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Workplace air — Terminology

Qualité de l’air — Terminologie

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Foreword

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The committee responsible for this document is ISO/TC 146, *Air quality*, Subcommittee SC 2, *Workplace atmospheres*.

Introduction

The health of workers in many industries is at risk through exposure by inhalation of chemical and biological agents. Industrial hygienists and other public health professionals need to determine the effectiveness of measures taken to control workers' exposure and this is generally achieved by making workplace air measurements.

Many terms that are commonly used in relation to workplace air measurements and exposure assessments are defined within individual standards or technical documents and are often defined differently from one standard or document to the next. This creates ambiguities and inconsistencies in the use of such terms. This International Standard was developed to ensure that commonly used terms have agreed-upon definitions and to eliminate ambiguities and inconsistencies in their usage. It will be of benefit to agencies concerned with health and safety at work, industrial hygienists and other public health professionals, analytical laboratories, industrial users of metals and metalloids and their workers.

Workplace air — Terminology

1 Scope

This International Standard specifies terms and definitions that are related to the assessment of workplace exposure (see 2.1.5.1) to chemical and biological agents (see 2.1.1.1). These are either general terms or are specific to physical and chemical processes of air sampling, the analytical method (see 2.3.3), or method performance.

The terms included are those that have been identified as being fundamental because their definition is necessary to avoid ambiguity and ensure consistency of use.

This International Standard is applicable to all International Standards, ISO Technical Reports, ISO Technical Specifications, and ISO Guides related to workplace atmospheres.

2 Terms and definitions

2.1 General terms

2.1.1 Agents

2.1.1.1
biological agent
one of a number of agents such as bacteria, viruses, fungi and other micro-organisms or parts of them and their associated toxins, including those which have been genetically modified, cell cultures or endoparasites which are potentially hazardous to human health

Note 1 to entry: Dusts of organic origin, for example, cotton dust, flour dust and wood dust, are not considered to be biological agents and are therefore not covered by this definition.

[SOURCE: EN 1540:2011, 2.1.1, modified — Added “one of a number of agents such as” to definition and changed “pollen” to “cotton dust”.]

2.1.1.2
chemical agent
chemical element or compound on its own or admixed as it occurs in the natural state or as produced, used, or released, including release as waste, by any work activity, whether or not produced intentionally and whether or not placed on the market

[SOURCE: Council Directive 98/24/EC, Art. 2 a]

2.1.2 Air pollutants

2.1.2.1
air pollutant
material emitted into the atmosphere either by human activity or natural processes and adversely affecting humans or the environment

[SOURCE: EN 1540:2011, 2.2.1, modified — Changed “man” to “humans”.]

2.1.2.2
airborne dust
finely divided matter, in solid form, dispersed in air

[SOURCE: EN 1540:2011, 2.2.2]

2.1.2.3
airborne particles
fine matter, in solid or liquid form, dispersed in air

[SOURCE: EN 1540:2011, 2.2.3, modified — Note 1 to entry deleted.]

2.1.2.4
total airborne particles
airborne particles (2.1.2.3) present in a given volume of air

[SOURCE: EN 1540:2011, 2.2.6, modified — Added “present” after “particles”.]

2.1.2.5
vapour
gas phase of a substance in a state of equilibrium or disturbed equilibrium with the same substance in a liquid or solid state below its boiling or sublimation point

[SOURCE: EN 1540:2011, 2.2.7]

2.1.3 Health-related fractions and conventions

2.1.3.1
health-related fractions
<airborne particles> collective term for the fractions of *airborne particles* (2.1.2.3) penetrating to different regions of the respiratory tract, i.e. the inhalable, thoracic and respirable fractions

Note 1 to entry: The health-related fractions of airborne particles are specified in ISO 7708.

[SOURCE: EN 1540:2011, 2.3.1, modified — citation in Note 1 to entry changed from EN 481 to ISO 7708.]

2.1.3.1.1
inhalable fraction
mass fraction of *total airborne particles* (2.1.2.4) which is inhaled through the nose and mouth

Note 1 to entry: The inhalable fraction depends on the speed and direction of the air movement, on the rate of breathing and other factors.

[SOURCE: ISO 7708:1995, 2.3]

2.1.3.1.2
extrathoracic fraction
mass fraction of *total airborne particles* (2.1.2.4) which fail to penetrate beyond the larynx

[SOURCE: ISO 7708:1995, 2.5, modified]

2.1.3.1.3
thoracic fraction
mass fraction of *total airborne particles* (2.1.2.4) which penetrate beyond the larynx

[SOURCE: ISO 7708:1995, 2.7, modified]

2.1.3.1.4
respirable fraction
mass fraction of *total airborne particles* (2.1.2.4) which penetrate to the unciliated airways

[SOURCE: ISO 7708:1995, 2.11, modified]

2.1.3.2
sampling convention
target specification for sampling instruments for a specified airborne particulate fraction

2.1.3.2.1
inhalable convention
target specification for sampling instruments when the *inhalable fraction* (2.1.3.1.1) is the fraction of interest

[SOURCE: ISO 7708:1995, 2.4]

2.1.3.2.2
extrathoracic convention
target specification for sampling instruments when the *extrathoracic fraction* (2.1.3.1.2) is the fraction of interest

[SOURCE: ISO 7708:1995, 2.6, modified — “the fraction” added before “of interest” for consistency of wording.]

2.1.3.2.3
thoracic convention
target specification for sampling instruments when the *thoracic fraction* (2.1.3.1.3) is the fraction of interest

[SOURCE: ISO 7708:1995, 2.8, modified — “the fraction” added before “of interest” for consistency of wording.]

2.1.3.2.4
respirable convention
target specification for sampling instruments when the *respirable fraction* (2.1.3.1.4) is the fraction of interest

[SOURCE: ISO 7708:1995, 2.12, modified — “the fraction” added before “of interest” for consistency of wording.]

2.1.4 Aerosols

2.1.4.1
aerosol
airborne particles (2.1.2.3) and the gas (and vapour) mixture in which they are suspended

Note 1 to entry: The airborne particles can be in or out of equilibrium with their own *vapours* (2.1.2.5).

[SOURCE: EN 1540:2011, 2.2.4]

2.1.4.2
bioaerosol
aerosol (2.1.4.1) consisting of (a) *biological agent(s)* (2.1.1.1)

Note 1 to entry: *Airborne dusts* (2.1.2.2) of organic origin, for example, cotton dust, flour dust and wood dust, are not considered to be bioaerosols and are therefore not covered by this definition.

[SOURCE: EN 1540:2011, 2.2.5, modified — “pollen” changed to “cotton dust” in Note 1 to entry.]

2.1.4.3
nanoaerosol
aerosol (2.1.4.1) comprised of, or consisting of, *nanoparticles* (2.1.4.4) and *nanostructured particles* (2.1.4.5)

[SOURCE: ISO/TR 27628:2007, 2.11]

2.1.4.4
nanoparticle
material with all three dimensions in the size range from approximately 1 nm to 100 nm

[SOURCE: ISO/TS 80004-4:2011, 2.1, 2.2, and 2.4, modified]

2.1.4.5
nanostructured particle
particle with structural features smaller than 100 nm, which can influence its physical, chemical and/or biological properties

Note 1 to entry: A nanostructured particle can have a maximum dimension substantially larger than 100 nm.

