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AMERICAN NATIONAL STANDARD

Methods for Determining the Insertion Loss of Outdoor Noise Barriers

Secretariat:

Acoustical Society of America

Approved on 27 April 1998:

American National Standards Institute, Inc.

Abstract

This Standard presents three methods for determining the insertion loss of outdoor noise barriers. The methods are ‘‘direct’’ BEFORE and AFTER measurements; ‘‘indirect’’ BEFORE measurements at an ‘‘equivalent’’ site; and ‘‘indirect’’ predictions of BEFORE sound levels. ‘‘Indirect BEFORE measurements’’ and ‘‘indirect BEFORE prediction’’ methods require direct measurements of AFTER sound levels. Measurements of acoustical descriptors use sound sources naturally present at a site, controlled natural sound sources, or controlled artificial sound sources. Within prescribed limits, the receiver location and atmospheric, ground, and terrain conditions may be chosen based on the objectives for determination of barrier insertion loss. Examples are provided for worksheets that may be used for data acquisition and analysis.

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AMERICAN NATIONAL STANDARD

METHODS FOR DETERMINING THE INSERTION LOSS OF OUTDOOR NOISE BARRIERS

ANSI/ASA S12.8-1998

Accredited Standards Committee S12, Noise

Standards Secretariat
Acoustical Society of America
120 Wall Street, 32nd Floor
New York, New York 10005-39

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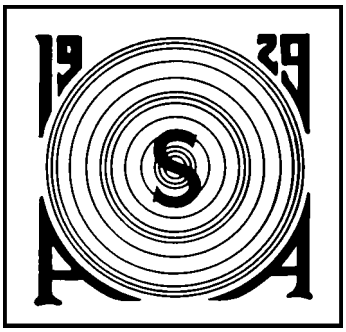

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Contents

Foreword

[This Foreword is for information only and is not an integral part of *American National Standard Methods for Determining the Insertion Loss of Outdoor Noise Barriers*, ANSI S12.8-1998.]

This American National Standard supersedes the previous version published as ANSI S12.8-1987.

This Standard contains three informative annexes.

This Standard was developed under the jurisdiction of Accredited Standards Committee S12, Noise, which 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 final approval, the membership was as follows:

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P. K. Baade	W. J. Galloway	L. H. Royster
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R. S. Gales	J. Pope	R. W. Young

Working Group S12/WG6, Insertion Loss of Outdoor Noise Barriers at Sites of Interest, which assisted Accredited Standards Committee S12, Noise, in the preparation of this Standard, had the following membership:

W. Bowlby, *Chair*

G. S. Anderson	R. Hendriks	A. D. Pierce
C. N. Blair	H. Jongedyk	J. E. Piercy
G. G. Fleming	R. F. Lambert	J. B. Pulaski
S. I. Hayek	J. M. Lawther	R. Raspet

Suggestions for improvement of this Standard will be welcomed. They should be made in writing to Accredited Standards Committee S12, Noise, in care of the Standards Secretariat, Acoustical Society of America, 120 Wall Street, 32nd Floor, New York, New York 10005-3993, USA. E-mail: asastds@aip.org; Telephone: +1 212 248 0373; Fax +1 212 248 0146.

American National Standard

Methods for Determining the Insertion Loss of Outdoor Noise Barriers

0 Introduction

Determining the insertion loss provided by outdoor noise barriers is often difficult. In many cases, the difficulty results from the absence of sound levels measured at a site before barrier installation, or the inability to estimate accurately the ''before-installation'' sound levels. Lack of standard methods for determining barrier insertion loss may lead to incorrectly performed (or poorly documented) computations and prevent independent evaluation of techniques and results.

1 Scope

1.1 This Standard adopts insertion loss—the difference between acoustical levels before and after a noise-barrier installation—as the basis for evaluating the acoustical effectiveness of an outdoor noise barrier. Methods are provided to determine the insertion loss of outdoor noise barriers at selected receiver locations and under conditions of interest.

1.2 This Standard covers insertion loss determination, by measurement or by the combination of measurement and prediction, for outdoor noise barriers of all types. Sound sources at a site may be those that are naturally present, controlled natural sound sources, or controlled artificial sound sources. Preferred acoustical descriptors are time-average, A-weighted sound level, A-weighted sound exposure level, or octave-band sound pressure level. Other acoustical descriptors of the BEFORE and AFTER sound are not precluded.

1.3 Standardized receiver locations or measurement conditions are not prescribed. Measured insertion losses apply only for the stated conditions and are not to be generalized to represent other conditions, sites, receiver locations, or sound sources.

1.4 This Standard may be used for routine checking of the insertion loss of an outdoor noise barrier, or for engineering or diagnostic evaluations. The methods of the Standard may be used in situations where a barrier is to be installed, or has already been installed.

1.5 This Standard does not present methods for comparing the insertion loss of outdoor noise barriers at different sites, nor does it specifically address sound transmission loss through a barrier. While comparisons of the insertion loss of outdoor noise barriers at different sites or extrapolations to other conditions may be possible, such comparisons or extrapolations are not within the scope of this Standard.

1.6 Reliable and repeatable results may be expected when the distances between all receivers and their closest and strongest sound sources (or closest point of approach for mobile sound sources) are within 70 m. The methods of the Standard may be applied for other conditions, but the experimental uncertainties likely will increase, perhaps substantially.

1.7 This Standard presents two methods for indirectly determining the level of the BEFORE sound. The two methods are (1) by measurement at a second site that is equivalent to the desired site prior to installation of the barrier, or (2) by prediction of the BEFORE sound levels. Equivalence here is in terms of sound-source characteristics, receiver locations, and terrain, atmospheric, and ground conditions. The Standard presents principles, not procedures, for assessing sound-source, atmospheric and terrain equivalence, as well as for choosing a model to predict the level of BEFORE sound.

1.8 This Standard presents a method to determine a lower bound to the insertion loss when background noise prevents clear measurement of the source sound level at a receiver location. In many applications, reporting a barrier insertion loss for a given receiver location as ''equal to or greater than X dB'' is sufficient. This Standard also presents a method to determine the total experimental uncertainty associated with the barrier insertion loss.

1.9 Because of many factors affecting the sound levels at receiver locations, it may not be possible to determine the insertion loss of an outdoor noise barrier for conditions of interest.