INTERNATIONAL STANDARD

ISO 16000-34

First edition
2018-08

Indoor air —

Part 34:
Strategies for the measurement of airborne particles

Air intérieur —

Partie 34: Stratégie pour la mesure des particules en suspension

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288ebe0db/iso-16000-34-2018

Reference number
ISO 16000-34:2018(E)

© ISO 2018

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288ebe0db/iso-16000-34-2018

COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ecc-8855-f89288c8e0db/iso-16000-34-2018

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a51-8b09-4ccc-8855-f85288ebe0db/iso-16000-34-2018

 © ISO 2018 – All rights reserved

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 6, *Indoor air*.

ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288eba0db/iso-16000-34-2018

A list of all parts in the ISO 16000 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.

© ISO 2018 – All rights reserved

Introduction

Airborne particulate matter (colloquially known as "fine dust") plays a role not only outdoors, but is also significant in terms of hygiene, especially indoors. People in industrialized countries spend most of the day indoors. Particles are either transported into indoor air from outdoor environments or the particles directly result from indoor sources, such as smoking, housework and do-it-yourself (DIY), burning candles, residential wood burning, cooking and using printers. The concentration, composition and size distribution of airborne particulate matter in indoor environments strongly depend on parameters such as the sources present in the room, room size, relative humidity, air exchange rate, air flow conditions and sink effects on surfaces (e.g. walls, ceilings, floor coverings, soft furnishings). In addition, particles already deposited can be re-entrained through various activities and subsequently inhaled. Depending on the particular case, all this can result in highly variable levels of indoor fine dust pollution that are not easily ascertained or assessed in terms of their impact on health.

In the ISO 16000 series, the following rooms are understood to constitute indoor spaces: dwellings with living rooms, bedrooms, work rooms, sport rooms, cellars, kitchens and bathrooms; work spaces or workstations in buildings not subject to controls under industrial safety legislation in terms of airborne pollution (e.g. offices, shops); public buildings (e.g. restaurants, theatres, cinemas, other function rooms); and the passenger compartments of vehicles and all public transport systems (e.g. buses, trains, aircraft).

Epidemiological and toxicological findings suggest that health effects are more strongly related to sub-micron particles[33]. Indeed, ultrafine particles (UFP), due to their small size, can deeply penetrate into the body and contribute to adverse health effects.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This document describes the general strategies for the measurement of airborne particles, including PM_{10}, $PM_{2,5}$, PM_1 and UFP. The different technologies available equipment are presented and compared in a way that allows the user to select the best technique depending on the monitoring objective. Sampling requirements are presented together with key factors that users should take into account.

ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288ebe0db/iso-16000-34-2018

 © ISO 2018 – All rights reserved

Indoor air —

Part 34:
Strategies for the measurement of airborne particles

1 Scope

This document specifies the general strategies for determining the concentration of airborne particles indoors and covers the size range from approximately 1 nm to 100 µm.

In addition, this document describes methods for identifying typical indoor particle sources and gives general recommendations for obtaining a representative sample.

The main sources of indoor particulate matter are described in this document, together with indoor particle dynamics. Various measurement methods are described, along with their advantages, disadvantages and areas of application, as well as some general sampling recommendations. Measurement strategies for determining airborne particles indoors are discussed, including reference case studies with more specific sampling recommendations.

Additional documents in the ISO 16000 series will focus on each fraction of airborne particulate matter and give specific recommendations for these measurements.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

The determination of measurement uncertainty and minimum reporting requirements are also part of this document.

ISO 16000-34:2018

This document does not apply to the determination of bioaerosols or the chemical characterization of particles. For the measurement and assessment of dust composition, see the relevant part in the ISO 16000 series.

This document does not apply to the measurement of airborne particles in vehicle passenger compartments and public transport systems.

