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

**Part 2:
Assessment of measurement
uncertainty of performance
parameters**

**(<https://standards.iteh.ai>)
Document Preview**

[ISO/TR 16494-2:2019](https://standards.iteh.ai/catalog/standards/iso/36ff6dd2-645e-4402-90e0-f952663e6a91/iso-tr-16494-2-2019)

<https://standards.iteh.ai/catalog/standards/iso/36ff6dd2-645e-4402-90e0-f952663e6a91/iso-tr-16494-2-2019>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO/TR 16494-2:2019](https://standards.iteh.ai/catalog/standards/iso/36ff6dd2-645e-4402-90e0-f952663e6a91/iso-tr-16494-2-2019)

<https://standards.iteh.ai/catalog/standards/iso/36ff6dd2-645e-4402-90e0-f952663e6a91/iso-tr-16494-2-2019>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols	2
5 Explanatory notes useful in laboratory application	3
5.1 Uncertainty	3
5.2 Confidence level	4
5.3 Evaluation of uncertainties	4
5.4 Steps in evaluation of uncertainty in measurements	4
5.5 Uncertainty of measurements	4
5.5.1 Uncertainty of individual measurements	4
5.5.2 Uncertainty of a mean value from several measurements	6
5.5.3 Uncertainty of a value obtained by using a smoothing curve	7
6 Evaluation of uncertainty	7
6.1 Airflow performance	7
6.1.1 Air volume flow rate	7
6.1.2 Air mass flow rate	8
6.1.3 Static pressure differential	8
6.2 Unit exhaust air transfer ratio	9
6.2.1 Measured parameters affecting test results	9
6.2.2 UEATR measurement	9
6.2.3 Uncertainty calculation — General case	9
6.3 Net supply airflow	9
6.3.1 Net supply airflow ducted units	9
6.3.2 Net supply airflow unducted ventilators	10
6.4 Gross effectiveness	11
6.4.1 Measured parameters affecting the measurement	11
6.4.2 Gross effectiveness measurement	11
6.4.3 Uncertainty calculation — General case	12
6.5 Coefficient of energy	12
6.5.1 Coefficient of energy: Ducted ventilators	12
6.5.2 Coefficient of energy — Unducted ventilators	14
6.6 Effective work (EW)	16
6.6.1 Measured parameters affecting the measurement	16
6.6.2 Effective work: Ducted or unducted ventilators	16
6.6.3 Uncertainty calculation — General case	16
6.6.4 Uncertainty calculation — Specific case	16
Annex A (informative) Uncertainty budget sheets	17
Annex B (informative) Determination of indirect contribution to uncertainty, $U(C_i)$	42
Bibliography	43

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 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 86, *Refrigeration and air-conditioning*, Subcommittee SC 6, *Testing and rating of air-conditioners and heat pumps*.

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.

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.

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO/TR 16494-2:2019](https://standards.itih.ai/catalog/standards/iso/36ff6dd2-645e-4402-90e0-f952663e6a91/iso-tr-16494-2-2019)

<https://standards.itih.ai/catalog/standards/iso/36ff6dd2-645e-4402-90e0-f952663e6a91/iso-tr-16494-2-2019>

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