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AMERICAN NATIONAL STANDARD

Guidelines for the Specification of Noise of New Machinery

ANSI/ASA S12.16-1992
(Formerly ANSI S12.16-1992)
(ASA 107-1992)

Accredited Standards Committee S12, Noise

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Guidelines for the Specification of Noise of New Machinery

Secretariat
Acoustical Society of America

Approved 23 December 1992
American National Standards Institute, Inc.

Abstract

This standard provides guidelines for obtaining noise level data from manufacturers of stationary equipment. The standard references existing American National Standards Institute, trade, and professional association measurement standards and techniques to request manufacturer noise level data. Appendices provide guidance for interpretation of the data received from the manufacturer.

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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 S12.16-1992 on 23 December 1992.

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.

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FOREWORD

[This Foreword is not a part of American National Standard *Guidelines for the Specification of Noise of New Machinery*, ANSI S12.16-1992 (ASA Catalog No. 107-1992).]

This standard was prepared to provide guidance for obtaining noise level data from manufacturers of stationary equipment. The Appendices provide guidance on noise level data interpretation.

Accredited Standards Committee S12, Noise, under whose jurisdiction this standard was developed, 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.

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

D. L. Johnson, *Chairman*
P. D. Schomer, *Vice-Chairman*
A. Brenig, *Secretary*

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Acoustical Systems, Inc. ● R. Goodwin, R. Seitz (*Alt*)
Air-Conditioning and Refrigeration Institute ● S. Wang, J. Clukey (*Alt*)
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Fastener Industry Noise Control Research Program ● E. H. Toothman, J. C. McMurray (*Alt*)
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Individual experts of Accredited Standards Committee S12, Noise, were:

P. K. Baade	R. S. Gales	W. W. Lang	H. E. von Gierke
R. G. Bartheld	W. J. Galloway	G. C. Maling, Jr.	L. A. Wilber
R. W. Benson	R. M. Guernsey	A. H. Marsh	G. E. Winzer
L. Beranek	R. K. Hillquist	L. H. Royster	G. S. K. Wong
K. M. Eldred	D. L. Johnson	W. R. Thornton	R. W. Young

Working Group S12/WG20, Specification of the Noise of Machinery at the Operator's Position, which assisted Accredited Standards Committee S12, Noise, in the development of this standard, had the following membership:

S. Roth, *Chairman*

C. Carlsson	H. S. Pei
F. Brittain	R. Peppin
J. Erdreich	E. Toothman

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

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American National Standard Guidelines for the Specification of Noise of New Machinery

1 SCOPE

This standard provides guidelines for obtaining sound level data from manufacturers of stationary equipment to allow the user to make appropriate decisions. It references existing American National Standards Institute, trade and professional association measurement standards and techniques. Data provided in accordance with those documents will be in a form specific to each document. Data may be A-weighted sound pressure levels, A-weighted sound power levels, noise power emission levels, etc., depending upon the requirements of the specific measurement document. This standard provides a focus for the user to intelligently request sound level information using those documents. It includes appendices that provide information for user interpretation of sound level data from a manufacturer.

This standard is a dynamic document subject to periodic review, updating, and revisions.

This standard provides application sheets to estimate the A-weighted sound pressure level at 3 feet (ft) [0.91 meter (m)] from the tested equipment.

It is beyond the scope of this standard to explain the measuring techniques, calculation procedures, etc., described in the referenced documents. It is recommended that the user become familiar with the document of interest to best understand the sound level data provided by the manufacturer.

2 PURPOSE

The purpose of this standard is to assist the user in obtaining reliable, accurate, consistent, and timely sound level information from equipment manufacturers. It assists the user in interpreting the information to make appropriate decisions. The standard is intended for users evaluating machinery sound levels while planning equipment layouts and installations. The user may reference this standard when requesting sound level data from a manufacturer, or may write a sound level specification incorporating relevant portions of this standard.

With the regular use of this standard, manufacturers will become better prepared to provide sound level reports based on proper requests. The result will be more reliable, accurate, consistent, and timely sound level information reporting for user evaluation.

3 FIELD OF APPLICATION

The ability to obtain reliable and accurate sound level data from a manufacturer is important in determining equipment acceptability. A person should be able to request equipment sound level data in an appropriate manner, and evaluate that data to determine acceptability depending on a relevant acceptance criterion. The criterion could be based on the risk of hearing loss, annoyance, speech interference, community requirements, or other appropriate interests.

This standard is suitable for obtaining sound level data from a manufacturer. It is written for stationary machinery including machine tools, pumps, electrical machinery, fans, blowers, gear units, pneumatic equipment, transformers, air conditioning and refrigeration machinery, and diesel engines. It is not meant to supersede existing American National Standards Institute, trade, or professional organization documents, but to provide a focus for appropriate use of them.

