Regulations concerning action and limit values for physical and chemical agents in the working environment and classified biological agents (Regulations concerning Action and Limit values)

Chapter 1. Introductory provisions

Section 1-1. Purpose

The purpose of these regulations is to protect employees against the dangers arising from physical, chemical and biological agents in the undertaking by listing limit values, action values and infection risk groups.

Section 1-2. Scope

The regulations apply to undertakings where the employees may be exposed to physical, chemical or biological agents.
Chapter 2 does not apply to offshore petroleum activities.

Section 1-3. To whom the regulations apply

Employers shall ensure that the provisions of these regulations are implemented.
Chapters 1, 4, 5 and 6 of the regulations also apply to undertakings with no employees.
Chapters 2 and 3 shall also be implemented by undertakings with no employees that engage in
- -building and construction activities
- -agricultural activities.

The regulations also apply to breathing air suppliers.

Section 1-4. Definitions – noise

For the purpose of these regulations, the following definitions shall apply:

a. *daily noise exposure level, $L_{EX,8h}$:* the equivalent A-weighted level ($L_{pAeq,T}$) for a nominal eight-hour working day in accordance with the international standard ISO 1999:1990 points 3.5 and 3.6. It includes all noise in the workplace;

b. *limit value*: a value for noise exposure that must not be exceeded;

c. *group I*: working conditions where there are high demands for continuous concentration or a need for conducting unstrained conversations, and in mess rooms and recreation rooms;

d. *group II*: working conditions where it is important to conduct conversations or with persistently high requirements for precision, speed and attention;

e. *group III*: working conditions involving noisy machinery or equipment that are not covered by working groups I or II;

f. *peak sound pressure level, $L_{pC,peak}$:* the C-weighted peak emission sound pressure level,

measured during a measurement period with the instrument set to ‘peak’;

g.*action value*: an exposure value that requires measures to be implemented in order to reduce the health risk and unfortunate exposure to a minimum.

Section 1-5. Definitions – vibrations

For the purpose of these regulations, the following definitions shall apply:

a.*daily exposure value*: the energy equivalent mean value of the frequency-weighted acceleration throughout the working day normalised to an eight-hour reference period (A(8)). A(8) = A(T)T/8 where A(T) equals the daily exposure to vibration throughout a working day of a total duration of T hours. For hand and arm vibrations, A(T) is determined pursuant to NS-EN-ISO-5349-1, Chapters 4 and 5 and Annex A. For whole body vibrations, A(T) is determined pursuant to NS-ISO-2631-1, Chapters 5 to 7 and Annexes A and B as the daily exposure value in the axial direction giving the highest value when K factors for a sitting or standing person are employed;

b.*daily exposure limit value (A(8))*: daily exposure value that shall not be exceeded;

c.*whole-body vibration*: mechanical vibration transmitted to the whole body and entailing a risk of harm to health, in particular trauma of the spine, and that may also entail a safety risk;

d.*hand and arm vibration*: mechanical vibration transmitted from work equipment to the human hand or arm and entailing a risk of vascular, bone or joint neurological or muscular disorders, and that may also entail a safety risk;

e.*daily exposure action value (A(8))*: daily exposure value that requires the implementation of measures in order to reduce the risk to a minimum.

Section 1-6. Definitions – chemicals

For the purpose of these regulations, the following definitions shall apply:

a.*fibre*: a particle longer than 5 µm, with a diameter smaller than or equal to 3 µm, and with a length to width ratio greater than or equal to 3:1;

b.*limit value*: the maximum value of the average concentration of a chemical substance in an employee’s breathing zone over a fixed reference period of eight hours;

c.*chemical*: any element, chemical compound or mixture thereof, whether it occurs naturally or is industrially produced or is used or released by any work operation, regardless of whether or not it is produced intentionally. This applies irrespective of whether the chemical is available on the market.

Section 1-7. Definitions – biological agents

For the purpose of these regulations, the following definitions shall apply:

a.*Biological limit value:* The limit to the concentration of a given agent in a biological environment, its metabolites or an effect indicator.

b.*Biological factors:* microorganisms, including genetically modified organisms, cell cultures,

human endoparasites and prions that can induce infections, allergy or toxic effects in humans. Microorganisms means: a microbiological unit, cellular or non-cellular, able to replicate or transfer genetic material.Cell culture means: the result of in vitro cultivation of cells from multicellular organisms.

c.*micro-organism*: any cellular or non-cellular microbiological entity capable of replication or of transferring genetic material.

Section 1-8. Definitions – radiation

For the purpose of these regulations, the following definitions shall apply:

a.*Electromagnetic field*: static electric, static magnetic and time variable electric, magnetic and electromagnetic field with frequencies up to 300 GHz.

b.*Limit value*: values determined on the basis of biophysical and biological considerations, in particular scientifically well-established short term and acute direct effects such as thermal effects and electric stimulation of tissue, that must not be exceeded,

c.*Limit value for health effects*: limit values that may cause adverse health effects for exposed employees such as heating and stimulation of nervous and muscular tissue, that must not be exceeded,

d.*Limit values for sensory effects*: limit values that may cause exposed employees to experience temporary sensory disturbances and minor changes to the brain functions, that must not be exceeded,

e.*Non-coherent optical radiation*: artificial optical radiation, with the exception of laser radiation,

f.*Ionising radiation*: X radiation, particle radiation, or radiation from a radioactive substance in the wavelength range between 0.01-10 nm,

g.*Artificial optical radiation*: electromagnetic radiation of a wavelength range between 100 nm and 1 mm that is not emitted from the sun. The spectrum of optical radiation is divided into ultraviolet radiation, visible radiation (light) and infrared radiation,

Ultraviolet radiation: optical radiation of wavelength range between 100 nm and 400 nm. This range is further divided into UVA (315-400 nm), UVB (280-315 nm) and UVC (100-280 nm),

Visible radiation: optical radiation of wavelength range between 380 nm and 780 nm,

Infrared radiation: optical radiation of the wavelength range between 780 nm and 1 mm. This range is further divided into IR-A (780-1400 nm), IR-B (1400-3000 nm) and IR-C (3000 nm-1 mm),

h.*Action value*: an exposure value that requires measures to be implemented in order to reduce the health risk and unfortunate exposure to a minimum.

Section 1-9. Exemption

The Norwegian Labour Inspection Authority, the Norwegian Ocean Industry Authority and the Civil Aviation Authority of Norway may grant exemption from the regulations in their respective areas if warranted on special grounds, if justified from a health and safety perspective and not in breach of the EEA Agreement.

Chapter 2. Noise

Section 2-1. Action values

The action values for noise exposure are set to:

a)	lower action value for working conditions in group I:	$L_{EX,1h}$ = 55 dB
b)	lower action value for working conditions in group II:	$L_{EX,1h}$ = 70 dB
c)	lower action value for working conditions in group III:	$L_{EX,8h}$ = 80 dB
d)	upper action values:	$L_{EX,8h}$ = 85 dB and $L_{pC,peak}$ = 130 dB

For working conditions in groups I and II, noise from the worker's own activities shall not be a part of the assessment for the lower action values, provided that the worker can disrupt the noise. For mess rooms and recreation rooms, only background noise from installations, adjacent premises and surroundings shall be included in the assessment.

Section 2-2. Limit values for noise

The limit values for noise exposure are set to:

a. daily noise exposure level, $L_{EX,8h}$: 85 dB
b. peak sound pressure level, $L_{pC,peak}$: 130 dB

The determination of the worker's effective noise exposure shall take account of the real-ear attenuation provided by the individual hearing protectors that the worker is required to wear.

Chapter 3. Vibrations

Section 3-1. Action values

Action values for daily exposure (A(8)):

a. for hand and arm vibration: 2.5 m/s^2
b. for whole-body vibration: 0.5 m/s^2

Section 3-2. Limit values

Limit values for daily exposure (A(8)):

a.for hand and arm vibration: 5.0 m/s^2
b.for whole-body vibration: 1.1 m/s^2

Chapter 4. Radiation

Section 4-1. Limit values for ionising radiation

The following limit values shall not be exceeded:

a.The limit value for workers over the age of 18 years is set to 20 mSv per calendar year.

b.The radiation dose to the lens of the eye shall not exceed 20 mSv per calendar year.

c.The radiation dose for the skin, hands and feet shall not exceed 500 mSv per calendar year.

d.For apprentices aged between 16 and 18 who employ radiation sources in their education, dose limits of 5, 15 and 50 mSv, respectively, per calendar year shall apply instead of the doses listed under (a)-(c).

e.In the case of pregnant women, the dose for the foetus shall not exceed 1 mSv for the remaining part of the pregnancy, i.e. from the time that pregnancy is confirmed.

Section 4-2. Limit values for artificial optical radiation

The limit values for exposure to artificial optical radiation, with the exception of laser radiation, are set out in Annex 3. The limit values for exposure to laser radiation are set out in Annex 4.

Section 4-3. Action and limit values for electromagnetic fields

Action and limit values for exposure to electromagnetic fields are laid down in Annexes 5, 6 and 7. Exposure may exceed the limit values if the exposure takes place in connection with installation, testing, use, development, maintenance or research related to magnetic resonance imaging (MRI) equipment for patients in the health sector, on condition of the following:

a.the risk assessment shows that the limit values have been exceeded,

b.all technical and organisational measures have been implemented,

c.circumstances warrant exceeding the limit values,

d.the special nature of the work site, work equipment or work method has been taken into account and,

e.the employer can demonstrate that the employees continue to be protected against exposure to health hazards and safety risks, including ensuring that the equipment manufacturer’s instructions for safe use have been adhered to.

The exposure may exceed the limit values temporarily in certain sectors or in connection with certain activities not comprised by the second paragraph, if the following has been met:

a.the risk assessment shows that the limit values have been exceeded,

b.all technical and organisational measures have been implemented,

c.the special nature of the work site, work equipment or work method has been taken into account and,

d.the employer can demonstrate that the employees continue to be protected against exposure to health hazards and safety risks, including by using comparable, more specific and internationally recognised standards and guidelines.

Chapter 5. Chemicals

Section 5-1. Limit values for pollutants in the working atmosphere

Limit values relating to pollutants in the working atmosphere are listed in Annex 1 to the regulations.

Section 5-2. Biological limit values

a.The limit value for lead is 0.5 µmol/l per litre blood for women of fertile age and 1.5 µmol/l per litre blood for other employees.
b.The limit value for mercury in urine is 30 µg Hg/g creatinine.

Section 5-3. Requirements relating to sand and other blasting agents used in sand blasting

Sand and other blasting agents used for sand blasting must not be carcinogenic.
Blasting agents must not contain lead or lead compounds, biologically available nickel or more than one per cent by weight of quartz or other crystalline silica.

Section 5-4. Requirements relating to cement and cement-containing mixtures

Cements and cement-containing mixtures that in hydrated form contain more than 2 mg soluble hexavalent chromium per kg dry cement may not be used.
The requirement in the first paragraph does not apply to use in connection with controlled, enclosed and fully automated processes where cement and cement-containing mixtures are handled by machines only and where there is no possibility of contact with the skin.

Section 5-5. Requirements relating to breathing air from filling plant

As far as possible, breathing air from the filling plant must be free of contaminants and be tasteless and odourless. The following values shall not be exceeded:

a.10 ppm (11 mg/m^3) carbon monoxide (CO)
b.500 ppm (900 mg/m^3) carbon dioxide (CO_2)
c.1 mg/m^3 oil
d.50 mg/m^3 water for cylinders with a filling pressure of 200 bar and 30 mg/m^3 water for cylinders with a filling pressure of 300 bar

The O_2 content shall be 21.0% +/- 0.5%.

Section 5-6. Prohibition on work with special chemicals

The prohibition on work with special chemicals is described in Chapter 12 of the Regulations concerning Organisation, Management and Employee Participation and in Chapters 3 and 4 of the Regulations concerning the Performance of Work.

Chapter 6. Classification of biological agents

Section 6-1. List of classified biological agents (infection risk groups)

As a basis for protection measures against biological hazard sources, the employer shall use the list in Annex 2 when assessing risks constituted by biological agents.

Chapter 7. Final provisions

Section 7-1. Penal sanctions

Wilful or negligent violation of these regulations or decisions made pursuant to these regulations, or aiding and abetting thereto, is a criminal offence pursuant to Chapter 19 of the Working Environment Act.

Section 7-2. Fine for violations

If someone who has acted on behalf of the enterprise has violated provisions in these regulations or decisions made pursuant to these regulations, the enterprise can be fined pursuant to Section 18-10 of the Working Environment Act.

Section 7-3. Entry into force

These regulations enter into force on 1 January 2013.

Annex 1: List of limit values for pollutants in the working atmosphere

Offshore petroleum activities are subject to the limit values with safety factors as mentioned in Section 36 of the Activities Regulations. Activities at onshore facilities (see Section 6(e) of the Framework Regulations) shall be planned with safety factors reflecting limit values.
The list includes comments as follows:

A:	Chemicals to be treated as provoking allergic reactions or other hypersensitivity in the eyes or respiratory organs, or to be treated as provoking allergic reactions in contact with skin.

E:	The EU has adopted a recommended limit value for the substance.
G:	The EU has adopted a binding limit value for the substance.
H:	Chemicals that can be absorbed through the skin.
K:	Chemicals to be treated as carcinogenic.
M:	Chemicals to be treated as mutagenic.
R:	Chemicals to be treated as harmful to reproduction.
S:	The short-term exposure limit: the average concentration of a chemical substance in an employee's breathing zone that must not be exceeded over a given reference period. The reference period is 15 minutes unless otherwise specified.
T:	The ceiling value: a momentary value indicating the maximum concentration of a chemical substance in the breathing zone, which must not be exceeded.

