



DEPARTMENT OF LABOR AND ECONOMIC OPPORTUNITY
AGRICULTURAL STANDARD

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(By authority conferred on the director of the department of consumer and industry services by sections 14 and 24 of 1974 PA 154 and Executive Reorganization Orders Nos. 1996-1 and 1996-2, MCL 408.1014, 408.1024, 330.3101, and 445.2001)

R 325.2401, R 325.2402, R 325.2403, R 325.2404, R 325.2405, R 325.2410, R 325.2411, R 325.2412, R 325.2413, R 325.2414, R 325.2415, R 325.2416, R 325.2417, R 325.2418, R 325.2419, R 325.2421, R 325.2422, R 325.2424, R 325.2429, R 325.2430, R 325.2431, R 325.2434, R 325.2435, R 325.2436, R 325.2437, R 325.2438, R 325.2439, R 325.2440, R 325.2441, R 325.2442, R 325.2442a, R 325.2442b, R 325.2442c, R 325.2443, R 325.2444, R 325.2445, R 325.2446, R 325.2447, and R 325.2448 of the Michigan Administrative Code are amended as follows:

PART 700, AGRICULTURE

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R 325.2401 Scope.

Rule 1. These rules apply only to places of employment.

R 325.2402 General definitions.

Rule 2. As used in these rules:

(a) "Aerosol" means particulate matter suspended in air.

(b) "Contaminant" means an airborne material capable of causing occupational disease or significant physiological disturbances to a person, and includes, but is not limited to, the substances listed in R 325.2413 to R 325.2419.

(c) "Director" means the director of the department of consumer and industry services or the designee of the director.

(d) "Employer" means an individual or type of organization which has in its employ 1 or more individuals performing services for it.

(e) "Gas" means a normally formless fluid which occupies a space or enclosure and which can be changed to the liquid or solid state by the effect of increased pressure or decreased temperature, or both.

(f) "Inert gas" means a gas or vapor which acts primarily as a simple asphyxiant without other significant physiological effect, recognizing that an inert gas may have flammable or explosive characteristics.

(g) "Inert particulate" means an aerosol which does not produce significant organic disease or toxic effect in a lung-tissue reaction from any of the following:

- (i) The architecture of the air spaces remains intact.
- (ii) Collagen (scar tissue) is not formed to a significant extent.
- (iii) The tissue reaction is potentially reversible.

(h) "Particulate matter" means fine solid or liquid particles.

(i) "Physical agent" means a form of energy transmitted directly or through the air from the point of emission to the receiver.

(j) "Vapor" means the gaseous state of a substance.

R 325.2403 Definitions pertaining to contaminants.

Rule 3. As used in these rules:

(a) "Maximum allowable concentration" or "MAC" means the threshold limit value or the time-weighted average 8-hour airborne concentration of a contaminant to which a person may be safely exposed. R 325.2413 to R 325.2419, tables 1 to 7, refer to the MAC of a particular contaminant.

(b) "Mg/M³" means milligrams of particulate per cubic meter of air.

(c) "Mppcf" means millions of particulates per cubic foot of air based on impinger samples counted by light field microscopic techniques.

(d) "Non-respirable atmosphere" means an atmosphere which contains insufficient oxygen, or an elevated level of contaminants, which may render a person incapable of self-rescue.

(e) "Ppm" means parts of vapor or gas per million parts of air by volume at 25 degrees Celsius and 760 millimeters of mercury pressure.

(f) "Source" means a process or equipment which releases a contaminant into the air in concentrations exceeding the MAC.

R 325.2404 Definitions pertaining to noise.

Rule 4. As used in these rules:

(a) "Auditory protective equipment" means ear plugs, muffs, or other protective devices worn by an exposed person to attenuate airborne noise pressure in the ear canal.

(b) "Broad-band noise" means noise generally distributed throughout the sound frequency spectrum.

(c) "Continuous noise" means an uninterrupted noise or more than 60 noises per minute.

(d) "dBA" means the airborne sound pressure level measured with the "A" weighting network of a sound level meter.

(e) "Decibel" or "dB" means a dimensionless unit expressing the ratio of 2 sound quantities in logarithmic form, 1 of which quantities is a reference level of 0.0002 microbar.

(f) "Impact noise meter" means an instrument used for the measurement of peak sound pressures of impulse.

(g) "Impulse noise" means a single noise or 60 or less noises per minute.

(h) "Noise" means airborne sound in the frequency range from 20 to 20,000 hertz or cycles per second.

(i) "Sound level meter" means an instrument, whose characteristics comply with those specified in the American standards association, standard S1.4-1961, used for the measurement of the airborne sound pressure level.

R 325.2405 Definitions pertaining to respirators.

Rule 5. As used in these rules:

(a) "Atmosphere immediately dangerous to life or health" means a non-respirable atmosphere.

(b) "Canister" means a container filled with air-purifying media to remove gases and vapors from air drawn through the container. The canister may also contain an aerosol filter to remove solid or liquid particulate matter.

(c) "Cartridge" means a canister having reduced air-purifying capacity.

(d) "Facepiece" means that portion of a respirator that is designed to make a gastight or dust-tight fit with the face and includes the headbands, exhalation valves, and connections for an air-purifying device or respirable-gas source. A half-mask facepiece covers the wearer's nose and mouth. A full-mask facepiece covers the wearer's nose, mouth, and eyes.

(e) "Filter" means a media used in a respirator to remove solid or liquid particulate matter from air drawn through the respirator.

(f) "Respiratory protective equipment" means a device or system designed to protect the wearer from inhalation of unhealthful atmospheres.

(g) "Respirator" means a type of respiratory protective equipment.

R 325.2410 Definitions pertaining to controls.

Rule 10. As used in these rules:

(a) "Control" means the limitation of worker exposure to contaminate levels not exceeding the MAC.

(b) "Controlled process" means an arrangement of equipment to control the contaminant by means of suitable design measures.

(c) "Enclosure" means a room, booth, or exhaust hood that confines contaminants at their sources.

(d) "General ventilation" means the supply and removal of air from a space to dilute or remove contaminants.

(e) "Local exhaust ventilation system" means an arrangement of exhaust hoods, ducts, and fans that removes air to control a contaminant at its source.

(f) "Process space" means a tunnel, process equipment, shaft, or enclosed space.

(g) "Supply ventilation system" means an arrangement of inlet openings or equipment to introduce outside air into the working environment.

R 325.2411 Contaminants; exposure; MACs.

Rule 11. (1) An employer shall not allow the exposure of a person to concentrations of a contaminant in excess of the limit expressed by the contaminant's MAC as established in R 325.2412 to R 325.2419.

(2) An employer shall not allow the exposure of a person to a contaminant or combination of contaminants in concentrations which are hazardous or injurious to the person's health.

R 325.2412 Maximum allowable concentrations.

Rule 12. (1) Maximum allowable concentrations of air contaminants based on a repeated 8-hour work day exposure are in tables 1 to 7 in R 325.2413 to R 325.2419.

(2) A substance in tables 1 to 6 in R 325.2413 to R 325.2418, which is preceded by A, C, or S, is an especially hazardous contaminant and all of the following precautions shall be taken:

(a) If the substance is preceded by "A," then the employer shall not allow a person or any part of his or her anatomy to be exposed to or come in contact with the substance by any respiratory, oral, or skin route.

(b) If the substance is preceded by "C," then its MAC means the highest concentration at which an employer may allow a person to be exposed at any time.

(c) If the substance is preceded by "S," then an employer shall provide necessary precautions against skin absorption of the contaminant by a person.