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 16000-1:2004, *Indoor air — Part 1: General aspects of sampling strategy*

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/

© ISO 2018 – All rights reserved

3.1
particle
small discrete mass of solid or liquid matter

[SOURCE: ISO 29464:2017, 3.2.111]

3.2
aerosol
suspension in a gaseous medium of solid *particles* (3.1), liquid particles or solid and liquid particles having a negligible falling velocity

[SOURCE: ISO 23210:2009, 3.1.9]

3.3
equivalent diameter
diameter of a spherical *particle* (3.1) which will impart geometric, optical, electrical or aerodynamic behaviour identical to that of the particle being examined

Note 1 to entry: Depending on the measurement method applied, various equivalent diameters could be defined for the same particle. These different diameters are only indirectly comparable since different particle properties are being measured, e.g. geometric diameter, diameter according to dielectric mobility, diameter according to light scattering properties. Nevertheless, the generic term “particle diameter” is often used for all of them.

[SOURCE: ISO 4225:1994, 3.35, modified — Note 1 to entry has been added.]

3.4
aerodynamic diameter
diameter of a sphere of density 1 g cm^{-3} with the same terminal velocity due to gravitational force in calm air as the *particle* (3.1), under the prevailing conditions of temperature, pressure and relative humidity

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288ebe0db/iso-16000-34-2018

Note 1 to entry: The aerodynamic diameter is calculated using the formula:

$$D_a = D_p \sqrt{\frac{1}{\chi}} \sqrt{\frac{\rho_p}{\rho_o}}$$

where

D_a is the aerodynamic diameter;

D_p is the particle diameter;

ρ_p is the density of the particle;

ρ_0 is the standard density;

χ is the form factor.

Note 2 to entry: The form factor describes by how much the resisting force of an irregularly shaped particle is greater than that of a sphere with the same volume[26].

Note 3 to entry: The aerodynamic diameter determines the sedimentation and the separation properties of particles in impactors. It is also of particular importance for penetrative behaviour and the retention of particles in the human body.

[SOURCE: ISO 7708:1995, 2.2, modified — “particle” has been removed from the term and Note 1 to entry has been replaced by Notes 1 to 3 to entry.]

© ISO 2018 – All rights reserved

3.5
fine dust
fraction of airborne *particles* (3.1) with an *aerodynamic diameter* (3.4) below 10 µm

[SOURCE: EN 15445:2008, 3.5]

3.6
coarse mode particle
particle (3.1) larger than 2,5 µm in diameter

Note 1 to entry: Coarse mode particles are formed by mechanical abrasion and the swirl-up of sediment and floor dust.

3.7
fine mode particle
particle (3.1) with a diameter below 2,5 µm

Note 1 to entry: Fine mode particles are formed primarily from gases or secondarily through nucleation and condensation.

3.8
ultrafine particle
UFP
particle (3.1) with a diameter of 100 nm or less

[SOURCE: ISO/TR 19601:2017, 3.34, modified — The definition has been shortened and Note 1 to entry has been deleted.]

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.9
cut-off diameter
aerodynamic diameter (3.4) at which the impactor stage has a separation efficiency of 50 %

ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288ebe0db/iso-16000-34-2018

[SOURCE: ISO 23210:2009, 3.1.2, modified — The definition has been changed from "where the separation efficiency of the impactor stage is 50 %".]

3.10
$PM_{2,5}$
fraction of the airborne *particles* (3.1) that passes a size-selective sampling head with a separation efficiency of 50 % with an *aerodynamic diameter* (3.4) of 2,5 µm

[SOURCE: EN 12341:2014, 3.1.14]

3.11
PM_{10}
fraction of the airborne *particles* (3.1) that passes a size-selective sampling head with a separation efficiency of 50 % with an *aerodynamic diameter* (3.4) of 10 µm

[SOURCE: EN 12341:2014, 3.1.14]

3.12
mass concentration
c
ratio of the mass *m* of the measured component and the gas volume *V*, as shown by:

$$c = \frac{m}{V}$$

[SOURCE: EN 15259:2007, 3.26]

3.13
number concentration
number of *particles* (3.1) per volume element of carrier gas (air)

© ISO 2018 – All rights reserved

3.14
lung-deposited surface area
LDSA
particle (3.1) surface area concentration per unit volume of air, weighted by the deposition probability in the lung

Note 1 to entry: Due to lung deposition efficiency during inhalation, only a fraction of the particles will effectively deposit in the human lung. LDSA is thus strongly related to the potential particles health impact.

