ASA/ANSI S12.23-1989
(ASA 83-1989

Reaffirmed by ANSI June 19, 2020

AMERICAN NATIONAL STANDARD

Method for the Designation of Sound Power Emitted by Machinery and Equipment

Secretariat:

Acoustical Society of America

Approved on 13 October 1989:

American National Standards Institute, Inc.

Abstract

This Standard describes a method for expressing the noise emission of machinery and equipment in a convenient manner. This Standard applies to all machinery and equipment that is essentially stationary in nature and for which overall A-weighted sound power is a meaningful descriptor of noise emission. This Standard is intended to facilitate preparation of equipment specifications, labels or other documentation that expresses in quantitative terms the noise emission of machinery or equipment.

ANSI S12.23-1989
(ASA 83-1989)

Reaffirmed by ANSI
August 8, 1996

Reaffirmed by ANSI
July 10, 2001

Reaffirmed by ANSI
May 3, 2006

Reaffirmed by ANSI
June 28, 2011

Reaffirmed by ANSI
May 6, 2016

Reaffirmed by ANSI
June 19, 2020

AMERICAN NATIONAL STANDARD
Method for the Designation of Sound Power Emitted by Machinery and Equipment

ACCREDITED STANDARDS COMMITTEE S12, NOISE

ABSTRACT

This Standard describes a method for expressing the noise emission of machinery and equipment in a convenient manner. This Standard applies to all machinery and equipment that is essentially stationary in nature and for which overall A-weighted sound power is a meaningful descriptor of noise emission. This Standard is intended to facilitate preparation of equipment specifications, labels, or other documentation that expresses in quantitative terms the noise emission of machinery or equipment.

AMERICAN NATIONAL STANDARDS ON ACOUSTICS

The Acoustical Society of America provides the Secretariat for Accredited Standards Committees S1 on Acoustics, S2 on Mechanical Shock and Vibration, S3 on Bioacoustics, and S12 on Noise. These committees have wide representation from the technical community (manufacturers, consumers, and general-interest representatives). The standards are published by the Acoustical Society of America through the American Institute of Physics as American National Standards after approval by their respective standards committees and the American National Standards Institute.

These standards are developed and published as a public service to provide standards useful to the public, industry, and consumers, and to Federal, State, and local governments.

This standard was approved by the American National Standards Institute as ANSI S12.23-1989 on 13 October 1989.

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

Caution Notice: An American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication.

The American National Standards Institute, Inc. (ANSI) is the national coordinator of voluntary standards development and the clearinghouse in the U.S. for information on national and international standards.

The Acoustical Society of America (ASA) is an organization of scientists and engineers formed in 1929 to increase and diffuse the knowledge of acoustics and to promote its practical applications.

Published by the Acoustical Society of America through the American Institute of Physics.

FOREWORD

[This Foreword is for information only, and is not part of American National Standard Method for the Designation of Sound Power Emitted by Machinery and Equipment, ANSI S12.23-1989.]

This Standard revises and supersedes American National Standard ANSI S1.23-1976 (R 1983), American National Standard Method for the Designation of Sound Power Level of Machinery and Equipment, and American National Standard ANSI S3.17-1975 (R 1980), American National Standard Method for Rating the Sound Power Spectrum of Small Stationary Noise Sources. ANSI S1.23 standardized the term Noise Power Emission Level (NPEL) to designate the A-weighted sound level in bels. ANSI S3.17 used the sound power level of the source to calculate the average A-weighted sound pressure level at a distance of 1 meter. Since ANSI S1.23 is more widely used than ANSI S3.17, the present Standard is based primarily on S1.23. The procedures of S3.17, which have not been widely used for designation of the noise emission of sources, are included in an appendix.

International Standard ISO 4871 specifies the unit of the A-weighted sound power level as the decibel but also permits the reporting of the sound power level divided by ten (i.e., the sound power level in bels). In this Standard, the term Noise Power Emission Level (NPEL) is used, and the levels are reported in bels.

This practice is consistent with American National Standard Y10.11-1984, Letter Symbols and Appreviations Used in Acoustics.

This Standard has been developed under the jurisdiction of Accredited Standards Committee S12 using the American National Standards Institute (ANSI) Standards Committee Procedures. The Acoustical Society of America holds the Secretariat for Accredited Standards Committee S12.

Accredited Standards Committee S12 has the following scope:

> Standards, specifications, and terminology, in the fields 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.

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

W. Melnick, *Chairman*
R. K. Hillquist, *Vice-Chairman*
A. Brenig, *Secretary*

Acoustical Society of America • W. Melnick, R. K. Hillquist (*Alt*)
Air-Conditioning and Refrigeration Institute • R. Harold, H. C. Skarbek (*Alt*)
Aluminum Association • S. I. Roth
American Academy of Otolaryngology—Head and Neck Surgery, Inc. • R. F. Naunton, L. A. Michael (*Alt*)

