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Respiratory protective devices — Vocabulary and graphical symbols

Appareils de protection respiratoire — Vocabulaire et symboles graphiques

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

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Foreword

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This document was prepared by Technical Committee ISO/TC 94, *Personal safety — Personal protective equipment*, Subcommittee SC 15, *Respiratory protective devices*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 79, *Respiratory protective devices*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 16972:2010), which has been technically revised. The main changes compared with the previous edition are as follows:

— the terms used in the field of respiratory protective devices (RPD) have been updated;

— Clause 5, “Units of measurement”, has been deleted;

— Annex A, “Terms and definitions referring to respiratory protective devices in current national standards, regulations or other national contexts”, has been deleted;

— Annex B, “Abbreviations used”, has been deleted.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Respiratory protective devices — Vocabulary and graphical symbols

1 Scope

This document defines terms and specifies units of measurement for respiratory protective devices (RPDs), excluding diving apparatus. It indicates graphical symbols that can be required on RPDs, parts of RPD or instruction manuals in order to instruct the person(s) using the RPD as to its operation.

NOTE Terms and definitions for diving apparatus are given in EN 250.

2 Normative references

There are no normative references in this document.

3 Terms related to respiratory protective devices

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 http://www.electropedia.org/

3.1
abrasive blasting respiratory protective device
breathing apparatus (3.32) incorporating a protective *hood* (3.115) or a *blouse* (3.23) fitted with an *impact resistant* (3.119) *visor* (3.252)

Note 1 to entry: *Breathable air* (3.28) is supplied to the *wearer* (3.257) from a source of air not carried by the wearer.

3.2
accessory
item, or items, that are attached to the *respiratory protective device (RPD)* (3.203) that are not necessary for the RPD to meet the requirements of the RPD performance standard and do not compromise its protection

3.3
adequacy assessment
selection method identifying the *respiratory protective device* (3.203) is able to reduce the *wearer's* (3.257) inhalation exposure to acceptable levels

3.4
adequate respiratory protective device
adequate RPD
RPD (3.203) capable of reducing the inhalation exposure to an acceptable level

3.5
aerodynamic diameter
diameter of a unit density sphere having the same settling velocity as the *particle* (3.170) in question

3.6
aerosol
suspension of solid, liquid, or solid and liquid *particles* (3.170) in a gaseous medium, having a negligible falling velocity (generally considered to be less than 0,25 m/s)

3.7
aerosol penetration
ability of *particles* (3.170) to pass through a particle-filtering material

3.8
air flow resistance
pressure difference between upstream and downstream locations caused by the flow of air through the parts and components of a *respiratory protective device* (3.203) such as an *exhalation valve* (3.79), *inhalation valve* (3.120), *filter(s)* (3.86), and *tube* (3.245), etc.

3.9
air supply hose
fresh air supply hose
hose (3.116) for the supply of air at about atmospheric pressure

3.10
ambient air bypass
means to enable the *wearer* (3.257) to breathe the *ambient atmosphere* (3.12) before entering and after leaving a *hazardous atmosphere* (3.108)

3.11
ambient air system
device used to deliver ambient air at a *low pressure* (3.134) directly to a *breathable gas* (3.29) *respiratory protective device* (3.203) (manually or power assisted)

3.12
ambient atmosphere
air surrounding the *wearer* (3.257)

3.13
ambient concentration
concentration of a compound in the air surrounding the *wearer* (3.257)

3.14
ambient laboratory conditions
atmosphere where the temperature is between 16 °C and 32 °C and the relative humidity is between 20 % and 80 %

3.15
apertometer
extended hemispherical dome for measuring the angular area of the *field of vision* (3.85) [*peripheral isopter* (3.176)] of a *respiratory protective device* (3.203) when mounted on a *respiratory protective device headform* (3.204)

3.16
as received
not preconditioned or modified to carry out a test

3.17
assigned protection factor
APF
anticipated level of respiratory protection that would be provided by a properly functioning *respiratory protective device (RPD)* (3.203) or class of RPD within an effective *RPD programme* (3.207)

3.18
assisted filtering respiratory protective device
assisted filtering RPD
filtering RPD (3.90) where *breathable gas* (3.29) is actively supplied to the *wearer* (3.257) by the *RPD* (3.203)

3.19
averaged interactive flow rate
interactive flow rate (3.126) averaged over 10 consecutive *breathing cycles* (3.34) of the *breathing machine* (3.38)

3.20
averaged maximum interactive flow rate
average of the highest *flow rate* (3.92) within each *breathing cycle* (3.34) of 10 consecutive breathing cycles of the *breathing machine* (3.38)

3.21
averaged minimum interactive flow rate
average of the lowest *flow rate* (3.92) within each *breathing cycle* (3.34) of 10 consecutive breathing cycles of the *breathing machine* (3.38)

3.22
averaged peak interactive flow rate
average of the maximum peak *flow rate* (3.92) within each *breathing cycle* (3.34) of 10 consecutive breathing cycles of the *breathing machine* (3.38)

3.23
blouse
garment, used as a *facepiece* (3.83), that covers the head and upper part of the body to the waist and wrists and to which air is supplied

3.24
body harness
means to enable certain components of a *respiratory protective device* (3.203) to be worn on the body

3.25
body temperature pressure saturated
BTPS
standard condition for the expression of *ventilation* (4.20) parameters

Note 1 to entry: Body temperature (37 °C), atmospheric pressure 101,3 kPa and water vapour pressure (6,27 kPa) in saturated air.

3.26
breakthrough concentration
concentration of test *gas* (3.97) in effluent air at which a *gas filter* (3.98) undergoing a gas *capacity* (3.44) test is deemed exhausted

3.27
breakthrough time
t_{br}
time taken from the start of the test until the test *gas* (3.97) and specified reaction products are detected at the specified *breakthrough concentration* (3.26) at the downstream side of the *filter* (3.86) under test

3.28
breathable air
air of a quality that makes it suitable for safe respiration

Note 1 to entry: For compressed air for *breathing apparatus* (3.32), see EN 12021:2014.

3.29
breathable gas
mixture of *gases* (3.97) that is suitable for respiration without adverse effects to health

3.30
breathable gas cylinder
integral part of the *respiratory protective device* (3.203) that contains the *breathable gas* (3.29) supply

3.31
breathable gas quality
composition of a *breathable gas* (3.29) as defined in relevant standards

3.32
breathing apparatus
device that enables the *wearer* (3.257) to breathe independently of the *ambient atmosphere* (3.12)

3.33
breathing bag
component of a *respiratory protective device* (3.203) that compensates for variations in the *breathable gas* (3.29) supply or demand and provides for peak inhalation flow requirements

3.34
breathing cycle
respiratory period comprising an inhalation and an exhalation phase

3.35
breathing frequency
number of *breathing cycles* (3.34) taken in a minute

Note 1 to entry: It is expressed in breaths per minute.