R 325.2413 Maximum allowable concentrations for substances A and B.

Rule 13. Table 1 reads as follows:

| TABLE 1 | | | |
|-----------|--|----------------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | Abate | --- | 15 |
| | Acetaldehyde | 200 | 360 |
| | Acetic acid | 10 | 25 |
| | Acetic anhydride | 5 | 20 |
| | Acetone | 1,000 | 2,400 |
| | Acetonitrile | 40 | 70 |
| | Acetylene | Inert gas | |
| | Acetylene dichloride | See 1,2-Dichloroethylene | |
| | Acetylene tetrabromide | 1 | 14 |
| | Acrolein | 0.1 | 0.25 |
| S | Acrylamide | --- | 0.3 |
| S | Acrylonitrile | (See R 325.51501 et seq.*) | |
| S | Aldrin | --- | 0.25 |
| S | Allyl alcohol | 2 | 5 |
| | Allyl chloride | 1 | 3 |
| C | Allyl glycidyl ether (AGE) | 10 | 45 |
| | Allyl propyl disulfide | 2 | 12 |
| | Alundum, (Al ₂ O ₃) | Inert dust | |
| | 2-Aminoethanol | See Ethanolamine | |
| | 2-Aminopyridine | 0.5 | 2 |
| | Ammonia | 50 | 35 |
| | Ammonium sulfamate (amate) | --- | 15 |
| | n-Amyl acetate | 100 | 525 |
| | sec-Amyl acetate | 125 | 650 |
| S | Aniline | 5 | 19 |
| S | Anisidine (o,p-isomers) | --- | 0.5 |
| | Antimony & compounds (as Sb) | --- | 0.5 |
| | ANTU (alpha naphthyl thiourea) | --- | 0.3 |
| | Argon | Inert gas | |
| | Arsenic, inorganic compounds | --- | 0.5 |
| | Arsenic, organic compounds (as As) | --- | 0.5 |
| | Arsine | 0.05 | 0.2 |
| S | Azinphos-methyl | --- | 0.2 |

| TABLE 1 | | | |
|---|--|------------|-------------------------|
| Substance | | MAC | |
| | | ppm | mg/m³ |
| | Barium (soluble compounds) | --- | 0.5 |
| S,C | Benzene (benzol) (See R 325.77101 et seq.*) | | |
| A,S | Benzidine | --- | --- |
| | P-Benzoquinone See Quinone | | |
| | Benzoyl peroxide | --- | 5 |
| | Benzyl chloride | 1 | 5 |
| | Beryllium | --- | 0.002 |
| | Biphenyl See Diphenyl | | |
| | Bisphenol A See Diglycidyl ether | | |
| | Boron oxide | --- | 15 |
| | Boron tribromide | 1 | 10 |
| C | Boron trifluoride | 1 | 3 |
| | Bromine | 0.1 | 0.7 |
| | Bromine pentafluoride | 0.1 | --- |
| S | Bromoform | 0.5 | 5 |
| | Butadiene (1,3-butadiene) (See R 325.50091 et seq.*) | | |
| | Butanethiol See Butyl mercaptan | | |
| | 2-Butanone | 200 | 590 |
| S | 2-Butoxy ethanol (butyl cellosolve) | 50 | 240 |
| | Butyl acetate (n-butyl acetate) | 150 | 710 |
| | sec-Butyl acetate | 200 | 950 |
| | tert-Butyl acetate | 200 | 950 |
| | Butyl alcohol | 100 | 300 |
| | sec-Butyl alcohol | 150 | 450 |
| | tert-Butyl alcohol | 100 | 300 |
| S,C | Butylamine | 5 | 15 |
| S,C | tert-Butyl chromate (as CrO ₃) | --- | 0.1 |
| | n-Butyl glycidyl ether (BGE) | 50 | 270 |
| | Butyl mercaptan | 0.5 | 1.5 |
| | p-tert-Butyltoluene | 10 | 60 |
| A, C, and S See R 325.2412. | | | |
| *Caution--these rules contain extensive requirements for exposure to these substances. | | | |

R 325.2414 Maximum allowable concentrations for substances C and D.

Rule 14. Table 2 reads as follows:

| TABLE 2 | | | |
|------------------|---|----------------------------|-------------------------|
| Substance | | MAC | |
| | | ppm | mg/m³ |
| | Cadmium (metal dust and soluble salts) | (See R 325.51851 et seq.*) | |
| C | Cadmium oxide fume (as Cd) | (See R 325.51851 et seq.*) | |
| | Calcium arsenate | --- | 1 |
| | Calcium carbonate | Inert dust | |
| | Calcium oxide | --- | 5 |
| | Camphor (synthetic) | 2 | --- |
| | Carbaryl (Sevin®) | --- | 5 |
| | Carbon black | --- | 3.5 |
| | Carbon dioxide | 5,000 | 9,000 |
| S | Carbon disulfide | 20 | 60 |
| | Carbon monoxide | 50 | 55 |
| S,C | Carbon tetrachloride | 10 | 65 |
| | Cellulose (paper fiber) | Inert dust | |
| S | Chlordane | --- | 0.5 |
| S | Chlorinated camphene | --- | 0.5 |
| | Chlorinated diphenyl oxide | --- | 0.5 |
| | Chlorine | 1 | 3 |
| | Chlorine dioxide | 0.1 | 0.3 |
| C | Chlorine trifluoride | 0.1 | 0.4 |
| C | Chloroacetaldehyde | 1 | 3 |
| | alpha-Chloroacetophenone (phenacylchloride) | 0.05 | 0.3 |
| | Chlorobenzene (monochlorobenzene) | 75 | 350 |
| | o-Chlorobenzylidene malononitrile (OCBM) | 0.05 | 0.4 |
| | Chlorobromomethane | 200 | 1,050 |
| | 2-Chloro-1,3-butadiene | See Chloroprene | |
| S | Chlorodiphenyl (42% Chlorine) | --- | 1 |
| S | Chlorodiphenyl (54% Chlorine) | --- | 0.5 |
| | 1-Chloro-2,3-epoxypropane | See Epichlorohydrin | |
| | 2-Chloroethanol | See Ethylene chlorohydrin | |
| | Chloroethylene | See Vinyl chloride | |
| C | Chloroform (trichloromethane) | 50 | 240 |
| | 1-Chloro-1-nitropropane | 20 | 100 |
| | Chloropicrin | 0.1 | 0.7 |

| TABLE 2 | | | |
|-----------|---|----------------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| S | Chloroprene (2-chloro-1,3-butadiene) | 25 | 90 |
| | Chromic acid and chromates (as CrO ₃) | --- | 0.1 |
| | Chromium, sol. chromic & chromous salts | | |
| | • (as Cr) | --- | 0.5 |
| | • Metal & insol. salts | --- | 1 |
| | Coal tar pitch volatiles (benzene soluble fraction: • anthracene, BaP, phenanthrene, acridine, chrysene, pyrene) | --- | 0.2 |
| | Cobalt, metal fume & dust | --- | 0.1 |
| | Coke oven emissions | (See R 325.50101 et seq.*) | |
| | Copper fume | --- | 0.1 |
| | • Dusts and mists | --- | 1 |
| | Corundum (Al ₂ O ₃) | Inert dust | |
| | Cotton dust (raw) | --- | 1 |
| | Crag® herbicide | --- | 15 |
| S | Cresol (all isomers) | 5 | 22 |
| | Crotonaldehyde | 2 | 6 |
| S | Cumene | 50 | 245 |
| S | Cyanide (as CN) | --- | 5 |
| | Cyanogen | 10 | --- |
| | Cyclohexane | 300 | 1,050 |
| | Cyclohexanol | 50 | 200 |
| | Cyclohexanone | 50 | 200 |
| | Cyclohexene | 300 | 1,015 |
| | Cyclopentadiene | 75 | 200 |
| | 2,4-D | --- | 10 |
| S | (Dichlorodiphenyltrichloroethane) | --- | 1 |
| | DDVP | See Dichlorvos | |
| S | Decaborane | 0.05 | 0.3 |
| S | Demeton® | --- | 0.1 |
| | Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone) | 50 | 240 |
| | 1,2-Diainoethane | See Ethylenediamine | |
| | Diazomethane | 0.2 | 0.4 |
| | Diborane | 0.1 | 0.1 |
| S,C | 2-Dibromoethane (ethylene dibromide) | 25 | 190 |
| | Dibutyl phosphate | 1 | 5 |

