

Title 29—LABOR

Chapter XVII—Occupational Safety and Health Administration, Department of Labor

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

National Consensus Standards and Established Federal Standards

Pursuant to authority in sections 6(a) and 8(g) of the Williams-Steiger Occupational Safety and Health Act of 1970 (84 Stat. 1593, 1600; 29 U.S.C. 655, 657), Chapter XVII of Title 29 of the Code of Federal Regulations, established on April 13, 1971 (36 F.R. 7006), is hereby amended by adding thereto a new Part 1910 to read as set forth below.

The provisions of 5 U.S.C. 553 concerning notice of proposed rulemaking, public participation therein, and delay in effective date are inapplicable by virtue of the exception to 5 U.S.C. Ch. 5, provided in section 6(a) of the Act.

The new Part 1910 contains occupational safety and health standards which are either national consensus standards or established Federal standards.

The national consensus standards are occupational safety and health standards adopted and promulgated either by the American National Standards Institute (ANSI) or by the National Fire Protection Association (NFPA) under procedures whereby it can be determined that persons interested and affected by the scope or provisions of the standards have reached substantial agreement on their adoption. I have determined that those standards have been adopted and promulgated under such procedures. Accordingly, pursuant to this determination, after consultation with other appropriate Federal agencies, and in accordance with section 3(9) of the Act, I do hereby designate as national consensus standards those standards in Part 1910 which are standards adopted and promulgated by either the American National Standards Institute or the National Fire Protection Association. The national consensus standards contain only mandatory provisions of the standards promulgated by those two organizations. The standards of ANSI and NFPA may also contain advisory provisions and recommendations the adoption of which by employers is encouraged, but they are not adopted in Part 1910.

The established Federal standards are operative occupational safety and health standards in effect on April 28, 1971, and established by the Department of Labor pursuant to section 107 of the Contract Work Hours and Safety Standards Act, as amended (40 U.S.C. 333); section 41 of the Longshoremen's and Harbor Workers' Compensation Act, as amended (33 U.S.C. 941); the Walsh-Healey Public Contracts Act, as amended (41 U.S.C. 35); the Service Contract Act of 1965 (41 U.S.C. 351); or pursuant to the National Foundation on the Arts and Humanities Act (20 U.S.C. 951). In any proceeding to

enforce any such standard, brought under any of such statutes or under the Williams-Steiger Occupational Safety and Health Act of 1970, the principle of collateral estoppel will be followed.

The effective date of the national consensus standards is delayed for 90 days with respect to every employer and employment subject to the Williams-Steiger Occupational Safety and Health Act of 1970. The effective date of the established Federal standards is also delayed for 90 days, but only for employers and employees not subject to any of the statutes listed in the preceding paragraph. The purpose of the delay is to insure that affected employers and employees would be informed of the existence of the standards and of their terms, and to give such employers and employees an opportunity to familiarize themselves with the requirements of the standards before their application. The delay is also intended to afford a State a full opportunity to apply for an agreement under section 18(h) of the Act permitting it to continue to enforce one or more occupational safety and health standards in the State and to submit a plan under section 18(b) of the Act for the development and enforcement of State safety and health standards. However, for established Federal standards which correspond to occupational safety and health standards (1) promulgated under any of the statutes listed in the preceding paragraph and (2) applicable to any employer and any employment by virtue of any of such statutes, no delay in effective date is provided with respect to such employer and employment. In the case of employers and employments subject to standards issued under such statutes, familiarity already exists.

An additional delay in effective date until February 15, 1972, is provided and codified in the new Part 1910 in sections within Subparts G, H, I, L, N, O, P, R, and S in situations where additional time is considered necessary to adjust to the new standards.

Effective date. The occupational safety and health standards in new Part 1910 shall become effective on August 27, 1971 except: (1) Where additional delays in effective date are specifically provided, and (2) with respect to any employment and place of employment which, on a date before August 27, 1971, is or becomes subject to any safety and health standard prescribed in 29 CFR Parts 505, 1501, 1502, 1503, 1504, 1516, or 1518, or in 41 CFR Part 50-204, any corresponding occupational safety and health standard in Subpart B of this Part 1910, or in Subpart D through S which are from 41 CFR 50-204, shall also become effective, and shall be applicable to such employment and place of employment, on such earlier date. For example, whenever a standard promulgated under the Contract Work Hours and Safety Standards Act and contained in 29 CFR Part 1518 is applicable to an employment and places of employment by virtue of the performance of a construction contract on a date before August 27, 1971, the

corresponding standard prescribed by § 1910.12 of new Part 1910 shall also become effective on the same date with respect to such employment and places of employment. However, this effective date provision shall not be deemed to relieve any employer of any duty under section 5(a)(1) of the Act to furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees, or to relieve the Secretary of Labor of his responsibilities and authority under section 13 of the Act to initiate enforcement proceedings to counteract imminent dangers, where any employer breaches such duty under section 5(a)(1).

The new Part 1910 is set forth below.

Signed at Washington, D.C., this 27th day of April, 1971.

J. D. HODGSON,
Secretary of Labor.

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AUTHORITY: The provisions of this Part 1910 issued under secs. 6(a), 8(g), 84 Stat. 1593, 1598; 29 U.S.C. 655, 657.

Subpart A—General

§ 1910.1 Purpose and scope.

