



DEPARTMENT OF LABOR & ECONOMIC GROWTH
DIRECTOR'S OFFICE
OCCUPATIONAL HEALTH STANDARDS

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

R 325.51401, R 325.51402, R 325.51403, R 325.51404, R 325.51405, R 325.51406, R 325.51407, R 325.51408, R 325.51409, R 325.51410, R 325.51411, R 325.51412, R 325.51413, and R 325.51414 of the Michigan Administrative Code are added as follows:

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PART 302. VINYL CHLORIDE

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R 325.51401 Scope and application.

- Rule 1. (1)** These rules specify the requirements for the control of employee exposure to vinyl chloride (chloroethene), chemical abstracts service registry no. 75014.
- (2)** These rules apply to the manufacture, reaction, packaging, repackaging, storage, handling, or use of vinyl chloride or polyvinyl chloride, but do not apply to the handling or use of fabricated products made of polyvinyl chloride.
- (3)** These rules apply to the transportation of vinyl chloride or polyvinyl chloride, except to the extent that the United States department of transportation regulates the hazards covered by these rules.
- (4)** These rules replace occupational health rule 2260, which is rescinded.

R 325.51402 Definitions.

Rule 2. (1) As used in these rules:

- (a) **“Action level”** means a concentration of vinyl chloride of 0.5 ppm averaged over an 8-hour work day.
- (b) **“Authorized person”** means any person specifically authorized by the employer whose duties require him or her to enter a regulated area or any person entering an area as a designated representative of employees for the purpose of exercising an opportunity to observe monitoring and measuring procedures.

- (c) **“Director”** means the director of the department of consumer and industry services.
- (d) **“Emergency”** means any occurrence such as equipment failure, or operation of a relief device which is likely to, or does, result in massive release of vinyl chloride.
- (e) **“Fabricated product”** means a product made wholly or partly from polyvinyl chloride, and which does not require further processing at temperatures, and for times, sufficient to cause mass melting of the polyvinyl chloride resulting in the release of vinyl chloride.
- (f) **“Hazardous operation”** means an operation, procedure, or activity where a release of either vinyl chloride liquid or gas might be expected as a consequence of the operation or because of an accident in the operation, which would result in an employee exposure in excess of the permissible exposure limit.
- (g) **“Polyvinyl chloride”** means polyvinyl chloride homopolymer or copolymer before conversion to a fabricated product.
- (h) **“Vinyl chloride”** means vinyl chloride monomer.

R 325.51403 Permissible exposure limit.

Rule 3. (1) An employer shall ensure that an employee is not exposed to vinyl chloride at concentrations greater than 1 ppm averaged over an 8-hour period.

- (2) An employer shall ensure that an employee is not exposed to vinyl chloride at concentrations greater than 5 ppm averaged over any period not exceeding 15 minutes.
- (3) An employer shall ensure that an employee is not exposed to vinyl chloride by direct contact with liquid vinyl chloride.

R 325.51404 Monitoring.

- Rule 4. (1)** An employer shall undertake a program of initial monitoring and measurement in each establishment to determine if there is any employee exposed, without regard to the use of respirators, in excess of the action level.
- (2) If a determination conducted under subrule (1) of this rule shows any employee exposures, without regard to the use of respirators, in excess of the action level, then an employer shall establish a program for determining exposures for each* employee. The following provisions apply to the program:
 - (a) Shall be repeated at least monthly if an employee is exposed, without regard to the use of respirators, in excess of the permissible exposure limit.
 - (b) Shall be repeated not less than quarterly if an employee is exposed, without regard to the use of respirators, in excess of the action level.
 - (c) May be discontinued for an employee only if at least two consecutive monitoring determinations, made not less than 5 working days apart, show exposures for the employee at or below the action level.
 - (3) If there is a production, process, or control change which may result in an increase in the release of vinyl chloride, or the employer has any other reason to suspect that any employee may be exposed in excess of the action level, then the employer shall ensure that a determination of employee exposure under subrule (1) of this rule is performed.
 - (4) An employer shall ensure that the method of monitoring and measurement has an accuracy (with a confidence level of 95 percent) of not less than plus or minus 50 percent from 0.25 through 0.5 ppm, plus or minus 35 percent from over 0.5 ppm through 1.0 ppm, and plus or minus 25 percent over 1.0 ppm. Methods meeting these accuracy requirements are available in the "NIOSH Manual of Analytical Methods".
 - (5) An employee or a designated representative shall be afforded reasonable opportunity to observe the monitoring and measuring required by these rules.

* each exposed employee as determined under subrule (1) of this rule.

R 325.51405 Regulated area.