CAS number	Name	ppm	mg/m^3	Comments	Last amended
75-07-0	Acetaldehyde	25	45	K	
60-35-5	Acetamide	10	25	K	
67-64-1	Acetone	125	295		
75-05-8	Acetonitril	30	50	HE	2007
	Acetylene tetrabromide, see 1,1,2,2-Tetrabromoethane				
	Acetylene tetrachloride, see 1,1,2,2-Tetrachloroethane				
50-78-2	Acetylsalsylic acid	–	5		

	AES wool	0.5 fibre/cm^3		2007	
	Acrolein, see Acrylaldehyde				
107-02-8	Acrylaldehyde	0.02	0.05	HE	2018
		0.05	0.12	S	
79-06-1	Acrylamide	–	0.03	HKM	
107-13-1	Acrylonitrile	2	4	H K	
79-10-7	Acrylic acid	10	29	AE	2018
		20	59	S	
309-00-2	Aldrin	–	0.25	H	
	Allyl alcohol, see 2-Propen-1-ol				
107-11-9	Allylamine	2	5		
	Allyl (2,3-epoxypropyl) ether, see 1-Allyloxy-2,3-epoxypropane				
	Allyl glycidyl ether, see 1-Allyloxy-2,3-epoxypropane				
	Allyl chloride; see 3-Chloropropene				
106-92-3	1-Allyloxsy-2,3-epoxypropane	5	22	TA	
2179-59-1	Allyl propyl disulphide	2	12		
7429-90-5	Aluminium powder (pyrotechnics)	–	5		

	Aluminium-soluble salts (calculated as Al)	–	2		
	Aluminium alkyls	–	2		
1344-28-1	Aluminium oxide	–	10	1	
	Aluminium welding fumes	–	5		
141-43-5	2-Aminoethanol	1	2.5	HE	2007
	2-Aminopropane, see 2-Propylamine				
504-29-0	2-Aminopyridine	0.5	2		
	Ammate, see Ammonium sulphamate				
61-82-5	Amitrole		0.2	E	2018
7664-41-7	Ammonia	15	11	E[2]	2012
		50	36	S	
12125-02-9	Ammonium chloride	–	10	1	
7773-06-0	Ammonium sulphamate	–	10	1	
	Amorphous silicon dioxide Respirable dust	–	1.5		
625-16-1	tert-Amyl acetate	50	260	E	

	iso-Amyl alcohol, see 3-Methyl-1-butanol			
62-53-3	Aniline	1	4	HK
	o-Anisidine and p-Anisidine, see 2-Methoxyaniline and 4-Methoxyaniline			
	Anon, see Cyclohexagon			
	Antimony and Antimony compounds (calculated as Sb)	–	0.5	K
7803-52-3	Antimony hydride	0.05	0.25	K
	ANTU, see 1-Naphthylthiourea			
	Arsenic and inorganic Arsenic compounds (except Arsenic hydride) (calculated as As)	–	0.01	K
7784-42-1	Arsenic hydride	0.003	0.01	K
	Arsinic, see Arsenic hydride			
	Asbestos, all forms	0.1 fibre/cm^3		GK
8052-42-4	Asphalt (fumes)	–	5	

1912-24-9	Atrazine	–	5	K	
111-40-0	3-Azapentane-1,5-diamine	1	4	HA	
	3-Azapentane-1,5-diol, see 2,2'-Iminodiethanol				
86-50-0	Azinphos-methyl	–	0.2	H	
	Aziridin, see Ethylenimine				
	Barium and Barium compounds (except Barium sulphate) (calculated as Ba)	–	0.5	E	
17804-35-2	Benomyl	0.8	10	1	
71-43-2	Benzene	1	3	GHK	
	1,2-Benzenediamine, see o-Phenylenediamine				
108-46-3	1,3-Benzenediol	10	45		2007
108-98-5	Benzenethiol	0.5	2		
	1,2,4-Benzenetricarboxylic acid 1,2-anhydride, see Benzene-1,2,4-tricarboxylic acid 1,2-anhydride				

552-30-7	Benzene-1,2,4-tricarboxylic acid 1,2-anhydride	0.005	0.04	A	
106-51-4	1,4-Benzoquinone	0.1	0.4		
94-36-0	Benzoyl peroxide	–	5	A	
85-68-7	Benzyl butyl phthalate (BBP)	–	1	RE	2007
	Benzyl chloride, see -Chlorotoluene				
	Beryllium and Beryllium compounds (calculated as Be)	–	0.001	K	
92-52-4	Biphenyl	0.2	1		
	Bis (2,3-epoxypropyl) ether, 2,2'-[oxybis(mehtylene)] bisoxirane				
80-05-7	Bisphenol A, inhalable	–	2	ARE	2018
	Bis (2-chloroethyl), see 2,2'-Dichlordiethyl ether				
	Bis-chloroethyl ether, see 1,1'-Dichloromethyl ether				

	Lead and inorganic Lead compounds (calculated as Pb) (dust and fumes)	–	0.05	GR	
301-04-2	Lead acetate (calculated as Pb)	–	0.05	KR	
7446-27-7	Lead phosphate (calculated as Pb)	–	0.05	KR	
7758-97-6	Lead chromate (calculated as Cr(VI))	–	0.005	KR	2010
1335-32-6	Lead subacetate (calculated as Pb)	–	0.05	KR	
	Lead tetraethyl, see Tetraethyl lead				
	Lead tetramethyl, see Tetramethyl lead				
	Hydrocyanic acid, see Hydrogen cyanide				
	Cotton dust, total dust	–	0.2	3	
	Borax, see Sodium tetraborate decahydrate				

1303-86-2	Boric oxide	–	10	1	
10294-33-4	Boron tribromide	1	10	T	
7637-07-2	Boron trifluoride	1	3	T	
7726-95-6	Bromine	0.1	0.7	E	
74-96-4	Bromoethane	5	22	H	
	Bromoform, see Tribromomethane				
	Bromoethylene, see Vinyl bromide				
74-97-5	Bromochloromethane	100	525		
	2-Bromo-2-chloro-1,1,1trifluoroethane, see Halothane				
74-83-9	Bromomethane	5	20	HK	
7789-30-2	Bromine pentafluoride	0.1	0.7		
75-63-8	Bromotrifluoromethane	500	3050		
106-99-0	1,3-Butadiene	1	2.2	K	
110-65-6	2-Butyne-1,4-diol		0.5	AE	2018
106-97-8	Butane	250	600		
71-36-3	Butan-1-ol	25	75	HT	2007
78-92-2	Butan-2-ol	25	75	HT	2007
431-03-8	2,3-Butanedione	0.02	0.07	AE	2018
		0.1	0.36	S	

	Butanol (all isomers)	25	75	HT	2007
78-93-3	Butanone	75	220	E	
1338-23-4	2-Butanone peroxide	–	1	T	
109-79-5	Butanethiol	0.5	1.5		
	2-butenal, see (E)-2-butenal				
123-73-9	(E)-2-butenal	2	6	H	
111-76-2	2-butoxy-ethanol	10	50	HE	
2426-08-6	1-butoxy-2,3-epoxypropane	5	27	A	
112-34-5	2-2(butoxyethoxy) ethanol	10	68		2007
112-07-2	2-butoxyethyl acetate	10	65	HE	
	Butyl acetate (all isomers)	75	355		
141-32-2	Butyl acrylate	2	11	AE	2007
	Butylamine (all isomers)	5	15	HT	
	Butyl ethyl ketone, see 3-heptanone				
	Butyl (2,3-epoxypropyl) ether, see 1-butoxsy-2,3-epoxypropane				
	Butyl glycidyl ether, see 1-butoxsy-2,3-epoxypropane				

	Butyl glycol, see 2-butoxyethanol				
1189-85-1	tert-butyl chromate (calculated as CrO_3)	–	0.1	HT	
138-22-7	Butyl lactate	5	25		
	Butyl mercaptan, see Butanethiol				
97-88-1	Butyl methacrylate	10	59	A	2007
1634-04-4	tert-butyl methyl ether (MTBE)	50	183.5	E	2011
		100	367	S	
	p-tert-butyltoluen, see 1-methyl-4-tert-butylbenzene				
2425-06-1	Captafol	–	0.1		
133-06-2	Captan	–	5	K	
1333-86-4	Carbon Black (lamp soot)	–	3.5		
	Cellosolve, see 2-etoxyethanol				
	Cellosolve acetate, see 2-etoxy ethylacetate				
21351-79-1	Cesium hydroxide	–	2		
420-04-2	Cyanamide	0.6	1	HE	2007

	Cyanides (calculated as CN)	–	5	H	
506-77-4	Cyanogen chloride	0.25	0.6	T	
13121-70-5	Cyhexatin	–	5		
	Cyklo-, see cyclo				
50-29-3	DDT	–	1	K	
17702-41-9	Decaborane	0.05	0.3	H	
	Decanes and other higher aliphatic hydrocarbons	40	275		
8065-48-3	Demeton	0.01	0.1	H	
867-27-6	Demeton-O-methyl	0.05	0.5	H	
57041-67-5	Desflurane	5	35		2010
	Diacetone alcohol, see 4-Hydroxy-4-methyl-2-pentanone				
	1,2-Diaminobenzen, see o-Phenylenediamine				
	1,3-Diaminobenzen se m-Phenylenediamine				

	1,4-Diaminobenzen se p-Phenylenediamine			
	Diatomaceous earth (natural kieselguhr) Respirable dust	–	1.5	
333-41-5	Diazinon	–	0.1	H
334-88-3	Diazomethane	0.2	0.4	K
	Dibenzoyl peroxide, see Benzoyl peroxide			
19287-45-7	Diborane	0.1	0.1	
	Dibrome, see Dimethyl1,2-dibromo-2,2-dichlorethyl phosphate			
75-61-6	Dibromodifluoro-methane	50	430	
106-93-4	1,2-Dibromoethane	0.1	1	K
102-81-8	2-(dibutylamino)ethanol	2	14	H
	Dibutyl phosphate (all isomers)	1	5	
84-74-2	Dibutyl phthalate	–	3	
460-19-5	Dicyan	10	22	
60-57-1	Dieldrin	–	0.25	

	Diethanolamine, see 2,2’-Iminodiethanol	3	15		
109-89-7	Diethylamine	5	15	E	2007
100-37-8	2-(dibutylamino)ethanol	10	50	H	
111-96-6	Diethylene glycol dimethylether	–	–	HR	
	Diethylenetriamine, see 3-azapentane-1,5-diamine				2000
60-29-7	Diethyl ether	100	300	E	2007
84-66-2	Diethyl phthalate	–	3		
117-81-7	Di-2-ethylhexyl phthalate (DEHP)	–	1	R	2007
	Diethyl ketone, see Pentane-3-one				
	Diphenyl, see biphenyl				
122-39-4	Diphenylamine	–	5		
101-84-8	Diphenyl ether	1	7	E	2018
		2	14	S	
101-68-8	Diphenylmethane-4,4’-diisocyanate (MDI)	0.005	0.05	A[4]	
	Difluorodibromomethane, see Dibromodifluoro-methane				

75-71-8	Difluorodichloromethane	500	2475		
75-45-6	Difluorochloromethane	500	1750	E	
76-12-0	1,2-difluoro-1,1,2,2tetrachloro-ethane	250	2085		
1314-56-3	Diphosphorous (V) oxide	–	1	E	
	Diglycidyl ether, see 2,2'-[oxybis(mehtylene)] bisoxirane				
120-80-9	1,2 dihydroxybenzene	5	20		
	1,3-Dihydroxybenzene, see 1,3-benzendiol				
	Diisobutyl ketone, see 2,6-dimethyl-4-heptanone				
	Diisocyanates	0.005		A[4]	
108-18-9	Diisopropylamine	5	20	H	
108-20-3	Diisopropyl ether	125	525		
7572-29-4	Dichloroacetylene	0.1	0.4	T	
95-50-1	1,2-Dichlorobenzene	20	122	HE	2012
		50	306	S	

106-46-7	1,4-Dichlorobenzene	2	12	HKE	2018
		10	60	S	
111-44-4	2,2’-Dichloroethyl ether	5	30	HK	
542-88-1	1,1’-Dichlorodimethyl ether	0.001	0.005	K	
118-52-5	1,3-Dichloro-5,5-dimethylhydantoin	–	0.2		
75-34-3	1,1-Dichloroethane	50	200	HK	
107-06-2	1,2-Dichloroethane	1	4	HK	
75-35-4	1,1-Dichloroethene	1	4	HKE	2018
		3	12	S	
540-59-0	1,2-Dichloroethene	100	395		
	1,2-Dichloroethylene, see 1,2-Dichloroethene				
94-75-7	2,4-Dichlorophenyloxyacetic acid	–	5		
136-78-7	2-(2,4-Dichlorophenoxy) ethyl sulphate	–	5		
75-09-2	Dichloromethane	15	50	HKE	2018
		45	150	S	

	Dichloromonofluoromethane, see Fluorodichloromethane				
594-72-9	1,1-Dichloro-1-nitroethane	2	12	HT	
78-87-5	1,2-Dichloropropane	40	185		
75-99-0	2,2-Dichloropropane acid	1	6		
542-75-6	1,3-Dichloropropene	1	5	H	
	2,2-Dichloropropionic acid, see 2,2-Dichloropropane acid				
	1,2-Dichloro-1,1,2,2tetrafluoroethane, see 1,1,2,2-Tetrafluoro-1,2dichloroethane				
62-73-7	Dichlorvos	0.1	1	HK	
85-00-7	Diquat dibromide	–	0.5		
109-87-5	Dimethoxymethane	500	1550		
127-19-5	N,N-Dimethylacetamide	10	35	HE	
124-40-3	Dimethylamine	2	4	E	2000

