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Cleaning equipment for air and other gases — Terminology

Séparateurs aérauliques — Terminologie

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 29464 was prepared by Technical Committee ISO/TC 142, *Cleaning equipment for air and other gases*.

This first edition of ISO 29464 cancels and replaces ISO 3649:1980, which has been technically revised.

Cleaning equipment for air and other gases — Terminology

1 Scope

This International Standard establishes a terminology for the air filtration industry and comprises terms and definitions together with, in some cases, symbols and units.

This International Standard is applicable to both particulate and gas phase air filters and cleaners used for the general ventilation of inhabited enclosed spaces. Air inlet filters for static or seaborne rotary machines are included.

It does not apply 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

The following referenced documents are indispensable for the application 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 29463-1, *High-efficiency filters and filter media for removing particles in air — Part 1: Classification, performance testing and marking*

3 Terms and definitions

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

3.1 Particulate filters

3.1.1
aerosol
system of solid or liquid particles suspended in gas

NOTE In general, one divides the atmospheric aerosol into three size categories: the ultrafine range $x \leq 0{,}1$ µm, the fine range $0{,}1\ \mu m < x \leq 1\ \mu m$ and the coarse range $x > 1$ µm, whereby x is the particle diameter.

3.1.2
monodisperse aerosol
aerosol, the width of whose distribution function, described by the geometric standard deviation σg, is less than 1,15 µm

3.1.3
polydisperse aerosol
aerosol, the width of whose distribution function, described by the geometric standard deviation σg, exceeds 1,5 µm

3.1.4
quasi-monodisperse aerosol
aerosol, the width of whose distribution function, described by the geometric standard deviation σg, lies between 1,15 µm and 1,5 µm

3.1.5
test aerosol
aerosol used for determining filter performance and for calibrating particle measurement devices

3.1.6
agglomerate
collection of solid particles adhering to each other

3.1.7
agglomeration
action leading to the formation of agglomerates

3.1.8
agglutination
action of joining, by impact, solid particles coated with a thin adhesive layer or of trapping solid particles by impact on a surface coated with adhesive

3.1.9
aggregate
relatively stable assembly of dry particles, formed under the influence of physical forces

3.1.10
filter media area
A_{fm}
area of media contained in the filter

3.1.11
effective filter media area
area of the media contained in the filter (without adhesive spaces or ligament) and passed by air during operation

3.1.12
exposed filter area
A_{exp}
area of filter medium in a filter effective for particle capture

3.1.13
nominal filter face area
A_{nff}
frontal face area of the filter including the header frame which determines the nominal filter face velocity

3.1.14
arrestance
A
measure of the ability of a filter to remove a standard test dust from the air passing through it, under given operating conditions

NOTE This measure is expressed as a weight percentage.

3.1.15
average arrestance
A_m
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

3.1.16
initial arrestance
value of arrestance determined after the first loading cycle in a filter test

NOTE 1 For example, in EN 14799 procedure for the first 30 g of test dust.

NOTE 2 This measure is expressed as a weight percentage.

3.1.17
ash
solid residue of effectively complete combustion

3.1.18
fly ash
ash entrained by combustion gases

3.1.19
dust holding capacity
DHC
C_d
amount of loading dust retained by the filter up to final pressure differential

3.1.20
capture
extraction of particles, liquid particles or gases, close to their sources for purposes of collection or sampling

3.1.21
classification
allocation of filters into groups and classes according to relevant aspects of their filtration performance

3.1.22
cleaning (after clogging)
removal of the deposit of solid or liquid particles which has produced clogging

3.1.23
clogging
deposition, progressive or otherwise, of solid or liquid particles on or within a filter medium, causing the flow to be obstructed

3.1.24
coalescence
action by which liquid particles in suspension unite to form larger particles

3.1.25
concentration
content
quantity of a solid, liquid or gaseous material expressed as a proportion of another material in which it is contained in the form of a mixture, a suspension or a solution

3.1.26
correlation ratio of sampling points
downstream particle concentration divided by the upstream particle concentration (measured without filter)

3.1.27
particle counter
device for detecting and counting numbers of discrete airborne particles present in a sample of air

3.1.28
condensation particle counter
CPC
type of **optical particle counter** (3.1.29) in which very fine airborne particles are enlarged by condensation to a size which may readily be counted by other particle counting methods

NOTE 1 It can provide data on particle numbers but not the original size distribution.