EXAMPLE A 500 nm diameter *agglomerate* (2.1.4.9) of *nanoparticles* (2.1.4.4) would be considered a nanostructured particle.

[SOURCE: ISO/TR 27628:2007, 2.13, modified — "may" changed to "can" in definition and Note 1 to entry.]

2.1.4.6
ultrafine aerosol
aerosol (2.1.4.1) consisting predominantly of *ultrafine particles* (2.1.4.7)

Note 1 to entry: The term is often used in the context of particles produced as a by-product of a process (incidental particles), such as welding *fume* (B.2.2) and combustion fume

[SOURCE: ISO/TR 27628:2007, 2.20]

2.1.4.7
ultrafine particle
particle with a nominal diameter (such as geometric, aerodynamic, mobility, projected-area or otherwise) of 100 nm or less, produced as a by-product of a process such as welding and combustion

[SOURCE: ISO/TR 27628:2007, 2.21, modified — Note 1 to entry moved to definition text.]

2.1.4.8
particle aerodynamic diameter
aerodynamic diameter
diameter of a sphere of 1 g cm^{-3} density with the same terminal settling velocity in calm air as the particle, under the prevailing conditions of temperature, pressure and relative humidity

Note 1 to entry: The particle aerodynamic diameter depends on the size, density and shape of the particle.

Note 2 to entry: Aerodynamic diameter is related to the inertial properties of aerosol particles.

[SOURCE: EN 1540:2011, 2.3.2, modified — Note 2 to entry derived from ISO/TR 27628:2007, 2.2.]

2.1.4.9
agglomerate
<aerosols> group of particles held together by relatively weak forces, including van der Waals forces, electrostatic forces and surface tension

[SOURCE: ISO/TR 27628:2007, 2.4 modified — Note 1 to entry deleted.]

2.1.4.10
aggregate
<aerosols> heterogeneous particle in which the various components are held together by relatively strong forces and thus not easily broken apart

[SOURCE: ISO/TR 27628:2007, 2.5, modified – Note 1 to entry deleted.]

2.1.4.11
coagulation
formation of larger particles through the collision and subsequent adhesion of smaller particles

[SOURCE: ISO/TR 27628:2007, 2.6]

2.1.4.12
coalescence
formation of homogeneous particles through the collision of smaller liquid particles and subsequent merging or mixing of constituent material

[SOURCE: ISO/TR 27628:2007, 2.7, modified — "liquid" added.]

2.1.5 Exposure assessment

2.1.5.1
exposure
<inhalation> situation in which a *chemical agent* (2.1.1.2) or *biological agent* (2.1.1.1) is present in the air that is inhaled by a person

[SOURCE: EN 1540:2011, 2.4.1, modified — "agent" added after "chemical" to facilitate cross-referencing.]

2.1.5.2
dermal exposure
contact between a *chemical agent* (2.1.1.2) or *biological agent* (2.1.1.1) and human skin

[SOURCE: EN 1540:2011, 2.4.2]

2.1.5.3
time-weighted average concentration
TWA concentration
concentration of a *chemical agent* (2.1.1.2) in the air, averaged over a *reference period* (2.1.5.7)

[SOURCE: ISO 21438-1:2007, 3.1.7, modified — Replaced "atmosphere" with "air".]

2.1.5.4
occupational exposure limit value
OELV
limit of the time-weighted average of the concentration of a *chemical agent* (2.1.1.2) in the air within the *breathing zone* (2.1.5.5) of a worker in relation to a specified *reference period* (2.1.5.7)

Note 1 to entry: The term "limit value" is often used as a synonym for "occupational exposure limit value" but the term "occupational exposure limit value" is preferred because there is more than one limit value (e.g. biological limit value and occupational exposure limit value).

Note 2 to entry: Occupational exposure limit values (OELVs) are often set for reference periods of 8 h but can also be set for shorter periods or concentration excursions. OELVs for gases and *vapours* (2.1.2.5) are stated in terms independent of temperature and air pressure variables in ml/m^3 and in terms dependent on those variables in mg/m^3 for a temperature of 20 °C and a pressure of 101,3 kPa. OELVs for *airborne particles* (2.1.2.3) and mixtures of particles and vapours are given in mg/m^3 or multiples of that for actual environmental conditions (temperature, pressure) at the *workplace* (2.1.6.2). OELVs of fibres are given in number of fibres/m^3 or number of fibres/cm^3 for actual environmental conditions (temperature, pressure) at the workplace.

[SOURCE: Council Directive 98/24/EC, Art. 2 d, modified — "OELV" and new Note 1 to entry added; original Note 1 becomes Note 2; "limit value" changed to "occupational exposure limit value" or "OELV" in Note 2 to entry; "mostly" changed to "often" in first sentence of Note 2 to entry.]

2.1.5.5
breathing zone
space around the nose and mouth from which breath is taken

Note 1 to entry: Technically, the breathing zone corresponds to a hemisphere (generally accepted to be 30 cm in radius) extending in front of the human face, centred on the midpoint of a line joining the ears. The base of the hemisphere is a plane through this line, the top of the head and the larynx. This technical description is not applicable when respiratory protective equipment is used.

[SOURCE: EN 1540:2011, 2.4.5]

2.1.5.6
measuring procedure
measurement procedure
measurement method
set of operations described specifically for the sampling and *analysis* (2.3.1) of *chemical agents* (2.1.1.2) or *biological agents* (2.1.1.1) in air

Note 1 to entry: A measuring procedure usually includes preparation for sampling, conducting the sampling, transportation and storage, and *sample preparation* (2.3.11) for analysis and conducting the analysis.

[SOURCE: EN 1540:2011, 2.4.6, modified — "agents" added after "chemical" to facilitate cross-referencing and Note 1 to entry editorially modified.]

2.1.5.7
reference period
specified period of time for which the *occupational exposure limit value* (2.1.5.4) of a *chemical agent (2.1.1.2)* or *biological agent* (2.1.1.1) applies

Note 1 to entry: The reference period is usually 8 h for long-term measurements and 15 min for short-term measurements.

[SOURCE: EN 1540:2011, 2.4.7, modified — "agent" added after "chemical" to facilitate cross-referencing.]

2.1.6 Other terms

2.1.6.1
dustiness
propensity of materials to produce *airborne dust* (2.1.2.2) during handling

Note 1 to entry: Dustiness is not an intrinsic property as it depends on how it is measured.

[SOURCE: EN 1540:2011, 2.5.1]

2.1.6.2
workplace
designated area or areas in which the work activities are carried out

[SOURCE: EN 1540:2011, 2.5.2]

2.2 Terms related to the physical and chemical processes of workplace (air) sampling

2.2.1 Workplace (air) sample

2.2.1.1
sample
air sample
<workplace air quality> product of the process of *(air) sampling* (2.2.3.1)

Note 1 to entry: An air sample is frequently considered to include the *collection substrate(s)* (2.2.3.7) as well as the collected *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1) or sometimes it is considered to be the fractional part of a larger volume of air.

[SOURCE: EN 1540:2011, 3.1.1, modified — "<workplace air quality>" added as the domain for the definition. In Note 1 to entry, "agents" added after "chemical" to facilitate cross-referencing.]

2.2.1.2
collected sample
product of the process of *(air) sampling* (2.2.3.1) that consists of the collected *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1) only

[SOURCE: EN 1540:2011, 3.1.2, modified — "Agents" added after "chemical" to facilitate cross-referencing.]