3.36
breathing gas regeneration
process whereby a *respiratory protective device* (3.203) absorbs carbon dioxide from exhaled *gas* (3.97), delivers oxygen, and controls the water vapour and temperature of gas to be rebreathed

3.37
breathing hose
<low pressure> flexible *hose* (3.116) connected to the *facepiece* (3.83) through which *breathable gas* (3.29) enters at atmospheric pressure or at a pressure slightly above or below

3.38
breathing machine
ventilation machine that simulates respiratory *ventilation* (4.20) using waveforms, which can be sinusoidal or representative of the *breathing cycle* (3.34)

Note 1 to entry: See also *metabolic simulator* (3.149).

3.39
breathing machine assembly
breathing machine (3.38) plus all the connecting *tubes* (3.245), control valves and other necessary hardware leading to the *trachea tube assembly* (3.244)

3.40
breathing peak resistance
maximum differential pressure of a *respiratory protective device* (3.203) during inhalation (inhalation peak resistance) or exhalation (exhalation peak resistance)

3.41
breathing resistance
pressure differential between the upstream and downstream location caused by a *respiratory protective device* (3.203) to the flow of *breathable gas* (3.29) during inhalation (inhalation resistance) or exhalation (exhalation resistance)

3.42
breath-responsive
actively or passively responsive following the *wearer's* (3.257) demand for air

3.43
bypass valve
component part of a *respiratory protective device* (3.203) that is furnished as an emergency manual valve to supply necessary *breathable gas* (3.29) when the ordinary supply path is out of order

3.44
capacity
volume of available *breathable gas* (3.29) of a *respiratory protective device* (3.203)

3.45
carbon dioxide concentration limits
CO_2 concentration limits
maximum allowed concentration of carbon dioxide within *inhaled breathable gas* (3.121)

3.46
char length
length of brittle residue found when a fabric or material is exposed to thermal energy

3.47
checking device
means to enable the *wearer* (3.257) to verify, before use or periodically during use, that the *manufacturer's minimum design conditions* (3.137) are met

3.48
class Sxxxx respiratory protective device
class Sxxxx RPD
supplied breathable gas RPD (3.236), where Sxxxx equals the amount of *breathable gas* (3.29) available for respiration in litres

3.49
cleaning/disinfection resistance
ability of the device to withstand the cleaning and disinfection processes defined by the manufacturer

3.50
combined filter
filter (3.86) intended to remove dispersed solid and/or liquid *particles* (3.170) and specified *gases* (3.97) and *vapours* (3.251) from the flow of air passing through it

3.51
combined respiratory protective device
combined RPD
RPD (3.203) that is capable of operating in either a filtering or *breathable gas* (3.29) supply mode

3.52
compatibility
ability of a *respiratory protective device* (3.203) to be used in conjunction with another item of personal protective equipment (PPE)

3.53
competent fit-test operator
person with suitable and sufficient experience and with practical and theoretical knowledge of fit-test methods who conducts the fit-testing procedures

3.54
competent person
person with suitable and sufficient experience and with practical and theoretical knowledge of the elements of a *respiratory protective device programme* (3.207) for which (s)he is responsible

3.55
compressed air filter
filter (3.86) intended to remove dispersed solid and/or liquid *particles* (3.170) and specified *gases* (3.97) and *vapours* (3.251) from compressed air passing through it

3.56
compressed air line breathing apparatus
device that is not self-contained and in which the *facepiece* (3.83) is supplied with *breathable air* (3.28) from a source of compressed air

3.57
compressed air supply tube
tube (3.245) that delivers *breathable air* (3.28) at a maximum pressure of 10 bar from a source of compressed air

3.58
confined space
area with limited access, as described in national regulations, which requires special considerations for entry

3.59
contaminant
undesirable solid, liquid or gaseous substance in the air

3.60
continuous control flow valve
control valve that provides the *wearer* (3.257) of a *supplied breathable gas respiratory protective device* (3.236) with *breathable gas* (3.29) and allows the wearer to regulate a continuous air flow within prescribed limits

3.61
count median diameter
CMD
particle size of a particle distribution for which one-half the total number of *particles* (3.170) are larger and one-half are smaller

3.62
dead space
<technical> space in which exhaled *gas* (3.97) has not been purged and is subject to being rebreathed

3.63
dead space
<anatomical> conducting regions of the pulmonary airways that do not contain *alveoli* (4.7) and, therefore, where no *gas* (3.97) exchange occurs

Note 1 to entry: These areas include the nose, mouth, trachea, large bronchia and the lower branching airways. This volume is typically 150 ml in a male of average size.

3.64
dead space
<physiological> sum of all anatomical *dead space* (3.63) as well as under-perfused (reduced blood flow) *alveoli* (4.7) that are not participating in *gas* (3.97) exchange

Note 1 to entry: The volume of the physiological dead space can vary with the degree of *ventilation* (4.20). Thus, the physiological dead space is the fraction of the *tidal volume* (3.240) that does not participate in gas exchange in the lungs.

3.65
demand type with positive pressure
type of *respiratory protective device* (3.203) that is fitted with a *demand valve* (3.67), is governed by the breathing action of the lungs, and that actuates at a *positive pressure* (3.179) in the *facepiece* (3.83) under conditions defined in relevant standards

3.66
demand type without positive pressure
type of *respiratory protective device* (3.203) that is fitted with a *demand valve* (3.67), is governed by the breathing action of the lungs, and that actuates at a *negative pressure* (3.161) during inhalation in the *facepiece* (3.83)

3.67
demand valve
valve that is governed by the breathing action of lungs and that supplies *breathable gas* (3.29) on demand

3.68
desorption
process in which one substance (the filter medium) releases an absorbed or adsorbed substance

3.69
dew point
temperature of air at a specified pressure below which condensation will occur

3.70
doffing
process of removing or taking off the *respiratory protective device* (3.203)

3.71
donning
process of putting on the *respiratory protective device* (3.203)

3.72
downstream valve
valve that opens with the pressure of the air and is normally kept shut by means of a spring

3.73
drip
to run or fall in drops or blobs

3.74
dynamic breathing resistance
differential pressure caused by a *respiratory protective device* (3.203) when the *breathable gas* (3.29) is delivered by a *breathing machine* (3.38) adjusted to a specified breathing *minute volume* (3.153) and waveform

3.75
dynamic flame test
test where the specimen is moving over the flame for the exposure

3.76
elastance
E
pressure change resulting from a volume change

Note 1 to entry: It is expressed in kPa/l.

3.77
end-of-service-life indicator
ESLI
system that warns the *wearer* (3.257) of the *gas filtering respiratory protective device* (3.102) of the approach of the end of respiratory protection

3.78
escape respiratory protective device
escape RPD
RPD (3.203) designed to be used only during an escape from *hazardous atmospheres* (3.108)

3.79
exhalation valve
non-return valve that allows the release of exhaled and excess *breathable gas* (3.29) from the *respiratory protective device* (3.203)

3.80
exhaled air
air breathed out by the *wearer* (3.257)

3.81
exposed part
part that can be touched in an as-worn state by the exposed surface identification probe specified in ISO 16900-5

3.82
face blank
main body of a *facepiece* (3.83) to which the functional components are attached

3.83
facepiece
part of a *respiratory protective device* (3.203) that connects the *wearer's* (3.257) respiratory tract to the other parts of the device and isolates the respiratory tract from *ambient atmosphere* (3.12)

Note 1 to entry: Facepieces may be *full face masks* (3.96), *half masks* (3.104), *quarter masks* (3.192), *mouthpiece assemblies* (3.157) or *filtering facepieces* (3.89).

