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Cleaning of air and other gases — Terminology

Épuration de l'air et autres gaz — Terminologie

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Foreword

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This document was prepared by Technical Committee ISO/TC 142, *Cleaning equipment for air and other gases*.

This second edition of ISO 29464 cancels and replaces the first edition (ISO 29464:2011), which has been technically revised.

Cleaning of air and other gases — Terminology

1 Scope

This document establishes a terminology for the air filtration industry and comprises terms and definitions only.

This document is applicable to particulate and gas phase air filters and air cleaners used for the general ventilation of inhabited enclosed spaces. It is also applicable to air inlet filters for static or seaborne rotary machines and UV-C germicidal devices.

It is not applicable to cabin filters for road vehicles or air inlet filters for mobile internal combustion engines for which separate arrangements exist. Dust separators for the purpose of air pollution control are also excluded.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1 General, applicable to both particulate and gas-phase air cleaners

3.1.1
air cleaner
device intended to remove *contaminants* (3.1.8) from air in a ventilation system or enclosed space

3.1.2
air velocity
rate of air movement

Note 1 to entry: It is expressed in m/s (fpm) to three significant figures.

3.1.3
bypass
air filter bypass
sneakage
proportion of the *challenge air stream* (3.5.13) that passes around an *air cleaner* (3.1.1) without interacting with the air cleaner

3.1.4
calibrate
to compare readings from the instrument to be calibrated with those from a reference device

3.1.5
capture
extraction of particles, liquid particles or gases, close to their sources for purposes of collection or sampling

3.1.6
classification
allocation of filters into groups and classes according to relevant aspects of their filtration performance

3.1.7
concentration
quantity of one substance dispersed in a defined amount of another

3.1.8
contaminant
pollutant
substance (solid, liquid or gas) that negatively affects the intended use of a fluid

3.1.9
contamination
pollution
presence of a substance that negatively affects the intended use of a fluid

3.1.10
decontamination factor
ratio of the *contaminant* (3.1.8) concentration or particle number upstream of the test device to the contaminant *concentration* (3.1.7) or particle number downstream of the device

Note 1 to entry: The decontamination factor can also be expressed as 1/(1 – overall efficiency) or as 1/penetration.

3.1.11
downstream
area or region into which fluid flows on leaving the test device

3.1.12
efficiency
filter efficiency
fraction or percentage of a challenge *contaminant* (3.1.8) that is removed by a test device

3.1.13
average efficiency
value of efficiency which results from averaging the efficiencies determined over a number of discreet intervals up to the final pressure differential

3.1.14
effluent
fluid discharged from a given source into the external environment

Note 1 to entry: This is a general term describing any fluid discharged from a given source; in this context, the discharged fluid may be liquid or gaseous and may contain associated liquid and/or particulate *contaminants* (3.1.8).

3.1.15
face velocity
filter face velocity
volumetric air flow rate divided by the *nominal filter face area* (3.1.18)

Note 1 to entry: filter face velocity is expressed in m/s.

3.1.16
filter
air filter
device for separating solid or liquid particles or gaseous *contaminant* (3.1.8) 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* (3.1.1) can reduce air *contamination* (3.1.9) by any method.

3.1.17
filter face area
cross-sectional face area of the filter including the header frame when viewed from the direction of air flow using exact dimensions

3.1.18
nominal filter face area
cross-sectional face area of the filter including the header frame when viewed from the direction of air flow using nominal dimensions

3.1.19
filter insert
replaceable part of a filter which contains the filter medium but which can only operate mounted inside a frame

3.1.20
filter medium
material separating *particulate matter* (3.2.139) from gases and characterized by its separating structure and its structural and/or textile-technological characteristics

3.1.21
filter medium area
area of *filter medium* (3.1.20) contained in the filter

Note 1 to entry: For filters with pleats or folds, the filter medium area may be much larger than the *filter face area* (3.1.17).

3.1.22
effective filter medium area
effective filtering area
exposed filter area
area of the *filter medium* (3.1.20) contained in the filter through which air passes during operation

Note 1 to entry: This excludes areas covered by sealant, spacers, struts, etc.

Note 2 to entry: Effective filter medium area is expressed in m^2.

3.1.23
filter medium velocity
media velocity
medium velocity
volumetric air flow rate divided by the *effective filter medium area* (3.1.22) of the *filter element* (3.2.77)

Note 1 to entry: Filter medium velocity is expressed in m/s.

Note 2 to entry: In devices where the filter medium surface area has been increased by use of pleats, folds or bags, the filter medium velocity may be much less than the *filter face velocity* (3.1.15).

3.1.24
flow rate
air flow rate
volume of air flowing through the filter per unit time

3.1.25
nominal flow rate
nominal air flow rate
air flow rate specified by the manufacturer

3.1.26
air flow rate, test
test air flow rate
test flow
test flow rate
test volume flow rate
air flow rate used for testing

Note 1 to entry: The flow rate is usually expressed in volumetric units (m^3/s).