2.2.1.3
personal sample
product of the process of using a *sampler* (2.2.2.1), attached to a person, to collect gases, *vapours* (2.1.2.5), and/or *airborne particles* (2.1.2.3) in the *breathing zone* (2.1.5.5) for the purpose of measuring *exposure* (2.1.5.1) to *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1)

2.2.1.4
static sample
area sample
product of using a *sampler* (2.2.2.1) in a stationary location that collects gases, *vapours* (2.1.2.5) and/or *airborne particles* (2.1.2.3) for the purpose of measuring *exposure* (2.1.5.1) to *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1)

2.2.2 Workplace (air) sampler

2.2.2.1
sampler
air sampler
<workplace air quality> device for separating and/or collecting *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1) from the surrounding air

Note 1 to entry: (Air) samplers are generally designed for a particular purpose, e.g. for sampling gases and *vapours* (2.1.2.5) or for sampling airborne particles.

[SOURCE: EN 1540:2011, 3.2.1, modified — "<workplace air quality>" added as the domain for the definition. "Separating" changed to "separating and/or collecting". "Agents" added after "chemical" to facilitate cross-referencing.]

2.2.2.1.1
passive sampler
sampler (2.2.2.1) that collects gases, *vapours* (2.1.2.5) or *airborne particles* (2.1.2.3) on a *collection substrate* (2.2.3.7) without active air movement

Note 1 to entry: Passive samplers include *diffusive samplers* (2.2.2.1.2) for collection of gases and vapours and samplers for collection of airborne particles based on turbulent diffusion and separation by electrical or other forces.

[SOURCE: EN 1540:2011, 3.2.1.1]

2.2.2.1.2
diffusive sampler
passive sampler (2.2.2.1.1) that collects gases or *vapours* (2.1.2.5) at a rate governed by diffusion through a static air layer and/or permeation through a membrane

[SOURCE: EN 1540:2011, 3.2.1.2, modified — Reference to airborne particles deleted and "a physical process such as" deleted.]

2.2.2.1.3

active sampler

sampler (2.2.2.1) that collects gases, *vapours* (2.1.2.5) or *airborne particles* (2.1.2.3), by means of active air movement

Note 1 to entry: Active samplers can collect *samples* (2.2.1.1) onto a *collection substrate* (2.2.3.7) such as a filter or a *sorbent tube* (2.2.2.5) or can collect samples into a canister or bag.

[SOURCE: EN 1540:2011, 3.2.1.3, modified — The phrase “on a collection substrate” was deleted from the definition and Note 1 to entry was added.]

2.2.2.1.4

pumped sampler

active sampler (2.2.2.1.3) that collects gases, *vapours* (2.1.2.5) or *airborne particles* (2.1.2.3) where the active air movement is induced by means of a pump

[SOURCE: EN 1540:2011, 3.2.1.4, modified — The phrase “on a collection substrate” was deleted from the definition and Note 1 to entry was deleted.]

2.2.2.1.5

flow-controlled pump

pump with nominally constant flow rate provided by an automatic flow control system

[SOURCE: ISO 13137:2013, 3.10]

2.2.2.1.6

aerosol sampler

airborne particle sampler

airborne particulate sampler

device that is used to collect *airborne particles* (2.1.2.3)

Note 1 to entry: The term aerosol sampler is commonly used although it is not in line with the definition of aerosol given in *aerosol* (2.1.4.1).

Note 2 to entry: The collection of airborne particles can be either active or passive.

[SOURCE: EN 1540:2011, 3.2.1.5, modified — Synonym format modified in accordance with ISO 10241-1:2011. “Sampler” changed to “device” and “transport” changed to “collect” in definition. The phrase “to a collection substrate” was deleted from definition. Cross-reference in Note 1 to entry was modified and Note 2 to entry was modified.]

2.2.2.1.6.1

inhalable sampler

aerosol sampler (2.2.2.1.6) that is used to collect the *inhalable fraction* (2.1.3.1.1) of airborne particles from the surrounding air

[SOURCE: EN 1540:2011, 3.2.1.5.1, modified — “Of airborne particles from the surrounding air” was added.]

2.2.2.1.6.2

thoracic sampler

aerosol sampler (2.2.2.1.6) that is used to collect the *thoracic fraction* (2.1.3.1.3) of airborne particles from the surrounding air

[SOURCE: EN 1540:2011, 3.2.1.5.2, modified — “Of airborne particles from the surrounding air” was added.]

2.2.2.1.6.3
respirable sampler
aerosol sampler (2.2.2.1.6) that is used to collect the *respirable fraction* (2.1.3.1.4) of airborne particles from the surrounding air

[SOURCE: EN 1540:2011, 3.2.1.5.3, modified — "Of airborne particles from the surrounding air" was added.]

2.2.2.1.7
mixed-phase sampler
sampler (2.2.2.1) or *sampling train* (2.2.2.6) that is used to collect *airborne particles* (2.1.2.3) and *vapours* (2.1.2.5) onto one or more *collection substrates* (2.2.3.7)

[SOURCE: EN 1540:2011, 3.2.1.6, modified — "Transport" changed to "collect." "To one or more" changed to "Onto one or more".]

2.2.2.2
personal sampler
sampler (2.2.2.1), attached to a person, that collects gases, *vapours* (2.1.2.5) or *airborne particles* (2.1.2.3) in the *breathing zone* (2.1.5.5) for the purpose of measuring *exposure* (2.1.5.1) to *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1)

[SOURCE: EN 1540:2011, 3.2.2, modified — "To determine" changed to "for the purpose of measuring" and "agents" added after "chemical" to facilitate cross-referencing.]

2.2.2.3
static sampler
area sampler
stationary *sampler* (2.2.2.1), not attached to a person, that collects gases, *vapours* (2.1.2.5) or *airborne particles* (2.1.2.3) at a particular location

[SOURCE: EN 1540:2011, 3.2.3, modified — "Stationary" was added to the definition.]

2.2.2.4
length-of-stain detector tube
glass tube containing chemical reagents in which a colour change is produced on a graduated scale, based on concentration of a specific *chemical agent* (2.1.1.2), when a *sample* (2.2.1.1) is drawn through it

2.2.2.5
sorbent tube
sampling device, usually made of metal or glass, containing a *collection substrate* (2.2.3.7) such as a *sorbent* (B.3.3) or a support impregnated with reagent, through which sampled air passes

Note 1 to entry: Some sorbent tubes are intended for use as *active samplers* (2.2.2.1.3) and some as *passive samplers* (2.2.2.1.1).

[SOURCE: EN 1540:2011, 3.2.5, modified — "Sampling" and "through which sampled air passes" were added to the definition.]

2.2.2.6
sampling train
apparatus consisting of one or more *(air) samplers* (2.2.2.1) connected in series, along with associated sampling equipment and connecting tubing, used to collect one or more *chemical agents* (2.1.1.2)

2.2.3 Workplace (air) sampling

2.2.3.1
sampling
air sampling
<workplace air quality> process consisting of the collection of *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1) from air or the withdrawal or isolation of a fractional part of a larger volume of air

[SOURCE: EN 1540:2011, 3.3.1, modified — “<Workplace air quality>” was added as the domain for the definition. “Separation” was changed to “collection.” “Onto a collection substrate” was deleted. “Agents” was added after “chemical” to facilitate cross-referencing.]

