AMERICAN NATIONAL STANDARD

SPECIFICATION FOR OCTAVE-BAND AND FRACTIONAL-OCTAVE-BAND ANALOG AND DIGITAL FILTERS

Accredited Standards Committee S1, Acoustics

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

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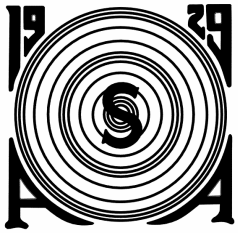

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Secretariat

Acoustical Society of America

Approved 19 February 2004

American National Standards Institute, Inc.

Abstract

This standard provides performance requirements for analog, sampled-data, and digital implementations of bandpass filters that comprise a filter set or spectrum analyzer for acoustical measurements. It supersedes ANSI S1.11-1986 (R1998) *American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters*, and is a counterpart to International Standard IEC 61260:1995 *Electroacoustics – Octave-Band and Fractional-Octave-Band Filters*. Significant changes from ANSI S1.11-1986 have been adopted in order to conform to most of the specifications of IEC 61260:1995. This standard differs from IEC 61260:1995 in three ways: (1) the test methods of IEC 61260 clauses 5 is moved to an informative annex, (2) the term “band number,” not present in IEC 61260, is used as in ANSI S1.11-1986, (3) references to American National Standards are incorporated, and (4) minor editorial and style differences are incorporated.

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Foreword

[This foreword is for information only and is not an integral part of ANSI S1.11-2004 *American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters*.]

This standard replaces ANSI S1.11-1986, and is the American National Standard counterpart of International Standard IEC 61260:1995, *Electroacoustics – Octave-band and fractional-octave-band filters* including Amendment 1:2001. The technical requirements in this American National Standard are similar to those in IEC 61260.

This standard contains four informative annexes.

This standard was developed under the jurisdiction of Accredited Standards Committee S1, Acoustics, which has the following scope:

> *Standards, specifications, methods of measurement and test, and terminology, in the fields of physical acoustics, including architectural acoustics, electroacoustics, sonics and ultrasonics, and underwater sound, but excluding those aspects which pertain to safety, human tolerance, and comfort.*

At the time this standard was submitted to Accredited Standards Committee S1, Acoustics, for final approval, the membership was as follows:

G.S.K. Wong, *Chairman*
T.F.W. Embleton, *Interim Vice Chairman*
S. B. Blaeser, *Secretary*

Acoustical Society of America	G.S.K. Wong
	T.J. Kuemmel (Alt.)
Air-Conditioning and Refrigeration Institute	R. Seel
	M. Darbeau (Alt.)
American Industrial Hygiene Association	D. Driscoll
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Audio Engineering Society, Inc.	D. Queen
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Bruel & Kjaer Instrumentation, Inc.	M. Alexander
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Larson-Davis, Inc.	L. Davis
	L. Harbaugh (Alt.)
Lucent Technologies	D. Quinlan
	R. Ruhala (Alt.)
National Council of Acoustical Consultants	G.E. Winzer
National Institute of Standards and Technology	V. Nedzelnitsky
	D.J. Evans (Alt.)
U.S. Army Human Research & Engineering Directorate	J. Kalb
	T.R. Letowski (Alt.)
U.S. Department of the Air Force	R.L. McKinley

Individual Experts of Accredited Standards Committee S1, Acoustics, were:

J.R. Bareham	T.J. Kuemmel	H.E. von Gierke
S.L. Ehrlich	W.W. Lang	G.S.K. Wong
K.M. Eldred	A.H. Marsh	R.W. Young
W.J. Galloway	P.D. Schomer	
D.L. Johnson	L.W. Sepmeyer	

Working Group S1/WG5, Band Filter Sets, which assisted Accredited Standards Committee S1, Acoustics, in the preparation of this standard, had the following membership:

J. Pope, *Chair*

P.J. Battenberg	A.H. Marsh	A.J. Zuckerwar
L. Wu	V. Nedzelnitsky	

Suggestions for improvement will be welcomed. Send suggestions for improvement to Accredited Standards Committee S1, Acoustics, in care of the ASA Standards Secretariat, 35 Pinelawn Road, Suite 114E, Melville, New York 11747-3177 Telephone: +1 631 390-0215 FAX: +1 631 390-0217.

American National Standard

Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters

1 Scope

1.1 This standard provides performance requirements for analog, sampled-data, and digital implementations of bandpass filters that comprise a filter set or spectrum analyzer. The extent of the passband region of a filter's relative attenuation characteristic is a constant percentage of the midband frequency for all filters of a given bandwidth. An instrument complying with the requirements of this standard may contain any number of bandpass filters covering any desired frequency range. Methods for testing the performance of filters are given in an informative annex.

1.2 Performance requirements are provided for three filter classes designated class 0, class 1, and class 2. Allowed tolerance limits increase as the class number increases.

1.3 Bandpass filters conforming with the performance requirements of this standard may be part of various measurement systems or may be an integral component of a specific instrument and shall operate in real time. Performance requirements apply to any method that is selected by the manufacturer to implement the design of the filters.

1.4 Instruments conforming with the requirements of this standard are capable of providing frequency-band-filtered spectral information for a wide variety of signals, for example, time-varying, intermittent, and steady; broadband and discrete frequency; and long and short durations. For applications involving transient signals, different realizations of filters meeting the requirements of this standard may give different results.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below.

2.1 American National Standards

ANSI S1.1-1994 (R1999), *American National Standard Acoustical Terminology*.

ANSI S1.4-1983 (R2001), *American National Standard Specification for Sound Level Meters* with Amendment ANSI S1.4A-1985 (R2001).

ANSI S1.6-1984 (R2001), *American National Standard Preferred Frequencies, Frequency Levels, and Band Numbers for Acoustical Measurements*.

ANSI S1.14-1988 (R2003), *American National Standard Recommendations for Specifying and Testing the Susceptibility of Acoustical Instruments to Radio-Frequency Electromagnetic Fields, 25 MHz to 1 GHz.*

ANSI S1.43-1997 (R2002), *American National Standard Specifications for Integrating-Averaging Sound Level Meters*.

2.2 International Standards

IEC 60050(801):1994, *International Electrotechnical Vocabulary* – Chapter 801: *Acoustics and electroacoustics*.

ISO Publication, *International vocabulary of basic and general terms in metrology*, ISBN 92-67-01075-1, 1993.

NOTE – The above reference is specified for compatibility with IEC 61260.