(a) Section 6(a) of the Williams-Steiger Occupational Safety and Health Act of 1970 (84 Stat. 1593) provides that "without regard to chapter 5 of title 5, United States Code, or to the other subsections of this section, the Secretary shall, as soon as practicable during the period beginning with the effective date of this Act and ending 2 years after such date, by rule promulgate as an occupational safety or health standard any national consensus standard, and any established Federal standard, unless he determines that the promulgation of such a standard would not result in improved safety or health for specifically designated employees." The legislative purpose of this provision is to establish, as rapidly as possible and without regard to the rule-making provisions of the Administrative Procedure Act, standards with which industries are generally familiar, and on whose adoption interested and affected persons have already had an opportunity to express their views. Such standards are either (1) national consensus standards on whose adoption affected persons have reached substantial agreement, or (2) Federal standards already established by Federal statutes or regulations.

(b) This part carries out the directive to the Secretary of Labor under section 6(a) of the Act. It contains occupational safety and health standards which have been found to be national consensus standards or established Federal standards.

§ 1910.2 Definitions.

As used in this part, unless the context clearly requires otherwise:

(a) "Act" means the Williams-Steiger Occupational Safety and Health Act of 1970 (84 Stat. 1590).

(vi) *Strength of step supports.* When subjected to a load of 400 pounds applied at the approximate center of the step, step frames, or supports and their guides shall be of adequate strength to:

(a) Prevent the disengagement of any step roller.

(b) Prevent any appreciable misalignment.

(c) Prevent any visible deformation of the steps or its support.

(vii) *Prohibition of steps without handholds.* No steps shall be provided unless there is a corresponding handhold above or below it meeting the requirements of subparagraph (4) of this paragraph. If a step is removed for repairs or permanently, the handholds immediately above and below it shall be removed before the lift is again placed in service.

(4) *Handholds—(i) Location.* Handholds attached to the belt shall be provided and installed so that they are not less than 4 feet nor more than 4 feet 8 inches above the step tread. These shall be so located as to be available on the both "up" and "down" run of the belt.

(ii) *Size.* The grab surface of the handhold shall be not less than 4½ inches in width, not less than 3 inches in depth, and shall provide 2 inches of clearance from the belt. Fastenings for handholds shall be located not less than 1 inch from the edge of the belt.

(iii) *Strength.* The handhold shall be capable of withstanding, without damage, a load of 300 pounds applied parallel to the run of the belt.

(v) *Prohibition of handhold without steps.* No handhold shall be provided without a corresponding step. If a handhold is removed permanently or temporarily, the corresponding step and handhold for the opposite direction of travel shall also be removed before the lift is again placed in service.

(6) *Type.* All handholds shall be of the closed type.

(7) *Up limit stops—(i) Requirements.* Two separate automatic stop devices shall be provided to cut off the power and apply the brake when a loaded step passes the upper terminal landing. One of these shall consist of a split-rail switch mechanically operated by the step roller and located not more than 6 inches above the top terminal landing. The second automatic stop device may consist of any of the following:

(a) Any split-rail switch placed 6 inches above and on the side opposite the first limit switch.

(b) An electronic device.

(c) A switch actuated by a lever, rod, or plate, the latter to be placed on the "up" side of the head pulley so as to just clear a passing step.

(d) *Manual reset location.* After the manlift has been stopped by a stop device it shall be necessary to reset the automatic stop manually. The device shall be so located that a person resetting it shall have a clear view of both the "up" and "down" runs of the manlift. It shall not be possible to reset the device from any 2nd platform.

(e) *Cut-off point.* The initial limit stop device shall function so that the

manlift will be stopped before the loaded step has reached a point 24 inches above the top terminal landing.

(iv) *Electrical requirements.* (a) Where such switches open the main motor circuit directly they shall be of the multipole type.

(b) Where electronic devices are used they shall be so designed and installed that failure will result in shutting off the power to the driving motor.

(c) Where flammable vapors or dusts may be present all electrical installations shall be in accordance with NFPA No. 70-1968 National Electric Code, requirements for such locations.

(d) Unless of the oil-immersed type controller contacts carrying the main motor current shall be copper to carbon or equal, except where the circuit is broken at two or more points simultaneously.

(6) *Emergency Stop—(i) General.* An emergency stop means shall be provided.

(ii) *Location.* This stop means shall be within easy reach of the ascending and descending runs of the belt.

(iii) *Operation.* This stop means shall be so connected with the control lever or operating mechanism that it will cut off the power and apply the brake when pulled in the direction of travel.

(iv) *Rope.* If rope is used, it shall be not less than three-eighths inch in diameter. Wire rope, unless marlin-covered, shall not be used.

(7) *Instruction and warning signs—*

(i) *Instruction signs at landings or belts.* Signs of conspicuous and easily read style giving instructions for the use of the manlift shall be posted at each landing or stenciled on the belt.

(a) Such signs shall be of letters not less than 1 inch in height and of a color having high contrast with the surface on which it is stenciled or painted (white or yellow on black or black on white or gray).

(b) The instructions shall read approximately as follows:

Face the Belt
Use the Handholds
To Stop—Pull Rope.

(ii) *Top floor warning sign and light.*

(a) At the top floor an illuminated sign shall be displayed bearing the following wording:

"TOP FLOOR—GET OFF"

Signs shall be in block letters not less than 2 inches in height. This sign shall be located within easy view of an ascending passenger and not more than 2 feet above the top terminal landing.

