemblies. The selection of one of the methods from the series for use in a particular application depends on the purpose of the test to determine the sound power level or sound energy level and on the facilities available. General guidelines to assist in the selection are provided in ISO 3740[1]. ISO 3740[1] to ISO 3747[7] give only general principles regarding the operating and mounting conditions of the machinery or equipment for the purposes of the test. It is important that test codes be established for individual kinds of noise source, in order to give detailed requirements for mounting, loading, and operating conditions under which the sound power levels or sound energy levels are to be obtained.

The method given in this part of ISO 3743 is based on a comparison of the sound pressure levels in octave frequency bands of a noise source under test with those of a calibrated reference sound source; A-weighted sound power levels or sound energy levels may be calculated from the octave-band levels. The method is applied in a hard-walled test room with prescribed acoustical characteristics, where it can be used for small items of portable equipment. Such a room allows either the sound power levels or the sound energy levels of the noise source under test to be determined, depending on the character of the noise emitted by the source. However, this kind of test room is not suitable for larger pieces of stationary equipment which, due to their manner of operation or installation, cannot readily be moved. The application of the method for use where the equipment or machinery is found *in situ* is described in ISO 3747[7].

The methods specified in this part of ISO 3743 permit the determination of the sound power level and the sound energy level in frequency bands and/or with frequency A-weighting applied.

This part of ISO 3743 describes a method of accuracy grade 2 (engineering grade) as defined in ISO 12001. For applications where greater accuracy is required, reference can be made to ISO 3741[2] or an appropriate part of ISO 9614[15][17]. If the relevant criteria for the measurement environment specified in this part of ISO 3743 are not met, it might be possible to refer to another standard from this series, or to an appropriate part of ISO 9614[15][17].

American National Standard

Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields, Part 1: Comparison method for a hard-walled test room

1 Scope

1.1 General

This part of ISO 3743 specifies methods for determining the sound power level or sound energy level of a noise source by comparing measured sound pressure levels emitted by this source (machinery or equipment) mounted in a hard-walled test room, the characteristics of which are specified, with those from a calibrated reference sound source. The sound power level (or, in the case of noise bursts or transient noise emission, the sound energy level) produced by the noise source, in frequency bands of width one octave, is calculated using those measurements. The sound power level or sound energy level with A-weighting applied is calculated using the octave-band levels.

1.2 Types of noise and noise sources

The method specified in this part of ISO 3743 is suitable for all types of noise (steady, non-steady, fluctuating, isolated bursts of sound energy, etc.) defined in ISO 12001.

The noise source under test may be a device, machine, component or sub-assembly. The maximum size of the source depends upon the size of the room used for the acoustical measurements (see 4.2).

1.3 Test environment

The test environment that is applicable for measurements made in accordance with this part of ISO 3743 is a hard-walled test room with prescribed acoustical characteristics.

1.4 Measurement uncertainty

Information is given on the uncertainty of the sound power levels and sound energy levels determined in accordance with this part of ISO 3743, for measurements made in frequency octave bands and for A-weighted frequency calculations performed on them. The uncertainty conforms to ISO 12001:1996, accuracy grade 2 (engineering grade).

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.