SLOVENSKI STANDARD

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Toplotna izolacija v stavbah - Ugotavljanje števila izmenjav zraka v stavbah - Metoda redčenja indikatorskega plina (ISO 12569:2017)

Thermal performance of buildings and materials - Determination of specific airflow rate in buildings - Tracer gas dilution method (ISO 12569:2017)

Wärmetechnisches Verhalten von Gebäuden und Werkstoffen - Bestimmung des spezifischen Luftvolumenstroms in Gebäuden - Indikatorgasverfahren (ISO 12569:2017)

Performance thermique des bâtiments et des matériaux - Détermination du débit d'air spécifique dans les bâtiments - Méthode de dilution de gaz traceurs (ISO 12569:2017)

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Thermal performance of buildings and materials - Determination of specific airflow rate in buildings - Tracer gas dilution method (ISO 12569:2017)

Performance thermique des bâtiments et des matériaux - Détermination du débit d'air spécifique dans les bâtiments - Méthode de dilution de gaz traceurs (ISO 12569:2017)

Wärmetechnisches Verhalten von Gebäuden und Werkstoffen - Bestimmung des spezifischen Luftvolumenstroms in Gebäuden - Indikatorgasverfahren (ISO 12569:2017)

This European Standard was approved by CEN on 6 July 2017.

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Contents

Page

European foreword

This document (EN ISO 12569:2017) has been prepared by Technical Committee ISO/TC 163 "Thermal performance and energy use in the built environment" in collaboration with Technical Committee CEN/TC 89 “Thermal performance of buildings and building components” the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2018 and conflicting national standards shall be withdrawn at the latest by March 2018.

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Endorsement notice

The text of ISO 12569:2017 has been approved by CEN as EN ISO 12569:2017 without any modification.

INTERNATIONAL STANDARD

ISO 12569

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Thermal performance of buildings and materials — Determination of specific airflow rate in buildings — Tracer gas dilution method

Performance thermique des bâtiments et des matériaux — Détermination du débit d'air spécifique dans les bâtiments — Méthode de dilution de gaz traceurs

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Contents

Page

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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 163, *Thermal performance and energy use in the built environment*, Subcommittee SC 1, *Test and measurement methods*.

This third edition cancels and replaces the second edition (ISO 12569:2012), which has been technically revised.

Introduction

The aim of ventilation is to maintain a proper hygienic status of the room by introducing outdoor air and diluting contaminants, heat, moisture or odour generated in the room, and evacuating them. In terms of energy savings, it is also important to keep the ventilation at the required rate, in order to reduce heat loss and heat gain under air conditioning as much as possible. Measurement of airflow rates is often necessary, for example, to check if the performance of a ventilation system is as intended, to assess the source strength of contaminants, to ensure that contaminants are properly eliminated, etc. The methods described here can be used to measure the ventilation rate or the specific airflow rate.

Thermal performance of buildings and materials — Determination of specific airflow rate in buildings — Tracer gas dilution method

1 Scope

This document establishes methods to obtain the ventilation rate or specific airflow rate in a building space (which is considered to be a single zone) using a tracer gas.

The measurement methods apply for spaces where the combined conditions concerning the uniformity of tracer gas concentration, measurement of the exhaust gas concentration, effective mixed zone and/or fluctuation of ventilation are satisfied.

This document provides three measurement methods using a tracer gas: concentration decay method, continuous dose method, and constant concentration method.

NOTE Specific measurement conditions are given in Table 1.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

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

3.1
single zone
V
space which only exchanges air with the outside

3.2
effective mixed zone
V_{emz}
space within a *single zone* (3.1), excluding sealed furniture or storage space, in which *tracer gas* (3.6) supplied to the zone is regarded as uniformly distributed

Note 1 to entry: Measured in cubic metres.

Note 2 to entry: Forced mixing of air in the zone is often needed to keep uniform tracer gas concentration.

3.3
ventilation rate
Q_v
total volume of air passing through the zone to the outside per unit of time

Note 1 to entry: Measured in m^3/s or m^3/h.