121-69-7	N,N-Dimethylaniline	5	25	H	
108-84-9	1,3-Dimethylbutyl acetate	25	150		
300-76-5	Dimethyl-1,2-Dibromo-2,2-Dichloroethyl phosphate	–	3		
115-10-6	Dimethyl ether	200	384	E	2007
598-56-1	Dimethylethylamine	2	6		
68-12-2	N,N-Dimethylformamide	5	15	HRE	2011
		10	30	S	
	N,N-Dimethylmethanamide, see N,N-Dimethylformamide				
131-11-3	Dimethyl phthalate	–	3		
108-83-8	2,6-Dimethyl-4-heptanone	20	120		
57-14-7	1,1-Dimethylhydrazine	0.01	0.02	HAK	
	1,2-Dimethylhydrazine	0.01	0.02	HK	
77-78-1	Dimethyl sulphate	0.01	0.05	HK	
	Dinitrobenzene (all isomers)	0.15	1	H	

10024-97-2	Dinitrogen oxide	50	90	R	2000
534-52-1	4,6-Dinitro-o-cresol	–	0.2	H	
	Dinitrotoluene (all isomers)	–	0.15	HK	
123-91-1	1,4-Dioxane	5	18	HKE	2011
		10	36	S	
117-84-0	Dioctyl phthalate	–	3		
138-86-3	Dipentene	25	140	A	
	Dipropylene glycol methyl ether, see (2-Methoxymethyl ethoxy) propanol				
	Dipropylene ketone, see Heptane-4-one				
	Disul, see 2-(2,4-Dichlorophenoxy) ethyl sulphate				
97-77-8	Disulfiram	–	2		
10025-67-9	Disulphur dichloride	1	6		
5124-30-1	Dicyclohexylmethane-4,4’diisocyanate	0.005	0.05	A[4]	
77-73-6	Dicyclopentadiene	5	30		
298-04-4	Di-Syston	–	0.1	H	
330-54-1	Diuron	–	5	K	

	Divinylbenzene (all isomers)	10	53		
	Dursban, see Chlorpyriphos				
64-19-7	Acetic acid	10	25	AE	2018
		20	50	S	
108-24-7	Acetic anhydride	5	20	T	
	Extraction benzene (largely n-hexane)	50	175		
	Extraction benzene (unspecified)	100	500		
115-29-7	Endosulfan	–	0.1	H	
72-20-8	Endrin	–	0.1	H	
13838-16-9	Enflurane	0.3	2.3	R	2000
	Epichlorohydrine, see 1-chloro-2,3-epoxypropane				
	EPN, see O-ethylO-4-nitrophenyl phenyl thiophosphonate				
	1,2-Epoxy-3-phenoxy-propane, see Phenyl glycidyl ether				

	1,2-Epoxypropane, see 1,2-propylene oxide				
556-52-5	2,3-Epoxy-1-propanol	25	75	A	
	2,3-Epoxypropyl phenyl ether, see Phenyl glycidyl ether				
4016-14-2	2,3-Epoxypropyl isopropyl ether	25	120		
64-17-5	Ethanol	500	950		
	Ethanolamine, see 2-Aminoethanol				
107-21-1	1,2-Ethanediol	20	52	HE[5]	2012
		40	104	S	
628-96-6	1,2-Ethanediol dinitrate	0.03	0.18	H	
75-08-1	Ethanethiol	0.5	1		
	Ether, see Diethylether				
110-80-5	2-Ethoxyethanol	5	18	HRE	2011
111-15-9	2-Ethoxyethyl acetate	2	11	HRE	2011
141-78-6	Ethyl acetate	200	734	E	2018
		400	1468	S	
140-88-5	Ethyl acrylate	5	21	HAKE	2011
		10	42	S	
75-04-7	Ethylamine	2	4		2000

	Ethyl-sec-amyl ketone, see 5-Methyl-3-heptanone				
100-41-4	Ethyl benzene	5	20	HKE	2000
	Ethyl bromide, see Bromoethane				
107-15-3	Ethylendiamine	10	25	A	
	Ethylene dibromide, see 1,2-Dibromoethane				
	Ethylene dichloride, see 1,2-Dichloroethane				
	Ethylene glycol, see 1,2-Ethanediol				
	Ethylene glycol dinitrate, see 1,2-Ethandiol nitrate				
	Ethylene glycol monobutyl ether, see 2-Butoxyethanol				
	Ethylene glycol monoethyl ether, see 2-Ethoxyethanol				
	Ethylene glycol monoethyl ether acetate, see 2-Etoxy ethylacetate				

	Ethylene glycol monomethyl ether, see 2-Methoxyethanol				
	Ethylene glycol monomethyl ether acetate, see 2-Metoxyethyl acetate				
151-56-4	Ethyleneimine	0.5	1	HK	
	Ethylene chlorohydrine, see 2-Chloroethanol				
75-21-8	Ethylene oxide	1	–	K	
109-94-4	Ethyl formate	50	150		
	Ethyl glycol, see 2-Ethoxyethanol				
	Ethyl glycol acetate, see 2-Ethoxyethyl acetate				
104-76-7	2-Ethylhexanol	1	5.4	E	2018
		10	54	S	
	Ethylidene chloride, see 1,1-Dichloroethane				
16219-75-3	5-Ethylidene-2-norbornene	5	25	T	
	Ethyl chloride, see Chloroethane				

97-63-2	Ethyl methacrylate	50	250	A	
	Ethylmercaptan, see Ethanethiol				
	Ethyl methanoate, see Ethyl formate				
100-74-3	N-Ethylmorpholine	5	23	H	
	O-ethyl-O-(4-nitrophenyl) phenyl monothiophosphonate, see O-ethyl-O-4-nitrophenyl phenyl thiophosphonate				
2104-64-5	O-ethyl-O-4-nitrophenyl phenyl thiophosphonate	–	0.5	H	
78-10-4	Ethyl silicate	5	44	E	2018
108-95-2	Phenol	1	4	HE	2011
		3	12	S	
92-84-2	Phenothiazine	–	5	H	
	1,2-Phenylenediamine, see o-Phenylenediamine				

	1,3-Phenylenediamine, see m-Phenylenediamine			
	1,4-Phenylenediamine, see p-Phenylenediamine			
	Phenyl ether, see Diphenyl ether			
108-45-2	m-Phenylenediamine	–	0.1	HA
95-54-5	o-Phenylenediamine	–	0.1	HAK
	p-Phenylenediamine	–	0.1	HA
638-21-1	Phenylphosphine	0.05	0.25	T
122-60-1	Phenyl glycidyl ether	1	5	A
100-63-0	Phenylhydrazine	–	0.6	A
	Phenyl mercaptan, see Benzenethiol			
98-83-9	2-Phenylpropene	50	240	E
14484-64-1	Ferbam	–	5	
12604-58-9	Ferrovanadium	–	1	
7782-41-4	Fluorine	0.1	0.2	E

	Fluorides (calculated as F), see Inorganic fluorides			
	Fluorine monoxide, see Oxygen difluoride			
75-43-4	Fluorodichloro methane	10	42	
75-69-4	Fluorotrichlrom ethane	500	2800	
	Hydrofluoric acid, see Hydrogen fluoride			
298-02-2	Phorate	–	0.05	H
50-00-0	Formaldehyde	0.5	0.6	AK
		1	1.2	T
75-12-7	Formamide	10	18	H
	Fosdrin, see Mevinphos			
7803-51-2	Phosphine	0.1	0.15	E
7723-14-0	Phosphorous (yellow)	–	0.1	
	Phosphoroxych loride, see Phosphoryl chloride			
10026-13-8	Phosphorus pentachloride	–	1	E
	Phosphorus pantaoxide, see Diphosphorous (V) oxide			

1314-80-3	Phosphorus pentasulphide	–	1	E	
7664-38-2	Phosphoric acid	–	1	E	
	Phosphoric acid anhydride, see Diphosphorous (V) oxide				
7719-12-2	Phosphorous trichloride	0.2	1.5		
10025-87-3	Phosphoryl chloride	0.1	0.6		
75-44-5	Phosgene	0.05	0.2	TE	2012
	Freon 11, see Fluorotrichloro methane				
	Freon 12, see Difluorodichlor omethane				
	Freon 21, Fluorodichloro methane				
	Freon 22, see Difluorochloro methane				
	Freon 112, see 1,2-difluoro-1,1,2,2tetrachlo roethane				
	Freon 113, see 1,2,2-trifluoro-1,1,2trichloroet hane				

	Freon 114, see 1,1,2,2-tetrafluoro-1,2dichloroethane				
626-17-5	m-Phthalodinitrile	–	5		
85-44-9	Phthalic acid anhydride	–	2	A	
98-01-1	2-Furaldehyde	2	8	H	
	Furfural, see 2-Furaldehyde				
98-00-0	Furfuryl alcohol	5	20	H	
7782-65-2	Germanium tetrahydride	0.2	0.6		
	Glass fibre/polyester, total dust	–	5		
	Mica Total dust Respirable dust	–	6		
		–	3		
111-30-8	Glutaraldehyde	0.2	0.8	AT	
	Glutaraldehyde (activated by alkaline)	–	0.25	T	
55-63-0	Glycerol trinitrate	0.01	0.09	HE	2018
		0.02	0.19	S	
	Glycidol, see 2,3-Epoxy-1-propanol				

	Graphite, natural Total dust Respirable dust	 – –	 5 2		
	Graphite, synthetic Total dust Respirable dust	 – –	 10 4		
7440-58-6	Hafnium	–	0.5		
151-67-7	Halothane	0.02	0.2	R	2000
	HDI, see Hexane-1,6-diisocyanate				
684-16-2	Hexafluoroacetone	0.1	0.7	H	
	Hexahydro-1,3,5-trinitro-1,s-triazine, see Perhydro-1,3,5-trinitro-1,3,5triazine				
87-68-3	Hexachlorobutadiene	0.02	0.24	H	
67-72-1	Hexachloroethane	1	10	H	
1335-87-1	Hexachloronaphthalene	–	0.2	H	
77-47-4	Hexachlorocyclopentadiene	0.01	0.1		
	Hexamethylene diisocyanate, see Hexane-1,6-diisocyanate				
100-97-0	Hexamethylenetetramine	–	3		

110-54-3	n-Hexane	20	72	RE	2007
	Hexane (except n-Hexane)	250	1050		
124-09-4	Hexsanediamine	0.5	1	HT	2007
822-06-0	Hexane-1,6-diisocyanate	0.005	0.035	A[4]	
	2-Hexanon, see Hexane-2-one				
591-78-6	Hexane-2-one	1	4	H	
	sec-Hexyl acetate, see 1,3-Dimethylbutyl acetate				
	Hexylene glycol, see 2-Methyl-2.4-pentandiol				
76-44-8	Heptachlor	–	0.5	H	
142-82-5	Heptane	200	800	E	
123-19-3	Heptane-4-one	25	115		
110-43-0	2-Heptanone	25	115	HE	
106-35-4	3-Heptanone	20	95	E	2014
		50	95	S	
	4-Heptanone, see Heptane-4-one				
302-01-2	Hydrazine	0.01	0.01	HAK	
10035-10-6	Hydrogen bromide	2	7	STE	2014
74-90-8	Hydrogen cyanide	0.9	1	HE	2018

		4	5	S	
61788-32-7	Hydrogenated terphenyl	2	19	E	2018
		5	48	S	
	Hydro-generated terphenyls	0.4	4.4		
7664-39-3	Hydrogen fluoride		0.5	HE	2010
		1.8	1.5	S	
	Hydrogen phosphide, see Phosphine				
7647-01-0	Hydrogen chloride	5	7	TE	
7722-84-1	Hydrogen peroxide	1	1.4		
7783-07-5	Hydrogen selenide	0.01	0.05	E	
7783-06-4	Hydrogen sulphide	5	7	E	2011
		10	14	T	
123-31-9	Hydroquinone	–	0.5	AK	
868-77-9	2-Hydroxyethyl methacrylate	2	11	A	2007
123-42-2	4-Hydroxy-4-methyl-2-pentanone	25	120		
999-61-1	2-Hydroxypropyl acrylate	0.5	2.9	HA	
	Refractory ceramic fibres	0.1 fibre/cm^3	K	2007	
111-42-2	2,2’-Iminodiethanol	3	15		

	2,2’-Iminodi(ethylamine), see 3-Azapentane-1,5-diamine				
95-13-6	Indene	10	45		
	Indium and Indium compounds (calculated as In)	–	0.1		
	Isoamyl acetate, see (3-Methylbutyl) acetate				
	Isoamyl alcohol, see 3-Methyl-1-butanol				
	Isobutyl acetate, see Butyl acetate (all isomers)				
97-86-9	Isobutyl methacrylate	50	300	A	
	Isocyanates, see diisocyanates				
26675-46-7	Isoflurane	2	15	R	2010
78-59-1	Isophorone	5	25	T	
4098-71-9	Isophorone diisocyanate	0.005	0.045	A[4]	
26952-21-6	Isooctan-1-ol	25	135		
	Isooctyl alcohol, see Isooctan-1-ol				
78-78-4	Isopentane	250	750	E	2007

