

Table 2 . . . Recommended Threshold Limit Values*

These values should be used as guides in the control of health hazards and should not be regarded as firm lines between safe and dangerous concentrations. They represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect. The values listed refer to time-weighted average concentrations for a normal workday. The amount by which these figures may be exceeded for short periods without injury to health depends upon a number of factors such as the nature of the contaminant, whether very high concentrations even for short periods produce acute poisoning, whether the effects are cumulative, the frequency with which high concentrations occur, and the duration of such periods. All must be taken into consideration in arriving at a decision as to whether a hazardous situation exists. Because it has been recognized that the threshold limits of certain acutely-acting substances may not provide a safety factor comparable to that of chronically-acting substances for which a time-weighted average applies, a C designation or ceiling has been affixed to such values indicating that the Threshold Limit Value should not be exceeded. The bases for the C listings is given in Appendix C. [Ceiling listings in this table are identified by an asterisk.]

Special consideration should be given to the application of these values in assessing the health hazards which may be associated with exposure to

mixtures of two or more substances. A brief discussion of basic considerations involved in developing threshold limit values for mixtures, and methods for their development, amplified by specific examples are given in Appendix B.

Threshold limits are based on the best available information from industrial experience, from experimental studies, and, when possible, from a combination of the two. These values are based on various criteria of toxic effects or on marked discomfort; thus, they should not be used as a common denominator of toxicity, nor should they be considered as the sole criterion in proving or disproving diagnosis of suspected occupational disease.

These limits are intended for use in the field of industrial hygiene and should be interpreted and applied only by persons trained in this field. They are not intended for use, or for modification for use, (1) as a relative index of toxicity, by making a ratio of two limits, or (2) in the evaluation or control of community air pollution or air pollution nuisances, or (3) in estimating the toxic potential of continuous uninterrupted exposures.

These values are reviewed annually by the Committee on Threshold Limits for revisions, or additions, as further information becomes available. The Committee welcomes the suggestion of substances to be added to the list and also comments, references, or reports of experience with these materials.

Substance	Threshold Limit Values ACGIH 1963	
	ppm ^b	mg/cu m ^a
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene tetrabromide	1	14
†Acrolein	0.1	0.25
Acrylonitrile—Skin	20	45
Aldrin (1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-dimethano-naphthalene)—Skin	—	0.25
Allyl alcohol—Skin	2	5
†Allyl chloride	1	3
*Allyl glycidyl ether (AGE)	10	45
†Allyl propyl disulfide	2	12
†Ammonia	100	70
Ammonium sulfamate (Ammate)	—	15
†Amyl acetate	100	525
Amyl alcohol (isoamyl alcohol)	100	360
Aniline—Skin	5	19
Antimony	—	0.5
ANTU (alpha-naphthyl-thiourea)	—	0.3
Arsenic	—	0.5
Arsine	0.05	0.2
Barium (soluble compounds)	—	0.5
*Benzene (benzol)—Skin	25	80
Benzidine	—	4 ¹
Benzyl chloride	1	5
Beryllium	—	0.002
Boron oxide	—	15
*Boron trifluoride	1	3
Bromine	0.1	0.7
Butadiene (1,3-butadiene)	1,000	2,200
2-Butanone (methyl ethyl ketone)	200	590
2-Butoxy ethanol (Butyl Cellosolve)	50	240
Butyl acetate (n-butyl acetate)	200	850
Butyl alcohol	100	300
tert. Butyl alcohol	100	300
*Butylamine	5	15

* ACGIH = American Conference of Governmental Industrial Hygienists. Table 2 is reprinted by permission of ACGIH.
† Parts of vapor or gas per million parts of air by volume at 25°C and 760 mm Hg pressure.

Substance	Threshold Limit Values ACGIH 1963	
	ppm ^b	mg/cu m ^a
n-Butyl glycidyl ether (BGE)	50	270
Butyl mercaptan	10	35
p-tert. Butyltoluene	10	60
Cadmium oxide fume	—	0.1
Calcium arsenate	—	1
Carbon dioxide	5,000	9,000
Carbon disulfide—Skin	20	60
Carbon monoxide	100	110
Carbon tetrachloride—Skin	10	65
Chlordane (1,2,4,5,6,7,8,9-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene)	—	0.5
Chlorinated camphene, 60%	—	0.5
Chlorinated diphenyl oxide	—	0.5
Chlorine	1	3
Chlorine dioxide	0.1	0.3
*Chlorine trifluoride	0.1	0.4
*Chloroacetaldehyde	1	3
Chlorobenzene (monochlorobenzene)	75	350
Chlorobromomethane	200	1,050
Chlorodiphenyl (42% Chlorine)—Skin	—	1
Chlorodiphenyl (54% Chlorine)—Skin	—	0.5
*Chloroform (trichloromethane)	50	240
1-Chloro-1-nitropropane	20	100
Chloropicrin	0.1	0.7
Chloroprene (2-chloro-1,3-butadiene)	25	90
Chromic acid and chromates (as CrO ₃)	—	0.1
Cobalt	—	0.5
Crag® herbicide (sodium 2-[2,4-dichlorophenoxy] ethanol hydrogen sulfate)	—	15
Cresol (all isomers)—Skin	5	22
Cyanide (as CN)—Skin	—	5
Cyclohexane	400	1,400
Cyclohexanol	50	200
Cyclohexanone	50	200
Cyclohexene	400	1,350
2,4-D (2,4-dichlorophenoxy-acetic acid)	—	10
DDT (2,2-bis [p-chlorophenyl]-1,1,1-trichloroethane)—Skin	—	1

* Approximate milligrams per cubic meter of air.
† 1963 Revision.
‡ Ceiling listing.
Note: The word "Skin" following a substance indicates that the liquid can penetrate the skin to contribute to the exposure.

