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Standards Secretariat  
Acoustical Society of America  
335 East 45th Street  
New York, New York 10017

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**AMERICAN NATIONAL STANDARD**  
**Statistical Methods for Determining and Verifying Stated**  
**Noise Emission Values of Machinery and Equipment**

**ABSTRACT**

This standard defines the preferred methods for determining and verifying noise emission values for machinery and equipment which are stated in product literature or labeled by other means.

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## AMERICAN NATIONAL STANDARDS ON ACOUSTICS

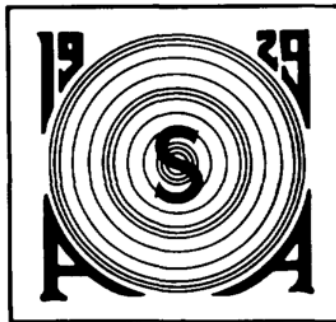
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**This standard was approved by the American National Standards Institute as ANSI S12.3-1985 on 24 May 1985.**

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# FOREWORD

[This Foreword is not part of American National Standard Statistical Methods for Determining and Verifying Stated Noise Emission Values of Machinery and Equipment, S12.3-1985 (ASA Catalog No. 57-1985).]

This American National Standard describes the preferred methods for determining and verifying noise emission values for machinery and equipment which are stated in product literature or labeled by other means. The methods of this American National Standard are consistent with ISO 7574 for Acoustics—Statistical methods for determining and verifying stated noise emission values of machinery and equipment.

This standard was developed using the American National Standards Institute (ANSI) Accredited Standards Committee Procedure under the Secretariat of the Acoustical Society of America.

Accredited Standards Committee S12, 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 Standards Committee S12 for approval, the membership was as follows:

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Individual experts of the S12 Committee were

L. Batchelder  
R. W. Benson  
S. Feldman  
R. S. Gales  
W. J. Galloway  
E. E. Gross, Jr.

R. M. Guernsey  
W. W. Lang  
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R. G. Bartheld  
R. D. Bruce

J. Goldstein  
R. K. Hillquist  
D. Johnson  
A. H. Marsh  
W. Melnick  
R. W. Young

This document was developed by Standards Committee S12 with the assistance of Working Group S12-7 on Statistical Sampling Procedures for Noise Emission Requirements which has the following membership:

Lyle F. Luttrell, *Chairman*

Daniel R. Flynn

John Lahmeyer

William W. Lang

Robert Hellweg

Suggestions for improvement of this standard will be welcomed. They should be sent to the Standards Secretariat, Acoustical Society of America, 335 East 45th Street, New York, NY 10017.

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# American National Standard

## Statistical Methods for Determining and Verifying Stated Noise Emission Values of Machinery and Equipment

### 0 INTRODUCTION

The object of noise emission labeling is to indicate a limit below which the noise emission value of an individual machine and/or a specified large proportion of the noise emission values of a batch of machines lie.

The principal purposes of this standard are to prescribe methods for verifying labeled noise emission values and to provide information to the labeler on the determination of noise emission values for product noise labeling purposes. The methods presented in the standard are consistent with the requirements of ISO 4871 and ISO 7574.

This standard considers the term "label" to include all means for providing information on the noise emission values to potential users of the equipment; this includes labels, brochures, advertisements, commercial literature, etc.

The methods described in this standard may also be applied to values stated for other purposes, e.g., to the upper noise emission limit set by an authority for a specific family of machines.

NOTE: Although this standard is drafted mainly in terms of A-weighted sound power level as a noise emission quantity, it is equally applicable to other single-number quantities.

This standard contains three methods:

I. Method for determining and verifying the noise emissions of machines with individually labeled values (Sec. 6).

II. Method for determining and verifying labeled values for batches of machines (Sec. 7).

III. Simple (transition) method for determining and verifying labeled values for batches of machines (Sec. 8).

### 1 SCOPE

This standard describes methods for determining and verifying labeled values for the noise emitted by machinery and equipment. Two types of labeling are considered in this standard: machines labeled with individual values and machines labeled with the same

value for the batch. For economical reasons, the labeled value for all machines of a batch of machines may be checked by sampling procedures.

This standard does not deal with the consequences to be drawn if the labeled value is not verified for the batch of machines or for the single machine.

### 2 PURPOSE

The principal purposes of this standard are to prescribe methods for verifying labeled noise emission values and to provide information to the labeler on the determination of noise emission values for product noise labeling purposes.