NOTE 2 The ISO committee dealing with CPC is TC 24/SC 4.

3.1.29
optical particle counter
OPC
particle counter which functions by illuminating airborne particles in a sample flow of air, converting the scattered light impulses to electrical impulse data capable of analysis to provide data on particle population and size distribution

NOTE See ISO 21501-4.

3.1.30
border zone error
with an optical limitation of the measuring volume or by means of the Gaussian distribution of the light intensity in the laser beam, the particles passing the border of the sensing zone are less illuminated than the ones passing the centre of the sensing zone

NOTE 1 The border zone error is device- and particle-size-dependent and has a direct effect on the size resolution.

NOTE 2 Due to the border zone error, the particle size is underestimated.

NOTE 3 The larger the particle to be measured, the larger the border zone error.

3.1.31
sizing accuracy
$\varepsilon(x)$
$\varepsilon(x)$ determined by the function:

$$\varepsilon(x) = \frac{x_{\text{measured}} - x_{\text{reference}}}{x_{\text{reference}}} \cdot 100$$

3.1.32
sizing resolution
$R(x)$
indicates which particle sizes can be differentiated by a particle measuring instrument

NOTE The sizing accuracy can be evaluated for any particle size as follows:

$$R(x) = \frac{\sqrt{\sigma^2_{\text{measured}}(x) - \sigma^2_{\text{reference}}(x)}}{x_{\text{reference}}} \cdot 100,\ \sigma = \text{geometric standard deviation}$$

3.1.33
lower size limit
smallest particle diameter with a counting efficiency of 0,5 ± 0,15 (50 % ± 15 %)

3.1.34
upper size limit
largest particle diameter with a counting efficiency of 0,5 ± 0,15 (50 % ± 15 %)

3.1.35
sampling flow rate
volumetric flow rate through the instrument

NOTE Any error in the volume flow will affect the reported particle number concentration.

3.1.36
calibration curve
graph depicting the relationship between scattered light intensity and particle size

NOTE For the clear particle size and quantity determination, an unambiguous, monotonically increasing calibration curve offers advantages. This enables narrower size intervals to be chosen.

3.1.37
calibrate
to compare readings from the instrument to be calibrated with those from a reference device

3.1.38
calibration particle
mono-disperse spherical particle with a known mean particle size, e.g. polystyrene latex (PSL) particle, that is traceable to an international standard of length, and where the standard uncertainty of the mean particle size is equal to or less than $\pm$ 2,5 %

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

[ISO 21501-3:2007, definition 2.1]

3.1.39
reference device
primary device possessing accurately known parameters used as a standard for calibrating secondary devices

3.1.40
coagulation losses
particle losses due to collision and adhesion of particles

NOTE Coagulation affects the measured particle parameters as follows: the particle number concentration decreases, the particle mass concentration remains the same and the particle size increases.

3.1.41
counting rate
N
number of counting events per unit time

3.1.42
zero count rate
N_z
number of counts registered per unit time by the particle counter when air, which is free of particles, is passed through the measuring volume

3.1.43
cyclone
dust separator or droplet separator utilizing essentially the centrifugal force derived from the motion of the gas

3.1.44
DEHS
DiEthylHexylSebacate
liquid used for generating the DEHS test aerosol

3.1.45
equivalent diameter
diameter of a spherical particle which will give behaviour equivalent to that of the particle being examined

3.1.46
count median diameter of aerosol
number median diameter of aerosol
CMD
d_m
50th percentile of the number distribution of the aerosol

NOTE 50 % of the particles are smaller than the count median diameter and 50 % are larger than the count median diameter.

3.1.47
count mean particle diameter
number mean particle diameter
d_{pm}
geometric average of the lower and upper limit of the size range

3.1.48
dispersion
operation as a result of which solid particles or liquid particles are distributed in a fluid

NOTE 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”, e.g. DOP (Dioctyl phthalate) liquid, or liquids with similar physical properties, are dispersed in air to generate a test aerosol.

