

or at change of shifts, the laser shall be turned off.

(f) Only mechanical or electronic means shall be used as a detector for guiding the internal alignment of the laser.

(g) The laser beam shall not be directed at employees.

(h) When it is raining or snowing, or when there is dust or fog in the air, the operation of laser systems shall be prohibited where practicable; in any event, employees shall be kept out of range of the area of source and target during such weather conditions.

(i) Laser equipment shall bear a label to indicate maximum output.

(j) Employees shall not be exposed to light intensities above:

(1) Direct staring: 1 micro-watt per square centimeter;

(2) Incidental observing: 1 milliwatt per square centimeter;

(3) Diffused reflected light: 2½ watts per square centimeter.

(k) Laser unit in operation should be set up above the heads of the employees, when possible.

(l) Employees shall not be exposed to microwave power densities in excess of 10 milliwatts per square centimeter.

§ 1926.55 Gases, vapors, fumes, dusts, and mists.

(a) Exposure of employees to inhalation, ingestion, skin absorption, or contact with any material or substance at a concentration above those speci-

fied in the "Threshold Limit Values of Airborne Contaminants for 1970" of the American Conference of Governmental Industrial Hygienists, shall be avoided. See appendix A to this section.

(b) To achieve compliance with paragraph (a) of this section, administrative or engineering controls must first be implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and technical measures used for this purpose must first be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with § 1926.103.

(c) Paragraphs (a) and (b) of this section do not apply to the exposure of employees to airborne asbestos, tremolite, anthophyllite, or actinolite dust. Whenever any employee is exposed to airborne asbestos, tremolite, anthophyllite, or actinolite dust, the requirements of § 1910.1101 or § 1926.58 of this title shall apply.

(d) Paragraphs (a) and (b) of this section do not apply to the exposure of employees to formaldehyde. Whenever any employee is exposed to formaldehyde, the requirements of § 1910.1048 of this title shall apply.

APPENDIX A TO § 1926.55—1970 AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS' THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS

THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
Abate; see Temephos.				
Acetaldehyde	75-07-0	200	360	—
Acetic acid	64-19-7	10	25	—
Acetic anhydride	108-24-7	5	20	—
Acetone	67-64-1	1000	2400	—
Acetonitrile	75-05-8	40	70	—
2-Acetylaminofluorine; see § 1926.1114	53-96-3			
Acetylene	74-86-2	E		
Acetylene dichloride; see 1,2-Dichloroethylene.				
Acetylene tetrabromide	79-27-6	1	14	—
Acrolein	107-02-8	0.1	0.25	—
Acrylamide	79-06-1	—	0.3	X
Acrylonitrile; see § 1926.1145	107-13-1			

THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
Aldrin	309-00-2	—	0.25	X
Allyl alcohol	107-18-6	2	5	X
Allyl chloride	107-05-1	1	3	—
Allyl glycidyl ether (AGE)	106-92-3	(C)10	(C)45	—
Allyl propyl disulfide	2179-59-1	2	12	—
alpha-Alumina	1344-28-1	—	—	—
Total dust		—	—	—
Respirable fraction		—	—	—
Alundum; see alpha-Alumina.				
4-Aminodiphenyl; see § 1926.1111	92-67-1			
2-Aminoethanol; see Ethanolamine.				
2-Aminopyridine	504-29-0	0.5	2	—
Ammonia	7664-41-7	50	35	—
Ammonium sulfamate	7773-06-0	—	—	—
Total dust		—	15	—
Respirable fraction		—	5	—
n-Amyl acetate	628-63-7	100	525	—
sec-Amyl acetate	626-38-0	125	650	—
Aniline and homologs	62-53-3	5	19	X
Anisidine (o-, p-isomers)	29191-52-4	—	0.5	X
Antimony and compounds (as Sb)	7440-36-0	—	0.5	—
ANTU (alpha Naphthylthiourea)	86-88-4	—	0.3	—
Argon	7440-37-1	E		
Arsenic, inorganic compounds (as As); see § 1926.1118	7440-38-2	—	—	—
Arsenic, organic compounds (as As)	7440-38-2	—	0.5	—
Arsine	7784-42-1	0.05	0.2	—
Asbestos; see 1926.58.				
Azinphos-methyl	86-50-0	—	0.2	X
Barium, soluble compounds (as Ba)	7440-39-3	—	0.5	—
Benzene ⁹ ; see § 1926.1128	71-43-2			
Benzidine; see § 1926.1110	92-87-5			
p-Benzoquinone; see Quinone.				
Benzo(a)pyrene; see Coal tar pitch volatiles.				
Benzoyl peroxide	94-36-0	—	5	—
Benzyl chloride	100-44-7	1	5	—
Beryllium and beryllium compounds (as Be)	7440-41-7	—	0.002	—
Biphenyl; see Diphenyl.				
Bisphenol A; see Diglycidyl ether.				
Boron oxide	1303-86-2	—	—	—
Total dust		—	15	—
Boron tribromide	10294-33-4	1	10	—
Boron trifluoride	7637-07-2	(C)1	(C)3	—
Bromine	7726-95-6	0.1	0.7	—
Bromine pentafluoride	7789-30-2	0.1	0.7	—
Bromoform	75-25-2	0.5	5	X
Butadiene (1,3-Butadiene); see 29 CFR 1910.1051; 29 CFR 1910.19(l)	106-99-0	STEL 1 ppm/5 ppm		—
Butanethiol; see Butyl mercaptan.				
2-Butanone (Methyl ethyl ketone)	78-93-3	200	590	—
2-Butoxyethanol	111-76-2	50	240	X
n-Butyl-acetate	123-86-4	150	710	—
sec-Butyl acetate	105-46-4	200	950	—
tert-Butyl acetate	540-88-5	200	950	—
n-Butyl alcohol	71-36-3	100	300	—
sec-Butyl alcohol	78-92-2	150	450	—
tert-Butyl alcohol	75-65-0	100	300	—
Butylamine	109-73-9	(C)5	(C)15	X