### 3 FIELD OF APPLICATION

This standard applies to machines produced in very small quantities as well as to machines produced by mass production methods. This standard applies to families of machines or equipment for which special measurement test codes for the determination of noise emission quantities are prepared. This standard requires that the labeled value be determined using the same measurement test code as that specified for verification. If no special test code for a particular family exists, the basic standards in the ANSI S1.31–S1.35 series may be appropriate.

NOTE: This does not preclude the use of other standards which may form the basis of special measurement test codes.

Section 6 contains methods for determining and verifying the labeled noise emission values which apply to machines labeled with individual values.

Section 7 contains statistical sampling methods for verifying the labeled noise emission values which apply to batches of machines. The labeled value for all machines of a batch is checked by sampling procedures. The use of Sec. 7 requires a labeling code for the family of machines. The labeling code must specify a reference standard deviation, the type of sampling to be used (single, double, or sequential), and the sample size required when testing the compliance of a batch of a specific family of machines. The procedures of Sec. 7 assume that the noise emission values of a batch of ma-

chines will follow a normal distribution curve. The statistical parameters upon which Sec. 7 is based assume there is 95% probability that not more than 6.5% of the noise emission values in a batch will exceed the labeled value. Information is included to assist the labeler in the determination of a labeled value based on these statistical parameters.

Section 8 contains simple methods for determining and verifying the stated values of batches of machines which may be applied when an agreed reference standard deviation of the family of machines is not available. The labeled value for all machines of a batch is checked by a sampling procedure. The sample size is three. Information is included for the labeler to assist in the determination of the labeled value for the batch. Section 8 is based on the same statistical principles as Sec. 7.

## 4 REFERENCES

### 4.1 American National Standards

ANSI S1.23-1976—American National Standard Method for Designation of Sound Power Emitted by Machinery and Equipment.

ANSI S1.31-1980—American National Standard Precision Methods for the Determination of Sound Power Levels of Broad-Band Noise Sources in Reverberation Rooms.

ANSI S1.32-1980—American National Standard Precision Methods for the Determination of Discrete-Frequency and Narrow-Band Noise Sources in Reverberation Rooms.

ANSI S1.34-1980—American National Standard Engineering Methods for the Determination of Sound Power Levels of Noise Sources for Essentially Free-Field Conditions over a Reflecting Plane.

ANSI S1.35-1979—American National Standard Precision Methods for Determination of Sound Power Levels of Noise Sources in Anechoic and Hemi-Anechoic Rooms.

ANSI/ASQC Z1.9-1980—American National Standard Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming.

### 4.2 ISO Standards

ISO 4871-1984-Acoustics—Noise classification and labeling of equipment and machinery. (At present in the stage of draft.)

ISO 3534-1977-Statistics—Vocabulary and symbols.

ISO 5725-1981-Precision of test methods—Determination of repeatability and reproducibility.

ISO 5479-Normality Tests (At present in the stage of draft.)

ISO 7574-Acoustics—Statistical methods for determining and verifying stated noise emission values of machinery and equipment. (At present in the stage of draft.)

## 5 DEFINITIONS

**5.1 A-weighted sound power level.** Sound power level of the noise source determined according to the appropriate noise measurement test code and using A-weighting. The reference sound power is 1 pW ( $= 10^{-12}$  W). Symbol:  $L_{WA}$ . Unit: decibel (dB).

**5.2 noise emission quantity, noise emission value.** Basic noise emission quantity is the A-weighted sound power level determined according to ANSI S1.23-1976. A value of the noise emission quantity is called noise emission value.

NOTE: The methods of this standard can also be applied to other single-number noise emission quantities.

**5.3 measured value.** Noise emission value determined from measurements on an individual machine according to an appropriate measurement test code. Symbol:  $L_i$ .

NOTE: Measured values should not be rounded. The precision of measured values should be consistent with the calculations to be performed according to this standard.

**5.4 family of machines.** Machines or equipment of similar design or type or intended to perform the same functions.

**5.5 labeled value.** Value of the noise emission quantity stated for an individual machine or all machines of a batch. The labeled value indicates the limit below which the noise emission value of the individual machine and/or a specified large proportion of the noise emission values of the batch of machines are stated to lie when the machines are new. Symbol:  $L_g$ .

**5.6 label.** Statement of the labeled value,  $L_g$ , which is included in product literature and/or affixed to a machine or piece of equipment.

**5.7 batch (lot) of machines.** Group of machines of the same family produced in quantity, manufactured to the same technical specifications, and characterized by the same labeled value.

NOTE: The batch may be a whole production series or a portion thereof.