

RULES AND REGULATIONS
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF HEALTH

Chapter 4

Article 432

Regulations Establishing
Threshold Limits in
Places of Employment

Under the provisions of the Administrative Code Act of April 9,
1929, P.L. 177, the following Rules and Regulations of the Department of
Health are adopted this 27th day of October, 1961.

Approved as to legality

of content this 6th

day of November, 1961.

Joseph L. Cohen
Assistant Attorney General

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- G. "Local exhaust ventilation" shall mean that type of ventilation in which suction is applied at the point of generation of dusts, fumes, gases, vapors, and mists.
- H. "Mist" shall mean liquid droplets suspended in air.
- I. "Place of employment" shall mean a location or site where an individual possesses employment in a trade, occupation, or profession for the sake of monetary gain.
- J. "Threshold Limit Value" (Maximum Allowable Concentration, mac) shall mean the maximum average atmospheric concentration of contaminant to which workers may be exposed for an eight hour working day. (These values are set forth in Table 1 hereof, which table is a part of these regulations).
- K. "Vapor" shall mean any liquid, except water, which when held in suspension in air will revert to its original liquid state after release from heat, chemical action, or pressure conditions.

Section 4. Employer's Duties

- A. Every employer shall install and provide such control measures and protective equipment as is required for the protection of health.
- B. Every employer shall inform and periodically instruct his employees regarding known hazards and proper methods for utilizing industrial hygiene control measures which are provided.
- C. When it is necessary for an employer to provide protective equipment, such employer shall provide an approved means for cleaning and sterilizing such protective equipment, and the employer shall cause such equipment to be maintained in a clean and sanitary condition. Respiratory equipment shall not be passed from one man to another until such equipment is clean and sterilized. When filter or cartridge type respirators are used, such employee shall have such respirator for his own exclusive use. Respiratory equipment and replacement units shall be stored, when not in use, in approved containers.
- D. When cases of occupational disease have occurred or when concentrations of atmospheric contaminants in excess of threshold limits have been found to exist, the Department may require any employer to have his employees examined at periodic intervals. These examinations may include X-ray examinations and laboratory studies when indicated.

Section 5. Threshold Limit Values

- A. No employee shall be exposed to atmospheric concentrations of contaminants which concentrations may give rise to occupational disease. Table 1 shall be used for the determination of permissible levels.
- B. Exposures to atmospheric contaminants or adverse environmental conditions not referred to in Section 5A shall be controlled when necessary to protect health.

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Under the provisions of the Administrative Code Act of April 9, 1929, P.L. 177, the following Rules and Regulations of the Department of Health are adopted this 27th day of October, 1961.

Section 1. Purpose

The purpose of these regulations and standards is to prescribe minimum requirements and standards for the maintenance of occupational health in places of employment in Pennsylvania.

Section 2. Application

These regulations and standards shall apply to every place of employment.

Section 3. Definitions

- A. "Atmospheric contaminant" shall mean a harmful substance or material in air usually occurring in the form of a dust, fume, gas, vapor, or mist.
- B. "Department" shall mean the Department of Health, Commonwealth of Pennsylvania.
- C. "Dust" shall mean finely divided solid particles dispersed in air and having been formed by mechanical means such as grinding, crushing, blasting, and drilling.
- D. "Fume" shall mean solid particles dispersed in air resulting from some chemical or physical process that involved a change of state, such as combustion, sublimation, or evaporation and condensation.
- E. "Gas" shall mean a formless fluid occupying the space of enclosure.
- F. "General or dilution ventilation" shall mean ventilation provided to dilute the concentration of dusts, fumes, gases, vapors, or mists in the atmosphere of all or part of the place of employment.

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Section 6. Air Recirculation and Discharge

- A. No air from any local exhaust ventilation system may be recirculated without express approval by the Department.
- B. The discharge of air from any exhaust system shall be such that no air contamination will enter any window, door, or other opening of any work area in quantities sufficient to create a health hazard to or in such area.

Section 7. Tanks and Vessels

- A. No individual shall be permitted to enter a tank or closed vessel until it has been ascertained that the atmosphere in the tank or vessel contains an adequate quantity of oxygen and that atmospheric contaminants have been diluted to safe concentrations.
- B. If the oxygen content of the air and the quantity of atmospheric contamination are not determined, entry to the tank or vessel shall be prohibited unless the workman is equipped with an air line respirator, a safety harness and safety line, and that another employee be stationed outside the tank or vessel to remove the workman in the tank or vessel should he experience difficulty.

