

High efficiency air filters (HEPA and ULPA) —

Part 1: Classification, performance testing, marking

The European Standard EN 1822-1:1998 has the status of a
British Standard

ICS 23.120

National foreword

This British Standard is the English language version of EN 1822-1:1998.

The UK participation in its preparation was entrusted by Technical Committee MCE/21, Filters for gases and liquids, to Subcommittee MCE/21/3, Air filters other than for air supply for IC engines and compressors, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 12, an inside back cover and a back cover.

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 November 1998

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Amendments issued since publication

Amd. No.	Date	Text affected

ISBN 0 580 29837 X

ICS 23.120

Descriptors: air filters, cleaning equipment for gases, ventilation, air conditioning, definitions, classifications, specifications, tests, aerosols, test conditions, effectiveness

English version

High efficiency air filters (HEPA and ULPA) — Part 1: Classification, performance testing, marking

Filtres à air à très haute efficacité et filtres à air à très faible pénétration (HEPA et ULPA) —
Partie 1: Classification, essais de performance et marquage

Schwebstofffilter (HEPA und ULPA) —
Teil 1: Klassifikation, Leistungsprüfung, Kennzeichnung

This European Standard was approved by CEN on 6 March 1998.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 195, Air filters for general air cleaning, the secretariat of which is held by DIN.
It is dealing with the performance testing of high efficiency particulate air filters (HEPA) and ultra low penetration air filters (ULPA).
The complete European Standard *High efficiency air filters (HEPA and ULPA)* will consist 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*

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 overall efficiency. Instead of mass relationships, this new technique is based on particle counting at the most penetrating particle size (MPPS; range: 0,15 to 0,30 µm). It also allows ultra low penetration air filters to be tested, which is not possible with the previous test methods because of their inadequate sensitivity.
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 1998, and conflicting national standards shall be withdrawn at the latest by October 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

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

It establishes a procedure for the determination of the efficiency on the basis of a particle counting method using a liquid test aerosol, and allows a standardized classification of these filters in terms of their efficiency.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1822-2, *High efficiency air filters (HEPA and ULPA) — Part 2: Aerosol production, measuring equipment, particle counting statistics*.

EN 1882-3, *High efficiency air filters (HEPA and ULPA) — Part 3: Testing flat sheet filter media*.

prEN 1882-4, *High efficiency air filters (HEPA and ULPA) — Part 4: Determining leakage of filter elements (Scan method)*.

prEN 1882-5, *High efficiency air filters (HEPA and ULPA) — Part 5: Determining the efficiency of filter elements*.

EN ISO 5167-1, *Measurement of fluid flow by means of pressure differential device — Part 1: Orifice plates, nozzles and Venturi tubes inserted in circular cross-section conduits running full* (ISO 5167-1:1991).

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this standard, the following definitions apply.

3.1.1

filter medium

flat sheet filter material, unfolded

3.1.2

folded pack

a pack of the filter medium formed by uniform individual folds

3.1.3

filter element (filter)

a folded pack enclosed by a frame

3.1.4

penetration

the ratio of the particle number concentration downstream of the filter to the concentration upstream

3.1.5

efficiency

the ratio of the number of particles held back by the filter to the number of the particles impinging on the filter

3.1.6

particle size efficiency

the efficiency for a specific particle diameter. The efficiency plotted as a function of the particle diameter gives the efficiency curve

3.1.7

minimum filter efficiency

the minimum of the efficiency curve under given operating conditions of the filter (see 3.1.24)

3.1.8

overall efficiency

the efficiency, averaged over the whole superficial face area of a filter element under given operating conditions of the filter

3.1.9

local efficiency

the efficiency at a specific point of the filter element under given operating conditions of the filter

3.1.10

nominal air volume flow rate

the air volume flow rate for which the filter element to be tested is specified

3.1.11

filter face area

the cross-sectional area of the filter element including the frame

3.1.12

superficial face area

the cross-sectional area of the filter element which is passed by the air flow

3.1.13

effective filter medium area

the effective cross-sectional area of the filter medium in the filter element (without adhesive areas, struts etc.) which is passed by the air flow

3.1.14

nominal filter medium face velocity

the nominal air volume flow rate divided by the effective filter medium area