American Industrial Hygiene Association • C. D. Bohl
American Occupational Medical Association • T. R. Hatfield, J. Sataloff (*Alt*)
American Otological Society, Inc. • (Vacant)
American Society of Heating, Refrigerating & Air-Conditioning Engineers (ASHRAE) • H. S. Pei, G. F. Hohn (*Alt*)
American Speech–Language–Hearing Association • R. Kasten, V. W. Byers (*Alt*)
American Welding Society • M. E. Kennebeck (*Alt*)
Audio Engineering Society, Inc. • M. R. Chial
Bruel & Kjaer Instruments, Inc. • G. C. Michel (*Alt*)
Compressed Air and Gas Institute (CAGI) • J. H. Addington
Computer & Business Equipment Manufacturers Association • L. F. Luttrell
Electric Light & Power Group • C. E. Hickman, M. C. Mingoia (*Alt*)
Fastener Industry Noise Control Research Program • E. H. Toothman, J. C. McMurray (*Alt*)
Federal Aviation Administration • R. Tedrick
Larson–Davis Laboratories • D. Johnson, L. Davis (*Alt*)
Motor Vehicle Manufacturers Association • D. B. Smith, T. J. Slavin (*Alt*)
National Council of Acoustical Consultants • J. Erdreich, R. L. Richards (*Alt*)
National Electrical Manufacturers Association • W. L. Billington
National Institute of Standards and Technology • D. Flynn, D. J. Evans (*Alt*)
Naval Ship Research & Development Center • D. J. Vendittis
Power Tool Institute, Inc. • J. L. Bennett
Scantek, Inc. • R. J. Peppin
U.S. Army Aeromedical Research Laboratory • B. Mozo, J. H. Patterson (*Alt*)
U.S. Army Human Engineering Laboratory • G. R. Price, J. Kalb (*Alt*)
U.S. Army Medical Corps • R. M. Atack
U.S. Department of the Air Force • H. E. von Gierke
U.S. Department of the Army, Environmental Office • P. D. Schomer, R. Raspet (*Alt*)
U.S. Department of the Navy, Naval Medical Command • J. Page, L. Marshall (*Alt*)

Individual experts of the Accredited Standards Committee S12, Noise, were:

P. K. Baade
R. G. Bartheld
L. Batchelder
R. W. Benson
R. D. Bruce
K. M. Eldred
S. Feldman
R. S. Gales
W. J. Galloway
E. E. Gross, Jr.
R. Guernsey
R. K. Hillquist
W. W. Lang
G. C. Maling, Jr.
A. H. Marsh
W. Melnick
J. Wesler
G. Winzer
R. W. Young

Working Group S12-25, Noise Labeling, which assisted Accredited Standards Committee S12, Noise, in the development of this standard, had the following membership:

P. K. Baade, *Co-Chairman*
R. S. Gales, *Co-Chairman*

D. R. Flynn
R. D. Hellweg
J. B. Malosh

Suggestions for improvements in this standard will be welcomed. They should be sent to **Accredited Standards Committee S12 at the Standards Secretariat, in care of the Acoustical Society of America, 335 East 45th Street, New York, NY 10017-3483. Telephone (212) 661-9404.**

CONTENTS

American National Standard Method for the Designation of Sound Power Emitted by Machinery and Equipment

0 INTRODUCTION

The A-weighted sound power level is a useful quantity for characterizing the noise emission of stationary machinery and equipment. The A-weighted sound power level is particularly useful for (1) comparing the noise emissions of machines which are similar in size and kind, (2) determining whether a machine complies with a specified upper limit of noise emission, and (3) predicting the A-weighted sound pressure levels in rooms or outdoors resulting from operation of the equipment or machine in those environments.

American and International Standards give alternative methods for determining the sound power level of a source in decibels. In fulfilling the need for information on the noise emission of machinery and equipment, it is necessary to avoid confusion between sound pressure levels (re 20 μPa) in decibels and sound power levels (re 1 pW), also expressed in decibels. To avoid this confusion this standard is based on sound power level expressed in bels.

NOTE: Sound pressure levels at a specified position near a machine depend on the installation of the machine, the environment, the directivity of noise radiation, and the measurement distance. Since sound power is independent of direction and distance and essentially independent of the environment, it is used in this standard as the preferred descriptor for designating the total noise emission of the machine. This is consistent with ANSI Y10.11-1984 which defines the term Noise Power Emission Level and its unit, the bel.

1 SCOPE

This standard applies to all machinery and equipment that is essentially stationary in nature and for which overall A-weighted sound power is a meaningful descriptor of noise emission. It is not applicable to machines or equipment that radiate most of their sound into ducts and piping systems and which must be tested in conjunction with the appropriate duct or piping system. It does not provide the spectral information needed for noise control design decisions.

This standard is intended to be used in conjunction with American and International Standards that describe alternative methods for determining the sound power level and with such additional test codes or standards as are needed to define the test and operating conditions appropriate to the noise radiation properties of specific types of machines or equipment. The designation described in this standard is based on the A-weighted sound power emitted by the source. The directional characteristics of the source are not included in the designation. This method is applicable only when the A-weighted sound power level can be obtained directly or indirectly using one of the procedures described in American or International Standards.

2 PURPOSE

It is the purpose of this standard to describe a method for expressing the noise emissions of machinery and equipment in a convenient manner. The method may be useful for equipment specification, labelling, or other documentation that expresses in quantitative terms the noise emission of a product or device. It is not the purpose of this standard to provide a classification of noise sources. The primary purpose of this standard is to define a standard noise descriptor, i.e., the noise emission level in bels, to facilitate the reporting of A-weighted sound power levels of machinery and equipment.

For some small sound sources, it may be convenient to provide also a single number rating in terms of free field sound level (A-weighted sound pressure level) at a specific distance. A method for obtaining such a sound pressure level rating from the sound power level designation is described in Appendix A.

3 STANDARDS REFERRED TO IN THIS DOCUMENT

[The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of approval by the American National Standards Institute, Inc. (ANSI), the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Information on the recent editions is available from the ASA Standards Secretariat.]