

Threshold Limit Values for 1955

Values are given in the following tabulation for the maximum average atmospheric concentration of contaminants to which workers may be exposed for an 8-hour working day without injury to health.

These values are based on the best available information from industrial experience, from experimental studies, and, when possible, from a combination of the two. They are not fixed values but are reviewed annually by the Committee on Threshold Limits of the American

Conference of Governmental Industrial Hygienists for changes, revisions, or additions as further information becomes available. Threshold limits should be used as guides in the control of health hazards and should not be regarded as fine lines between safe and dangerous concentrations. They represent conditions only within which it is felt that workers may be repeatedly exposed, day after day, without their health being adversely affected. It is felt, at the present time, that workers should not be exposed to a working environment containing any of these substances in excess of the value indicated.

These values are not intended for use, or for modification for use, in the evaluation or control of community air pollution or air pollution nuisances.

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ESTABLISHED VALUES

Gases and Vapors

SUBSTANCE	P.P.M.
Acetaldehyde	200
Acetic acid	10
Acetic anhydride	5
Acetone	1,000
Acrolein	0.5
Acrylonitrile	20
Ammonia	100
Amyl acetate	200
Amyl alcohol (isoamyl alcohol)	100
Aniline	5
Arsine	0.05
Benzene (benzol)	35
Bromine	1
Butadiene (1,3-butadiene)	1,000
Butanone (methyl ethyl ketone)	250
Butyl acetate (<i>n</i> -butyl acetate)	200
Butyl alcohol (<i>n</i> -butanol)	100
Butyl cellosolve (2-butoxyethanol)	200
Carbon dioxide	5,000
Carbon disulfide	20
Carbon monoxide	100

P.P.M.=parts of vapor or gas per million parts of air, by volume.

SUBSTANCE	P.P.M.
Carbon tetrachloride	25
Cellosolve (2-ethoxyethanol)	200
Cellosolve acetate (hydroxyethyl acetate)	100
Chlorine	1
Chlorobenzene (monochlorobenzene)	75
Chloroform (trichloromethane)	100
1-Chloro-1-nitropropane	20
Chloroprene (2-chlorobutadiene)	25
Cresol (all isomers)	5
Cyclohexane	400
Cyclohexanol	100
Cyclohexanone	100
Cyclohexene	400
Cyclopropane	400
<i>o</i> -Dichlorobenzene	50
Dichlorodifluoromethane	1,000
1,1-Dichloroethane	100
1,2-Dichloroethylene	200
Dichloroethyl ether	15
Dichloromonofluoromethane	1,000
1,1-Dichloro-1-nitroethane	10
Dichlorotetrafluoroethane	1,000
Diethylamine	25
Dimethylaniline (N-dimethylaniline)	5
Dimethylsulfate	1
Dioxane (diethylene dioxide)	100

SUBSTANCE	P.P.M.
Ethyl acetate	400
Ethyl alcohol (ethanol)	1,000
Ethylamine	25
Ethyl benzene	200
Ethyl bromide	200
Ethyl chloride	1,000
Ethyl ether	400
Ethyl formate	100
Ethyl silicate	100
Ethylene chlorohydrin	5
Ethylene dibromide (1,2-dibromoethane)	25
Ethylene dichloride (1,2-dichloroethane)	100
Ethylene oxide	100
Fluorine	0.1
Fluorotrichloromethane	1,000
Formaldehyde	5
Gasoline	500
Heptane (<i>n</i> -heptane)	500
Hexane (<i>n</i> -hexane)	500
Hexanone (methyl butyl ketone)	100
Hexone (methyl isobutyl ketone)	100
Hydrogen chloride	5
Hydrogen cyanide	10
Hydrogen fluoride	3
Hydrogen selenide	0.05
Hydrogen sulfide	20
Iodine	1
Isophorone	25
Mesityl oxide	50
Methyl acetate	200
Methyl alcohol (methanol)	200
Methyl bromide	20
Methyl cellosolve (methoxyethanol)	25
Methyl cellosolve acetate (ethylene glycol monomethyl ether acetate)	25
Methyl chloride	100
Methylal (dimethoxymethane)	1,000
Methyl chloroform (1,1,1-trichloroethane)	500
Methylcyclohexane	500
Methylcyclohexanol	100
Methylcyclohexanone	100
Methyl formate	100
Methylene chloride (dichloromethane)	500
Naphtha (coal tar)	200
Naphtha (petroleum)	500
Nickel carbonyl	0.001
Nitrobenzene	1
Nitroethane	100
Nitrogen dioxide	5
Nitroglycerin	0.5
Nitromethane	100
2-Nitropropane	50
Nitrotoluene	5
Octane	500
Ozone	0.1
Pentane	1,000
Pentanone (methyl propyl ketone)	200
Perchloroethylene (tetrachloroethylene)	200
Phenol	5
Phosgene (carbonyl chloride)	1
Phosphine	0.05
Phosphorus trichloride	0.5
Propyl acetate	200
Propyl alcohol (isopropyl alcohol)	400
Propyl ether (isopropyl ether)	500
Propylene dichloride (1,2-dichloropropane)	75
Stibine	0.1
Stoddard solvent	500
Styrene monomer (phenyl ethylene)	200
Sulfur monochloride	1
Sulfur dioxide	10
1,1,2,2-Tetrachloroethane	5
Toluene	200
<i>o</i> -Toluidine	5