| TABLE 2 | | | |
|-----------|--|--------------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | Dibutyl phthalate | --- | 5 |
| C | Dichloroacetylene | 0.1 | 0.4 |
| C | o-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-Dichloroethane | 50 | 200 |
| | 1,2-Dichloroethylene | 200 | 790 |
| S,C | Dichloroethyl ether | 15 | 90 |
| | Dichloromethane | See Methylene chloride | |
| | Dichloromonofluoromethane | 1,000 | 4,200 |
| C | 1,1-Dichloro-1-nitroethane | 10 | 60 |
| | 1,2-Dichloropropane | See Propylene dichloride | |
| | Dichlorotetrafluoroethane | 1,000 | 7,000 |
| S | Dichlorvos (DDVP) | --- | 1 |
| S | Dieldrin | --- | 0.25 |
| | Diethyl | 25 | 75 |
| S | Diethylamino, ethanol | 10 | 50 |
| S,C | Diethylene triamine | 10 | 42 |
| | Diethyl ether | See Ethyl ether | |
| | Difluorodibromomethane | 100 | 860 |
| C | Diglycidyl ether (DGE) | 0.5 | 2.8 |
| | Dihydroxybenzene | See Hydroquinone | |
| | Diisobutyl ketone | 50 | 290 |
| S | Diisopropylamine | 5 | 20 |
| | Dimethoxymethane | See Methylal | |
| S | Dimethyl acetamide | 10 | 35 |
| | Dimethylamine | 10 | 18 |
| | Dimethylaminobenzene | See Xylidene | |
| S | Dimethylaniline (N-dimethylaniline) | 5 | 25 |
| | Dimethylbenzene | See Xylene | |
| | Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphate (Dibrom®) | --- | 3 |
| S | Dimethylformamide | 10 | 30 |

| TABLE 2 | | | |
|---|---|--|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | 2,6-Dimethylheptanone | See Diisobutyl ketone | |
| S | 1,1-Dimethylhydrazine | 0.5 | 1 |
| | Dimethylphthalate | --- | 5 |
| S | Dimethylsulfate | 1 | 5 |
| S | Dinitrobenzene (all isomers) | --- | 1 |
| S | Dinitro-o-cresol | --- | 0.2 |
| S | Dinitrotoluene | --- | 1.5 |
| S | Dioxane (diethylene dioxide) | 100 | 360 |
| | Diphenyl | 0.2 | 1 |
| | Diphenyl amine | --- | 10 |
| | Diphenylmethane diisocyanate | See Methylene bisphenyl isocyanate (MDI) | |
| S | Dipropylene glycol methyl ether | 100 | 600 |
| | Di-sec,octyl phthalate (di-2-ethylhexylphthalate) | --- | 5 |
| A, C, and S See R 325.2412. | | | |
| *Caution--these rules contain extensive requirements for exposure to these substances. | | | |

R 325.2415 Maximum allowable concentrations for substances E to H.

Rule 15. Table 3 reads as follows:

| TABLE 3 | | | |
|------------------|--|-------------------------------|-------------------------|
| Substance | | MAC | |
| | | ppm | mg/m³ |
| | Emery | Inert dust | |
| S | Endosulfan (Thiodan®) | --- | 0.1 |
| S | Endrin | --- | 0.1 |
| S | Epichlorohydrin | 5 | 19 |
| S | EPN | --- | 0.5 |
| | 1,2-Epoxypropane | See Propylene oxide | |
| | 2,3-Epoxy-1-propanol | See Glycidol | |
| | Ethane | Inert gas | |
| | Ethanethiol | See Ethyl mercaptan | |
| | Ethanolamine | 3 | 6 |
| S | 2-Ethoxyethanol | 200 | 740 |
| S | 2-Ethoxyethylacetate (cellosolve acetate) | 100 | 540 |
| | Ethyl acetate | 400 | 1,400 |
| S | Ethyl acrylate | 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 | Inert gas | |
| S | Ethylene chlorohydrin | 5 | 16 |
| | Ethylenediamine | 10 | 25 |
| | Ethylene dibromide | See 1,2-Dibromoethane | |
| | Ethylene dichloride | See 1,2-Dichloroethane | |
| S,C | Ethylene glycol dinitrate and/or Nitroglycerin | 0.2 | |
| | Ethylene glycol monomethyl ether acetate | See Methyl cellosolve acetate | |
| S | Ethyleneimine | 0.5 | 1 |

| TABLE 3 | | | |
|-----------|---------------------------------|--|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | Ethylene oxide | (See R 325.51151 et seq.*) | |
| | Ethylidene chloride | See 1,1-Dichloroethane | |
| S | N-Ethylmorpholine | 20 | 94 |
| | Ferbam | --- | 15 |
| | Ferrovandium dust | --- | 1 |
| | Fibrous glass | Inert dust | |
| | Fluoride (as F) | --- | 2.5 |
| | Fluorine | 0.1 | 0.2 |
| | Fluorotrichloromethane | 1,000 | 5,600 |
| C | Formaldehyde | (See R 325.51451 et seq.*) | |
| | Formic acid | 5 | 9 |
| S | Furfural | 5 | 20 |
| | Furfuryl alcohol | 50 | 200 |
| | Gasoline | (limits will be based on aromatic hydrocarbons in mixture) | |
| | Glycerine mist | | Inert mist |
| | Glycidol (2,3-epoxy-1-propanol) | 50 | 150 |
| | Glycol monoethyl ether | See 2-Ethoxyethanol | |
| | Graphite (synthetic) | Inert dust | |
| | Guthion® | See Azinphos-methyl | |
| | Gypsum | Inert dust | |
| | Hafniun | --- | 0.5 |
| | Helium | Inert gas | |
| S | Heptachlor | --- | 0.5 |
| | Heptane (n-heptane) | 500 | 2,000 |
| S | Hexachloroethane | 1 | 10 |
| S | Hexachloronaphthalene | --- | 0.2 |
| | Hexane (n-hexane) | 500 | 1,800 |
| | 2-Hexanone | 100 | 410 |
| | Hexone (methyl isobutyl ketone) | 100 | 410 |
| | sec-Rexyl acetate | 50 | 300 |
| S | Hydrazine | 1 | 1.3 |
| | Hydrogen | Inert gas | |
| | Hydrogen bromide | 3 | 10 |
| C | Hydrogen chloride | 5 | 7 |

| TABLE 3 | | | |
|---|-------------------|------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| S | Hydrogen cyanide | 10 | 11 |
| | Hydrogen fluoride | 3 | 2 |
| | Hydrogen peroxide | 1 | 1.4 |
| | Hydrogen selenide | 0.05 | 0.2 |
| | Hydrogen sulfide | 10 | 15 |
| | Hydroquinone | --- | 2 |
| A, C, and S See R 325.2412. | | | |
| *Caution--these rules contain extensive requirements for exposure to these substances. | | | |

R 325.2416 Maximum allowable concentrations for substances I to M.

