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Nadomešča:

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Zračni filtri pri splošnem prezračevanju - 4. del: Metoda kondicioniranja za ugotavljanje minimalne frakcijske učinkovitosti (ISO 16890-4:2022)

Air filters for general ventilation - Part 4: Conditioning method to determine the minimum fractional test efficiency (ISO 16890-4:2022)

Luftfilter für die allgemeine Raumluftechnik - Teil 4: Konditionierungsverfahren für die Ermittlung des Fraktionsabscheidegradminimums (ISO 16890-4:2022)

Filtres à air de ventilation générale - Partie 4: Méthode de conditionnement afin de déterminer l'efficacité spectrale minimum d'essai (ISO 16890-4:2022)

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91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning systems
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Air filters for general ventilation - Part 4: Conditioning method to determine the minimum fractional test efficiency (ISO 16890-4:2022)

Filtres à air de ventilation générale - Partie 4: Méthode de conditionnement afin de déterminer l'efficacité spectrale minimum d'essai (ISO 16890-4:2022)

Luftfilter für die allgemeine Raumlufttechnik - Teil 4: Konditionierungsverfahren für die Ermittlung des Fraktionsabscheidegradminimums (ISO 16890-4:2022)

This European Standard was approved by CEN on 21 July 2022.

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COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN ISO 16890-4:2022) has been prepared by Technical Committee ISO/TC 142 "Cleaning equipment for air and other gases" in collaboration with Technical Committee CEN/TC 195 "Cleaning equipment for air and other gases" 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of an identical text or by endorsement, at the latest by February 2023, and conflicting national standards shall be withdrawn at the latest by February 2023.

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

This document supersedes EN ISO 16890-4:2016.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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Endorsement notice

The text of ISO 16890-4:2022 has been approved by CEN as EN ISO 16890-4:2022 without any modification.

INTERNATIONAL
STANDARD

ISO
16890-4

Second edition
2022-07

Air filters for general ventilation —

Part 4:

**Conditioning method to determine the
minimum fractional test efficiency**

Filtres à air de ventilation générale —

*Partie 4: Méthode de conditionnement afin de déterminer l'efficacité
spectrale minimum d'essai*

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ISO 16890-4:2022(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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 142, *Cleaning equipment for air and other gases*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 195, *Cleaning equipment for air and other gases*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 16890-4:2016), which has been technically revised.

The main changes are as follows:

- in [7.2](#) the dimensions of the conditioning cabinet are indicated in a more flexible way. This change does not affect the test, however, it does make the procedure more reasonable for the users;
- [9.1](#) has been reworded to remove duplicate information and some parts have been moved to a new [subclause 9.3](#);
- in [9.2](#) a sentence has been added to make the proper procedure clear to the users.

A list of all parts in the ISO 16890 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The effects of particulate matter (PM) on human health have been extensively studied in the past decades. The results are that fine dust can be a serious health hazard, contributing to or even causing respiratory and cardiovascular diseases. Different classes of PM can be defined according to the particle size range. The most important ones are PM_{10} , $PM_{2,5}$ and PM_1 . The U.S. Environmental Protection Agency (EPA), the World Health Organization (WHO) and the European Union (EU) define PM_{10} as PM which passes through a size-selective inlet with a 50 % efficiency cut-off at 10 μm aerodynamic diameter. $PM_{2,5}$ and PM_1 are similarly defined. However, this definition is not precise if there is no further characterization of the sampling method and the sampling inlet with a clearly defined separation curve. In Europe, the reference method for the sampling and measurement of PM_{10} is described in EN 12341. The measurement principle is based on the collection on a filter of the PM_{10} fraction of ambient PM and the gravimetric mass determination (see Reference [7]).

As the precise definition of PM_{10} , $PM_{2,5}$ and PM_1 is quite complex and not easy to measure, public authorities, such as the U.S. EPA or the German Federal Environmental Agency (Umweltbundesamt), increasingly use in their publications the simpler denotation of PM_{10} as being the particle size fraction less than or equal to 10 μm . Since this deviation to the above-mentioned complex “official” definition does not have a significant impact on a filter element’s particle removal efficiency, the ISO 16890 series refers to this simplified definition of PM_{10} , $PM_{2,5}$ and PM_1 .

PM in the context of the ISO 16890 series describes a size fraction of the natural aerosol (liquid and solid particles) suspended in ambient air. The symbol ePM_x describes the efficiency of an air cleaning device to particles with an optical diameter between 0,3 μm and x μm . The following particle size ranges are used in the ISO 16890 series for the listed efficiency values as shown in [Table 1](#).

Table 1 — Optical particle diameter size ranges for the definition of the efficiencies, ePM_x

Efficiency	Size range, μm
ePM_{10}	$0,3 \leq x \leq 10$
$ePM_{2,5}$	$0,3 \leq x \leq 2,5$
ePM_1	$0,3 \leq x \leq 1$

Air filters for general ventilation are widely used in heating, ventilation and air-conditioning applications of buildings. In this application, air filters significantly influence the indoor air quality and, hence, the health of people, by reducing the concentration of PM. To enable design engineers and maintenance personnel to choose the correct filter types, there is an interest from international trade and manufacturing for a well-defined, common method of testing and classifying air filters according to their particle efficiencies, especially with respect to the removal of PM. Current regional standards are applying completely different testing and classification methods, which do not allow any comparison with each other, and thus hinder global trade with common products. Additionally, the current industry standards have known limitations by generating results which often show better filtration performance than the filter performance in service, i.e. overstating the particle removal efficiency of many products. With the ISO 16890 series, a completely new approach for a classification system is adopted, which gives better and more meaningful results compared to the existing standards.

The ISO 16890 series describes the equipment, materials, technical specifications, requirements, qualifications and procedures to produce the laboratory performance data and efficiency classification based upon the measured fractional efficiency converted into a PM efficiency (ePM) reporting system.

Air filter elements according to the ISO 16890 series are evaluated in the laboratory by their ability to remove aerosol particulate expressed as the efficiency values ePM_1 , $ePM_{2,5}$ and ePM_{10} . The air filter elements can then be classified according to the procedures defined in ISO 16890-1. The particulate removal efficiency of the filter element is measured as a function of the particle size in the range of 0,3 μm to 10 μm of the unloaded and unconditioned filter element as per the procedures defined in ISO 16890-2. After the initial particulate removal efficiency testing, the air filter element is conditioned according to the procedures defined in this document and the particulate removal efficiency is repeated on the conditioned filter element. This is done to provide information about the intensity of