[SOURCE: Reference [22], modified — Note 1 to entry has been added.]

3.15
particle volume concentration
total volume of all dispersed *particles* (3.1) per unit volume of the carrier gas

4 Origin, properties and health implications of airborne particles

4.1 Origin and properties

Airborne solid and liquid particles (e.g. in the form of dust, smoke, mist and fog) have always been a component of the atmosphere. Together they are referred to as aerosol. Natural sources that contribute to the release of primary particles into the air include oceans, deserts, plants, volcanic eruptions, erosion and fire. In addition, atmospheric photochemistry involving biogenic volatile organic compounds (known as precursor gases, such as isoprene and monoterpenes) leads to the generation of secondary particles. Since the industrial revolution, in particular, primary or secondary anthropogenic particles have been making up a growing proportion of the atmospheric particle spectrum. Large amounts of carbon dioxide, carbon monoxide, nitrogen oxides, sulfur dioxide, organic and elementary carbon, plus other gaseous and particulate substances, reach the troposphere via industrial processes and the combustion of fossil oil products, black coal, brown coal and biomass. According to the World Health Organization (WHO), particular sources of high concentrations of anthropogenic airborne particles include combustion processes and photochemical reactions from anthropogenic precursor gases.[40] Abrasion and re-entrainment processes (e.g. those involving bulk freight, industry, agriculture, the construction industry) can also contribute to fine dust pollution, especially with the coarse mode fraction.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 16000-34:2018

The interaction between natural and anthropogenic aerosols from local, regional and remote sources results in ambient aerosol, in which composition undergoes pronounced spatial and temporal fluctuations. In towns, ambient aerosol is often referred to as urban aerosol.

Ambient aerosol is made up of various particle sizes, i.e. ultrafine, fine and coarse particles. The chemical composition can vary greatly, depending on the source and transport conditions.[35] Elevated concentrations are measured in the vicinity of industrial facilities. Particles with a diameter less than 50 nm are essentially composed of low-volatility organic compounds.

The dynamic behaviour of an aerosol always depends on the properties of the aerosol particles themselves and on those of the surrounding medium, including potential sinks. This is a dynamic system, subject to constant changes caused by various physical and chemical processes, which are also characteristic of different size fractions of the total aerosol. Nucleation gives rise to particles with diameters of a few nanometres (nucleation mode). Condensation and coagulation result in further growth processes taking place (accumulation mode). Abrasion and re-entrainment processes generate in particular particles in the coarse mode (see ISO 4225 and ISO 16000-37).

Airborne particles are thus a cluster of various pollutant species with high variation in shape, size, chemical composition and physical properties.

4.2 Health implications

Based on epidemiological studies, it has been assumed for many years that fine dust pollution of the ambient air can cause health problems, without relevant threshold values having been found thus

© ISO 2018 – All rights reserved

far, see ISO 20988. In general, a linear dose-effect relationship is assumed. With the EU Air Quality Directive (1999/30/EC) that came into force in 2005, this issue has become a focus of attention for the wider public. This Directive envisages limits for the daily and annual means of PM_{10} in ambient air. For the $PM_{2,5}$ fraction, the amendment of this Directive (2008/50/EC) specifies an annual mean of 25 µg m^{-3} as a target value from 2010 and as a limit from 2015, and which from 2020 is to be lowered to 20 µg m^{-3}. The PM_{10} limits remain unchanged in the 2008 revision of this Directive (24 h mean: 50 µg m^{-3}, which may be exceeded 35 times per year; annual mean: 40 µg m^{-3}). The limit set by the EU Air Quality Directive for PM_{10} represents, in terms of type, level and measurement strategy, a convention for limiting the health risks caused by fine dust in the ambient air.