Section 8. Housekeeping

- A. The interiors, exteriors, and environs of buildings where hazardous materials are used, stored, or handled, shall be cleaned and maintained in such a manner as to prevent harmful exposure to hazardous materials.
- B. Employees engaged in such cleaning operations and all others who may be exposed shall wear protective equipment as is required. The cleaning operations should be done by suction apparatus.
- C. Where wet processes are used, reasonable drainage should be maintained. False floors, platforms, mats, or other means of safe footing should be provided.

Section 9. Labeling

Adequate identification, warning, and caution labels shall be applied to all containers of hazardous chemicals.

Table 1

Threshold Limit Values

Gases and Vapors

Substance	P.P.M. ^a	Approx. Mg. ^b per Cu. M.
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetylene tetrabromide	1	14
Acrolein	0.5	1.2
Acrylonitrile - Skin	20	45
Allyl alcohol - Skin	2	5
Allyl chloride	5	15
Allyl propyl disulfide	2	12
Ammonia	100	70
Amyl acetate	200	1,050
Amyl alcohol (isoamyl alcohol)	100	360
Aniline - Skin	5	19
Arzine	0.05	0.2
Benzene (benzol)	25	80
Benzyl chloride	1	5
Boron trifluoride	1	3
Bromine	0.1	0.7
Butadiene (1,3-butadiene)	1,000	2,200
2-Butanone (methyl ethyl ketone)	200	590
Butyl acetate (n-butyl acetate)	200	950
Butyl alcohol (n-butanol)	100	300
tert. Butyl alcohol	100	300
Butylamine	5	15
Butyl cellosolve (2-butoxyethanol)	50	240
para-tert Butyltoluene	10	60
Carbon dioxide	5,000	9,000
Carbon disulfide - Skin	20	60
Carbon monoxide	100	110
Carbon tetrachloride - Skin	25	160
Cellosolve (2-ethoxyethanol)	200	740
Cellosolve acetate (2-ethoxyethyl acetate)	100	540
Chlorine	1	3
Chlorine dioxide	0.1	0.3
Chlorine trifluoride	0.1	0.4
Chlorobenzene (monochlorobenzene)	75	350
Chloroform (trichloromethane)	50	240
1-Chloro-1-nitropropane	20	100
Chloropierin	0.1	0.7
Chloroprene (2-chloro-1,3-butadiene)	25	90
Cresol (all isomers) - Skin	5	22

NOTE: The word "Skin" following a compound's name indicates that the liquid compound can penetrate the skin to cause systemic effects.

Substance	P.P.M. ^a	Approx. Mg. ^b per Cu. M.
Cyclohexane	400	1,400
Cyclohexanol	50	200
Cyclohexanone	50	200
Cyclohexene	400	1,350
Decaborane - Skin	0.05	0.3
Diacetone alcohol (4-hydroxy-4-methyl- 2-pentanone)	50	240
Diborane	0.1	0.1
ortho-Dichlorobenzene	50	300
para-Dichlorobenzene	75	450
Dichlorodifluoromethane	1,000	4,950
1,1-Dichloroethane	100	400
1,2-Dichloroethane (ethylene dichloride)	100	400
1,2-Dichloroethylene	200	750
Dichloroethyl ether	15	90
Dichloromonofluoromethane	1,000	4,200
1,1-Dichloro-1-nitroethane	10	60
Dichlorotetrafluoroethane	1,000	7,000
Diethylamine	25	75
Difluorodibromomethane	100	360
Diisobutyl ketone	50	290
Dimethylaniline (N-dimethylaniline) - Skin	5	25
Dimethylformamide	20	60
1,1-Dimethylhydrazine - Skin	0.8	1
Dimethylsulfate - Skin	1	5
Dipropylene glycol methyl ether	100	600
Dioxane (diethylene dioxide)	100	360
Ethyl acetate	400	1,400
Ethyl acrylate - Skin	25	100
Ethyl alcohol (ethanol)	1,000	1,900
Ethylamine	25	45
Ethylbenzene	200	870
Ethyl bromide	200	890
Ethyl chloride	1,000	2,400
Ethyl ether	400	1,200
Ethyl formate	100	300
Ethyl silicate	100	350
Ethylene chlorohydrin - Skin	5	16
Ethylenediamine	10	30
Ethylene dibromide (1,2-dibromoethane)	25	190
Ethylene imine - Skin	5	9
Ethylene oxide	50	90
Fluorine	0.1	0.2
Fluorotrichloromethane	1,000	5,600
Formaldehyde	5	6
Furfural	5	20
Furfuryl alcohol	50	200
Gasoline	500	2,000
Heptane (n-heptane)	500	2,000
Hexane (n-hexane)	500	1,800
Hexanone (methyl butyl ketone)	100	410