Note 2 to entry: *Helmets* (3.113), *hoods* (3.115), *blouses* (3.23) and suits may serve the same purpose.

3.84
face-seal leakage
leakage between the *wearer's* (3.257) face and the *respiratory interface* (3.202)

3.85
field of vision
area of fixed sight while wearing a *respiratory protective device* (3.203)

3.86
filter
device intended to remove specific *contaminants* (3.59) from the ambient air passing through it

3.87
filter holder
filter housing
component that is attached to either a *respiratory interface* (3.202) or another part of the *respiratory protective device* (3.203) and into which a *filter* (3.86), either encapsulated or un-encapsulated, is inserted

3.88
filter self rescuer
respiratory protective device (3.203) exclusively intended for escape, incorporating a *filter* (3.86) against carbon monoxide through which the ambient air is drawn to a *facepiece* (3.83)

3.89
filtering facepiece
respiratory protective device (3.203) entirely or substantially constructed of filtering material

Note 1 to entry: Marked "FF" for filtering facepiece.

3.90
filtering respiratory protective device
filtering RPD
assisted or unassisted *RPD* (3.203) in which air passes through a *gas filter(s)* (3.98), *particle filter(s)* (3.171) or *combined filter(s)* (3.50) before being inhaled

3.91
fit test
use of a challenge agent and specific protocol to qualitatively or quantitatively determine the effectiveness of the seal between the *wearer's* (3.257) face and *respiratory interface* (3.202) with a specific make, model and size of a *respiratory protective device* (3.203)

3.92
flow rate
V_{fl}
volume (mass) of *breathable gas* (3.29) passing through the device in a given time

3.93
fogging
reduction of the *field of vision* (3.85) and/or visual acuity caused by the condensation of humidity on the *visor* (3.252)

3.94
force-fitting
practice of repeating a failed *fit test* (3.91) with the same *respiratory protective device (RPD)* (3.203) more than three times, re-donning, or otherwise adjusting the RPD (e.g. over-tightening the straps), until a passing fit test is finally achieved

3.95
fresh air hose breathing apparatus
respiratory protective device (3.203) in which *breathable air* (3.28) is obtained through an *air supply hose* (3.9) either assisted or unassisted

3.96
full face mask
tight-fitting respiratory interface (3.241) covering the mouth, nose, eyes and chin

3.97
gas
fluid that is in a gaseous state at a standard temperature and pressure that expands to occupy the space or enclosure in which it is confined

3.98
gas filter
filter (3.86) intended to remove specific *gases* (3.97) and *vapours* (3.251) from the atmosphere passing through it

3.99
gas filter capacity
mass or volume of a specific test agent that is removed or retained by a *gas filter* (3.98) or *combined filter* (3.50) under specified conditions of temperature, humidity, challenge test gas concentration and *flow rate* (3.92) at *breakthrough concentration* (3.26)

Note 1 to entry: The mass or volume is determined by measuring the *breakthrough time* (3.27) at a defined breakthrough concentration. The formula to calculate the gas *capacity* (3.44) is:

$$C = V_{\mathrm{fl}} \times c_{\mathrm{gas}} \times t_{\mathrm{br}} \times 10^{-6}$$

where

C is gas capacity (in l);
V_{fl} is volume *flow rate* (3.92) (in l/min);
c_{gas} is gas concentration (in ml/m^3);
t_{br} is *breakthrough time* (3.27) (in min).

EXAMPLE V_{fl} = 30 l/min

c_{gas} = 1 000 ml/m^3

t_{br} = 30 min

C = 30 l/min × 1 000 ml/m^3 × 30 min × 10^{-6} = 0,9 l

3.100
gas filter change schedule
time interval after which a *gas filter* (3.98) is replaced with a new one

3.101
gas filter validation test at specified flow rates
test to evaluate the ability of the *filter* (3.86) to achieve a minimum performance level at its *work rate* (3.260) classification

3.102
gas filtering respiratory protective device
gas filtering RPD
RPD (3.203) consisting of a *respiratory interface* (3.202) with a *filter* (3.86) that removes certain *gases* (3.97) or *vapours* (3.251) from the air to be inhaled by the *wearer* (3.257) for a limited period

3.103
hairnet
head net
head harness (3.110) in the form of a net (mesh fabric)

3.104
half mask
tight-fitting respiratory interface (3.241) covering the mouth, nose and chin

3.105
half mask without inhalation valves
filtering device with a *half mask* (3.104) and without *inhalation valves* (3.120), which may or may not have *exhalation valves* (3.79)

Note 1 to entry: It comprises a half mask and separable and replaceable *filters* (3.86).

3.106
hand wheel diameter
D
nominal value of twice the largest radius from the centre of the hand wheel

Note 1 to entry: It is expressed in mm.

3.107
hazard ratio
measured airborne concentration of a substance divided by the *occupational exposure limit* (3.163)

Note 1 to entry: This ratio is calculated for each *gas* (3.97), *vapour* (3.251) and/or particulate component, or for a mixture when the components have additive effects.

3.108
hazardous atmosphere
any atmosphere that is oxygen-deficient and/or where the level of substances in the atmosphere is at a concentration deemed to be hazardous

3.109
hazardous substance
substance that presents a potential to cause injury or ill health if it is inhaled, ingested or comes into contact with, or is absorbed through, the skin

Note 1 to entry: A hazardous substance may be a pure substance or generated as a by-product during work activities. For example, wood dust and stone dust welding fume.

Note 2 to entry: Hazardous substances can be present in the atmosphere in a number of physical states as:

a) *gases* (3.97);

b) *vapours* (3.251);

c) *particles* (3.170).

3.110
head harness
means of holding a *respiratory interface* (3.202) in place on the head

3.111
heads up display
HUD
visual *monitor* (3.155) or warning in the line of sight of the *wearer* (3.257)

3.112
heavy duty construction
mechanical properties of a *respiratory protective device* (3.203) designed to be used in work situations with need for a mechanically robust device

Note 1 to entry: See also *light duty construction* (3.131).