123-92-2	Isopentyl acetate	50	260	E
	Isopropanol, see 2-propanol			
109-59-1	2-Isopropoxyethanol	20	80	
	2-Isopropoxypropane, see Diisopropyl ether			
108-21-4	Isopropyl acetate	100	420	
	Isopropylamine, see 2-Propylamine			
768-52-5	Isopropylaniline	2	11	H
	Isopropyl glycidyl ether, see 2,3-Epoxypropyl isopropyl ether			
1309-37-1	Iron(III)oxide (calculated as Fe)	–	3	
13463-40-6	Iron pentacarbonyl	0.01	0.08	
	Iron salts (calculated as Fe)	–	1	
7553-56-2	Iodine	0.1	1	T
74-88-4	Iodomethane	1	5	H
	Iodoform, see Triiodomethane			

	Cadmium and inorganic Cadmium compounds (except cadmium sulphate) (calculated as Cd)	–	0.05	K	
1306-19-0	Cadmium oxide (calculated as Cd)	–	0.02	KT	
151-50-8	Potassium cyanide	0.9	1	HE	2018
		4	5	S	
1310-58-3	Potassium hydroxide	–	2	T	
156-62-7	Calcium cyanamide	–	0.5		
1305-62-0	Calcium hydroxide Respirable dust	–	1	E	2018
			4	S	
1305-78-8	Calcium oxide Respirable dust	–	1	E	2018
			4	S	
8001-35-2	Camphechlor	–	0.5	H	
76-22-2	Camphor (synthetic)	2	12		
105-60-2	-Caprolactam	10	40	E5	2012
63-25-2	Carbaryl	–	5	H	
1563-66-2	Carbofuran	–	0.1	H	
124-38-9	Carbon dioxide	5000	9000	E	

75-15-0	Carbon disulphide	5	15	HRE	2011
630-08-0	Carbon monoxide	20	23	RE	2018
		100	117	S[6]	
558-13-4	Carbon tetrabromide	0.1	1.4		
	Carbon tetrachloride; see Tetrachloromethane				
353-50-4	Carbonyl fluoride	2	5		
	Carbonyl chloride, see Phosgene				
13466-78-9	-Carene	25	140	A	
	Catechol, see 1,2-Dihydroxybenzene				
463-51-4	Ketene	0.5	0.9		
	Quinone, see 1,4-Benzoquinone				
	Steatite Total dust	–	6		
	Respirable dust	–	3		
7782-50-5	Chlorine	0.5	1.5	E	2007
		1	3	T	
107-20-0	Chloroacetaldehyde	1	3	T	
532-27-4	-Chloroacetophenone	0.05	0.3		

79-04-9	Chloroacetyl chloride	0.05	0.2	H	
108-90-7	Chlorobenzene	5	23	E	2007
2698-41-1	o-Chlorobenzylidenemalononitrile	0.05	0.4	H	
	Chlorobromomethane, see Bromochloromethane				
57-74-9	Chlordane	–	0.5	H	
	Chlorodifluoromethane, see Difluorochloromethane				
10049-04-4	Chlorine dioxide	0.1	0.3		
106-89-8	1-chloro-2,3-epoxypropane	0.5	1.9	HAK	
55720-99-5	Chlorinated diphenyl oxide	–	0.5	H	
	Chlorinated camphene, see Toxaphene				
75-00-3	Chloroethane	100	270	KE	2007
107-07-3	2-Chloroethanol	1	3	HT	
	Chloroethene, see Vinyl chloride				
74-87-3	Chloromethane	25	50	K	
	Chloromethylbenzene, see Chlorotoluene				
100-00-5	1-Chloro-4-nitrobenzene	–	1	H	

600-25-9	1-Chloro-1-nitropropane	2	10		
	Chloroform, see Trichloromethane				
	Chloropicrin, see Trichloronitromethane				
126-99-8	2-Chloroprene	1	3.6	H	
107-05-1	3-Chloropropene	1	3	H	
2921-88-2	Chlorpyrifos	–	0.2	H	
2039-87-4	o-Chlorostyrene	25	140		
100-44-7	-Chlorotoluene	1	5		
95-49-8	o-Chlorotoluene	25	125	H	
7790-91-2	Chlorotrifluoride	0.1	0.4		
7440-50-8	Copper Fumes	–	0.1		
	Dust	–	1		
	Cobalt (fumes) and inorganic Cobalt compounds (calculated as Co, except Co(II)	–	0.02	AR	2000
	Cobalt, Co(II) compounds (fumes) and inorganic (calculated as Co)	–	0.02	AKR	2000

	Cobalt hydrocarbonyl (calculated as Co)	–	0.1		
	Cobalt carbonyl (calculated as Co)	–	0.1		
1319-77-3	Cresols (all isomers)	5	22	HE	
14464-46-1	Cristobalite Total dust	–	0.15	K[7]	
	Respirable dust	–	0.05	K[7]	
	Chromium and Cr^{2} ± and Cr^{3} ± compounds (calculated as Cr)	–	0.5	E	
	Chromic acid and chromates (calculated as Cr(VI))	–	0.005	AK	2010
	Chrotonaldehyde, see (E)-2-butenal				
	(E)-chrotonaldehyde, see (E)-2-butenal				
	Coal dust Total dust	–	4		
	Respirable dust	–	1.5		
	Cumene, see 1-Methylethyl benzene				

14808-60-7	-quartz Total dust	–	0.3	K[7]	
	Respirable dust	–	0.1	K[7]	
	Mercury and Mercury compounds (except alkyl compounds) (calculated as Hg) Biological limit value for urine	–	0.02	AE	2007
		30 µg Hg/g creatinine		8	
	Mercury, alkyl compounds (calculated as Hg)	–	0.01	AH	
	Limonene, see d-Limonene, i-Limonene and Dipentene				
5989-27-5	d-Limonene	25	140	A	
5989-54-8	i-Limonene	25	140		
58-89-9	Lindane	–	0.5	H	
7580-67-8	Lithium hydride Inhalable	–	0.02	SE	2018
	Soldering wire with resincontaining core (calculated as formaldehyde)	–	0.1		
	Laughing gass, see Dinitrogen oxide				
1309-48-4	Magnesium oxide	–	10	1	

121-75-5	Malathion	–	5	H	
108-31-6	Maleic acid anhydride	0.2	0.8	A	
7439-96-5	Manganese and inorganic Managenese compounds (calculated as Mn)				2018
	Inhalable fraction	–	0.2	E[9]	
	Respirable fraction	–	0.05	E[9]	
12079-65-1	Manganese cyclopentadienyl tricarbonyl (calculated as Mn)	–	0.1	H	
64-18-6	Formic acid	5	9	E	
	MDI, see Diphenylmethane- 4,4’-diisocyanate				
	Flour dust, inhalable		3	A[10]	2000
	Mercaptoacetic acid, see Thioglycolic acid				
108-67-8	Mesitylene (trimethylbenzenes)	20	100		
	Mesityloxide, see 4-methyl-3-penten-2-one				
79-41-4	Methacrylic acid	20	70		

	Methacrylic acid methyl ester, see Methyl methacrylate				
67-56-1	Methanol	100	130	HE	
74-93-1	Methanthiol	0.5	1		
90-04-0	2-Methoxyaniline	0.1	0.5	HK	
104-94-9	4-Methoxyaniline	0.1	0.5	H	
109-86-4	2-Methoxyethanol	1	3.1	HRE	2011
111-77-3	2-(2-Methoxyethoxy)ethanol	10	50	HRE	2007
110-49-6	2-Metoxyethyl acetate	1	4.9	HRE	2011
150-76-5	4-Methoxyphenol	–	5		
72-43-5	Methoxychlor	–	5		
34590-94-8	(2-Methoxymethylethoxy) propanol	50	300	HE	
107-98-2	1-Methoxy-2-propanol	50	180	HE	
108-65-6	1-Methoxy-2-propyl acetate	50	270	HE	
1589-47-5	2-Methyloxy-1-propanol	20	75	HR	
70657-70-4	2-Methoxy-1-propyl acetate	20	110	HR	
16752-77-5	Methomyl	–	2.5	H	
79-20-9	Methyl acetate	100	305		

	Methylacetylene, see Propyne				
	Methyl acetylene-Propadien mixture	500	900		
96-33-3	Methyl acrylate	5	18	HAE	2011
		10	36	S	
126-98-7	Methylacrylonitrile	1	3	HA	
74-89-5	Methylamine	10	12		
	Methylamyl alcohol, see 4-Methyl-2-pentanol				
	Meholamyl ketone, see 2-Heptanone				
100-61-8	N-Methylaniline	0.5	2	H	
75-55-8	2-Methylaziridine	2	5	HK	
	Methyl bromide, see Bromomethane				
	3-Methyl butanone, see 3-Methyl-2-butanone				
563-80-4	3-Methyl-2-butanone	100	350	H	
123-51-3	3-Methyl-1-butanol	50	180		
626-38-0	1-Methylbutyl acetate	50	260	E	

	3-methylbutyl acetate, see Isopentyl acetate				
98-51-1	1-Methyl-4-tert-butylbenzene	10	60		
	Methylbutyl ketone, see Hexane-2-one				
137-05-3	Methyl -2-cyanoacrylate	2	8	A	
	Methylene-bis(4-cyclohexyl isocyanate), see Dicyclohexylmethane-4,4’-diisocyanate				
	Methylene-bis-phenyl diisocyanate, see Diphenylmethane- 4,4’-diisocyanate				
101-77-9	4,4’-Methylenedianiline	0.1	0.8	HAK	
	Methylene chloride, see Dichloromethane				
98-82-8	1-Methylethyl benzene	20	100	HKE	2012
		50	250	S	

	Methylethyl ketone, see Butanone				
	Methylethyl ketone peroxide, see 2-Butanone peroxide				
	Methylphenol, see Cresols				
	Methyl formate, see Methyl methanoate				
	Methyl glycol, see 2-Methoxyethanol				
	Methyl glycol acetate, see 2-Methoxyethyl acetate				
110-12-3	5-Methyl-2-hexanone	20	95	E	2014
		50	250	S	
541-85-5	5-Methyl-3-heptanone	20	100	E	2014
		20	107	S	
60-34-4	Methyl hydrazine	0.01	0.02	HK	
	Methyl isobutyl carbinol, see 4-Methyl-2-pentanol				
	Methyl ispbutyl ketone, see 4-Methylpentan-2-one				

624-83-9	Methyl isocyanate	0.02	0.05	S (5 min) AE[11]	2011
	Methyl isopropyl ketone, see 3-Methyl-2-butanone				
	Methyl iodide, see Iodomethane				
	Methyl chloride, see Chloromethane				
	Methyl chloroform, see 1,1,1-Trichloroethane				
	Methyl mercaptan, see Methanthiol				
80-62-6	Methyl methacrylate	25	100	AE	2011
		100	400	S	
107-31-3	Methyl methanate	50	125	HE	2018
		100	250	S	
107-41-5	2-Methyl-2,4-pendandiol	20	100	T	
872-50-4	N-Methyl-2-pyrrolidone	5	20	HRE	2011
		20	80	S	
108-11-2	4-Methyl-2-pentanol	20	80	H	

108-10-1	4-Methylpentan-2-one	20	83	HE	2012
		50	208	S	
141-79-7	4-Methyl-3-penten-2-one	10	40		
	4-Methylpentyl-2-acetate, see 1,3-Dimethylbutyl acetate				
78-83-1	2-Methylpropan-1-ol	25	75	HT	2007
75-65-0	2-Methyl-2-propanol	25	75	HT	2007
	Methyl propyl ketone, see 2-Pentanone				
681-84-5	Methyl silicate	1	6		
	-Methylstyrene, see 2-Phenylpropene				
108-87-2	Methylcyclohexane	200	800		
	Methylcyclohexanol (all isomers)	25	120		
583-60-8	2-Methylcyclohexanon	25	115	H	
12108-13-3	Methylcyclopentadienyl manganese tricarbonyl (calculated as Mn)	0.1	0.2	H	

479-45-8	N-Methyl-2,4,6-N-tetranitroaniline	–	1.5	HA	
7786-34-7	Mevinphos	0.01	0.1	H	
	MMMF (Man Made Mineral Fibers), see Refractory ceramic fibres, thin glass fibres for special purposes, mineral wool and AES wool				
	Mineral wool	1 fibre/cm^3		12	2007
	Molybdenum compounds, soluble (calculated as Mo)	–	5		
	Molybdenum compounds, insoluble (calculated as Mo)	–	10		
	Monofluorodichloromethane, see Fluorodichloromethane				
110-91-8	Morpholine	10	36	HE	2007
91-20-3	Naphthalene	10	50	E	
3173-72-6	Naphthalene-1,5-diisocyanate	0.005	0.04	A[4]	

86-88-4	1-Naphthylthiourea	–	0.3		
26628-22-8	Sodium azide	–	0.1	E	2014
		–	0.3	S	
	Sodium bisulphite, see Sodium hydrogen sulphite				
143-33-9	Sodium cyanide	0.9	1	HE	2018
		4	5	S	
62-74-8	Sodium fluoroacetate	–	0.05	H	
7631-90-5	Sodium hydrogen sulphite	–	5		
1310-73-2	Sodium hydroxide	–	2	T	
7681-57-4	Sodium methabisulphite (Sodium pyrosulphate)	–	5		
	Sodium tetraborates:				
1330-43-4	Anhydrous	–	1		
1303-96-4	Decahydrates	–	5		
12447-40-4	Pentahydrates	–	1		
463-82-1	Neopenthane	250	750	E	2007
	Nickel and Nickel compounds (calculated as Ni)	–	0.05	AKR	2000