3.1.49
downstream
area or region into which fluid flows on leaving the filter

3.1.50
droplet
liquid particle of small mass, capable of remaining in suspension in a gas

NOTE In some turbulent systems, for example clouds, its diameter can reach 200 µm.

3.1.51
dust
airborne solid particles which settle by gravity in calm conditions

3.1.52
test dust capacity
TDC
amount of loading dust held by the filter at final test pressure differential

3.1.53
dust control
whole of the processes for the separation of solid particles from a gas stream in which they are suspended

NOTE By extension this also includes the activities involved in the construction and commissioning of a dust separator.

3.1.54
loading dust
synthetic dust formulated specifically for determination of the test dust capacity and arrestance of air filters

NOTE A number of loading dusts are currently used, e.g. ISO fine test dust, ASHRAE dust and JIS-11.

3.1.55
efficiency
E
fraction of contaminant entering the filter which is retained

3.1.56
average efficiency
E_{av}
value of efficiency which results from averaging the efficiencies determined over a number of discrete intervals up to the final pressure differential

3.1.57
collection efficiency
ratio of the quantity of particles retained by a separator to the quantity entering it with regard to filters, dust separators and droplet separators

NOTE It is generally expressed as a percentage.

3.1.58
conditioned efficiency
efficiency of the conditioned filter media operating at an average media velocity corresponding to the test air flow rate in the filter

3.1.59
counting efficiency
E_c
ratio, expressed as a percentage, of detected number concentration of particles divided by the actual number concentration of particles in a given size or range of sizes

3.1.60
dust loaded efficiency
efficiency of the filter operating at test flow rate and after dust loadings up to final test pressure differential

3.1.61
fractional efficiency
ability of an air cleaning device to remove particles of a specific size or size range

NOTE The efficiency plotted as a function of particle size gives the particle size efficiency spectrum.

3.1.62
initial efficiency
E_i
efficiency of the air cleaning device operating at the test air flow rate

NOTE Expressed in % for each selected size of particle.

3.1.63
integral efficiency
efficiency, averaged over the whole superficial face area of a filter under given operating conditions

3.1.64
local filter efficiency
E_{local}
efficiency at a specific point of a filter element under given operating conditions

3.1.65
minimum filter efficiency
E_{min}
minimum value of the filter efficiency curve under given operating conditions

3.1.66
effluent
fluid discharged from a given source into the external environment

NOTE 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.

3.1.67
filter element
filtering material in a preformed shape being a part of a complete filter

3.1.68
elutriation
method of separating a mixture of particles according to their settling velocities within a fluid

3.1.69
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 The coincidence error leads to a measured number concentration which is too low and a value for the particle diameter which is too high.

3.1.70
air filter
apparatus for separating solid or liquid particles or gaseous contaminants from a gas stream

NOTE The apparatus is generally formed of a layer or layers of porous, fibrous or granular material.

3.1.71
brush filter
air filter in which the medium consists of a screen of intermeshing brushes

3.1.72
cartridge filter
compact filter often of cylindrical design

3.1.73
cellular filter
replaceable filter insert which is or may be installed in a multiple bank or wall structure

NOTE Examples of these are HEPA filters, rigid bags and panels.

3.1.74
ceramic filter
filter with a medium consisting of ceramic fibres or sintered porous ceramic

3.1.75
charged filter
filter in which the medium is electrostatically charged or polarized

3.1.76
filter class
range of filtration performances clearly defined by lower and upper limit values

3.1.77
cleanable filter
filter designed to enable the removal of collected dust by application of an appropriate technique

NOTE The removal of collected dust is usually partial.

3.1.78
disposable filter
filter which is not intended to be cleaned or regenerated for re-use

3.1.79
effective filtering area
area of filter medium in the filter which collects dust

3.1.80
electret filter
filter with an electrostatically charged medium

3.1.81
efficient particulate air filter
EPA filter
filter with performance complying with requirements of filter class ISO 15 – ISO 30 as per ISO 29463-1

3.1.82
fabric filter
filter medium manufactured either from woven or non-woven textile or a combination of both

NOTE The term is most often applied to dust collectors. In these devices the filtering is effectively carried out by a bed of deposited dust, the textile providing a supporting substrate.

3.1.83
filter face area
frontal face area of the filter including the header frame

3.1.84
filter face velocity
air flow rate divided by the filter face area

3.1.85
fibrous filter
filter comprising a medium consisting of a mass of fibres, including fine and very fine fibres

NOTE 1 The efficiency of these filters is derived from the presence of very fine fibres which are supported by coarser fibres in a relatively open structure.

NOTE 2 Fibrous filters are usually disposable.

3.1.86
final filter
air filter used to collect the loading dust passing through or shedding from the filter under test

3.1.87
group of filters
filters of more than one adjacent class within a performance spectrum

3.1.88
HEPA filter
filters with performance complying with requirements of filter class ISO 35 - ISO 45 as per ISO 29463-1

3.1.89
filter insert
replaceable part of a filter which contains the filter medium but which can only operate mounted inside a frame

3.1.90
filter medium
material used for filtering

NOTE The part of a filter on or within which the particles are retained.

3.1.91
metal filter
filter with a medium consisting of metal mesh(es), fibres or sintered porous metal

3.1.92
filter pack
filtering material in a preformed shape being a part of a complete filter

3.1.93
panel filter
shallow parallel-faced filter element or cell

3.1.94
particulate air filter
filter designed to remove suspended particles from air flowing through it

3.1.95
pocket filter
bag filter
filter in which the medium is formed into pockets or bags

3.1.96
renewable media filter
filter in which the medium can be replaced

3.1.97
roll filter
filter incorporating a means for advancing new medium

NOTE For example, from a roll.

3.1.98
self-cleaning filter
filters having an inbuilt mechanism for removing collected contaminants

3.1.99
filter type
designation of the structure and test regime of a filter

3.1.100
ULPA filter
filters with performance complying with requirements of filter class ISO 55 - ISO 75 as per ISO 29463-1

3.1.101
nominal air volume flow rate
$q_{v,nom}$
air volume flow rate specified by the manufacturer

3.1.102
rated flow
q_{vr}
gas flow rate through a separator, either as stated by the manufacturer for defined conditions of use, or as agreed between the interested parties for a particular installation

3.1.103
sampling volume flow rate
representative partial flow rate used for the determination of airborne particle characteristics

3.1.104
service flow
gas flow rate through a separator under given service conditions

3.1.105
test flow
gas flow rate through a separator during a rig test or a site test

NOTE This flow, which can differ from the rated flow, shall be specified or, failing this, agreed between the interested parties.

3.1.106
test volume flow rate
q_{vt}
volumetric air flow rate used for testing

3.1.107
header frame
integral rigid frame of a filter enabling it to be fastened and sealed against the holding frame

3.1.108
holding frame
rigid structural frame, part of an air handling system into which filters are fastened and sealed

3.1.109
fume
aerosol of solid particles, usually from metallurgical processes, generated by condensation from the gaseous state generally after volatilization from melted substances and often accompanied by chemical reactions such as oxidation

NOTE In popular usage, this is referred to as gaseous effluent, often unpleasant and malodorous, which may arise from chemical processes.

3.1.110
grit
airborne solid particles in the atmosphere or flues

NOTE In the UK, of size greater than 75 µm [see "dust" (3.1.51)].

3.1.111
hood
inlet device for extraction system

3.1.112
housing
device used to hold filter

3.1.113
impact
collision of two particles with each other, or of a particle with a solid or liquid surface

3.1.114
impaction
inertial separation due to mass and velocity of a particle causing divergence from the airflow stream lines onto individual filter fibres

3.1.115
KCl
solid potassium chloride particles generated from an aqueous solution and used as test aerosol

3.1.116
porous layer
permeable layer of solid material in any form having interstices of small size, generally known as "pores"

3.1.117
leak
point in a filter at which the local penetration exceeds a given value

3.1.118
mist
suspension of droplets in a gas

3.1.119
neutralization
action of bringing the aerosol to a Boltzmann charge equilibrium distribution with bipolar ions

NOTE This process is more often described as “discharging”.