(b) In addition to the sign required by subdivision (a) of this subdivision, a red warning light of not less than 40-watt rating shall be provided immediately below the upper landing terminal and so located as to shine in the passenger's face.

(iii) *Visitor Warning.* A conspicuous sign having the following legend—AUTHORIZED PERSONNEL ONLY—shall be displayed at each landing. The sign shall be of block letters not less than 2 inches in height and shall be of a color offering high contrast with the background color.

(d) *Operating rules—(1) Proper use of manlifts.* No freight, packaged goods, pipe, lumber, or construction materials of any kind shall be handled on any manlift.

(e) *Periodic inspection—(1) Frequency.* All manlifts shall be inspected by a competent designated person at intervals of not more than 30 days. Limit switches shall be checked weekly. Manlifts found to be unsafe shall not be operated until properly repaired.

(2) *Items covered.* This periodic inspection shall cover but is not limited to the following items:

Steps.
Step Fastenings.
Rails.
Rail Supports and Fastenings.
Rollers and Slides.
Belt and Belt Tension.
Handholders and Fastenings
Floor Landings.
Guardrails.
Lubrication.
Limit Switches.
Warning Signs and Lights.
Illumination.
Drive Pulley.
Bottom (boot) Pulley and Clearance
Pulley Supports.
Motor.
Driving Mechanism.
Brake.
Electrical Switches.
Vibration and Misalignment.
"Skip" on up or down run when mounting step (indicating worn gears)

(3) *Inspection log.* A written record shall be kept of findings at each inspection. Records of inspection shall be made available to the Assistant Secretary of Labor or his duly authorized representative.

(Source: ANSI A90.1-1969 Safety Code for Manlifts.)

§ 1910.69 Sources of standards.

Sec.	Source
1910.66	ANSI A120.1-1970 Safety Code for Powered Platforms for Exterior Building Maintenance
1910.67	ANSI A92.2-1969 American National Standard for Vehicle-Mounted Elevating and Rotating Work Platforms
1910.68	ANSI A90.1-1969 Safety Code for Manlifts.

§ 1910.70 Standards organizations.

Specific standards of the following organizations have been referenced in this subpart. Copies of the standards may be obtained from the issuing organization: American National Standards Institute, 1430 Broadway, New York, NY 10018

Subpart G—Occupational Health and Environmental Control

§ 1910.93 Air contaminants. (Gases, vapors, fumes, dust, and mists.)

(a) *Exposures by inhalation, ingestion, skin absorption, or contact to any material or substance (1) at a concentration above those specified in the "Threshold Limit Values of Airborne Contaminants for 1970" of the American Conference of Governmental Industrial Hygienists, listed in Table G-1, except for the American National Standards listed in Table G-2 of this section and*

except for values of mineral dusts listed in Table G-3 of this section, and (2) concentrations above those specified in Table G-1, G-2, and G-3 of this section, shall be avoided, or protective equipment shall be provided and used.

b. To achieve compliance with paragraph (a) of this section, feasible administrative or engineering controls must first be determined and implemented in all cases. In cases where protective equipment or protective equipment in addition to other measures is used as the method of protecting the employee, such protection must be approved for each specific application by a competent industrial hygienist or other technically qualified source.

TABLE G-1

Substance	p.p.m.*	mg./M ³ †
Acetic acid		15
Acetic anhydride	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene dichloride, see 1, 2-Dichloroethene		
Acetylene tetrabromide	1	14
Ammonia	0.1	0.25
Acrylonitrile-Skin	20	45
Allyl-Skin		0.25
Allyl alcohol-Skin	2	5
Allyl chloride	1	3
*C Allyl glycidyl ether (AGE)	10	45
Allyl propyl sulfide	2	12
2-Aminoethanol, see Ethanolamine		
2-Aminopropane	0.5	2
*Ammonia	50	35
Ammonium sulfate (Am-S)		15
Ammonium acetate	100	525
sec-Amyl acetate	125	650
Aniline-Skin	5	19
Aniline (o-p isomers)-Skin		0.5
Antimony and compounds (as Sb)		0.5
ANT (alpha naphthyl) thiourea		0.3
Antimony compounds (as As)		0.5
Antimony	0.05	0.2
Antimony triethyl-Skin		0.2
Barium (soluble compounds)		0.5
Barbituric acid, see Quinone		
Benzene peroxide		5
Benzene	1	5
Benzene, see Toluene		
Benzene, A, see Diglycidyl ether		
Benzene		15
Benzene bromide	1	10
Benzene sulfonate	1	3
Bromine	0.1	0.7
Bromine persulfate	0.1	0.7
Bromine-Skin	0.5	5
Butadiene (1,3-butadiene)	1,000	2,200
Butadienol, see Butyl mercaptan		
Butanone	200	590
Butyl alcohol Butyl Cellosolve-Skin	50	240
Butyl acetate-n-Butyl acetate	150	710
sec-Butyl acetate	200	930
tert-Butyl acetate	200	930
Butyl alcohol	100	300
sec-Butyl alcohol	150	430
tert-Butyl alcohol	100	300
C-Butyl amine-Skin	5	15
C-tert-Butyl chromate (as CrO ₃)-Skin		0.1
n-Butyl glycidyl ether (BGE)	50	770
*Butyl mercaptan	0.5	1.5
tert-Butyltoluene	10	60
Calcium arsenate	1	1
Calcium oxide		5
Calcium hydroxide	2	
Calcium chloride		5
Calcium carbonate		3.5
Calcium chloride	5,000	9,000
Calcium fluoride	50	55
Calcium chloride-Skin		0.5
Calcium compounds-Skin		0.5
Calcium chloride peroxide		0.5
Calcium chloride	1	3
Calcium chloride	0.1	0.3
Calcium fluoride	0.1	0.3

^aSee footnotes at end of table.