	Nickel carbonyl, see Nickel tetracarbonyl				
13463-39-3	Nickel tetracarbonyl	0.001	0.007	HKR	
54-11-5	Nicotine	–	0.5	HE	
100-01-6	p-Nitroaniline	–	3	H	
98-95-3	Nitrobenzene	0.2	1	HKRE	2007
79-24-3	Nitroethane	20	62	HE	2018
		100	312	S	
10102-44-0	Nitrogen dioxide	0.5	0.96	E[13]	2018
		1	1.91	S	
10102-43-9	Nitrogen monoxide	2	2.5	E[14]	2018
	Nitrogen oxide, see Nitrogen monoxide				
7783-54-2	Nitrogen trifluoride	10	29		
	Nitroglycerol, see Glycerol trinitrate				
	Nitroglycol, see 1,2-Ethandiol dinitrate				
	p-Nitrochloroben zene, see 1-chloro-4-nitrobenzene				
75-52-5	Nitromethane	50	125		
108-03-2	1-Nitropropane	20	70		
79-46-9	2-Nitropropane	10	35	K	

	Nitrotoluene (all isomers)	1	5.5	H	
111-84-2	Nonane	100	525		
144-62-7	Oxalic acid	–	1	E	
	2-oxo-Hexamethyleni mine, see Caprolactam				
05/07/2238	2,2’-[oxybis(mehtyl ene)] bisoxirane	0.1	0.5	AT	
7783-41-7	Oxygen difluoride	0.05	0.1		
2234-13-1	Octachloronap hthalene	–	0.1	H	
111-65-9	Octane	150	725		
	2-Octanol, see Isooctan-1-ol				
	Oil vapour	–	50		
	Oil mist (mineral oil particles)	–	1		
	Organic dust, total dust	–	5		
20816-12-0	Osmium tetraoxide	0.0002	0.002		
10028-15-6	Ozone	0.1	0.2		
	PAH (polyaromatic hydrocarbons)	–	0.04	K[1516]	2010
8002-74-2	Paraffin (fumes)	–	2		
4685-14-7	Paraquat	–	0.1	H	
56-38-2	Paration	–	0.05	H	

298-00-0	Parathion-methyl	–	0.2	H
1336-36-3	PCB (polychlorinated biphenyls)	–	0.01	HK
19624-22-7	Pentaborane	0.005	0.01	
76-01-7	Pentachloroethane	5	40	H
87-86-5	Pentachlorophenol	0.05	0.5	HK
1321-64-8	Pentachloronaphtalene	–	0.5	H
109-66-0	Pentane	250	750	E
96-22-0	Pentane-3-one	100	350	
	Pentanol (all isomers)	50	180	
107-87-9	2-Pentanone	75	260	
	3-Pentanone, see Pentane-3-one			
620-11-1	3-Pentyl acetate	50	260	E
628-63-7	Pentyl acetate	50	260	E
	Pentyl acetat (all isomers)	50	260	
121-82-4	Perhydro-1,3,5-trinitro-1,3,5triazine	–	1.5	H
	Perchloroethylene, see Tetrachloroethene			

	Perchloromethyl mercaptan, see Trichloromethane sulfenyl chloride				
7616-94-6	Perchloril fluoride	3	14		
	Perlite				
	Total dust	–	10		
	Respirable dust	–	4		
	Persulphates	–	2	A	
88-89-1	Picric acid	–	0.1	HE	
83-26-1	Pindone	–	0.1		
80-56-8	-Pinene	25	140	H	
127-91-3	-Pinene	25	140		
110-85-0	Piperazine	0.1	–	AE	2014
			0.3	S	
	Pival, see Pindone				
	2-Pivaloyl-1,3-indandione, see Pindone				
	Platinum compounds, soluble (calculated as Pt)	–	0.002		
7440-06-4	Platinum, metallic	No prescribed limit value		E	2012
	Plictran, see Cyhexatin				
	Polyester/glass fibre, total dust	–	5		

74-98-6	Propane	500	900		
57-55-6	Propane-1,2-diol	25	79		2007
6423-43-4	Propane-1,2-diyl dinitrate	0.05	0.3	H	
	1,2-Propanediol dinitrate, see Propane-1,2-diyl dinitrate				
71-23-8	1-Propanol	100	245	H	
67-63-0	2-Propanol	100	245		
	Propargyl alcohol, see 2-Propyne-1-ol				
	Propenal, see acrylaldehyde				
107-18-6	2-Propen-1-ol	2	5	HE	
79-09-4	Propionic acid	10	30	E	
57-57-8	-Propiolactone	0.5	1.5	K	
114-26-1	Propoxur	–	0.5		
	2-Propyl acetate, see isopropyl acetate				
109-60-4	n-Propyl acetate	100	420		
75-31-0	2-Propylamine	5	12		
	1,2-Propylene glycol dinitrate, see Propane-1,2-diyl dinitrate				

	Propylene glycol monomethyl ether, see 1-Methoxy-2-propanol				
	2-Propyl glycidyl ether, see 2,3-Epoxypropyl isopropyl ether				
	Propylenimine, see 2-Methylaziridine				
75-56-9	1,2-Propylene oxide	1	2	HAK	
	iso-Propyl glycidyl ether, see 2,3-Epoxypropyl isopropyl ether				
627-13-4	Propyl nitrate	20	90		
74-99-7	Propyne	500	825		
107-19-7	2-Propyne-1-ol	1	2.5	H	
8003-34-7	Pyrethrin	–	1	E	2007
110-86-1	Pyridine	5	15	E	
	Pyrocatechol, see 1,2-Dihydroxybenzene				
	Resorcinol, see 1,3-Benzenediol				

	Respirable dust in the silicon carbide industry, in furnace houses and furnace-houserelated departments in the silicon carbide industry		0.5		
7440-16-6	Rhodium	–	0.1		
	Rhodium compounds, soluble (calculated as Rh)	–	0.001		
299-84-3	Ronnel	–	5		
83-79-4	Rotenone	–	5		
7697-37-2	Nitric acid	2	5	E	2007
	Hydrochloric acid, see Hydrogen chloride				
	Selenium and inorganic Selenium compounds (except selenium sulphide, hydrogen selenide and selenium hexsafluoride) (calculate as Se)	–	0.05	A	2000
7783-79-1	Selenium hexafluoride	0.05	0.4		

7446-34-6	Selenium sulphide		0.05	AK	2000
28523-86-6	Sevoflurane	5	35		2010
7803-62-5	Silane	0.5	0.7		
7440-21-3	Silicon	–	10	1	
	Silicon carbide fibres	0.1 fibre/cm^3		K	
	Silicon carbide, see Respirable dust in the silicon carbide industry				
	Silicon tetrahydride, see Silanium				
7646-85-7	Zinc chloride	–	1		
1314-13-2	Zinc oxide	–	5		
	Irritating dust				
	Total dust	–	10		
	Respirable dust	–	5		
	Stibin, see Antimony hydride				
57-24-9	Strychnine	–	0.15	T	
100-42-5	Styrene	25	105	M	
1395-21-7	Subtilisins (enzymes used in detergents)	–	0.00006	T	
3689-24-5	Sulfotep	–	0.1	HE	2014
2699-79-8	Sulphuryl fluoride	5	20		
	Welding fumes (unspecified)	–	5	17	
7446-09-5	Sulphur dioxide	0.5	1.3	E[18]	2018

		1.0	2.7	S	
2551-62-4	Sulphur hexafluoride	1000	6000		
	Sulphur monochloride, see Disulphur dichloride				
5714-22-7	Sulphur pentafluoride	0.01	0.1	T	
7664-93-9	Sulphuric acid aerosol, thoracic fraction	–	0.1	KE	2011
7783-60-0	Sulphur tetrafluoride	0.1	0.4		
110-82-7	Cyclohexane	150	525	E	
108-93-0	Cyclohexanol	25	100		
108-94-1	Cyclohexanon	10	40	HE	2014
		20	80	S	
110-83-8	Cyclohexene	150	510		
108-91-8	Cyclohexylamine	10	40	H	
	Cyclonite, see Perhydro-1,3,5-trinitro-1,3,5triazine				
542-92-7	1,3-Cyclopentadiene	40	110		
	Synthetic mineral fibres, see MMMF				
7440-22-4	Silver, metal dust and fumes	–	0.1	E	

	Silver, soluble compounds (calculated as Ag)	–	0.01	E
	2,4,5-T, see 2,4,5-Trichlorophenoxyacetic acid			
	Talcum without fibres Total dust Respirable dust	– –	6 2	
	TDI, see 2,4- and 2,6-Toluene diisocyanate			
13494-80-9	Tellurium	–	0.1	
7783-80-4	Tellurium hexsafluoride	0.02	0.2	
	TEPP, see Tetraethyl pyrophosphate			
	Terphenyls	0.5	4.5	T
8006-64-2	Terpentine (of plant origin)	25	140	HA
79-27-6	1,1,2,2-Tetrabromoethane	1	14	
	Tetrabromomethane, see Carbon tetrabromide			
78-00-2	Tetraethyl lead	0.01	0.075	HR
107-49-3	Tetraethyl pyrophosphate	0.004	0.05	H

76-14-2	1,1,2,2-tetrafluoro-1,2dichloroethane	500	3500		
109-99-9	Tetrahydrofuran	50	150	HE	
79-34-5	1,1,2,2-Tetrachloroethane	1	7	H	
127-18-4	Tetrachloroethene	6	40	HKRE	2018
		18	120	S	
	Tetrachloroethylene, see Tetrachloroethene				
56-23-5	Tetrachloromethane	1	6.3	HKE	2018
		3	19	S	
1335-88-2	Tetrachloronaphtalene	–	2	H	
75-74-1	Tetramethyl lead	0.01	0.075	HR	
3333-52-6	Tetramethylsuccinonitrile	0.5	3	H	
7722-88-5	Tetrasodium pyrophosphate	–	5		
509-14-8	Tetranitromethane	0.005	0.04	K	
	Tetryl, see N-Methyl-2,4,6-N-tetranitroaniline				

	Thallium and soluble Thallium compounds (calculated as Tl)	–	0.1	H
7719-09-7	Thionyl chloride	1	5	T
	Tin compounds, organic (calculated as Sn)	–	0.1	H
	Tin compounds, inorganic (calculated as Sn)	–	2	E
68-11-1	Thioglycolic acid	1	5	
137-26-8	Thiram	–	5	AM
13463-67-7	Titanium dioxide	–	5	
	TNT, see 2,4,6-Trinitrotoluene			
	Toxaphene, see Camphechlor			
108-88-3	Toluene	25	94	HE
584-84-9	2,4-Toluene diisocyanate	0.005	0.035	AK[4]
91-08-7	2,6-Toluene diisocyanate	0.005	0.035	AK[4]
95-53-4	o-Toluidine	1	4.5	HK

	Wood dust from exotic hardwoods, oak and beech, total dust	–	1	GK[19]	
	Wood dust from Nordic woods, except oak and beech, total dust	–	2	K	
75-25-2	Tribromomethane	0.5	5	HK	
126-73-8	Tributyl phosphate	0.2	2.5		
	Tri(cyclohexyl)tin hydroxide, see Cyhexatin				
15468-32-3	Tridymite				
	Total dust	–	0.15	K[7]	
	Respirable dust	–	0.05	K[7]	
102-71-6	Triethanolamine	–	5		
121-44-8	Triethylamine	2	8	HE	
112-24-3	Triethylenetetramine	1	6	A	2007
603-34-9	Triphenylamine	–	5		
115-86-6	Triphenylphosphate	–	3		
	Trifluoromonobromomethane, see Bromotrifluoromethane				
76-13-1	1,2,2-Trifluoro-1,1,2trichloro-ethane	500	3800		

75-47-8	Triiodomethane	0.2	3		
120-82-1	1,2,4-Trichlorobenzene	2	15	HE	2014
76-03-9	Trichloroacetic acid	0.75	5		
71-55-6	1,1,1-Trichloroethane	50	270	E	
79-00-5	1,1,2-Trichloroethane	10	54	H	
79-01-6	Trichloroethene	10	50	K	
	Trichloroethylene, see Trichloroethene				
	Trichlorofluoromethane, see Fluorotrichloromethane				
93-76-5	(2,4,5-Trichlorophenoxy) acetic acid	–	5	H	
67-66-3	Trichloromethane	2	10	HKRE	
594-42-3	Trichloromethanesulphenyl chloride	0.1	0.8		
1321-65-9	Trichloronaphtalene	–	5	H	
76-06-2	Trichloronitromethane	0.1	0.7		

96-18-4	1,2,3-Trichloropropane	10	60	H	
	Trimellitic acid anhydride, see Benzene-1,2,4-tricarboxylic acid-1,2-anhydride				
75-50-3	Trimethylamine	10	24		
526-73-8	1,2,3-Trimethylbenzene	20	100	E	
95-63-6	1,2,4-Trimethylbenzene	20	100	E	
	Trimethylbenzene (all isomers), see Mesitylene				
121-45-9	Trimethyl phosphite	0.5	2.6		
118-96-7	2,4,6-Trinitrotoluene	–	0.1	H	
78-30-8	Triorthocresyl phosphate	–	0.1		
	Tricyclohexylhydroxytin, see Cyhexatin				
	Thin glass fibres for special purposes	0.1 fibre/cm^3		K^{20}	2007
	Inorganic fluorides (calculated as F)	–	0.5	E	2010

	Uranium and Uranium compounds (calculated as U)	–	0.2		
110-62-3	Valeraldehyde	25	90		
7440-62-2	Vanadium				
	Fumes (calculated as V)	–	0.05	T	
	Dust (calculated as V)	–	0.2		
108-05-4	Vinyl acetate	5	17.6	KE	2011
		10	35.2	S	
	Vinyl benzene, see Styrene				
593-60-2	Vinyl bromide	1	4	K	
	Vinylidene chloride, see 1,1-Dichloroethane				
75-01-4	Vinyl chloride	1	3	G K	
106-87-6	Vinylcyclohexene dioxide	10	60		
	Vinyl toluene (all isomers)	50	240		
1304-82-1	Bismuth telluride	–	10	1	
	Bismuth telluride (with added Selenium)	–	5		
81-81-2	Warfarin	–	0.1		

	White Spirit (content of aromatic compounds <22%)	50	275	
	White Spirit (content of aromatic compounds >22%)	25	120	
	Tungsten and insoluble Tungsten compounds (calculated as W)	–	5	
	Tungsten compounds, soluble (calculated as W)	–	1	
1330-20-7	Xylene (all isomers)	25	108	HE
108-38-3	m-Xylene	25	108	HE
106-42-3	p-Xylene	25	108	HE
95-47-6	o-Xylene	25	108	HE
1477-55-0	m-Xylene--,-Diamine)	–	0.1	T
	Xylidine (all isomers)	1	5	H
7440-65-5	Yttrium	–	1	
	Zirconium compounds (calculated as Zr)	–	5	

Footnotes

1 The limit value is set equal to the value for nuisance dust.2 In agriculture, a limit value equal to 20 ppm is applicable during a transitional period (2013.2024) for livestock production in older farm

buildings (farm buildings erected before 2002).3 The limit value applies to raw cotton of less than 15 µm.4 The short-term value for diisocyanates is 0.01 ppm.5 The limit value is based on the calculated aggregate sum of the gaseous and particulate (aerosol) form of the substance.6 Only for the short-term value: Some undertakings in the smelting industry will be unable to comply with this short-term value for technical/financial reasons. These undertakings are responsible for documenting a sound working environment. Written instructions must be prepared for work in a CO atmosphere.