3.113
helmet
respiratory interface (3.202) offering head protection

3.114
high pressure
pressure equal to or greater than 2 MPa absolute pressure

3.115
hood
loose-fitting respiratory interface (3.132) that covers at least the face and can cover the entire head

3.116
hose
hollow flexible conduit to transport *breathable gas* (3.29)

3.117
hydrostatic test
calibrated expansion pressure test of the structural integrity of cylinders

3.118
immediately dangerous to life or health
IDLH
atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a *hazardous atmosphere* (3.108)

3.119
impact resistance
ability of a *respiratory protective device* (3.203) to withstand mechanical shock and dynamic stress from the environment

3.120
inhalation valve
valve that opens during inhalation and closes during exhalation

3.121
inhaled breathable gas
breathable gas (3.29) breathed in by the *wearer* (3.257)

3.122
inspection
process that assesses the *respiratory protective device (RPD)* (3.203), components, *marking* (3.139), information supplied by the *RPD manufacturer* (3.206) and any safety data sheets (if applicable) or declarations relevant to the materials used in its construction

3.123
integral dose
volume of the test *gas* (3.97) on the effluent side of the *filter* (3.86) released during the testing period

Note 1 to entry: This is calculated as the integral of the instant effluent concentration (function of time) of the test gas during the testing time multiplied by the volume *flow rate* (3.92).

3.124
integral filter
filter (3.86) that is not separable from the rest of the *respiratory interface* (3.202)

3.125
interactive flow
flow resulting from the combined action of a power-assisted device and a tidal breathing pattern at the *respiratory interface* (3.202)

3.126
interactive flow rate
flow rate (3.92) through the *filters* (3.86) of an *assisted filtering respiratory protective device (RPD)* (3.18) resulting from the combined action of the assisted filtering RPD and the breathing pattern generated by the *breathing machine* (3.38)

3.127
intrinsic safety
(type of) protection where the *respiratory protective device* (3.203) is not a source of ignition in explosive atmospheres

3.128
inward leakage
leakage of the *ambient atmosphere* (3.12) into the *respiratory interface* (3.202) from all sources excluding the *filter(s)* (3.86), where present, when measured in the laboratory in the specific test atmosphere

Note 1 to entry: It is expressed as a percentage ratio of *contaminant* (3.59) concentration inside a *respiratory protective device* (3.203) and ambient atmosphere.

3.129
leak-tightness
ability to withstand a loss of pressure inside a *respiratory protective device* (3.203) over a given time as determined by a laboratory test

3.130
life cycle
time between the date of manufacturing of the device to the date when the device has to be withdrawn from service

3.131
light duty construction
mechanical properties of a *respiratory protective device* (3.203) designed to be used in work situations with little risk of mechanical damage

Note 1 to entry: See also *heavy duty construction* (3.112).

3.132
loose-fitting respiratory interface
loose-fitting RI
RI (3.202) that does not rely on forming a complete seal to the *wearer's* (3.257) skin

3.133
low boiling organic compound
organic compound having a boiling point of ≤ 65 °C at atmospheric pressure

3.134
low pressure
pressure up to 100 hPa above atmospheric pressure

3.135
lung governed demand valve
valve for *breathing apparatus* (3.32) by which an air supply is regulated in accordance with the *wearer's* (3.257) breathing

3.136
manufacturer's design duration
time, as stated by the manufacturer, for which the *manufacturer's minimum design flow rate* (3.138) is exceeded

3.137
manufacturer's minimum design condition
lowest level of operating conditions of the device, as stated by the manufacturer, at which the complete *respiratory protective device* (3.203) will still meet the requirements for the designated class

3.138
manufacturer's minimum design flow rate
minimum air *flow rate* (3.92), as stated by the manufacturer, at which the class requirements are met

3.139
marking
information included on the device to indicate specific *respiratory protective device* (3.203) characteristics

3.140
mass median aerodynamic diameter
MMAD
point in an aerodynamic particle size distribution where half of the mass lies in *particles* (3.170) with a diameter less than the MMAD and half in particles with a diameter greater than the MMAD

3.141
maximum flow condition
factors appropriate to the design specified by the manufacturer that give rise to the highest *flow rate* (3.92)

3.142
maximum use concentration
MUC
maximum atmospheric concentration of a *hazardous substance* (3.109) from which the *wearer* (3.257) can be expected to be protected when wearing a *respiratory protective device (RPD)* (3.203)

Note 1 to entry: This is determined by the *assigned protection factor* (3.17) of the RPD or class of RPD and the *occupational exposure limit* (3.163) of the hazardous substance.

Note 2 to entry: The MUC can usually be determined mathematically by multiplying the assigned protection factor specified for an RPD by the occupational exposure limit used for the hazardous substance.

3.143
measured maximum flow rate
volumetric *flow rate* (3.92) of an *assisted filtering respiratory protective device (RPD)* (3.18), determined in a laboratory test, when the *RPD* (3.203) is in the condition that results in the highest air flow rate

Note 1 to entry: This condition takes into account the influence of temperatures, settings of RPD, pre-conditionings, use of accessories and others.

3.144
measured minimum flow rate
volumetric *flow rate* (3.92) of an *assisted filtering respiratory protective device (RPD)* (3.18), determined in a laboratory test, when the *RPD* (3.203) is in the condition that results in the lowest air flow rate

Note 1 to entry: This condition takes into account the influence of temperatures, settings of RPD, pre-conditionings, use of accessories and others.

3.145
mechanical strength of the visor
ability of the device to withstand *mechanical stress* (3.146) to the *visor* (3.252)

3.146
mechanical stress
dynamic force on the device during a fall from a given height as determined by a laboratory test

3.147
medium pressure
pressure between 100 hPa to 2 MPa above atmospheric pressure

3.148
medium pressure connecting tube
tube (3.245) connecting the *demand valve* (3.67) or the control valve with the air supply system at a *medium pressure* (3.147)

3.149
metabolic simulator
programmable automatic *breathing machine* (3.38) that can simulate the characteristics of both human breathing [variable *tidal volume* (3.240) and respiratory rate, humidity and temperature] and metabolic functions [variable *oxygen consumption* (4.5) and carbon dioxide production]

3.150
metabolic simulator assembly
metabolic simulator (3.149) plus all the connecting *tubes* (3.245), control valves and other necessary hardware leading to the *trachea tube assembly* (3.244)

3.151
minimum flow condition
factors appropriate to the design specified by the manufacturer that give rise to the lowest *flow rate* (3.92)

3.152
minute ventilation
V_E
total volume of air inhaled (or exhaled) in the lungs during 1 min

Note 1 to entry: It is expressed in l/s *body temperature pressure saturated (BTPS)* (3.25).