Rule 16. Table 4 reads as follows:

| TABLE 4 | | | |
|------------------|----------------------------------|------------|-------------------------|
| Substance | | MAC | |
| | | ppm | mg/m³ |
| | 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 |
| | Isophorone | 25 | 140 |
| | Isopropyl acetate | 250 | 950 |
| | Isopropyl alcohol | 400 | 980 |
| | Isopropylamine | 5 | 12 |
| | Isopropyl ether | 500 | 2,100 |
| | Isopropyl glycidyl ether (IGE) | 50 | 240 |
| | Kaolin | Inert dust | |
| | Ketene | 0.5 | 0.9 |
| | Lead | --- | 0.2 |
| | Lead arsenate | --- | 0.15 |
| | Limestone | Inert dust | |
| S | Lindane | --- | 0.5 |
| | Lithium hydride | --- | 0.025 |
| | L.P.G. (liquified petroleum gas) | 1,000 | 1,800 |
| | Magnesite | Inert dust | |
| | Magnesium oxide fume | --- | 15 |
| S | Malathion | --- | 15 |
| | Maleic anhydride | 0.25 | 1 |
| C | Manganese and compounds (as Mn) | --- | 5 |
| | Marble | Inert dust | |
| S | Mercury | --- | 0.1 |
| S | Mercury (organic compounds) | --- | 0.01 |
| | Mesityl oxide | 25 | 100 |
| | Methane | Inert gas | |

| TABLE 4 | | | |
|-----------|--|------------------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | Methanethiol | See Methyl mercaptan | |
| | Methoxychlor | --- | 15 |
| | 2-Methoxyethanol | See Methyl cellosolve | |
| | Methyl acetate | 200 | 610 |
| | Methyl acetylene (propyne) | 1,000 | 1,650 |
| | Methyl acetylene-propadiene mixture (MAPP) | 1,000 | 1,800 |
| S | Methyl acrylate | 10 | 35 |
| | Methylal (dimethoxymethane) | 1,000 | 3,100 |
| | Methyl alcohol (methanol) | 200 | 260 |
| | Methylamine | 10 | 12 |
| | Methyl amyl alcohol | See Methyl isobutyl carbinol | |
| | Methyl (n-amyl) ketone (2-heptanone) | 100 | 465 |
| S,C | Methyl bromide | 20 | 80 |
| | Methyl butyl ketone | See 2-Hexanone | |
| S | Methyl cellosolve | 25 | 80 |
| S | Methyl cellosolve acetate | 25 | 120 |
| C | Methyl chloride | 100 | 210 |
| | Methyl chloroform | 350 | 1,900 |
| | Methylcyclohexane | 500 | 2,000 |
| | Methylcyclohexanol | 100 | 470 |
| S | o-Methylcyclohexanone | 100 | 460 |
| | Methylenedianiline (MDA) | (See R 325.51651 et seq.*) | |
| | Methyl ethyl ketone (MEK) | See 2-Butanone | |
| | Methyl formate | 100 | 250 |
| S | Methyl iodide | 5 | 28 |
| | Methyl isoanyl ketone | 100 | 475 |
| S | Methyl isobutyl carbinol | 25 | 100 |
| | Methyl isobutyl ketone | See Hexone | |
| S | Methyl isocyanate | 0.02 | 0.05 |
| | Methyl mercaptan | 0.5 | 1 |
| | Methyl methacrylate | 100 | 410 |
| | Methyl propyl ketone | See 2-Pentanone | |
| C | Methyl silicate | 5 | 30 |
| C | alpha-Methyl styrene | 100 | 480 |

| TABLE 4 | | | |
|---|--|------------|-------------------------|
| Substance | | MAC | |
| | | ppm | mg/m³ |
| C | Methylene bisphenyl isocyanate (MDI) | 0.02 | 0.2 |
| | Methylene chloride (dichloromethane) (See R 325.51651 et seq. *) | | |
| | Molybdenum | | |
| | • (soluble compounds) | --- | 5 |
| | • (insoluble compounds) | --- | 15 |
| S | Monomethyl aniline | 2 | 9 |
| S,C | Monomethyl hydrazine | 0.2 | 0.35 |
| S | Morpholine | 20 | 70 |
| A, C, and S See R 325.2412. | | | |
| *Caution--these rules contain extensive requirements for exposure to these substances. | | | |

R 325.2417 Maximum allowable concentrations for substances N to P.

Rule 17. Table 5 reads as follows:

| TABLE 5 | | | |
|-----------|---|------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | Naphtha (coal tar) | 100 | 400 |
| | Naphtha (petroleum) (MAC will be based on aromatic hydrocarbons in mixture) | | |
| | Naphthalene | 10 | 50 |
| A | beta-Naphthylamine | --- | |
| | Neon | Inert gas | |
| | Nickel carbonyl | 0.001 | 0.007 |
| | Nickel, metal and soluble compounds (as Ni) | --- | 1 |
| S | Nicotine | --- | 0.5 |
| | Nitric acid | 2 | 5 |
| | Nitric oxide | 25 | 30 |
| S | p-Nitroaniline | 1 | 6 |
| S | Nitrobenzene | 1 | 5 |
| S | p-Nitrochlorobenzene | --- | 1 |
| | Nitroethane | 100 | 310 |
| | Nitrogen | Inert gas | |
| | Nitrogen dioxide | 5 | 9 |
| | Nitrogen trifluoride | 10 | 29 |
| S | Nitroglycerin | 0.2 | 2 |
| | Nitromethane | 100 | 250 |
| | 1-Nitropropane | 25 | 90 |
| | 2-Nitropropane | 25 | 90 |
| S,A | N-Nitrosodimethylamine (dimethylnitrosamine) | --- | --- |
| S | Nitrotoluene | 5 | 30 |
| | Nitrotrichloromethane | See Chloropicrin | |
| | Nitrous oxide | Inert gas | |
| S | Octachloronaphthalene | --- | 0.1 |
| | Octane | 400 | 1,900 |
| | Oil mist, particulate | --- | 5 |
| | Oil mist, vapor (MAC will be based on aromatic hydrocarbons in mixture) | | |
| | Osmium tetroxide | --- | 0.002 |
| | Oxalic acid | --- | 1 |
| | Oxygen difluoride | 0.05 | 0.1 |
| | Ozone | 0.1 | 0.2 |

| TABLE 5 | | | |
|-----------|--|-------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| S | Paraquat | --- | 0.5 |
| S | Parathion | --- | 0.1 |
| | Pentaborane | 0.005 | 0.01 |
| S | Pentachloronaphthalene | --- | 0.5 |
| S | Pentachlorophenol | --- | 0.5 |
| | Pentaerythritol | Inert particulate | |
| | Pentane | 500 | 1,500 |
| | 2-Pentanone | 200 | 700 |
| | Perchloroethylene | 100 | 670 |
| | Perchloromethyl mercaptan | 0.1 | 0.8 |
| | Perchloryl fluoride | 3 | 13.5 |
| | Petroleum distillates (naphtha) (MAC will be based on aromatic hydrocarbons in mixture) | | |
| S | Phenol | 5 | 19 |
| S | p-Phenylene diamine | --- | 0.1 |
| | Phenyl ether (vapor) | 1 | 7 |
| | Phenyl ether-biphenyl mixture (vapor) | 1 | 7 |
| | Phenylethylene | See Styrene | |
| | Phenyl glycidyl ether (PGE) | 10 | 60 |
| S | Phenylhydrazine | 5 | 22 |
| S | Phosdrin (Mevinphos®) | --- | 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 |
| S | Picric acid | --- | 0.1 |
| | Pival® (2-pivalyl-1,3-indandione) | --- | 0.1 |
| | Plaster of Paris | Inert dust | |
| | Platinim, soluble salts (as Pt) | --- | 0.002 |
| | Polytetrafluoroethylene decomposition products See Teflon® decomposition products | | |
| | Propane | Inert gas | |