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THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
tert-Butyl chromate (as CrO ₃); see 1926.1126 ⁿ	1189-85-1			
n-Butyl glycidyl ether (BGE)	2426-08-6	50	270	—
Butyl mercaptan	109-79-5	0.5	1.5	—
p-tert-Butyltoluene	98-51-1	10	60	—
Cadmium (as Cd); see 1926.1127	7440-43-9			
Calcium carbonate	1317-65-3			
Total dust		—		—
Respirable fraction		—		—
Calcium oxide	1305-78-8	—	5	—
Calcium sulfate	7778-18-9			
Total dust		—	15	—
Respirable fraction		—	5	—
Camphor, synthetic	76-22-2	—	2	—
Carbaryl (Sevin)	63-25-2	—	5	—
Carbon black	1333-86-4	—	3.5	—
Carbon dioxide	124-38-9	5000	9000	—
Carbon disulfide	75-15-0	20	60	X
Carbon monoxide	630-08-0	50	55	—
Carbon tetrachloride	56-23-5	10	65	X
Cellulose	9004-34-6			
Total dust		—		—
Respirable fraction		—		—
Chlordane	57-74-9	—	0.5	X
Chlorinated camphene	8001-35-2	—	0.5	X
Chlorinated diphenyl oxide	55720-99-5	—	0.5	—
Chlorine	7782-50-5	1	3	—
Chlorine dioxide	10049-04-4	0.1	0.3	—
Chlorine trifluoride	7790-91-2	(C)0.1	(C)0.4	—
Chloroacetaldehyde	107-20-0	(C)1	(C)3	—
a-Chloroacetophenone (Phenacyl chloride)	532-27-4	0.05	0.3	—
Chlorobenzene	108-90-7	75	350	—
o-Chlorobenzylidene malononitrile	2698-41-1	0.05	0.4	—
Chlorobromomethane	74-97-5	200	1050	—
2-Chloro-1,3-butadiene; see beta-Chloroprene.				
Chlorodiphenyl (42% Chlorine) (PCB) ..	53469-21-9	—	1	X
Chlorodiphenyl (54% Chlorine) (PCB) ..	11097-69-1	—	0.5	X
1-Chloro,2,3-epoxypropane; see Epichlorohydrin.				
2-Chloroethanol; see Ethylene chlorohydrin.				
Chloroethylene; see Vinyl chloride.				
Chloroform (Trichloromethane)	67-66-3	(C)50	(C)240	—
bis(Chloromethyl) ether; see § 1926.1108	542-88-1			
Chloromethyl methyl ether; see § 1926.1106	107-30-2			
1-Chloro-1-nitropropane	600-25-9	20	100	—
Chloropicrin	76-06-2	0.1	0.7	—
beta-Chloroprene	126-99-8	25	90	X
Chromium (II) compounds.				
(as Cr)	7440-47-3	—	0.5	—
Chromium (III) compounds.				
(as Cr)	7440-47-3	—	0.5	—
Chromium (VI) compounds; See 1926.1126 ^o .				
Chromium metal and insol. salts (as Cr)	7440-47-3	—	1	—
Chrysene; see Coal tar pitch volatiles.				

THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
Coal tar pitch volatiles (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene	65996-93-2	—	0.2	—
Cobalt metal, dust, and fume (as Co) ..	7440-48-4	—	0.1	—
Coke oven emissions; see § 1926.1129.				
Copper	7440-50-8			
Fume (as Cu)		—	0.1	—
Dusts and mists (as Cu)		—	1	—
Corundum; see Emery.				
Cotton dust (raw)		—	1	
Crag herbicide (Sesone)	136-78-7			
Total dust		—		—
Respirable fraction		—		—
Cresol, all isomers	1319-77-3	5	22	X
Crotonaldehyde	123-73-9;	2	6	
	4170-30-3			
Cumene	98-82-8	50	245	X
Cyanides (as CN)	Varies with	—	5	X
	Compound			
Cyanogen	460-19-5	10	—	—
Cyclohexane	110-82-7	300	1050	—
Cyclohexanol	108-93-0	50	200	—
Cyclohexanone	108-94-1	50	200	—
Cyclohexene	110-83-8	300	1015	—
Cyclonite	121-82-4	—	1.5	X
Cyclopentadiene	542-92-7	75	200	—
DDT, see				
Dichlorodiphenyltrichloroethane.				
DDVP, see Dichlorvos.				
2,4-D (Dichlorophenoxyacetic acid)	94-75-7	—	10	—
Decaborane	17702-41-9	0.05	0.3	X
Demeton (Systox)	8065-48-3	—	0.1	X
Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone)	123-42-2	50	240	—
1,2-Diaminoethane; see Ethylenediamine.				
Diazomethane	334-88-3	0.2	0.4	—
Diborane	19287-45-7	0.1	0.1	—
1,2-Dibromo-3-chloropropane (DBCP); see § 1926.1144	96-12-8			—
1,2-Dibromoethane; see Ethylene dibromide.				
Dibutyl phosphate	107-66-4	1	5	—
Dibutyl phthalate	84-74-2	—	5	—
Dichloroacetylene	7572-29-4	(C)0.1	(C)0.4	—
o-Dichlorobenzene	95-50-1	(C)50	(C)300	—
p-Dichlorobenzene	106-46-7	75	450	—
3,3'-Dichlorobenzidine; see § 1926.1107	91-94-1			
Dichlorodifluoromethane	75-71-8	1000	4950	—
1,3-Dichloro-5,5-dimethyl hydantoin	118-52-5	—	0.2	—
Dichlorodiphenyltrichloroethane (DDT)	50-29-3	—	1	X
1,1-Dichloroethane	75-34-3	100	400	—
1,2-Dichloroethane; see Ethylene dichloride.				
1,2-Dichloroethylene	540-59-0	200	790	—
Dichloroethyl ether	111-44-4	(C)15	(C)90	X
Dichloromethane; see Methylene chloride.				
Dichloromonofluoromethane	75-43-4	1000	4200	—
1,1-Dichloro-1-nitroethane	594-72-9	(C)10	(C)60	—

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THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
1,2-Dichloropropane; see Propylene dichloride.				
Dichlorotetrafluoroethane	76-14-2	1000	7000	—
Dichlorvos (DDVP)	62-73-7	—	1	X
Dieldrin	60-57-1	—	0.25	X
Diethylamine	109-89-7	25	75	—
2-Diethylaminoethanol	100-37-8	10	50	X
Diethylene triamine	111-40-0	(C)10	(C)42	X
Diethyl ether; see Ethyl ether.				
Difluorodibromomethane	75-61-6	100	860	—
Diglycidyl ether (DGE)	2238-07-5	(C)0.5	(C)2.8	—
Dihydroxybenzene; see Hydroquinone.				
Diisobutyl ketone	108-83-8	50	290	—
Diisopropylamine	108-18-9	5	20	X
4-Dimethylaminoazobenzene; see § 1926.1115	60-11-7			
Dimethoxymethane; see Methylal.				
Dimethyl acetamide	127-19-5	10	35	X
Dimethylamine	124-40-3	10	18	—
Dimethylaminobenzene; see Xylidine.				
Dimethylaniline (N,N-Dimethylaniline) ...	121-69-7	5	25	X
Dimethylbenzene; see Xylene.				
Dimethyl-1,2-dibromo- 2,2-dichloroethyl phosphate	300-76-5	—	3	—
Dimethylformamide	68-12-2	10	30	X
2,6-Dimethyl-4-heptanone; see Diisobutyl ketone.				
1,1-Dimethylhydrazine	57-14-7	0.5	1	X
Dimethylphthalate	131-11-3	—	5	—
Dimethyl sulfate	77-78-3	1	5	X
Dinitrobenzene (all isomers)			1	X
(ortho)	528-29-0			
(meta)	99-65-0			
(para)	100-25-4			
Dinitro-o-cresol	534-52-1	—	0.2	X
Dinitrotoluene	25321-14-6	—	1.5	X
Dioxane (Diethylene dioxide)	123-91-1	100	360	X
Diphenyl (Biphenyl)	92-52-4	0.2	1	—
Diphenylamine	122-39-4	—	10	—
Diphenylmethane diisocyanate; see Methylene bisphenyl isocyanate.				
Dipropylene glycol methyl ether	34590-94-8	100	600	X
Di-sec octyl phthalate (Di-(2-ethylhexyl) phthalate)	117-81-7	—	5	—
Emery	12415-34-8			
Total dust		—		—
Respirable fraction		—		—
Endosulfan	115-29-7	—	0.1	X
Endrin	72-20-8	—	0.1	X
Epichlorohydrin	106-89-8	5	19	X
EPN	2104-64-5	—	0.5	X
1,2-Epoxypropane; see Propylene oxide.				
2,3-Epoxy-1-propanol; see Glycidol.				
Ethane	74-84-0	E		
Ethanethiol; see Ethyl mercaptan.				
Ethanolamine	141-43-5	3	6	—
2-Ethoxyethanol (Cellosolve)	110-80-5	200	740	X
2-Ethoxyethyl acetate (Cellosolve acetate)	111-15-9	100	540	X
Ethyl acetate	141-78-6	400	1400	—
Ethyl acrylate	140-88-5	25	100	X

THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
Ethyl alcohol (Ethanol)	64-17-5	1000	1900	—
Ethylamine	75-04-7	10	18	—
Ethyl amyl ketone (5-Methyl-3-heptanone)	541-85-5	25	130	—
Ethyl benzene	100-41-4	100	435	—
Ethyl bromide	74-96-4	200	890	—
Ethyl butyl ketone (3-Heptanone)	106-35-4	50	230	—
Ethyl chloride	75-00-3	1000	2600	—
Ethyl ether	60-29-7	400	1200	—
Ethyl formate	109-94-4	100	300	—
Ethyl mercaptan	75-08-1	0.5	1	—
Ethyl silicate	78-10-4	100	850	—
Ethylene	74-85-1	E		
Ethylene chlorohydrin	107-07-3	5	16	X
Ethylenediamine	107-15-3	10	25	—
Ethylene dibromide	106-93-4	(C)25	(C)190	X
Ethylene dichloride (1,2-Dichloroethane)	107-06-2	50	200	—
Ethylene glycol dinitrate	628-96-6	(C)0.2	(C)1	X
Ethylene glycol methyl acetate; see Methyl cellosolve acetate.				
Ethyleneimine; see § 1926.1112	151-56-4			
Ethylene oxide; see § 1926.1147	75-21-8			
Ethylidene chloride; see 1,1-Dichloroethane.				
N-Ethylmorpholine	100-74-3	20	94	X
Ferbam	14484-64-1			
Total dust		—	15	—
Ferrovandium dust	12604-58-9	—	1	—
Fibrous Glass.				
Total dust				—
Respirable fraction		—		—
Fluorides (as F)	Varies with compound	—	2.5	—
Fluorine	7782-41-4	0.1	0.2	—
Fluorotrichloromethane (Trichlorofluoromethane)	75-69-4	1000	5600	—
Formaldehyde; see § 1926.1148	50-00-0			
Formic acid	64-18-6	5	9	—
Furfural	98-01-1	5	20	X
Furfuryl alcohol	98-00-0	50	200	—
Gasoline	8006-61-9		A ³	—
Glycerin (mist)	56-81-5			
Total dust		—		—
Respirable fraction		—		—
Glycidol	556-52-5	50	150	—
Glycol monoethyl ether; see 2-Ethoxyethanol.				
Graphite, natural, respirable dust	7782-42-5	(²)	(²)	(²)
Graphite, synthetic.				
Total dust		—		—
Respirable fraction		—		—
Guthion; see Azinphos methyl.				
Gypsum	13397-24-5			
Total dust		—		—
Respirable fraction		—		—
Hafnium	7440-58-6	—	0.5	—
Helium	7440-59-7	E		
Heptachlor	76-44-8	—	0.5	X
Heptane (n-Heptane)	142-82-5	500	2000	—
Hexachloroethane	67-72-1	1	10	X
Hexachloronaphthalene	1335-87-1	—	0.2	X

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THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
n-Hexane	110-54-3	500	1800	—
2-Hexanone (Methyl n-butyl ketone)	591-78-6	100	410	—
Hexone (Methyl isobutyl ketone)	108-10-1	100	410	—
sec-Hexyl acetate	108-84-9	50	300	—
Hydrazine	302-01-2	1	1.3	X
Hydrogen	1333-74-0	E		
Hydrogen bromide	10035-10-6	3	10	—
Hydrogen chloride	7647-01-0	(C)5	(C)7	—
Hydrogen cyanide	74-90-8	10	11	X
Hydrogen fluoride (as F)	7664-39-3	3	2	—
Hydrogen peroxide	7722-84-1	1	1.4	—
Hydrogen selenide (as Se)	7783-07-5	0.05	.02	—
Hydrogen sulfide	7783-06-4	10	15	—
Hydroquinone	123-31-9	—	2	—
Indene	95-13-6	10	45	—
Indium and compounds (as In)	7440-74-6	—	0.1	—
Iodine	7553-56-2	(C)0.1	(C)1	—
Iron oxide fume	1309-37-1	—	10	—
Iron salts (soluble) (as Fe)	Varies with compound	—	1	—
Isoamyl acetate	123-92-2	100	525	—
Isoamyl alcohol (primary and secondary)				
Isobutyl acetate	123-51-3	100	360	—
Isobutyl alcohol	110-19-0	150	700	—
Isobutyl alcohol	78-83-1	100	300	—
Isophorone	78-59-1	25	140	—
Isopropyl acetate	108-21-4	250	950	—
Isopropyl alcohol	67-63-0	400	980	—
Isopropylamine	75-31-0	5	12	—
Isopropyl ether	108-20-3	500	2100	—
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240	—
Kaolin	1332-58-7			
Total dust		—		—
Respirable fraction		—		—
Ketene	463-51-4	0.5	0.9	—
Lead, inorganic (as Pb); see 1926.62 ..	7439-92-1			
Limestone	1317-65-3			
Total dust		—		—
Respirable fraction		—		—
Lindane	58-89-9	—	0.5	X
Lithium hydride	7580-67-8	—	0.025	—
L.P.G. (Liquefied petroleum gas)	68476-85-7	1000	1800	
Magnesite	546-93-0			
Total dust		—		—
Respirable fraction		—		—
Magnesium oxide fume	1309-48-4			
Total particulate		15	—	—
Malathion	121-75-5			
Total dust		—	15	X
Maleic anhydride	108-31-6	0.25		
Manganese compounds (as Mn)	7439-96-5	—	(C)5	—
Manganese fume (as Mn)	7439-96-5	—	(C)5	—
Marble	1317-65-3			
Total dust		—		—
Respirable fraction		—		—
Mercury (aryl and inorganic)(as Hg)	7439-97-6		0.1	X
Mercury (organo) alkyl compounds (as Hg)				
Hg)	7439-97-6	—	0.01	X
Mercury (vapor) (as Hg)	7439-97-6	—	0.1	X
Mesityl oxide	141-79-7	25	100	—
Methane	74-82-8	E		
Methanethiol; see Methyl mercaptan.				

THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
Methoxychlor	72-43-5	—	15	—
Total dust				
2-Methoxyethanol (Methyl cellosolve) ...	109-86-4	25	80	X
2-Methoxyethyl acetate (Methyl cellosolve acetate)	110-49-6	25	120	X
Methyl acetate	79-20-9	200	610	—
Methyl acetylene (Propyne)	74-99-7	1000	1650	—
Methyl acetylene-propadiene mixture (MAPP)		1000	1800	—
Methyl acrylate	96-33-3	10	35	X
Methylal (Dimethoxy-methane)	109-87-5	1000	3100	—
Methyl alcohol	67-56-1	200	260	—
Methylamine	74-89-5	10	12	—
Methyl amyl alcohol; see Methyl isobutyl carbinol.				
Methyl n-amyl ketone	110-43-0	100	465	—
Methyl bromide	74-83-9	(C)20	(C)80	X
Methyl butyl ketone; see 2-Hexanone.				
Methyl cellosolve; see 2-Methoxyethanol.				
Methyl cellosolve acetate; see 2-Methoxyethyl acetate.				
Methylene chloride; see § 1910.1052.				
Methyl chloroform (1,1,1-Trichloroethane)	71-55-6	350	1900	—
Methylcyclohexane	108-87-2	500	2000	—
Methylcyclohexanol	25639-42-3	100	470	—
o-Methylcyclohexanone	583-60-8	100	460	X
Methylene chloride	75-09-2	500	1740	—
Methylenedianiline (MDA)	101-77-9			
Methyl ethyl ketone (MEK); see 2-Butanone.				
Methyl formate	107-31-3	100	250	—
Methyl hydrazine (Monomethyl hydrazine)	60-34-4	(C)0.2	(C)0.35	X
Methyl iodide	74-88-4	5	28	X
Methyl isoamyl ketone	110-12-3	100	475	—
Methyl isobutyl carbinol	108-11-2	25	100	X
Methyl isobutyl ketone; see Hexone.				
Methyl isocyanate	624-83-9	0.02	0.05	X
Methyl mercaptan	74-93-1	0.5	1	—
Methyl methacrylate	80-62-6	100	410	—
Methyl propyl ketone; see 2-Pentanone.				
Methyl silicate	681-84-5	(C)5	(C)30	—
alpha-Methyl styrene	98-83-9	(C)100	(C)480	—
Methylene bisphenyl isocyanate (MDI)	101-68-8	(C)0.02	(C)0.2	—
Mica; see Silicates.				
Molybdenum (as Mo)	7439-98-7			
Soluble compounds		—	5	—
Insoluble compounds.				
Total dust		—	15	—
Monomethyl aniline	100-61-8	2	9	X
Monomethyl hydrazine; see Methyl hydrazine.				
Morpholine	110-91-8	20	70	X
Naphtha (Coal tar)	8030-30-6	100	400	—
Naphthalene	91-20-3	10	50	—
alpha-Naphthylamine; see § 1926.1104	134-32-7			
beta-Naphthylamine; see § 1926.1109	91-59-8			
Neon	7440-01-9	E		
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	—

