SLOVENSKI STANDARD
SIST EN ISO 29463-4:2018

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Nadomešča:
SIST EN 1822-4:2010

Zelo učinkoviti filtri in filtrirno sredstvo za odstranjevanje delcev iz zraka - 4. del: Preskusne metode za ugotavljanje prepuščanja delcev skozi filtrske elemente - metoda s skeniranjem (ISO 29463-4:2011)

High-efficiency filters and filter media for removing particles in air - Part 4: Test method for determining leakage of filter elements-Scan method (ISO 29463-4:2011)

Schwebstofffilter und Filtermedien zur Abscheidung von Partikeln aus der Luft - Teil 4: Prüfverfahren zur Ermittlung der Leckage des Filterelementes - Scan-Verfahren (ISO 29463-4:2011)

Filtres à haut rendement et filtres pour l'élimination des particules dans l'air - Partie 4: Méthode d'essai pour déterminer l'étanchéité de l'élément filtrant (méthode scan) (ISO 29463-4:2011)

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13.040.99	Drugi standardi v zvezi s kakovostjo zraka	Other standards related to air quality
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SIST EN ISO 29463-4:2018 **en,fr,de**

EUROPEAN STANDARD

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English Version

High-efficiency filters and filter media for removing particles in air - Part 4: Test method for determining leakage of filter elements-Scan method (ISO 29463-4:2011)

Filtres à haut rendement et filtres pour l'élimination des particules dans l'air - Partie 4: Méthode d'essai pour déterminer l'étanchéité de l'élément filtrant (méthode scan) (ISO 29463-4:2011)

Schwebstofffilter und Filtermedien zur Abscheidung von Partikeln aus der Luft - Teil 4: Prüfverfahren zur Ermittlung der Leckage des Filterelementes - Scan-Verfahren (ISO 29463-4:2011)

This European Standard was approved by CEN on 6 May 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Page

European foreword

The text of ISO 29463-4:2011 has been prepared by Technical Committee ISO/TC 142 "Cleaning equipment for air and other gases" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 29463-4:2018 by 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 April 2019, and conflicting national standards shall be withdrawn at the latest by April 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1822-4:2009.

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Endorsement notice

The text of ISO 29463-4:2011 has been approved by CEN as EN ISO 29463-4:2018 without any modification.

INTERNATIONAL STANDARD

ISO 29463-4

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High-efficiency filters and filter media for removing particles in air —

Part 4: Test method for determining leakage of filter elements — Scan method

Filtres à haut rendement et filtres pour l'élimination des particules dans l'air —

Partie 4: Méthode d'essai pour déterminer l'étanchéité de l'élément filtrant (méthode scan)

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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.

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 29463-4 was prepared by Technical Committee ISO/TC 142, *Cleaning equipment for air and other gases*.

ISO 29463 consists of the following parts, under the general title *High-efficiency filters and filter media for removing particles in air*:

— *Part 1: Classification, performance, testing and marking*

— *Part 2: Aerosol production, measuring equipment, particle-counting statistics*

— *Part 3: Testing flat sheet filter media*

— *Part 4: Test method for determining leakage of filter element — Scan method*

— *Part 5: Test method for filter elements*

Introduction

ISO 29463 (all parts) is derived from EN 1822 (all parts) with extensive changes to meet the requests from non-EU p-members. It contains requirements, fundamental principles of testing and the marking for high-efficiency particulate air filters with efficiencies from 95 % to 99,999 995 % that can be used for classifying filters in general or for specific use by agreement between users and suppliers.

ISO 29463 (all parts) establishes a procedure for the determination of the efficiency of all filters on the basis of a particle counting method using a liquid (or alternatively a solid) test aerosol, and allows a standardized classification of these filters in terms of their efficiency, both local and overall efficiency, which actually covers most requirements of different applications. The difference between ISO 29463 (all parts) and other national standards lies in the technique used for the determination of the overall efficiency. Instead of mass relationships or total concentrations, this technique is based on particle counting at the most penetrating particle size (MPPS), which is, for micro-glass filter mediums, usually in the range of 0,12 µm to 0,25 µm. This method also allows testing ultra-low penetration air filters, which was not possible with the previous test methods because of their inadequate sensitivity. For membrane filter media, separate rules apply, and they are described in ISO 29463-5:2011, Annex B. Although no equivalent test procedures for testing filters with charged media is prescribed, a method for dealing with these types of filters is described in ISO 29463-5:2011, Annex C. Specific requirements for test method, frequency, and reporting requirements can be modified by agreement between supplier and customer. For lower efficiency filters (group H, as described below), alternate leak test methods described in Annex A of this part of ISO 29463 can be used by specific agreement between users and suppliers, but only if the use of these other methods is clearly designated in the filter markings as described in Annex A of this part of ISO 29463.

There are differences between ISO 29463 (all parts) and other normative practices common in several countries. For example, many of these rely on total aerosol concentrations rather than individual particles. For information, a brief summary of these methods and their reference standards are provided in ISO 29463-5:2011, Annex A.

High-efficiency filters and filter media for removing particles in air —

Part 4: Test method for determining leakage of filter elements — Scan method

1 Scope

This part of ISO 29463 specifies the test procedure of the “scan method”, considered to be the reference method, for determining the leakage of filter elements. It is applicable to filters ranging from classes ISO 35 H to ISO 75 U. It also describes the other normative methods, the oil thread leak test (see Annex A) and the photometer leak test (see Annex B), applicable to classes ISO 35 H to ISO 45 H HEPA filters, and the leak test with solid PSL aerosol (see Annex E). It is intended for use in conjunction with ISO 29463-1, ISO 29463-2, ISO 29463-3 and ISO 29463-5.

