

ANSI/ASA S12.72-2015

---

---

---

# AMERICAN NATIONAL STANDARD

## **Procedure for Measuring the Ambient Noise Level in a Room**

---

---

---

ANSI/ASA S12.72-2015

Accredited Standards Committee S12, Noise

---

Standards Secretariat  
Acoustical Society of America  
1305 Walt Whitman Road, Suite 300  
Melville, NY 11747

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.



**ANSI/ASA S12.72-2015**

AMERICAN NATIONAL STANDARD

# **Procedure for Measuring the Ambient Noise Level in a Room**

**Secretariat:**

**Acoustical Society of America**

**Approved on February 24, 2015 by:**

**American National Standards Institute, Inc.**

## **Abstract**

This standard specifies requirements and describes procedures for the measurement of ambient noise in a room. The measurements may be made at a specified point in the room, in a defined region of the room, or the measurements may be made to represent the space-average sound pressure level throughout the room. Two methods are offered: a survey method for quick evaluation and an engineering method for a more precise assessment of the ambient noise level. Both fixed and moving measurement microphones are allowed. The scope of this standard includes all types of ambient noise including building utility systems and exterior noise intrusion from street traffic and aircraft. Noise sources excluded from the scope of this standard include noise from building occupants and transient noise sources. The results of the measurements obtained via this standard are intended to be used to compare measured sound pressure levels with acoustic criteria similar to those presented in ANSI/ASA S12.2. It should be noted that by its very nature, ambient noise is not always stationary in time. Consequently, one should not expect to obtain identical results when a procedure specified in this standard is used in the same room at a different time.

## AMERICAN NATIONAL STANDARDS ON ACOUSTICS

The Acoustical Society of America (ASA) provides the Secretariat for Accredited Standards Committees S1 on Acoustics, S2 on Mechanical Vibration and Shock, S3 on Bioacoustics, S3/SC 1 on Animal Bioacoustics, and S12 on Noise. These committees have wide representation from the technical community (manufacturers, consumers, trade associations, organizations with a general interest, and government representatives). The standards are published by the Acoustical Society of America as American National Standards after approval by their respective Standards Committees and the American National Standards Institute (ANSI).

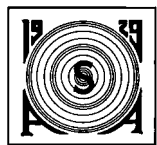
These standards are developed and published as a public service to provide standards useful to the public, industry, and consumers, and to Federal, State, and local governments.

Each of the Accredited Standards Committees (operating in accordance with procedures approved by ANSI) is responsible for developing, voting upon, and maintaining or revising its own Standards. The ASA Standards Secretariat administers Committee organization and activity and provides liaison between the Accredited Standards Committees and ANSI. After the Standards have been produced and adopted by the Accredited Standards Committees, and approved as American National Standards by ANSI, the ASA Standards Secretariat arranges for their publication and distribution.

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered and that a concerted effort be made towards their resolution.

The use of an American National Standard is completely voluntary. Their existence does not in any respect preclude anyone, whether he or she has approved the Standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the Standards.

NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this Standard.



Acoustical Society of America  
ASA Secretariat  
1305 Walt Whitman Road, Suite 300  
Melville, New York 11747  
Telephone: 1 (631) 390-0215  
Fax: 1 (631) 923-2875  
E-mail: [asastds@acousticalsociety.org](mailto:asastds@acousticalsociety.org)

© 2015 by Acoustical Society of America. This standard may not be reproduced in whole or in part in any form for sale, promotion, or any commercial purpose, or any purpose not falling within the provisions of the U.S. Copyright Act of 1976, without prior written permission of the publisher. For permission, address a request to the Standards Secretariat of the Acoustical Society of America.

## Contents

|      |   |    |
|------|---|----|
| 1    | Scope.....  | 1  |
| 2    | Purpose.....  | 2  |
| 3    | Applications.....   | 2  |
| 4    | Normative references .....  | 2  |
| 5    | Terms and definitions, nomenclature and mathematical descriptions.....                                | 3  |
| 5.1  | Terms and definitions .....   | 3  |
| 5.2  | Nomenclature .....  | 6  |
| 5.3  | Mathematical descriptions .....   | 7  |
| 6    | Types of sound .....  | 8  |
| 6.1  | Temporal characteristics .....  | 8  |
| 6.2  | Frequency characteristics.....  | 10 |
| 6.3  | Spatial characteristics.....  | 11 |
| 7    | Types of acoustical environments .....  | 12 |
| 7.1  | Size and reverberation .....  | 12 |
| 7.2  | Function .....  | 13 |
| 8    | Instrumentation .....   | 15 |
| 9    | Test conditions.....  | 15 |
| 10   | Allowable measurement volume.....   | 16 |
| 11   | Measurement procedure.....  | 16 |
| 11.6 | Survey method.....  | 17 |
| 11.7 | Engineering method.....   | 17 |
| 12   | Background noise correction .....   | 18 |
| 12.1 | Definition.....   | 18 |
| 12.2 | Measurement methods.....  | 18 |
| 12.3 | Background noise correction .....   | 18 |
| 13   | Criteria evaluation.....  | 19 |
| 14   | Test report.....  | 19 |
| 14.1 | Measurement objectives.....   | 20 |
| 14.2 | Test conditions.....  | 20 |
| 14.3 | Measured sound pressure levels.....   | 20 |
|      | <b>Annex A</b> (informative) Typical noise metrics for various indoor sound level measurements.....   | 21 |
|      | <b>Annex B</b> (informative) Sample data sheet for indoor sound level measurements .....              | 22 |
|      | <b>Annex C</b> (informative) Example of Using ANSI S12.72 for School Classrooms (Survey Method) ..... | 23 |
|      | Bibliography .....  | 25 |

## Figures

|   |    |
|---|----|
| Figure 1 – Recommended motion for handheld space-average measurement..... | 17 |
|---|----|

## Tables

|   |    |
|---|----|
| Table 1 — Quantity symbols and unity symbols. ....      | 6  |
| Table A.1 — Appropriate indoor sound level metrics..... | 21 |

## Foreword

[This Foreword is for information only and is not a part of the American National Standard ANSI/ASA S12.72-2015 American National Standard Procedure for Measuring the Ambient Noise Level in a Room. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the standard.]