TABLE G-1--Con.

Substance	p.p.m.*	mg./Ml.*
C Chloroacetaldehyde.....	1	3
α-Chloroacetophenone (phenacyl chloride).....	0.05	0.3
Chlorobenzene (monochloro- benzene).....	75	350
α-Chlorobenzylidene malononitrile (OCBM).....	0.05	0.4
Chlorobromomethane.....	200	1,050
2-Chloro-1,3-butanediene, see Chloroprene.....		
Chlorodiphenyl (42 percent Chlorine)—Skin.....		1
Chlorodiphenyl (54 percent Chlorine)—Skin.....		0.5
1-Chloro-2,3-epoxypropane, see Epichlorohydrin.....		
2-Chloroethanol, see Ethylene chlorohydrin.....		
Chloroethylene, see Vinyl chloride.....		
C Chloroform (trichloro- methane).....	50	240
1-Chloro-1-nitropropane.....	25	100
Chloropicrin.....	0.1	0.7
Chloroprene (2-chloro-1,3- butadiene)—Skin.....	25	90
Chromium, sol. chromic, chromous salts as Cr.....		0.5
Metal and insol. salts.....		1
Coal tar pitch volatiles (ben- zene soluble fraction) anthra- cene, BaP, phenanthrene, acridine, chrysene, pyrene.....		0.2
Cobalt, metal fume and dust.....		0.1
Copper fume.....		0.1
Dusts and Mists.....		1
Cotton dust (raw).....		1
Crag® herbicide.....		15
Cresol (all isomers)—Skin.....	5	22
Crotonaldehyde.....	2	6
Cumene—Skin.....	50	245
Cyanide (as CN)—Skin.....		5
*Cyanogen.....	100	
Cyclohexane.....	300	1,050
Cyclohexanol.....	50	200
Cyclohexanone.....	50	200
Cyclohexene.....	300	1,015
Cyclopentadiene.....	75	200
2,4-D.....		10
DDT—Skin.....		1
DDVP, see Dichlorvos.....		
Decaborane—Skin.....	0.05	0.5
Demeton®—Skin.....		0.1
Diacetone alcohol (4-hydroxy- 4-methyl-2-pentanone).....	50	240
1,2-diaminoethane, see Ethylenediamine.....		
Diazomethane.....	0.2	0.4
Diborane.....	0.1	0.1
Dibutyl phosphate.....	1	5
Dibutylphthalate.....		5
*C Dichloroacetylene.....	0.1	0.4
C α-Dichlorobenzene.....	50	300
p-Dichlorobenzene.....	75	450
Dichlorodifluoromethane.....	1,000	4,950
1,3-Dichloro-5,5-dimethyl hydantoin.....		0.2
1,1-Dichloroethane.....	100	400
1,2-Dichloroethylene.....	200	750
C Dichloroethyl ether—Skin.....	15	90
Dichloromethane, see Methylenechloride.....		
Dichloromonofluoromethane.....	1,000	4,200
C 1,1-Dichloro-1-nitroethane.....	10	60
1,2-Dichloropropane, see Propylenedichloride.....		
Dichlorotetrafluoroethane.....	1,000	1,000
Dichlorvos (DDVP)—Skin.....		1
Dieldrin—Skin.....		0.25
Diethylamine.....	25	75
Diethylamino ethanol—Skin.....	10	50
*C Diethylene triamine—Skin.....	10	42
Diethylether, see Ethyl ether.....		
Difluorodibromomethane.....	100	860
C Diglycidyl ether (DGE).....	0.5	2.5
Dihydroxybenzene, see Hydroquinone.....		
Diisobutyl ketone.....	50	290
Diisopropylamine—Skin.....	5	20
Dimethoxymethane, see Methylal.....		
Dimethyl acetamide—Skin.....	10	35
Dimethylamine.....	10	18
Dimethylaminobenzene, see Nylidene.....		
Dimethylaniline (N-dimethyl- aniline)—Skin.....	5	25
Dimethylbenzene, see Xylene.....		
Dimethyl 1,2-dibromo-2,2-di- chloroethyl phosphate.....		3
(Dibrom).....		30
Dimethylformamide—Skin.....	10	30
2,6-Dimethylheptanone, see Diisobutyl ketone.....		
1,1-Dimethylhydrazine—Skin.....	0.5	1
Dimethylphthalate.....		5

TABLE G-I—Con.

