



ASA/ANSI S12.76-2017

Reaffirmed by ANSI June 19, 2020

AMERICAN NATIONAL STANDARD

Methods for Measurement of Supersonic Jet Noise from Uninstalled Military Aircraft Engines

Secretariat:

Acoustical Society of America

Approved on March 27, 2017:

American National Standards Institute, Inc.

Abstract

This standard describes procedures to measure jet noise from uninstalled military aircraft engines with supersonic exhaust flows. The methods pertain to propulsion systems mounted on outdoor test stands with appropriate inlets and representative nozzles. Detailed measurement procedures are described for near-field acoustical characterization. These data can be used to establish baseline noise levels, assess effectiveness of noise reduction technologies, estimate personnel noise exposure, and provide full-scale data for refinement of engine noise models. Far-field measurement procedures are described to provide data for estimates of community noise. This standard describes required measurement instrumentation, signal processing, data formatting, and measurement uncertainty. This standard does not apply to commercial engines, dual-use engines, or other engines covered by FAA/ICAO noise certification requirements.

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Accredited Standards Committee S12, Noise

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

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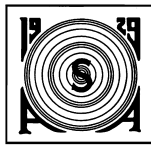
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Acoustical Society of America
Standards Secretariat
1305 Walt Whitman Road, Suite 300
Melville, New York 11747
Telephone: 1 (631) 390-0215
Fax: 1 (631) 923-2875
E-mail: asastds@acousticalsociety.org

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Foreword

[This Foreword is for information only and is not a part of the American National Standard ANSI/ASA S12.76-2017 American National Standard Methods for Measurement of Supersonic Jet Noise from Uninstalled Military Aircraft Engines. 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 noise. It was developed and approved by Accredited Standards Committee S12, Noise, under its approved operating procedures. Those procedures have been accredited by the American National Standards Institute (ANSI). The Scope of Accredited Standards Committee S12 is as follows:

Standards, specifications, and terminology in the field of acoustical noise pertaining to methods of measurement, evaluation, and control, including biological safety, tolerance, and comfort, and physical acoustics as related to environmental and occupational noise.

This standard is not comparable to any existing ISO Standard.

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.....	D. Gilmer (Alt.)
Université du Québec ETS	J. Voix
.....	R. Bouserhal (Alt.)

Individual Experts of Accredited Standards Committee S12, Noise, were:

B.M. Brooks	D. Lubman	R.J. Peppin
A.J. Campanella	D. Michaud	J.G. Schmitt
L.S. Finegold	N.P. Miller	P.D. Schomer
R.D. Hellweg	W.J. Murphy	W.R. Thornton
A. Konheim	M.A. Nobile	L.A. Wilber
S.J. Lind		G.E. Winzer

Working Group S12/WG 53, High Performance Aircraft Noise Measurement, which assisted Accredited Standards Committee S12, Noise, in the development of this standard, had the following membership:

R. McKinley, Chair

A. Aubert	T. Hartley	A. Pilon
K. Becker	C. Lykins	H. Roos
W. Dalton	M. Majjigi	J. Skalecky
M. Downing	S. Martens	R. Schlinker
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B. Glass	P. Morris	A. Wall
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Suggestions for improvements to this standard will be welcomed. They should be sent to Accredited Standards Committee S12, Noise, in care of the Standards Secretariat of the Acoustical Society of America, 1305 Walt Whitman Road, Suite 300, Melville, NY 11747. Telephone: 631-390-0215; FAX: 631-923-2875; E-mail: asastds@acousticalsociety.org.

Introduction

Noise from military aircraft can impact the hearing and performance of nearby personnel and can be a source of annoyance to people living near airbases, airports, and ranges where such aircraft operate. Federal agencies operating airfields are required to analyze the noise impacts by proposed new flight operations as part of the environmental analysis that is required by the National Environmental Policy Act of 1969 (NEPA). Additionally, overexposure of flight line/flight deck personnel to high levels/durations of noise can adversely affect hearing and negatively impact voice communication capability.

It is advantageous to assess the noise emissions from new and existing engine/propulsion systems prior to the design, installation, and flight test in a new aircraft. During the development of new engines/propulsion systems and technologies, including noise reduction techniques and technologies, it is desirable to measure and compare the new uninstalled engine noise emissions with legacy engines or prior versions of the new engine. This standard provides the methods to conduct such measurements.

Accurate, reliable, and repeatable noise measurements from standardized techniques enable confidence in the data used to establish baseline noise levels, assess effectiveness of noise reduction technologies, and provide full-scale data for refinement of engine noise models.

It is understood that estimating the installed engine noise emissions for near-field personnel noise or community noise using uninstalled engine data is a complex and difficult process.

This standard was developed over a series of working group meetings and a public review meeting that formed consensus defining measurement methods that result in accurate, reliable, and repeatable noise data from the operation of uninstalled military jet engines. The standard addresses important test considerations such as measurement site; instrumentation specifications; weather measurement and limits; and data formatting, organization, analysis, and reporting.

The standard describes multiple methods for uninstalled engines at two different heights with coarse or dense microphone arrays in the near-field and an optional method for a far-field array.

American National Standard

Methods for Measurement of Supersonic Jet Noise from Uninstalled Military Aircraft Engines

1 Scope

This standard describes procedures to measure jet noise from uninstalled military aircraft engines with supersonic exhaust flows. The methods pertain to propulsion systems mounted on outdoor test stands with appropriate inlets and representative nozzles. Detailed measurement procedures are described for near-field acoustical characterization. These data can be used to establish baseline noise levels, assess effectiveness of noise reduction technologies, estimate personnel noise exposure, and provide full-scale data for refinement of engine noise models. Far-field measurement procedures are described to provide data for estimates of community noise. This standard describes required measurement instrumentation, signal processing, data formatting, and measurement uncertainty. This standard does not apply to commercial engines, dual-use engines, or other engines covered by FAA/ICAO noise certification requirements.

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/ASA S1.1-2013 *American National Standard Acoustical Terminology*

ANSI/ASA S1.6-2016 *American National Standard Preferred Frequencies and Filter Band Center Frequencies for Acoustical Measurements*

ANSI/ASA S1.8-2016 *American National Standard Reference Values for Levels Used in Acoustics and Vibrations*

ANSI/ASA S1.11/IEC 61260 Parts 1, 2, 3 *American National Standard Electroacoustics - Octave-band and Fractional-octave-band Filters – Part 1: Specifications (nationally adopted international standards)*

ANSI/ASA S1.13-2005 (R2010) *American National Standard Measurement of Sound Pressure Levels in Air*

ANSI/ASA S1.15-1997/Part 1 (R2016) *American National Standard Measurement Microphones – Part 1: Specifications for Laboratory Standard Microphones*

ANSI/ASA S1.17-2014/Part 1 *American National Standard Microphone Windscreens – Part 1: Test Procedures for Measurements of Insertion Loss in Still Air*

ANSI/ASA S1.18-2010 *American National Standard Method for Determining the Acoustic Impedance of Ground Surfaces*

ANSI/ASA S1.26-2014 *American National Standard Method for Calculation of the Absorption of Sound by the Atmosphere*