**ASA/ANSI S12.53/2-1999**
**ISO 3743-2:1994**
**Reaffirmed by ANSI June 19, 2020**

AMERICAN NATIONAL STANDARD

# Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering methods for small, movable sources in reverberant fields - Part 2: Methods for special reverberation test rooms

## (a nationally adopted international standard)

**Secretariat:**

**Acoustical Society of America**

**Approved on 18 October 1999:**

**American National Standards Institute, Inc.**

**Abstract**
ISO 3743 is one of the ISO 3740 series, which specifies various methods for determining the sound power levels of machines, equipment and sub-assemblies. These basic standards specify the acoustical requirements for measurements appropriate for different test environments as shown in table 0.1. When selecting one of the methods of the ISO 3740 series, it is necessary to select the most appropriate for the conditions and purposes of the noise test. General guidelines to assist in the selection are provided in ISO 3740. The ISO 3740 series gives only general principles regarding the operating and mounting conditions of the machine or equipment under test. Reference should be made to the noise test code for a specific type of machine or equipment, if available, for specifications on mounting and operating conditions.

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# AMERICAN NATIONAL STANDARD

# Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering methods for small, movable sources in reverberant fields -

# Part 2: Methods for special reverberation test rooms

**(A Nationally Adopted International Standard)**

NAIS STANDARD
ANSI S12.53/2-1999
ISO 3743-2: 1994

Accredited Standards Committee S12, Noise

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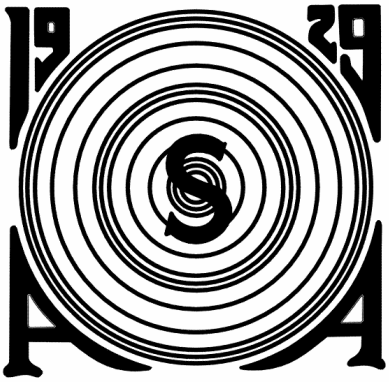

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AMERICAN NATIONAL STANDARD

# Acoustics—Determination of sound power levels of noise sources using sound pressure—Engineering methods for small, movable sources in reverberant fields—

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## Contents

## Foreword

[This Foreword is not part of the Nationally Adopted International Standard (NAIS), *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 2: Methods for special reverberation test rooms*, ANSI S12.53/2-1999, ISO 3743-2:1994.]

This Nationally Adopted International Standard (NAIS) comprises a part of a group of definitions, standards, and specifications for use in acoustical work. It has been adopted by the American National Standards Institute utilizing the Accredited Standards Committee Procedure, under the Secretariat of the Acoustical Society of America.

Accredited Standards Committee S12, Noise, under whose jurisdiction this NAIS Standard was adopted, has the following scope:

> *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 in harmony with International Standard ISO 3743-2:1994, *Acoustics—Determination of sound power levels of noise sources using sound pressure—Engineering methods for small, movable sources in reverberant fields—Part 2: Methods for special reverberation test rooms*, which was developed by Working Group 28 of Technical Committee 43/Subcommittee 1 of the International Organization for Standardization (ISO/TC 43/SC 1/WG 28).

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

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M. A. Nobile
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Suggestions for improvement of this NAIS Standard will be welcomed. Send suggestions for improvement to Accredited Standards Committee S12, Noise, in care of the ASA Standards Secretariat, 120 Wall Street, 32nd floor, New York, New York 10005-3993, USA. Telephone: +1 212 248 0373; FAX: +1 212 248 0146.

# Introduction

**0.1** ISO 3743 is one of the ISO 3740 series, which specifies various methods for determining the sound power levels of machines, equipment and sub-assemblies. These basic standards specify the acoustical requirements for measurements appropriate for different test environments as shown in table 0.1. When selecting one of the methods of the ISO 3740 series, it is necessary to select the most appropriate for the conditions and purposes of the noise test. General guidelines to assist in the selection are provided in ISO 3740. The ISO 3740 series gives only general principles regarding the operating and mounting conditions of the machine or equipment under test. Reference should be made to the noise test code for a specific type of machine or equipment, if available, for specifications on mounting and operating conditions.

**0.2** The method given in this part of ISO 3743 enables measurement of sound pressure levels with A-weighting and in octave bands at prescribed fixed microphone positions or along prescribed paths. It allows determination of A-weighted sound power levels or sound power levels with other weighting and octave-band sound power levels. Quantities which cannot be determined are the directivity characteristics of the source and the temporal pattern of noise radiated by sources emitting non-steady noise.