SUBSTANCE	P.P.M.
Trichloroethylene	200
Turpentine	100
Vinyl chloride (chloroethene)	500
Xylene	200

Toxic Dusts, Fumes, and Mists

SUBSTANCE	MG. PER CU. M.
Antimony	0.5
Arsenic	0.5
Barium (soluble compounds)	0.5
Cadmium	0.1
Chlorodiphenyl	1
Chromic acid and chromates as CrO ₃	0.1
Cyanide as CN	5
Dinitrotoluene	1.5
Dinitro- <i>o</i> -cresol	0.2
Fluoride	2.5
Iron oxide fume	15
Lead	0.15
Magnesium oxide fume	15
Manganese	6
Mercury	0.1
Parathion (O,O-Diethyl-O- <i>p</i> -nitrophenyl thiophosphate)	0.1
Pentachloronaphthalene	0.5
Pentachlorophenol	0.5
Phosphorus (yellow)	0.1
Phosphorus pentachloride	1
Phosphorus pentasulfide	1
Selenium compounds (as Se)	0.1
Sulfuric acid	1
Tellurium	0.1
Tetryl (2,4,6-trinitrophenyl-methylnitramine)	1.5
Trichloronaphthalene	5
Trinitrotoluene	1.5
Uranium (soluble compounds)	0.05
Uranium (insoluble compounds)	0.25
Zinc oxide fumes	15

RADIOACTIVITY: For permissible concentrations of radioisotopes in air see Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentrations in Air and Water, handbook 52, U. S. Department of Commerce, National Bureau of Standards, March 1953. In addition, see Permissible Dose from External Sources of Ionizing Radiation, handbook 59, Department of Commerce, National Bureau of Standards, September 24, 1954.

MG. PER CU. M.=milligrams of dust, fume, or mist per cubic meter of air.

Mineral Dusts

SUBSTANCE	M.P.P.C.F.
Alundum (aluminum oxide)	50
Asbestos	5
Carborundum (silicon carbide)	50
Dust (nuisance, no free silica)	50
Mica (below 5 percent free silica)	20
Portland cement	50
Talc	20
Silica:	
High (above 50 percent free SiO ₂)	5
Medium (5 to 50 percent free SiO ₂)	20
Low (below 5 percent free SiO ₂)	50
Slate (below 5 percent free SiO ₂)	50
Soapstone (below 5 percent free SiO ₂)	20
Total dust (below 5 percent free SiO ₂)	50

M.P.P.C.F.=Millions of particles per cubic foot of air.

TENTATIVE THRESHOLD LIMIT VALUES

The following values are suggested for further consideration before being presented for adoption as established values. (An asterisk * marks materials added in 1955 and for which bibliographical material has been prepared. The other materials appeared in the 1954 report.) It is proposed that the entire list will be presented for adoption at the meeting of the American Conference of Governmental Indus-

trial Hygienists in 1956, if no reason to the contrary is forthcoming.

Reference material has been prepared on each of the following substances and, though in some instances it is rather meager, it is available for distribution. The committee welcomes suggestions of substances to be added and also comments, additional references, or reports of experience with these materials.