Note 2 to entry: Test flow rate may differ from the manufacturer's rated flow through the air cleaner.

3.1.27
rated flow
flow rate through a test device, either as stated by the manufacturer for defined conditions of use or as agreed between the interested parties for a particular installation

Note 1 to entry: The manufacturer's rated flow may differ from the *test air flow rate* (3.1.26).

3.1.28
gas

substance whose vapour pressure is greater than the *ambient pressure* (3.5.50) at ambient temperature

3.1.29
header frame
integral rigid frame of a filter enabling it to be fastened and sealed against the *holding frame* (3.1.30)

3.1.30
holding frame
rigid structural frame, part of an air handling system into which filters are fastened and sealed

3.1.31
housing
device used to hold filter

3.1.32
hood
inlet device for extraction system

3.1.33
leak
point in a filter at which the local penetration exceeds a given value

3.1.34
penetration
breakthrough
ratio of contaminant concentration downstream of the test device to the upstream (challenge) *concentration* (3.1.7)

Note 1 to entry: Sometimes expressed as a percentage.

Note 2 to entry: Penetration is related to efficiency (E) by the expression: $E = (1 - P) \times 100\ \%$.

Note 3 to entry: Penetration is related to the *decontamination factor* (DF) (3.1.10) by the expression: DF = 1/penetration.

3.1.35
reference device
primary device possessing accurately known parameters used as a standard for calibrating secondary devices

Note 1 to entry: Reference particle filters are laboratory tested for *removal efficiency by particle size* (3.2.149) and/or resistance to air flow.

3.1.36
resistance to air flow
differential pressure
pressure differential
pressure drop
difference in absolute (static) pressure between two points in a system

Note 1 to entry: Resistance to air flow is measured in Pa.

3.1.37
test air
air to be used for testing purposes

3.1.38
test device
filter element (3.2.77) being subjected to performance testing

3.1.39
upstream
area or region from which fluid flows as it enters the *test device* (3.1.38)

3.1.40
washer
dust separator (3.2.158), *droplet separator* (3.2.157) or *gas purifier* (3.5.38) that depends on a liquid acting as a collecting medium for its operation

3.2 Particulate filters (including general ventilation, HEPA and ULPA filters)

3.2.1
aerosol
system of solid or liquid particles suspended in gas

Note 1 to entry: In general, one divides the atmospheric aerosol into three size categories: the ultrafine range $x < 0{,}1$ µm, the fine range $0{,}1$ µm $\leq x < 1$ and the coarse range $x \geq 1$ µm, whereby x is the *particle diameter* (3.2.124).

3.2.2
liquid phase aerosol
liquid particles suspended in a gas

3.2.3
monodisperse aerosol
aerosol, the width of whose distribution function, described by the geometric standard deviation σg, is less than 1,15 µm

3.2.4
aerosol photometer
light-scattering airborne particle mass *concentration* (3.1.7) measuring apparatus, which uses a forward-scattering-light optical chamber to make measurements

3.2.5
polydisperse aerosol
aerosol, the width of whose distribution function, described by the geometric standard deviation σg, exceeds 1,5 µm

3.2.6
quasi-monodisperse aerosol
aerosol, the width of whose distribution function, described by the geometric standard deviation σg, is between 1,15 µm and 1,5 µm

3.2.7
reference aerosol
defined approved aerosol for test measurement within a specific size range

3.2.8
solid phase aerosol
solid particles suspended in a gas

3.2.9
test aerosol
aerosol used for determining performance of the device being tested and for calibrating particle measurement devices

3.2.10
agglomerate
collection of solid particles adhering to each other

3.2.11
agglomeration
action leading to the formation of *agglomerates* (3.2.10)

3.2.12
agglutination
action of joining, by *impact* (3.2.102), solid particles coated with a thin adhesive layer or of trapping solid particles by impact on a surface coated with adhesive

3.2.13
aggregate
relatively stable assembly of dry particles, formed under the influence of physical forces

3.2.14
arrestance
measure of the ability of a filter to remove a standard test dust from the air passing through it, under given operating conditions

Note 1 to entry: This measure is expressed as a weight percentage.

3.2.15
average arrestance
ratio of the total amount of loading dust retained by the filter to the total amount of dust fed up to final test pressure differential

3.2.16
average gravimetric arrestance
ratio of the total mass of a standard test dust retained by the filter to the total mass of dust fed up to final test pressure differential

3.2.17
gravimetric arrestance
measure of the ability of a filter to remove mass of a standard test dust from the air passing through it under given operating conditions

Note 1 to entry: This measure is expressed as a weight percentage.

3.2.18
initial arrestance
value of arrestance determined after the first loading cycle in a filter test

Note 1 to entry: For example, in ISO 29461-1 or ISO 16890-3 procedure.

Note 2 to entry: This measure is expressed as a weight percentage.

