BS EN 1540:2021

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Workplace exposure — Terminology

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee EH/2/2, Work place atmospheres.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Workplace exposure - Terminology

Exposition sur les lieux de travail - Terminologie

Exposition am Arbeitsplatz - Terminologie

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European foreword

This document (EN 1540:2021) has been prepared by Technical Committee CEN/TC 137 "Assessment of workplace exposure to chemical and biological agents", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2022, and conflicting national standards shall be withdrawn at the latest by June 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1540:2011.

The major technical changes between this document and the previous edition are as follows:

a) The given terminology has been re-adjusted, where appropriate, to ISO 18158:2016, which represents a modified ISO-adoption of EN 1540:2011.

b) The subdivision and order of the terms and definitions has partly been changed and simplified by deleting some subheadings.

c) The following terms and definitions (admitted terms given in italic) have been added:

   1) General terms:

      aerodynamic diameter, *aerodynamic equivalent diameter,* agglomerate, aggregate, *air sampling device,* appraiser, coagulation, *diffusive diameter*, *diffusive equivalent diameter*, dustiness mass fraction, *effective density*, equivalent density, *exposure by inhalation*, exposure profile, inhalation exposure, material density, median diameter, *median particle diameter*, microbial compound, *mobility diameter*, *mobility equivalent diameter*, nanomaterial, nano-object, nanoparticle, nanoscale, *particle aerodynamic equivalent diameter*, *particle diffusive diameter*, *particle diffusive equivalent diameter*, *particle material density*, particle mobility diameter, *particle mobility equivalent diameter*, particle number concentration, particle size, particle size distribution, *particle surface area*, similar exposure group, source domain, surface area, *ultrafine particle*, volume diameter, *volume equivalent diameter*

   2) Terms related to the physical and chemical processes of workplace air sampling:

      area sampling, *back pressure,* blank, *blank sample*, direct-reading instrument, flow-controlled pump, *method blank*, pressure drop, *real-time monitor*, *stationary sampler*, sampling cassette, vapour sampler

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3) Terms related to the analytical method:

   test gas

4) Terms related to method performance:

   collection efficiency, *measurement bias*, *measurement precision, repeatability condition of measurement*, *reproducibility condition of measurement*, sampler bias, sampling bias

d) The term "thermodynamic diameter" is no longer used (see 3.1.2.12).

e) The term "efficiency curve" has been deleted as synonymous term for "sampling efficiency".

f) In Annex A, an additional column has been introduced for symbols commonly used.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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1 Scope

This document specifies terms and definitions that are related to the assessment of workplace exposure to chemical and biological agents. These are either general terms or terms which are specific to physical and chemical processes of air sampling, the analytical method 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.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at https://www.electropedia.org/

3.1 General terms

3.1.1 Agents and air pollutants

3.1.1.1
biological agent
bacteria, viruses, fungi and other micro-organisms or microbial compounds, including those which have been genetically modified, cell cultures and human endoparasites which can provoke hazardous effects

Note 1 to entry: Examples for hazardous effects are infections, allergies, poisoning and inflammations.

Note 2 to entry: Dusts of organic origin, for example pollen, flour dust and wood dust, are not considered to be biological agents and are therefore not covered by this definition.

3.1.1.2
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)]

3.1.1.3
air pollutant
chemical or biological agent emitted into the atmosphere either by human activity or natural processes and adversely affecting humans or the environment

[SOURCE: ISO 18158:2016, 2.1.2.1, modified – "material" has been replaced with "chemical or biological agent".]

3.1.1.4
airborne dust
chemical and/or biological agent(s) in solid form, dispersed in air

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3.1.1.5
airborne particle
chemical or biological agent in solid or liquid form, dispersed in air

[SOURCE: ISO 18158:2016, 2.1.2.3, modified – Singular form of term has been used and "fine matter" has been replaced with "chemical or biological agent".]

3.1.1.6
total airborne particles
all airborne particles present in a given volume of air

[SOURCE: ISO 18158:2016, 2.1.2.4, modified – "all" has been added.]

3.1.1.7
aerosol
airborne particles 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.