- Rule 5. (1)** An employer shall establish a regulated area under both of the following conditions:
- (a) Vinyl chloride or polyvinyl chloride is manufactured, reacted, repackaged, stored, handled or used.
 - (b) Vinyl chloride concentrations are in excess of the permissible exposure limit.
- (2) An employer shall limit access to regulated areas to authorized persons. A daily roster shall be made of authorized persons who enter.

R 325.51406 Methods of compliance.

- Rule 6. (1)** An employer shall ensure that employee exposure to vinyl chloride is controlled to at or below the permissible exposure limit provided in R 325.51403 of these rules by the following engineering, work practice, and personal protective controls:
- (a) Feasible engineering and work practice controls shall immediately be used to reduce exposures to at or below the permissible exposure limit.
 - (b) If feasible engineering and work practice controls which can be instituted immediately are not sufficient to reduce exposures to at or below the permissible exposure limit, then the controls shall nonetheless be used to reduce exposures to the lowest practicable level, and shall be supplemented by respiratory protection in accordance with R 325.51407 of these rules. An employer shall establish and implement a program to reduce exposures to, at, or below the permissible exposure limit, or to the greatest extent feasible, solely by means of engineering and work practice controls, as soon as it is feasible.
 - (c) An employer shall develop written plans for a program and furnish the plans upon request for examination and copying to the authorized representatives of the director. The plans shall be updated at least every six months.

R 325.51407 Respiratory protection.

- Rule 7. (1)** For employees who use respirators required by these rules, an employer shall provide respirators that comply with the requirements of these rules.
- (2) An employer shall implement a respiratory protection program in accordance with 29 C.F.R. §1910.134(c) to (d) and (f) to (m), except for (d)(1)(iii) and (d)(3)(iii)(B)(1) and (2), as adopted by reference in Michigan Administrative Rule, R 325.60051 et seq.

- (3) An employer shall select respirators from the following table:

Atmospheric concentration of vinyl chloride	Required apparatus
(a) Unknown, or above 3,600 parts per million (ppm)	Open -circuit, self-contained breathing apparatus, pressure demand type, with full facepiece.
(b) Not over 3,600 ppm	(i) Combination type C supplied-air respirator, pressure demand type, with full or half facepiece and auxiliary self-contained air supply; or
(c) Not over 1,000 ppm	(i) Combination type, supplied-air respirator continuous flow type, with full or half facepiece and auxiliary self-contained air supply. Type C, supplied-air respirator, continuous flow type, with full or half facepiece, helmet, or hood.
(d) Not over 100 ppm	(i) Combination type C supplied-air respirator, demand type, with full facepiece and auxiliary self-contained air supply; or (ii) Open-circuit self-contained breathing apparatus with full facepiece, in demand mode; or Type C supplied-air respirator, demand type, with full facepiece.
(e) Not over 25 ppm	(i) A powered air-purifying respirator with hood, helmet, full or half facepiece, and a canister that provides a service life of not less than 4 hours for concentrations of vinyl chloride up to 25 ppm; or (ii) A gas mask, front- or back-mounted canister that provides a service life of not less than 4 hours for concentrations of vinyl chloride up to 25 ppm.
(f) Not over 10 ppm	(i) Combination type C supplied-air respirator, demand type, with half facepiece and auxiliary self-contained air supply; or (ii) Type C supplied-air respirator, demand type, with half facepiece; or (iii) Any chemical cartridge respirator with an organic vapor cartridge that provides a service life of at least 1 hour for concentrations of vinyl chloride up to 10 ppm.

Note: Respirators specified for higher concentrations may be used for lower concentrations.

- (4) An employer shall replace air-purifying canisters or cartridges before the expiration of their service life or the end of the shift in which they are first used, whichever occurs first. In addition, an employer shall provide a continuous monitoring and alarm system where concentrations of vinyl chloride could reasonably exceed the allowable concentrations for the devices in use. An employer shall use the system to alert employees when vinyl chloride concentrations exceed the allowable concentrations for the devices in use.
- (5) An employer may use apparatus prescribed for higher concentrations for any lower concentration.

R 325.51408 Hazardous operations.

- Rule 8. (1)** An employer shall ensure that employees engaged in hazardous operations, including entry of vessels to clean polyvinyl chloride residue from vessel walls, be provided and required to wear and use all of the following;
- Respiratory protection in accordance with R 325.51403 and R 325.51407.
 - Protective garments to prevent skin contact with liquid vinyl chloride or with polyvinyl chloride residue from vessel walls. An employer shall select the protective garments for the operation and its possible exposure conditions.
- (2) An employer shall ensure that protective garments are provided clean and dry for each use.

R 325.51409 Emergency situations.

