ASA/ANSI S12.64-2009/Part 1

Reaffirmed by ANSI November 1, 2019

AMERICAN NATIONAL STANDARD

Quantities and Procedures for Description and Measurement of Underwater Sound from Ships – Part 1: General Requirements

Secretariat:

Acoustical Society of America

Approved on September 30, 2009:

American National Standards Institute, Inc.

Abstract

This standard describes the measurement systems, procedures, and methodologies used for the beam aspect measurement of underwater sound pressure levels from ships for a given operating condition. The resulting quantities are reported as nominal source level values in one-third octave bands. It does not require the use of a specific ocean location, but the requirements for an ocean test site are provided. The underwater sound pressure level measurements are performed in the far-field and then corrected to a reference distance of 1 m. This standard is applicable to any and all surface vessels either manned or unmanned. This standard is not applicable to submerged vessels or to aircraft. Measurement systems are described for measurement of underwater sound pressure levels and also the distance or range between the underwater transducers and the subject vessel. Processing and reporting of the data are described, and informational guidance is provided. This standard does not specify or provide guidance on underwater noise criteria.

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ANSI/ASA S12.64-2009/Part 1

Accredited Standards Committee S12, Noise

Standards Secretariat
Acoustical Society of America
35 Pinelawn Road, Suite 114 E
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Foreword

This Foreword is for information only and is not a part of ANSI/ASA S12.64-2009/Part 1 American National Standard Quantities and Procedures for Description and Measurement of Underwater Sound from Ships - Part 1: General Requirements.

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:

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Working Group S12/WG 47, Underwater Noise Measurement of Ships, which assisted Accredited Standards Committee S12, Noise, in the development of this standard, had the following membership:

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D. Hazelwood	J. Roche	K. Yankaskas

Suggestions for improvements of 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.

Introduction

This part of ANSI/ASA S12.64 was written to provide a standardized measurement method for the quantification and qualification of a ship's underwater (radiated) noise. More specific discussions of advanced measurement systems, along with technical rationale and tradeoffs, and computation examples will be included in subsequent parts of this standard. Future parts will also contain recommendations concerning issues such as hydrophone suspension, narrowband processing and reporting, shallow water measurements, and factors that affect the uncertainty and repeatability of the data.

Reduction of all types of vessel emissions has become an issue in the past ten years, most notably ballast water and engine emissions. More recently, these emissions have included underwater noise for the purpose of reducing the impact on marine animals. Excessive underwater noise has the potential to interfere with a marine animal's ability to perform a variety of critical life functions such as navigate, communicate, find food, etc. Thus, the environmental impact statements of underwater projects (e.g., pile driving, pipe laying, oil exploration) now include assessments of underwater noise impacts. This standard should help promote consistency among those reporting sound measurements from shipping sources.

American National Standard

Quantities and Procedures for Description and Measurement of Underwater Sound from Ships - Part 1: General Requirements

1 Scope

This part of ANSI/ASA S12.64 describes the general measurement systems, procedures, and methodologies used for the measurement of underwater sound pressure levels from ships at a prescribed operating condition. It contains methodology for the reporting of one-third octave band sound pressure levels. The resulting quantities are the sound pressure levels normalized to a distance of 1 m. Since the underwater sound pressure levels are affected by the presence of the free surface (and sometimes the bottom), such quantities are considered "affected source levels," herein referred to as source levels.

The underwater sound pressure level measurements are performed in the geometric far field and then adjusted to the 1 m normalized distance for use in comparison with appropriate underwater noise criteria. However, this standard does not specify or provide guidance on underwater noise criteria or address the potential effects of noise on marine organisms.

This standard is applicable to any and all underway surface vessels, either manned or unmanned. The methods have no inherent limitation on minimum or maximum vessel size. This standard is not applicable to submerged vessels or to aircraft. This standard is limited to vessels transiting at speeds no greater than 50 knots (25.70 m/s). The measurement methods mitigate the variability caused by Lloyd's Mirror surface image coherence effects (see 3.16), but do not exclude a possible influence of bottom reflections. No specific computational adjustments for either of these effects are part of this standard. A specific ocean location is not required to use this standard, but the requirements for an ocean test site are provided.

The intended uses of the methods described in this standard are: to show compliance with contract requirements, to enable periodic signature assessments, and for research and development. The intended users include: government agencies, research vessel operators, and commercial vessel owners that need to operate in acoustically sensitive waters.

This standard offers three grades of measurement, each with a stated applicability, test methodology, uncertainty, system repeatability, and complexity. A summary of the attributes of each "Grade" (denoted A, B, and C) is given in Table 1.

2 Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI S1.1, *American National Standard Acoustical Terminology*

ANSI/ASA S1.11, *American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters*