
**Nanotechnologies — Air filter media
containing polymeric nanofibres —
Specification of characteristics and
measurement methods**



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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.

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 229, *Nanotechnologies*.

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

Air filter media play an important role in the performance and efficiency of different types of air filters. In this respect, most air filter media take advantage of nonwovens to separate solid or liquid particles. Air filter media have a wide range of applications such as gas turbine inlet air, industrial dust collectors, respiratory masks, personal protective equipment, heating, ventilation and air conditioning systems, cleanrooms, etc.

In recent years, air filter media containing nanofibres have been commercialized and widely used by different industries due to their high filtration efficiency along with a low pressure drop created by the slip flow effect^[6]. Air filter media containing nanofibres are normally produced by depositing one or more types of polymer-based nanofibres directly on the surface of a suitable porous substrate during spinning.

Since the diameter of nanofibres is significantly smaller than that of conventional microfibres employed in filters, it offers a higher chance of inertial impaction and interception, i.e. a more optimum filtration efficiency. The slip flow also results in a reduced pressure drop and more contaminants passing near the surface of the nanofibres. Hence, the inertial impaction and interception efficiencies rise. As a result, the filtration capability of the nanofibres layer increases for the same pressure drop as compared with a conventional fibre layer. Additionally, the very high surface area of nanofibres facilitates the adsorption of contaminants from the air. All these desirable features have led to a wide range of air filter media containing nanofibres being used for air filtration applications^{[6][7][8]}.

Different techniques such as electrospinning, force spinning and other methods have been used to produce air filter media containing nanofibres. The deposited nanofibres form a web-like nonwoven layer on the surface of the substrate. Nanofibres can exhibit different crystalline structures, morphology and diameter. The surface area and crossed-fibres porosity of the formed nonwoven layer is mainly affected by the nanofibre diameter as well as the morphology. Polymeric nanofibres such as polyamide, polyvinylidene fluoride (PVDF), polyacrylonitrile (PAN) and polyurethane (PU) are normally used for air filter media. Nanofibres can be deposited on different kinds of woven and nonwoven substrates. [Annex A](#) shows a schematic of the cross-section of an air filter medium (see [Figure A.1](#)) and SEM images relating to the morphology of the nanofibres (see [Figures A.2](#) and [A.3](#)).

This document facilitates the communication between sellers and buyers and supports the growing trade of this new class of air filter media.

Nanotechnologies — Air filter media containing polymeric nanofibres — Specification of characteristics and measurement methods

1 Scope

This document specifies the characteristics to be measured of air filter media containing polymeric nanofibres on the surfaces of a substrate. It also describes measurement methods for determining the individual characteristics.

This document does not cover characteristics specific for health and safety issues.

NOTE The properties/performance assessment of air filter media related to applications requires the use of relevant published standards. The physical properties and performances of filtration media, such as pressure drop, and the particle removal efficiency of air filter media are measured with test methods suitable for specific applications.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

air filter filter

device for separating solid or liquid *particles* (3.6) or gaseous contaminant from an air stream passing through the device

Note 1 to entry: The device is generally formed of a layer or layers of porous, fibrous or granular material.

Note 2 to entry: Air being cleaned by a filter must pass through the filter, whereas an air cleaner can reduce air contamination by any method.

[SOURCE: ISO 29464:2017, 3.1.16, modified — The preferred term has been changed to “air filter”.]

3.2

air filter medium

porous permeable material employed in *filtration* (3.3) within which the filtrate is trapped or deposited

Note 1 to entry: The filter medium is composed of a *nanofibre* (3.5) layer(s) and *substrate* (3.7).

[SOURCE: ISO 9912-1:2004, 2.27, modified — “air” has been added to the term and Note 1 to entry has been added.]