For the underground mining and tunnelling industries, the following limit value applies for carbon monoxide up to 21 August 2023: 25 ppm, 29 mg/m., and short-term exposure should not exceed 100 ppm. If such values can occur, written instructions shall be prepared for work in CO atmospheres.7 Dust containing -Quartz, Cristobalite and/or Tridymite shall be assessed on the basis of the summation equation. At the same time, the values for nuisance dust must be must be complied with.8 Measurements of compliance with this biological limit value is conditional on voluntary cooperation by employees.9 Some undertakings in the smelting industry will be unable to comply with the limit values for technical/financial reasons. These undertakings are responsible for documenting a sound working environment. Such undertakings must have a plan for how to reduce exposure and must demonstrate lower values over time. The Norwegian Labour Inspection Authority, trade union representatives and safety representatives must be consulted and informed of annual plans and the results achieved.10 The limit value for flour dust is set equal to the value for inhalable dust.11 The short-term value is below the odour threshold.12 By ‘mineral wool’ is meant glass wool (except thin glass fibres for special purposes), rock wool and slag wool.13 Some undertakings will be unable to comply with the limit values for technical/financial reasons. These undertakings are responsible for documenting a sound working environment. Such undertakings must have a plan for how to reduce exposure and must demonstrate lower values over time. The Norwegian Labour Inspection Authority, trade union representatives and safety representatives must be consulted and informed of annual plans and the results achieved.

For the underground mining and tunnelling industries, the following limit value applies for nitrogen dioxide up to 21 August 2023: 0.6 ppm, 1.1 mg/m^3.14 Some undertakings will be unable to comply with the limit values for technical/financial reasons. These undertakings are responsible for documenting a sound working environment. Such undertakings must have a plan for how to reduce exposure and must demonstrate lower values over time. The Norwegian Labour Inspection Authority, trade union representatives and safety representatives must be consulted and informed of annual plans and the results achieved.

For the underground mining and tunnelling industries, the following limit value applies for nitrogen monoxide up to 21 August 2023: 25 ppm, 30 mg/m^3.15 The limit value applies to particulate PAH collected by filtration and is based on the sum of the following 21 PAH compounds: Anthracene (3), Benzo(a)anthracene (2A), benzo[a]fluorene (3), benzo[b]fluorene (3), benzo[b]fluoranthene (2A), benzo[j] fluoranthene (2A), benzo[k]fluoranthene (2A), Benzo[a]pyrene (1), Benzo[e]pyrene (3), benzo[ghi]perylene (3), dibenzo[a,h])anthracene (2A), dibenzo[a,e]pyrene (3), dibenzo[a,h]pyrene (2A), dibenzo[a,i]pyrene (2A), dibenzo[a,l]pyrene (2A), phenanthrene (3), fluoranthene (3), indeno((1,2,3-cd)pyrene (2B), Chrysen (2A), Pyrene (3) and triphenylene (3).16 Naphthalene and Biphenyl are gaseous PAHs that have accumulated in the absorbent. These two

substances shall be assessed separately in relation to the respective limit values that apply to each of them.17 Welding/metal fumes contain different substances. In addition to the limit value for welding fumes (unspecified), the value for each individual substance in the welding fumes shall be complied with.18 Some undertakings will be unable to comply with the limit values for technical/financial reasons. These undertakings are responsible for documenting a sound working environment. Such undertakings must have a plan for how to reduce exposure and must demonstrate lower values over time. The Norwegian Labour Inspection Authority, trade union representatives and safety representatives must be consulted and informed of annual plans and the results achieved.19 The limit value applies to the inhalable fraction of the wood dust. If dust from hardwoods is mixed with other wood dust, the limit value shall apply to all wood dust that is present in the mixture.20 These fibres correspond to ‘Special-purpose glass fibres’ in the International Agency for Research on Cancer (IARC) monographs on the evaluation of carcinogenic risks to humans. Man-made vitreous fibres 2002: Vol 81. http://monographs.iarc.fr/ENG/Monographs/vol81/volume81.pdf

Annex 2: List of classified biological agents (infection risk groups)

Micro-organisms shall be classified into four risk groups, according to their level of risk of infection:

a. Infection risk group 1: a biological agent that is unlikely to cause infectious disease in humans.
b. Infection risk group 2: a biological agent that can cause infectious disease in humans and might be a hazard to employees; it is unlikely to spread to the community; there is usually effective prophylaxis or treatment available.
c. Infection risk group 3: a biological agent that can cause severe infectious disease in humans and present a serious hazard to employees; it may present a risk of spreading to the community, but there is usually effective prophylaxis or treatment available.
d. Infection risk group 4: a biological agent that causes severe infectious disease in human and is a serious hazard to employees; it may present a high risk of spreading to the community; there is usually no effective prophylaxis or treatment available.

The list is limited to biological agents that cause infectious disease in humans. In addition, the list provides an overview of the following comments:

-A: may cause allergic reactions
-D: Registers of employees who are exposed to the biological agent shall be stored for at least ten years after the most recently known exposure event
-T: Induces the formation of toxins, may cause toxic reactions
-V: Effective vaccine available

Bacteria and similar

	Infection risk group	*Comment*
Actinobacillus actinomycetemcomitans	2	
Actinomadura madurae	2	
Actinomadura pelletieri	2	

Actinomyces gerencseriae	2	
Actinomyces israelii	2	
Actinomyces pyogenes	2	
Actinomyces spp.[1]	2	
Arcanobacterium haemolyticum (Corynebacterium haemolyticum)	2	
Bacillus anthracis	3	
Bacteroides fragilis	2	
Bartonella bacilliformis	2	
Bartonella (Rochalimea) spp.[1]	2	
Bordetella bronchiseptica	2	
Bordetella parapertussis	2	
Bordetella pertussis	2	V
Borrelia burgdorferi	2	
Borrelia duttonii	2	
Borrelia recurrentis	2	
Borrelia spp.[1]	2	
Brucella abortus	3	
Brucella canis	3	
Brucella melitensis	3	
Brucella suis	3	
Burkholderia mallei (Pseudomonas mallei)	3	
Burkholderia pseudomallei (Pseudomonas pseudomallei)	3	
Campylobacter fetus	2	
Campylobacter jejuni	2	
Campylobacter spp.[1]	2	
Cardiobacterium hominis	2	
Chlamydia pneumoniae	2	
Chlamydia trachomatis	2	

Chlamydia psittaci (avian strains)	3	
Chlamydia psittaci (other strains)	2	
Clostridium botulinum	2	T
Clostridium perfringens	2	
Clostridium tetani	2	T, V
Clostridium spp.[1]	2	
Corynebacterium diphtheriae	2	T, V
Corynebacterium minutissimum	2	
Corynebacterium pseudotuberculosis	2	
Corynebacterium spp.[1]	2	
Coxiella burnetii	3	
Edwardsiella tarda	2	
Ehrlichia sennetsu (Rickettsia sennetsu)	2	
Ehrlichia spp.[1]	2	
Eikenella corrodens	2	
Enterobacter aerogenes/cloacae	2	
Enterobacter spp.[1]	2	
Enterococcus spp.[1]	2	
Erysipelothrix rhusiopathiae	2	
Escherichia coli[2]	2	
Escherichia coli, verocytotoxic strains e.g. O157:H7 or O103	3[3]	T
Flavobacterium meningosepticum	2	
Fluoribacter bozemanae (Legionella)	2	
Francisella tularensis (Type A)	3	
Francisella tularensis (Type B)	2	

Fusobacterium necrophorum	2	
Gardnerella vaginalis	2	
Haemophilus ducreyi	2	
Haemophilus influenzae	2	V
Haemophilus spp.[1]	2	
Helicobacter pylori	2	
Klebsiella oxytoca	2	
Klebsiella pneumoniae	2	
Klebsiella spp.[1]	2	
Legionella pneumophila	2	
Legionella spp.[1]	2	
Leptospira interrogans (all serotypes)	2	
Listeria monocytogenes	2	
Listeria ivanovii	2	
Morganella morganii	2	
Mycobacterium africanum	3	V
Mycobacterium avium/intracellulare	2	
Mycobacterium bovis (except BCG strains)	3	V
Mycobacterium chelonae	2	
Mycobacterium fortuitum	2	
Mycobacterium kansasii	2	
Mycobacterium leprae	3	
Mycobacterium malmoense	2	
Mycobacterium marinum	2	
Mycobacterium microti	3[3]	
Mycobacterium paratuberculosis	2	
Mycobacterium scrofulaceum	2	
Mycobacterium simiae	2	

Mycobacterium szulgai	2	
Mycobacterium tuberculosis	3	V
Mycobacterium ulcerans	3[3]	
Mycobacterium xenopi	2	
Mycoplasma caviae	2	
Mycoplasma hominis	2	
Mycoplasma pneumoniae	2	
Neisseria gonorrhoeae	2	
Neisseria meningitidis	2	V
Nocardia asteroides	2	
Nocardia brasiliensis	2	
Nocardia farcinica	2	
Nocardia nova	2	
Nocardia otitidiscaviarum	2	
Pasteurella multocida	2	
Pasteurella spp.[1]	2	
Peptostreptococcus anaerobius	2	
Plesiomonas shigelloides	2	
Porphyromonas spp.[1]	2	
Prevotella spp.[1]	2	
Proteus mirabilis	2	
Proteus penneri	2	
Proteus vulgaris	2	
Providencia alcalifaciens	2	
Providencia rettgeri	2	
Providencia spp.[1]	2	
Pseudomonas aeruginosa	2	
Rhodococcus equi	2	
Rickettsia akari	3[3]	
Rickettsia canada	3[3]	
Rickettsia conorii	3	

Rickettsia montana	3[3]	
Rickettsia typhi (mooseri)	3	
Rickettsia prowazekii	3	
Rickettsia rickettsii	3	
Rickettsia tsutsugamushi	3	
Rickettsia spp.[1]	2	
Bartonella quintana (Rochalimaea quintana)	2	
Salmonella arizonae	2	
Salmonella enteritidis	2	
Salmonella typhimurium	2	
Salmonella paratyphi A, B, CC	2	
Salmonella typhi	3[3]	V
Salmonella (other serotypes)	2	
Serpulina spp.[1]	2	
Shigella boydii	2	
Shigella dysenteriae (Type 1)	3[3]	T
Shigella dysenteriae (except Type 1)	2	
Shigella flexneri	2	
Shigella sonnei	2	
Staphylococcus aureus	2	
Streptobacillus moniliformis	2	
Streptococcus pneumoniae	2	V
Streptococcus pyogenes	2	
Streptococcus suis	2	
Streptococcus spp.[1]	2	
Treponema carateum	2	
Treponema pallidum	2	
Treponema pertenue	2	
Treponema spp.[1]	2	

Vibrio cholerae (including El Tor)	2	V
Vibrio parahaemoloyticus	2	
Vibrio spp.[1]	2	
Yersinia enterocolitica	2	
Yersinia pestis	3	V
Yersinia pseudotuberculosis	2	
Yersinia spp.[1]	2	

Notes

1 The term ‘spp.’ refers to other species of the same genus known to be human pathogens.2 With the exception of non-pathogenic strains.3 Usually not spread by airborne transmission.4 Hepatitis D virus infections is pathogenic in employees only in the presence of simultaneous or secondary infection caused by the hepatitis B virus. Vaccination against the hepatitis B virus will therefore protect employees who are not infected by the virus against the hepatitis D virus (Delta).5 Only for types A and B.6 Recommended for work involving direct contact with these agents.7 Two viruses are identified: one a type of the buffalopox virus and the other a variant of the Vaccinia virus.8 Variant of the cowpox virus.9 Variant of the Vaccinia virus.10 At present, there is no evidence of disease in humans caused by retroviruses of simian origin. As a precaution, containment level 3 is recommended for work involving exposure to such retroviruses.11 There is no evidence of in humans of infections caused by the agents responsible for other TSEs than BSE in animals. The containment level used for agents in infection risk group 3 (with pertaining footnote 3) is nevertheless recommended as a precaution for laboratory work, with the exception of laboratory work involving identified Scrapie agents for which containment level 2 is sufficient.