Substance	P.P.M. ^a	Approx. Mg. ^b per Cu. M.
Hexone (methyl isobutyl ketone)	100	410
Hydrazine - Skin	1	1.3
Hydrogen bromide	3	10
Hydrogen chloride	5	7
Hydrogen cyanide - Skin	10	11
Hydrogen fluoride	3	2
Hydrogen peroxide, 90%	1	1.4
Hydrogen selenide	0.05	0.2
Hydrogen sulfide	20	30
Iodine	0.1	1
Isophorane	25	140
Isopropylamine	5	12
Mesityl oxide	25	100
Methyl acetate	200	610
Methyl acetylene	1,000	1,650
Methyl acrylate - Skin	10	35
Methyl (dimethoxymethane)	1,000	3,100
Methyl alcohol (methanol)	200	260
Methyl bromide - Skin	20	80
Methyl cellosolve (2-methoxyethanol)	25	80
Methyl cellosolve acetate (ethylene glycol monomethyl ether acetate)	25	120
Methyl chloride	100	210
Methyl chloroform (1, 1, 1-trichloroethane)	500	2,700
Methylcyclohexane	500	2,000
Methylcyclohexanol	100	470
Methylcyclohexanone	100	460
Methyl formate	100	250
Methyl isobutyl carbinol (methyl amyl alcohol)	25	100
alpha-Methyl styrene	100	480
Methylene chloride (dichloromethane)	500	1,750
Monomethyl aniline - Skin	2	9
Naphtha (coal tar)	300	800
Naphtha (petroleum)	500	2,000
Nickel carbonyl	10,001	0.007
Nitric acid	10	25
para-Nitroaniline - Skin	1	6
Nitrobenzene - Skin	1	5
Nitroethane	100	310
Nitrogen dioxide	5	9
Nitroglycerin	0.5	5
Nitromethane	100	250
2-Nitropropane	25	90
Nitrotoluene - Skin	5	30
Octane	500	2,350
Ozone	0.1	0.2
Pentane	1,000	2,950
Pentanone (methyl propyl ketone)	200	700
Perchloroethylene (tetrachloroethylene)	100	570
Phenol - Skin	5	19

Substance	P.P.M. ^a	Approx. Mg. ^b per cu. M.
Phenylhydrazine - Skin	5	22
Phosgene (carbonyl chloride)	1	4
Phosphine	0.05	0.07
Phosphorus trichloride	0.5	3
Propyl acetate	200	840
Propyl alcohol (isopropyl alcohol)	400	980
Propyl ether (isopropyl ether)	500	2,100
Propylene dichloride (1,2-dichloropropane)	75	350
Propylene imine - Skin	25	60
Propylene oxide	100	240
Pyridine	5	15
Quinone	0.1	0.4
Stibine	0.1	0.5
Stoddard solvent	500	2,900
Styrene monomer (phenylethylene)	100	420
Sulfur dioxide	5	13
Sulfur hexafluoride	1,000	6,000
Sulfur monochloride	1	6
Sulfur pentafluoride	0.025	0.25
1,1,2,2-Tetrachloroethane - Skin	5	35
Tetrahydrofuran	200	590
Tetranitromethane	1	8
Toluene (toluol) -	200	750
ortho-Toluidine - Skin	5	22
Tolylene-2,4-diisocyanate	0.02	0.14
Trichloroethylene	100	320
Triethylamine	25	100
Trifluoromethane	1,000	6,100
Turpentine	100	560
Vinyl chloride (chloroethylene)	500	1,300
Vinyl toluene	100	480
Xylene (xylol)	200	870
Xylidine - Skin	5	25

^aParts of vapor or gas per million parts of air by volume at 25°C and 760 mm. Hg. Pressure.

^bApproximate milligrams per cubic meter of air.