In principle, the global interim and target values proposed by WHO in 2006 for fine dust in ambient air can also be used for indoor situations.[40] However, this WHO proposal relates primarily to particles emitted by combustion sources; these are mostly particles belonging to the $PM_{2,5}$ fraction.

Epidemiological studies show that high concentrations of fine dust in the ambient air are associated with health consequences, such as damage to the cardiovascular system and the respiratory tract, and with increased morbidity and mortality.[21] A summarizing analysis of European time-series and panel studies on the effects of particles from the ambient air, carried out in 2004 for WHO, demonstrated statistically significant elevated risk associated with total mortality, mortality caused by respiratory tract and cardiovascular diseases in all age groups and hospital admissions of elderly patients.[16] Accordingly, limits have been developed for ambient air concentration of fine dust. Compared with the number of studies that describe the effect of ambient air aerosols on human health, so far there exist few studies dealing with indoor air[23].

For fine dust indoors, WHO recommends that levels should be minimized. An assessment in terms of health is currently difficult.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Considering these aspects, the following statements on the health implications of fine dust in indoor air can be made.

ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f85288ebe0db/iso-16000-34-2018

— Neither the particulate matter limits of the EU Directive 1999/30/EC, nor the annual or daily means for particulate matter in the ambient air proposed by WHO[40], can be used as assessment values for indoor air.

— In the absence of specific internal dust sources, the concentrations of $PM_{2,5}$ inside dwellings are principally due to fine dust from ambient air and resuspension.[38] It seems reasonable, therefore, to use the $PM_{2,5}$ daily mean derived by WHO for dwellings without specific internal sources for guidance.

— In other indoor spaces, such as kitchens, basements, rooms where handicraft activities and hobbies are pursued or community facilities (e.g. office, school, retail centres, medical centres) with specific internal sources (e.g. combustion sources, printing facilities, chemical products), the aforementioned WHO evaluation standard cannot be extended meaningfully.

— The current absence of suitable evaluation standards applicable to all indoor spaces and all particle sizes does not mean that fine dust in indoor air shall be rated as “harmless to health”. Provided no valid assessment in the form of guide or limit values is possible, the conventional procedures for improving indoor air quality shall be implemented on precautionary grounds. In many cases, suitable ventilation procedures shall also contribute to alleviating the problem of fine dust.

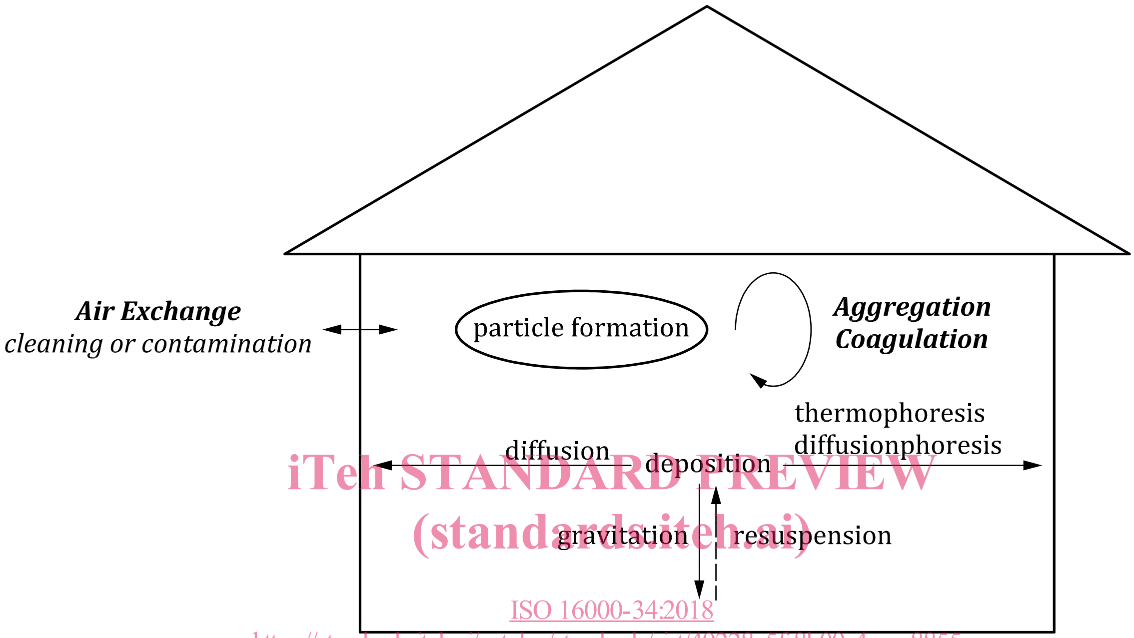
When considering the health implications of indoor particle pollution, not only particle size but also particle chemical composition and morphology shall be taken into account. This document does not discuss the determination of these parameters.