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THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
Nickel, metal and insoluble compounds (as Ni)	7440-02-0	—	1	—
Nickel, soluble compounds (as Ni)	7440-02-0	—	1	—
Nicotine	54-11-5	—	0.5	X
Nitric acid	7697-37-2	2	5	—
Nitric oxide	10102-43-9	25	30	—
p-Nitroaniline	100-01-6	1	6	X
Nitrobenzene	98-95-3	1	5	X
p-Nitrochlorobenzene	100-00-5	—	1	X
4-Nitrodiphenyl; see § 1926.1103	92-93-3	—	—	—
Nitroethane	79-24-3	100	310	—
Nitrogen	7727-37-9	E	—	—
Nitrogen dioxide	10102-44-0	(C)5	(C)9	—
Nitrogen trifluoride	7783-54-2	10	29	—
Nitroglycerin	55-63-0	(C)0.2	(C)2	X
Nitromethane	75-52-5	100	250	—
1-Nitropropane	108-03-2	25	90	—
2-Nitropropane	79-46-9	25	90	—
N-Nitrosodimethylamine; see § 1926.1116	62-79-9	—	—	—
Nitrotoluene (all isomers)	—	5	30	X
o-isomer	88-72-2;	—	—	—
m-isomer	99-08-1;	—	—	—
p-isomer	99-99-0	—	—	—
Nitrotrichloromethane; see Chloropicrin.	—	—	—	—
Nitrous oxide	10024-97-2	E	—	—
Octachloronaphthalene	2234-13-1	—	0.1	X
Octane	111-65-9	400	1900	—
Oil mist, mineral	8012-95-1	—	5	—
Osmium tetroxide (as Os)	20816-12-0	—	0.002	—
Oxalic acid	144-62-7	—	1	—
Oxygen difluoride	7783-41-7	0.05	0.1	—
Ozone	10028-15-6	0.1	0.2	—
Paraquat, respirable dust	4685-14-7;	—	0.5	X
1910-42-5;	—	—	—	—
2074-50-2	—	—	—	—
Parathion	56-38-2	—	0.1	X
Particulates not otherwise regulated.	—	—	—	—
Total dust organic and inorganic ...	—	—	15	—
PCB; see Chlorodiphenyl (42% and 54% chlorine).	—	—	—	—
Pentaborane	19624-22-7	0.005	0.01	—
Pentachloronaphthalene	1321-64-8	—	0.5	X
Pentachlorophenol	87-86-5	—	0.5	X
Pentaerythritol	115-77-5	—	—	—
Total dust	—	—	—	—
Respirable fraction	—	—	—	—
Pentane	109-66-0	500	1500	—
2-Pentanone (Methyl propyl ketone)	107-87-9	200	700	—
Perchloroethylene (Tetrachloroethylene)	127-18-4	100	670	—
Perchloromethyl mercaptan	594-42-3	0.1	0.8	—
Perchloryl fluoride	7616-94-6	3	13.5	—
Petroleum distillates (Naphtha)(Rubber Solvent)	—	—	A ³	—
Phenol	108-95-2	5	19	X
p-Phenylene diamine	106-50-3	—	0.1	X
Phenyl ether, vapor	101-84-8	1	7	—
Phenyl ether-biphenyl mixture, vapor ...	—	1	7	—
Phenylethylene; see Styrene.	—	—	—	—
Phenyl glycidyl ether (PGE)	122-60-1	10	60	—
Phenyhydrazine	100-63-0	5	22	X

THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
Phosdrin (Mevinphos)	7786-34-7	—	0.1	X
Phosgene (Carbonyl chloride)	75-44-5	0.1	0.4	—
Phosphine	7803-51-2	0.3	0.4	—
Phosphoric acid	7664-38-2	—	1	—
Phosphorus (yellow)	7723-14-0	—	0.1	—
Phosphorus pentachloride	10026-13-8	—	1	—
Phosphorus pentasulfide	1314-80-3	—	1	—
Phosphorus trichloride	7719-12-2	0.5	3	—
Phthalic anhydride	85-44-9	2	12	—
Picric acid	88-89-1	—	0.1	X
Pindone (2-Pivalyl-1,3-indandione)	83-26-1	—	0.1	—
Plaster of Paris	26499-65-0	—	—	—
Total dust		—	—	—
Respirable fraction		—	—	—
Platinum (as Pt)	7440-06-4	—	—	—
Metal		—	—	—
Soluble salts		—	0.002	—
Polytetrafluoroethylene decomposition products			A ²	
Portland cement	65997-15-1	—	—	—
Total dust		—	15	—
Respirable fraction		5	—	—
Propane	74-98-6	E	—	—
Propargyl alcohol	107-19-7	1	—	X
beta-Propiolactone; see § 1926.1113 ..	57-57-8	—	—	—
n-Propyl acetate	109-60-4	200	840	—
n-Propyl alcohol	71-23-8	200	500	—
n-Propyl nitrate	627-13-4	25	110	—
Propylene dichloride	78-87-5	75	350	—
Propylene imine	75-55-8	2	5	X
Propylene oxide	75-56-9	100	240	—
Propyne; see Methyl acetylene.				
Pyrethrum	8003-34-7	—	5	—
Pyridine	110-86-1	5	15	—
Quinone	106-51-4	0.1	0.4	—
RDX; see Cyclonite.				
Rhodium (as Rh), metal fume and insoluble compounds	7440-16-6	—	0.1	—
Rhodium (as Rh), soluble compounds	7440-16-6	—	0.001	—
Ronnel	299-84-3	—	10	—
Rotenone	83-79-4	—	5	—
Rouge.				
Total dust		—	—	—
Respirable fraction		—	—	—
Selenium compounds (as Se)	7782-49-2	—	0.2	—
Selenium hexafluoride (as Se)	7783-79-1	0.05	0.4	—
Silica, amorphous, precipitated and gel	112926-00-8	(²)	(²)	(²)
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica	61790-53-2	(²)	(²)	(²)
Silica, crystalline, respirable dust.				
Cristobalite; see 1926.1153	14464-46-1			
Quartz; see 1926.1153 ⁵	14808-60-7			
Tripoli (as quartz); see 1926.1153 ⁵	1317-95-9			
Trydimite; see 1926.1153	15468-32-3			
Silica, fused, respirable dust	60676-86-0	(²)	(²)	(²)
Silicates (less than 1% crystalline silica).				
Mica (respirable dust)	12001-26-2	(²)	(²)	(²)
Soapstone, total dust		(²)	(²)	(²)
Soapstone, respirable dust		(²)	(²)	(²)