[SOURCE: ISO 18158:2016, 2.1.4.1]

3.1.1.8
bioaerosol
biological agent(s) suspended in air

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

[SOURCE: ISO 18158:2016, 2.1.4.2, modified – "aerosol consisting of (a)" has been deleted from the beginning of the definition and "suspended in air" has been added at the end of the definition.]

3.1.1.9
microbial compound
cell or cell wall component or metabolite of microbial origin

Note 1 to entry: Microbial compounds also include the chemical agents which are produced by microorganisms.

Note 2 to entry: Endotoxins, glucans, mycotoxins and enzymes are examples of microbial compounds. Microbial DNA is also included in this definition.

[SOURCE: EN 13098:2019, 3.17 modified – New Note 1 to entry has been added.]

3.1.1.10
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

3.1.2 Particles

3.1.2.1
health-related fractions
fractions of airborne particles penetrating to different regions of the respiratory tract

Note 1 to entry: The health-related fractions are the inhalable fraction, the thoracic fraction and the respirable fraction.

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3.1.2.2
inhalable fraction
mass fraction of total airborne particles which is inhaled through the nose and mouth

[SOURCE: ISO 18158:2016, 2.1.3.1.1, modified – Note 1 to entry has been deleted.]

3.1.2.3
thoracic fraction
mass fraction of total airborne particles which penetrate beyond the larynx

[SOURCE: ISO 18158:2016, 2.1.3.1.3]

3.1.2.4
respirable fraction
mass fraction of total airborne particles which penetrate to the unciliated airways

[SOURCE: ISO 18158:2016, 2.1.3.1.4]

3.1.2.5
nanoparticle
ultrafine particle
particle with an equivalent diameter less than 0,1 µm

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

Note 2 to entry: An equivalent diameter can be aerodynamic, diffusive, mobility, volume, geometric, projected-area or otherwise equivalent.

[SOURCE: CEN ISO/TS 80004-2:2017, A.2.2, modified – "nanoparticle" has been introduced as preferred term and the original Notes 1 and 2 to entry have been replaced by new Notes to entry.]

3.1.2.6
particle size
linear dimension of a particle determined by a specified measuring procedure and under specified measurement conditions

[SOURCE: ISO 26824:2013, modified – "measurement method" has been replaced with "measuring procedure".]

3.1.2.7
particle size distribution
distribution of particles as a function of particle size

Note 1 to entry: Particle size distribution can be expressed as cumulative distribution or a distribution density (distribution of the fraction of material in a particle size class, divided by the width of that class).

Note 2 to entry: Adapted from EN ISO 14644-1:2015.

[SOURCE: EN 17199-1:2019, 3.6]

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3.1.2.8
particle number concentration
C_N
number of particles related to the unit volume of the carrier gas

Note 1 to entry: The particle number concentration is given as number per cubic centimetre [cm^{-3}].

[SOURCE: EN 16897:2017, 3.7, modified – The original Notes 1 and 2 to entry have been deleted and replaced by a new Note 1 to entry.]

3.1.2.9
dustiness
propensity of materials to produce airborne dust during handling

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

3.1.2.10
dustiness mass fraction
w_D
ratio of a health-related fraction of airborne dust produced by the dustiness test procedure to the test mass for the respective test method

3.1.2.11
particle aerodynamic diameter
aerodynamic diameter
particle aerodynamic equivalent diameter
aerodynamic equivalent diameter
d_{ae}
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: In the human respiratory tract, the separation of particles with an aerodynamic diameter smaller than approximately 0,4 µm is better characterized by the particle diffusive equivalent diameter.

[SOURCE: ISO 18158:2016, 2.1.4.8, modified – Further admitted terms, letter symbol and Note 1 to entry have been taken over from EN 16966:2018.]

3.1.2.12
particle diffusive diameter
particle diffusive equivalent diameter
diffusive equivalent diameter
diffusive diameter
DEPRECATED: thermodynamic diameter
d_{de}
diameter of a sphere with the same diffusion coefficient as the particle under prevailing condition of temperature and pressure within the respiratory tract

Note 1 to entry: For particles with aerodynamic diameter above approximately 0,4 µm, the aerodynamic diameter becomes more significant in characterizing deposition than particle diffusive diameter.

