



**DEPARTMENT OF LABOR AND ECONOMIC OPPORTUNITY**  
**GENERAL INDUSTRY STANDARD**

Filed with the Secretary of State on January 1, 1975 (as amended April 11, 2000)  
(as amended September 18, 2013) (as amended December 12, 2018) **(as amended April 27, 2021)**

These rules take effect immediately upon filing with the secretary of state unless adopted under section 33, 44, or 45a(6) of the administrative procedures act of 1969, 1969 PA 306, MCL 24.233, 24.244, or 24.245a.

Rules adopted under these sections become effective 7 days after filing with the secretary of state.

(By authority conferred on the director of the department of labor and economic opportunity by sections 14, 16, 19, 21, and 24 of the Michigan occupational safety and health act, 1974 PA 154, MCL 408.1014, 408.1016, 408.1019, 408.1021, and 408.1024, and Executive Reorganization Order Nos. 1996-1, 1996-2, 2003-1, 2008-4, 2011-4, and 2019-3, MCL 330.3101, 445.2001, 445.2011, 445.2025, 445.2030, and 125.1998)

R 325.51401 of the Michigan Administrative Code is amended, as follows:

**PART 302, VINYL CHLORIDE**

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**R 325.51401 Scope, application, adoption, and availability of standards.**

**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.

Standard Part 470. "Employee Medical Records and Trade Secrets."

(8) The adopted federal regulations have the same force and effect as a rule promulgated under the

(4) The following federal Occupational Safety and Health Administration (OSHA) regulations are adopted by reference in these rules:

(a) 29 CFR 1910.1017 "Vinyl chloride," as amended May 14, 2019.

(b) 29 CFR 1910.1017, appendix A "Supplemental medical information," as amended February 13, 1996.

(5) A reference to 29 CFR 1910.134 means General Industry and Construction Safety and Health Standard Part 451. "Respiratory Protection."

(6) A reference to 29 CFR 1910.1200 means Occupational Health Standard Part 430. "Hazard Communication."

(7) A reference to 29 CFR 1910.1020 means General Industry and Construction Safety and Health Michigan occupational safety and health act, 1974 PA 154, MCL 408.1001 to 408.1094.

(9) The OSHA regulations adopted in these rules are available from the United States Department of

Labor, Occupational Safety and Health Administration website, [www.osha.gov](http://www.osha.gov), at no charge, as of the time of adoption of these rules.

(10) The standards adopted in these rules are available for inspection at the Department of Labor and Economic Opportunity, MIOSHA, Standards and FOIA Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143.

(11) The standards adopted in these rules may be obtained from the publisher or the Department of Labor and Economic Opportunity, MIOSHA, Standards and FOIA Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143, at the cost charged in this rule, plus \$20.00 for shipping and handling.

(12) The following Michigan occupational safety and health administration (MIOSHA) standards are referenced in these rules. Up to 5 copies of these

standards may be obtained at no charge from the Department of Labor and Economic Opportunity, MIOSHA, Standards and FOIA Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143 or via the internet at the following website: [www.michigan.gov/mioshastandards](http://www.michigan.gov/mioshastandards). For quantities greater than 5, the cost, as of the time of adoption of these rules, is 4 cents per page.

(a) General Industry and Construction Safety and Health Standard Part 451. "Respiratory Protection," R 325.60051 to R 325.60052.

(b) Occupational Health Standard Part 430. "Hazard Communication," R 325.77001 to R 325.77004.

(c) General Industry and Construction Safety and Health Standard Part 470. "Employee Medical Records and Trade Secrets," R 325.3451 to R 325.3476.

## 1910.1017 VINYL CHLORIDE

### 1910.1017(a) Scope and application.

1910.1017(a)(1) This section includes requirements for the control of employee exposure to vinyl chloride (chloroethene), Chemical Abstracts Service Registry No. 75014.

1910.1017(a)(2) This section applies to the manufacture, reaction, packaging, repackaging, storage, handling or use of vinyl chloride or polyvinyl chloride, but does not apply to the handling or use of fabricated products made of polyvinyl chloride.