2.2.3.2
sampling method
air sampling method
<workplace air quality> all steps of the *measuring procedure* (2.1.5.6) that describe the physical process of *(air) sampling* (2.2.3.1)

[SOURCE: EN 1540:2011, 3.3.2, modified — “<Workplace air quality>” added as the domain for the definition.]

2.2.3.3
personal sampling
process of using a *sampler* (2.2.2.1), attached to a person, to collect gases, *vapours* (2.1.2.5) or *airborne particles* (2.1.2.3) in the *breathing zone* (2.1.5.5) for the purpose of measuring *exposure* (2.1.5.1) to *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1)

2.2.3.4
static sampling
area sampling
process of using a *sampler* (2.2.2.1) in a stationary location that collects gases, *vapours* (2.1.2.5) or *airborne particles* (2.1.2.3) for the purpose of measuring *exposure* (2.1.5.1) to *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1)

2.2.3.5
loading
<sample> amount of *sample* (2.2.1.1) collected

[SOURCE: EN 1540:2011, 3.3.5, modified — definition pertaining to <analyte> is in *loading* (2.2.3.6) and “on the collection substrate” changed to “collected”.]

2.2.3.6
loading
<analyte> amount of *analyte* (2.3.2) collected

[SOURCE: EN 1540:2011, 3.3.5, modified — definition pertaining to (sample) is in *loading* (2.2.3.5) and “on the collection substrate” changed to “collected”]

2.2.3.7
collection substrate
sampling substrate
collection medium
sampling medium
medium on which airborne *chemical agents* (2.1.1.2) and/or *biological agents* (2.1.1.1) are collected for subsequent *analysis* (2.3.1)

Note 1 to entry: Filters, polyurethane foams, impinger solutions and sampling cassettes are examples of collection substrates for *airborne particles* (2.1.2.3).

Note 2 to entry: Activated carbon, silica gel and reagent impregnated filters are examples of *collection substrates* (2.2.3.7) for gases and *vapours* (2.1.2.5).

Note 3 to entry: Agar and water media are examples of collection substrates for *bioaerosols* (2.1.4.2).

[SOURCE: EN 1540:2011, 3.3.6, modified — In Note 1 to entry, “impinger solutions” added; in Note 3 to entry, “and water” added; “agents” added after “chemical” to facilitate cross-referencing.]

2.2.3.8
blank (sample)

unused *collection substrate* (2.2.3.7), taken from the same batch used for *sampling* (2.2.3.1), processed so as to measure artifacts in the measurement (sampling and analysis) process

[SOURCE: EN 14902:2005, 3.1.9]

2.2.3.9
field blank

blank (sample) (2.2.3.8) that is transported to the sampling site, but not used for sample collection

Note 1 to entry: A field blank is loaded in the *sampler* (2.2.2.1), where applicable, and returned to the laboratory in the same way as a *sample* (2.2.1.1).

Note 2 to entry: The results from the *analysis* (2.3.1) of field blanks are used to identify contamination of the sample arising from handling in the field and during transport.

[SOURCE: EN 1540:2011, 3.3.8]

2.2.3.10
laboratory blank
method blank

blank (sample) (2.2.3.8) that is not transported to the field

Note 1 to entry: The laboratory blank undergoes the same handling as the sample substrate in the laboratory, including conditioning and placing into the *samplers* (2.2.2.1) or transport containers when this is done in the laboratory.

Note 2 to entry: The results from the *analysis* (2.3.1) of laboratory blanks are used to correct sample results for contamination with *analyte* (2.3.2) and/or *interferents* (2.3.6).

2.2.3.11
breakthrough volume

<gas/vapour> volume of air that can be passed through a *sampler* (2.2.2.1) before the gas or *vapour* (2.1.2.5) exceeds the capacity of the sampler

Note 1 to entry: For practical application, see EN 1076:2009, Annex A.

[SOURCE: EN 1540:2011, 3.3.9, modified — “elutes from” changed to “exceeds the capacity of”.]

2.2.3.12
sampling efficiency
sampler efficiency

<aerosol sampler> for each particle *aerodynamic diameter* (2.1.4.8), relative fraction of the concentration of *airborne particles* (2.1.2.3) collected from the undisturbed air onto the *collection substrate* (2.2.3.7) for *analysis* (2.3.1)

Note 1 to entry: The sampling efficiency is independent of whether the particle concentration is determined by number, surface area or mass.

Note 2 to entry: As used in this definition, the word “undisturbed” applies to ideal laboratory conditions where the presence of the *sampler* (2.2.2.1) and the body onto which it is mounted do not disturb the determination of the reference concentration. The word “undisturbed” does not refer to movement of the air itself.

Note 3 to entry: For an *aerosol sampler* (2.2.2.1.6) with internal separation, e.g. size-selective sampling, the sampling efficiency is the product of the inlet efficiency and the internal penetration.

[SOURCE: EN 1540:2011, 3.3.10, modified — Synonym “efficiency curve” deleted; “aerodynamic diameter of a particle” changed to “particle aerodynamic diameter”; “transported” changed to “collected”; “to the collection substrate” changed to “onto the collection substrate”; new Note 2 to entry added; in Note 3 to entry, “a sampler” changed to “an aerosol sampler”, “separation efficiency” changed to “internal penetration”; “e.g. size selective sampling” added.]

2.2.3.13
pressure drop
<sampling train> difference between ambient pressure and the pressure at the inlet of the pump, for a constant volume flow rate setting

Note 1 to entry: The pressure drop, sometimes referred to as back pressure, is measured across the *sampler* (2.2.2.1), the *collection substrate* (2.2.3.7) and the tubing.

[SOURCE: ISO 13137:2013, 3.9]

2.2.3.14
operating time
period during which the sampling pump can be operated at specified flow rate and *pressure drop* (2.2.3.13) without recharging or replacing the battery

[SOURCE: ISO 13137:2013, 3.12, modified — “sampling” added.]

2.3 Terms related to the analytical method

2.3.1
analysis
all operations carried out after *sample preparation* (2.3.11) to determine the amount or concentration of the *analyte(s)* (2.3.2) of interest present in the *sample* (2.2.1.1)

Note 1 to entry: Adapted from EN 14902:2005, 3.1.1.

[SOURCE: EN 1540:2011, 4.1]

2.3.2
analyte
substance or chemical constituent that is determined in an *analytical method* (2.3.3)

[SOURCE: EN 1540:2011, 4.2]

2.3.3
analytical method
all steps of the *measuring procedure* (2.1.5.6) that describe the overall process of *sample preparation* (2.3.11) and *analysis* (2.3.1)

Note 1 to entry: In the context of this International Standard, determination of mass by weighing is considered to be an analytical method.

[SOURCE: EN 1540:2011, 4.3]

2.3.4
homologous series
series of compounds possessing similar physicochemical properties, each member of which differs from the preceding member by addition of a repeating unit

Note 1 to entry: A common example of the repeating unit is the –CH2- methylene group.

[SOURCE: EN 1540:2011, 4.4, modified — In Note 1, “The most” changed to “A”.]

