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Fans — Tolerances, methods of conversion and technical data presentation

Ventilateurs — Tolérances, méthodes de conversion et présentation des données techniques

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 third edition cancels and replaces the second edition (ISO 13348:2007), which has been technically revised.

The main changes are as follows:

— terms have been revised;

— symbols and units in Clause 4 have been updated;

— Clauses 6 and 7 have been revised;

— additional information provided in Annex D.

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 aims to clarify technical aspects of contracts where fan performance is concerned, and the accuracy and consistency of performance details published in technical catalogues.

In this document, a distinction is drawn between specially designed fans to suit a specific purpose, to meet a contract specification, and series-produced fans where the performance data is contained in a catalogue.

For purpose-designed fans, the methods of calculating performance data under contract conditions, from performance data obtained under test conditions, are described in Clause 5 for both air and sound data. Four tolerance grades are given, each appropriate to a particular type of fan and/or its application. These procedures have been found satisfactory; however, the supplier and user can agree to adopt alternative methods.

For series-produced non-certified fans, the associated technical data will be contained in a catalogue (electronic and/or printed form). In this case, the recommended method of applying tolerances is as described in Clause 5.

For series-produced fans in certified ratings programmes, the associated technical data will be contained in a catalogue (electronic and/or printed form). In this case, the recommended method of applying tolerances is as described in Clause 6 (based on AMCA (Air Movement and Control Association) International, Inc. certified reference program rules[16],[17],[18]).

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Fans — Tolerances, methods of conversion and technical data presentation

1 Scope

This document specifies performance tolerances and the technical data presentation for fans of all types. It does not apply for fans designed solely for low-volume air circulation, such as those used for household or similar purposes (ceiling and table fans, extractor fans, etc.). For jet fans, refer to ISO 13350.

The upper limit of fan work per unit mass is normally 25 kJ/kg, corresponding to an increase of fan pressure of approximately 30 kPa for a mean density in the fan of 1,2 kg/m^3. For higher values, agreement is to be reached between the supplier and the user.

This document applies the five installation categories defined in ISO 5801:

A free inlet, free outlet;

B free inlet, ducted outlet;

C ducted inlet, free outlet;

D ducted inlet, ducted outlet;

E free inlet and free outlet without a partition.

The performance of a fan can vary considerably with the installation category it is operating within. Therefore, these categories form an important part of the definition of the fan's technical data presentation.

NOTE International acceptance of the five installation categories provides the opportunity to base a contract on the most appropriate fan category for the end user and the system designer. Correspondingly, the likelihood of the fan providing the agreed performance, without compromise or concession, is enhanced.

The efficiency scaling procedures described in 8.1.5 apply to centrifugal fans and axial fans within the specific speed ranges shown in Table 4. To date, there is no experimental data to confirm how they apply to mixed flow fans, having specific speeds in between.

Category E fans are treated in Clause 7.

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 5801:2017, *Fans — Performance testing using standardized airways*

ISO 5802, *Industrial fans — Performance testing in situ*

ISO 13347-1, *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 13349-2, *Fans — Vocabulary and definitions of categories — Part 2: Categories*

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

ISO 14694, *Industrial fans — Specifications for balance quality and vibration levels*

ISO 14695, *Industrial fans — Method of measurement of fan vibration*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5801, ISO 5802, ISO 13349-1, ISO 13349-2 and ISO 13350 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/

3.1
fan
fan other than that used for household or similar purposes such as air circulation, climatization

Note 1 to entry: For the purpose of this document and other industrial fan standards, a household fan is defined as having a single-phase motor operating at a maximum of 250 V and 16 A. With a sufficiently soft start, this equates to an input power of not more than 3 kW.

3.2
series-produced fan
fan whose detailed performances is widely available in a catalogue (electronic and or printed), and which is frequently manufactured in significant quantities and available on short delivery

3.3
average stagnation pressure at a section x
p_{sgx}
sum of the conventional dynamic pressure, p_{dx}, corrected by the Mach factor coefficient, f_{Mx}, at the section, and the average absolute pressure, p_x

$$p_{sgx} = p_x + p_{dx} f_{Mx} \tag{1}$$

Note 1 to entry: The average stagnation pressure can be calculated by Formula (2):

$$p_{sgx} = p_x \left(1 + \frac{\kappa - 1}{2} Ma_x^2 \right)^{\frac{\kappa}{\kappa - 1}} . \tag{2}$$

where

κ is the isentropic exponent;

p_x is the static pressure at the section x;

p_{dx} is the dynamic pressure at the section x;

f_{Mx} is the Mach factor coefficient at the section x;

Ma_x is the Mach number at the section x.

Note 2 to entry: It is expressed in pascals (Pa).

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