3.153
minute volume
volume of *breathable gas* (3.29) exhaled in 1 min

3.154
mode of operation
primary means of supplying the *wearer* (3.257) with *breathable gas* (3.29), i.e. particle filtering, gas and vapour filtering, or breathable-gas supplying

3.155
monitor
component of a *respiratory protective device* (3.203) to enable the *wearer* (3.257) to continuously assess that the manufacturer's minimum design air *flow rate* (3.92) or *manufacturer's minimum design conditions* (3.137) are met

3.156
mounting flange
device to fix tightly together a *full face mask* (3.96) and a *helmet* (3.113)

3.157
mouthpiece assembly
respiratory interface (3.202) held by the teeth or by the teeth and a *head harness* (3.110), sealing against the lips and through which air is inhaled and exhaled while the nose is closed by a clip

3.158
multi-functional respiratory protective device
multi-functional RPD
RPD (3.203) that is capable of operating within its *mode of operation* (3.154) using different operating methods, for example:

— *assisted filtering RPD* (3.18);

— power on/off;

— compressed *breathable gas* (3.29) system with compressed breathable gas RPD

3.159
multiple filters
construction where the full air flow for a *respiratory protective device* (3.203) is divided between two or more *filters* (3.86)

3.160
multi-type gas filter
gas filter (3.98) that meets the requirements of more than one type of gas filter

3.161
negative pressure
pressure inside the *respiratory interface* (3.202), *hose* (3.116), etc. that is lower than that of the *ambient atmosphere* (3.12)

3.162
nominal working duration
rated working duration
working time of a device, used for the classification determined in laboratory tests with a specified *flow rate* (3.92)

Note 1 to entry: The nominal or rated working duration does not give an indication of the possible effective working duration of a device in practical use. Possible effective working durations can differ from the nominal or rated working duration in both directions, positive and negative, depending upon the actual *work rate* (3.260).

3.163
occupational exposure limit
OEL
maximum concentration of airborne *contaminants* (3.59) deemed to be acceptable, as defined by the authority having jurisdiction

3.164
open-circuit
technical solution where the *exhaled air* (3.80) passes without recirculation into the *ambient atmosphere* (3.12)

3.165
operating pressure
pressure developed within the *respiratory protective device* (3.203) during service

3.166
overflow valve
non-return valve, fitted to the *breathing hose* (3.37), that is specially designed to allow the excess air supply to escape into the atmosphere

3.167
oxygen compatibility
capability of a *respiratory protective device* (3.203) to allow direct contact with pressurised oxygen without risk of fire or explosion by being oil and grease free

3.168
oxygen deficiency
condition based on an oxygen concentration or *partial pressure* (4.17) below which a person can be adversely affected

Note 1 to entry: Each authority having jurisdiction may establish an alternative definition or specific limit.

3.169
oxygen-enriched breathable gas
breathable gas (3.29) containing oxygen at a higher concentration than that of atmospheric air at sea level

3.170
particle
solid or liquid substance in the finely divided state

3.171
particle filter
filter (3.86) that is intended to remove airborne *particles* (3.170)

3.172
particle filter efficiency
degree to which a *filter* (3.86) removes *aerosols* (3.6) from the *ambient atmosphere* (3.12)

3.173
particle filter respiratory protective device
particle filter RPD
device consisting of a *respiratory interface* (3.202) with a *particle filter* (3.171) that removes finely divided *particles* (3.170) from the air to be inhaled by the *wearer* (3.257)

Note 1 to entry: The filter medium may be replaceable or be an integral part of the construction.

3.174
peak inspiratory flow rate
highest instantaneous *flow rate* (3.92) during the inhalation phase of a *breathing cycle* (3.34)

Note 1 to entry: It is expressed in l/s *body temperature pressure saturated (BTPS)* (3.25).

Note 2 to entry: l/s is the preferred unit as the flow takes place during only a short fraction of the breathing cycle.

3.175
pendulum-type respiratory protective device
pendulum-type RPD
RPD (3.203) in which the *wearer* (3.257) alternatively inhales and exhales by the same route

3.176
peripheral isopter
field of vision (3.85) while wearing a *respiratory protective device* (3.203), indicated by the lighted area, which is measured by a solid line connecting the points

3.177
permeation
process by which a chemical moves through a *respiratory protective device* (3.203) material on a molecular level (diffusion)

3.178
porous device
respiratory protective device (3.203) incorporating materials, excluding *filters* (3.86), that can be penetrated by *gases* (3.97) and *vapours* (3.251) during an inward leakage test leading to an increase of the *inward leakage* (3.128)

3.179
positive pressure
pressure inside the *respiratory interface* (3.202), *hose* (3.116), etc. that is higher than that of the *ambient atmosphere* (3.12)

3.180
powered filtering respiratory protective device
powered filtering RPD
filtering RPD (3.90) in which air is moved through the *filter(s)* (3.86) by means of a blower to supply the *wearer* (3.257) with *breathable air* (3.28)

3.181
powered fresh air hose breathing apparatus incorporating a hood
apparatus that is not self-contained and in which breathable fresh air is blown from an air source by means of a powered air supply to the *hood* (3.115)

3.182
practical performance
evaluation of a *respiratory protective device* (3.203) during the simulation of typical work or escape activities in a laboratory

3.183
prefilter
filter (3.86) intended to remove coarse *particles* (3.170) before they enter the filter

3.184
pressure reducer
device that reduces pressure to a lower pressure

3.185
protection class
PC
numerical designation from PC1 to PC6 allocated to an individual *respiratory protective device* (3.203) based upon laboratory testing indicating its relative protection

3.186
protection level
degree of respiratory protection allocated to a *respiratory protective device (RPD)* (3.203) for the purposes of selection and use that is expected to be provided to *wearers* (3.257) when used within an effective *RPD programme* (3.207)

3.187
psychological impact on the wearer
positive and negative influences on the *wearer's* (3.257) state of mind from wearing the *respiratory protective device* (3.203) or by its appearance and/or design

3.188
qualitative fit factor
QLFF
qualitative estimate of the minimum fit of a particular *tight-fitting respiratory interface* (3.241) to a specific individual when a *qualitative fit test* (3.189) is passed, i.e. the test agent is not detected by the subject's senses

3.189
qualitative fit test
QLFT
pass/fail test method that relies on the subject's sensory response to detect a challenge agent in order to assess the adequacy of a *respiratory protective device* (3.203) fit

3.190
quantitative fit factor
QNFF
numeric value of the fit of a particular *tight-fitting respiratory interface* (3.241) to a specific individual

Note 1 to entry: It represents only the *respiratory interface* (3.202) to face leakage. Leakage from other sources [e.g. air-purifying elements, *exhalation valve* (3.79)] should be significantly lower than the measured *face-seal leakage* (3.84). The QNFF is measured with specialized instrumentation.

3.191
quantitative fit test
QNFT
test method that uses an instrument to assess (quantify) the amount of *face-seal leakage* (3.84) into the *respiratory protective device* (3.203) in order to assess the adequacy of its fit

3.192
quarter mask
tight-fitting respiratory interface (3.241) covering the mouth and nose

3.193
rated filling pressure
maximum allowable pressure to which the valved pressure vessel is intended to be filled

3.194
rated working pressure
maximum allowable pressure for which the apparatus is designed

3.195
ready for assembly state
component with seals, plugs or other environmental protective means, if applicable, still in place

3.196
ready for use configuration
complete *respiratory protective device* (3.203), which may not be fully assembled, but is in a state which allows the immediate start of the *donning* (3.71) procedure as described by the manufacturer

3.197
ready for use packaging
means to protect the functional components from environmental stress while the device is kept in a state that permits rapid *donning* (3.71) by the *wearer* (3.257)

3.198
ready for use state
respiratory protective device (RPD) (3.203) ready to be *donned* (3.71) as described by the manufacturer

Note 1 to entry: In line with the information supplied by the manufacturer for donning the RPD, further actions can be necessary.

