International Standard

ISO 13347-4

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

Part 4: Sound intensity method

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

Partie 4: Méthode de l'intensité acoustique

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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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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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 13347-4:2004), which has been technically revised. It also incorporates the Technical Corrigendum ISO 13347-4:2004/Cor 1:2006.

The main changes are as follows:

— inclusion of acoustic methods for installation category E fans;

— symbols harmonized with those used in ISO 5801 and other ISO standards listed as normative references [2];

— closer alignment with the superordinate ISO 9614 series relating to sound intensity measurement;

— editorial revisions.

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 establishes a method for determining the sound power level of a fan. The method is reproducible in all laboratories which are qualified according to the requirements of this document.

The method specified 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.

Since sound power levels are considered independent of the acoustic environment around the fan, a good comparison can be made between two or more fans proposed for any specific air performance condition. Moreover, these values establish an accurate base for estimating the acoustical outcome of the fan installation in terms of sound pressure levels. A successful estimate of sound pressure levels requires extensive information on the fan and the environment in which it is to be located.

It is often advantageous for the equipment user to employ acoustical consultation to ensure that all factors which affect the final sound pressure levels are considered. More detailed information on the complexity of this situation may be found in acoustic textbooks.

This document has been developed in response to the need for a reliable and accurate enveloping surface method for determining the sound power levels of fan equipment. Where possible, it has been based on existing National standards and combines state-of-the-art with practical considerations.

NOTE The bibliography contains further references for those wishing to explore this subject in greater detail (see References [1] to [7]).

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

Part 4: Sound intensity method

1 Scope

This document specifies a method to measure sound power by using sound intensity measurements on a measurement surface which encloses the sound source. This document provides guidelines on the acoustical environment, ambient noise, measurement surface, and number of measurements. The installation categories are generally designed to represent the physical orientation of a fan installed in accordance with ISO 5801, ISO 13350 and also defined in ISO 13349-1.

This document is applicable to fans defined in ISO 5801 and ISO 13349-1. This document is limited to the determination of airborne sound emission for the specified installation categories. Vibration is not measured, nor is the sensitivity of airborne sound emission to vibration effects determined.

The sizes of the fan, which can be tested in accordance with this document are limited only by the practical aspects of the test installations.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 5136, *Acoustics — Determination of sound power radiated into a duct by fans and other air-moving devices — In-duct method*

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

ISO 9614-1, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points*

ISO 9614-2, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning*

ISO 13347-1, *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*

IEC 1043, *Electroacoustics; Instruments for the measurement of sound intensity; measurement with pairs of pressure sensing microphones*

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3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5801, ISO 13349-1 and the following 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/

NOTE Some definitions have been expanded to fit the specific needs of this document. Further acoustic definitions can be found in ISO 13347-1.

3.1.1
fan inlet
opening, usually circular or rectangular, through which the air first enters the fan casing

Note 1 to entry: If the fan is provided with an inlet-connecting flange or spigot, the fan inlet dimensions are measured inside this connection. The inlet area is the gross area measured inside this flange, i.e. no deductions are made for blockages, such as motors and bearing supports.

Note 2 to entry: When the inlet area is not clearly defined, agreement can be reached between the parties to the contract.

Note 3 to entry: The fan inlet is defined by the airflow, when you reverse the airflow, what was previously the outlet, now becomes the inlet

[SOURCE: ISO 13349-1:2022, 3.7.1]

3.1.2
fan outlet
opening, usually circular or rectangular, through which the air finally leaves the fan casing

Note 1 to entry: If the fan is provided with an outlet connecting flange or spigot, the fan outlet dimensions are measured inside this connection. When the fan is delivered with a diffuser and the performance is quoted with this fitted, the area of the fan outlet may be taken as equal to the outlet area of the diffuser.

Note 2 to entry: Fan outlet area is, by convention, taken as the gross area in the outlet plane inside the casing, without deduction for motor, fairings or other obstructions. When the outlet area is not clearly defined, agreement can be reached between the parties to the contract.

Note 3 to entry: The fan outlet is defined by the airflow, when you reverse the airflow, what was previously the inlet, now becomes the outlet

[SOURCE: ISO 13349-1:2022, 3.7.2]

3.1.3
inlet sound power level
sound power level of a fan determined at the *fan inlet* (3.1.1) in a specified installation category A, B, C, D or E

3.1.4
outlet sound power level
sound power level of a fan determined at the *fan outlet* (3.1.2) in a specified installation category A, B, C, D or E

3.1.5
casing sound power level
sound power level radiated from a fan casing

Note 1 to entry: If the fan drive is external to the fan casing, the casing sound power shall include the sound power generated by and radiated from the fan drive

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