



**ASA/ANSI S2.28-2009**  
**(Revision of ANSI S2.28-2003)**

**Reaffirmed by ANSI May 6, 2014**

**AMERICAN NATIONAL STANDARD**

# **Guide for the Measurement and Evaluation of Broadband Vibration of Surface Ship Auxiliary Rotating Machinery**

**Secretariat:**

**Acoustical Society of America**

**Approved on April 1, 2009**

**American National Standards Institute, Inc.**

## **Abstract**

This Standard contains procedures for the measurement and evaluation of broadband mechanical vibration of non-reciprocating auxiliary machines on surface ships, as measured on non-rotating parts. It applies to acceptance tests on new machinery (shop tests or on-board tests) and to in-situ tests on existing machinery on board ship. This American National Standard is related to the ISO 10816 series that provides guidelines for the evaluation of different types of machines.

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## AMERICAN NATIONAL STANDARD

# **Guide for the Measurement and Evaluation of Broadband Vibration of Surface Ship Auxiliary Rotating Machinery**

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ANSI/ASA S2.28-2009

Accredited Standards Committee S2, Mechanical Vibration and Shock

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Standards Secretariat  
Acoustical Society of America  
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Melville, NY 11747-3177

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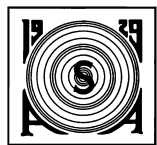
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## Foreword

[This Foreword is for information only, and is not a part of the American National Standard ANSI/ASA S2.28-2009 American National Standard Guide for the Measurement and Evaluation of Broadband Vibration of Surface Ship Auxiliary Rotating Machinery.]

This standard comprises a part of a group of definitions, standards, and specifications for use in mechanical vibration and shock. It was developed and approved by Accredited Standards Committee S2, Mechanical Vibration and Shock, under its approved operating procedures. Those procedures have been accredited by the American National Standards Institute (ANSI). The scope of Accredited Standards Committee S2 is as follows:

*Standards, specification, methods of measurement and test, and terminology in the field of mechanical vibration and shock, and condition monitoring and diagnostics of machines, including the effects of exposure to mechanical vibration and shock on humans, including those aspects which pertain to biological safety, tolerance and comfort.*

This standard is a revision of ANSI S2.28-2003, which has been technically and editorially revised. The major changes in this edition include revised zone limits based on statistical analysis and the addition of limits for continuous and periodic monitoring.

This standard is not comparable to any existing ISO Standard, but it is related to the ISO 10816 series.

At the time this Standard was submitted to Accredited Standards Committee S2, Mechanical Vibration and Shock for approval, the membership was as follows:

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Working Group S2/WG 10/Panel 2, Operational Monitoring and Condition Evaluation, which assisted Accredited Standards Committee S2, Mechanical Vibration and Shock, in the development of this standard, had the following membership.

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Suggestions for improvements to this standard will be welcomed. They should be sent to Accredited Standards Committee S2, Mechanical Vibration and Shock, in care of the Standards Secretariat of the Acoustical Society of America, 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](mailto:asastds@aip.org).

## **Introduction**

This American National Standard relies on ISO 10816-1:1995 as the basis document that describes the general requirements for evaluating the vibration of machines when the vibration measurements are made on non-rotating components, such as bearing housings.

In all parts of ISO 10816, two criteria are provided for assessing machine vibration. One criterion considers the magnitudes of vibration; the other criterion considers changes in magnitudes of vibration. The evaluation of vibration requires trending with time, comparison with other similar machines, and correlation with maintenance history. It is not to be done only with simple comparison to a standard vibration level.

For some machine types it is also appropriate to judge the vibration based on measurements taken on the rotating shafts, and such measurements are addressed in ANSI/ASA S2.29-2003 (R2008).



## American National Standard

# Guide for the Measurement and Evaluation of Broadband Vibration of Surface Ship Auxiliary Rotating Machinery

## 1 Scope

This American National Standard provides specific guidance for assessing the severity of vibrations measured on bearing housings of shipboard machinery so as to ensure reliable mechanical operation.

The criteria provided in this Standard apply to the vibration of all non-reciprocating machinery on board surface ships, except for main propulsion machinery. They apply to broadband vibration measurements taken on the bearing housings, or as close as possible to the bearing supports, of machines under steady-state operating conditions with normal operating conditions of speed and load. For further evaluation of gears and rolling element bearings, measurements of frequency components may be needed.

This Standard applies to acceptance tests on new machinery (shop tests or on-board tests) and to *in-situ* tests on existing machinery on board ship. The criteria are applicable only for the vibration produced by the machine itself and not for vibrations which are transmitted to the machine from the outside environment.

## 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 S2.1/ISO 2041, American National Standard Vibration and Shock – Vocabulary (a nationally adopted international standard)

ISO 10816-1:1995, Mechanical vibration - Evaluation of machine vibration by measurements on non-rotating parts - Part 1: General guidelines.

## 3 Terms and definitions

For the purposes of this standard, the terms and definitions given in ANSI S2.1/ISO 2041 apply.

## 4 Test measurements

### 4.1 Measurement procedures

Measurement procedures should conform to the general procedures listed in ISO 10816-1 as well as those given below.

### 4.2 Measurement equipment

Measurement equipment shall be capable of measuring broadband rms vibratory velocity within 5 percent accuracy over a frequency range of at least 10 Hz to 2 kHz. The broadband measurement error shall be calibrated to within 10 percent of the C/D zone boundary (see Table 3). Any variation in the lower or upper frequency limits should be included in the machinery specifications. If only broadband readings are taken, both velocity and displacement should be recorded.