© ISO 2018 – All rights reserved

5 Sources of indoor particulate matter and particle dynamics indoors

5.1 General

Fine dust concentrations indoors can originate from continuous (e.g. ambient air, heating) and from intermittent (e.g. cooking, smoking, burning candles, printers) sources. As a result of these different source locations and dynamics, the size distribution and composition of indoor particles vary markedly. The processes mentioned below are of special importance. All processes together induce and determine the dynamics of the indoor particle spectrum[29] (see Figure 1).



iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288ebe0db/iso-16000-34-2018

Figure 1 — Particle formation and particle dynamics indoors

5.2 Sources of indoor particulate matter

5.2.1 Typical indoor sources

The major particle sources in indoor environments are as follows.

— Infiltration of outdoor aerosol through windows, doors and the building envelope. In the case of high levels of air exchange, the likelihood of particles from the ambient air entering the building is very high; it drops with decreasing air exchange.[30] The presence of an air-conditioner and related air-filtration system has a huge impact. The fraction of the ambient aerosol found indoors (even with closed windows) depends on particle size, and is highest for particles around 0,3 µm[23].

— Combustion processes, such as smoking, burning candles, open fires, fireplaces and incense sticks.

— Activities, such as cooking, cleaning, hobbies, DIY activities, textile abrasion, and using household and office appliances.

— Humans and domestic animals (skin flakes and hair particles), microorganisms (moulds, bacteria, cell fragments, etc.), pollen and other allergens.

— Particle reformation through physicochemical reactions of volatile organic compounds (VOC), e.g. ozone-terpene reaction.

— Resuspension of deposited particles. Various activities may cause the re-suspension of particles from room surfaces.

 © ISO 2018 – All rights reserved

5.2.2 Influence of the premises

The indoor sources of particulate matter are diverse. If the premises are in use, the indoor aerosol is often affected by indoor sources, which may be located either in the investigated room itself or in adjacent rooms. A non-exhaustive list of case studies is given in the Bibliography, see References [42] to [77], which can be a good source of inspiration for users, depending on the intended purpose. Typical sources found in different types of premises and which should be taken into consideration are listed below.

a) The typical sources in living rooms include:

   1) cooking, heating, smoking, candles, fireplaces and fragrant oil burners;

   2) body care and cleaning materials (e.g. sprays);

   3) electric appliances (e.g. refrigerators, vacuum cleaners);

   4) people and domestic animals;

   5) abrasion of textiles and textile floor coverings.

b) The typical sources in an office include:

   1) office machines (e.g. printers, copiers, computers);

   2) air-conditioning units;

   3) people;

   4) external inputs (e.g. smoking, adjoining manufacturing premises);

   5) abrasion of textiles and textile floor coverings.

c) The typical sources in kindergartens and schools include:

