ICS 91.140.30 PREDBEŽNÁ SLOVENSKÁ TECHNICKÁ NORMA August 2019

STN P	**Skúšobná metóda na meranie účinnosti filtračných médií na sférický nanomateriál Časť 2: Častice veľkosti od 3 nm do 30 nm (ISO/TS 21083-2: 2019)**	**STN P CEN ISO/TS 21083-2** 12 5004

Test method to measure the efficiency of air filtration media against spherical nanomaterials - Part 2: Size range from 3 nm to 30 nm (ISO/TS 21083-2:2019)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/19

Táto predbežná STN je určená na overenie. Pripomienky zasielajte ÚNMS SR najneskôr do marca 2021.

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TECHNICAL SPECIFICATION

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CEN ISO/TS 21083-2

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ICS 91.140.30

English Version

Test method to measure the efficiency of air filtration media against spherical nanomaterials - Part 2: Size range from 3 nm to 30 nm (ISO/TS 21083-2:2019)

Méthode d'essai pour mesurer l'efficacité des médias de filtration d'air par rapport aux nanomatériaux sphériques - Partie 2: Spectre granulométrique de 3 nm à 30 nm (ISO/TS 21083-2:2019)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (CEN ISO/TS 21083-2:2019) has been prepared by Technical Committee ISO/TC 142 "Cleaning equipment for air and other gases" in collaboration with Technical Committee CEN/TC 195 “Air filters for general air cleaning” the secretariat of which is held by UNI.

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Endorsement notice

The text of ISO/TS 21083-2:2019 has been approved by CEN as CEN ISO/TS 21083-2:2019 without any modification.

TECHNICAL SPECIFICATION

ISO/TS 21083-2

First edition
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Test method to measure the efficiency of air filtration media against spherical nanomaterials —

Part 2: Size range from 3 nm to 30 nm

Méthode d'essai pour mesurer l'efficacité des médias de filtration d'air par rapport aux nanomatériaux sphériques —

Partie 2: Spectre granulométrique de 3 nm à 30 nm

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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.

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

A list of all parts in the ISO 21083 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

Nano-objects are discrete piece of material with one, two or three external dimensions in the nanoscale (see ISO/TS 80004-2) and are building blocks of nanomaterials. Nanoparticles, referring to particles with at least one dimension below 100 nm, generally have a higher mobility than larger particles. Because of their higher mobility and larger specific surface area, available for surface chemical reactions, they can pose a more serious health risk than larger particles. Thus, particulate air pollution with large concentrations of nanoparticles can result in an increased adverse effect on human health and an increased mortality (see Reference [15]).

With the increased focus on nanomaterials and nanoparticles, the filtration of airborne nanoparticles is also subject to growing attention. Aerosol filtration can be used in diverse applications, such as air pollution control, emission reduction, respiratory protection for human and processing of hazardous materials. The filter efficiency can be determined by measuring the testing particle concentrations upstream and downstream of the filter. The particle concentration may be based on mass, surface area or number. Among these, the number concentration is the most sensitive parameter for nanoparticles measurement. State-of-the-art instruments enable accurate measurement of the particle number concentration in air and therefore precise fractional filtration efficiency. Understanding filtration efficiency for nanoparticles is crucial in schemes to remove nanoparticles, and thus, in a wider context, improve the general quality of the environment, including the working environment.

Filtration testing for nanoparticles, especially those down to single-digit nanometres, is a challenging task which necessitates generation of a large amount of extremely small particles, and accurate sizing and quantification of such particles. The thermal rebound remains a question for particles down to 1 nm to 2 nm (see Reference [11]). The accuracy of particle size classification is complicated by very strong diffusion of particles below 10 nm (see References [7] and [8]). The state-of-the-art commercial condensation particle counters for general purposes can detect particles down to 1 nm to 2 nm.

A large number of standards for testing air filters exist such as the ISO 29463 and ISO 16890 series. The test particle range in the ISO 29463 series is between 0,04 µm and 0,8 µm, and the focus is on measurement of the minimum efficiency at the most penetrating particle size (MPPS). The test particle range in the ISO 16890 series is between 0,3 µm and 10 µm. The ISO 21083 series aims to standardize the methods of determining the efficiencies of filter media, of all classes, used in most common air filtration products and it focuses on filtration efficiency of airborne nanoparticles, especially for particle size down to single-digit nanometres.

Advances in aerosol instruments and studies on nanoparticle filtration in the recent years provide a solid base for development of a test method to determine effectiveness of filtration media against airborne nanoparticles down to 3 nm range.

Test method to measure the efficiency of air filtration media against spherical nanomaterials —

Part 2:
Size range from 3 nm to 30 nm

1 Scope

This document specifies the testing instruments and procedure for determining the filtration efficiencies of flat sheet filter media against airborne nanoparticles in the range of 3 nm to 30 nm. The testing methods in this document are limited to spherical or nearly-spherical particles to avoid uncertainties due to the particle shape.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 5167 (all parts), *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full*

ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

ISO 15900, *Determination of particle size distribution — Differential electrical mobility analysis for aerosol particles*

ISO 27891, *Aerosol particle number concentration — Calibration of condensation particle counters*

ISO 29464, *Cleaning of air and other gases — Terminology*

