
AMERICAN NATIONAL STANDARD

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

ANSI/ASA S12.76-2017

Accredited Standards Committee S12, Noise

Standards Secretariat
Acoustical Society of America
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Secretariat:

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Approved on March 27, 2017, by:

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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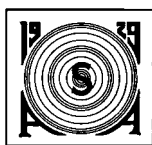
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Contents

1	Scope	1
2	Normative references.....	1
3	Terms and definitions.....	2
4	Noise data acquisition system requirements	4
4.1	Microphones and preamplifiers	4
4.2	Digital recording system	5
5	Measurement site	6
5.1	Terrain	6
5.2	Ground impedance – optional far-field measurements only.....	6
5.3	Weather requirements	7
6	Measurement methods	7
6.1	General procedures.....	7
6.2	Engine performance measurement methods	8
6.3	Near-field method	8
6.4	Optional far-field method using elevated microphones	10
7	Data analysis	12
7.1	Weather analysis	12
7.2	Spectral analysis.....	12
7.3	Uncorrected pressure-time histories – pressure vs. time	13
7.4	Corrected one-third octave-band spectra.....	13
7.5	Overall levels	13
7.6	Engine performance histories.....	13
8	Reporting and test documentation.....	13
8.1	Calibration records.....	13
8.2	Weather data	13
8.3	Test log / scribe notes	14
8.4	Instrumentation setup log	14
8.5	Test location data	14
8.6	Ground impedance data – optional far-field measurements only.....	14
8.7	Engine performance data	14
8.8	Raw noise measurement data.....	14
8.9	Reduced noise data.....	14
8.10	Uncertainty.....	16
Annex A	(normative) Measurement uncertainty for near-field noise measurements.....	17
A.1	Measurement uncertainty	17
Annex B	(informative) Microphone cable length considerations.....	20
Annex C	(normative) Obstructions and reflections	22
C.1	Obstructions.....	22
C.2	Field reflections check	22
	Bibliography	23

Figures

Figure 1 — Uninstalled engine near-field microphone locations	9
Figure 2 — Uninstalled engine far-field microphone locations	11
Figure 3 — Example of an ASCII header mirroring the contents of the database description document ..	15
Figure B.1 —Maximum frequency as a function of cable length for constant current supply levels of 2, 4, 10, and 20 mA for coaxial cable type and maximum output sensor voltages of: a) RG-58 and 1 V, b) RG-58 and 10 V, c) RG-59 and 1 V, d) RG-59 and 10 V	21

Tables

Table A.1 — Uncertainty budget for method A elevated engine near-field noise measurement methods.	18
Table A.2 — Uncertainty budget for the optional method C far-field noise measurement methods	19

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.

At the time this Standard was submitted to Accredited Standards Committee S12, Noise, for approval, the membership was as follows:

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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*