

**High efficiency air filters (EPA, HEPA and ULPA) -
Part 2: Aerosol production, measuring equipment,
particle counting statistic**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 1822-2:2010 sisaldab Euroopa standardi EN 1822-2:2009 ingliskeelset teksti.

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English Version

**High efficiency air filters (EPA, HEPA and ULPA) - Part 2:
Aerosol production, measuring equipment, particle counting
statistics**

Filtres à air à haute efficacité (EPA, HEPA et ULPA) -
Partie 2: Production d'aérosol, équipement de mesure et
statistiques de comptage de particules

Schwebstofffilter (EPA, HEPA und ULPA) - Teil 2:
Aerosolerzeugung, Meßgeräte, Partikelzählstatistik

This European Standard was approved by CEN on 17 October 2009.

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Foreword

This document (EN 1822-2:2009) 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of an identical text or by endorsement, at the latest by May 2010, and conflicting national standards shall be withdrawn at the latest by May 2010.

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 1822-2:1998.

It is dealing with the performance testing of efficient particulate air filters (EPA), high efficiency particulate air filters (HEPA) and ultra low penetration air filters (ULPA) at the manufacturers site.

EN 1822, *High efficiency air filters (EPA, HEPA and ULPA)*, consists of the following parts:

- *Part 1: Classification, performance testing, marking*
- *Part 2: Aerosol production, measuring equipment, particle counting statistics*
- *Part 3: Testing flat sheet filter media*
- *Part 4: Determining leakage of filter elements (scan method)*
- *Part 5 : Determining the efficiency of filter elements*

This European Standard is based on particle counting methods which actually cover most needs of different applications. The difference between this European Standard and its previous edition lies in the addition of:

- an alternative test method for using a solid, instead of a liquid, test aerosol;
- a method for testing and classification of filters made out of membrane type filter media;
- a method for testing and classification filters made out of synthetic fibre media; and
- an alternative method for leak testing of group H filters with other than panel shape.

Beside that, various editorial corrections have been implemented.

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, 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 and the United Kingdom.

Introduction

As decided by CEN/TC 195, this European Standard is based on particle counting methods which actually cover most needs of different applications. The difference between this European Standard and previous national standards lies in the technique used for the determination of the integral efficiency. Instead of mass relationships, 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 .

For Membrane filter media, separate rules apply; see EN 1822-5:2009, Annex A. This method also allows testing ultra low penetration air filters, which was not possible with the previous test methods because of their inadequate sensitivity.

1 Scope

This European Standard applies to efficient particulate air filters (EPA), high efficiency particulate air filters (HEPA) and ultra low penetration air filters (ULPA) used in the field of ventilation and air conditioning and for technical processes, e.g. for applications in clean room technology or pharmaceutical industry.

It establishes a procedure for the determination of the efficiency 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 integral efficiency.

This European Standard describes the measuring instruments and aerosol generators used in the course of this testing. With regard to particle counting it specifies the statistical basis for the evaluation of counts with only small numbers of counted events.

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.

EN 1822-1:2009, *High efficiency air filters (EPA, HEPA and ULPA) — Part 1: Classification, performance testing, marking*

EN 1822-3, *High efficiency air filters (EPA, HEPA and ULPA) — Part 3: Testing flat sheet filter media*

EN 14799:2007, *Air filters for general air cleaning — Terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14799:2007 apply.

4 Aerosol production

4.1 General

When testing a filter a test aerosol with liquid particles shall be used as reference test method and as defined in EN 1822-1. Alternatively, a solid PSL aerosol can be used for local efficiency (leak) testing (see EN 1822-4:2009, Annex D).

The testing of high-performance filters (U16 and U17) requires methods of aerosol production with high production rates (10^{10} s^{-1} to 10^{11} s^{-1}), in order to provide statistically significant measurements downstream of the filter.

By adjusting the operating parameters of the aerosol generator it shall be possible to adjust the mean particle diameter of the aerosol so that it is equal to the MPPS. The concentration and the size distribution of the aerosol produced shall remain constant throughout the test.

4.2 Aerosol substances

A suitable aerosol substance for the reference test method is a liquid with a vapour pressure which is so low at the ambient temperature that the size of the droplets produced does not change significantly due to evaporation over the time scale relevant for the test procedure (typically max. 5 s).