

ANSI S2.28-2003

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AMERICAN NATIONAL STANDARD

**Guide for the Measurement and Evaluation  
of Vibration of Shipboard Machinery**

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ANSI S2.28-2003

Accredited Standards Committee S2, Mechanical Vibration and Shock

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

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**ANSI S2.28 - 2003**

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**Guide for the Measurement and Evaluation  
of Vibration of Shipboard Machinery**

**Secretariat  
Acoustical Society of America**

**Approved 17 December 2003  
American National Standards Institute, Inc.**

**Abstract**

This standard contains procedures for the measurement and evaluation of the mechanical vibration of non-reciprocating machines, as measured on non-rotating parts. It contains criteria for evaluating new machines and for vibration monitoring. This American National Standard is related to the ISO 10816 series that provides guidelines for the evaluation of different types of machines. The type of machinery covered in this part is shipboard machinery. This is a new ANSI standard, and there is, at present, no International Standards Organization version of this standard.

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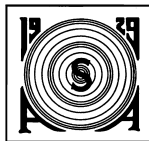
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## Foreword

[This Foreword is for information only, and is not a part of the American National Standard ANSI S2.28 - 2003 Guide for the Measurement and Evaluation of Vibration of Shipboard Machinery].

This standard comprises a part of a group of definitions, standards, and specifications for use in mechanical vibration and shock. It has been developed using the American National Standards Institute (ANSI) Accredited Standards Committee Procedure. The Acoustical Society of America provides the Secretariat for Accredited Standards Committee S2, Mechanical Vibration and Shock.

Accredited Standards Committee S2, Mechanical Vibration and Shock, under whose jurisdiction this standard was developed, has the following scope:

*Standards, specifications, methods of measurement and test terminology in the fields of mechanical vibration and shock and condition monitoring and diagnostics of machines, but excluding those aspects which pertain to biological safety, tolerance, and comfort.*

This standard is not comparable to any existing ISO Standard.

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

R.J. Peppin, *Chair*  
D.J. Evans, *Vice-Chair*  
S.B. Blaeser, *Secretary*

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<b>U.S. Naval Surface Warfare Center (NSWC)</b> .....	P. Shang, L.D. Cole (Alt.)
<b>U.S. Naval Surface Warfare Center, Crane Div. (NSWC Crane Div.)</b> .....	A. Parkes, D. Kristler (Alt.)
<b>Vibration Institute</b> .....	R.L. Eshleman, D.J. Vendittis (Alt.)

Individual Experts of Accredited Standards Committee S2, Mechanical Vibration and Shock,

P. K. Baade      L. A. Herstein

Working Group S2/WG 10.2, 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:

J. Niemkiewicz, Chair  
P. Maedel, Vice-Chair

G. Antonides	W. Gfeller	R.F. Misialek
R. Bankert	S. Holm	R. Subbiah
A.J. Cautilli	A.K. Kukk	J.L. Weil
J. Evans	E.J. Lambert	
S. Feldman	M.T. McGown	

Suggestions for improvements of 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.

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## American National Standard

# Guide for the Measurement and Evaluation of Vibration of Shipboard Machinery

## 0 Introduction

ISO 10816-1:1995 (Reference [1]) is the basis document which describes the general requirements for evaluating the vibration of machines when the vibration measurements are made on non-rotating components, such as bearing housings. The other parts of ISO 10816 cover various specific types of machinery, and this American National Standard, ANSI S2.28-2003, covers shipboard machinery.

In all parts of ISO 10816, two criteria are provided for assessing machine vibration. One criterion considers the magnitudes of observed vibration; the second considers changes in magnitudes. It must be recognized, however, that these two criteria may not form the only basis for judging the severity of vibration. For some machine types it is common to judge the vibration based on measurements taken on the rotating shafts as well. Shaft vibration measurements and related criteria are addressed in ANSI S2.13-1996/Part 1 (R 2001) (Reference [2]).

Comments and suggestions related to this standard are encouraged. They should be sent to the Acoustical Society of America (ASA), and will be referred to the Accredited Standards Committee S2, Mechanical Vibration and Shock.

NOTE - Address comments to: ASA Standards Secretariat, 35 Pinelawn Road, Suite 114E, Melville, NY 11747-3177

## 1 Scope, purpose, and applications

### 1.1 Scope

The criteria provided in this document apply to the vibration of all non-reciprocating machinery on board ships, except for main propulsion machinery, which is covered in SNAME Code C-5 (Reference [3]). They apply to broadband vibration measurements taken on the bearing housings, or as close as possible to the bearings on the bearing supports, of machines under steady-state operating conditions within the nominal operating speed range. They apply to both acceptance testing (in the shop or installed on board), and operational monitoring in-situ. This standard covers marine machines, including those with gears or rolling element bearings. However, to evaluate the condition of gears or bearings, additional measurements and criteria may also be required.

### 1.2 Purpose

The purpose of this standard is to provide specific guidance for assessing the severity of vibrations measured on bearing housings of shipboard machinery, so as to insure smooth operation from the standpoint of mechanical suitability.

### 1.3 Applications

These guidelines apply to acceptance tests (shop tests or on-board tests) for new machinery, and in-situ testing for monitoring purposes, of rotating machinery installed 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 References

### 2.1 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and agreements based on this standard should reference the most recent editions