3.1.120
particle
small discrete mass of solid or liquid matter

3.1.121
particle bounce
behaviour of particles that impinge on the filter without being retained

3.1.122
mean particle diameter
geometric mean of the upper and lower border diameters in a size range

3.1.123
particle number
N_p
number of particles present in a defined group

3.1.124
particle number concentration
C_N
number of particles per unit of volume of air

3.1.125
particle production rate
Q
number of particles produced per unit of time by an aerosol generator

3.1.126
particle size
d_p
geometric diameter (equivalent spherical, optical or aerodynamic, depending on context) of the particles of an aerosol

3.1.127
particle size analysis
technique used to measure the size distribution of an assembly of particles

3.1.128
particle size distribution
presentation, in the form of tables of numbers or of graphs, of the experimental results obtained using a method or an apparatus capable of measuring the equivalent diameter of particles in a sample or capable of giving the proportion of particles for which the equivalent diameter lies between defined limits

3.1.129
most penetrating particle size
MPPS
d_{mpps}
particle size at which the minimum of the particle size efficiency curve occurs under test conditions

3.1.130
penetration
P
ratio of particle concentration detected downstream versus the particle concentration upstream

NOTE In some industries, the reciprocal of the penetration is known as the “decontamination factor” (DF).

3.1.131
pollutant
contaminant
undesirable solid, liquid or gaseous matter in a gaseous or liquid medium

3.1.132
pollution
contamination
introduction of pollutants into a liquid or gaseous medium, or any undesirable modification of the composition of a liquid or gaseous medium

3.1.133
precipitation
operation in which particles are separated from a gas stream in which they are suspended

NOTE For example, by the action of an electrical field or a thermal gradient.

3.1.134
electrostatic precipitator
device in which particles become charged and are precipitated on the collecting surface

NOTE Also referred to as electrostatic collector, electrical separator or electrostatic separator.

3.1.135
burst pressure
p_b
value of differential pressure across a filter, above which damage/destruction of the filter media or the structure occurs

3.1.136
differential pressure
D_p
difference in absolute (static) pressure between two points in a system

3.1.137
mean differential pressure
D_{pM}
arithmetical mean value of the measured number of differential pressures

3.1.138
final differential pressure
D_{pf}
differential pressure up to which the filtration performance is measured for classification purposes

3.1.139
recommended final differential pressure
D_{pfr}
maximum operating differential pressure of the filter as recommended by the manufacturer

3.1.140
initial differential pressure
D_{pi}
differential pressure of the clean filter operating at its test air flow rate

3.1.141
purification
total or partial removal of unwanted constituents from a gaseous medium

3.1.142
re-entrainment
release to the air flow of particles previously collected on the filter

3.1.143
sampling duration
t_{sd}
time period during which the particles in the sample are counted upstream and downstream

3.1.144
isokinetic sampling
technique for air sampling such that the probe inlet air velocity is the same as the velocity of the air surrounding the sampling point

3.1.145
scan test
test procedure by which local efficiency or penetration values are determined by sampling filtered air at the downstream filter face according to a specified grid pattern

3.1.146
sedimentation
separation of particles from the fluid in which they are suspended, by the action of gravity

3.1.147
separator
apparatus for separating solid or liquid particles or gases from a gaseous stream in which they are suspended or mixed

3.1.148
droplet separator
apparatus for separating suspended liquid particles from a gas stream

3.1.149
dust separator
apparatus for separating suspended solid particles from a gas stream

3.1.150
shedding
release to the air flow of particles due to particle bounce and re-entrainment effects and to the release of fibres or particulate matter from the filter or filtering material

3.1.151
smoke
visible aerosol resulting from combustion

3.1.152
soot
deposits of agglomerated carbonaceous particles formed by incomplete combustion

3.1.153
suspension
two-phase system in which one phase, the disperse phase, is distributed throughout the other, known as the continuous phase

3.1.154
transmission
ratio of the quantity of particles leaving a filter, dust separator or a droplet separator, to the quantity entering it

3.1.155
upstream
region in a process system traversed by a flowing fluid before it enters that part of the process under consideration

NOTE The part of the process under consideration in the context of this International Standard will normally be a filter.

