

# INTERNATIONAL STANDARD

**ISO**  
**29463-1**

First edition  
2011-10-15

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

### Part 1: Classification, performance testing and marking

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

*Partie 1: Classification, essais de performance et marquage*



Reference number  
ISO 29463-1:2011(E)

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Published in Switzerland

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## ISO 29463-1:2011(E)

### 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.

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.

ISO 29463-1 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, for micro-glass filter mediums, is 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; 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 noted in ISO 29463-4:2011, Annex A, 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 noted in ISO 29463-4:2011, Annex A. Although the methods prescribed in this part of ISO 29463 can be generally used to determine filter performance for nano-size particles, testing or classification of filters for nano-size particles is beyond the scope of this part of ISO 29463 (see Annex A for additional information).

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 1: Classification, performance testing and marking

### 1 Scope

This part of ISO 29463 establishes a classification of filters based on their performance, as determined in accordance with ISO 29463-3, ISO 29463-4 and ISO 29463-5. It also provides an overview of the test procedures, and specifies general requirements for assessing and marking the filters, as well as for documenting the test results. It is intended for use in conjunction with ISO 29463-2, ISO 29463-3, ISO 29463-4 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 29463-2:2011, *High-efficiency filters and filter media for removing particles in air — Part 2: Aerosol production, measuring equipment, particle-counting statistics*

ISO 29463-3:2011, *High-efficiency filters and filter media for removing particles in air — Part 3: Testing flat sheet filter media*

ISO 29463-4:2011, *High-efficiency filters and filter media for removing particles in air — Part 4: Test method for determining the leakage of filter element — Scan method*

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

ISO 29464<sup>1)</sup>, *Cleaning equipment for air and other gases — Terminology*

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1) To be published.

## ISO 29463-1:2011(E)

### 3 Terms and definitions

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

- 3.1**  
**filter medium**  
material used for filtering
- 3.2**  
**folded pack**  
pack of the filter medium formed by uniform individual folds
- 3.3**  
**filter element**  
**filter**  
folded pack enclosed by a frame
- 3.4**  
**efficiency**  
ratio of the number of particles retained by the filter to the number of the particles entering it
- 3.5**  
**particle size efficiency**  
efficiency for a specific particle diameter
- NOTE The efficiency plotted as a function of the particle diameter gives the fractional efficiency curve.
- 3.6**  
**overall efficiency**  
efficiency, averaged over the whole superficial face area of a filter element under given operating conditions of the filter
- 3.7**  
**local efficiency**  
efficiency at a specific point of the filter element under given operating conditions of the filter
- 3.8**  
**nominal air volume flow rate**  
air volume flow rate at which the filter element shall be tested, as specified by the manufacturer
- 3.9**  
**filter face area**  
cross-sectional area of the filter element including the frame
- 3.10**  
**superficial face area**  
cross-sectional area of the filter element through which the air flow passes
- 3.11**  
**effective filter medium area**  
area of the filter medium contained in the filter element (without areas covered by sealant, spacers, struts, etc.) through which the air flow passes
- 3.12**  
**nominal filter medium face velocity**  
nominal air volume flow rate divided by the effective filter medium area
- 3.13**  
**quasi-mono-disperse aerosol**  
aerosols whose distribution has a geometric standard deviation between  $\sigma_g = 1,15$  and  $\sigma_g = 1,5$