Table 2 . . . Recommended Threshold Limit Values* (Continued)

Substance	Threshold Limit Values ACGIH 1963		Substance	Threshold Limit Values ACGIH 1963	
	ppm ^b	mg/cu m ^a		ppm ^b	mg/cu m ^a
Decaborane—Skin	0.05	0.3	Gasoline	500	2,000
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	50	240	Glycidol (2,3-epoxy-1-Propanol)	50	150
Diborane	0.1	0.1	Heptane (n-heptane)	500	2,000
1,2-Dibromoethane (Ethylene dibromide)	25	190	Hexane (n-hexane)	500	1,800
o-Dichlorobenzene	50	300	Hexanone (methyl butyl ketone)	100	410
*Dichlorobenzene	75	450	†sec-Hexyl acetate	50	295
Dichlorodifluoromethane	1,000	4,950	Hexone (methyl isobutyl ketone)	100	410
1,1-Dichloroethane	100	400	*Hydrazine—Skin	1	1.3
1,2-Dichloroethane (ethylene dichloride)	50	200	Hydrogen bromide	3	10
1,2-Dichloroethylene	200	790	*Hydrogen chloride	5	7
Dichloroethyl ether (DGE)	15	90	Hydrogen cyanide—Skin	10	12
Dichloromono-fluoromethane	1,000	4,200	Hydrogen fluoride	3	2
1,1-Dichloro-1-nitroethane	10	60	Hydrogen peroxide, 90%	1	1.4
Dichlorotetrafluoroethane	1,000	7,000	Hydrogen selenide	0.05	0.2
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)—Skin	—	0.25	*Hydrogen sulfide	20	30
Diethylamine	25	75	Hydroquinone	—	1
Difluorodibromomethane	100	860	*Iodine	0.1	1
*[Diglycidyl ether (DGE)]	0.5	2.8	Iron oxide fume	—	15
Diisobutyl ketone	50	290	Isophorone	25	140
Dimethyl acetamide—Skin	10	35	Isopropylamine	5	12
Dimethylaniline (N-dimethylaniline)—Skin	5	25	Isopropyl glycidyl ether (IGE)	50	240
Dimethylformamide	20	60	Ketene	0.5	0.9
1,1-Dimethylhydrazine—Skin	0.5	1	Lead	—	0.2
Dimethylsilicate—Skin	1	5	Lead arsenate	—	0.15
Dinitrobenzene—Skin	—	1	Lindane (hexachlorocyclohexane, gamma isomer)	—	0.5
Dinitrotoluene—Skin	—	1.5	Lithium hydride	—	0.025
Dinitro-o-cresol—Skin	—	0.2	Magnesium oxide fume	—	15
Dioxane (dihydrate dioxane)	100	360	Malathion (O, O-dimethyl dithiophosphate of diethyl mercaptosuccinate)—Skin	—	15
Dipropylene glycol methyl ether	100	600	*Manganese	—	5
EPN (O-ethyl O-p-nitrophenyl thionobenzenephosphonate)—Skin	—	0.5	Mercury	—	0.1
Ethyl acetate	400	1,400	Mercury (organic compounds)—Skin	—	0.01
Ethyl acrylate—Skin	25	100	Mesityl oxide	25	100
Ethyl alcohol (ethanol)	1,000	1,900	Methoxychlor (2,2-di-p-methoxyphenyl-1,1-trichloroethane)	—	15
Ethylamine	25	45	Methyl acetate	200	610
*Ethylbenzene	200	870	Methyl acetylene	1,000	1,650
Ethyl bromide	200	890	Methyl acrylate—Skin	10	35
Ethyl chloride	1,000	2,600	Methylal (dimethoxymethane)	1,000	3,100
Ethyl ether	400	1,200	Methyl alcohol (methanol)	200	260
Ethyl formate	100	300	*Methyl bromide—Skin	20	80
*Ethyl mercaptan	20	62	Methyl cellosolve (2-methoxyethanol)	25	80
Ethyl silicate	100	850	Methyl cellosolve acetate (ethylene glycol monomethyl ether acetate)	25	120
Ethylene chlorohydrin—Skin	5	16	*Methyl chloride	100	210
Ethylenediamine	10	30	†Methyl chloroform (1,1,1-trichloroethane)	350	1,900
Ethylene glycol dinitrate—Skin	0.2	1.2	Methycyclohexane	500	2,000
Ethyleneimine—Skin	5	9	Methycyclohexanol	100	470
Ethylene oxide	50	90	Methycyclohexanone	100	460
2-Ethoxyethanol (Cellosolve)	200	740	Methyl formate	100	250
2-Ethoxyethylacetate (Cellosolve Acetate)	100	540	Methyl isobutyl carbinol (methyl amyl alcohol)	25	100
Perbam (ferrie dimethyl dithiocarbamate)	—	15	*Methyl mercaptan	20	40
Ferrivanadium dust	—	1	α-Methyl styrene	100	450
Fluoride	0.1	0.2	Methylene chloride (dichloromethane)	500	1,750
Fluorotrichloromethane	1,000	5,600	Monomethyl aniline—Skin	2	9
*Formaldehyde	5	6	Molybdenum (soluble compounds)	—	5
Furfural	5	20	(insoluble compounds)	—	15
Furfuryl alcohol	50	200			