

ANSI/ASA S1.11-2016/Part 2 / IEC 61260-2:2016

---

---

---

AMERICAN NATIONAL STANDARD

**Electroacoustics – Octave-band and  
Fractional-octave-band Filters –  
Part 2: Pattern-evaluation Tests  
(a nationally adopted international standard)**

---

---

---

ANSI/ASA S1.11-2016/Part 2 /  
IEC 61260-2:2016

Accredited Standards Committee S1, Acoustics

---

Standards Secretariat  
Acoustical Society of America  
1305 Walt Whitman Road, Suite 300  
Melville, NY 11747

The American National Standards Institute, Inc. (ANSI) is the national coordinator of voluntary standards development and the clearinghouse in the U.S.A. for information on national and international standards.

The Acoustical Society of America (ASA) is an organization of scientists and engineers formed in 1929 to increase and diffuse the knowledge of acoustics and to promote its practical applications.



**ANSI/ASA S1.11-2016/Part 2 / IEC 61260-2:2016**

AMERICAN NATIONAL STANDARD

# **Electroacoustics – Octave-band and Fractional-octave-band Filters – Part 2: Pattern-evaluation Tests**

**Secretariat:**

**Acoustical Society of America**

**Approved on July 19, 2016, by:**

**American National Standards Institute, Inc.**

## **Abstract**

This part provides details of the tests necessary to verify conformance to all mandatory specifications given in ANSI/ASA S1.11-2014/Part 1/IEC 61260-1:2014 for octave-band and fractional-octave-band filters. Tests and test methods are applicable to class 1 and class 2 bandpass filters. The aim is to ensure that all testing laboratories use consistent methods to perform pattern-evaluation tests.

## AMERICAN NATIONAL STANDARDS ON ACOUSTICS

The Acoustical Society of America (ASA) provides the Secretariat for Accredited Standards Committees S1 on Acoustics, S2 on Mechanical Vibration and Shock, S3 on Bioacoustics, S3/SC 1 on Animal Bioacoustics, and S12 on Noise. These committees have wide representation from the technical community (manufacturers, consumers, trade associations, organizations with a general interest, and government representatives). The standards are published by the Acoustical Society of America as American National Standards after approval by their respective Standards Committees and the American National Standards Institute (ANSI).

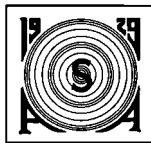
These standards are developed and published as a public service to provide standards useful to the public, industry, and consumers, and to Federal, State, and local governments.

Each of the Accredited Standards Committees (operating in accordance with procedures approved by ANSI) is responsible for developing, voting upon, and maintaining or revising its own standards. The ASA Standards Secretariat administers Committee organization and activity and provides liaison between the Accredited Standards Committees and ANSI. After the standards have been produced and adopted by the Accredited Standards Committees, and approved as American National Standards by ANSI, the ASA Standards Secretariat arranges for their publication and distribution.

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered and that a concerted effort be made towards their resolution.

The use of an American National Standard is completely voluntary. Their existence does not in any respect preclude anyone, whether he or she has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the Standards.

NOTICE: This American National Standard may be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken periodically to reaffirm, revise, or withdraw this Standard.



Acoustical Society of America  
Standards Secretariat  
1305 Walt Whitman Road, Suite 300  
Melville, New York 11747  
Telephone: 1 (631) 390-0215  
Fax: 1 (631) 923-2875  
E-mail: [asastds@acousticalsociety.org](mailto:asastds@acousticalsociety.org)

© 2016 by Acoustical Society of America. This standard may not be reproduced in whole or in part in any form for sale, promotion, or any commercial purpose, or any purpose not falling within the provisions of the U.S. Copyright Act of 1976, without prior written permission of the publisher. For permission, address a request to the Standards Secretariat of the Acoustical Society of America.

These materials are subject to copyright claims of IEC and ASA. No part of this publication may be reproduced in any form, including an electronic retrieval system, without the prior written permission of the Acoustical Society of America (ASA). All requests pertaining to this standard should be submitted to the ASA Standards Secretariat.

## Contents

1	Scope .....	1
2	Normative references .....	1
3	Terms and definitions .....	2
4	Submission for testing .....	2
5	Marking of the filter and information in the instruction manual .....	2
6	Mandatory facilities and general requirements .....	3
6.1	General.....	3
6.2	Test instruments.....	4
7	Tests at reference conditions .....	5
7.1	General.....	5
7.2	Relative attenuation, effective bandwidth deviation and summation of output signals.....	5
7.3	Linear operating range, measurement range, level range control and overload indicator ..	7
7.4	Time-invariant operation .....	8
7.5	Power supply check .....	9
8	Electromagnetic and electrostatic compatibility requirements .....	9
8.1	General.....	9
8.2	Influence of electrostatic discharges .....	9
8.3	Influence of AC power-frequency and radio-frequency fields .....	10
8.4	Radio-frequency emissions and public power supply disturbances .....	12
9	Sensitivity to ambient air temperature and relative humidity .....	12
10	Pattern-evaluation report.....	13
	Annex A (informative) Uncertainty related to test by sinusoidal sweeps.....	14
A.1	General.....	14
A.2	Digitally generated signal .....	15
A.3	Test signal from a signal generator.....	15
A.4	Comparing measurements.....	16
	Annex B (informative) Test of time invariant operation with the use of an exponential sweep – Example .....	17
B.1	General.....	17
B.2	Example .....	17

