
**ASA/ANSI S12.62-2012 / ISO 9613-2:1996 (MOD)(a Modified Nationally Adopted International Standard)**

**Reaffirmed by ANSI June 22, 2020**

AMERICAN NATIONAL STANDARD

# Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

# (a modified nationally adopted international standard)

**Secretariat:**

**Acoustical Society of America**

**Approved on September 5, 2012:**

**American National Standards Institute, Inc.**

## Abstract

This modified Nationally Adopted International Standard specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in parts 1 to 3 of ISO 1996) under meteorological conditions favorable to propagation from sources of known sound emission.

**ANSI/ASA S12.62-2012 / ISO 9613-2:1996 (MOD)**
**(a Modified Nationally Adopted International Standard)**

**Reaffirmed by ANSI October 5, 2017**

**Reaffirmed by ANSI June 22, 2020**

AMERICAN NATIONAL STANDARD

# Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

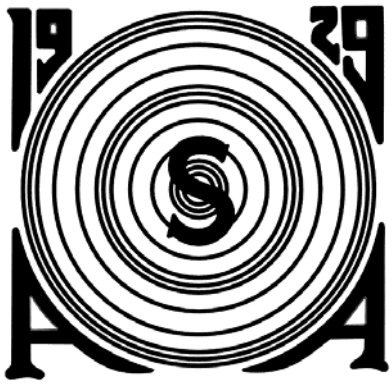
ANSI/ASA S12.62-2012 / ISO 9613-2:1996 (MOD)

Accredited Standards Committee S12, Noise

Standards Secretariat
Acoustical Society of America
35 Pinelawn Road, Suite 114E
Melville, NY 11747-3177

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 S12.62-2012 / ISO 9613-2:1996 (MOD)**
**(A Modified Nationally Adopted International Standard)**

AMERICAN NATIONAL STANDARD

# Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

**Secretariat:**

**Acoustical Society of America**

**Approved on September 5, 2012 by:**

**American National Standards Institute, Inc.**

## Abstract

This modified Nationally Adopted International Standard specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in parts 1 to 3 of ISO 1996) under meteorological conditions favorable to propagation from sources of known sound emission.

## 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
35 Pinelawn Road, Suite 114E
Melville, New York 11747-3177
Telephone: 1 (631) 390-0215
Fax: 1 (631) 390-0217
E-mail: asastds@aip.org

## Contents



## Figures

## Tables

## Foreword

[*This Foreword is for information only and is not a part of ANSI/ASA S12.62-2012/ISO 9613-2:1996 (MOD) American National Standard Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.*]

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 an editorially modified version of ISO 9613-2:1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*, which was prepared by ISO/TC 43/ SC 1, Noise. In conformance with ANSI and ISO rules, the words "this American National Standard" replace the words "this part of ISO 9613" where they appear in the ISO document, decimal points were substituted in place of the decimal commas used in ISO documents, and American English spelling is used in place of British English spelling. In addition, figures were added to help clarify geometry and some editorial changes were made to improve clarity. All editorial additions and modifications are shown in a **bold blue font within a blue box** and are identified as U.S. Modifications. Technically, there is no difference between this version and ISO 9613-2:1996.

Annexes A and B of ANSI/ASA S12.62-2012 / ISO 9613-2:1996 (MOD) are for information only.

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*

**3M Occupational Health & Environmental Safety Division** ..... E.H. Berger

**Acoustical Society of America**..... R.D. Hellweg
..... D. Lubman (Alt.)

**Air-Conditioning, Heating and Refrigeration Institute** ..... S.J. Lind
.....D. Abbate (Alt.)

**Air Movement & Control Association, Inc.**.....J.A. Brooks
.....M. Stevens (Alt.)

**American Academy of Audiology**.....D. Ostergren
..... S. Gordon-Salant (Alt.)

**American Academy of Otolaryngology - Head and Neck Surgery**.....R.A. Dobie
.....L.A. Michael (Alt.)

**American Industrial Hygiene Association** .....D. Driscoll
..... S.N. Hacker (Alt.)

**American Speech-Language-Hearing Association** .....L.A. Wilber

V. Gladstone (Alt.)

**Caterpillar, Inc.** K.G. Meitl

**Compressed Air and Gas Institute** R.C. Johnson
D.R. Bookshar (Alt.)

**Council for Accreditation in Occupational Hearing Conservation** VACANT
L.D. Hager (Alt.)

**Emerson Electric – Copeland Corporation** A.T. Herfat
G. Williamson (Alt.)

**ETS – Lindgren Acoustic Systems** D. Winker
M. Black (Alt.)

**ExxonMobil** B. Moulton

**G.R.A.S. Sound & Vibration** J. Soendergaard
B. Schustrich (Alt.)

**GE Aviation** R. Majjigi
R. Babbitt (Alt.)

**General Motors** D.B. Moore

**Harley-Davidson Motor Company** VACANT

**Information Technology Industry Council** W.M. Beltman
J. Rosenberg (Alt.)

**Institute of Noise Control Engineering** R.J. Peppin
B. Tinianov (Alt.)

**International Safety Equipment Association** J. Birkner
C.Z. Fargo (Alt.)

**John Deere** K.B. Washburn
K. Cone (Alt.)

**National Council of Acoustical Consultants** J. Erdreich
G.E. Winzer (Alt.)

**National Hearing Conservation Association** J. Cissna

**National Institute for Occupational Safety and Health** W.J. Murphy
E. Zechmann (Alt.)

**National Institute of Standards and Technology – National Voluntary Laboratory Accreditation Program** B.A. Sandoval

**National Park Service** G.R. Stanley
K. Fristrup (Alt.)

**Noise Control Engineering, Inc.** M.A. Bahtiarian
R. Fischer (Alt.)

**Noise Pollution Clearinghouse** L. Blomberg

**PCB Group** K. Cox
L. Harbaugh (Alt.)

**Power Tool Institute, Inc.** ..... W.D. Spencer
..... M. Hickok (Alt.)

**Schomer and Associates, Inc.** ..... P.D. Schomer

**Sierra Club – National Parks and Monuments Committee** ..... D.J. Hingson

**Sperian Hearing Protection, LLC** ..... R. Ghent
..... B. Witt (Alt.)

**U.S. Air Force** ..... R.L. McKinley
..... H. Gallagher (Alt.)

**U.S. Army Aeromedical Research Lab** ..... W.A. Ahroon

**U.S. Army Construction Engineering Research Laboratory** ..... M.J. White
..... M. Swearingen (Alt.)

**U.S. Army Public Health Command** ..... C. Stewart
..... M. Grantham (Alt.)

**U.S. Army Research Laboratory, Human Research and Engineering Directorate** ..... J. Gaston
..... M.S. Binseel (Alt.)

**U.S. Department of Transportation** ..... A. Konheim

**U.S. Naval Surface Warfare Center - Carderock** ..... M. Craun

**Université du Québec ETS** ..... J. Voix
..... F. Laville (Alt.)

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

| | | |
|---|---|---|
| P.K. Baade | W.W. Lang | R.J. Peppin |
| E.H. Berger | D. Lubman | J. Schmitt |
| B.M. Brooks | D. Michaud | P.D. Schomer |
| A.J. Campanella | N.P. Miller | L.C. Sutherland |
| L.S. Finegold | W.J. Murphy | W.R. Thornton |
| R.D. Godfrey | M.A. Nobile | L.A. Wilber |
| R.D. Hellweg | | G.E. Winzer |

Working Group S12/WG 31, Predicting Sound Pressure Levels Outdoors, which assisted Accredited Standards Committee S12, Noise, in the development of this standard, had the following membership.

R.J. Peppin, Chair

| | | |
|---|---|---|
| A.J. Campanella | A. Ghosh | P.D. Schomer |
| W. Gastmeier | T. Kelsall | L.C. Sutherland |
| | M. Kovacik | |

Suggestions for improvements to this standard will be welcomed. They should be sent to Accredited Standards Committee S12, Noise, in care of the Standards Secretariat of the Acoustical Society of America, 35 Pinelawn Road, Suite 114E, Melville, New York 11747-3177. Telephone: 631-390-0215; FAX: 631-390-0217; E-mail: asastds@aip.org.

# AMERICAN NATIONAL STANDARD

# Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

## 1 Scope

This American National Standard specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in parts 1 to 3 of ISO 1996) under meteorological conditions favorable to propagation from sources of known sound emission.

These conditions are for downwind propagation, as specified in 5.4.3.3 of ISO 1996-2:1987 or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night. Inversion conditions over water surfaces are not covered and may result in higher sound pressure levels than predicted from this American National Standard.

The method also predicts a long-term average A-weighted sound pressure level as specified in ISO 1996-1 and ISO 1996-2. The long-term average A-weighted sound pressure level encompasses levels for a wide variety of meteorological conditions.

The method specified in this American National Standard consists specifically of octave-band algorithms (with nominal midband frequencies from 63 Hz to 8 kHz) for calculating the attenuation of sound which originates from a point sound source, or an assembly of point sources. The source (or sources) may be moving or stationary. Specific terms are provided in the algorithms for the following physical effects:

— geometrical divergence;

— atmospheric absorption;

— ground effect;

— reflection from surfaces;

— screening by obstacles.

Additional information concerning propagation through housing, foliage and industrial sites is given in annex A.

This method is applicable in practice to a great variety of noise sources and environments. It is applicable, directly or indirectly, to most situations concerning road or rail traffic, industrial noise sources, construction activities, and many other ground-based noise sources. It does not apply to sound from aircraft in flight, or to blast waves from mining, military or similar operations.

To apply the method of this American National Standard, several parameters need to be known with respect to the geometry of the source and of the environment, the ground surface characteristics, and the source strength in terms of octave-band sound power levels for directions relevant to the propagation.

NOTE 1 If only A-weighted sound power levels of the sources are known, the attenuation terms for 500 Hz may be used to estimate the resulting attenuation.