Substance	p.p.m.*	mg./Ml. ^b
Dimethylsulfate-Skin	1	5
Dinitrobenzene (all isomers)- Skin		1
Dinitro-o-cresol-Skin		0.2
Dinitrotoluene-Skin		1.5
Dioxane (Dietylene dioxide)- Skin	100	360
Diphenyl	0.2	1
Diphenyl amine		10
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate (MDI))		
Dipropylene glycol methyl ether-Skin	100	600
Di-sec. octyl phthalate (Di-2- ethylhexylphthalate)		5
* Endosulfan (Thiodan ®)- Skin		0.1
Endrin-Skin		0.1
Epichlorohydrin-Skin	5	19
EPN-Skin		0.5
1,2-Epoxypropane, see Propyleneoxide		
2,3-Epoxy-1-propanol, see Glycidol		
Ethanthiol, see Ethylmer- captan		
Ethanolamine	3	6
2-Ethoxyethanol-Skin	200	740
2-Ethoxyethanoate (Cello- solve acetate)-Skin	100	540
Ethyl acetate	400	1,400
Ethyl acrylate-Skin	25	100
Ethyl alcohol (ethanol)	1,000	1,900
Ethylamine	10	18
Ethyl sec-amyl ketone (5- methyl-3-heptanone)	25	130
Ethyl benzene	100	435
Ethyl bromide	200	890
Ethyl butyl ketone (3- heptanone)	50	230
Ethyl chloride	1,000	2,600
Ethyl ether	400	1,200
Ethyl formate	100	300
Ethyl mercaptan	0.5	1
Ethyl silicate	100	850
Ethylene chlorohydrin-Skin	5	16
Ethylenediamine	10	25
Ethylene dibromide, see 1,2- Dibromoethane		
Ethylene dichloride, see 1,2- Dichloroethane		
C Ethylene glycol dinitrate and/or Nitroglycerin-Skin	* 0.2	
Ethylene glycol monomethyl ether acetate, see Methyl cellosolve acetate		
Ethylene imine-Skin	0.5	1
Ethylene oxide	50	90
Ethylidene chloride, see 1,1- Dichloroethane		
N-Ethylmorpholine-Skin	20	94
Ferbam		15
Ferrocyanidum dust		1
Fluoride (as F)		2.5
Fluorine	0.1	0.2
Fluorotrichloromethane	1,000	5,600
Formic acid	5	9
Furfural-Skin	5	5
Furfuryl alcohol	50	200
Glycidol (2,3-Epoxy-1- propanol)	50	150
Glycol monethyl ether, see 2-Ethoxyethanol		
Guthion, ® see Azinphos- methyl		
Hafnium		0.5
Heptachlor-Skin		0.5
Heptane (n-heptane)	500	2,000
Hexachloroethane-Skin	1	10
Hexachloronaphthalene-Skin		0.2
Hexane (n-hexane)	500	1,800
2-Hexanone	100	410
Hexone (Methyl isobutyl ketone)	100	410
sec-Hexyl acetate	50	300
Hydrazine-Skin	1	1.3
Hydrogen bromide	3	10
C Hydrogen chloride	5	7
Hydrogen cyanide-Skin	10	11
Hydrogen peroxide	1	1.4
Hydrogen selenide	0.05	0.2
Hydroquinone		2
* Indene	10	45
Indium and compounds, as In		0.1
C Iodine	0.1	1
Iron oxide fume		10
Iron salts, soluble, as Fe		1
Isoamyl acetate	100	525
Isoamyl alcohol	100	360
Isobutyl acetate	150	700
Isobutyl alcohol	100	300
Isopropyl alcohol	100	140
Isopropyl acetate	25	950
Isopropyl alcohol	400	980
Isopropylamine	5	12

TABLE G-1—Con.

Substance	p.p.m.*	mg./M ³ *
Isopropylether.....	500	2,100
Isopropyl glycidyl ether (IGE).....	50	240
Ketene.....	0.5	0.9
Lead arsenate.....		0.15
Lindane—Skin.....		0.5
Lithium hydride.....		0.025
L.F.O. (liquified petroleum gas).....	1,000	1,800
Magnesium oxide fume.....		15
Malathion—Skin.....		15
Maleic anhydride.....	0.25	1
C Manganese and compounds, as Mn.....		5
Mesityl oxide.....	25	100
Methanethiol, see Methyl mercaptan.....		15
Methoxychlor.....		15
2-Methoxyethanol, see Methyl cellosolve.....		
Methyl acetate.....	200	610
Methyl acetylene (propyne).....	1,000	1,650
Methyl acetylene-propadiene mixture (M.A.P.P.).....	1,000	1,800
Methyl acrylate—Skin.....	10	35
Methylal (dimethoxymethane).....	1,000	3,100
Methyl alcohol (methanol).....	200	260
Methylamine.....	10	12
Methyl amyl alcohol, see Methyl isobutyl carbinol.....		
*Methyl isocamyl ketone.....	100	475
Methyl (n-amyl) ketone (2-Hexanone).....	100	465
C Methyl bromide—Skin.....	20	80
Methyl butyl ketone, see 2-Hexanone.....		
Methyl cellosolve—Skin.....	25	80
Methyl cellosolve acetate—Skin.....	25	120
Methyl chloroform.....	350	1,900
Methylcyclohexane.....	500	2,000
Methylcyclohexanol.....	100	470
o-Methylcyclohexanone—Skin.....	100	460
Methyl ethyl ketone (MEK), see 2-Butanone.....		
Methyl formate.....	100	250
Methyl iodide—Skin.....	5	28
Methyl isobutyl carbinol—Skin.....	25	100
Methyl isobutyl ketone, see Hexane.....		
Methyl isocyanate—Skin.....	0.02	0.05
*Methyl mercaptan.....	0.5	1
Methyl methacrylate.....	100	410
Methyl propyl ketone, see 2-Pentanone.....		
C Methyl silicate.....	5	30
o-Methyl styrene.....	100	480
C Methylene bisphenyl isocyanate (MDI).....	0.02	0.2
Molbdenum.....		
Soluble compounds.....		5
Insoluble compounds.....		15
Monomethyl aniline—Skin.....	2	9
C Monomethyl hydrazine—Skin.....	0.2	0.35
Morpholine—Skin.....	20	70
Naphthalene (coal tar).....	100	400
Naphthalene.....	10	50
Nickel carbonyl.....	0.001	0.007
Nickel, metal and soluble compounds, as Ni.....		1
Nitric acid.....	2	5
Nitric oxide.....	25	30
p-Nitroaniline—Skin.....	1	6
Nitrobenzene—Skin.....	1	5
p-Nitrochlorobenzene—Skin.....	100	310
Nitroethane.....	5	29
Nitrogen dioxide.....	10	29
Nitrogen trifluoride.....	0.2	2
Nitromethane.....	100	250
1-Nitropropane.....	25	90
2-Nitropropane.....	25	90
Nitrotoluene—Skin.....	5	30
Nitrotrichloromethane, see Chloroform.....		
Octachloronaphthalene—Skin.....		0.1
*Oxalene.....	400	1,900
*Oil mist, particulate.....		5
Osmium tetroxide.....		0.002
Oxalic acid.....	1	1
Oxygen difluoride.....	0.05	0.1
Ozone.....	0.1	0.2
Paraldehyde—Skin.....		0.5
Silver, metal and soluble compounds.....		0.01
Sodium fluoracetate (100%)—Skin.....		0.05
Sodium hydroxide.....	2	5
Solvent.....	0.1	0.5
*Standard solvent.....	200	1,150
Sulfur dioxide.....	5	13
Sulfur hexafluoride.....	1,000	6,000