- Rule 9. (1)** An employer shall develop a written operations plan for emergency situations for each facility storing, handling, or otherwise using vinyl chloride as a liquid or compressed gas. Appropriate portions of the plan shall be implemented in the event of an emergency. The plan shall specifically provide the following:
- Employers shall equip employees engaged in hazardous operations or correcting situations of existing hazardous releases as required in R 325.51408.
 - Employers shall ensure that other employees not equipped in accordance with subdivision (a) of this subrule shall evacuate the area and not return until conditions are controlled by the methods required in R 325.51406 and the emergency is abated.

R 325.51410 Training.

- Rule 10. (1)** An employer shall provide training to each employee engaged in vinyl chloride or polyvinyl chloride operations. Training shall be in a program relating to the hazards of vinyl chloride and precautions for its safe use.
- (2) The program shall include all of the following:
- The nature of the health hazard from chronic exposure to vinyl chloride including specifically the carcinogenic hazard.
 - The specific nature of operations which could result in exposure to vinyl chloride in excess of the permissible limit and necessary protective steps.

- (c) The purpose for, proper use, and limitations of respiratory protective devices.
 - (d) The fire hazard and acute toxicity of vinyl chloride, and the necessary protective steps.
 - (e) The purpose for, and a description, of the monitoring program.
 - (f) The purpose for, and a description of, the medical surveillance program.
 - (g) Emergency procedures.
 - (h) Specific information to aid the employee in recognition of conditions which may result in the release of vinyl chloride.
 - (i) A review of this rule at the employee's first training and indoctrination program, and annually thereafter.
- (3) Employers shall provide all materials relating to the program to the director upon request.

R 325.51411 Medical surveillance.

Rule 11. (1) An employer shall institute a program of medical surveillance for each employee exposed, without regard to the use of respirators, to vinyl chloride in excess of the action level. The employer shall provide each exposed employee with an opportunity for examinations and tests in accordance with this subrule. The employer shall ensure that all medical examinations and procedures be performed by or under the supervision of a licensed physician. The medical examinations and procedures shall be provided without cost to the employee.

(2) An employer shall ensure that at the time of initial assignment, or upon institution of medical surveillance, the following provisions are met:

- (a) A general physical examination shall be performed, with specific attention to detecting enlargement of liver, spleen or kidneys, or dysfunction in these organs, and for abnormalities in skin, connective tissues and the pulmonary system (See Appendix I of this rule).
- (b) A medical history shall be taken, to include all of the following information:
 - (i) Alcohol intake.
 - (ii) Past history of hepatitis.
 - (iii) Work history and past exposure to potential hepatotoxic agents, including drugs and chemicals.
 - (iv) Past history of blood transfusions.
 - (v) Past history of hospitalizations.
- (c) A serum specimen shall be obtained and determinations made of the following:
 - (i) Total bilirubin.
 - (ii) Alkaline phosphatase.
 - (iii) Serum glutamic oxalacetic transaminase (SGOT).
 - (iv) Serum glutamic pyruvic transaminase (SGPT).
 - (v) Gamma glutamyl transpeptidase.

(3) An employer shall ensure that examinations provided in accordance with these rules are performed at least:

- (a) Every 6 months for each employee who has been employed in vinyl chloride or polyvinyl chloride manufacturing for 10 years or longer.
- (b) Annually for all other employees.

- (4) An employer shall ensure that each employee exposed to an emergency is afforded appropriate medical surveillance.
- (5) An employer shall obtain from the examining physician promptly after any examination a statement of each employee's suitability for continued exposure to vinyl chloride including use of protective equipment and respirators. An employer shall provide a copy of the physician's statement to each employee.
- (6) An employer shall withdraw an employee from possible contact with vinyl chloride if the employee's health would be materially impaired by continued exposure.
- (7) An employer shall ensure that laboratory analyses for all biological specimens included in medical examinations be performed in laboratories licensed under 42 C.F.R. Part 74.
- (8) If the examining physician determines that alternative medical examination to those required by subrule (11)(2) of this rule will provide at least equal assurance of detecting medical conditions pertinent to the exposure to vinyl chloride, then the employer may accept the alternative examinations as meeting the requirements of subrule (11)(2) of this rule. The employer shall obtain a statement from the examining physician setting forth the alternative examinations and the rationale for substitution. This statement shall be available upon request for examination and copying by the director.

R 325.51412 Signs and labels.

