AMERICAN NATIONAL STANDARD

Sound Power Level Determination for Sources Using a Single-source Position

ANSI/ASA S12.58-2012

Accredited Standards Committee S12, Noise

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

Acoustical Society of America

Approved by ANSI on:

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Abstract

This American National Standard describes a method for the determination of sound power levels of noise sources that emit broadband sound and/or discrete frequency sounds/tones using reverberation rooms. The standard applies when it is either undesirable or unfeasible to move the source to decrease the uncertainty of the measurement. The method described requires reverberation room pre-qualification through test and requires the use of the comparison method to determine sound power levels. This standard specifies the physical environment, procedures, and equipment used to qualify the reverberation room by test. Pre-qualifying the room ensures adequate modal density for the use of one source location to obtain acceptable accuracy and repeatability of results. The reference sound source (RSS) used for the comparison method relies on AHRI Standard 250 to accurately describe the requirements for and characterize sound power of the RSS at all frequencies of interest.

AMERICAN NATIONAL STANDARDS ON NOISE

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Foreword

[*This Foreword is for information only and is not a part of the American National Standard ANSI/ASA S12.58-2012 American National Standard Sound Power Level Determination for Sources Using a Single-source Position. 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 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.

The information in this paragraph of the Foreword was updated during the 2019 reaffirmation process, but the technical content in the body of the document, as well as all other front matter (membership, remains identical to the 2012 publication. This standard was developed from the Air-Conditioning, Heating and Refrigeration Institute's (AHRI) standard AHRI 220. It is published here with permission from AHRI after being approved by ballot in Accredited Standards Committee S12. The intent for AHRI and S12 is to move to undated references when appropriate, and the technical portion of this document will be updated in the next revision cycle. It is appropriate to use undated references for ANSI/ASA S1.6, ANSI/ASA S1.11/IEC 61260 Parts 1 through 3, ANSI/ASA S12.51/ISO 3741, and AHRI 250. Also, ASHRAE Terminology of Heating, Ventilation, Air-Conditioning and Refrigeration was replaced with a web application https://www.ashrae.org/resources--publications/free-resources/ashrae-terminology.

This standard is not comparable to any existing ISO Standard.

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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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.

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Suggestions for improvements to 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 standard describes a method for determination of sound power levels of broadband and/or discrete-frequency noise, and narrowband noise sources in reverberation rooms. It is based on but more restrictive than ANSI/ASA S12.51/ISO 3741, which allows the user to test using either the direct method or the comparison method and also allows the user to employ a space with general characteristics. The intent of ANSI/ASA S12.51/ISO 3741 is to have a room that provides a “good” environment for testing, with the understanding that if the end result has a variation that is too high, the user can increase the number of measurement locations to improve the spatial averaging and thus lower the variation. This is not practical for sources that are difficult to move.

The method described herein requires reverberation room pre-qualification through test and requires the use of the comparison method to determine sound power levels. This Standard specifies the physical environment, procedures, and equipment to qualify the reverberation room by test. Pre-qualifying the room ensures adequate modal density for the use of one source location to obtain acceptable accuracy and repeatability of results. The reference sound source (RSS) used for the comparison method relies on AHRI Standard 250 to accurately determine the sound power for the RSS at all frequencies of interest. The use of the comparison method reduces a number of potential sources of data collection and calculation errors. The standard contains information on instrumentation, installation, and operation of the source, procedures for determining the number of microphone positions or length of traverse, and procedures for the calculation of sound power levels.

American National Standard

Sound Power Level Determination for Sources Using a Single-source Position

1 Scope

This American National Standard describes a method for the determination of sound power levels of noise sources that emit broadband sound and/or discrete frequency sounds/tones in reverberation rooms. The method described herein requires reverberation room pre-qualification through test and requires the use of the comparison method to determine sound power levels. This standard specifies the physical environment, procedures, and equipment used to qualify the reverberation room by test. Pre-qualifying the room ensures adequate modal density for the use of one source location to obtain acceptable accuracy and repeatability of results. The reference sound source (RSS) used for the comparison method relies on AHRI Standard 250 to accurately describe the performance and characterize the sound power of the RSS at all frequencies of interest. Sound rating values are often useful for applications and design; therefore, it is important to acquire data and qualify measurement rooms in one-third octave bands. The use of the comparison method reduces a number of potential sources of error. This standard contains information on instrumentation, installation, and operation of the source; procedures for determining the number of microphone positions or length of traverse; and procedures for the calculation of sound power level. Measurements made in conformity with this standard will, with very few exceptions, result in standard deviations equal to or less than specified in Table 1.

The frequencies covered in this standard range from the 50 Hz to the 10,000 Hz one-third octave bands (63 Hz to 8000 Hz octave bands). The 50 to 80 Hz one-third octave band sound frequently affects product applications and often cannot be ignored. The product-specific standards referring to this method should specify the frequency range of interest for qualification, calculation, and reporting. This standard is based on ANSI/ASA S12.51/ISO 3741 but provides additions, exceptions, and extensions.

Table 1 — Maximum standard deviations of sound power level reproducibility determined in accordance with this standard

One-third octave band center frequency, Hz	One-third octave band maximum standard deviation of reproducibility, σ_{R0}, dB
50 - 80	4.0
100 - 160	3.0
200 - 315	2.0
400 - 5000	1.5
6000 - 10000	3.0
A-weighted	1.0

This standard is intended to serve as a basic reference to be used in product-specific standards and for the guidance of the industry, including manufacturers, engineers, installers, contractors, and users.

The standard is appropriate for all noise sources but is especially appropriate when it is either undesirable or unfeasible to move the source to decrease the uncertainty of the measurement.

This standard applies to products where sound power is determined by measurement using the comparison method in a reverberation room that meets the qualification requirements of this standard.