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THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ^{3b}	Skin Designation
Talc (containing asbestos); use asbestos limit; see 1926.58.				
Talc (containing no asbestos), respirable dust	14807-96-6	(²)	(²)	(²)
Tremolite, asbestiform; see 1926.58.				
Silicon carbide	409-21-2	—	—	—
Total dust		—	—	—
Respirable fraction		—	—	—
Silver, metal and soluble compounds (as Ag)	7440-22-4	—	0.01	—
Soapstone; see Silicates.				
Sodium fluoroacetate	62-74-8	—	0.05	X
Sodium hydroxide	1310-73-2	—	2	—
Starch	9005-25-8	—	—	—
Total dust		—	—	—
Respirable fraction		—	—	—
Stibine	7803-52-3	0.1	0.5	—
Stoddard solvent	8052-41-3	200	1150	—
Strychnine	57-24-9	—	0.15	—
Styrene	100-42-5	(C)100	(C)420	—
Sucrose	57-50-1	—	—	—
Total dust		—	—	—
Respirable fraction		—	—	—
Sulfur dioxide	7446-09-5	5	13	—
Sulfur hexafluoride	2551-62-4	1000	6000	—
Sulfuric acid	7664-93-9	—	1	—
Sulfur monochloride	10025-67-9	1	6	—
Sulfur pentafluoride	5714-22-7	0.025	0.25	—
Sulfuryl fluoride	2699-79-8	5	20	—
Systox, see Demeton.				
2,4,5-T (2,4,5-trichlorophenoxyacetic acid)	93-76-5	—	10	—
Talc; see Silicates—.				
Tantalum, metal and oxide dust	7440-25-7	—	5	—
TEDP (Sulfotep)	3689-24-5	—	0.2	X
Teflon decomposition products			A2	—
Tellurium and compounds (as Te)	13494-80-9	—	0.1	—
Tellurium hexafluoride (as Te)	7783-80-4	0.02	0.2	—
Temephos	3383-96-8	—	—	—
Total dust		—	—	—
Respirable fraction		—	—	—
TEPP (Tetraethyl pyrophosphate)	107-49-3	—	0.05	X
Terphenyls	26140-60-3	(C)1	(C)9	—
1,1,1,2-Tetrachloro-2,2-difluoroethane ..	76-11-9	500	4170	—
1,1,2,2-Tetrachloro-1,2-difluoroethane ..	76-12-0	500	4170	—
1,1,2,2-Tetrachloroethane	79-34-5	5	35	X
Tetrachloroethylene; see Perchloroethylene.				
Tetrachloromethane; see Carbon tetrachloride.				
Tetrachloronaphthalene	1335-88-2	—	2	X
Tetraethyl lead (as Pb)	78-00-2	—	0.1	X
Tetrahydrofuran	109-99-9	200	590	—
Tetramethyl lead, (as Pb)	75-74-1	—	0.15	X
Tetramethyl succinonitrile	3333-52-6	0.5	3	X
Tetranitromethane	509-14-8	1	8	—
Tetryl (2,4,6-Trinitrophenylmethylinramine)	479-45-8	—	1.5	X
Thallium, soluble compounds (as Tl)	7440-28-0	—	0.1	X
Thiram	137-26-8	—	5	—

THRESHOLD LIMIT VALUES OF AIRBORNE CONTAMINANTS FOR CONSTRUCTION—Continued

Substance	CAS No. ^d	ppm ^a	mg/m ³ ^b	Skin Designation
Tin, inorganic compounds (except oxides) (as Sn)	7440-31-5	—	2	—
Tin, organic compounds (as Sn)	7440-31-5	—	0.1	—
Tin oxide (as Sn)	21651-19-4	—	—	—
Total dust	—	—	—	—
Respirable fraction	—	—	—	—
Titanium dioxide	13463-67-7	—	—	—
Total dust	—	—	—	—
Toluene	108-88-3	200	750	—
Toluene-2,4-diisocyanate (TDI)	584-84-9	(C)0.02	(C)0.14	—
o-Toluidine	95-53-4	5	22	X
Toxaphene; see Chlorinated camphene.				
Tremolite; see Silicates.				
Tributyl phosphate	126-73-8	—	5	—
1,1,1-Trichloroethane; see Methyl chloroform.				
1,1,2-Trichloroethane	79-00-5	10	45	X
Trichloroethylene	79-01-6	100	535	—
Trichloromethane; see Chloroform.				
Trichloronaphthalene	1321-65-9	—	5	X
1,2,3-Trichloropropane	96-18-4	50	300	—
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	1000	7600	—
Triethylamine	121-44-8	25	100	—
Trifluorobromomethane	75-63-8	1000	6100	—
Trimethyl benzene	25551-13-7	25	120	—
2,4,6-Trinitrophenol; see Picric acid.				
2,4,6-Trinitrophenylmethylnitramine; see Tetryl.				
2,4,6-Trinitrotoluene (TNT)	118-96-7	—	1.5	X
Triorthocresyl phosphate	78-30-8	—	0.1	—
Triphenyl phosphate	115-86-6	—	3	—
Tungsten (as W)	7440-33-7	—	—	—
Insoluble compounds	—	—	5	—
Soluble compounds	—	—	1	—
Turpentine	8006-64-2	100	560	—
Uranium (as U)	7440-61-1	—	—	—
Soluble compounds	—	—	0.2	—
Insoluble compounds	—	—	0.2	—
Vanadium	1314-62-1	—	—	—
Respirable dust (as V ₂ O ₅)	—	—	(C)0.5	—
Fume (as V ₂ O ₅)	—	—	(C)0.1	—
Vegetable oil mist.				
Total dust	—	—	—	—
Respirable fraction	—	—	—	—
Vinyl benzene; see Styrene.				
Vinyl chloride; see § 1926.1117	75-01-4	—	—	—
Vinyl cyanide; see Acrylonitrile.				
Vinyl toluene	25013-15-4	100	480	—
Warfarin	81-81-2	—	0.1	—
Xylenes (o-, m-, p-isomers)	1330-20-7	100	435	—
Xylidine	1300-73-8	5	25	X
Yttrium	7440-65-5	—	1	—
Zinc chloride fume	7646-85-7	—	1	—
Zinc oxide fume	1314-13-2	—	5	—
Zinc oxide	1314-13-2	—	—	—
Total dust	—	—	15	—
Respirable fraction	—	—	5	—
Zirconium compounds (as Zr)	7440-67-7	—	5	—