| TABLE 5 | | | |
|-----------------------------------|----------------------|----------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| S | Propargyl alcohol | 1 | --- |
| A | beta-Propiolactone | --- | --- |
| | n-Propyl acetate | 200 | 840 |
| | Propyl alcohol | 200 | 500 |
| | n-Propyl nitrate | 25 | 110 |
| | Propylene dichloride | 75 | 350 |
| S | Propylene imine | 2 | 5 |
| | Propylene oxide | 100 | 240 |
| | Propyne | See Methyl acetylene | |
| | Pyrethrum | --- | 5 |
| | Pyridine | 5 | 15 |
| A, C, and S See R 325.2412 | | | |

R 325.2418 Maximum allowable concentrations for substances Q to Z.

Rule 18. Table 6 reads as follows:

| TABLE 6 | | | |
|-----------|---|---------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | Quinone | 0.1 | 0.4 |
| S | RDX | --- | 1.5 |
| | Rhodium, metal fume, dusts, and insoluble compounds (as Rh) | --- | 0.1 |
| | Rhodium, soluble compounds (as Rh) | --- | 0.001 |
| | Ronnel | --- | 10 |
| | Rotenone (commercial) | --- | 5 |
| | Rouge | Inert dust | |
| | Selenium compounds (as Se) | --- | 0.2 |
| | Selenium hexafluoride | 0.05 | 0.4 |
| | Silicon carbide | Inert dust | |
| | Silver, metal and soluble compounds | --- | 0.01 |
| S | Sodium fluoroacetate (1080) | --- | 0.05 |
| | Sodium hydroxide | --- | 2 |
| | Starch | Inert dust | |
| | Stibine | 0.1 | 0.5 |
| | Stoddard solvent | 200 | 1,150 |
| | Strychnine | --- | 0.15 |
| C | Styrene monomer (phenylethylene) | 100 | 420 |
| | Sucrose | Inert dust | |
| | Sulfur dioxide | 5 | 13 |
| | Sulfur hexafluoride | 1,000 | 6,000 |
| | Sulfuric acid | --- | 1 |
| | Sulfur monochloride | 1 | 6 |
| | Sulfur pentafluoride | 0.025 | 0.25 |
| | Sulfuryl fluoride | 5 | 20 |
| | Systox | See Demeton® 2,4,5T | --- |
| | Tantalum | --- | 5 |
| S | TEDP | --- | 0.2 |
| | Teflon® decomposition products (maintain minimal air concentration) | | |
| | Tellurium | --- | 0.1 |
| | Tellurium hexafluoride | 0.02 | 0.2 |
| S | TEPP | --- | 0.05 |
| C | Terphenyls | 1 | 9 |

| TABLE 6 | | | |
|-----------|--|--------------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | 1,1,1,2-Tetrachloro-2,2-difluoroethane | 500 | 4,170 |
| | 1,1,2,2-Tetrachloro-1,2-difluoroethane | 500 | 4,170 |
| S | 1,1,2,2-Tetrachloroethane | 5 | 35 |
| | Tetrachloroethylene | See Perchloroethylene | |
| | Tetrachloromethane | See Carbon tetrachloride | |
| S | Tetrachloronaphthalene | --- | 2 |
| S | Tetraethyl lead (as Pb) | --- | 0.075 |
| | Tetrahydrofuran | 200 | 590 |
| S | Tetramethyl lead (THL) (as Pb) | --- | 0.150 |
| S | Tetramethyl succinonitrile | 0.5 | 3 |
| | Tetranitromethane | 1 | 8 |
| S | Tetryl (2,4,6-trinitrophenylmethylnitramine) | --- | 1.5 |
| S | Thallium, soluble compounds (as T1) | --- | 0.1 |
| | Thiram | --- | 5 |
| | Tin | | |
| | • (inorganic compounds, except SnH ₄ and SnO ₂) | --- | 2 |
| | • (organic compounds) | --- | 0.1 |
| | Tin oxide | Inert particulate | |
| | Titanium dioxide | Inert particulate | |
| | Toluene (toluol) | 200 | 750 |
| C | Toluene-2,4-diisocyanate | 0.02 | 0.14 |
| S | o-Toluidine | 5 | 22 |
| | Toxaphene | See Chlorinated camphene | |
| | Tributyl phosphate | --- | 5 |
| | 1,1,1-Trichloroethane | See Methyl chloroform | |
| S | 1,1,2-Trichloroethane | 10 | 45 |
| | Trichloroethylene | 100 | 535 |
| | Trichloromethane | See Chloroform | |
| S | Trichloronaphthalene | --- | 5 |
| | 1,2,3-Trichloropropane | 50 | 300 |
| | 1,1,2-Trichloro-1,2,2-trifluoroethane | 1,000 | 7,600 |
| | Triethylamine | 25 | 100 |
| | Trifluoromonobromomethane | 1,000 | 6,100 |
| | Trimethyl benzene | 25 | 120 |

| TABLE 6 | | | |
|---|--|----------------------------|-------------------|
| Substance | | MAC | |
| | | ppm | mg/m ³ |
| | 2,4,6-Trinitrophenol | See Picric acid | |
| | 2,4,6-Trinitrophenylmethylnitramine | See Tetryl | |
| S | Trinitrotoluene | --- | 1.5 |
| | Triorthocresyl phosphate | --- | 0.1 |
| | Triphenyl phosphate | --- | 3 |
| | Tungsten and compounds (as W) | | |
| | Insoluble | --- | 5 |
| | Soluble | --- | 1 |
| | Turpentine | 100 | 560 |
| | Uranium (natural) soluble & insoluble 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 | (See R 325.51401 et seq.*) | |
| | Vinyl cyanide | See Acrylonitrile | |
| | Vinyl toluene | 100 | 480 |
| | Warfarin | --- | 0.1 |
| | Xylene (xylol) | 100 | 435 |
| S | Xylidine | 5 | 25 |
| | Yttrium | --- | 1 |
| | Zinc chloride fume | --- | 1 |
| | Zinc oxide fume | --- | 5 |
| | Zirconium compounds (as Zr) | --- | 5 |
| A, C, and S See R 325.2412. | | | |
| *Caution--these rules contain extensive requirements for exposure to these substances. | | | |

R 325.2419 Maximum allowable concentrations for mineral dusts.