Aldrin (1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-dimethanonaphthalene)	0.25	mg/M ³	Hydroquinone*	2	mg/M ³
Allyl alcohol	5	p.p.m.	Isopropylamine*	5	p.p.m.
Allyl propyl disulfide	2	p.p.m.	Lead arsenate	0.2	mg/M ³
Ammate (ammonium amidosulfate) ..	15	mg/M ³	Lindane (hexachlorocyclohexane, gamma isomer)	0.5	mg/M ³
Benzyl chloride	1	p.p.m.	Malathion (0,0-dimethyl dithio phosphate of diethyl mercaptosuccinate)	15	mg/M ³
Butyl amine*	5	p.p.m.	Methoxychlor (2,2-diparamethoxyphenyl-1,1,1-trichloroethane)	15	mg/M ³
Butyl mercaptan	10	p.p.m.	Methyl acetylene*	1,000	p.p.m.
Calcium arsenate	0.3	mg/M ³	Methyl isobutyl carbinol (methyl amyl alcohol)	25	p.p.m.
Chlordane (1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindane)	2.0	mg/M ³	Methyl mercaptan	50	p.p.m.
Chlorine trifluoride*	0.1	p.p.m.	Molybdenum		
Chlorinated diphenyl oxide*	0.5	mg/M ³	(soluble compounds)*	5	mg/M ³
Crag Herbicide (sodium-2,4-dichlorophenoxy ethyl sulfate)	15	mg/M ³	(insoluble compounds)*	15	mg/M ³
2,4-D (2,4-dichlorophenoxyacetic acid)	10	mg/M ³	<i>p</i> -Nitroaniline	1	p.p.m.
D. D. T. (2,2-bis-(<i>p</i> -chlorophenyl)-1,1,1-trichloroethane)	2.0	mg/M ³	Organo mercurials (as mercury)	0.01	mg/M ³
Diacetone alcohol (4-hydroxy-4-methyl pentanone-2)	50	p.p.m.	Perchloromethyl mercaptan	0.1	p.p.m.
Diborane*	0.1	p.p.m.	Phenylhydrazine	5	p.p.m.
Dieldrin (1,2,3,4,10,10-hexachloro-6,7, epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4,5,8-dimethanonaphthalene) ..	0.25	mg/M ³	Picric acid	0.1	mg/M ³
Difluorodibromomethane*	100	p.p.m.	Propylene imine*	25	p.p.m.
Diisobutyl ketone	50	p.p.m.	Pyridine	10	p.p.m.
EPN (ethyl- <i>p</i> -nitrophenyl thiono benzene phosphonate)	0.5	mg/M ³	Quinone*	0.1	p.p.m.
Ethyl mercaptan	250	p.p.m.	Sodium hydroxide	2	mg/M ³
Ethylene diamine*	10	p.p.m.	Sulfur hexafluoride	1,000	p.p.m.
Ethylene imine*	5	p.p.m.	Sulfur pentafluoride	0.025	p.p.m.
Ferro vanadium dust	1	mg/M ³	TEDP (tetraethyl dithiono pyrophosphate)	0.2	mg/M ³
Furfural	5	p.p.m.	TEPP (tetraethyl pyrophosphate) ..	0.05	mg/M ³
Furfuryl alcohol*	200	p.p.m.	<i>p</i> -Tertiary butyl toluene*	10	p.p.m.
Hydrazine*	1	p.p.m.	Tetrahydrofuran*	75	p.p.m.
Hydrogen bromide*	5	p.p.m.	Tetranitromethane*	1	p.p.m.
Hydrogen peroxide, 90 percent*	1	p.p.m.	Titanium dioxide	15	mg/M ³
			Trifluoromonobromomethane*	1,000	p.p.m.
			Vanadium		
			(V ₂ O ₅ dust)	0.5	mg/M ³
			(V ₂ O ₅ fume)	0.1	mg/M ³
			Zirconium	5	mg/M ³

BERYLLIUM: During the past few years, several papers have reported a limit of 2γ per cubic meter of air for beryllium. Among these is the paper by Van Ordstrand, H. S.: Berylliosis, A. M. A. Arch. Indust. Hyg. 10: 232-234, September 1954, and one by Sterner, J. H., and Eisenbud, M.: Epidemiology of Beryllium

Intoxication, A. M. A. Arch. Indust. Hyg. 4: 123-151, August 1951. Conflicting data from industrial experience have caused the committee to postpone the suggestion of a threshold limit for this material. It is apparent that more epidemiological work is needed for the establishment of a definite view.