Annex 3: Non-coherent optical radiation

The biophysically relevant exposure values to optical radiation can be determined with the formulae below. The formulae to be used depend on the range of radiation emitted by the source and the results should be compared with the corresponding exposure limit values indicated in Table 3.1. More than one exposure value and corresponding exposure limit can be relevant for a given source of optical radiation.

Numbering (a) to (o) refers to corresponding rows of Table 3.1.

a)

$$H_{eff} = \int_{0}^{t} \int_{\lambda=180\ nm}^{\lambda=400\ nm}$$

(H_{eff} is only relevant in the range 180 to 400 nm)

b)

$$H_{UVA} = \int_{0}^{t} \int_{\lambda=315}^{\lambda=400}$$

(H_{UVA} is only relevant in the range 315 to 400 nm)

c), d)

$$L_B = \int_{\lambda=300\ nm}^{\lambda=700\ nm} L_\lambda$$

(L_B is only relevant in the range 300 to 700 nm)

e), f)

$$E_B = \int_{\lambda=300\ nm}^{\lambda=700\ nm} E_\lambda$$

(E_B is only relevant in the range 300 to 700 nm)

g)-l)

$$L_R = \int_{\lambda_1}^{\lambda_2} L_\lambda(\lambda) \cdot R$$

(See Table 1.1 for appropriate values of $_1$ and $_2$)

m), n)

$$E_{IR} = \int_{\lambda=780\ nm}^{\lambda=3000\ nm} E$$

(E_{IR} is only relevant in the range 780 to 3000 nm)

o) $$H_{skin} = \int_{0}^{t} \int_{\lambda=380}^{\lambda=3000}$$ (H_{skin} is only relevant in the range 380 to 3000 nm)

For the purposes of these regulations, the formulae above can be replaced by the following expressions and the use of discrete values as set out in the following tables:

a) $$E_{eff} = \sum_{\lambda=180\ nm}^{\lambda=400\ nm} E_\lambda$$ and ($H_{eff} = E_{eff} \cdot t$)

b) $$E_{UVA} = \sum_{\lambda=315\ nm}^{\lambda=400\ nm}$$ and ($H_{UVA} = E_{UVA} \cdot t$)

c), d) [formula missing, see Norwegian version]

e), f)

$$L_B = \sum_{\lambda=300\ \text{nm}}^{\lambda=700\ \text{nm}} L_\lambda$$

g) – l)

$$L_R = \sum_{\lambda_1}^{\lambda_2} L_\lambda \cdot R(\lambda)$$

(See Table 1.1 for appropriate values of $_1$ and $_2$)

m), n)

$$E_{IR} = \sum_{\lambda=780\ \text{nm}}^{\lambda=3000\ \text{nm}} E$$

o) $$E_{skin} = \sum_{\lambda=380\ nm}^{\lambda=3000\ nm} \text{and } (H_{skin} = E_{skin} \cdot t)$$

Notes:

E (,t), E	*spectral irradiance or spectral power density*: the radiant power incident per unit area upon a surface, expressed in watts per square metre per nanometre [Wm^{-2} nm-1]; [Wm^{-2} nm^{-1}]; values of E (, t) and E come from measurements or may be provided by the manufacturer of the equipment;
E_{eff}	*effective irradiance (UV range)*: calculated irradiance within the UV wavelength range 180 to 400 nm spectrally weighted by S (); expressed in watts per square metre [Wm^{-2}];
H	*radiant exposure*: the time integral of the irradiance, expressed in joules per square metre (Jm^{-2});
H_{eff}	effective radiant exposure: radiant exposure spectrally weighted by S (), expressed in joules per square metre [Jm^{-2}];
E_{UVA}	*total irradiance (UVA)*: calculated irradiance within the UVA wavelength range 315 to 400 nm, expressed in watts per square metre [Wm^{-2}];
H_{UVA}	*radiant exposure*: the time and wavelength integral or sum of the irradiance within the UVA wavelength range 315 to 400 nm, expressed in joules per square metre [Jm^{-2}];

S ()	*spectral weighting*: taking into account the wavelength dependence of the health effects of UV radiation on eye and skin (Table 1.2) [dimensionless];
t, t	*time, duration of the exposure*, expressed in seconds [s];
	wavelength, expressed in nanometres [nm];
	bandwidth: expressed in nanometres [nm], of the calculation or measurement intervals;
L (), L	spectral radiance of the source expressed in watts per square metre per steradian per nanometre [W m^{-2} sr^{-1} nm^{-1}];
R ()	*spectral weighting*: taking into account the wavelength dependence of the thermal injury caused to the eye by visible and IRA radiation (Table 1.3) [dimensionless];
LR	*effective radiance (thermal injury)*: calculated radiance spectrally weighted by R () (), expressed in watts per square metre per steradian [Wm^{-2} sr^{-1}];
B ()	*spectral weighting*: taking into account the wavelength dependence of the photochemical injury caused to the eye by blue light radiation (Table 1.3) [dimensionless];
L_R	*effective radiance (blue light)*: calculated radiance spectrally weighted by R () (), expressed in watts per square metre per steradian [Wm^{-2} sr^{-1}];
E_B	*effective irradiance (blue light)*: calculated irradiance, spectrally weighted by B (), expressed in watts per square metre [Wm^{-2}];
E_{IR}	*total irradiance (thermal injury)*: calculated irradiance within the infrared wavelength range 780 nm to 3 000 nm expressed in watts per square metre [Wm^{-2}];

E_{skin}	*total irradiance (visible, IRA and IRB)*: calculated irradiance within the visible and infrared wavelength range 380 nm to 3 000 nm, expressed in watts per square metre [Wm^{-2}];
H_{skin}	radiant exposure: the time and wavelength integral or sum of the irradiance within the visible and infrared wavelength range 380 to 3 000 nm, expressed in joules per square metre [Jm^{-2}];
	angular subtense: the angle subtended by an apparent source, as viewed at a point in space, expressed in milliradians (mrad). Apparent source is the real or virtual object that forms the smallest possible retinal image.

Table 3. 1. Exposure limit values for non-coherent optical radiation

To read Table 3.1, see: (pdf)

Table 3. 2. S () [dimensionless], 180 nm to 400 nm

in nm	*S ()*	*in nm*	*S ()*	*in nm*	*S ()*	*in nm*	*S ()*	*in nm*	*S ()*
180	0,0120	228	0,1737	276	0,9434	324	0,000520	372	0,000086
181	0,0126	229	0,1819	277	0,9272	325	0,000500	373	0,000083
182	0,0132	230	0,1900	278	0,9112	326	0,000479	374	0,000080
183	0,0138	231	0,1995	279	0,8954	327	0,000459	375	0,000077
184	0,0144	232	0,2089	280	0,8800	328	0,000440	376	0,000074
185	0,0151	233	0,2188	281	0,8568	329	0,000425	377	0,000072
186	0,0158	234	0,2292	282	0,8342	330	0,000410	378	0,000069
187	0,0166	235	0,2400	283	0,8122	331	0,000396	379	0,000066

188	0,0173	236	0,2510	284	0,7908	332	0,000383	380	0,000064
189	0,0181	237	0,2624	285	0,7700	333	0,000370	381	0,000062
190	0,0190	238	0,2744	286	0,7420	334	0,000355	382	0,000059
191	0,0199	239	0,2869	287	0,7151	335	0,000340	383	0,000057
192	0,0208	240	0,3000	288	0,6891	336	0,000327	384	0,000055
193	0,0218	241	0,3111	289	0,6641	337	0,000315	385	0,000053
194	0,0228	242	0,3227	290	0,6400	338	0,000303	386	0,000051
195	0,0239	243	0,3347	291	0,6186	339	0,000291	387	0,000049
196	0,0250	244	0,3471	292	0,5980	340	0,000280	388	0,000047
197	0,0262	245	0,3600	293	0,5780	341	0,000271	389	0,000046
198	0,0274	246	0,3730	294	0,5587	342	0,000263	390	0,000044
199	0,0287	247	0,3865	295	0,5400	343	0,000255	391	0,000042
200	0,0300	248	0,4005	296	0,4984	344	0,000248	392	0,000041
201	0,0334	249	0,4150	297	0,4600	345	0,000240	393	0,000039
202	0,0371	250	0,4300	298	0,3989	346	0,000231	394	0,000037
203	0,0412	251	0,4465	299	0,3459	347	0,000223	395	0,000036
204	0,0459	252	0,4637	300	0,3000	348	0,000215	396	0,000035
205	0,0510	253	0,4815	301	0,2210	349	0,000207	397	0,000033

206	0,0551	254	0,5000	302	0,1629	350	0,000200	398	0,000032
207	0,0595	255	0,5200	303	0,1200	351	0,000191	399	0,000031
208	0,0643	256	0,5437	304	0,0849	352	0,000183	400	0,000030
209	0,0694	257	0,5685	305	0,0600	353	0,000175		
210	0,0750	258	0,5945	306	0,0454	354	0,000167		
211	0,0786	259	0,6216	307	0,0344	355	0,000160		
212	0,0824	260	0,6500	308	0,0260	356	0,000153		
213	0,0864	261	0,6792	309	0,0197	357	0,000147		
214	0,0906	262	0,7098	310	0,0150	358	0,000141		
215	0,0950	263	0,7417	311	0,0111	359	0,000136		
216	0,0995	264	0,7751	312	0,0081	360	0,000130		
217	0,1043	265	0,8100	313	0,0060	361	0,000126		
218	0,1093	266	0,8449	314	0,0042	362	0,000122		
219	0,1145	267	0,8812	315	0,0030	363	0,000118		
220	0,1200	268	0,9192	316	0,0024	364	0,000114		
221	0,1257	269	0,9587	317	0,0020	365	0,000110		
222	0,1316	270	1,0000	318	0,0016	366	0,000106		
223	0,1378	271	0,9919	319	0,0012	367	0,000103		

224	0,1444	272	0,9838	320	0,0010	368	0,000099
225	0,1500	273	0,9758	321	0,000819	369	0,000096
226	0,1583	274	0,9679	322	0,000670	370	0,000093
227	0,1658	275	0,9600	323	0,000540	371	0,000090

Table 3. 3. B (), R () [dimensionless], 380 nm to1400 nm

in nm	*B ()*	*R ()*
300 < 380	0,01	–
380	0,01	0,1
385	0,013	0,13
390	0,025	0,25
395	0,05	0,5
400	0,1	1
405	0,2	2
410	0,4	4
415	0,8	8
420	0,9	9
425	0,95	9,5
430	0,98	9,8
435	1	10
440	1	10
445	0,97	9,7
450	0,94	9,4
455	0,9	9
460	0,8	8
465	0,7	7
470	0,62	6,2
475	0,55	5,5

480	0,45	4,5
485	0,32	3,2
490	0,22	2,2
495	0,16	1,6
500	0,1	1
500 < 600	$10^{0,02\cdot(450-)}$	1
600 < 700	0,001	1
700 < 1050	–	$10^{0,002\cdot(700-)}$
1050 < 1150	–	0,2
1150 < 1200	–	$0,2 \cdot 10^{0,02\cdot(1150-)}$
1200 < 1400	–	0,02

Annex 4: Optical radiation from lasers

The biophysically relevant exposure values to optical radiation can be determined with the formulae below. The formulae to be used depend on the wavelength and duration of radiation emitted by the source and the results should be compared with the corresponding exposure limit values indicated in Tables 4.2 to 4.4. More than one exposure value and corresponding exposure limit can be relevant for a given source of laser optical radiation.
Coefficients used as calculation tools within Tables 4.2 to 4.4 are listed in Table 4.5 and corrections for repetitive exposure are listed in Table 4.6.

$$E = \frac{dP}{dA} [W\ m^{-2}]$$

$$H = \int_{t} E(t) \cdot dt\ [J\ m^{-2}]$$

Notes

dP	*power*, expressed in watts [W];
dA	*surface*, expressed in square metres [m^2];
E(t), E	*irradiance or power density*, the radiant power density per unit area upon a surface, generally expressed in watts per square metre (Wm^{-2}). Values of E(t), E come from measurements or may be provided by the manufacturer of the equipment;

H	*radiant exposure*: the time integral of the irradiance, expressed in joules per square metre (Jm-2);
t	*time, duration of the exposure*, expressed in seconds [s];
m	*wavelength*, expressed in nanometres [nm]; *limiting cone angle of measurement in field-of-view*, expressed in milliradians [mrad]; *measurement field of view*, expressed in milliradians [mrad]; *angular subtense of a source*, expressed in milliradians [mrad]; *limiting aperture* the circular area over which irradiance and radiant exposure are averaged;
G	*integrated radiance*: the integral of the radiance over a given exposure time expressed as radiant energy per unit area of a radiating surface per unit solid angle of emission, in joules per square metre per steradian [Jm^{-2} sr^{-1}].