3.199
reconstituted air
gaseous mixture prepared from pure liquid or gaseous oxygen and pure liquid or gaseous nitrogen

3.200
relief valve
valve to release overpressure

3.201
required fit factor
RFF
numeric value established as a pass/fail point or acceptance criterion for *quantitative fit testing* (3.191)

3.202
respiratory interface
RI
part of a *respiratory protective device (RPD)* (3.203) that forms the protective barrier between the *wearer's* (3.257) respiratory tract and the *ambient atmosphere* (3.12)

Note 1 to entry: The RI is connected to the filtering part of the RPD or the part managing the supply of *breathable gas* (3.29).

3.203
respiratory protective device
RPD
personal protective equipment designed to protect the *wearer's* (3.257) respiratory tract against the inhalation of *hazardous atmospheres* (3.108)

3.204
respiratory protective device head form
RPD head form
laboratory test head simulating human heads used in testing a *respiratory protective device* (3.203)

3.205
respiratory protective device head form assembly
RPD head form assembly
RPD head form (3.204) with *trachea tube assembly* (3.244) included

3.206
respiratory protective device manufacturer
RPD manufacturer
natural or legal person, who:

— designs and/or manufactures an *RPD* (3.203) or who has an RPD designed and/or manufactured with a view to placing it on the market or for other use, under his/her own name or trademark;

— places an RPD on the market and/or puts it into service, under his/her own name or trademark

3.207
respiratory protective device programme
RPD programme
process of selecting, using and maintaining an *RPD* (3.203) to ensure adequate protection to the *wearer* (3.257)

3.208
respiratory protective device programme administrator
RPD programme administrator
individual designated to ensure the development, implementation and maintenance of an *RPD programme* (3.207)

3.209
respiratory protective device tool
RPD tool
device that assists with the testing of an *RPD* (3.203)

3.210
respiratory protective device torso
RPD torso
generic body form used in combination with an *RPD head form* (3.204) used in testing an *RPD* (3.203)

3.211
respiratory protective device verification tool
RPD verification tool
test device that simulates a specific performance characteristic(s) of an *RPD* (3.203)

Note 1 to entry: The theoretical results from the test device are known and are compared with the actual results obtained in a given test laboratory when the test device is used with the appropriate test system in that laboratory.

3.212
reusable particle or combined filter
particle filter (3.171) or *combined filter* (3.50) intended to be used for more than a single shift

3.213
risk assessment
process of hazard, adequacy and *suitability assessments* (3.233) relating to the selection of a *respiratory protective device* (3.203)

3.214
second high pressure inlet connector
component for emergency purposes that receives *breathable gas* (3.29) from an alternative *high pressure* (3.114) breathable gas source while in use

3.215
second medium pressure inlet connector
component of *respiratory protective device* (3.203) to receive *breathable gas* (3.29) from an alternative *medium pressure* (3.147) breathable gas source

3.216
second medium pressure outlet connector
component of *respiratory protective device* (3.203) to supply *breathable gas* (3.29) to a second person for the purpose of rescue

3.217
self-contained breathing apparatus
SCBA
breathing apparatus (3.32) where the *breathable gas* (3.29) supply is carried by the *wearer* (3.257)

3.218
separator
device to remove liquids from compressed air

3.219
service life
time period during which the *respiratory protective device* (3.203) or components are expected to give protection to the *wearer* (3.257)

3.220
service life of gas filter
time until the breakthrough of *contaminants* (3.59) during actual use

3.221
shelf life
time a *respiratory protective device (RPD)* (3.203) or RPD component can be stored without deteriorating prior to use when stored in accordance with the information supplied by the *RPD manufacturer* (3.206)

3.222
single use
respiratory protective device (3.203) or *filter* (3.86) that is not designed for repeated applications after the first use

3.223
single-shift use
descriptor for identifying a *respiratory protective device (RPD)* (3.203) or RPD component that is not designed for reuse after one shift

Note 1 to entry: The duration of a single shift depends on national/local regulations.

3.224
smoke
aerosols (3.6) generated by an incomplete combustion consisting of liquid and/or solid *particles* (3.170)

3.225
smoke hood
respiratory protective device (3.203) for escape only

Note 1 to entry: Function based upon a *filter* (3.86) through which ambient air is drawn to a *hood* (3.115).

3.226
sorption
process in which one substance (the filter medium) takes up or holds another [the test *gas* (3.97)], either by adsorption or absorption

3.227
special application
requirement related to a specific area(s) of *respiratory protective device* (3.203) use

3.228
spiral coiled tube
tube (3.245) that is manufactured such that being in its relaxed state it assumes a natural spiral coil

3.229
standard temperature pressure dry
STPD
standard condition for the expression of *oxygen consumption* (4.5)

Note 1 to entry: Standard temperature (0 °C) and pressure (101,3 kPa, 760 mmHg), dry air (0 % relative humidity).

3.230
standardized connector
device that allows an optional connection between a *filter* (3.86) and a *respiratory interface* (3.202)

Note 1 to entry: Standardized connectors are defined in ISO 17420-3 and EN 148-1.

3.231
static breathing resistance
differential pressure caused by a *respiratory protective device (RPD)* (3.203) when the *breathable gas* (3.29) is passed through the RPD at a constant flow

3.232
static flame test
test where the specimen is maintained still over the flame for the exposure

3.233
suitability assessment
selection method identifying a *respiratory protective device* (3.203) able to provide adequate protection during intended use, taking into consideration the *wearer* (3.257), the *task* (3.237) and the workplace environment

3.234
suitable respiratory protective device
suitable RPD
RPD (3.203) that is adequate and is matched to the requirements of the *wearer* (3.257), the *task* (3.237) and the working environment

3.235
supervisor
employer or a person assigned by the employer having responsibility for the *wearer* (3.257) and control over the workplace

3.236
supplied breathable gas respiratory protective device
supplied breathable gas RPD
RPD (3.203) that supplies the *wearer* (3.257) with *breathable gas* (3.29) from a source independent of the *ambient atmosphere* (3.12) either individually carried or supplied by a stationary source

3.237
task
working activity to be undertaken by the *wearer* (3.257)

3.238
temperature of operation
environmental temperature during the expected conditions of use

3.239
test subject
human being selected from a panel used for testing a *respiratory protective device* (3.203)

3.240
tidal volume
V_T
size of a breath

Note 1 to entry: It is expressed in litres.

3.241
tight-fitting respiratory interface
tight-fitting RI
RI (3.202) that forms a protective barrier between the *wearer's* (3.257) respiratory tract and the *ambient atmosphere* (3.12) by forming a seal to the wearer's skin

3.242
time-weighted average
TWA
average concentration of a *contaminant* (3.59) in air during a specific time period

3.243
total inward leakage
TIL
leakage of the *ambient atmosphere* (3.12) into the *respiratory interface* (3.202) from all sources including *filter(s)* (3.86), where present, or a *respiratory protective device* (3.203), when measured in a laboratory in the specific test atmosphere

Note 1 to entry: It is expressed as a percentage ratio of *contaminant* (3.59) concentration inside an RPD and ambient atmosphere.