See footnotes at end of table.

TABLE G-1—Con.

Substance	p.p.m.*	mg./M ³ *
Sulfuric acid.....		1
Sulfur monochloride.....	1	6
Sulfur pentasulfide.....	0.025	0.25
Sulfuryl fluoride.....	5	20
Systox, see Demeton ©.....		10
2,4,5-T.....		5
Tantalum.....		0.2
TEDP—Skin.....		0.1
Tellurium.....	0.02	0.2
Tellurium hexafluoride.....		0.05
TEPP—Skin.....	1	9
C Terphenyls.....		500
1,1,1,2-Tetrachloro-2,2-difluoroethane.....	500	4,170
1,1,2,2-Tetrachloro-1,2-difluoroethane.....	500	4,170
1,1,2,2-Tetrachloroethane—Skin.....	5	35
Tetrachloroethylene, see Perchloroethylene.....		
Tetrachloromethane, see Carbon tetrachloride.....		
Tetrachloronaphthalene—Skin.....		2
Tetraethyl lead (as Pb)—Skin.....		100
Tetrahydrofuran.....	200	590
Tetramethyl lead (as Pb)—Skin.....		100
Tetramethyl succinonitrile—Skin.....	0.5	3
Tetranitromethane.....	1	5
Tetryl (2,4,6-trinitrophenyl-methyl-nitramine)—Skin.....		1.5
Thallium (soluble compounds)—Skin as TL.....		0.1
Thiram.....		5
Tin (inorganic compds. except SnH ₄ and SnO ₂).....		2
Tin (organic compds.).....		0.1
C Toluene-2,4-disocyanate.....	0.02	0.14
o-Toluidine—Skin.....	5	22
Toxaphene, see Chlorinated camphene.....		
Triethyl phosphate.....		5
1,1,1-Trichloroethane see Methyl chloroform.....		
1,1,2-Trichloroethane—Skin.....	10	45
Parathion—Skin.....		0.1
Pentaborane.....	0.005	0.01
Pentachloronaphthalene—Skin.....		0.5
Pentachlorophenol—Skin.....		0.3
*Pentane.....	500	1,500
2-Pentanone.....	200	700
Perchloromethyl mercaptan.....	0.1	0.8
Perchloro fluoride.....	3	13.5
Phenol—Skin.....	5	19
p-Phenylene diamine—Skin.....	1	0.1
Phenyl ether (vapor).....	1	7
Phenyl ether-biphenyl mixture (vapor).....	1	7
Phenylethylene, see Styrene.....		
Phenyl glycidyl ether (PGE).....	10	60
Phenylhydrazine—Skin.....	5	22
Phosdrin (Mevinphos ©)—Skin.....		0.1
Phosgene (carbonyl chloride).....	0.1	0.4
Phosphine.....	0.3	0.4
Phosphoric acid.....		1
Phosphorus (yellow).....		0.1
Phosphorus pentachloride.....		1
Phosphorus pentasulfide.....		1
Phosphorus trichloride.....	0.5	3
Phthalic anhydride.....	2	12
Picric acid—Skin.....		0.1
Pival © (2-Pivalyl-1,3-indandione).....		0.1
Platinum (Soluble Salts) as Pt.....		0.002
Propargyl alcohol—Skin.....	1	5
n-Propyl acetate.....	200	840
Propyl alcohol.....	200	500
n-Propyl nitrate.....	25	110
Propylene dichloride.....	75	350
Propylene imine—Skin.....	2	5
Propylene oxide.....	100	240
Propyne, see Methylacetylene.....		
Pyrethrum.....		5
Pyridine.....	5	15
Quinone.....	0.1	0.4
RDX—Skin.....		1.5
Rhodium, Metal fume and dusts, as Rh.....		0.1
Soluble salts.....		0.001
Ronnel.....		10
Rotenone (commercial).....		5
Selenium compounds (as Se).....		0.2
Selenium hexafluoride.....	0.05	0.4
Trichloromethane, see Chloroform.....		
Trichloronaphthalene—Skin.....		5
1,2,3-Trichloropropane.....	50	300
1,1,2-Trichloro-1,2,2-difluoroethane.....	1,000	7,600
Trichloramine.....	25	100
Trifluoromethanethiol.....	1,000	6,100

TABLE G-1—Con.