   1) human and external inputs brought in with clothing (e.g. animal hairs);

   2) activities (e.g. cooking, art, crafts);

   3) electric appliances (e.g. printers, copiers, computers);

   4) soft furnishings;

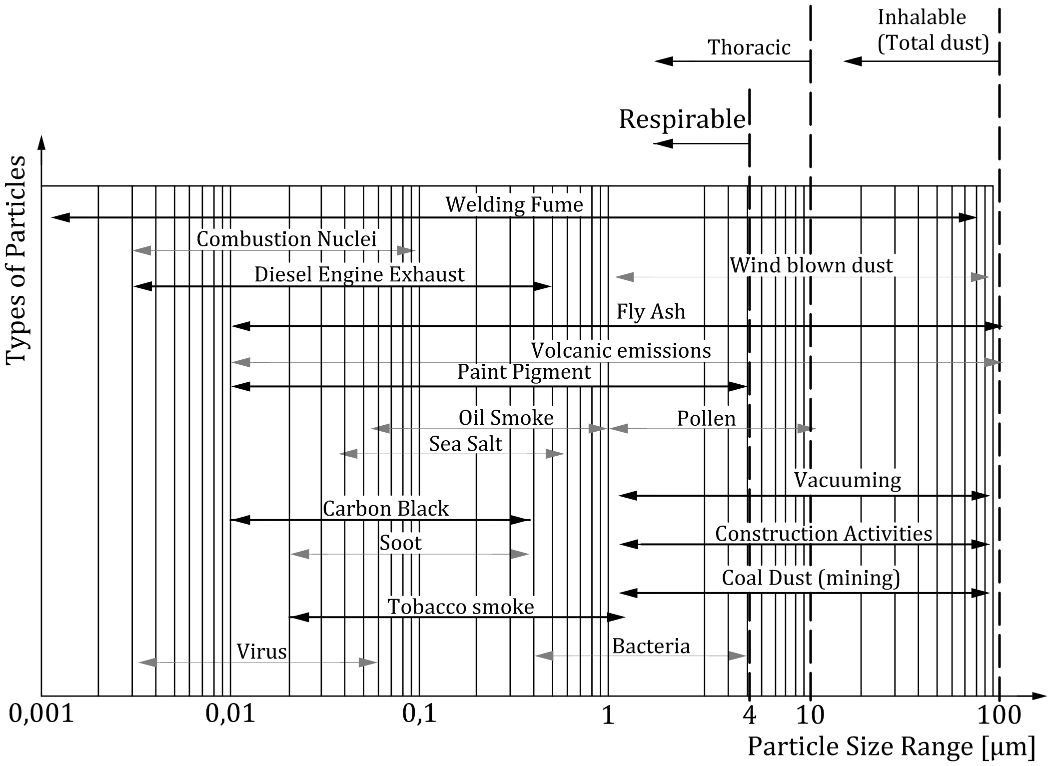
   5) air-conditioning units where relevant.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288ebe0db/iso-16000-34-2018

5.2.3 Particle size range generated by typical sources

Indoor airborne particles cover a large size range from a few nanometres up to 100 µm. Particle size is deeply influenced by origin, but also by chemical or physical reaction following generation. A non-exhaustive list of typical sources of indoor airborne particles with their typical size ranges is presented in Figure 2.

© ISO 2018 – All rights reserved



iTeh STANDARD PREVIEW

Figure 2 — Typical sources of airborne particles and size ranges

(standards.iteh.ai)
ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/40228a5f-8b09-4cec-8855-
f83288cbe0db/iso-16000-34-2018

The calculated concentration depends on many factors, such as the intensity of the source, the type, nature, intensity and frequency of use, the distance between the source and the measuring equipment and on specific properties of the room, especially the ventilation rate. Therefore, it is difficult to give empirical ranges of possible concentration values through indoor air measurements of residential premises. Drawing conclusions about hygiene risks associated with the measured particle numbers and mass concentrations is also difficult and should only be done if all parameters have been taken into account. There are several sources dealing with specific activities or specific investigation purposes and some examples are listed in References [42] to [77]. Values obtained during these studies can help experts and/or measuring institutes during future fine dust measurements to select the effective range of the measurement method correctly.

