TECHNICAL SPECIFICATION

ISO/TS 21220

First edition
2009-10-01

Particulate air filters for general ventilation — Determination of filtration performance

Filtres à air particulaires pour ventilation générale — Détermination des performances de filtration

Reference number
ISO/TS 21220:2009(E)

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Published in Switzerland

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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.

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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

— an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/TS 21220 was prepared by Technical Committee ISO/TC 142, *Cleaning equipment for air and other gases*.

Introduction

This Technical Specification is based on EN 779[5] and ANSI/ASHRAE 52.2[1], and covers the testing of the performance of air filters mainly used in general ventilation applications. During its preparation, it was perceived that the document was not sufficiently mature for publication as an International Standard, and so its publication as a Technical Specification was decided as an intermediate step. Moreover, with such a document covering the needs of the air filtration industry and of the end users, it is envisaged that a future revision in the form of an International Standard could also include a classification system.

The classification or rating of air filters is determined by national bodies or other associations and is not within the scope of this Technical Specification

In the method set out in this Technical Specification, representative samples of particles upstream and downstream of the filters are analysed by an optical particle counter (OPC) to provide filter particle size efficiency data.

Initiatives to address the potential problems of particle re-entrainment, shedding and the in-service charge neutralization characteristics of certain types of media are presented.

Certain types of filter media rely on electrostatic effects to achieve high efficiencies at low resistance to air flow. Exposure to some types of challenge, such as combustion particles or other fine particles, can inhibit such charges, with the result that filter performance suffers. The conditioning test procedure given in Annex A provides techniques for identifying this type of behaviour and can be used both to determine whether the filter efficiency is dependent on the electrostatic removal mechanism and to provide quantitative information about the importance of the electrostatic removal. This procedure was selected because it is well established, reproducible, simple to perform and relatively quick and ultimately because an acceptable alternative procedure was not available.

In an ideal filtration process, each particle would be permanently arrested at the first contact with a filter fibre, but incoming particles can impact on a captured particle and dislodge it into the air stream. Fibres or particles from the filter itself could also be released, due to mechanical forces. From the user's point of view it might be important to know this, and a description is given in Annex B.

A brief overview of the test method and its principles is given in Annex C.

A means for calculating pressure drop is set out in Annex D.

Particulate air filters for general ventilation — Determination of filtration performance

1 Scope

This Technical Specification presents test methods and specifies a test rig for measuring the filter performance of particulate air filters used for general ventilation. The test rig is designed for an air flow rate of between 0,25 m^3/s [900 m^3/h (530 ft^3/min)] and 1,5 m^3/s [5 400 m^3/h (3 178 ft^3/min)].

This Technical Specification is applicable to air filters having an initial efficiency of less than 99 % with respect to 0,4 µm particles. Filters in the higher end and those with an above 99 % initial efficiency are tested and classified according to other standards.

It combines two test methods: a "fine" method for air filters in the higher efficiency range and a "coarse" method for filters of lower efficiency. In either case, a flat-sheet media sample or media pack sample from an identical filter is conditioned (discharged) to provide information about the intensity of the electrostatic removal mechanism. After determination of its initial efficiency, the untreated filter is loaded with synthetic dust in a single step until its final test pressure drop is reached. Information on the loaded performance of the filter is then obtained.

The performance results thus obtained cannot alone be quantitatively applied to predict in-service performance with regard to efficiency and lifetime, so other factors influencing performance are presented in Annexes A and B.

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 2854, *Statistical interpretation of data — Techniques of estimation and tests relating to means and variances*

ISO 5167-1:2003, *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 12103-1:1997, *Road vehicles — Test dust for filter* evaluation *— Part 1: Arizona test dust*

ISO 21501-1, *Determination of particle size distribution — Single particle light interaction methods — Part 1: Light scattering aerosol spectrometer*

ISO 21501-4, *Determination of particle size distribution — Single particle light interaction methods — Part 4: Light scattering airborne particle counter for clean spaces*

JIS Z 8901:1995, Test powders and test particles[1)]

1) Japanese Industrial Standard.