Substance	p.p.m.*	mg./M ³ *
*Trimethyl benzene.....	25	120
2,4,6-Trinitrophenol, see Picric acid.....		
2,4,6-Trinitrophenylmethyl-nitramine, see Tetryl.....		
Trinitrotoluene—Skin.....		1.5
Trorthocresyl phosphate.....		0.1
Triphenyl phosphate.....		3
Tungsten and compounds, as W.....		
Soluble.....		1
Insoluble.....		5
Turpentine.....	100	560
Uranium (natural) sol. and insol. compounds as U.....		0.2
C Vanadium.....		
V ₂ O ₅ dust.....		0.5
V ₂ O ₅ fume.....		0.1
Vinyl benzene, see Styrene.....		
*C Vinyl chloride.....	500	1,300
Vinylcyanide, see Acrylonitrile.....		
Vinyl toluene.....	100	480
Warfarin.....		0.1
Xylene (xyli).....	100	425
Xylidine—Skin.....	5	25
Yttrium.....		1
Zinc chloride fume.....		1
Zinc oxide fume.....		5
Zirconium compounds (as Zr).....		5

*1970 Addition.

* Parts of vapor or gas per million parts of contaminated air by volume at 25° C. and 760 mm. Hg pressure.

* Approximate milligrams of particulate per cubic meter of air.

(No footnote "c" is used to avoid confusion with ceiling value notations.)

* An atmospheric concentration of not more than 0.02 p.p.m., or personal protection may be necessary to avoid headache.

* As sampled method that does not collect vapor.

* For control of general room air, biologic monitoring is essential for personnel control.

TABLE G-2

	8-hour time weighted average
Benzene (Z37.4-1969).....	10 p.p.m.
Beryllium and beryllium compounds (Z37.29-1970).....	0.002 mg./M ³
Cadmium dust (as Cd) (Z37.5-1970).....	0.2 mg./M ³
Cadmium fume (as Cd) (Z37.5-1970).....	0.1 mg./M ³
Carbon disulfide (Z37.3-1968).....	20 p.p.m.
Carbon tetrachloride (Z37.17-1967).....	10 p.p.m.
Ethylene dibromide (Z37.31-1970).....	20 p.p.m.
Ethylene dichloride (Z37.21-1969).....	50 p.p.m.
Formaldehyde (Z37.16-1967).....	3 p.p.m.
Hydrogen fluoride (Z37.28-1969).....	3 p.p.m.
Fluoride as dust (Z37.28-1966).....	2.5 mg./M ³
Lead and its inorganic compounds (Z37.11-1969).....	0.2 mg./M ³
Methyl chloride (Z37.18-1969).....	100 p.p.m.
Methylene chloride (Z37.23-1969).....	500 p.p.m.
Organo (alkyl) mercury (Z37.30-1969).....	0.01 mg./M ³
Styrene (Z37.12-1969).....	100 p.p.m.
Tetrachloroethylene (Z37.22-1967).....	100 p.p.m.
Toluene (Z37.12-1967).....	200 p.p.m.
	Acceptable ceiling concentration
Hydrogen sulfide (Z37.2-1966).....	20 p.p.m.
Chromic acid and chromates (Z37.3-1971).....	1 mg./10M ³
Mercury (Z37.8-1971).....	1 mg./10M ³

TABLE G-3—MINERAL DUSTS

Substance	Mppcf	Mg/M ³
Crystalline Quartz (respirable).....	250	10mg/M ³ =
	$\%SiO_2 = 5$	$\%SiO_2 = 2$
Quartz (total dust).....		30mg/M ³
		$\%SiO_2 = 2$
Crystalline. Use 1/2 the value calculated from the count or mass formulae for quartz.		
Thymite. Use 1/2 the value calculated from the formulae for quartz.		
Amorphous, including natural diatomaceous earth.....	20	80mg/M ³
		$\%SiO_2 = 5$
Tremolite.....	5	20mg/M ³
		$\%SiO_2 = 2$
Slender (less than 17 crystals per millimeter greater than 5 microns in length) or.....	2	
Mica.....	20	
Soapstone.....	20	
Talc.....	20	
Portland cement.....	30	
Graphite (natural).....	15	
Coal dust (respirable fraction less than 5% SiO ₂).....		2.4mg/M ³ or 10mg/M ³
For more than 5% SiO ₂		$\%SiO_2 = 2$
Inert or Nuisance Dust: Respirable fraction.....	15	5mg/M ³
Total dust.....	50	15mg/M ³

Note: Conversion factors—
mppcf x 35.3 = million particles per cubic meter
= particles per c.c.

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

† The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.

‡ As determined by the membrane filter method at 450 X phase contrast magnification.

§ Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percent passing selector
3	90
2.5	75
2	50
1.5	25
1.0	5

The measurements under this note refer to the use of an AEC instrument. If the respirable fraction of coal dust is determined with a NRE the figure corresponding to that of 2.4 Mc/M³ in the table for coal dust is 4.5 Mc/M³.