3.4
specific airflow rate
N
ratio of the *ventilation rate* (3.3) of a zone to the volume of the *effective mixed zone* (3.2), per second or per hour

3.5
building envelope
boundary or barrier separating the interior volume of a building from the outside environment

3.6
tracer gas
gas that can be mixed with air and measured in very small concentration in order to study airflow rate

3.7
concentration decay method
method by which the *specific airflow rate* (3.4) is obtained from the decaying curve of concentration observed after the end of the injection of *tracer gas* (3.6)

3.8
continuous dose method
method by which the *ventilation rate* (3.3) is obtained from the concentration resulting from continuous generation or injection of the *tracer gas* (3.6)

3.9
constant concentration method
method by which the *ventilation rate* (3.3) is obtained from the injection rate of *tracer gas* (3.6) dosed for constant concentration in the space

4 Measurement method and its selection

4.1 General

Selection of a measurement method and data processing depends on the building structure, ventilation system and measurement instrument employed. One of the three measurement methods (concentration decay method, continuous dose method and constant concentration method) is used to estimate the ventilation rate or specific airflow rate. The concentration decay method has a limited measurement time of up to several hours while the continuous dose and constant concentration methods can provide a longer measurement time up to several weeks. The guideline of selection of the method and what is measured by the method is listed in Table 1.

In order to improve the accuracy of deriving the ventilation rate or specific airflow rate, it is sometimes necessary to devise measures that approximate prerequisite conditions demanded of measurement methods. In particular, if a measurement method were used that requires uniformity of concentration in the effective mixed zone, it would be preferable to forcibly mix the internal air. In general, forced mixing of internal air has little effect on ventilation rate or specific airflow rate, but there is a risk that forced mixing affects the measured ventilation rate if natural ventilation due to temperature differences predominates and the temperature within the room is distributed significantly, or if airflow emitted from a fan for the purpose of mixing air directly impinges on the leakage areas in buildings. In such instances, a mixing system needs to be improved or it would be recommended to select a measurement method that could ensure uniformity of concentration without mixing.

In Table 1, specifications for the various applications are described as follows.

— “Room concentration can be maintained uniform at initial stage only” means making the concentration in the effective mixed zone uniform by a method such as forced mixing when supplying a tracer gas into the zone, but allowing the concentration to be distributed in principle with the measurement.

— If it is specified that "room concentration can be maintained uniform at all times", continuous forced mixing of air in the effective mixed zone is preferable. However, if the constant concentration method is used, and if concentration is controlled by injecting the tracer gas at several places and air is sampled at several locations, it is possible to assume that concentration is uniform without mixing.

— "Average exhaust concentration can be measured" can either mean instances in which concentration in an effective mixed zone is made uniform using mixing, or instances whereby the pressure inside a zone is kept lower than the outside when using the exhaust ventilation system, or the leakage area is extremely low so the exfiltration rate may be ignored and exhaust pathways may be specified beforehand.

— When using measurement methods that require the "known volume of an effective mixed zone", the volume of the effective mixed zone can be estimated using room dimensions. However, when using the corresponding average inverse concentration method and average concentration method, high accuracy for estimating the volume of an effective mixed zone is not needed if a sufficiently long time is taken to evaluate the ventilation rate.

— Measurement methods that can be applied in instances where "fluctuation in ventilation rate can be ignored" are designed on the assumption that the ventilation rate or specific airflow rate over time does not change.

— The tracer gas volume is defined as the value of exhaust temperature converted into density. When the room air is mixed well, the room temperature approximately matches the exhaust temperature.

— In addition to the measurement methods in Table 1, there is an intermittent dose method that allows the measurement of the volume of an effective mixed zone and ventilation rate at the same time.

— For measurement of ventilation rate among the other measurements, if volume of an effective mixed zone is known, the ventilation rate can be obtained by multiplying the volume of the effective mixed zone by the specific airflow rate, and then converting to ventilation rate.