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MINERAL DUSTS

SILICA:	
Crystalline	250 ^(k)
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Quartz. Threshold Limit calculated from the formula ^(p)	% SiO ₂ +5
Cristobalite.	
Amorphous, including natural diatomaceous earth	20
SILICATES (less than 1% crystalline silica)	
Mica	20
Portland cement	50
Soapstone	20
Talc (non-asbestiform)	20
Talc (fibrous), use asbestos limit	--
Graphite (natural)	15
<hr/>	
Inert or Nuisance Particulates: ^(m)	50 (or 15 mg/m ³ whichever is the smaller) of total dust <1% SiO ₂

[Inert or Nuisance Dusts includes all mineral, inorganic, and organic dusts as indicated by examples in TLV's appendix D]

Conversion factors.

mppcf × 35.3 = million particles per cubic meter = particles per c.c.

Footnotes

- ¹[Reserved]
- ²See Mineral Dusts Table.
- ³Use Asbestos Limit § 1926.58.
- ⁴See 1926.58.
- ⁵See Mineral Dusts table for the exposure limit for any operations or sectors where the exposure limit in § 1926.1153 is stayed or is otherwise not in effect.
- ^{*}The PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit.
- ^{**}As determined from breathing-zone air samples.
- ^aParts of vapor or gas per million parts of contaminated air by volume at 25 °C and 760 torr.
- ^bMilligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.
- ^c[Reserved]
- ^dThe CAS number is for information only. Enforcement is based on the substance name. For an entry covering more than one metal compound, measured as the metal, the CAS number for the metal is given—not CAS numbers for the individual compounds.
- ^e[Reserved]
- ^gFor sectors excluded from § 1926.1128 the limit is 10 ppm TWA.
- ^h[Reserved]
- ^jMillions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.
- ^kThe percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods have been shown to be applicable.
- ^l[Reserved]
- ^mCovers all organic and inorganic particulates not otherwise regulated. Same as Particulates Not Otherwise Regulated.
- ⁿIf the exposure limit in § 1926.1126 is stayed or is otherwise not in effect, the exposure limit is a ceiling of 0.1 mg/m³.
- ^oIf the exposure limit in § 1926.1126 is stayed or is otherwise not in effect, the exposure limit is 0.1 mg/m³ (as CrO₃) as an 8-hour TWA.
- ^pThis standard applies to any operations or sectors for which the respirable crystalline silica standard, 1926.1153, is stayed or otherwise is not in effect.
- The 1970 TLV uses letter designations instead of a numerical value as follows:
- A¹[Reserved]
- A²Polytetrafluoroethylene decomposition products. Because these products decompose in part by hydrolysis in alkaline solution, they can be quantitatively determined in air as fluoride to provide an index of exposure. No TLV is recommended pending determination of the toxicity of the products, but air concentrations should be minimal.
- A³Gasoline and/or Petroleum Distillates. The composition of these materials varies greatly and thus a single TLV for all types of these materials is no longer applicable. The content of benzene, other aromatics and additives should be determined to arrive at the appropriate TLV.
- E Simple asphyxiants. The limiting factor is the available oxygen which shall be at least 19.5% and be within the requirements addressing explosion in part 1926.

[39 FR 22801, June 24, 1974, as amended at 51 FR 37007, Oct. 17, 1986; 52 FR 46312, Dec. 4, 1987; 58 FR 35089, June 30, 1993; 61 FR 9249, 9250, Mar. 7, 1996; 61 FR 56856, Nov. 4, 1996; 62 FR 1619, Jan. 10, 1997; 71 FR 10381, Feb. 28, 2006; 71 FR 36009, June 23, 2006; 81 FR 16875, Mar. 25, 2016; 81 FR 31168, May 18, 2016]