**0.3** Parts 1 and 2 of ISO 3743 specify engineering methods for determining the A-weighted and octave-band sound power levels of small noise sources. The methods are applicable to small machines, devices, components and sub-assemblies which can be installed in a special reverberation test room or in a hard-walled test room with prescribed acoustical characteristics. The methods are particularly suitable for small items of portable equipment; they are not intended for larger pieces of stationary equipment which, due to their manner of operation or installation, cannot readily be moved into the test room and operated as in normal usage. The procedures are intended to be used when an engineering grade of accuracy is desired without requiring the use of laboratory facilities.

**0.4** In ISO 3743-1, a comparison method is used to determine the octave-band sound power levels of the source. The spatial average (octave-band) sound pressure levels produced by the source under test are compared to the spatial average (octave-band) sound pressure levels produced by a reference sound source of known sound power output. The difference in sound pressure levels is equal to the difference in sound power levels if conditions are the same for both sets of measurements. The A-weighted sound power level is then calculated from the octave-band sound power levels.

The requirements to be fulfilled by the special reverberation test room for measurements in accordance with this part of ISO 3743 are significantly more restrictive than those placed on the hard-walled test room by the comparison method of ISO 3743-1.

**Table 0.1 — International Standards specifying various methods for determining the sound power levels of machines and equipment**

| International Standard | Classification of method[1] | Test environment | Volume of source | Character of noise | Sound power levels obtainable | Optional information available |
|---|---|---|---|---|---|---|
| 3741 | Precision (grade 1) | Reverberation room meeting specified requirements | Preferably less than 1 % of test room volume | Steady, broad-band | In one-third-octave or octave bands | A-weighted sound power level |
| 3742 | | | | Steady, discrete frequency or narrow-band | | |
| 3743-1 | Engineering (grade 2) | Hard-walled test room | | Steady, broad-band, narrow-band, or discrete frequency | A-weighted and in octave bands | Other weighted sound power levels |
| 3743-2 | | Special reverberation test room | | | | |
| 3744 | Engineering (grade 2) | Outdoors or in large room | Greatest dimension less than 15 m | Any | A-weighted and in one-third-octave or octave bands | Directivity information and sound pressure levels as a function of time; other weighted sound power levels |
| 3745 | Precision (grade 1) | Anechoic or semi-anechoic room | Preferably less than 0,5 % of test room volume | Any | | |
| 3746 | Survey (grade 3) | No special test environment | No restrictions: limited only by available test environment | Any | A-weighted | Sound pressure levels as a function of time; other weighted sound power levels |
| 3747 | Survey (grade 3) | No special test environment; source under test not movable | No restrictions | Steady, broad-band, narrow-band, or discrete frequency | A-weighted | Sound power levels in octave bands |

1) See ISO 2204.

# Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields —

# Part 2:
Methods for special reverberation test rooms

## 1 Scope

### 1.1 General

This part of ISO 3743 specifies a relatively simple engineering method for determining the sound power levels of small, movable noise sources. The measurements are carried out when the source is installed in a specially designed room having a specified reverberation time over the frequency range of interest. The A-weighted sound power level of the source under test is determined from a single A-weighted sound pressure level measurement at each microphone position, rather than from a summation of octave-band levels. This direct method eliminates the need for a reference sound source, but requires the use of a special reverberation test room. The direct method is based on the premise that the sound pressure level, averaged in space and time in the test room, can be used to determine the sound power level emitted by the source. The properties of the special reverberation test room are chosen so that the room's influence on the sound power output of the equipment under test is small. The number of microphone positions and source locations required in the test room are specified. Guidelines for the design of special reverberation rooms are given in annex B.

In addition to the direct method, a comparison method is also described (see 8.3). However, since the requirements on the test room for the comparison method of ISO 3743-1 are considerably less restrictive, it is recommended that the comparison method of ISO 3743-1 be used if a special reverberation test room is not available.

NOTE 1 Precision methods for the determination of the sound power levels of small noise sources are specified in ISO 3741 and ISO 3745.

### 1.2 Types of noise

The methods specified in this part of ISO 3743 are suitable for measurements of all types of noise within a specified frequency range, except impulsive noise consisting of isolated bursts of sound energy.

NOTES

2 A classification of different types of noise is given in ISO 12001.

3 For sources of impulsive noise consisting of short-duration noise bursts, the free-field methods specified in ISO 3744 and ISO 3745 should be used.

### 1.3 Noise source

The noise source may be a device, machine, component or sub-assembly.