2.3.5
instrumental detection limit
IDL

lowest concentration at which an instrument can distinguish the presence of *analyte* (2.3.2) from the background generated by a matrix, such as a *reagent blank* (2.3.9), having a minimal content of that analyte

[SOURCE: ISO 30011:2010, 3.2.7, modified — "analyte content" changed to "the presence of analyte", "minimal matrix" changed to "matrix, such as a reagent blank, having a minimal content of that analyte" for clarity, and Note 1 to entry not included.]

2.3.6
interferent
constituent of the *(air) sample* (2.2.1.1) or other aspect of the sampling or analytical procedure having an adverse effect on the accuracy of the measurement

Note 1 to entry: Interferents can include components of sampling or analysis equipment, reagents, etc.

[SOURCE: EN 1540:2011, 4.5, modified — Added "or other aspect of the sampling or analytical procedure" and added Note 1 to entry.]

2.3.7
dynamic range
range of concentrations over which the measured *analyte* (2.3.2) response is suitable for the *measuring procedure* (2.1.5.6)

Note 1 to entry: For example, in methods such as atomic spectrometry, the linear dynamic range extends from the *limit of quantification* (2.4.3.5) to the onset of calibration curvature. See ISO 30011 for more information.

2.3.8
measurand
particular quantity subject to measurement

[SOURCE: EN 1540:2011, 4.6]

2.3.9
reagent blank
all reagents used in *sample preparation* (2.3.11), in the same quantities used to prepare blank and sample solutions

Note 1 to entry: The reagent blank is used to assess contamination from the laboratory environment and to characterize background from the reagents used in sample preparation.

[SOURCE: ISO 30011:2010, 3.2.12, modified — Editorially improved.]

2.3.10
reference sample
sample (2.2.1.1) having a known or measured content and/or *loading* (2.2.3.6) of the *analyte* (2.3.2) of interest

Note 1 to entry: A reference sample can be analysed to determine the *analytical bias* (2.4.3.1.1) or the *analytical precision* (2.4.2.6) of *a measuring procedure* (2.1.5.6).

[SOURCE: EN 1540:2011, 4.7, modified — "or loading" changed to "and/or loading".]

2.3.11
sample preparation
all operations carried out on a *sample* (2.2.1.1), usually after transportation and storage, to prepare it for *analysis* (2.3.1), including transformation of the sample into a measurable state, where necessary

Note 1 to entry: Adapted from EN 14902:2005, 3.1.24.

[SOURCE: EN 1540:2011, 4.8]

2.4 Terms related to method performance

2.4.1 Efficiency

2.4.1.1
analytical recovery
all operations carried out after *sample preparation* (2.3.11) to determine the amount or concentration of the *analyte(s)* (2.3.2) of interest present in the collected *sample* (2.2.1.2)

Note 1 to entry: Adapted from EN 14902:2005, 3.1.1.

[SOURCE: EN 1540:2011, 5.1.1]

2.4.1.2
method recovery
ratio of the measured concentration of *chemical agent* (2.1.1.2) in air to its actual concentration

Note 1 to entry: The method recovery is usually given as a percentage.

Note 2 to entry: The method recovery incorporates both *sampling efficiency* (2.2.3.12) and *analytical recovery* (2.4.1.1).

[SOURCE: EN 1540:2011, 5.1.2, modified — Changed “determined” to “measured”.]

2.4.1.3
selectivity
<measuring procedure> extent of independence of a *measuring procedure* (2.1.5.6) from interferences

[SOURCE: EN 1540:2011, 5.1.3]

2.4.2 Uncertainty

2.4.2.1
uncertainty of measurement
measurement error
measured quantity value (2.4.2.1.1) minus a *reference quantity value* (2.4.2.1.2)

Note 1 to entry: Application of the concept of measurement uncertainty is described in JCGM 200:2012.

[SOURCE: JCGM 200:2012, 2.16, modified — Only the JCGM definition is used; Note 1 to entry is added.]

2.4.2.1.1
measured quantity value
value of a measured quantity
measured value
quantity value representing a measurement result

Note 1 to entry: Additional information can be found in JCGM 200:2012.

[SOURCE: JCGM 200:2012, 2.10, modified – Only the JCGM definition is used; Note 1 to entry is added.]

2.4.2.1.2
reference quantity value
reference value
quantity value used as a basis for comparison with values of quantities of the same kind

Note 1 to entry: Additional information can be found in JCGM 200:2012.

[SOURCE: JCGM 200:2012, 5.18, modified — Only the JCGM definition is used; Note 1 to entry is added.]

2.4.2.1.3
non-random uncertainty
systematic measurement error
systematic error of measurement
systematic error
component of *uncertainty of measurement* (2.4.2.1) that, in replicate measurements, remains constant or varies in a predictable manner

Note 1 to entry: Additional information can be found in JCGM 200:2012.

[SOURCE: JCGM 200:2012, 2.17, modified — Only the JCGM definition is used; Note 1 to entry is added.]

2.4.2.1.4
random uncertainty
random measurement error
random error of measurement
random error
uncertainty associated with random errors

Note 1 to entry: Additional information can be found in JCGM 200:2012.

[SOURCE: EN 1540:2011, 5.2.1.2, modified — Note 1 to entry added.]

2.4.2.2
analytical uncertainty
analytical error
u_a
combined uncertainty of the *analytical method* (2.3.3) including contributions from the *analytical recovery* (2.4.1.1) and the analytical variability

[SOURCE: EN 1540:2011, 5.2.2, modified — Synonym "analytical error" has been added and Note 1 to entry has been moved into the definition.]

2.4.2.2.1
non-random analytical uncertainty
systematic analytical error
$u_{a,nr}$
uncertainty associated with non-random analytical error

[SOURCE: EN 1540:2011, 5.2.2.1]

2.4.2.2.2
random analytical uncertainty
random analytical error
$u_{a,r}$
uncertainty associated with random analytical error

Note 1 to entry: The random analytical error (in some cases called "analytical variability") is equivalent to the *analytical precision* (2.4.2.6) determined under reproducibility conditions or the analytical precision determined under repeatability conditions together with other random uncertainty components associated with interferences, calibration, instrument response drift, blank correction, etc.

[SOURCE: EN 1540:2011, 5.2.2.2]

2.4.2.3
sampling uncertainty
sampling error
u_S
combined uncertainty of the *sampling method* (2.2.3.2) including, where relevant, contributions from sampled air volume, *sampling efficiency* (2.2.3.12), sample storage and, if applicable, transport

[SOURCE: EN 1540:2011, 5.2.3, modified — Synonym “sampling error” has been added, “sampling procedure” changed to “sampling method”, and note moved into definition.]

2.4.2.3.1
non-random sampling uncertainty
systematic sampling uncertainty
systematic sampling error
$u_{S,nr}$
uncertainty associated with non-random sampling error

[SOURCE: EN 1540:2011, 5.2.3.1]

2.4.2.3.2
random sampling uncertainty
random sampling error
$u_{S,r}$
uncertainty associated with random sampling error

[SOURCE: EN 1540:2011, 5.2.3.2]

2.4.2.4
combined standard uncertainty
u_C
uncertainty of the result of a measurement, expressed as a standard deviation, when that result is obtained from the values of a number of other quantities, equal to the positive square root of a sum of terms, the terms being the variances or covariances of these other quantities weighted according to how the measurement result varies with changes in these quantities

[SOURCE: EN 1540:2011, 5.2.5, modified — Definition of “standard uncertainty” from EN 1540 incorporated into this definition.]