3.1.156
filter face velocity
average velocity of the air through the filter face area

3.1.157
filter medium face velocity
u_{fm}
volume flow rate divided by the effective filter medium area of the filter element

3.1.158
washer
dust separator, droplet separator or gas purifier that depends on a liquid acting as a collecting medium for its operation

3.2 Gas phase filters

3.2.1
absorption
transport and dissolution of a sorbate into an absorbent to form a homogeneous mixture having the characteristics of a solution

3.2.2
activated alumina
aluminium oxide, usually in the form of granules, treated to enhance its surface area and consequent ability to adsorb gases

3.2.3
active site
position on an adsorbent surface with the potential to trap an adsorbate molecule

3.2.4
adsorbate
molecular compound contaminant in gaseous or vapour phase that may be retained by an adsorbent media

3.2.5
adsorbate capacity
W_n
amount (mass or moles) of a selected sorbate that is contained in the media of a GPACD at given test conditions and a specific end point

NOTE Capacity can also be negative during desorption,WD.

3.2.6
adsorbent
material having the ability to retain gaseous or vapour contaminants on its surface by physical or chemical processes

3.2.7
regenerable adsorbent
adsorbent material which, after saturation, may be treated to recover its adsorption properties, thereby enabling its reuse

3.2.8
ageing of adsorbent
chemical or physical process which reduces the effectiveness (efficiency and/or capacity) of an adsorbent

NOTE Ageing reduces the number of active sites.

3.2.9
adsorption
physical process in which the molecules of gases and vapours adhere by physical or chemical processes to the exposed surfaces of solid substances

3.2.10
area, effective filter media
area of filter media in a filter which collects contaminants from the passing air

3.2.11
area, filter face
cross-sectional face area of the filter including the header frame when viewed from the direction of air flow using exact dimensions

3.2.12
area, filter media
area of filter media contained in the filter

3.2.13
area, nominal filter face
cross-sectional face area of the filter including the header frame when viewed from the direction of air flow using nominal dimensions

3.2.14
bed depth
depth of adsorbent media through which the gas being processed passes

3.2.15
breakthrough point
point in the operating cycle of a GPACD at which the effluent contamination concentration becomes measurable

3.2.16
challenge air stream
test contaminant(s) of interest diluted to the specified concentration(s) of the test prior to filtration

3.2.17
channeling
disproportionate or uneven flow of gas through passages of lower resistance due to inconsistencies in the design or production of a GPACD, particularly in packed granular beds

3.2.18
activated charcoal
activated carbon
carbon, usually in the form of granules, treated to enhance its surface area and consequent ability to adsorb gases through a highly developed pore structure

NOTE Usually produced from coal, carbonized coconut shell or other organic materials.

3.2.19
chemisorption
chemical adsorption
trapping of gaseous or vapour contaminants on an adsorbent involving chemical reaction on the adsorbent surface

3.2.20
close valve time
t_{vc}
time when the challenge gas(es) are initially turned off or when switching from upstream to downstream monitoring

3.2.21
concentration
C_n
quantity of one substance dispersed in a defined amount of another

NOTE Indices “n” denote location or origin.

3.2.22
concentration, challenge
concentration of the test contaminant(s) of interest in the air stream prior to filtration (challenge air stream)

3.2.23
contaminant
substance (solid, liquid, or gas) that negatively affects the intended use of a fluid

3.2.24
contamination
presence of a substance that negatively affects the intended use of a fluid

3.2.25
desorption
opposite of adsorption, in which sorbate molecules leave the surface of the sorbent and re-enter the fluid stream

3.2.26
efficiency
fraction or percentage of a challenge contaminant that is removed by a filter or GPACD at a given time

3.2.27
efficiency, average
value of efficiency which results from averaging the efficiencies determined over a number of discrete intervals up to the final pressure drop for particle filters

3.2.28
efficiency vs. capacity curve
plot of the GPACD removal efficiency against the integrated capacity over the duration of a challenge test for a particular challenge concentration and airflow

3.2.29
efficiency, end
E_{end}
removal efficiency calculated from the concentrations at the end of the test

3.2.30
efficiency, initial
E_I
efficiency of an unexposed filter or GPACD calculated as soon after the start of a test as is possible

NOTE For gas-phase, this should be as soon as a steady reading can be obtained; for particles, this should be before any dust loading occurs.

3.2.31
efficiency vs. time curve
plot of the GPACD removal efficiency against time over the duration of a challenge test for a particular challenge concentration and airflow

3.2.32
effluent
fluid discharged from a given source into the external environment

NOTE In this context the discharged fluid may be liquid or gaseous and may contain associated liquid and/or particulate contaminants.