Rule 12. (1) An employer shall ensure that entrances to regulated areas be posted with legible signs bearing the following legend:

**CANCER-SUSPECT AGENT AREA
AUTHORIZED PERSONNEL ONLY**

(2) An employer shall ensure that areas containing hazardous operations or where an emergency currently exists be posted with legible signs bearing the following legend:

**CANCER-SUSPECT AGENT IN THIS AREA
PROTECTIVE EQUIPMENT REQUIRED
AUTHORIZED PERSONNEL ONLY**

(3) An employer shall ensure that containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride be legibly labeled with the following legend:

**CONTAMINATED WITH VINYL CHLORIDE
CANCER-SUSPECT AGENT**

(4) An employer shall ensure that containers of polyvinyl chloride be legibly labeled with the following legend:

**POLYVINYL CHLORIDE (or Trade Name)
contains VINYL CHLORIDE
VINYL CHLORIDE IS A
CANCER-SUSPECT AGENT**

- (5) An employer shall ensure that containers of vinyl chloride be legibly labeled with either of the following legends:

(a)

**VINYL CHLORIDE EXTREMELY
FLAMMABLE GAS UNDER PRESSURE
CANCER-SUSPECT AGENT**

- (b) In accordance with 49 C.F.R., Parts 170-189 (United States Department of Transportation regulations), with the additional following legend:

CANCER-SUSPECT AGENT

applied near the label or placard.

- (6) An employer shall ensure that no statement shall appear on or near any required sign, label, or instruction which contradicts or detracts from the effect of any required warning, information, or instruction.

R 325.51413 Records.

- Rule 13. (1)** An employer shall ensure that all records maintained in accordance with these rules include the name and social security number of each employee, if relevant.
- (2) An employer shall keep records of required monitoring and measuring, medical records, and authorized personnel rosters. An employer shall make the records available to the director for examination and copying.
- (3) An employer shall ensure that monitoring and measuring records comply with all of the following provisions:
- State the date of the monitoring and measuring and the concentrations determined and identify the instruments and methods used.
 - Include any additional information necessary to determine individual employee exposures where exposures are determined by means other than individual monitoring of employees.
 - Are maintained for not less than 30 years.
- (4) An employer shall maintain authorized personnel rosters for not less than 30 years.
- (5) An employer shall maintain medical records for the duration of employment of each employee plus 20 years, or for 30 years, whichever is longer.
- (6) If an employer ceases to do business and there is no successor to receive and retain the employer's records for the prescribed period, then the employer shall transmit the records, by registered mail, to the director and shall notify each employee individually, in writing, of the transfer. An employer shall also comply with requirements in R 325.3475, Employee Medical Records and Trade Secrets, regarding transfer of records.
- (7) An employer shall provide access to an employee or the employee's designated representative to examine and copy records of required monitoring and measuring.

- (8) An employer shall provide a former employee access to examine and copy required monitoring and measuring records reflecting the former employee's own exposures.
- (9) Upon written request of an employee, an employer shall furnish a copy of the medical record of the employee to a physician designated by the employee.

R 325.51414 Reports.

- Rule 14. (1)** Not later than 1 month after the establishment of a regulated area, an employer shall report the following information to the Michigan department of consumer and industry services:
- The address and location of each establishment that has 1 or more regulated areas.
 - The number of employees in each regulated area during normal operations, including maintenance. An employer shall report any changes to the information within 15 days.
- (2) An employer shall report emergencies, and the facts obtainable at the time of the emergency, to the Michigan department of consumer and industry services within 24 hours of the emergency. Upon request of the director of the department of consumer and industry services, the employer shall submit additional information, in writing, relevant to the nature and extent of employee exposures and measures taken to prevent future emergencies of similar nature.
- (3) Within 10 working days following any monitoring and measuring which discloses that any employee has been exposed, without regard to the use of respirators, in excess of the permissible exposure limit, an employer shall notify each exposed employee, in writing, of the results of the exposure measurement and the steps being taken to reduce the exposure to within the permissible exposure limit.

APPENDIX I SUPPLEMENTARY MEDICAL INFORMATION

When required tests under section (11)(2) of this rule show abnormalities, the tests should be repeated as soon as practicable, preferably within 3 to 4 weeks. If tests remain abnormal, consideration should be given to withdrawal of the employee from contact with vinyl chloride, while a more comprehensive examination is made.

Additional tests which may be useful:

- For kidney dysfunction: Urine examination for albumin, red blood cells, and exfoliative abnormal cells.
- Pulmonary system: Forced vital capacity, forced expiratory volume at 1 second, and chest roentgenogram (posterior-anterior, 14 x 17 inches).
- Additional serum tests: Lactic acid dehydrogenase, lactic acid dehydrogenase isoenzyme, protein determination, and protein electrophoresis.
- For a more comprehensive examination on repeated abnormal serum tests: Hepatitis B antigen, and liver scanning.



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