2.4.2.4.1
combined non-random standard uncertainty
$u_{C,nr}$
combined uncertainty associated with *non-random sampling uncertainty* (2.4.2.3.1) and *non-random analytical uncertainty* (2.4.2.2.1)

[SOURCE: EN 1540:2011, 5.2.5.2, modified — “error” changed to “uncertainty”.]

2.4.2.4.2
combined random standard uncertainty
$u_{C,r}$
combined uncertainty associated with *random sampling uncertainty* (2.4.2.3.2) and *random analytical uncertainty* (2.4.2.2.2)

Note 1 to entry: In some cases, the combined random sampling uncertainty and random analytical uncertainty is called method variability.

[SOURCE: EN 1540:2011, 5.2.5.1, modified — “error” changed to “uncertainty”.]

2.4.2.5
expanded uncertainty
U
quantity defining an interval about a result of a measurement, expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the *measurand* (2.3.8)

[SOURCE: EN 1540:2011, 5.2.6]

2.4.2.6
analytical precision
closeness of agreement between indications or *measured quantity values* (2.4.2.1.1) obtained by replicate analytical measurements on the same or similar objects under specified conditions

Note 1 to entry: Analytical precision is usually expressed numerically, e.g. by standard deviation, variance, or coefficient of variation under specified conditions of measurement.

Note 2 to entry: The analytical precision can be determined under *repeatability conditions of measurement* (2.4.3.7), *intermediate precision conditions of measurement* (B.5.5), or *reproducibility conditions of measurement* (2.4.3.9). See ISO 5725-1.

[SOURCE: JCGM 200:2012 (VIM), 2.15]

2.4.2.7
method precision
variability arising from the *measuring procedure* (2.1.5.6) as a whole, including sampling and *analysis* (2.3.1)

[SOURCE: EN 1540:2011, 5.2.8, modified — “imprecision” changed to “variability”.]

2.4.3 General statistical terms

2.4.3.1
measurement bias
bias
estimate of a *systematic measurement error* (2.4.2.1.3)

Note 1 to entry: An additional definition can be found in ISO 3534-2:2006, 3.3.2.

[SOURCE: JCGM 200:2012 (VIM), 2.18, modified — Note 1 to entry added.]

2.4.3.1.1
analytical bias
estimate of systematic analytical error

2.4.3.1.2
method bias
systematic measurement error (2.4.2.1.3) of the *measuring procedure* (2.1.5.6) as a whole, incorporating both *sampling efficiency* (2.2.3.12) and *analytical bias* (2.4.3.1.1)

[SOURCE: EN 1540:2011, 5.3.1.2, modified — In definition text, “bias” changed to “systematic measurement error” and Note 1 moved into definition.]

2.4.3.2
coverage factor
k
numerical factor used as a multiplier of the *combined standard uncertainty* (2.4.2.4) in order to obtain an *expanded uncertainty* (2.4.2.5)

Note 1 to entry: A coverage factor, k , is typically in the range from 2 to 3.

[SOURCE: EN 1540:2011, 5.3.2, modified – Note 2 to entry deleted.]

2.4.3.3
precision
measurement precision
closeness of agreement between independent test/measurement results obtained under stipulated conditions

Note 1 to entry: Precision can be expressed as a standard deviation or relative standard deviation (coefficient of variation).

[SOURCE: ISO 3534-2:2006, 3.3.4, modified — Note 1 to entry added.]

2.4.3.4
limit of detection
detection limit
LOD
lowest amount of an *analyte* (2.3.2) that is detectable with a given confidence level

Note 1 to entry: The limit of detection can be calculated as three times the standard deviation of blank measurements. This represents a probability of 50 % that the analyte will not be detected when it is present at the concentration of the LOD.

Note 2 to entry: The LOD can be used as a threshold value to assert the presence of a substance with a known confidence.

[SOURCE: EN 1540:2011, 5.3.4]

2.4.3.5
limit of quantification
quantification limit
LOQ
lowest amount of an *analyte* (2.3.2) that is quantifiable with a given confidence level

Note 1 to entry: The limit of quantification can be calculated as ten times the standard deviation of blank measurements.

Note 2 to entry: The value LOQ can be used as a threshold value to assure quantitative measurement of an analyte accurately.

[SOURCE: EN 1540:2011, 5.3.5, modified — Note 2 to entry modified and Note 3 to entry deleted.]

2.4.3.6
measurement repeatability
repeatability
measurement precision (2.4.3.3) under a set of repeatability conditions of measurement

[SOURCE: JCGM 200:2012 (VIM), 2.21]

2.4.3.7
repeatability condition of measurement
repeatability condition
condition of measurement, out of a set of conditions that includes the same *measuring procedure* (2.1.5.6), same operators, same measuring system, same operating conditions and same location, and replicate measurements on the same or similar objects over a short period of time

Note 1 to entry: A condition of measurement is a repeatability condition only with respect to a specified set of repeatability conditions.

[SOURCE: JCGM 200:2012 (VIM), 2.20, modified — "measurement procedure" changed to "measuring procedure".]

2.4.3.8
measurement reproducibility
reproducibility
measurement precision (2.4.3.3) under *reproducibility conditions of measurement* (2.4.3.9)

[SOURCE: JCGM 200:2012 (VIM), 2.25]

2.4.3.9
reproducibility condition of measurement
reproducibility condition
condition of measurement, out of a set of conditions that includes different locations, operators, measuring systems, and replicate measurements on the same or similar objects

Note 1 to entry: The different measuring systems may use different *measuring procedures* (2.1.5.6).

Note 2 to entry: A specification should give the conditions changed and unchanged, to the extent practical.

[SOURCE: JCGM 200:2012 (VIM), 2.24, modified — In Note 1 to entry, “measurement” changed to “measuring”.]

2.4.3.10
true value
value which characterizes a quantity or quantitative characteristic perfectly defined in the conditions which exist when that quantity or quantitative characteristic is considered

Note 1 to entry: The true value of a quantity or quantitative characteristic is a theoretical concept and, in general, cannot be known exactly. In practice, a reference value is commonly accepted as the true value.

[SOURCE: ISO 3534-2:2006, 3.2.5, modified — Note 2 to entry deleted.]

2.4.4 Other statistical terms

2.4.4.1
validation
process of evaluating the performance of a *measuring procedure* (2.1.5.6) and checking that the performance meets certain pre-set criteria

Note 1 to entry: Performance characteristics to be considered include confirmation of identity, *selectivity* (2.4.1.3)/specificity, *limit of detection* (2.4.3.4), *limit of quantification* (2.4.3.5), *analytical recovery* (2.4.1.1), working and linear *dynamic ranges* (2.3.7), accuracy, *measurement repeatability* (2.4.3.6), *measurement reproducibility* (2.4.3.8), *ruggedness* (B.4.5), and *robustness* (B.4.4).

[SOURCE: EN 1540:2011, 5.4.1]

2.4.4.2
measuring range
concentration range for which the *expanded uncertainty* (2.4.2.5) of a validated *measuring procedure* (2.1.5.6) is a specified value

Note 1 to entry: EN 482:2012 specifies maximum values for expanded uncertainty.

[SOURCE: EN 1540:2011, 5.4.2]

Annex A
(informative)

Alphabetical index of terms defined

Table A.1 provides an alphabetical index of terms defined in this International Standard. Preferred terms (presented in bold in the main body) are listed in non-italicized font. Synonyms (admitted terms) are listed in italics.