§ 1910.94 Ventilation.

(a) **Abrasive blasting**—(1) **Definitions applicable to this paragraph**—(i)

Abrasive. A solid substance used in an abrasive blasting operation.

(ii) **Abrasive-blasting respirator.** A continuous flow air-line respirator constructed so that it will cover the wearer's head, neck, and shoulders to protect him from rebounding abrasive.

(iii) **Blast cleaning barrel.** A complete enclosure which rotates on an axis, or which has an internal moving tread to tumble the parts in order to expose various surfaces of the parts to the action of an automatic blast spray.

(iv) **Blast cleaning room.** A complete enclosure in which blasting operations are performed and where the operator works inside of the room to operate the

blasting nozzle and direct the flow of the abrasive material.

(v) **Blasting cabinet.** An enclosure where the operator stands outside and operates the blasting nozzle through an opening or openings in the enclosure.

(vi) **Clean air.** Air of such purity that it will not cause harm or discomfort to an individual if it is inhaled for extended periods of time.

(vii) **Dust collector.** A device or combination of devices for separating dust from the air handled by an exhaust ventilation system.

(viii) **Exhaust ventilation system.** A system for removing contaminated air from a space, comprising two or more of the following elements (a) enclosure or hood, (b) duct work, (c) dust collecting equipment, (d) exhauster, and (e) discharge stack.

(ix) **Particulate-filter respirator.** An air purifying respirator, commonly referred to as a dust or a fume respirator, which removes most of the dust or fume from the air passing through the device.

(x) **Respirable dust.** Airborne dust in sizes capable of passing through the upper respiratory system to reach the lower lung passages.

(xi) **Rotary blast cleaning table.** An enclosure where the pieces to be cleaned are positioned on a rotating table and are passed automatically through a series of blast sprays.

(xii) **Abrasive blasting.** The forcible application of an abrasive to a surface by pneumatic pressure, hydraulic pressure, or centrifugal force.

(2) **Dust hazards from abrasive blasting.** (i) Abrasives and the surface coatings on the materials blasted are shattered and pulverized during blasting operations and the dust formed will contain particles of respirable size. The composition and toxicity of the dust from these sources shall be considered in making an evaluation of the potential health hazards.

(ii) The concentration of respirable dust or fume in the breathing zone of the abrasive-blasting operator or any other worker shall be kept below the levels specified in § 1910.93.

(iii) Organic abrasives which are combustible shall be used only in automatic systems where flammable or explosive dust mixtures may be present, the construction of the equipment, including the exhaust system and all electric wiring shall conform to the requirements of American National Standard Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying, Z33.1-1961 (NFPA 91-1961), and American National Standard National Electrical Code, C1-1968 (NFPA 70-1968). The blast nozzle shall be bonded and grounded to prevent the buildup of static charges. Where flammable or explosive dust mixtures may be present, the abrasive blasting enclosure, the ducts, and the dust collector shall be constructed with loose panels or explosion venting areas located on sides away from any occupied area, to provide for pressure relief in case of explosion, following the principles set forth in the National Fire Protection

Association Explosion Venting Guide, NFPA 68-1954.

(3) **Blast-cleaning enclosures.** (i) Blast-cleaning enclosures shall be exhaust ventilated in such a way that a continuous inward flow of air will be maintained at all openings in the enclosure, during the blasting operation.

(a) All air inlets and access openings shall be baffled or so arranged that by the combination of inward air flow and baffling the escape of abrasive or dust particles into an adjacent work area will be minimized and visible spurts of dust will not be observed.

(b) The rate of exhaust shall be sufficient to provide prompt clearance of the dust-laden air within the enclosure after the cessation of blasting.

(c) Before the enclosure is opened, the blast shall be turned off and the exhaust system shall be run for a sufficient period of time to remove the dusty air within the enclosure.

(d) Safety glass protected by screening shall be used in observation windows, where hard deep-cutting abrasives are used.

(e) Slit abrasive-resistant baffles shall be installed in multiple sets at all small access openings where dust might escape, and shall be inspected regularly and replaced when needed.

(f) Doors shall be flanged and tight when closed.

(2) Doors on blast-cleaning rooms shall be operable from both inside and outside, except that where there is a small operator access door, the large work access door may be closed or opened from the outside only.

(4) **Exhaust ventilation systems.** (i) The construction, installation, inspection, and maintenance of exhaust systems shall conform to the principles and requirements set forth in American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, Z9.2-1960, and ANSI Z33.1-1961.

(a) When dust leaks are noted, repairs shall be made as soon as possible.

(b) The static pressure drop at the exhaust ducts leading from the equipment shall be checked when the installation is completed and periodically thereafter to assure continued satisfactory operation. Whenever an appreciable change in the pressure drop indicates a partial blockage, the system shall be cleaned and returned to normal operating condition.

(c) In installations where the abrasive is recirculated, the exhaust ventilation system for the blasting enclosure shall not be relied upon for the removal of fines from the spent abrasive instead of an abrasive separator. An abrasive separator shall be provided for the purpose.

(d) The air exhausted from blast-cleaning equipment shall be discharged through dust collecting equipment. Dust collectors shall be set up so that the accumulated dust can be emptied and removed without contaminating other working areas.

(5) **Personal protective equipment.** (i) Only respiratory protective equipment