## Foreword

[*This Foreword is for information only, and is not a part of the American National Standard ANSI/ASA S1.11-2016/Part 2/IEC 61260-2:2016 American National Standard Electroacoustics – Octave-band and Fractional-octave-band Filters – Part 2: Pattern-evaluation Tests. 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 supplements 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.*

This standard is an identical national adoption of IEC 61260-2:2016 *Electroacoustics – Octave-band and fractional-octave-band filters – Part 2: Pattern-evaluation tests*, 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.

The ANSI/ASA equivalents to ISO/IEC standards referenced herein are given below:

- 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 (a nationally adopted international standard)
- ANSI/ASA S1.4-2014/Part 1/IEC 61672-1:2013 American National Standard Electroacoustics – Sound Level Meters – Part 1: Specifications (a nationally adopted international 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.A. Scharine, *Vice-Chair*

N. Stremmel, *Secretary*

**3M Personal Safety Division, Detection Solutions** ..... P.J. Battenberg  
..... M. Wurm (Alt.)

**Acoustical Society of America** ..... R.J. Peppin  
..... R.D. Hellweg (Alt.)

**Air-Conditioning, Heating and Refrigeration Institute** ..... S.J. Lind  
..... D. Abbate (Alt.)

<b>American Industrial Hygiene Association</b> .....	D. Driscoll
.....	D. Sandfort (Alt.)
<b>Campanella Associates</b> .....	A.J. Campanella
<b>Casella USA</b> .....	R. Brauch
<b>ETS-Lindgren Acoustic Systems</b> .....	D. Winker
.....	M. Black (Alt.)
<b>G.R.A.S. Sound &amp; Vibration</b> .....	B. Schustrich
<b>Information Technology Industry Council</b> .....	W.M. Beltman
.....	J. Rosenberg (Alt.)
<b>Josephson Engineering, Inc.</b> .....	D.L. Josephson
<b>National Council of Acoustical Consultants</b> .....	E. Logsdon
.....	G.E. Winzer (Alt.)
<b>National Institute of Standards &amp; Technology (NIST)</b> .....	R.P. Wagner
.....	S. Fick (Alt.)
<b>PCB Group</b> .....	K. Cox
.....	C.M. Walber (Alt.)
<b>Scantek, Inc.</b> .....	S. Marshall
.....	V. Buzduga (Alt.)
<b>U.S. Air Force (USAF)</b> .....	R.L. McKinley
.....	F. Mobley (Alt.)
<b>U.S. Army Construction Engineering Research Laboratory</b> .....	M. Swearingen
.....	M.J. White (Alt.)
<b>U.S. Army Research Laboratory, Human Research and Engineering Directorate</b> .....	A. Scharine
.....	M.A. Ericson (Alt.)
<b>U.S. Department of Labor – Mine Safety and Health Administration</b> .....	J. Novakovich

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

L.A. Boudreault	P. Hanes	C. Walber
V. Buzduga	T.R. Letowski	L. Wu
	P.D. Schomer	

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](mailto:asastds@acousticalsociety.org).

## Introduction

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

- Part 1: Specifications
- Part 2: Pattern-evaluation tests
- Part 3: Periodic tests

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 the 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.

This edition of ANSI/ASA S1.11/Part 2/IEC 61260-2 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 2: Pattern-evaluation Tests

## 1 Scope

**1.1** This part of ANSI/ASA S1.11/IEC 61260 provides details of the tests necessary to verify conformance to all mandatory specifications given in ANSI/ASA S1.11-2014/Part 1/IEC 61260-1:2014 for octave-band and fractional-octave-band filters.

**1.2** Tests and test methods are applicable to class 1 and class 2 bandpass filters. The aim is to ensure that all testing laboratories use consistent methods to perform pattern-evaluation tests.

## 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 61000-4-2:2008, *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 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

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

IEC 61000-6-2:2005, *Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments*

IEC 61000-6-3, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for residential, commercial and light-industrial environments*

IEC 61260-1:2014, *Electroacoustics – Octave-band and fractional-octave-band filters – Part 1: Specifications*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

CISPR 16-1-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*

CISPR 16-1-2, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-2: Radio disturbance and immunity measuring apparatus – Coupling devices for conducted disturbance measurements*