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AMERICAN NATIONAL STANDARD

For Acoustics – Portable Electric Power Tools, Stationary and Fixed Electric Power Tools, and Gardening Appliances – Measurement of Sound Emitted

ANSI/ASA S12.15-1992
(Formerly ANSI S12.15-1992)
(ASA 106-1992)

Accredited Standards Committee S12, Noise

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



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Stationary and Fixed Electric Power Tools, and
Gardening Appliances – Measurement of Sound
Emitted**

Secretariat
Acoustical Society of America

Approved 7 December 1992
American National Standards Institute, Inc.

Abstract

This American National Standard describes relatively simple test procedures for the measurement of airborne sound from portable electric power tools, stationary and fixed electric power tools, and gardening appliances. Methods are given for the measurement of sound pressure levels and for the calculation of sound power levels. These methods may be used by manufacturers to specify, in part, the sound produced by their products.

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.

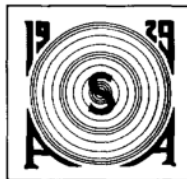
This standard was approved by the American National Standards Institute as ANSI S12.15-1992 on 7 December 1992.

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

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FOREWORD

[This Foreword is not a part of American National Standard For Acoustics—Portable Electric Power Tools, Stationary and Fixed Electric Power Tools, and Gardening Appliances—Measurement of Sound Emitted, ANSI S12.15-1992 (ASA Catalog No. 106-1992) (revision and redesignation of ANSI/PTI S10.1-1983).]

This American National Standard provides a methodology for the measurement of airborne sound emitted from portable electric power tools, stationary and fixed electric power tools, and gardening appliances. This standard also provides for the measurement of sound pressure levels and the calculation of sound power levels.

This standard, originally developed by the Power Tool Institute as ANSI/PTI S10.1-1983, now comes under the jurisdiction of Accredited Standards Committee S12, Noise. It has therefore been redesignated as ANSI S12.15-1992, the year of its approval by ANSI, with its editorially revised text.

This standard, ANSI S12.15-1992, covers the revision to remove ambiguities and clarify technical requirements to American National Standard for Acoustics—Portable Electric Power Tools, Stationary and Fixed Electric Power Tools, and Gardening Appliances—Measurement of Sound Emitted (ANSI/PTI S10.1-1983).

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, *Chair*
L. H. Royster, *Vice-Chair*
A. Brenig, *Secretary*

Acoustical Society of America • D. L. Johnson, W. J. Galloway (*A/I*)
Acoustical Systems, Inc. • R. Goodwin, R. Seitz (*A/I*)
Air-Conditioning and Refrigeration Institute • S. Wang, J. C. Clukey (*A/I*)
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Power Tool Institute, Inc. • R. Callahan, D. Keller (*A/t*)
Scantek, Inc. • R. J. Peppin
U. S. Air Force • R. McKinley
U. S. Army Aeromedical Research Laboratory • B. Mozo, J. H. Patterson (*A/t*)
U. S. Army Construction Engineering Research Laboratory (USACERL) • P. D. Schomer, M. White (*A/t*)
U. S. Army Human Engineering Laboratory • G. R. Price, J. Kalb (*A/t*)
U. S. Department of the Army, Walter Reed Medical Center • R. M. Attack
U. S. Department of the Navy, Bureau of Medicine and Surgery • J. Page, L. Marshall (*A/t*)

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

P. K. Baade	R. S. Galès	W. W. Lang	H. E. von Gierke
R. G. Bartheld	W. J. Galloway	G. Maling	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/WG30 on the revision of the Power Tool Institute (PTI) standard ANSI/PTI S10.1-1983, which assisted Standards Committee S12, Noise, in the development of this standard, had the following membership:

R. J. Callahan, *Chair*

D. Keller	W. Saffell
J. Myers	D. Peot
	R. Stavenhagen

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 For Acoustics—Portable Electric Power Tools, Stationary and Fixed Electric Power Tools, and Gardening Appliances— Measurement of Sound Emitted

1 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this standard is to provide test procedures for the measurement of airborne sound from portable electric power tools, stationary and fixed electric power tools, and gardening appliances.

This standard provides for the measurement of sound pressure levels and for the calculation of sound power levels.

1.2 Scope

1.2.1. This standard applies to portable electric power tools rated at or below 250 volts (V) for use in accordance with American National Standard National Electric Code, ANSI/NFPA 70-1990.

1.2.2. This standard also applies to stationary and fixed electric power tools rated at or below 600 V for use in accordance with ANSI/NFPA 70-1990.

1.2.3. This standard also applies to gardening appliances, such as cultivators, edger-trimmers, grass shears, etc., either battery-operated or cord-connected, and rated at or below 250 V for use in accordance with ANSI/NFPA 70-1990.

1.2.4. This standard does not cover machine tools, as defined in ANSI/NFPA 70-1990, nor does it cover tools, other than hand tools, intended primarily for production line use. This standard does not cover garage equipment, soldering irons or guns, painting equipment, floor-finishing machines, or vacuum cleaners. Lawnmowers, snow throwers, and chain saws are also excluded since they are covered in American National Standard Safety Specifications for Power Lawn Mowers, Lawn and Garden Tractors, and Lawn Tractors, ANSI B71.1-1980, American National Standard Safety Specifications for Snow Throwers, ANSI B71.3-1984, and the American National Standard Safety Standard for Portable Electric Tools, ANSI/UL 45-1990, respectively.

1.2.5. This standard does not apply to pneumatic and gasoline-powered tools.

1.2.6. This standard also provides a single-sheet certification form (see Appendix A).

2 RELATED STANDARDS

2.1 Related American National Standards

This standard is intended to be used in conjunction with the following American National Standards:

(1) American National Standard National Electric Code, ANSI/NFPA 70-1990.

(2) American National Standard Specification for Sound Level Meters, ANSI S1.4-1983 and ANSI S1.4A-1985.

(3) American National Standard Preferred Frequencies and Band Numbers for Acoustical Measurements, ANSI S1.6-1984 (R 1990).

(4) American National Standard Preferred Reference Quantities for Acoustical Levels, ANSI S1.8-1989.

(5) American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, ANSI S1.11-1986.

(6) American National Standard Methods for the Measurement of Sound Pressure Levels, ANSI S1.13-1971 (R 1986).

(7) American National Standard Safety Standard for Portable Electric Tools, ANSI/UL 45-1990.

(8) American National Standard Safety Standard for Motor-Operated Appliances, ANSI/UL 73-1985.

(9) American National Standard Safety Standard for Stationary and Fixed Electric Tools, ANSI/UL 987-1990.

(10) American National Standard Safety Standard for Snow Throwers Safety Specifications, ANSI B71.3-1984.

2.2 Other Related Standards

This standard is also intended to be used in conjunction with the following standards:

(1) Octave, Half-Octave, and Third-Octave Band Filters Intended for the Analysis of Sounds and Vibrations, IEC 225 (1966).

(2) Sound Level Meters, IEC 651 (1979).

(3) Acoustics—Preferred Frequencies for Measurements, ISO 266-1975.

3 REFERENCE LEVELS

In this standard the following reference levels are used:

Sound pressure level:

20 micropascals (μPa) = 2.0×10^{-5} N/m².

Sound power level:

1 picowatt = 1.0 pW = 10^{-12} watts (W).

4 INSTRUMENTATION

The instrumentation required for carrying out the tests specified in this standard is as follows:

(1) Sound Level Meter and Microphone System. This system shall meet the requirements of Type 1 in ANSI S1.4-1983 and ANSI S1.4A-1985. Where noise fluctuations are extreme, an integrating sound level meter should be used.

(2) Octave Band Analyzer. The analyzer shall meet the requirements of ANSI S1.11-1986.

(3) Acoustical Calibration. The entire instrumentation system, including the microphone and cable, shall be calibrated at a convenient frequency before and after each test series. A piston-type calibrator or a transducer-type calibrator with an accuracy of ± 0.5 decibels (dB) is required. The frequency response of the system shall be calibrated annually over the entire frequency range of interest.

(4) Recorders. If a tape recorder or graphic-level recorder is used, its stability, frequency response, and accuracy shall be at least equal to those of the sound level meter and microphone system, over the frequency range of interest.

5 RANGE OF ACOUSTICAL FREQUENCIES AND LEVELS

5.1 Acoustical Frequencies

The range of frequencies generally considered is that of the octave bands whose center frequencies lie

between 63 hertz (Hz) and 8 kilohertz (kHz) inclusive.

NOTE: Measurements may be made at lower frequencies, but measurement precision decreases with decreasing frequency.

5.2 Levels

Octave bands of interest are defined as those bands in which the sound pressure levels produced by the machine are within 50 dB of the highest measured octave-band level.

6 OPERATION AND LOADING

6.1 Operation of Equipment

The power tool shall be operating as intended by the manufacturer at its highest rated voltage and at either the upper or lower limits of its rated electrical frequency range, whichever results in the highest noise levels.

Single phase tools with plugs for nominal 120 or 240 voltage-rating receptacles shall be tested at a confirmed test voltage of 120 and 240 volts, regardless of the voltage indicated on the nameplate.

During testing, current, power, voltage, and speed should be measured at the power tool and not at the power source.

Portable tools that are tested under load may also be tested under no-load conditions with the tool in the test stand, but with the load uncoupled.

6.2 Loading of Power Tools

The instructions for operation and loading given herein and those instructions specified and illustrated in Figs. 1 through 17 shall be carried out with great care to ensure repeatability of results. The microphone locations shall be as specified in Sec. 9.2 and in Figs. 1 through 17.

When loading is specified, the sound produced by the energy-absorbing device (eddy current brake, water brake, pony brake, etc.) shall produce a sound pressure level no higher than 10 dB below that of the free-running tool to be tested, when measured at each microphone location and in each octave band of interest.

