INTERNATIONAL STANDARD

ISO 16956

First edition
2015-02-01

Thermal performance in the built environment — Determination of air flow rate in building applications by field measuring methods

Performance thermique des bâtiments — Détermination du taux de renouvellement d'air dans les bâtiments par des méthodes de mesure sur site

Reference number
ISO 16956:2015(E)

© ISO 2015



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015

All rights reserved. Unless otherwise specified, 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
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Symbols and abbreviated terms **2**

5 Types and selection of measurement method **2**
5.1 Types of measurement methods and their application 2
5.2 Selection of measurement method 2

6 Basic specifications measuring instruments and utilization methods **2**
6.1 General 2
6.2 Thermal anemometer 2
6.3 Pitot tube and manometer 3
6.4 Vane-type anemometer 3

7 Field measuring methods of air flow rate of ventilation and air conditioning systems **3**
7.1 Multipoint air velocity measurement method 3
7.1.1 Measurement in a duct 4
7.1.2 Measurement method at duct connection of air-conditioning system 6
7.1.3 Selection of measuring instruments 7
7.2 Tracer gas measurement method 7
7.2.1 Formula 7
7.2.2 Tracer gas 8
7.2.3 Procedures for measuring air flow rate 8
7.2.4 Tracer gas injection procedures 9
7.2.5 Tracer gas sampling procedures 10
7.3 Flow hood method 10
7.3.1 General 10
7.3.2 Equipment composition 10
7.3.3 Measurement procedures 11
7.4 Pressure compensation measurement method 11
7.4.1 Equipment composition 12
7.4.2 Measurement procedures 13
7.4.3 Effective application range 13
7.5 Pressure difference measurement method 13
7.5.1 Measuring equipment 13
7.5.2 Selection of measuring instruments 14
7.5.3 Measuring procedures 14

8 Uncertainty **15**
8.1 Uncertainty of each measurement 15
8.1.1 Multipoint air velocity measurement method 15
8.1.2 Tracer gas measurement method 15
8.1.3 Flow hood method 15
8.1.4 Pressure-loss compensation measurement method 15
8.1.5 Pressure difference measurement method 15
8.2 Analysis of uncertainty 15

9 Measurement report **16**
9.1 Information related to measured object 16
9.2 Items related to measuring method 16
9.3 Measurement results 16

Annex A (normative) **Position for cross-section measurement in a duct using multipoint measurement method** **17**

© ISO 2015 – All rights reserved

Annex B (normative) **Accuracy of air velocity measurement instrument** **21**
Annex C (informative) **Types of tracer gas** **22**
Bibliography **23**

© ISO 2015 – All rights reserved

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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*.

© ISO 2015 – All rights reserved

Thermal performance in the built environment — Determination of air flow rate in building applications by field measuring methods

1 Scope

In the cooling and heating loads of a building, the air taken in from outside account for a large portion of the entire load; in order to estimate this load, it is necessary to correctly grasp the air flow rate of ventilation and air-conditioning systems. This International Standard stipulates the methods for measuring the rate of air flow through the ducts in a steadily operating ventilation and air-conditioning system and in the air control ports including air diffuser, suction opening, and exhaust opening.

2 Normative references

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

ISO 5168, *Measurement of fluid flow — Procedures for the evaluation of uncertainties*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
orifice plate
thin plate having a hole, or holes, bored through it

Note 1 to entry: These are used for measuring the difference in static pressure of the flow before and after the disc and obtaining the air flow rate in the duct by multiplying by a predetermined coefficient.

3.2
tracer gas
gas used to measure its concentration varying in the air

Note 1 to entry: This gas is mixed with a sufficiently small amount of air so as not to affect the flow, and the amount of air is determined by measuring the gas concentration diluted in the air.

3.3
volumetric concentration
ratio of the volume of the specific gas to the unit volume of the mixture of air

Note 1 to entry: It is expressed in cubic meters per cubic meters or 10-6 · vol.

3.4
mass flow
mass of air or tracer gas flowing in unit time

Note 1 to entry: It is expressed in mg per second or kg per hour.

3.5
volumetric flow
volume of air flowing in unit time

Note 1 to entry: It is expressed in cubic meters per hour.

© ISO 2015 – All rights reserved