3.2.33
filter
apparatus for separating a contaminant from a fluid stream by retention of the contaminant

NOTE The term is most commonly used for particle filters, but may be applied to gas-phase devices as well.

3.2.34
carbon filter
filter in which the filtering medium is, or includes, activated charcoal, and which is used for the separation of gaseous substances from the passing air

3.2.35
filter insert
replaceable part of a filter which contains the filter media but which can only operate mounted inside a frame

3.2.36
sorption filter
filter unit that removes gases or vapour contaminants from a gas stream using adsorption or absorptive processes

3.2.37
filtration
separation of contaminants from a fluid stream in which they are suspended through retention of the contaminants (by extension, also the whole of the activities involved in the construction and commissioning of a filter installation)

3.2.38
air flow rate
q
volume of air passing through the filter per unit time

3.2.39
rated flow
flow rate through a filter or GPACD, either as stated by the manufacturer for defined conditions of use, or as agreed between the interested parties for a particular installation

3.2.40
air flow rate sampling point
location where the air flow rate is sufficiently stable to permit a reliable flow measurement

3.2.41
test volume flow rate
q_{vt}
volumetric air flow rate used for testing

3.2.42
header frame
integral rigid frame of a filter enabling it to be fastened and sealed against the holding frame

3.2.43
holding frame
rigid structural frame, part of an air handling system into which filters are fastened and sealed

3.2.44
gas
substance whose vapour pressure is greater than the ambient pressure at ambient temperature

3.2.45
gas phase air cleaning device
GPACD
assembly of a fixed size enabling the removal of specific gas or vapour-phase contaminants

NOTE It is normally box shaped or fits into a box of dimensions 600 × 600 × 600 mm or 2 × 2 × 2 feet.

3.2.46
gas purifier
apparatus for totally or partially removing one or more constituents from a gas mixture

3.2.47
hood
inlet device for extraction system

3.2.48
housing
device used to hold filter

3.2.49
leak
point in a filter at which the local penetration exceeds a given value

3.2.50
open valve time
t_{VO}
time when challenge contaminants are initially injected into the test duct

3.2.51
penetration
ratio of contaminant concentration downstream of the filter to the upstream (challenge) concentration, sometimes expressed as a percentage

NOTE Related to efficiency (%) by the expression: Efficiency = (1 - Penetration) × 100 %.

3.2.52
physisorption
physical adsorption
attraction of an adsorbate to the surface, both outer surface and inner pore surface, of an adsorbent by physical forces (Van der Waals forces)

3.2.53
pollutant
contaminant that is present in a fluid as a result of man-made processes

3.2.54
pollution
presence of contaminants in a fluid through man-made processes

3.2.55
pores
minute passageways through which fluid may pass or that expose to the fluid stream the internal surfaces of an adsorbent media

3.2.56
pores, macro
largest sized pores (diameter > 50 nm) of adsorbent media

3.2.57
pores, meso
intermediate sized pores (diameter > 2 nm and < 50 nm) of adsorbent media

3.2.58
pores, micro
smallest sized pores (diameter < 2 nm) of adsorbent media

3.2.59
pressure, ambient
absolute pressure immediately outside the test rig

3.2.60
pressure differential resistance
difference in pressure between two points in an airflow system at specified conditions, especially when measured across the filter or GPACD

3.2.61
retentivity
measure of the ability of an adsorbent or GPACD to resist desorption of an adsorbate

3.2.62
separator
apparatus for separating solid or liquid particles or gases from a gaseous stream in which they are suspended or mixed

3.2.63
molecular sieve
silica-based minerals having a crystalline three-dimensional structure with cavities and channels whose surfaces can adsorb small molecules

3.2.64
bypass sneakage
proportion of the challenge air stream that passes around the filter or GPACD without contacting the filter media

3.2.65
sorption
process in which fluid molecules (gas or liquid) are removed by a medium by absorption or adsorption

3.2.66
breakthrough time
time to reach a specified penetration (x)

NOTE Relevant breakthrough times may be defined as penetrations of 5 %, 50 %, and 95 % (tb5 , tb50 ,tb95).

3.2.67
breakthrough vs. time curve
plot of contaminant penetration versus time for a particular challenge concentration and airflow