
**Cleaning equipment for air and other
gases — Terminology**

Séparateurs aérauliques — Terminologie

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Foreword

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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.

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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 $x \leq 0,1 \mu\text{m}$, the fine range $0,1 \mu\text{m} < x \leq 1 \mu\text{m}$ and the coarse range $x > 1 \mu\text{m}$, whereby x is the particle diameter.

3.1.2

monodisperse aerosol

aerosol, the width of whose distribution function, described by the geometric standard deviation σ_g , is less than $1,15 \mu\text{m}$

3.1.3

polydisperse aerosol

aerosol, the width of whose distribution function, described by the geometric standard deviation σ_g , exceeds $1,5 \mu\text{m}$

3.1.4

quasi-monodisperse aerosol

aerosol, the width of whose distribution function, described by the geometric standard deviation σ_g , lies between $1,15 \mu\text{m}$ and $1,5 \mu\text{m}$

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:

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

3.1.33

lower size limit

smallest particle diameter with a counting efficiency of $0,5 \pm 0,15$ (50 % $\pm$ 15 %)

3.1.34

upper size limit

largest particle diameter with a counting efficiency of $0,5 \pm 0,15$ (50 % $\pm$ 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

$q_{v, \text{nom}}$

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