3.2.19
initial gravimetric arrestance
ratio of the mass of a standard test dust retained by the filter to the mass of dust fed after the first loading cycle in a filter test

Note 1 to entry: This measure is expressed as a weight percentage.

3.2.20
ash
solid residue of effectively complete combustion

3.2.21
fly ash
ash entrained by combustion gases

3.2.22
bioaerosol
particles of biological origin with an aerodynamic diameter of up to 100 µm suspended in a gaseous medium

Note 1 to entry: Bioaerosol particles include viruses, bacteria, fungi, pollen, plant debris, fragments of these and their derivatives such as endotoxins, glucans, allergens and mycotoxins.

3.2.23
burst pressure
value of differential pressure across a filter, above which damage/destruction of the *filter medium* (3.1.20) or the structure occurs

3.2.24
calibration particle
mono-disperse spherical particle with a known mean particle size, e.g. polystyrene latex (PSL) particle traceable to an international standard of length where the standard uncertainty of the mean particle size is equal to or less than ±2,5 %

Note 1 to entry: The refractive index of (PSL) calibration particles is close to 1,59 at a wavelength of 589 nm (sodium D line).

3.2.25
dust holding capacity
DHC
total weight of loading dust captured by the air-cleaning device up to the final pressure differential

3.2.26
test dust capacity
dust loading capacity
TDC
amount of a standard test dust held by the test device at the final test pressure differential

3.2.27
cleaning
<after clogging> removal of the deposit of solid or liquid particles which has produced clogging

3.2.28
clogging
deposition, progressive or otherwise, of solid or liquid particles on or within a *filter medium* (3.1.20), causing the flow to be obstructed

3.2.29
coagulation losses
particle losses due to collision and adhesion of particles

Note 1 to entry: Coagulation affects the measured particle parameters as follows: the *particle number concentration* (3.2.131) decreases, the particle mass *concentration* (3.1.7) remains the same and the *particle size* (3.2.133) increases.

3.2.30
coalescence
action by which liquid particles in *suspension* (3.2.162) unite to form larger particles

3.2.31
coefficient of variation
CV
standard deviation of a group of measurements divided by the mean

3.2.32
coincidence error
error which occurs because at a given time more than one particle is contained in the measurement volume of a particle counter

Note 1 to entry: The coincidence error leads to a measured number *concentration* (3.1.7) which is too low and a value for the *particle diameter* (3.2.124) which is too high.

3.2.33
correlation ratio
calculation of any potential bias between the upstream and downstream sampling systems

3.2.34
correlation ratio
<sampling points>downstream particle concentration divided by the upstream particle concentration (measured without filter)

3.2.35
counting efficiency
expression of that proportion of the particles of detectable size suspended in the volume flow under analysis that make their way through the measured volume and are counted by the particle counter

EXAMPLE The ratio of the *concentration* (3.1.7) measured to actual aerosol concentration.

Note 1 to entry: The counting efficiency depends on the *particle size* (3.2.133) and decreases progressively in the proximity of the lower detection limit of the particle counter.

3.2.36
counting rate
number of counting events per unit time

3.2.37
cyclone
dust separator (3.2.158) or *droplet separator* (3.2.157) utilizing essentially the centrifugal force derived from the motion of the gas

3.2.38
DiEthylHexylSebacate
DEHS
liquid used for generating the DEHS *test aerosol* (3.2.9)

3.2.39
equivalent diameter
diameter of a spherical particle which will give behaviour equivalent to that of the particle being examined

3.2.40
median diameter
diameter of the particle for which the cumulated volume fraction is equal to 50 % on a cumulated volume particle size distribution curve

3.2.41
count median diameter of aerosol
number median diameter of aerosol
CMD
50th percentile of the number distribution of the aerosol

Note 1 to entry: 50 % of the particles are smaller than the count median diameter and 50 % are larger than the count median diameter.

3.2.42
final differential pressure
differential pressure up to which the filtration performance is measured for *classification* (3.1.6) purposes

3.2.43
initial differential pressure
differential pressure of the clean filter operating at its *test air flow rate* (3.1.26)

3.2.44
mean differential pressure
arithmetical mean value of the measured number of differential pressures

3.2.45
recommended final differential pressure
maximum operating differential pressure of the filter as recommended by the manufacturer

3.2.46
diluter
dilution system
system for reducing the sampled *concentration* (3.1.7) to avoid coincidence error in the particle counter

3.2.47
dispersion
operation as a result of which solid particles or liquid particles are distributed in a fluid

Note 1 to entry: Also applied to a two-Phase System in which one phase, known as the “disperse phase”, is distributed throughout the other, known as the “continuous medium”. For example, Dioctyl phthalate (DOP) liquid or liquids with similar physical properties, are dispersed in air to generate a *test aerosol* (3.2.9).

3.2.48
D.O.P.
dispersed oil particulates

3.2.49
DOP
dioctyl phthalate