Table A.1 — Index of terms defined

Table A.1 *(continued)*

Term	**Number**
coagulation	2.1.4.11
coalescence	2.1.4.12
collected sample	2.2.1.2
collection medium	2.2.3.7
collection substrate	2.2.3.7
combined non-random standard uncertainty	2.4.2.4.1
combined random standard uncertainty	2.4.2.4.2
combined standard uncertainty	2.4.2.4
coverage factor	2.4.3.2
dermal exposure	2.1.5.2
detection limit	2.4.3.4
diffusive sampler	2.2.2.1.2
dustiness	2.1.6.1
dynamic range	2.3.7
expanded uncertainty	2.4.2.5
exposure	2.1.5.1
extrathoracic convention	2.1.3.2.2
extrathoracic fraction	2.1.3.1.2
field blank	2.2.3.9
flow-controlled pump	2.2.2.1.5
health-related fractions	2.1.3.1
homologous series	2.3.4
IDL	2.3.5
inhalable convention	2.1.3.2.1
inhalable fraction	2.1.3.1.1
inhalable sampler	2.2.2.1.6.1
instrumental detection limit	2.3.5
interferent	2.3.6
laboratory blank	2.2.3.10
length-of-stain detector tube	2.2.2.4
limit of detection	2.4.3.4
limit of quantification	2.4.3.5
loading (analyte)	2.2.3.6
loading (sample)	2.2.3.5
LOD	2.4.3.4
LOQ	2.4.3.5
measurand	2.3.8
measured quantity value	2.4.2.1.1
measured value	2.4.2.1.1
measurement bias	2.4.3.1
measurement error	2.4.2.1
measurement method	2.1.5.6
measurement precision	2.4.3.3
measurement procedure	2.1.5.6

Table A.1 *(continued)*

Term	**Number**
measurement repeatability	2.4.3.6
measurement reproducibility	2.4.3.8
measuring procedure	2.1.5.6
measuring range	2.4.4.2
method bias	2.4.3.1.2
method precision	2.4.2.7
method recovery	2.4.1.2
mixed-phase sampler	2.2.2.1.7
nanoaerosol	2.1.4.3
nanoparticle	2.1.4.4
nanostructured particle	2.1.4.5
non-random analytical uncertainty	2.4.2.2.1
non-random sampling uncertainty	2.4.2.3.1
non-random uncertainty	2.4.2.1.3
occupational exposure limit value	2.1.5.4
OELV	2.1.5.4
operating time	2.2.3.14
particle aerodynamic diameter	2.1.4.8
passive sampler	2.2.2.1.1
personal sample	2.2.1.3
personal sampler	2.2.2.2
personal sampling	2.2.3.3
precision	2.4.3.3
pressure drop	2.2.3.13
pumped sampler	2.2.2.1.4
quantification limit	2.4.3.5
random analytical error	2.4.2.2.2
random analytical uncertainty	2.4.2.2.2
random error	2.4.2.1.4
random error of measurement	2.4.2.1.4
random measurement error	2.4.2.1.4
random sampling error	2.4.2.3.2
random sampling uncertainty	2.4.2.3.2
random uncertainty	2.4.2.1.4
reagent blank	2.3.9
reference period	2.1.5.7
reference quantity value	2.4.2.1.2
reference sample	2.3.10
reference value	2.4.2.1.2
repeatability	2.4.3.6
repeatability condition	2.4.3.7
repeatability condition of measurement	2.4.3.7
reproducibility	2.4.3.8
reproducibility condition	2.4.3.9

Table A.1 *(continued)*

Term	**Number**
reproducibility condition of measurement	2.4.3.9
respirable convention	2.1.3.2.4
respirable fraction	2.1.3.1.4
respirable sampler	2.2.2.1.6.3
sample	2.2.1.1
sample preparation	2.3.11
sampler	2.2.2.1
sampler efficiency	2.2.3.12
sampling	2.2.3.1
sampling convention	2.1.3.2
sampling efficiency	2.2.3.12
sampling error	2.4.2.3
sampling medium	2.2.3.7
sampling method	2.2.3.2
sampling substrate	2.2.3.7
sampling train	2.2.2.6
sampling uncertainty	2.4.2.3
selectivity	2.4.1.3
sorbent tube	2.2.2.5
static sample	2.2.1.4
static sampler	2.2.2.3
static sampling	2.2.3.4
systematic analytical error	2.4.2.2.1
systematic error	2.4.2.1.3
systematic error of measurement	2.4.2.1.3
systematic measurement error	2.4.2.1.3
systematic sampling error	2.4.2.3.1
systematic sampling uncertainty	2.4.2.3.1
thoracic convention	2.1.3.2.3
thoracic fraction	2.1.3.1.3
thoracic sampler	2.2.2.1.6.2
time-weighted average concentration	2.1.5.3
total airborne particles	2.1.2.4
true value	2.4.3.10
TWA concentration	2.1.5.3
ultrafine aerosol	2.1.4.6
ultrafine particle	2.1.4.7
uncertainty of measurement	2.4.2.1
validation	2.4.4.1
value of a measured quantity	2.4.2.1.1
vapour	2.1.2.5
workplace	2.1.6.2

Annex B
(informative)

Additional terms

B.1 General

The normative text of this International Standard contains terms and definitions that are used in workplace air quality International Standards developed by ISO/TC 146/SC 2. This Annex provides additional terms of importance in workplace air quality but not used in International Standards developed by ISO/TC 146/SC 2. This informative Annex is provided for the convenience of users of this International Standard.

These terms are not included in the alphabetical index in Annex A.

B.2 Terms used in general

B.2.1
contaminant
material added by human or natural activities which may, in sufficient concentrations, render the atmosphere unacceptable

Note 1 to entry: Contaminants refer to gases, vapours, mists, *aerosols* (2.1.4.1), *fumes* (B.2.2), particles, or dusts, and so forth, that are airborne. The term does not apply to elements that make up the components of the earth's atmosphere, such as nitrogen, oxygen, argon, and so forth.

[SOURCE: ASTM D1356-14b]

B.2.2
fume
aerosol (2.1.4.1) 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

[SOURCE: ISO 4225:1994, 3.38]

B.3 Terms related to the physical and chemical processes of workplace (air) sampling

B.3.1
sampling rate
rate at which data collection from a *sampler* (2.2.2.1) occurs, usually presented as sample volume per unit time

[SOURCE: ASTM D1356-14b.]

B.3.2
representative sample
sample (2.2.1.1) with the same quality and characteristics for the material of interest as that of its source at the time of *sampling* (2.2.3.1)

[SOURCE: ISO 2889:2010, 3.67]

B.3.3
sorbent
insoluble material or mixture of materials used to recover fluids through the mechanisms of absorption or adsorption or both

[SOURCE: ISO 16165:2013, 2.6.1.13, modified]

B.4 Terms related to the analytical method

B.4.1
calibration curve
graphical representation of measuring signal as a function of quantity of *analyte* (2.3.2)

[SOURCE: EURACHEM Guide on the Fitness for Purpose of Analytical Methods, A3]

B.4.2
reference material
material or substance one or more of whose property values are sufficiently homogenous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

Note 1 to entry: A reference material may be in the form of a pure or mixed gas, liquid, or solid. Examples are water for the calibration of viscometers, sapphire as a heat-capacity calibrant in calorimetry, and solutions used for calibration in chemical *analysis* (2.3.1).