Rule 19. Table 7 reads as follows:

| TABLE 7 MINERAL DUSTS | | |
|---|------------------|--|
| Substance | | MAC (MPPCF) |
| Silica | | |
| • Crystalline * | | $MAC = \frac{250}{\% SiO_2 + 5}$ |
| • Quartz | | |
| • Cristobalite | | MAC same as quartz |
| • Amorphous, including natural diatomaceous earth | | 20 |
| Silicates (less than 1% crystalline silica) | | |
| • Asbestos, all types | | (See asbestos in construction R 325.51301 et seq.) |
| • Mica | | 20 |
| • Portland cement | | 50 |
| • Soapstone | | 20 |
| • Talc (non-asbestiform) | | 20 |
| • Talc (fibrous) | | (See asbestos in construction R 325.51301 et seq.) |
| • Tremolite | | (See asbestos in construction R 325.51301 et seq.) |
| Graphite (natural) | | 15 |
| Inert or nuisance particles ** | | 50 of total dust less than 1% SiO ₂ (or 15 mg/m ³ , whichever is the smaller) |
| * The percentage of crystalline silica, SiO ₂ , in the formula is the amount determined from airborne samples. | | |
| ** The following are some examples of inert or nuisance particulates when toxic impurities are not present; e.g. quartz less than 1%. | | |
| Alundum (Al ₂ O ₃) | Gypsum | Rouge |
| Calcium carbonate | Limestone | Silicon carbide |
| Cellulose | Magnesite | Starch |
| Corundum (Al ₂ O ₃) | Marble | Sucrose |
| Emery | Pentaerythritol | Tin oxide |
| Glycerine mist | Plaster of Paris | Titanium dioxide |
| Graphite (synthetic) | Portland cement | Vegetable oil mists (except castor, cashew nut, or similar irritant oils) |

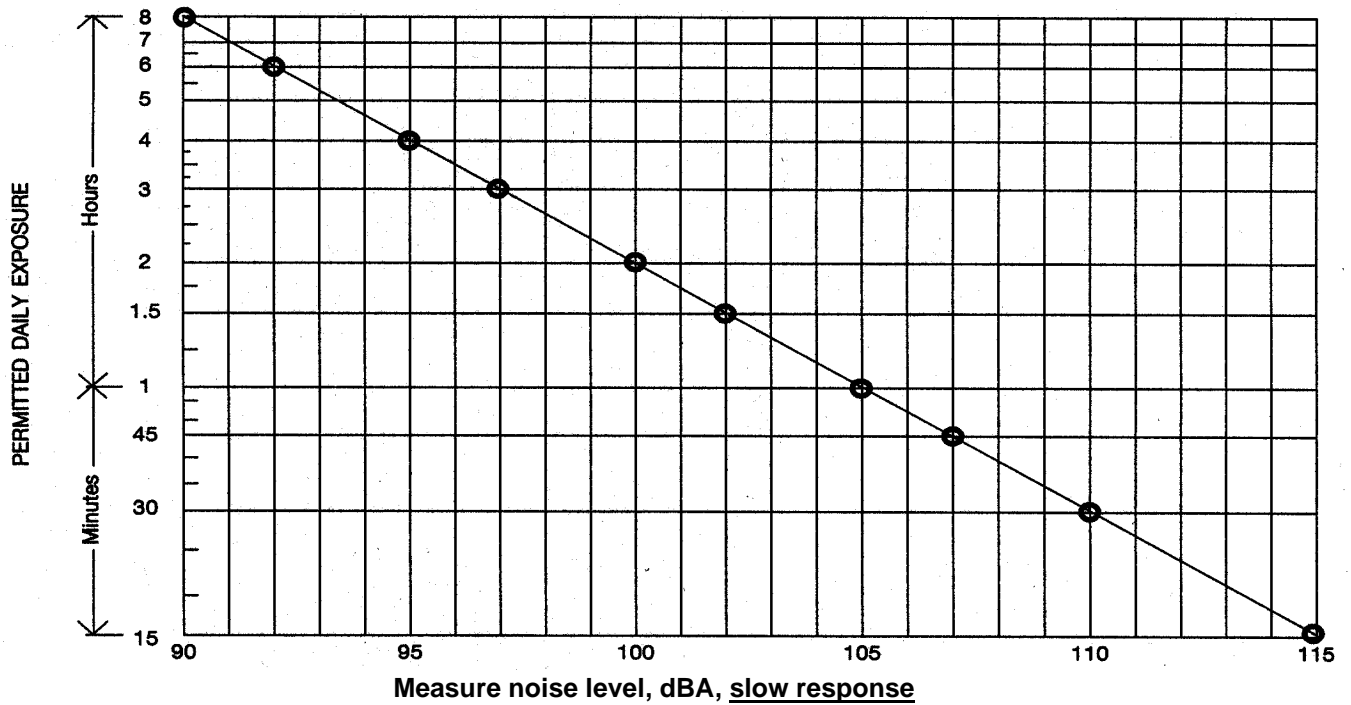
R 325.2421 Continuous, broad-band noise.

Rule 21. (1) The following are maximum permissible levels of continuous, broad-band noise based on daily exposure time in places of employment:

| PERMITTED DAILY EXPOSURE TIME, HOURS | MAXIMUM PERMISSIBLE NOISE LEVEL, DBA, SLOW RESPONSE |
|--------------------------------------|---|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1 1/2 | 102 |
| 1 | 105 |
| 3/4 | 107 |
| 1/2 | 110 |
| 1/4 | 115 |

(2) If a noise level is between 2 listed maximum permissible noise levels in subrule (1) of this rule, then chart A shall be used to determine the permitted daily exposure time. In applying the chart, measured noise levels will be taken to the nearest whole number.

**Chart A
NOISE EXPOSURE CHART**



(3) If airborne noise levels and exposure times exceed the values in subrule (1) or (2) of this rule, then noise control measures or reduction of exposure time shall be provided or auditory protective equipment shall be provided by the employer and used by the employee.

(4) If the daily noise exposure is composed of 2 or more periods of noise exposure of different levels, each period of noise exposure shall be determined by dividing the actual exposure time in minutes at the measured noise level by the permitted exposure time in minutes at that measured noise level pursuant to subrule (1) of this rule. The noise exposure for the periods shall be totaled. The total noise exposure shall not exceed the unit number 1. If an actual exposure time is measured at a noise level less than 90 dBA, then that period of noise exposure shall be unlimited or infinity (∞).

(5) The following are examples of the use of the formula in accordance with subrule (4) of this rule:

(6) A sound level meter shall be used with the "A" network, slow response to compare airborne continuous noise levels with the maximum permissible noise levels.

$$N = \frac{t_1}{T_1} + \frac{t_2}{T_2} + \frac{t_3}{T_3} + \dots \quad N = \text{total noise exposure.}$$

t_1, t_2, t_3 = actual exposure times in minutes, at different noise levels.
 T_1, T_2, T_3 = permitted exposure times in minutes, at different noise levels.

| |
|---|
| Example #1 |
| 5 Hr. = 300 Min. Exposure @ 83 dBA Permissible Time = ∞ |
| 2 Hr. = 120 Min. Exposure @ 95 dBA Permissible Time = 4 Hr. = 240 Min. |
| 1 Hr. = 60 Min. Exposure @ 97 dBA Permissible Time = 3 Hr. = 180 Min. |
| $\frac{t_1}{T_1} + \frac{t_2}{T_2} + \frac{t_3}{T_3} = N: \frac{300}{\infty} + \frac{120}{240} + \frac{60}{180} = 0 + .5 + .33 = .83$ |
| Since N does not exceed 1 the exposure is less than the permissible limit. |

| |
|---|
| Example #2 |
| 1 Hr. = 60 Min. Exposure @ 87 dBA Permissible Time = ∞ |
| 3 Hr. = 180 Min. Exposure @ 90 dBA Permissible Time = 8 Hr. = 480 Min. |
| 3 Hr. = 180 Min. Exposure @ 95 dBA Permissible Time = 4 Hr. = 240 Min. |
| 1 Hr. = 60 Min. Exposure @ 100 dBA Permissible Time = 2 Hr. = 120 Min. |
| $\frac{t_1}{T_1} + \frac{t_2}{T_2} + \frac{t_3}{T_3} = N: \frac{60}{\infty} + \frac{180}{480} + \frac{180}{240} + \frac{60}{120} = 0 + .38 + .75 + .5 = 1.63$ |
| Since N is greater than 1 the exposure exceeds the permissible limit. |

R 325.2422 Impulse noise.