Table 4. 1 Radiation hazards

Wavelength [nm]	*Radiation range*	*Affected organ*	*Hazard*	*Exposure limit value table*
180 to 400	UV	Eye	photochemical damage and thermal damage	4.2, 4.3
180 to 400	UV	Skin	erythema	4.4
400 to 700	visible	Eye	Retinal damage	4.2
400 to 600	visible	Eye	photochemical damage	4.3
400 to 700	visible	Skin	thermal damage	4.4
700 to 1400	IRA	Eye	thermal damage	4.2, 4.3
700 to 1400	IRA	Skin	thermal damage	4.4
1400 to 2600	IRB	Eye	thermal damage	4.2

2600 to 10^6	IRC	Eye	thermal damage	4.2
1400 to 10^6	IRB, IRC	Eye	thermal damage	4.3
1400 to 10^6	IRB, IRC	Skin	thermal damage	4.4

Table 4. 2 Exposure limit values for laser exposure to the eye – Short exposure duration < 10 s

To read Table 4.2, see: (pdf)

Table 4. 3. Exposure limit values for laser exposure to the eye – Long exposure duration 10 s

To read Table 4.3, see: (pdf)

Table 4. 4. Exposure limit values for laser exposure of skin

To read Table 4.4, see: (pdf)

Table 4. 5 Applied correction factors and other calculation parameters

Parameter as listed in ICNIRP	*Valid spectral range (nm)*	*Value*
C_A	< 700	$C_A = 1.0$
	700 – 1050	$C_A = 10^{0,002(-700)}$
	1050 – 1400	$C_A = 5.0$
C_B	400 – 450	$C_B = 1.0$
	450 – 700	$C_A = 10^{0,02(-450)}$
C_C	700 – 1150	$C_C = 1.0$
	1150 – 1200	$C_C = 10^{0,018(-1150)}$
	1200 – 1400	$C_C = 8,0$
T_1	< 450	$T_1 = 10$ s
	450 – 500	$T_1 = 10 \cdot [10^{0,02((-450)]}$ s
	> 500	$T_1 = 100$ s
Parameter as listed in ICNIRP	Valid for biological effect	Value

min	all thermal effects	$_{min}$ = 1.5 mrad
Parameter as listed in ICNIRP	Valid angular range (mrad)	Value
C_E	$< _{min}$	C_E = 1,0
	$_{min} < < 100$	CE = /min
	> 100	CE = ^{2} /($_{min} \cdot _{max}$) mrad with $_{max}$ = 100 mrad
T_2	< 1.5	T_2 = 10 s
	1.5 < < 100	$T_2 = 10 \cdot [10^{(-1,5)/98,5}]$ s
	> 100	T_2 = 100 s
	t 100	= 11 [mrad]
	100 < t < 10^4	= 1.1 $t^{0,5}$ [mrad]
	t > 10^4	= 110 [mrad]

Table 4. 6 Correction for repetitive exposure

Each of the following three general rules should be applied to all repetitive exposures as occur from repetitively pulsed or scanning laser systems:

1. The exposure from any single pulse in a train of pulses shall not exceed the exposure limit value for a single pulse of that pulse duration.
2. The exposure from any group of pulses (or sub-group of pulses in a train) delivered in time t shall not exceed the exposure limit value for time t.
3. The exposure from any single pulse within a group of pulses shall not exceed the single-pulse exposure limit value multiplied by a cumulativethermal correction factor $C_{p=N}^{-0.25}$, where N is the number of pulses. This rule applies only to exposure limits to protect against thermal injury, where all pulses delivered in less than T_{min} are treated as a single pulse.

Parameter	Valid spectral range (nm)	Value
T_{min}	315 < 400	$T_{min} = 10^{-9}$ s (= 1 ns)
	400 < 1050	$T_{min} = 18 - 10^{-6}$ s (= 18 s)
	1050 < 1400	$T_{min} = 50 - 10^{-6}$ s (= 50 s)
	1400 < 1500	$T_{min} = 10^{-3}$ s (= 1 ms)
	1500 < 1800	T_{min} = 10 s

1800 < 2600	$T_{min} = 10^{-3}$ s (= 1 ms)
2600 < 10^6	$T_{min} = 10^{-7}$ s (= 100 ns)

Annex 5: Lower action values for electromagnetic fields

Table 5. 1. Lower action values for exposure to electric fields from 1 Hz to 300 GHz

Frequency range, f	*Lower action value for electrical field strength (E) [Vm^{-1}] (RMS)*	*Lower action value for power density (S) [Wm^{-2}]*
1 Hz f < 25 Hz	2.0×10^4	– (Value not given in the Directive, but can be calculated based on E. $S=E^2/120$)
25 Hz f < 3 kHz	$5.0 \times 10^5 / f$	–
3 kHz f < 3.59 MHz	170	–
3.59 MHz f < 10 MHz	$6.1 \times 10^8 / f$	–
10 MHz f < 400 MHz	61	–
400 MHz f < 2 GHz	$3{,}0 \times 10^{-3} f^{1/2}$	–
2 GHz f 300 GHz	140	50

Note 5.1-1: f is the frequency in hertz [Hz].

Note 5.1-2: Lower action values for electrical field strength are Root-Mean-Square, RMS values corresponding to the peak values divided by 2 for sinusoidal fields. For non-sinusoidal fields, the exposure assessment shall be based on the method using weighted peak value (filtration during the period).

Note 5.1-3: The action values represent the maximum calculated or measured values for the employee's body position.

Note 5.1-4: The power density is calculated as the mean value for an exposed area of 20 cm^2. The local maximum power density, calculated as the mean value for 1 cm^2, should not exceed 20 times 50 Wm^{-2}. The power density from 6 to 10 GHz is calculated as the mean value for a six-minute period. Above 10 GHz, the power density is calculated as the mean value over a $68/f^{1.05}$ -minute-period (where f equals the frequency in GHz) to compensate for a gradual decline in penetration depth as the frequency increases.

Table 5. 2. Lower action limits for exposure to magnetic fields from 1 Hz to 300 GHz

Frequency range, f	*Lower action value for magnetic flux density (B) [μT] (RMS)*	*Lower action value for magnetic flux density (B) for exposure of limbs in a restricted magnetic field [μT] (RMS)*
1 Hz f < 8 Hz	$2.0 \times 10^5 / f^2$	$9.0 \times 10^5 / f$
8 Hz f < 25 Hz	$2.5 \times 10^4 / f$	$9.0 \times 10^5 / f$
25 Hz f < 300 Hz	1000	$9.0 \times 10^5 / f$
300 Hz f < 3 kHz	$3.0 \times 10^5 / f$	$9.0 \times 10^5 / f$
3 kHz f <100 kHz	100	300
100 kHz f < 10 MHz	$2.0 \times 10^6 / f$	300
10 MHz f < 400 MHz	0.2	–
400 MHz f < 2 GHz	$1.0 \times 10^{-5} f^{1/2}$	–
2 GHz f 300 GHz	0.45	–

Note 5.2-1: f is the frequency in hertz [Hz].
Note 5.2-2: Lower action values for exposure to magnetic fields are Root-Mean-Square, RMS values corresponding to the peak values divided by 2 for sinusoidal fields. For non-sinusoidal fields, the exposure assessment shall be based on the method using weighted peak value (filtration during the period).
Note 5.2-3: The action values for exposure to magnetic fields represent the maximum calculated or measured values for the employee's body position.

Table 5. 3. Lower action values for exposure to contact current and induced current in limbs

Frequency range, f	*Lower action value for contact current (I_c) [mA] (RMS)*	*Lower action value for induced current in limbs (I_i) [mA] (RMS)*
f < 2.5 kHz	1.0	
2.5 kHz f < 100 kHz	0.4 f	
100 kHz f < 10 MHz	40	
10 MHz f 110 MHz	40	100

Note 5.3-1: f is the frequency in hertz [kHz].
Note 5.3-2: [Action values for induced power $(I_i)]^2$ are calculated as the mean value for a six-minute period.

Table 5. 4. Lower action values for exposure to static magnetic fields

Risk/hazard	*Lower action value for magnetic flux density (B_0) [mT]*
Interference with active implants, e.g. pacemaker	0.5
Risk of attraction and projectile near strong magnets (> 100 mT)	3

Annex 6: Upper action values for electromagnetic fields

Table 6. 1. Upper action values for exposure to electric fields from 1 Hz to 300 GHz

Frequency area, f	*Upper action value for electric field strength (E) [Vm^{-1}] (RMS)*
1 Hz f < 50 Hz	2.0×10^{-4}
50 Hz f < 1.64 kHz	1.0×10^{-6} /f
1.64 kHz f < 10 MHz	610
10 MHz f < 400 MHz	61
400 MHz f < 2 GHz	$3.0 \times 10^{-3} \times f^{½}$
2 GHz f 300 GHz	140

Note 6.1-1: f is frequency in hertz [Hz].
Note 6.1-2: The upper action values for electric field strength are Root-Mean-Square, RMS values equivalent to peak values divided by 2 for sine-shaped fields. As regards fields that are not sine-shaped, the exposure assessment shall be carried out based on the weighted peak method (filtering in the time domain).
Note 6.1-3: The action values represent maximum calculated or measured values at the employee's body position.

Table 6. 2. Upper action values for exposure to magnetic fields from 1 Hz to 300 GHz

Frequency range, f	*Upper action value for magnetic flux density (B) [µT] (RMS)*
1 Hz f < 3 kHz	3.0×10^{-5} /f
3 kHz f < 10 MHz	100
10 MHz f < 400 MHz	0.2

400 MHz f < 2 GHz	$1.0 \times 10^{-5} \times f^{1/2}$
2 GHz f 300 GHz	0.45

Note 6.2-1: f is frequency in hertz [Hz].
Note 6.2-2: The action values for exposure to magnetic fields are Root-Mean-Square, RMS values equivalent to peak values divided by 2 for sine-shaped fields. As regards fields that are not sine-shaped, the exposure assessment shall be carried out based on the weighted peak method (filtering in the time domain).
Note 6.2-3: Action values for exposure to magnetic fields represent maximum calculated or measured values at the employee's body position.

Annex 7: Limit values for electromagnetic fields

Table 7. 1. Limit values for exposure to external magnetic flux density (B0) from 0 to 1 Hz

	Limit values for sensory effects [T]
Normal working conditions	2
Local exposure of limbs	8
	Limit values for health effects [T]
Controlled working conditions	8

Table 7. 2. Limit values for health effects upon exposure to internal electric field strength (E) from 1 Hz to 10 MHz

Frequency rate, f	*Limit values for health effects [Vm^{-1}]*
1 Hz f < 3 kHz	1.1
3 kHz f 10 MHz	3.8×10^{-4} f

Note 7.2-1: f is the frequency in hertz [Hz].
Note 7.2-2: Limit values for health effects upon exposure to internal electric field strength are local peak values in the body of the exposed individual.
Note 7.2-3: Limit values for health effects are peak values in time corresponding to Root-Mean-Square, the RMS values multiplied by 2 for sinusoidal fields. For non-sinusoidal fields, the exposure assessment shall be based on the method using weighted peak value (filtration during the period). Other scientifically documented and recognised methods may be used to assess exposure if they give corresponding and comparable results.

Table 7. 3. Limit values for sensory effects upon exposure to internal electric field strength (E) from 1 to l 400 Hz

Frequency rate, f	*Limit values for sensory effects* $[Vm^{-1}]$
1 Hz f < 10 Hz	0.7/f
10 Hz f < 25 Hz	0.07
25 Hz f 400 Hz	0.0028 f

Note 7.3-1: f is the frequency in hertz [Hz].
Note 7.3-2: Limit values for sensory effects upon exposure to internal electric field strength are local peak values in the exposed individual's head.
Note 7.3-3: Limit values for sensory effects are peak values in time corresponding to Root-Mean-Square, the RMS values multiplied by 2 for sinusoidal fields. For non-sinusoidal fields, the exposure assessment shall be based on the method using weighted peak value (filtration during the period). Other scientifically documented and recognised methods may be used to assess exposure if they give corresponding and comparable results.

Table 7. 4. Limit values for health effects upon exposure to electromagnetic fields from 100 kHz to 6 GHz

Health effects	*Specific energy absorption rate (SAR) over a six-minute period* $[W/kg^{-1}]$
Limit value related to whole-body heat load	0.4
Limit value related to local heat load in the head and body	10
Limit value related to local heat load in limbs	20

Note 7.4-1: Health effects are expressed as average SAR in the body.
Note 7.4-2: Local SAR is calculated as the mean value of a mass of 10 g coherent body tissue with almost homogeneous electric properties. Because it specifies a coherent body mass, this method can be used within electronic dosimetry, but it can be difficult in connection with direct physical measurements. A simple form, such as e.g. cubic or spherical body tissue mass can be used.

Table 7. 5. Limit values for sensory effects upon exposure to electromagnetic fields from 0. 3 GHz to 6 GHz

Frequency rate, f	*Local specific energy absorption (SA)* $[mJ/kg^{-1}]$
0.3 f 6 GHz	10

Note 7.5-1: Local SA is calculated as the average mass for 10 g body tissue.

Table 7. 6. Limit values for health effects upon exposure to electromagnetic field from 6 GHz to 300 GHz

Frequency rate, f	*Limit values for health effects related to radiation density [W/m^{-2}]*
6 f 300 GHz	50

Note 7.6-1: Effect density is calculated as the mean value for 20 cm^2 of exposed area. The local maximum effect density, calculated as the mean value for 1 cm^2, should not exceed 20 times 50 Wm^{-2}. The effect density from 6 to 10 GHz is calculated as the mean value for a six-minute period. For more than 10 GHz the effect density is calculated as the mean value over a 68/f$^{1.05}$ -minute-period (where f is the frequency in GHz) to compensate for the gradual decline in penetration depth as the frequency increases.