[SOURCE: EN ISO 13138:2012, 3.2, modified — 'Particle diffusive diameter" has been introduced as new preferred term, further admitted terms have been added, term 'thermodynamic diameter' is referred as deprecated; the original Notes 1 to 3 to entry have been deleted and replaced by a new Note 1 to entry.]

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3.1.2.13
particle mobility diameter
particle mobility equivalent diameter
mobility equivalent diameter
mobility diameter
d_{me}
diameter of a sphere carrying a single elementary charge with the same drift speed in an electric field as the particle under prevailing condition of temperature and pressure

Note 1 to entry: The mobility diameter of a particle depends on its size, shape and electric charge level (which depends on the charging process involving its capacitance, i.e. its capacity to become electrically charged by bipolar air ions), but not of its density.

[SOURCE: EN 16966:2018, 3.21]

3.1.2.14
volume diameter
volume equivalent diameter
diameter of a sphere with the same volume as the particle under prevailing condition of temperature and pressure

[SOURCE: EN 16966:2018, 3.25, modified – Notes 1 and 2 to entry have been deleted.]

3.1.2.15
agglomerate
collection of weakly bound particles or aggregates or mixtures of the two where the resulting external surface area is similar to the sum of the surface areas of the individual components

Note 1 to entry: The forces holding an agglomerate together are weak forces, for example van der Waals forces, or simple physical entanglement.

Note 2 to entry: Agglomerates are also termed secondary particles and the original source particles are termed primary particles.

[SOURCE: EN 16966:2018, 3.1]

3.1.2.16
aggregate
particle comprising strongly bonded or fused particles where the resulting external surface area can be significantly smaller than the sum of calculated surface areas of the individual components

Note 1 to entry: The forces holding an aggregate together are strong forces, for example covalent bonds, or those resulting from sintering or complex physical entanglement.

Note 2 to entry: Aggregates are also termed secondary particles and the original source particles are termed primary particles.

[SOURCE: CEN ISO/TS 80004-2:2017, 3.5]

3.1.2.17
coagulation
process caused by relative motion between particles which causes particles to collide with each other and thereafter adhering to one another

[SOURCE: EN 16966:2018, 3.5, modified – Note 1 to entry has been deleted.]

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3.1.2.18
equivalent density
effective density
ratio of mass of an agglomerate/aggregate to the volume of a sphere defined by an equivalent diameter of the same agglomerate/aggregate

Note 1 to entry: The equivalent density generally decreases as the size of an agglomerate/aggregate increases.

Note 2 to entry: An equivalent diameter can be aerodynamic, diffusive, mobility, volume, geometric, projected-area or otherwise equivalent.

[SOURCE: EN 16966:2018, 3.7, modified – "effective density" has been replaced in Note 1 to entry by "equivalent density" and Note 2 to entry has been added.]

3.1.2.19
material density
particle material density
ratio of particle mass to particle volume excluding all pores, voids and other gas containing compartments

[SOURCE: EN 16966:2018, 3.11]

3.1.2.20
median diameter
median particle diameter
particle size of a particle distribution for which one-half of the total number of particles are larger and one-half are smaller

[SOURCE: EN 16966:2018, 3.12, modified – The word "of" has been added between "one-half" and "the total number".]

3.1.2.21
nanomaterial
material with any external dimensions in the nanoscale or having internal structure or surface structure in the nanoscale

[SOURCE: CEN ISO/TS 80004-1:2015, 2.4]

3.1.2.22
nano-object
discrete piece of material with one, two or three external dimensions in the nanoscale

Note 1 to entry: The second and third external dimensions are orthogonal to the first dimension and to each other.

[SOURCE: CEN ISO/TS 80004-1: 2015, 2.5]

3.1.2.23
nanoscale
length range approximately from 1 nm to 100 nm

Note 1 to entry: Properties that are not extrapolations from larger sizes are predominantly exhibited in this length range.

[SOURCE: CEN ISO/TS 80004-1: 2015, 2.1]

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