Particulate air filters for general ventilation - Determination of the filtration performance

EESTI STANDARDIKESKUS
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NATIONAL FOREWORD

See Eesti standard EVS-EN 779:2012 sisaldab Euroopa standardi EN 779:2012 ingliskeelset teksti.	This Estonian standard EVS-EN 779:2012 consists of the English text of the European standard EN 779:2012.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 11.04.2012.	Date of Availability of the European standard is 11.04.2012.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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EUROPEAN STANDARD

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English Version

Particulate air filters for general ventilation - Determination of the filtration performance

Filtres à air de ventilation générale pour l'élimination des particules - Détermination des performances de filtration

Partikel-Luftfilter für die allgemeine Raumlufttechnik - Bestimmung der Filterleistung

This European Standard was approved by CEN on 14 April 2011.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Contents

Foreword

This document (EN 779:2012) has been prepared 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 October 2012, and conflicting national standards shall be withdrawn at the latest by October 2012.

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

This document supersedes EN 779:2002.

EN 779:2012 is based on the test method according to EN 779:2002. It contains extensive test rig qualification procedures together with procedures which give some information regarding the real life behaviour of particulate air filters (see ”Introduction”).

Annexes A to D are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

General

The procedures described in this standard have been developed from those given in EN 779:2002. The basic design of test rig given in EN 779:2002 is retained. A challenge aerosol of DEHS (or equivalent) is dispersed evenly across the duct upstream of the filter being tested. Representative upstream and downstream air samples are analysed by an optical particle counter (OPC) to provide filter particle size efficiency data.

Classification

The EN 779:2002 classification system (comprising groups F and G filters) has been changed to three groups (F-, M- and G-filters).

Filters found to have an average efficiency value of less then 40 % of 0,4 µm particles will be allocated to group G and the efficiency reported as "< 40 %". The classification of G filters (G1 - G4) is based on their average arrestance with the loading dust.

Filters found to have an average efficiency value from 40 % to less than 80 % of 0,4 µm particles will be allocated to group M (M5, M6) and the classification is based on their average efficiency (0,4 µm). The filter classes F5 and F6 have changed to M5 and M6, but with same requirements, as in the old classification system.

Filters found to have an average efficiency of 80 % or more of 0,4 µm particles will be allocated to group F (F7-F9) and the classification is based on their average efficiency (0,4 µm) as in the old system and the minimum efficiency during the test.

Test aerosol

A challenge aerosol of DEHS (or equivalent) was chosen for the efficiency test for the following reasons:

— Experience has already been gained by users of EN 779:2002 and Eurovent 4/9 test method so that much suitable equipment already exists.

— Liquid aerosols is easy to generate in the concentrations, size range and degree of consistency required.

— Undiluted DEHS is used to give a non charged aerosol.

— Spherical latex particles are used to calibrate particle counters. The determination of the particle size of spherical liquid particles using optical particle counters is more accurate than would be the case with solid particles of non-spherical salt and test dusts.

Filtration characteristics

Initiatives to address the potential problems of particle re-entrainment and shedding from filters have been included in Annex A.

In an ideal filtration process, each particle would be permanently arrested at the first contact with a filter fibre, but incoming particles may 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, but such behaviour would probably not be detected by a particle counter system according to this standard.

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 in normal atmospheric air or oil mist, may neutralise such charges with the result that filter performance suffers. It is important that the users are aware of the potential for performance degradation when loss of charge occurs. It is also important that means be available for

identifying cases where the potential exists. The discharge test procedure described provides techniques for identifying this type of behaviour. This procedure is used 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.

1 Scope

This European Standard refers to particulate air filters for general ventilation. These filters are classified according to their performance as measured in this test procedure.

This European Standard contains requirements to be met by particulate air filters. It describes testing methods and the test rig for measuring filter performance.

In order to obtain results for comparison and classification purposes, particulate air filters shall be tested against two synthetic aerosols, a fine aerosol for measurement of filtration efficiency as a function of particle size within a particle size range 0,2 µm to 3,0 µm, and a coarse one for obtaining information about test dust capacity and, in the case of coarse filters, filtration efficiency with respect to coarse loading dust (arrestance).

This European Standard applies to air filters having an initial efficiency of less than 98 % with respect to 0,4 µm particles. Filters shall be tested at an air flow rate between 0,24 m^3/s (850 m^3/h) and 1,5 m^3/s (5400 m^3/h).

The performance results obtained in accordance with this standard cannot by themselves be quantitatively applied to predict performance in service with regard to efficiency and lifetime. Other factors influencing performance to be taken into account are described in Annex A (informative).

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.

EN 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 5167-1:2003)*

ISO 2854:1976, *Statistical interpretation of data — Techniques of estimation and tests relating to means and variances*

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

3 Terms and definitions

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

3.1
arrestance
weighed (mass) removal of loading dust

3.2
average arrestance - A_m
ratio of the total amount of loading dust retained by the filter to the total amount of dust fed up to final test pressure drop

Note 1 to entry: Average arrestance is used for classification of G-filters.

3.3
average efficiency - E_m
weighted average of the efficiencies of 0,4 µm particles for the different specified dust loading levels up to final test pressure drop

Note 1 to entry: Average efficiency is used for classification of M and F-filters.