3.244
trachea tube assembly
tube (3.245) that simulates the human trachea, containing ports for the measurement of pressure, carbon dioxide content and temperature of breathed *breathable gas* (3.29) and interface connections permitting seating to the *RPD head form* (3.204), *RPD torso* (3.210) or alternative (benchtop) fixture

3.245
tube
hollow conduit to carry *breathable gas* (3.29) at pressures in excess of the ambient pressure

3.246
unassisted filtering respiratory protective device
unassisted filtering RPD
filtering RPD (3.90) in which air is drawn through the *filter(s)* (3.86) solely by the breathing of the *wearer* (3.257)

3.247
unencapsulated filter
filter (3.86) that in itself is not contained in a rigid housing

3.248
user
person or organization who makes use of *respiratory protective device* (3.203), e.g. those involved in selecting, maintaining and wearing

3.249
validated method
documented procedure that has been scientifically evaluated by qualified persons and determined to be appropriate and acceptable with regards to reproducibility, accuracy, precision and other necessary parameters

3.250
valved filtering half mask
respiratory protective device (3.203) fitted with *exhalation valves* (3.79) and *inhalation valves* (3.120)

3.251
vapour
gaseous phase of a substance that is liquid or solid at 20 °C and 100 kPa (absolute)

3.252
visor
part of the *respiratory interface* (3.202) through which the *wearer* (3.257) sees and that can, in addition, provide eye and face protection

3.253
visual clarity
measure of a *visor(s)* (3.252) to affect the sight within the *field of vision* (3.85) of a *respiratory protective device* (3.203)

3.254
visual field score
VFS
summation of grid points contained within the *peripheral isopter* (3.176) shadow cast onto the *apertometer* (3.15) by the *respiratory protective device* (3.203)

3.255
volume-averaged pressure
WOB/V_T
work of breathing (3.259) divided by its *tidal volume* (3.240)

Note 1 to entry: It is expressed in kPa.

Note 2 to entry: The WOB/V_T can be determined separately for an inspiration, an expiration or for a whole breath.

3.256
warning device
device to inform the *wearer* (3.257) that the *respiratory protective device* (3.203) will soon stop or has already stopped operating at the desired conditions

Note 1 to entry: This informs the *user* (3.248) to take some action.

3.257
wearer
person who actually wears the *respiratory protective device* (3.203)

3.258
wearer-seal check
action conducted by the *wearer* (3.257) to determine if the tight-fitting *respiratory protective device* (3.203) is properly *donned* (3.71) and sealed on the face

3.259
work of breathing
WOB
work required for an entire *breathing cycle* (3.34)

Note 1 to entry: It is expressed in Joules.

3.260
work rate
demand for *breathable gas* (3.29) by the *wearer* (3.257) per time due to workload

3.261
work rate class
numerical designation from W1 to W4 allocated to an individual *respiratory protective device* (3.203) based upon laboratory testing indicating its relative ability to meet the *wearer's* (3.257) demand for *breathable gas* (3.29) at different activity levels

3.262
working pressure
settled pressure of a compressed *gas* (3.97) at a uniform reference temperature of 15 °C in a full gas cylinder

Note 1 to entry: It is expressed in bar.

4 Terms related to human factors

4.1
aerobic energy production
biochemical process in human cells that delivers energy by combustion of fat, carbohydrates and, to a lesser extent, protein in the presence of oxygen, with water and carbon dioxide as end products

4.2
anaerobic energy production
biochemical process in human cells that delivers energy by combustion of carbohydrates without oxygen, with lactic acid as the end product

4.3
ambient temperature pressure saturated
ATPS
standard condition for the expression of *ventilation* (4.20) parameters related to expired air

4.4
ambient temperature pressure humidity
ATPH
standard condition for the expression of *ventilation* (4.20) parameters related to inspired air

4.5
oxygen consumption
V_{O_2}
amount of oxygen consumed by human tissues for *aerobic energy production* (4.1)

Note 1 to entry: It is expressed in l/min *standard temperature pressure dry (STPD)* (3.229).

4.6
physical work capacity
ability of a person to engage in muscular work

4.7
alveoli
s. alveolus
terminal air sacs of the lungs in which respiratory *gas* (3.97) exchange occurs between the alveolar air and the pulmonary capillary

Note 1 to entry: The alveoli are the anatomical and functional unit of the lungs.

4.8
carbaminohaemoglobin
$HbCO_2$
haemoglobin (4.11) that has bound carbon dioxide at the tissue site for transport to the lungs

4.9
dyspnoea
sense of air hunger, difficult or laboured breathing, or a sense of breathlessness

4.10
end-tidal carbon dioxide
ET CO_2
volume fraction of carbon dioxide in the breath at the mouth at the end of exhalation

Note 1 to entry: End-tidal carbon dioxide corresponds closely to alveolar carbon dioxide.

4.11
haemoglobin
Hb
specific molecules contained within all red blood cells that bind oxygen or carbon dioxide under normal physiological states and transport either oxygen or carbon dioxide to or from the tissues of the body

4.12
hyperoxia
volume fraction or *partial pressure* (4.17) of oxygen in the breathing environment greater than that which is found in the Earth's atmosphere at sea level, which contributes to an excess of oxygen in the body

Note 1 to entry: This can occur when a person is under hyperbaric conditions (i.e. diving), subjected to *breathable gas* (3.29) mixtures with an elevated oxygen fraction, or during certain medical procedures.

4.13
hypocapnia
volume fraction or *partial pressure* (4.17) of carbon dioxide in the breathing environment or in the body that is lower than that which is found in the Earth's atmosphere at sea level

Note 1 to entry: This usually occurs under *hyperventilation* (4.34) conditions (i.e. diving) or in medical settings that contribute to a reduction of carbon dioxide in the body.

4.14
inotropic
affecting the force of muscle contraction

Note 1 to entry: A negative inotropic effect reduces and a positive inotropic effect increases the force of muscular contraction (e.g. both skeletal and heart muscle).

4.15
medulla oblongata and pons
areas of the brain where the respiratory control centre is located

4.16
oxyhaemoglobin
HbO_2
haemoglobin (4.11) that has bound oxygen from the lungs for transport to the body tissues

4.17
partial pressure
pressure exerted by each of the components of a *gas* (3.97) mixture to form a total pressure

EXAMPLE Air is a mixture of oxygen, nitrogen, carbon dioxide, inert gases (argon, neon) and water vapour. The volume fraction of oxygen in air is about 20,9 %. At sea level, total atmospheric pressure is 101,3 kPa (760 mmHg). Water vapour pressure is 6,26 kPa (47 mmHg) (fully saturated in the lungs at a body temperature of approximately 37 °C). To find the partial pressure of oxygen, subtract vapour pressure from total atmospheric pressure and then multiply the oxygen volume fraction by the dry atmospheric pressure. Thus, 101,3 − 6,3 = 95,1 kPa (760 mmHg − 47 mmHg = 713 mmHg); 0,21 × 95,1 kPa = 19,9 kPa (= 149 mmHg). If the ambient pressure increases (as in diving), the partial pressure of each component gas increases. Thus, at 2 atm absolute, the partial pressure of oxygen in dry gas is 101,3 × 2 = 202,6 kPa (760 mmHg × 2 = 1 520 mmHg); 0,21 × 202,6 = 42,6 kPa (0,21 × 1 520 mmHg = 319 mmHg) oxygen.

