SLOVENSKI STANDARD
SIST EN ISO 12569:2013

01-marec-2013

Nadomešča:
SIST EN ISO 12569:2001

Toplotna izolacija v stavbah - Ugotavljanje števila izmenjav zraka v stavbah - Metoda redčenja indikatorskega plina (ISO 12569:2012)

Thermal performance of buildings and materials - Determination of specific airflow rate in buildings - Tracer gas dilution method (ISO 12569:2012)

Wärmetechnisches Verhalten von Gebäuden und Werkstoffen - Bestimmung des spezifischen Luftvolumenstroms in Gebäuden - Indikatorgasverfahren (ISO 12569:2012)

Performance thermique des bâtiments et des matériaux - Détermination du débit volumique d'air dans les bâtiments - Méthode de dilution de gaz traceurs (ISO 12569:2012)

Ta slovenski standard je istoveten z: **EN ISO 12569:2012**

ICS:

91.120.10	Toplotna izolacija stavb	Thermal insulation

SIST EN ISO 12569:2013 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 12569

December 2012

ICS 91.120.10

Supersedes EN ISO 12569:2000

English Version

Thermal performance of buildings and materials - Determination of specific airflow rate in buildings - Tracer gas dilution method (ISO 12569:2012)

Performance thermique des bâtiments et des matériaux - Détermination du débit d'air spécifique dans les bâtiments - Méthode de dilution de gaz traceurs (ISO 12569:2012)

Wärmetechnisches Verhalten von Gebäuden und Werkstoffen - Bestimmung des spezifischen Luftvolumenstroms in Gebäuden - Indikatorgasverfahren (ISO 12569:2012)

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Foreword

This document (EN ISO 12569:2012) 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of an identical text or by endorsement, at the latest by June 2013, and conflicting national standards shall be withdrawn at the latest by June 2013.

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The text of ISO 12569:2012 has been approved by CEN as a EN ISO 12569:2012 without any modification.

INTERNATIONAL STANDARD

ISO 12569

Second edition
2012-12-01

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

Reference number
ISO 12569:2012(E)

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Published in Switzerland

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 12569 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 second edition cancels and replaces the first edition (ISO 12569:2000), which has been technically revised.

Introduction

The aim of ventilation is to maintain a proper hygienic status of the room by introducing outdoor air into a room, 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 International Standard establishes an engineering standard by which to obtain the ventilation rate/specific airflow rate, using a tracer gas in a building space, which is considered to be of a single zone.

The measurement method is valid in 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 International Standard provides three measurement methods using a tracer gas: (1) concentration decay method, (2) continuous dose method, and (3) constant concentration method.

NOTE Specific measurement conditions are given in Table 1.

2 Terms and definitions

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

2.1
single zone
V
space where the ventilation rate/specific airflow rate is measured and which only exchanges air with the outside

NOTE 1 Measured in cubic metres.

NOTE 2 Conditions needed for measurement are different for each measurement method, and details are given in Clause 4.

2.2
effective mixed zone
V_{emz}
space within a single zone, excluding sealed furniture or storage space, in which tracer gas supplied to the zone is regarded as uniformly distributed

NOTE 1 Measured in cubic metres.

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

2.3
ventilation rate
Q_v
total volume of air passing through the zone to the outdoor air per unit of time

NOTE Measured in m^3/s or m^3/h.

2.4
specific airflow rate
N
ratio of the Qv to the volume of the effective mixed zone, per second or per hour

2.5
building envelope
boundary or barrier separating the interior volume of a building from the outside environment

2.6
tracer gas
gas that can be mixed with air and measured in very small concentration in order to study airflow rate

NOTE 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.

2.7
concentration decay method
method by which the specific airflow rate is obtained from the decaying curve of concentration observed after the end of the injection of tracer gas.

2.8
continuous dose method
method by which the ventilation rate is obtained from the concentration resulting from continuous generation or injection of the tracer gas

2.9
constant concentration method
method by which the ventilation rate is obtained from the injection rate of tracer gas dosed for constant concentration in the space

3 Measurement method and its selection

3.1 General

One of the three measurement methods concentration decay method, continuous dose method and constant concentration method, is used to measure the ventilation rate/specific airflow rate. Selection of a measurement method and data processing depends on a building structure, ventilation system and measurement instrument employed. 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 measuring the ventilation rate/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/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" may 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, if a sufficiently long time is taken to evaluate the ventilation rate, high accuracy for estimating the volume of an effective mixed zone is not needed.

— 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/specific airflow rate over time does not change.

Table 1 — Method, application and measured quantities

Method		Application and measured quantities						
		Application					What is measured	
		Room concentration can be maintained uniform at initial stage only	Room concentration can be maintained uniform at all times	Average exhaust concentration can be measured	Known volume of effective mixed zone	Fluctuation in ventilation rate can be ignored	Ventilation rate or specific airflow rate	Flexibility to transient ventilation rate
Concentration decay method	2-point decay method		○				Specific airflow rate	Δ
	Multi-point decay method		○			○	Specific airflow rate	
	Step-down exhaust concentration method	○		○		○	Specific airflow rate	
	Pulse method			○		○	Ventilation rate	

NOTE In addition to the measurement methods above, there is an intermittent dose method that allows the measurement 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. The measurement methods marked with "Δ" in the "flexibility to transient ventilation rate" column can apply, in principle, to the case where changes in ventilation rate/specific airflow rate cannot be ignored, however, because the measurement is based on time-mean ventilation rate/specific airflow rate, it indicates that it does not meet the measurement of transient ventilation rate/specific airflow rate. The constant concentration methods marked with "○" indicate it meets measurement of transient ventilation rate if the dose of the tracer gas responds accurately to the transient ventilation rate with internal concentration maintained at a constant level.