ANSI/ASA S1.11-2014/Part 1 / IEC 61260-1:2014
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AMERICAN NATIONAL STANDARD

Electroacoustics – Octave-band and Fractional-octave-band Filters – Part 1: Specifications (a nationally adopted international standard)

ANSI/ASA S1.11-2014/Part 1 / IEC 61260-1:2014

Accredited Standards Committee S1, Acoustics

Standards Secretariat
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ANSI/ASA S1.11-2014/Part 1 / IEC 61260-1:2014
(Revision of ANSI/ASA S1.11-2004 [R2009])

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Secretariat:

Acoustical Society of America

Approved on July 2, 2014 by:

American National Standards Institute, Inc.

Abstract

This standard provides performance requirements for analog, sampled-data, and digital implementations of band-pass filters that comprise a filter set or spectrum analyzer for acoustical measurements. It supersedes ANSI/ASA S1.11-2004 (R2009) *American National Standard Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters*, and is an identical national adoption of IEC 61260:2014 *Electroacoustics – Octave-band and fractional-octave-band filters, Part 1: Specifications*. Significant changes from previous versions is that IEC 61260 has been adopted in full: (1) the original test methods of IEC 61260 clause 5 that was moved to an informative annex was replaced as normative, (2) the term “band number,” was replaced, and (3) some references were removed.

AMERICAN NATIONAL STANDARDS ON ACOUSTICS

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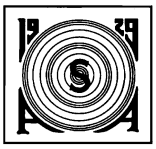

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Foreword

[*This Foreword is for information only, and is not a part of the American National Standard* ANSI/ASA S1.11-2014/Part 1 / IEC 61260-1:2014 American National Standard Electroacoustics – Octave-band and Fractional-octave-band Filters – Part 1: Specifications. *As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the standard.*]

This standard comprises a part of a group of definitions, standards, and specifications for use in acoustics. It was developed and approved by Accredited Standards Committee S1 Acoustics, under its approved operating procedures. Those procedures have been accredited by the American National Standards Institute (ANSI). The Scope of Accredited Standards Committee S1 is as follows:

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

This standard revises and replaces ANSI/ASA S1.11-2004 (R2009) *American National Standard Specification for Octave-band and Fractional-octave-band Analog and Digital Filters*.

This standard is an identical national adoption of IEC 61260-1 Ed 1.0 2014-02 *Electroacoustics – Octave-band and fractional-octave-band filters – Part 1: Specifications*, which was prepared by IEC/TC 29. However, in conformance with ANSI and IEC rules, the words “this part of ANSI/ASA S1.11 / IEC 61260” replace the words “this part of IEC 61260” where they appear in the IEC document, decimal points were substituted in place of the decimal commas used in IEC documents, and American English spelling is used in place of British English spelling.

This standard includes eight Annexes. Annexes B and E are normative and are considered to be a part of this standard. Annexes A, C, D, F, G, and H are informative and are not considered part of this standard.

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

R.J. Peppin, *Chair*
A. Scharine, *Vice-Chair*

S.B. Blaeser, *Secretary*

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..... M. Wurm (Alt.)

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PCB Group ..... K. Cox
..... L. Harbaugh (Alt.)

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..... F. Mobley (Alt.)

U.S. Army Construction Engineering Research Laboratory ..... M. Swearingen
..... M.J. White (Alt.)

U.S. Army Research Laboratory, Human Research and Engineering Directorate ..... A. Scharine
..... M.A. Ericson (Alt.)

U.S. Department of Labor – Mine Safety and Health Administration ..... J. Homer

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

V. Buzduga	V. Nedzelnitsky	C. Walber
P. Hanes	P.D. Schomer	L. Wu

Working Group S1/WG 5, Band Filter Sets, which assisted Accredited Standards Committee S1, Acoustics, in the development of this standard, had the following membership.

R.J. Peppin, Chair

O-H. Bjor	M. Buzduga

Suggestions for improvements to this standard will be welcomed. They should be sent to Accredited Standards Committee S1, Acoustics, in care of the Standards Secretariat of the Acoustical Society of America, 1305 Walt Whitman Road, Suite 300, Melville, New York 11747. Telephone: 631-390-0215; FAX: 631-923-2875; E-mail: asastds@acousticalsociety.org.

INTRODUCTION

IEC 61260:1995 and its Amendment 1:2001 are now separated into the following three parts of IEC 61260 series:

- Part 1: Specifications
- Part 2: Pattern evaluation tests (under consideration)
- Part 3: Periodic tests (under consideration)

For assessments of conformance to performance specifications, ANSI/ASA S1.11/Part 1 / IEC 61260-1 uses different criteria than were used for the IEC 61260:1995 edition.

IEC 61260:1995 did not provide any requirements or recommendations to account for the uncertainty of measurement in assessments of conformance to specifications. This absence of requirements or recommendations to account for uncertainty of measurement created ambiguity in determinations of conformance to specifications for situations where a measured deviation from a design goal was close to a limit of the allowed deviation. If conformance was determined based on whether a measured deviation did or did not exceed the limits, the end-user of the octave-band and fractional-octave-band filters incurred the risk that the true deviation from a design goal exceeded the limits.

To remove this ambiguity, IEC Technical Committee 29, at its meeting in 1996, adopted a policy to account for measurement uncertainty in assessments of conformance in International Standards that it prepares.

ANSI/ASA S1.11/Part 1 / IEC 61260-1 uses an amended criterion for assessing conformance to a specification. Conformance is demonstrated when (a) measured deviations from design goals do not exceed the applicable *acceptance limits* and (b) the uncertainty of measurement does not exceed the corresponding maximum-permitted uncertainty. Acceptance limits are analogous to the tolerance limits allowances for design and manufacturing implied in the IEC 61260:1995.

Actual and maximum-permitted uncertainties of measurement are determined for a coverage probability of 95 %. Unless more-specific information is available, the evaluation of the contribution of a specific filter or filter set to a total measurement uncertainty can be based on the acceptance limits and maximum-permitted uncertainties specified in this standard.

American National Standard

Electroacoustics – Octave-band and Fractional-octave-band Filters – Part 1: Specifications (a nationally adopted international standard)

1 Scope

1.1 This part of the ANSI/ASA S1.11 / IEC 61260 series specifies performance requirements for analogue, sampled-data, and digital implementations of band-pass filters. The extent of the pass-band region of a filter's relative attenuation characteristic is a constant percentage of the exact mid-band frequency for all filters of a given bandwidth. An instrument conforming to the requirements of this standard may contain any number of contiguous band-pass filters covering any desired frequency range.

1.2 Performance requirements are provided for two filter classes: class 1 and class 2. In general, specifications for class 1 and class 2 filters have the same design goals and differ mainly in the acceptance limits and the range of operational temperature. Acceptance limits for class 2 are greater than, or equal to, those for class 1. Maximum-permitted expanded uncertainties of measurement are also specified.

1.3 Performance requirements are given for designs where the octave frequency ratio and the mid-band frequencies are powers of ten.

1.4 Band-pass filters conforming to the performance requirements of this standard may be part of various measurement systems or may be an integral component of a specific instrument such as a spectrum analyzer.

1.5 This standard specifies the ranges of environmental conditions for operation of the filters. The required range depends on whether the instrument containing the filters is designed to be operated in a controlled environment or more generally in the field.

1.6 Band-pass filters conforming to 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 or steady; broadband or discrete frequency; and long or short durations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-6-1:2005, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments*