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Heat recovery ventilators and energy recovery ventilators — Method of test for performance —

Part 2: Assessment of measurement uncertainty of performance parameters

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Foreword

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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 documents 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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A list of all parts in the ISO 16494 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 is intended to be a practical guide to assist laboratory personnel in evaluating the uncertainties in the measurement of the performance of ventilators falling under the scope of ISO 16494:2014. It contains a brief introduction to the theoretical basis for the calculations, and contains examples of uncertainty budget sheets that can be used as a basis for the determination of the uncertainty of measurement.

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Heat recovery ventilators and energy recovery ventilators — Method of test for performance —

Part 2: Assessment of measurement uncertainty of performance parameters

1 Scope

This document provides guidance for practical applications of those principles in the measurement of the performance of ventilators falling under the scope of ISO 16494:2014. The references listed in the Bibliography give detailed information on the principles and theory of uncertainty as applied to measurements.

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 16494, *Heat recovery ventilators and energy recovery ventilators — Method of test for performance*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16494 and the following apply.

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

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

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

3.1
calibration
operation that, under specified conditions, in a first step establishes a relation between the quantity values with measurement uncertainties provided by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication

3.2
correction
modification applied to a measured quantity value to compensate for a known systematic effect

3.3
instrumental drift
continuous change in an indication, related neither to a change in the quantity being measured nor to a change of any recognized influence quantity

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3.4
resolution
smallest change in a quantity being measured that causes a perceptible change in the corresponding indication

Note 1 to entry: In the case of a digital instrument, this value corresponds to the number of digits of the reading of the instrument. This value might be different on the overall range of the instrument.

3.5
stability
ability of a measuring instrument or measuring system to maintain its metrological properties constant with time

3.6 Type of evaluation of uncertainty

3.6.1
type A evaluation of standard uncertainty
evaluation of standard uncertainty based on any valid statistical method for treating data

Note 1 to entry: Examples are calculating the standard deviation of the mean of a series of independent observations, using the method of least squares to fit a curve to data in order to evaluate the parameters of the curve and their standard deviations, and carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurements. If the measurement situation is especially complicated, one should consider obtaining the guidance of a statistician.

3.6.2
type B evaluation of standard uncertainty
evaluation of standard uncertainty that is usually based on scientific judgment using all the relevant information available

Note 1 to entry: Relevant information can include previous measurement data, experience with, or general knowledge of, the behaviour and property of relevant materials and instruments, manufacturer's specifications, data provided in calibration and other reports, and uncertainties assigned to reference data taken from handbooks.

3.7
uncertainty due to the lack of homogeneity
component specific to air temperature measurements where several probes are used simultaneously

Note 1 to entry: In this case the air temperature value used is the mean of the measurements of the different probes.

4 Symbols

For the purposes of this document, the symbols defined in ISO 16494:2014 and the following apply.

Symbol	Description	Unit
A	Nozzle throat area	m^2
$C_{1,2,3,4}$	Tracer gas concentrations at stations 1,2,3,4	10^6
C_D	Nozzle discharge coefficient	1^{NOTE}
C_p	Specific heat of dry air	kJ/(kg K)
h	Enthalpy	kJ/kg
$NSAR$	Net supply airflow ratio	%
P_{aux}	Input power to any other electrical components in the ventilator	W
P_{em}	Input power to all electric motors in the ventilator	W
P_{in}	Input power to ventilator	W
NOTE Some quantities of dimension 1 are defined as ratios of two quantities of the same kind. The coherent derived unit is the number 1. (ISO 80000-1:2009, 3.8).		

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