5.3 Particle dynamics indoors

5.3.1 Major particle sinks

Particles that are around 0,1 µm in diameter have the lowest deposition rates on indoor surfaces, whereas smaller and especially larger particles have significantly higher deposition rates. This process depends greatly on, for example, air movements in the room, the room's furnishings and the nature of the surfaces.[37] It is important to distinguish between the processes of sedimentation, impaction and diffusion.[39] These processes decrease the number, mass, volume and surface area concentration.

Building design and construction, as well as climatic conditions, can result in a decrease in the concentration of particles in indoor air through their deposition on surfaces (the sink effect). The cause for this lies in dynamic aerosol processes referred to as thermophoresis, electrophoresis[30], diffusion, dilution, filtration, coagulation, ventilation, deposition, resuspension and others[30].

5.3.2 Variations of the particle spectrum

Physical and chemical reaction after particle emission for their source will occur and have a large impact on the particle size. The accretion of smaller particles on the surfaces of larger ones and the

© ISO 2018 – All rights reserved

coalescing of smaller particles into larger ones (coagulation) can decrease the number concentration without changing the total mass concentration. If such growth processes create particles above the cut-off diameter of the mass fraction being measured (e.g. in the case of $PM_{2,5}$, particles larger than 2,5 µm), this also leads to a decrease in the mass concentration of this fraction. The accretion of low-volatility compounds on particles does not change the number concentration.

In addition, secondary particle formation from precursor gases is observed. Thus, the particle spectrum is influenced by the distance between the source and the measuring, and also by the presence of other sources in the room due to cross reaction between the different emitted compounds.

5.3.3 Effect of air conditioning

Air-conditioning units affect indoor particle concentration and dynamics, for example, via the air duct, filtration, flow and exit speed of the air. Improperly installed and maintained systems can lead to elevated particle input to the room.

5.3.4 Conditions of room use

The indoor fine dust inputs, which are mostly intermittent and usage-dependent, can be divided into two groups. On the one hand, they include concretely classifiable sources resulting from the use of individual appliances or furnishings. On the other hand, there are diffuse sources caused by the users themselves. Typically, these include fine dust brought in by humans/users and their clothing. The sum of these sources determines the fine dust concentration in the air measured at a particular time.

The sources and their highly variable inputs to the fine dust concentration in the indoor air do not allow a consistent specification of the measurement conditions. The measurement procedure, therefore, should be derived and justified based on the task and situation. This justification shall be recorded in the test report, together with the chosen measurement and sampling conditions (as described in ISO 16000-1:2004, Clause 4). Other parameters, e.g. those relating to ventilation, should be taken into consideration. No standard scenario can be defined.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 16000-34:2018
https://standards.iteh.ai/catalog/standards/sist/49228a5f-8b09-4ccc-8855-f83288ebe0db/iso-16000-34-2018

6 Measurement methods for airborne particles indoors

6.1 General

A variety of complementary measurement methods are available for measuring airborne particles indoors[22][23].

Using the various methods, the following measured variables are determined, either as integral or as size-resolved quantities:

— particle mass concentration;

— particle number concentration;

— particle surface area concentration;

— particle lung-deposited surface area (LDSA) concentration;

— particle volume concentration.

These variables are either measured directly or calculated from the measured values. In the latter case (e.g. when calculating surface area concentration from the number concentration for the various particle size fractions), it is necessary to check whether the calculation method used is plausible for the intended task.

NOTE Estimating the mass concentration from the number concentration is possible only if the spatial particle size distribution and the density of the particles are known (see Clause 7). The same is true for conversions for other quantities (surface area, volume, etc.).

© ISO 2018 – All rights reserved