Rule 22. The maximum permissible level for impulse noise shall be 140 dB as measured with a cathode-ray oscilloscope system or with other equipment such as the impact noise meter capable of indicating the maximum-instantaneous peak noise level.

R 325.2424 Illumination.

Rule 24. The level of illumination shall be adequate as determined by the director for the performance of the task.

R 325.2429 Control methods for enclosures and controlled processes.

Rule 29. (1) An enclosure shall be provided at a stationary source unless the omission of the enclosure does not impair control.

(2) A controlled process shall be designed and regulated to prevent the creation of a hazard to health or life. If the director determines that there may be an immediate danger to health or life due to the failure of the process design or regulatory device, then he or she may require that the process fail-safe in such manner to avert the hazard.

R 325.2430 Rescinded.

R 325.2431 Inert gas or foam systems.

Rule 31. If an inert gas or foam system is provided in an occupied area for the prevention or extinguishment of fire or explosion, then the affected area shall be conspicuously posted to call attention to the potential creation of a non-respirable atmosphere. The actuating of an audible and visible alarm before the system is activated shall be provided. The system shall incorporate a sufficient time-delay to permit the egress of persons within the affected area. After the activation of the system, an audible and visible warning that a non-respirable atmosphere has been created within the area shall continue until the non-respirable atmosphere has been purged or diluted with air to safe breathing levels.

R 325.2434 Supply ventilation systems.

Rule 34. (1) A supply ventilation system shall be provided to ensure a flow of air into the working environment to replace the volume of air exhausted.

(2) A mechanical air supply system shall be provided if its absence will result in building negative pressures sufficient to cause back-drafting of vents from fuel-fired equipment or ineffective control.

(3) Mechanical air supply volumes shall be heated to maintain a minimum air temperature of 65 degrees Fahrenheit measured at the point of air discharge to the space. Exceptions to this requirement are refrigerated storage rooms, special process rooms, and similar locations where lower air temperatures are essential to the preservation of the product or service, or, if in the opinion of the director, a lower air temperature will not be harmful to the health of the persons affected.

R 325.2435 Direct-fired air heaters.

Rule 35. (1) A direct-fired air heater, wherein combustion products are released in the supply air stream, may be installed in buildings of industrial occupancy, garages, laundries, and commercial kitchens. They shall not be installed in offices, schools, hospitals, and places of public assembly.

(2) A direct-fired air heater shall have an inlet duct connected directly to the out-of-doors. Room air shall not be circulated across the burner.

(3) A direct-fired air heater shall deliver air which contains not more than 10 ppm of carbon monoxide and is free from odors of combustion products. Permissible concentrations of other contaminants in the delivered air may be established by the director pursuant to their MAC and the degree of exposure to a person.

(4) The air volume supplied to the building by a direct-fired air heater shall not exceed 110% of the total air volume exhausted. The director may require interlocking of a heater control system with an exhaust ventilation system if necessary to ensure that the exhaust systems are operating.

(5) A direct-fired air heater shall have both of the following:

(a) A pre-ignition purge of fresh air.

(b) A positive fuel supply closure in the event of fuel supply failure, ignition failure, flame failure, power failure or interruption, or air flow reduction below 50% of its rated capacity.

R 325.2436 Exhaust ventilation systems.

Rule 36. The minimum rate of exhaust ventilation for places of manufacturing, processing, assembling, maintenance and repair, or storage of material shall be 1 cubic foot of air per minute per square foot of floor area. This amount of exhaust ventilation may be provided by local exhaust, general exhaust, or both. The director may permit a variance if contaminant control can be accomplished at a lesser rate of ventilation.

R 325.2437 Local exhaust ventilation.

Rule 37. (1) Local exhaust ventilation shall be provided at all stationary sources. The director may allow a variance from this requirement if control is accomplished with general ventilation.

(2) If a local exhaust system is used, then the exhaust air volume shall create an in-draft air volume at an enclosure, hood, duct, or fan sufficient to control the contaminant.

(3) A local exhaust system shall be designed to capture and control the contaminant. Distribution of exhaust air between various exhaust points may be accomplished by balanced duct design. If balancing gates are used, then they shall be locked permanently in place after final adjustment.

(4) The design and construction of a local exhaust ventilation system shall be adequate for the contaminant and conditions of service. A listing of practical ventilation texts and references shall be available from the director upon request. Technical information and experience regarding specific contaminants and control measures may be obtained from the director.

R 325.2438 General ventilation system.

Rule 38. A general ventilation system may be used for contaminant control. The ventilation air volume shall be sufficient to dilute the airborne contaminant to levels not exceeding the MAC.

R 325.2439 Exhaust system discharge locations.

Rule 39. The discharge locations of local exhaust or general exhaust systems shall not permit exhausted air to re-enter a workroom or other buildings directly, or indirectly, through air supply systems without substantial dilution.

R 325.2440 Recirculation of air from exhaust systems.

Rule 40. (1) The recirculation of air containing a contaminant whose MAC is at least 1000 ppm, 15 mg/m³, or 50 mppcf, shall be permitted if the exhaust ventilation system is equipped with an air cleaning device capable of reducing the contaminant concentrations to 10% or less of their MAC in the returned air.

(2) The director may allow the recirculation of air containing a contaminant whose MAC is less than 1000 ppm, 15 mg/m³ or 50 mppcf, if the toxicity of the contaminant and the degree of air cleaning to be achieved create an environment which will not impair the health of the workers, and if the contaminant concentrations in the returned air do not exceed 10% of its MAC.

(3) A recirculation system shall include an alternate air duct connection to discharge the returned air outside of the building if necessary to protect the workers' health.

R 325.2441 Air pollution control.

Rule 41. A local exhaust and general exhaust ventilation system shall comply with rules adopted by the Michigan Department of Environmental Quality, being R 336.1101 to R 336.1910.

R 325.2442 Respiratory protective equipment; selection and use.

Rule 42. (1) Respiratory protective equipment for the safeguarding of the workers' health shall be provided by the employer if other methods do not control the contaminants.

(2) Respiratory protective equipment for the safeguarding of a worker's health may be used in place of other control measures in intermittent or temporary work situations.

(3) Respiratory protective equipment shall be of a type approved for protection against the contaminant and degree of exposure to be encountered. A listing of approved types of respiratory protective equipment shall be available from the director.

(4) Responsibility for equipment selection, issuance, use, training, and maintenance shall be vested in a qualified individual who shall have sufficient knowledge of the subject.

(5) A worker shall be trained in the use of the equipment and shall have an opportunity to become familiar with it, have it fitted properly, and test its facepiece to face seal. If a worker needs to wear corrective lenses, then the facepiece and lenses shall be fitted by a qualified individual.

(6) A worker shall use the equipment in accordance with instructions, shall report any malfunctioning of the equipment to the person responsible, and shall guard the equipment against damage.

(7) If the equipment is to be used in an atmosphere immediately dangerous to life or health, then the worker shall use it in normal air for a reasonable familiarity period.

(8) Emergency equipment shall be readily accessible at all times and its location shall be clearly marked.

R 325.2442a Respiratory protective equipment; maintenance.

Rule 42a. (1) Respiratory protective equipment shall be maintained in clean and effective condition.

