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# Workplace air — Terminology

*Qualité de l'air — Terminologie*

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

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# Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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


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# 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.

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# 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]

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**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


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**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]

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**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]


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**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]

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**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.]


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