This standard references existing American National Standards Institute, trade, and professional association documents as an integral part of the procedure to obtain sound level data from a manufacturer. It would be best to develop one all-encompassing measurement procedure to which all manufacturers would test and report sound level data. Unfortunately, this is not realistic as the broad types of equipment for which this standard has been developed cannot be properly served by one measurement procedure. Also, there are well-established American National Standards Institute, trade, and professional association procedures that will endure. For these reasons, existing sound measurement documents are incorporated in this standard.

The American National Standards Institute, trade, and professional association measurement documents provide various sound descriptors such as A-weighted sound pressure levels, A-weighted sound power levels, noise power emission levels, etc., depending upon the requirements of the specific measurement document. The user will acquire that information, and will want to interpret it to determine equipment acceptability. Appendices A through N of this standard provide application sheets to estimate the A-weighted sound pressure level at 3 feet (0.91 meter)

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from the tested equipment depending upon the test method, reported sound level data, and other relevant information received from the equipment manufacturer.

This standard is expected to be used by people who may have limited acoustical knowledge. It was written to assist a user in obtaining sound level data from a manufacturer and interpreting those data. It is realized that the user may need to obtain advice from acoustical professionals for additional interpretation and assistance in decision-making.

4 DEFINITIONS

For the purpose of this standard, the following definitions apply:

A-weighting: frequency weighting that attenuates low frequency sound. The A-weighting characteristics are given in ANSI S1.4-1983.

background sound: all-encompassing sound associated with a given environment without contributions from the source or sources of interest.

noise power emission level (L_{NPE})**:** A-weighted sound power level in bels. The reference power is 1 pW. Unit: bel (B). (1 B = 10 dB.)

octave band: a range of frequencies such that the highest frequency in the band is double the lowest frequency. Also, for successive octave bands, the center frequency of the higher band is two times the frequency of the next lower center frequency band.

sound power: the rate at which sound energy is radiated by a sound source. Unit: watt (W).

sound power level (L_W)**:** ten times the common logarithm of the ratio of the sound power radiated by the sound source under test to the standard reference power of 1 pW.

sound pressure: a fluctuating pressure superimposed on the static pressure by the presence of sound. Its magnitude can be expressed in several ways, such as instantaneous sound pressure or maximum sound pressure, but in the present standard, the term means the square root of the mean-square sound pressure. Unit: pascal (Pa).

sound pressure level (L_p)**:** ten times the common logarithm of the square of the ratio of the sound pressure to the reference sound pressure of 20 micropascals. Unit: decibel (dB).

sound level: sound pressure level in decibels measured by use of the A, B, or C frequency weighting; and fast, slow or impulse exponential time averaging as specified in this standard. The time and frequency weightings shall be specified.

5 EQUIPMENT CATEGORIES AND CORRESPONDING AMERICAN NATIONAL STANDARDS INSTITUTE, TRADE, OR PROFESSIONAL MEASUREMENT DOCUMENTS

Table 1 is a chart to determine which measurement document is appropriate for the equipment to be purchased.

Example: If the user is purchasing a lathe, a paragraph that may be written to request sound level information may be:

> Manufacturer shall provide A-weighted sound pressure level information as measured at 3 feet (0.91 meter) from the equipment. Manufacturer shall use the NMTBA* Noise Measurement Techniques-1976 of the National Machine Tool Builders Association when making sound level measurements.
>
> *NMTBA is now the Association for Manufacturing Technology.

6 APPLICATION OF SOUND MEASUREMENT INFORMATION RECEIVED FROM MANUFACTURER

6.1 Operating Conditions

The user should insure that sound measurement tests are conducted under operating conditions as close to the user's actual installation as possible. For example, equipment running speed, load, pressures, temperatures, etc., during test should be comparable to expected conditions during actual operation. All conditions should be specified by the user and reported by the manufacturer.

6.2 Test Room versus Installation Room

The manufacturer must report the layout of the test room, including room dimensions, and all materials of construction. If the test room is of different size or different acoustical character than the room where the equipment will be installed, the sound level data from a manufacturer will need to be corrected. See Appendices A through N for application sheets for this correction.

6.3 Test Conducted by Various Measurement Techniques

A given piece of equipment could be tested by various measurement techniques. For example, a machine tool could be tested by the NMTBA Standard on Noise Measurement Techniques-1976, or possibly the ANSI/ASME PTC 36-1985 Standard on Measurement of Industrial Sound. The user should be

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