This standard comprises a part of a group of definitions, standards, and specifications for use in noise. It was developed and approved by Accredited Standards Committee S12 Noise, under its approved operating procedures. Those procedures have been accredited by the American National Standards Institute (ANSI). The scope of Accredited Standards Committee S12 is as follows:

*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 not comparable to any existing ISO Standard.

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

W.J. Murphy, *Chair*  
S.J. Lind, *Vice-Chair*

S.B. Blaeser, *Secretary*

|   |                      |
|---|----------------------|
| <b>3M Occupational Health &amp; Environmental Safety Division</b> .....     | E.H. Berger          |
| <b>Acoustical Society of America</b> .....                                  | R.D. Hellweg         |
| .....   | D. Lubman (Alt.)     |
| <b>Air-Conditioning, Heating and Refrigeration Institute</b> .....          | S. Lind              |
| .....   | D. Abbate (Alt.)     |
| <b>Air Movement &amp; Control Association, Inc.</b> .....                   | J.A. Brooks          |
| .....   | M. Stevens (Alt.)    |
| <b>American Academy of Audiology</b> .....                                  | T. Ricketts          |
| .....   | C. Schweitzer (Alt.) |
| <b>American Academy of Otolaryngology - Head and Neck Surgery</b> .....     | R.A. Dobie           |
| .....   | L.A. Michael (Alt.)  |
| <b>American Industrial Hygiene Association</b> .....                        | D. Driscoll          |
| .....   | S.N. Hacker (Alt.)   |
| <b>American Speech-Language-Hearing Association</b> .....                   | L.A. Wilber          |
| .....   | N. DiSarno (Alt.)    |
| <b>Caterpillar, Inc.</b> .....  | K.G. Meitl           |
| <b>Compressed Air and Gas Institute</b> .....                               | R.C. Johnson         |
| .....   | D.R. Bookshar (Alt.) |
| <b>Council for Accreditation in Occupational Hearing Conservation</b> ..... | VACANT               |
| .....   | L.D. Hager (Alt.)    |

|   |                        |
|---|------------------------|
| <b>Emerson Electric – Copeland Corporation</b> .....  | A.T. Herfat            |
| .....   | G. Williamson (Alt.)   |
| <b>ETS – Lindgren Acoustic Systems</b> .....  | D. Winker              |
| .....   | M. Black (Alt.)        |
| <b>ExxonMobil</b> .....   | B. Moulton             |
| <b>G.R.A.S. Sound &amp; Vibration</b> .....   | B. Schustrich          |
| .....   | J. Soendergaard (Alt.) |
| <b>GE Aviation</b> .....  | R. Majjigi             |
| .....   | R. Babbitt (Alt.)      |
| <b>General Motors</b> .....   | D.B. Moore             |
| <b>Honeywell Safety Products</b> .....  | R. Ghent               |
| .....   | B. Witt (Alt.)         |
| <b>Information Technology Industry Council</b> .....  | W.M. Beltman           |
| .....   | J. Rosenberg (Alt.)    |
| <b>Institute of Noise Control Engineering</b> .....   | R.J. Peppin            |
| .....   | B. Tinianov (Alt.)     |
| <b>International Safety Equipment Association</b> .....   | J. Birkner             |
| .....   | C.Z. Fargo (Alt.)      |
| <b>John Deere</b> .....   | K. Cone                |
| <b>National Council of Acoustical Consultants</b> .....   | B.M. Brooks            |
| .....   | G.E. Winzer (Alt.)     |
| <b>National Hearing Conservation Association</b> .....  | T. Thunder             |
| .....   | G.L. Poling (Alt.)     |
| <b>National Institute for Occupational Safety and Health</b> .....  | W.J. Murphy            |
| .....   | E. Zechmann (Alt.)     |
| <b>National Institute of Standards and Technology – National<br/>Voluntary Laboratory Accreditation Program</b> ..... | K. Harper              |
| <b>National Park Service</b> .....  | M. McKenna             |
| .....   | K. Fristrup (Alt.)     |
| <b>Noise Control Engineering, Inc.</b> .....  | M.A. Bahtiarian        |
| .....   | R. Fischer (Alt.)      |
| <b>Noise Pollution Clearinghouse</b> .....  | L. Blomberg            |
| <b>PCB Group</b> .....  | K. Cox                 |
| .....   | L. Harbaugh (Alt.)     |
| <b>Power Tool Institute, Inc.</b> .....   | W.D. Spencer           |
| .....   | M. Hickok (Alt.)       |
| <b>Schomer and Associates, Inc.</b> .....   | P.D. Schomer           |
| <b>U.S. Air Force</b> .....   | R.L. McKinley          |
| .....   | H. Gallagher (Alt.)    |