2 Normative references

The following referenced documents are indispensable for the application 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 5167-1, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 1: General principles and requirements*

ISO 29463-1:2011, *High-efficiency filters and filter media for removing particles in air — Part 1: Classification, performance, testing and marking*

ISO 29463-2:2011, *High-efficiency filters and filter media for removing particles in air — Part 2: Aerosol production, measuring equipment, particle-counting statistics*

ISO 29463-3, *High-efficiency filters and filter media for removing particles in air — Part 3: Testing flat sheet filter media*

ISO 29463-5:2011, *High-efficiency filters and filter media for removing particles in air — Part 5: Test method for filter elements*

ISO 29464[1)], *Cleaning equipment for air and other gases — Terminology*

1) To be published.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 29463-1, ISO 29463-2, ISO 29463-3, ISO 29463-5, ISO 29464 and the following apply.

3.1
sampling duration
time period during which the particles in the sample are counted upstream and downstream

3.2
total particle count method
particle counting method in which the total number of particles in a certain sample volume is determined without classification according to size

EXAMPLE By using a condensation nucleus counter.

3.3
particle counting and sizing method
particle counting method which allows both the determination of the number of particles and also the classification of the particles according to size

EXAMPLE By using an optical particle counter.

3.4
particle flow rate
number of particles that are measured or that flow past a specified cross-section per unit time

3.5
particle flow distribution
distribution of the particle flow over a plane at right angles to the direction of flow

3.6
aerosol photometer
light-scattering airborne particle mass concentration measuring apparatus, which uses a forward-scattering-light optical chamber to make measurements

4 Principle

For most high-efficiency filter applications, a leak-free filter is essential. The reference leakage test serves to test the filter element for local penetration values and determine whether it exceeds permissible levels (see ISO 29463-1). For group H filters, alternatives to the reference scan method provide equivalent filter leakage determination and are described as alternate methods in Annexes A, B, E and F. Although not considered equivalent, the particle count method using 0,3 µm to 0,5 µm PSL given in Annex F may be used instead of the oil thread method (see Annex A).

For leakage testing, the test filter is installed in the mounting assembly and subjected to a test airflow corresponding to the nominal airflow rate. After measuring the pressure differential at the nominal air flow volume flow rate, the filter is purged and the test aerosol produced by the aerosol generator is mixed with the prepared test air along a mixing duct, so that it is spread homogeneously over the cross-section of the duct.

The particle flow rate on the downstream side of the test filter is smaller than the particle flow rate reaching the filter on the upstream side by the mean penetration factor.

The manufacturing irregularities of the filter media or leaks lead to a variation of the particle flow rate over the filter face area. In addition, leaks at the boundary areas and within the components of the test filter (sealant, filter frame, seal of the filter mounting assembly) can lead locally to an increase in the particle flow rate on the downstream side of the test filter.

For the leakage test, the particle flow distribution shall be determined on the downstream side of the filter in order to check where the limit values are exceeded. The coordinates of these positions shall be recorded.

The scanning tracks shall also cover the area of the filter frame, the corners, the sealant between filter frame and the gasket, so that possible leaks in these areas can also be detected. It is advisable to scan filters for leaks with their original gasket mounted and in the same mounting position and airflow direction as they are installed on site.

In order to measure the downstream particle flow distribution, a probe with defined geometry shall be used on the downstream side to take a specified partial flow as sample. From this partial flow, a sample volume flow rate shall be directed to a particle counter, which counts the particles and displays the results as a function of time. During the testing, the probe moves at a defined speed in adjoining or overlapping tracks without gaps (see C.3.2 and C.3.3) close to the downstream side of the filter element. The measuring period for the downstream particle flow distribution can be shortened by using several measuring systems (partial flow extractors/particle counters) operating in parallel.

The measurement of the coordinates of the probe, a defined probe speed, and measurement of the particle flow rate at sufficiently short intervals allow the localization of leaks. In a further test step, the local penetration shall be measured at this position using a stationary probe.

The leakage tests shall always be conducted using MPPS particles (see ISO 29463-3), except for filters with membrane medium in accordance with Annex E. The size distribution of the aerosol particles can be checked using a particle size analysis system (for example, a differential mobility particle sizer, DMPS).

The leakage testing can be carried out using either a mono-disperse or poly-disperse test aerosol. It shall be ensured that the mean particle diameter corresponds to the most penetrating particle size (MPPS) particle diameter, at which the filter medium has its minimum efficiency.

When testing with a mono-disperse aerosol, the total particle counting method may be used with a condensation particle counter (CPC) or an optical particle counter (OPC; e.g. a laser particle counter).

When using a poly-disperse aerosol, an optical particle counter that counts the particles and measures their size distribution shall be used.

5 Test filter

A test filter shall be used for the leak testing that does not show any visible signs of damage or other irregularities and that can be sealed in position and subjected to air flow in accordance with requirements. The temperature of the test filter during the tests shall correspond to the temperature of the test air. The test filter element shall be handled with care and shall be clearly and permanently marked with the following details:

a) designation of the test filter element;

b) upstream side of the filter element.

6 Test apparatus

6.1 Set-up of the test apparatus

Figure 1 shows the set-up of the test apparatus. This layout is valid for tests with a mono-disperse or with a poly-disperse aerosol. The only differences between these lie in the technique used to measure the particles and the way the aerosol is generated.