



**ASA/ANSI S12.57-2011 / ISO 3747:2010
(a revision of ANSI S12.57-2002 / ISO
3747:2000)**

Reaffirmed by ANSI June 19, 2020

AMERICAN NATIONAL STANDARD

**Acoustics – Determination of sound power
levels and sound energy levels of noise sources
using sound pressure – Engineering/survey
methods for use in situ in a reverberant
environment
(a nationally adopted international standard)**

Secretariat:

Acoustical Society of America

Approved on August 26, 2011:

American National Standards Institute, Inc.

Abstract

This American National Standard specifies a method for determining the sound power level or sound energy level of a noise source by comparing measured sound pressure levels emitted by a noise source (machinery or equipment) mounted in situ in a reverberant environment, 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 frequency A-weighting applied is calculated using the octave-band levels.

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AMERICAN NATIONAL STANDARD

Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Engineering/survey methods for use *in situ* in a reverberant environment

(a Nationally Adopted International Standard)

ANSI/ASA S12.57-2011 / ISO 3747:2010

Accredited Standards Committee S12, Noise

Standards Secretariat
Acoustical Society of America
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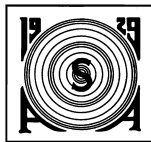
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Foreword

[This Foreword is for information only and is not a part of the American National Standard ANSI/ASA S12.57-2011 / ISO 3747:2010 American National Standard Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering/survey methods for use in situ in a reverberant environment.]

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 S12.57-2002 / ISO 3747:2000, which has been technically revised.

This Standard is identical to International Standard ISO 3747, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering/survey methods for use in situ in a reverberant environment*, 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;
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At the time this Standard was submitted to Accredited Standards Committee S12, Noise, for approval, the membership was as follows:

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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 3741^[2] to ISO 3747, 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 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 American National Standard 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 where the noise source is found *in situ* and as such is suitable for larger pieces of stationary equipment which, due to their manner of operation or installation, cannot readily be moved.

The method specified in this American National Standard permits the determination of the sound power level and the sound energy level in octave bands from which the A-weighted value is calculated.

This American National Standard describes a method giving results of either ISO 12001:1996, accuracy grade 2 (engineering grade) or ISO 12001:1996, accuracy grade 3 (survey grade), depending on the extent to which the requirements concerning the test environment are met. For applications where greater accuracy is required, reference can be made to ISO 3741^[2], ISO 3744^[5] or an appropriate part of ISO 9614^{[17]-[19]}. If the relevant criteria for the measurement environment specified in this American National Standard are not met, it might be possible to refer to another standard from this series, or to an appropriate part of ISO 9614^{[17]-[19]}.

American National Standard

Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering/survey methods for use *in situ* in a reverberant environment

1 Scope

1.1 General

This American National Standard specifies a method for determining the sound power level or sound energy level of a noise source by comparing measured sound pressure levels emitted by a noise source (machinery or equipment) mounted *in situ* in a reverberant environment, 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 frequency A-weighting applied is calculated using the octave-band levels.

1.2 Types of noise and noise sources

The method specified in this American National Standard is suitable for all types of noise (steady, non-steady, fluctuating, isolated bursts of sound energy, etc.) defined in ISO 12001. The method is primarily applicable to sources which emit broad-band noise. It can, however, also be used for sources which emit narrow-band noise or discrete tones, although there is a possibility that the measurement reproducibility is then degraded.

The noise source under test can be a device, machine, component or sub-assembly, especially one which is non-movable.

1.3 Test environment

The test environment that is applicable for measurements made in accordance with this American National Standard is a room where the sound pressure level at the microphone positions depends mainly on reflections from the room surfaces (see 4.1). In measurements of ISO 12001:1996, accuracy grade 2 (engineering grade), background noise in the test environment is low compared to that of the noise source or reference sound source (see 4.2).

1.4 Measurement uncertainty

Information is given on the uncertainty of the sound power levels and sound energy levels determined in accordance with this American National Standard, for measurements made in octave bands and for A-weighted frequency calculations performed on them. The uncertainty conforms with that of either ISO 12001:1996, accuracy grade 2 (engineering grade) or ISO 12001:1996, accuracy grade 3 (survey grade), depending on the extent to which the requirements concerning the test environment are met.