International Standard

ISO 13347-2

Fans — Determination of fan sound power levels under standardized laboratory conditions —

Part 2: Reverberant room method

Ventilateurs — Détermination des niveaux de puissance acoustique des ventilateurs dans des conditions de laboratoire standardisées —

Partie 2: Méthode de la salle réverbérante

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 117, *Fans*.

This second edition cancels and replaces the first edition (ISO 13347-2:2004), which has been technically revised. It also incorporates the Technical Corrigendum ISO 13347-2:2004/Cor 1:2006.

The main changes are as follows:

— inclusion of acoustic methods for installation category E fans;

— symbols harmonized with ISO 5801 and those listed in normative references;

— editorial corrections.

A list of all parts in the ISO 13347 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document deals with the determination of the fan sound power level appropriate to a particular application. In describing the test and rating procedures, numerous references are made to ISO 5801 as well as to other relevant ISO standards. This reverberant room method should be read in conjunction with ISO 13447-1 and each part of the ISO 13347 series which details other methods for determining the sound power radiated by a fan in specified installation conditions as a function of frequency.

The method in this document employs standard sound measurement instrumentation. The test set-ups are generally designed to represent the physical orientation of a fan as installed, in accordance with ISO 5801 or ISO 13350.

This document primarily deals with the determination of sound power levels of fans used for ducted applications.

The test procedures described in this document relate to laboratory conditions. The measurement of performance under site conditions is not included. Acoustic system effects can be considerable where the airflow into and out of the fan is not free from swirl, nor the velocity profile there fully developed.

This document describes methods for determining sound power levels of fans in one-third octave bandwidths and one octave bandwidths.

Data obtained in accordance with this document may be used for the following purposes amongst others:

a) comparison of fans which are similar in size and type;

b) comparison of fans which are different in size and type;

c) determining whether a fan complies with a specified upper limit of sound emission;

d) scaling of fan noise from one size and speed to another size and speed;

e) prediction of sound pressure level in an installation of which the fan forms a part;

f) engineering work to assist in developing quiet machinery and equipment.

NOTE The Bibliography provides additional references [1] to [19] for those wishing to explore this subject in greater detail.

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Fans — Determination of fan sound power levels under standardized laboratory conditions —

Part 2: Reverberant room method

1 Scope

This document specifies determining sound power levels of fans under standardized laboratory conditions from sound pressure levels measured in a reverberant room.

This document is applicable for determination of the acoustic performance of fans. This document can additionally be applied to determine the acoustic performance of fans combined with an ancillary device, such as a roof cowl or damper or, where the fan is fitted with a silencer, the sound power resulting from the fan and silencer combination. For guidance of testing with ancillary items, see Annex C.

This document applies to fans as defined in ISO 13349-1. It is limited to the determination of airborne sound emission for the specified set-ups. Vibration is not measured, nor is the sensitivity of airborne sound emission to vibration effects determined.

This document is intended to be used in conjunction with ISO 5136, which covers the in-duct method, and ISO 10302-1 for small fans.

The size of fans which can be tested in accordance with this document is limited only by the practical aspects of the test set-up. Test fan dimensions and air performance will control the room size.

NOTE Based on usage, small fans can be tested according to this document or to ISO 10302-1.

For reverberant field tests, the size of equipment under test is limited to less than 2 % of the room volume.

For low power fans (up to 3 kW) that can be run from a domestic power supply (single phase AC at a voltage not exceeding 250 V and a current not exceeding 16 A), reference IEC 60704-2-7[18].

The test arrangements in this document establish the laboratory conditions necessary for a successful test. It is difficult to meet these requirements in situ and this document is not intended for field measurements. In these situations, users are reminded that the acoustic environment is unlikely to meet the specified conditions and there can be additional acoustic system effects where inlet and outlet conditions at the fan are less than ideal.

2 Normative references

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

ISO 3741, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for reverberation test rooms*

ISO 3743 (all parts), *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure*

ISO 5801, *Fans — Performance testing using standardized airways*

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ISO 7235:2003, *Acoustics — Laboratory measurement procedures for ducted silencers and air-terminal units — Insertion loss, flow noise and total pressure loss*

ISO 13347-1:2025, *Industrial fans — Determination of fan sound power levels under standardized laboratory conditions — Part 1: General overview*

ISO 13349-1, *Fans — Vocabulary and definitions of categories — Part 1: Vocabulary*

ISO 13350, *Fans — Performance testing of jet fans*

3 Terms and Definitions

3.1 Terms and definitions

For the purposes of this document, terms and definitions defined in ISO 13347-1 shall apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.2 Symbols and units

For consistency and mutual understanding, it is recommended that the symbols and units shown in Table 1 be used in reporting and calculation. Unless otherwise noted, the subscript number refers to the mid-frequency of the octave band or one-third octave band number.

Table 1 — Symbols, units

Symbol	Term	SI unit
D_{min}	minimum distance between equipment under test and reverberant room measurement surface	m
E_o	duct outlet end correction	dB
E_i	duct inlet end correction	dB
L_p	sound pressure level, re 20 µPa (2×10^{-5} Pa)	dB
L_{pc}	corrected sound pressure level of the fan	dB
L_{pb}	recorded sound pressure level of room background as measured over the normal microphone path	dB
L_{Wrq}	RSS calibration sound power level	dB
L_{pm}	recorded sound pressure level of fan and room background as measured over the normal microphone path	dB
L_{pq}	corrected sound pressure level of the RSS	dB
L_{pqm}	recorded sound pressure level of the RSS and room background as measured over the normal microphone path	dB
L_W	sound power level, re 1 pW (1×10^{-12} W)	dB
L_{Wr}	sound power level of RSS	dB
λ	wavelength	m
p_{ref}	reference sound pressure, 20 µPa (2×10^{-5} Pa)	Pa

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