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Preskusna metoda za ocenjevanje zmogljivosti sredstev in naprav za čiščenje plinske faze za splošno prezračevanje - 2. del: Plinske naprave za čiščenje plinske faze (ISO 10121-2:2013)

Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation - Part 2: Gas phase air cleaning devices (GPACD) (ISO 10121-2:2013)

Methode zur Leistungsermittlung von Medien und Vorrichtungen zur Reinigung der Gasphase für die allgemeine Lüftung - Teil 2: Einrichtungen zur Reinigung der Gasphase (ISO 10121-2:2013)

Méthodes d'essai pour l'évaluation de la performance des médias et des dispositifs de filtration moléculaire pour la ventilation générale - Partie 2: Dispositifs de filtration moléculaire (GPACD) (ISO 10121-2:2013)

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Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation - Part 2: Gas-phase air cleaning devices (GPACD) (ISO 10121-2:2013)

Méthodes d'essai pour l'évaluation de la performance des médias et des dispositifs de filtration moléculaire pour la ventilation générale - Partie 2: Dispositifs de filtration moléculaire (GPACD) (ISO 10121-2:2013)

Methode zur Leistungsermittlung von Medien und Vorrichtungen zur Reinigung der Gasphase für die allgemeine Lüftung - Teil 2: Einrichtungen zur Reinigung der Gasphase (ISO 10121-2:2013)

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Foreword

This document (EN ISO 10121-2:2013) has been prepared by Technical Committee ISO/TC 142 “Cleaning equipment for air and other gases” in collaboration with Technical Committee CEN/TC 195 “Air filters for general air cleaning” the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

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Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation —

Part 2: Gas-phase air cleaning devices (GPACD)

Méthodes d'essai pour l'évaluation de la performance des médias et des dispositifs de filtration moléculaire pour la ventilation générale —

Partie 2: Dispositifs de filtration moléculaire (GPACD)

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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.

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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 10121-2 was prepared by Technical Committee ISO/TC 142, *Cleaning equipment for air and other gases*.

ISO 10121 consists of the following parts, under the general title *Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation*:

— *Part 1: Gas-phase air cleaning media (GPACM)*

— *Part 2: Gas-phase air cleaning devices (GPACD)*

Introduction

There is an increasing use and need for gas-phase filtration in general filtration applications. This demand can be expected to increase rapidly due to the increasing pollution problems in the world together with an increasing awareness that solutions to the problems are available in the form of filtration devices or, phrased more technically, gas-phase air cleaning devices (GPACD). The performance of devices relies to a large extent on the performance of a gas-phase air cleaning media (GPACM) incorporated in the device. Still applications and device performance are often poorly understood by the users and suppliers of such media and devices. Media tests may also be adequate to offer data for real applications if actual low concentrations (< 100 ppb) and longer exposure times (>weeks) can be used in the test, provided that the geometrical configuration, packing density and flow conditions of the small-scale test specimen are equal to those used in the real applications. Such tests are however not included in the scope of ISO 10121. ISO 10121 attempts to increase understanding and communication by supplying a more standardized interface between media suppliers, device suppliers and end users. At present, standards exist for general ventilation in Japan[1] by JIS, automotive filters by ISO[4], in-duct sorptive media gas-phase air-cleaning devices by ASHRAE[7] and for adsorptive media by ASHRAE[8] and ASTM[9]. No international standard for general filtration exists today.

This part of ISO 10121 prescribes methods, test equipment, data interpretation and reporting for gas-phase air cleaning devices intended for the removal of gas-phase contamination from air in general ventilation applications.

In addition, information is given in a number of annexes:

— Annex A describes the normative validation procedure in detail in a tabulated form.

— Annex B gives a list of possible test gases, generation sources and suggests suitable analysis equipment for common test gases in addition to reference techniques given for the simplified benchmark setup in Clause 5.5.

— Annex C discusses different test stand designs.

A general introduction to molecular filtration and molecular filtration testing can be found in the scientific literature.

ISO 10121 aims to provide laboratory test methods for media and devices which are used for removal of gas-phase contaminants from air in general ventilation. It consists of two parts:

— ISO 10121-1 covers three different media configurations and is targeted towards giving a standardized interface between media suppliers and producers of air cleaning devices. It may also be used between media suppliers and end customers with regards to loose fill media properties.

— This part of ISO 10121 aims to give a standardized interface between suppliers of air cleaning devices and end customers seeking the most cost efficient way to employ gas-phase filtration.

Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation —

Part 2:
Gas-phase air cleaning devices (GPACD)

1 Scope

This part of ISO 10121 aims to provide an objective test method to estimate the performance of any full size gas filtration device (GPACD) for general filtration regardless of media or technique used in the device. In fact, the goal of this part of ISO 10121 is to avoid relating the test data to internal parameters altogether. The benefit with this approach is that customers of GPACDs will be able to concentrate on price/performance and suppliers will have access to a normative and objective test standard that will not require the release of proprietary information or reverse engineering of the product.

To ensure objectivity for test equipment suppliers, no specific design of the test apparatus is specified. Instead requirements of apparatus properties and validation tests are specified. However, different design examples in present use are outlined. This part of ISO 10121 can also be used with technologies such as scrubbers, absorbers, non-sorptive devices or packed columns as long as they fit into the test apparatus, can be meaningfully judged by the test method and are intended for general ventilation applications, both residential and non residential. Nuclear and military applications are specifically excluded.

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 29464:2011, *Cleaning equipment for air and other gases — Terminology*

EN 15805:2009, *Particulate air filters for general ventilation — Standardised dimensions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 29464 and the followings apply.

3.1
absorption
transport and dissolution of a sorbate into an absorbent

3.2
adsorbate
molecular compound in gaseous or vapour phase that will be retained by the adsorbent material of the media

3.3
adsorbent
material that collects adsorbates on its surface through physical or chemical processes

3.4
adsorption
process in which the molecules of a gas adhere by physical or chemical processes to the exposed surfaces of solid substances, both the outer surface and inner pore surface, with which they come into contact

3.5
breakthrough
amount of gaseous contaminant in the effluent of a GPACD

Note 1 to entry: See "penetration".

3.6
breakthrough vs. time curve
plot of contaminant penetration versus time for a particular challenge concentration and airflow

[Source: ISO 29464:2011; 3.2.67]

3.7
bypass
proportion of the challenge air stream that passes around the GPACD without contacting the media

[Source: ISO 29464:2011; 3.2.64]

3.8
capacity
m_s
amount (mass or moles) of a selected sorbate that can be contained in the filter media of a GPACD at given test conditions, and a specific end point

Note 1 to entry: Capacity can also be negative during desorption.

3.9
challenge concentration
concentration of the test contaminant(s) of interest in the air stream prior to filtration
cf. challenge air stream

3.10
challenge compound
chemical compound that is being used as the contaminant of interest for any given test

3.11
challenge air stream
test contaminant(s) of interest diluted to the specified concentration(s) of the test prior to filtration

[Source: ISO 29464:2011; 3.2.16]

3.12
channeling
disproportionate or uneven flow of gas through passages of lower resistance due to inconsistencies in the design or production of a GPACD, particularly in packed granular beds

[Source: ISO 29464:2011; 3.2.17]

3.13
chemisorption
chemical adsorption
trapping of gaseous or vapour contaminants on an adsorbent involving chemical reaction on the adsorbent surface

[Source: ISO 29464:2011; 3.2.19]

3.14
concentration
C_n
quantity of one substance dispersed in a defined amount of another

Note 1 to entry: Indices "n" denote location.

[Source: ISO 29464:2011; 3.2.21]

3.15
contaminant
substance (solid, liquid, or gas) that negatively affects the intended use of a fluid

[Source: ISO 29464:2011; 3.2.23]

3.16
decay time
t_{Dn}
time required for the gas contaminant monitoring instrument to record a reduction from greater than 95 % of the challenge concentration to less than 5 % of the challenge concentration ($t_{END} - t_{VC}$) at the downstream sampling point for a specific test (n), challenge gas and gas flow after stopping the injection of the contaminant with no GPACD present

3.17
desorption
process in which adsorbate molecules leave the surface of the adsorbent and re-enter the air stream

Note 1 to entry: Desorption is the oppsite of adsorption.

3.18
downstream
area following the filter in the direction of fluid flow

3.19
efficiency vs. time curve
plot of the GPACD removal efficiency against time over the duration of a challenge test for a particular challenge concentration and airflow

[Source: ISO 29464:2011; 3.2.31]

3.20
efficiency vs. capacity curve
plot of the GPACD removal efficiency against the integrated capacity over the duration of a challenge test for a particular challenge concentration and airflow

[Source: ISO 29464:2011; 3.2.28]

3.21
face velocity
air flow rate divided by the cross sectional area of the GPACD

3.22
gas
substance whose vapour pressure is greater than the ambient pressure at ambient temperature

[Source: ISO 29464:2011; 3.2.44]

3.23
gas-phase air cleaning device
GPACD
assembly of a fixed size enabling the removal of specific gas- or vapour-phase contaminants

Note 1 to entry: It is normally box shaped or fits into a box of dimensions between 300 × 300 × 300 mm up to approximately 610 × 610 × 610 mm or 2 × 2 × 2 feet.

[Source: ISO 29464:2011; 3.2.45, modified – NOTE has been modified.]