Note 1 to entry: Partial pressure is dependent on the volume fraction of the component gas.

Note 2 to entry: The partial pressure of a gas can increase or decrease while its relative volume fraction remains the same. Partial pressure drives the diffusion of gas across cell membranes and is, therefore, more important than the relative volume fraction of the gas.

4.18
respiratory quotient
R_Q
ratio of the volume of carbon dioxide exhaled to the volume of oxygen consumed

Note 1 to entry: R_Q is calculated as follows:

$$R_Q = \frac{V_{CO_2}}{V_{O_2}}$$

where

V_{CO_2} is the volume of carbon dioxide exhaled;

V_{O_2} is the volume of oxygen consumed.

Note 2 to entry: R_Q gives an estimate of the content of substrate utilization during steady-state respiration and *metabolism* (4.36). At rest, R_Q = 0,82 reflects a substrate utilization of a combination of carbohydrates and fats as the primary energy source.

4.19
respiratory system
tubular and cavernous organs [mouth, trachea, bronchi, lungs, *alveoli* (4.7), etc.] and structures that bring about pulmonary *ventilation* (4.20) and *gas* (3.97) exchange between ambient air and blood

4.20
ventilation
<general> process of exchange of air between the lungs and the ambient environment

4.21
compliance
change in volume of the human lung that results from a change in pressure

Note 1 to entry: It is expressed in l kPa^{-1}.

Note 2 to entry: This term is the typical term for the elastic behaviour of the lungs and chest. Compliance is the inverse of *elastance* (3.76).

4.22
relaxation volume
functional residual capacity
FRC
expiratory reserve volume
ERV
lung volume when respiratory muscles are relaxed, i.e. the volume at the beginning of an inspiration

4.23
vital capacity
VC
volume of the largest breath a person can take, i.e. the volume difference between a maximum inspiration and a maximum expiration

Note 1 to entry: It is expressed in litres *body temperature pressure saturated (BTPS)* (3.25).

4.24
clo
unit for the expression of the thermal insulation of clothing

Note 1 to entry: 1 clo is equal to 0,155 K m^2/W.

4.25
insulation required
IREQ
cold stress index as determined in accordance with ISO 11079

4.26
metabolic rate
physiological energy utilization per unit of time

4.27
predicted heat strain
PHS
heat stress index as determined in accordance with ISO 7933

4.28
aetiopathology
cause of the pathological state or disorder

4.29
anxiety
state of being uneasy, apprehensive or worried about what might happen

4.30
cardiac arrhythmia
variation from the normal rhythm of the heartbeat

4.31
claustrophobia
abnormal fear or dread of being in an enclosed or *confined space* (3.58)

4.32
dysphoria
sensation of disquiet, restlessness or malaise

4.33
hypercapnia
excess amount of carbon dioxide (CO_2) in the blood

4.34
hyperventilation
increase in overall respiration resulting from an increase in both the depth and frequency of breathing

Note 1 to entry: This can be voluntary or result from an increase in activity, fear or breathing excess carbon dioxide (CO_2).

4.35
hypoxia
volume fraction or *partial pressure* (4.17) of oxygen in the breathing atmosphere below that found in the atmosphere at sea level

4.36
metabolism
energy produced in human cells by aerobic or anaerobic processes

4.37
paresthesia
abnormal sensation without an objective cause, such as numbness, prickling and tingling

4.38
psycho-physical effect
effect that pertains to the mind and its relation to physical manifestations

4.39
psycho-physiological effect
psychological trait(s) and responses to a given situation that can provoke a physiological response, and the physiological responses to a given situation that can provoke a psychological reaction

4.40
oxygen saturation
SaO_2
degree of saturation of *haemoglobin* (4.11) with oxygen in arterial blood

Note 1 to entry: It is expressed as a % of total saturation.

4.41
stereoacuity
visual clarity (3.253) in three dimensions

4.42
tachycardia
increased heart rate due to exercise, pain, *anxiety* (4.29) or pathophysiological state

4.43
transcutaneous carbon dioxide
$tcCO_2$
level of CO_2 in tissue vasculature, as measured by a transcutaneous CO_2 detector attached to the earlobe

4.44
phobia
persistent and irrational fear of a specific object, activity or situation that results in a compelling desire to avoid the feared stimulus

4.45
state-trait anxiety inventory
psychological assessment tool used to determine the presence and type of *anxiety* (4.29) in an individual and to differentiate between situational anxiety (state anxiety) and chronic feelings of anxiety as part of the overall personality structure (trait anxiety)

4.46
hearing
manner in which the brain and central nervous system recognizes and interprets *sounds* (4.50)

4.47
ototoxicity
damage to *hearing* (4.46) from overexposure to drugs or toxic substances

4.48
noise
unwanted *sound* (4.50)

4.49
presbycusis
gradual sensorineural *hearing* (4.46) loss due to natural ageing

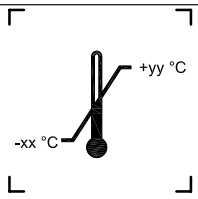
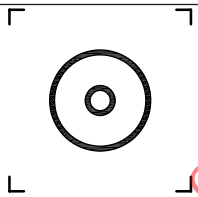
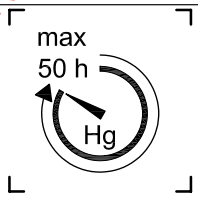
4.50
sound
form of energy that moves through media in waves of pressure

4.51
sound pressure
local pressure deviation from the ambient atmospheric pressure caused by a *sound* (4.50) wave

Note 1 to entry: It is expressed in pascals (Pa).

4.52
root mean square sound pressure
RMS sound pressure
deviation from the ambient atmospheric pressure caused by a *sound* (4.50) wave at an instant in time over a given period of time

5 Graphical symbols for use on respiratory protective devices

No.	Graphical symbol	Symbol title and description	ISO/IEC registration number
5.1		**See the information supplied by the *RPD manufacturer*** (3.206)	ISO 7000-1641
5.2		**End of *shelf life*** (3.221) Hour glass, with "yyyy" for year and "mm" for month	ISO 7000-2607, modified
5.3		**Temperature range of storage conditions**	ISO 7000-0632, modified
5.4		**Maximum humidity of storage conditions**	ISO 7000-0626, modified
5.5		**Standardized connector**	ISO 14617-15-3085
5.6		***Single-shift use*** (3.223) **only** Crossed out 2. During one shift, multiple use is allowed.	ISO 7000-1051
5.7		**Maximum time of use of Hg filters**	IEC 60417-5417, modified