(2) Routinely used equipment shall be cleaned, inspected, and sanitized as frequently as necessary to ensure that proper protection is provided for the wearer.

(3) Emergency equipment that is not routinely used shall be inspected, cleaned, and sanitized after each use and inspected at least monthly to ensure that it is in effective working condition. A record shall be kept of inspection dates and findings.

(4) Equipment inspection shall include a check of the tightness of connections and the proper functioning of all parts.

(5) Replacement or repairs shall be made by trained persons with parts designated for the specific equipment. Reducing valves or regulators shall be returned to the manufacturer or to a trained technician for adjustment or repair.

(6) Equipment shall be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals.

R 325.2442b Respiratory protective equipment; types for certain hazards.

Rule 42b. The following equipment shall be used in any of the following hazards:

| HAZARD | REQUIRED EQUIPMENT |
|---|---|
| Oxygen deficiency | <ul style="list-style-type: none"> • Hose mask with blower • Self-contained breathing apparatus |
| Gas vapor, particulate contaminants | |
| Atmospheres immediately dangerous to life or health | <ul style="list-style-type: none"> • Hose mask with blower • Self-contained breathing apparatus • Self-rescue mouthpiece respirator (for escape only) |
| Atmospheres not immediately dangerous to life or health | <ul style="list-style-type: none"> • Air-line respirator • Air-line abrasive blasting respirator (for escape only) • Gas mask with canister or with canister and filter • Hose mask with blower • Respirator with chemical cartridge or filter or both |

R 325.2442c Respiratory protective equipment; supplies and components.

Rule 42c. (1) Compressed or liquid oxygen used with respiratory protective equipment shall be of high purity. Compressed oxygen shall not be used in supplied-air respirators or in open-circuit self-contained breathing apparatus that have previously used compressed air.

(2) Air may be supplied to equipment from cylinders or air compressors with proper pressure regulation and control. Air shall contain 19-23% oxygen and not more than 20 ppm carbon monoxide and 5 mg/m³ oil mist.

(3) A compressor or compressor air intake shall be situated so as to prevent entry of contaminants into the system in amounts which may be injurious to the health of an exposed person.

(4) An oil lubricated compressor shall incorporate suitable inline air purifying sorbents and filters, temperature regulators, and high-temperature cut-off to assure breathing air quality. An oil lubricated compressor shall not use vegetable oil lubricants.

(5) An air-line coupling or connector shall be incompatible with outlets for other gas systems to prevent connection with non-respirable gases or oxygen.

(6) A self-contained breathing apparatus and universal type gas mask shall incorporate an audible or visible alarm or window to indicate impending failure of the device to provide respirable air. It is recommended that warning be given when 20-25% of rated service time remains.

R 325.2443 Variances.

Rule 43. Variances as provided in R 325.2436 and R 325.2437(1) may be granted by the director upon written request. Variances granted by the director shall be in writing and shall consider the potential health hazard and the control measures to be employed.

R 325.2444 Hearing procedures.

Rule 44. (1) The director shall serve a written notice upon an employer alleged to be in violation of these rules. The notice shall describe the alleged violation and set a date, time, and place for a hearing to determine whether a violation exists. The notice shall be delivered at least 15 days before the hearing date.

(2) Evidence and testimony may be introduced at the hearing and all interested parties shall be given the full opportunity to present evidence and to cross-examine witnesses.

(3) If a violation is found to exist, the director shall issue an order directing the person, firm, or corporation to correct the violation before a specified correction date. The correction date shall be established with consideration to the health hazard involved and the difficulty of eliminating the violation.

(4) At the time of the hearing, or within 30 days after receipt of an order from the director, the person, firm, or corporation may request an extension of the correction date. The director may grant an extension of the correction date, with consideration to the health hazard and the difficulty of correction, for a reasonable time if it is shown that the violation can and will be corrected before the extended correction date.

(5) If a violation is not eliminated within the time specified, then the director shall issue a final order directing the person, firm, or corporation to cease the operation of the source that is in violation.

R 325.2445 Emergency procedure.

Rule 45. If the director knows there is an immediate and serious hazard from exposure to a contaminant and he or she believes that a delay of 15 days would be prejudicial to the health or life of exposed persons, then the director shall notify the employer by written notice to discontinue immediately the exposure to the contaminant. Within 15 days the director shall provide the employer the opportunity to be heard and to present any proof that exposure to the contaminant does not constitute a danger to the health or life of the exposed persons.

R 325.2446 Appeals.

Rule 46. An employer aggrieved by a decision of the director may appeal the decision pursuant to sections 101 to 106 of 1969 PA 306, MCL 24.301 to 24.306.

R 325.2447 Amendments; revisions.

Rule 47. (1) If the director has knowledge that rule revision is required for the prevention of occupational disease or significant physiological disturbance, or after consideration of a request by any person, he may proceed to amend these rules in accordance with the administrative procedures act.

(2) If the director believes that there is a significant hazard to the health of exposed persons, he may proceed to amend these rules and provide for the immediate effect of the amendment in accordance with the administrative procedures act.

R 325.2448 Rescission.

Rule 48. The rules entitled "Basic Guides for Control of Exposure to Atmospheric Contaminants in Places of Employment," being R 325.1351 to R 325.1355 of the Michigan Administrative Code and appearing on pages 2592 to 2599 of the 1962 Annual Supplement to the Code, are rescinded.

INFORMATIONAL APPENDIX

The following Michigan Occupational Safety and Health (MIOSHA) standards are referenced in these rules. Up to 5 copies of these standards may be obtained at no charge from the Michigan Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, P.O. Box 30643, Lansing, Michigan, 48909-8143 or via the internet at website: www.michigan.gov/mioshastandards. For quantities greater than 5, the cost, at the time of adoption of these rules, is 4 cents per page.

| STATEMENT FROM TABLE | REFERS TO THE FOLLOWING MIOSHA OCCUPATIONAL HEALTH (OH) STANDARD | RULE NUMBERS |
|---|--|----------------------------|
| (See R 325.51401 et seq.*) | GI Part 302 Vinyl Chloride | R 325.51401 to R 325.51414 |
| (See R 325.51151 et seq.*) | GI & CS Part 304 Ethylene Oxide | R 325.51151 to R 325.51177 |
| (See R 325.51451 et seq.*) | GI & CS Part 306 Formaldehyde | R 325.51451 to R 325.51477 |
| (See R 325.51501 et seq.*) | GI & CS Part 307 Acrylonitrile | R 325.51501 to R 325.51527 |
| (See R 325.51851 et seq.*) | GI & CS Part 309 Cadmium | R 325.51851 to R 325.51886 |
| (See R 325.77101 et seq.*) | GI & CS Part 311 Benzene | R 325.77101 to R 325.77115 |
| (See R 325.50091 et seq.*) | GI & CS Part 312 1,3-Butadiene | R 325.50091 to R 325.50093 |
| (See R 325.51651 et seq.*) | GI & CS Part 313 Methylene Chloride | R 325.51651 to R 325.51653 |
| (See R 325.50101 et seq.*) | GI & CS Part 314 Coke Oven Emissions | R 325.50100 to R 325.50136 |
| (See asbestos in construction R 325.51301 et seq.) | CS Part 602 Asbestos for Construction | R 325.51301 to R 325.51312 |



Michigan Occupational Safety and Health Administration
PO Box 30643
Lansing, Michigan 48909-8143
For technical questions of this standard – Ph: 517-284-7750 (GISHD) or 517-284-7720 (CETD)
To order copies of this standard – Ph: 517-284-7740

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