Dusts, Fumes and Mists

Substance	Mg. per ^c Cu. M.
Aldrin (1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4, 5, 8-dimethanonaphthalene) - Skin	0.25
Ammate (ammonium sulfamate)	15
Antimony	0.5
ANTU (alpha-naphthyl-thiourea)	0.3
Arsenic	0.5
Barium (soluble compounds)	0.5
Beryllium	0.002
Cadmium oxide fume	0.1
Calcium arsenate	0.1
Chlordane (1, 2, 4, 5, 6, 7, 8, 9-octachloro-3a, 4, 7, 7a-tetra-hydro-4, 7-methanoindane)	2
Chlorinated camphene, 60%	0.5
Chlorinated diphenyl oxide	0.5
Chlorodiphenyl (42% chlorine) - Skin	1
Chlorodiphenyl (54% chlorine) - Skin	0.5
Chromic acid and chromates (as CrO ₃)	0.1
Crag herbicide sodium 2-(2, 4-dichlorophenoxy) ethanol hydrogen sulfate)	15
Cyanide (as CN) - Skin	5
2, 4-D (2, 4-dichlorophenoxyacetic acid)	10
DDT (2, 2-bis [p-chlorophenyl]-1, 1, 1-trichloroethane)	1
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
Dinitrobenzene - Skin	1
Dinitrotoluene - Skin	1.5
Dinitro-o-cresol - Skin	0.2
EPN (0-ethyl 0-p-nitrophenyl Thienobenzenephosphonate) - Skin	0.5
Forbam (ferric dimethyl dithiocarbamate)	15
Ferrevanadium dust	1
Fluoride	2.5
Hydroquinone	2
Iron oxide fume	15
Lead	0.2
Lead arsenate	0.15
Lindane (hexachlorocyclohexane, gamma isomer)	0.5
Lithium hydride	0.025
Magnesium oxide fume	15
Malathion (0, 0-dimethyl dithiophosphate of diethyl mercaptosuccinate) - Skin	15
Manganese	5
Mercury	0.1
Mercury (organic compounds) - Skin	0.01
Methoxychlor (2, 2-di-p-methoxyphenyl-1, 1, 1-trichloroethane)	15
Molybdenum (soluble compounds)	5
(insoluble compounds)	15
Nicotine - Skin	0.5
Parathion (0, 0-diethyl-0-p-nitrophenyl thiophosphate) - Skin	0.1
Pentachloronaphthalene - Skin	0.5
Pentachlorophenol - Skin	0.5
Phosphoric acid	1
Phosphorus (yellow)	0.1
Phosphorus pentachloride	1
Phosphorus pentasulfide	1
Picric acid - Skin	0.1

Substance	Mg. per ^c Cu. M.
Pyrethrum	2
Rotenone	5
Selenium compounds (as Se) -	0.1
Sodium fluoroacetate (1080) - Skin	0.1
Sodium hydroxide	2
Strychnine	0.15
Sulfuric acid	1
TEDP (tetraethyl dithionopyrophosphate) - Skin	0.2
TEPP (tetraethyl pyrophosphate) - Skin	0.05
Tellurium -	0.1
Tetryl (2, 4, 6-trinitrophenylmethylnitramine) - Skin	1.5
Thallium (soluble compounds)	0.1
Thiram (tetramethyl thiuram disulfide)	5
Titanium dioxide -	15
Trichloronaphthalene - Skin	5
Trinitrotoluene - Skin	1.5
Uranium (soluble compounds)	0.05
(insoluble compounds)	0.25
Vanadium	
(V ₂ O ₅ dust)	0.5
(V ₂ O ₅ fumes) -	0.1
Warfarin (3-(4-acetonylbenzyl)-4-hydroxycoumarin)	0.5
Yttrium	5
Zinc oxide fumes	15
Zirconium compounds (as Zr)	5

Milligrams of dust, fume, or mist per cubic meter of air.

Mineral and Non-Metallic Inorganic Dusts

Substance	M.P.P.C.F. ^d
Silica	
Quartz	
High (above 50% free silica)	5
Medium (5 to 50% free silica)	20
Low (below 5% free silica)	30
Cristobalite (above 5%)	5
Amorphous	20
Silicates	
Asbestos	5
Mica	20
Portland Cement	50
Soapstone	20
Talc	20
Miscellaneous:	
Aluminum Oxide	50
Calcite	50
Dolomite	50
Limestone	50
Marble	50
Silicon Carbide	50
Other inert dusts	30

^d Millions of particles per cubic foot of air based on impinger samples counted by light-field techniques.

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