[SOURCE: ISO Guide 30:2015, 2.1.1, modified]

B.4.3
certified reference material
reference material (B.4.2), accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes its traceability to an accurate realization of the unit in which the property values are expressed, and for which each certified value is accompanied by an uncertainty at a stated level of confidence.

[SOURCE: ISO Guide 30:2015, 2.1.2, modified]

B.4.4
robustness
capacity of an *analytical method* (2.3.3) to remain unaffected by small but deliberate variations in method parameters

Note 1 to entry: The robustness of an analytical method provides an indication of its reliability during normal usage.

[SOURCE: EURACHEM Guide on the Fitness for Purpose of Analytical Methods, A25.2, modified — Part of the EURACHEM Guide definition was moved to Note 1 to entry.]

B.4.5
ruggedness
insensitivity of an *analytical method* (2.3.3) to departures from specified test or environmental conditions

Note 1 to entry: An evaluation of the ruggedness of a test method or an empirical model derived from an experiment is useful in determining whether the results or decisions will be relatively invariant over some range of environmental variability under which the test method or the model is likely to be applied.

[SOURCE: ASTM E1169-13a, modified — “a test method” changed to “an analytical method.”]

B.5 Terms related to method performance and statistics

B.5.1

measurement accuracy
accuracy of measurement
accuracy

closeness of agreement between a *measured quantity value* (2.4.2.1.1) and a true quantity value of a *measurand* (2.3.8)

Note 1 to entry: The concept "measurement accuracy" is not a quantity and is not given a numerical quantity value. A measurement is said to be more accurate when it offers a smaller measurement error.

Note 2 to entry: The term "measurement accuracy" should not be used for measurement trueness and the term "measurement precision" should not be used for "measurement accuracy", which, however, is related to both these concepts.

Note 3 to entry: "Measurement accuracy" is sometimes understood as closeness of agreement between measured quantity values that are being attributed to the measurand.

[SOURCE: JCGM 200:2012 (VIM), 2.13]

B.5.2

sensitivity of a measuring system
sensitivity

quotient of the change in an indication of a measuring system and the corresponding change in a value of a quantity being measured

[SOURCE: JCGM 200:2012 (VIM), 4.12, modified — Notes 1 and 2 to entry deleted.]

B.5.3

type A evaluation of measurement uncertainty
type A evaluation

evaluation of a component of measurement uncertainty by a statistical analysis of *measured quantity values* (2.4.2.1.1) obtained under defined measurement conditions

Note 1 to entry: For various types of measurement conditions, see *repeatability condition of measurement* (2.4.3.7), *intermediate precision condition of measurement* (B.5.5), and *reproducibility condition of measurement* (2.4.3.9).

[SOURCE: JCGM 200:2012 (VIM), 2.28, modified — Notes 2 and 3 to entry were omitted.]

B.5.4

type B evaluation of measurement uncertainty
type B evaluation

evaluation of a component of measurement uncertainty determined by means other than a *type A evaluation of measurement uncertainty* (B.5.3)

EXAMPLE Evaluation based on information

- associated with authoritative published quantity values,
- associated with the quantity value of a *certified reference material* (B.4.3),
- obtained from a calibration certificate,
- about drift,
- obtained from the accuracy class of a verified measuring instrument,
- obtained from limits deduced through personal experience.

[SOURCE: JCGM 200:2012 (VIM), 2.29, modified — Note 1 to entry was omitted.]

B.5.5

intermediate precision condition of measurement

intermediate precision condition

condition of measurement, out of a set of conditions that includes the same *measuring procedure* (2.1.5.6), same location, and replicate measurements on the same or similar objects over an extended period of time but may include other conditions involving changes

Note 1 to entry: The changes can include new calibrations, calibrators, operators, and measuring systems.

[SOURCE: JCGM 200:2012 (VIM), 2.22, modified — “Measurement procedure” changed to “measuring procedure.” Notes 2 and 3 to entry were omitted.]

B.5.6

proficiency testing

evaluation of participant performance against pre-established criteria by means of interlaboratory comparisons

[SOURCE: ISO/IEC 17043:2010, 3.7, modified]

Bibliography

[1] ISO Guide 30:2015, *Reference materials — Selected terms and definitions*

[2] ISO 2889:2010, *Sampling airborne radioactive materials from the stacks and ducts of nuclear facilities*

[3] ISO 3534-2:2006, *Statistics — Vocabulary and symbols — Part 2: Applied statistics*

[4] ISO 4225:1994, *Air quality — General aspects — Vocabulary*

[5] ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

[6] ISO 7708:1995, *Air quality — Particle size fraction definitions for health-related sampling*

[7] ISO 10241-1:2011, *Terminological entries in standards — Part 1: General requirements and examples of presentation*

[8] ISO 13137:2013, *Workplace atmospheres — Pumps for personal sampling of chemical and biological agents — Requirements and test methods*

[9] ISO/TR 14294, *Workplace atmospheres — Measurement of dermal exposure — Principles and methods*

[10] ISO 16165:2013, *Ships and marine technology — Marine environment protection — Terminology relating to oil spill response*

[11] ISO/IEC 17043:2010, *Conformity assessment — General requirements for proficiency testing*

[12] ISO 21438-1:2007, *Workplace atmospheres — Determination of inorganic acids by ion chromatography — Part 1: Non-volatile acids (sulfuric acid and phosphoric acid)*

[13] ISO/TR 27628:2007, *Workplace atmospheres — Ultrafine, nanoparticle and nano-structured aerosols — Inhalation exposure characterization and assessment*

[14] ISO 30011:2010, *Workplace air — Determination of metals and metalloids in airborne particulate matter by inductively coupled plasma mass spectrometry*

[15] ISO/TS 80004-4:2011, *Nanotechnologies — Vocabulary — Part 4: Nanostructured materials*

[16] JCGM 200:2012, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

[17] ASTM D1356-14b, *Standard Terminology Relating to Sampling and Analysis of Atmospheres*

[18] ASTM E1169-13a, *Standard Practice for Conducting Ruggedness Tests*

[19] EN 481:1993, *Workplace Atmospheres — Size Fraction Definitions for Measurement of Airborne Particles*

[20] EN 482:2012, *Workplace exposure — General requirements for the performance of procedures for the measurement of chemical agents*

[21] EN 1076:2009, *Workplace exposure — Procedures for measuring gases and vapours using pumped samplers — Requirements and test methods*

[22] EN 1540:2011, *Workplace exposure — Terminology*

[23] EN 14902:2005, *Ambient air quality — Standard method for the measurement of Pb, Cd, As and Ni in the PM10 fraction of suspended particulate matter*

[24] Council Directive 98/24/EC of 7 April 1988 on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

[25] EURACHEM Guide. The Fitness for Purpose of Analytical Methods: A Laboratory Guide to Method Validation and Related Topics. First Internet Version, 1998

[26] EURACHEM/CITAC Guide. *Measurement Uncertainty arising from sampling – A guide to methods and approaches*, First Edition, 2007

[27] British Columbia Field Sampling Manual. 2003 Edition, accessible at www.env.gov.bc.ca/wsd/data_searches/field_sampling_manual/field_man_pdfs/fld_man_03.pdf

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