1910.1017(a)(3) This section applies to the transportation of vinyl chloride or polyvinyl chloride except to the extent that the Department of Transportation may regulate the hazards covered by this section.

### 1910.1017(b) Definitions.

1910.1017(b)(1) **Action level** means a concentration of vinyl chloride of 0.5 ppm averaged over an 8-hour work day.

1910.1017(b)(2) **Assistant Secretary** means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or his designee.

1910.1017(b)(3) **Authorized person** means any person specifically authorized by the employer whose duties require him to enter a regulated area or any person entering such an area as a designated representative of employees for the purpose of exercising an opportunity to observe monitoring and measuring procedures.

1910.1017(b)(4) **Director** means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or his designee.

1910.1017(b)(5) **Emergency** means any occurrence such as, but not limited to, equipment failure, or operation of a relief device which is likely to, or does, result in massive release of vinyl chloride.

1910.1017(b)(6) **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.

1910.1017(b)(7) **Hazardous operation** means any 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.

1910.1017(b)(8) **OSHA Area Director** means the Director for the Occupational Safety and Health Administration Area Office having jurisdiction over the geographic area in which the employer's establishment is located.

1910.1017(b)(9) **Polyvinyl chloride** means polyvinyl chloride homopolymer or copolymer before such is converted to a fabricated product.

1910.1017(b)(10) **Vinyl chloride** means vinyl chloride monomer.

### 1910.1017(c) Permissible exposure limit.

1910.1017(c)(1) No employee may be exposed to vinyl chloride at concentrations greater than 1 ppm averaged over any 8-hour period, and

1910.1017(c)(2) No employee may be exposed to vinyl chloride at concentrations greater than 5 ppm averaged over any period not exceeding 15 minutes.

1910.1017(c)(3) No employee may be exposed to vinyl chloride by direct contact with liquid vinyl chloride.

### 1910.1017(d) Monitoring.

1910.1017(d)(1) A program of initial monitoring and measurement shall be undertaken in each establishment to determine if there is any employee exposed, without regard to the use of respirators, in excess of the action level.

1910.1017(d)(2) Where a determination conducted under paragraph (d)(1) of this section shows any employee exposures, without regard to the use of respirators, in excess of the action level, a program for determining exposures for each such employee shall be established. Such a program:

1910.1017(d)(2)(i) Must be repeated at least quarterly for any employee exposed, without regard to the use of respirators, in excess of the permissible exposure limit.

1910.1017(d)(2)(ii) Must be repeated not less than every 6 months for any employee exposed without regard to the use of respirators, at or above the action level.

1910.1017(d)(2)(iii) May be discontinued for any employee only when at least two consecutive monitoring determinations, made not less than 5 working days apart, show exposures for that employee at or below the action level.

1910.1017(d)(3) Whenever there has been 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, a determination of employee exposure under paragraph (d)(1) of this section shall be performed.

1910.1017(d)(4) The method of monitoring and measurement shall have 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").

1910.1017(d)(5) Employees or their designated representatives shall be afforded reasonable opportunity to observe the monitoring and measuring required by this paragraph.

**1910.1017(e) Regulated area.**

1910.1017(e)(1) A regulated area shall be established where:

1910.1017(e)(1)(i) Vinyl chloride or polyvinyl chloride is manufactured, reacted, repackaged, stored, handled or used; and

1910.1017(e)(1)(ii) Vinyl chloride concentrations are in excess of the permissible exposure limit.

1910.1017(e)(2) Access to regulated areas shall be limited to authorized persons.

**1910.1017(f) Methods of compliance.**

Employee exposures to vinyl chloride shall be controlled to at or below the permissible exposure limit provided in paragraph (c) of this section by engineering, work practice, and personal protective controls as follows:

1910.1017(f)(1) Feasible engineering and work practice controls shall immediately be used to reduce exposures to at or below the permissible exposure limit.

1910.1017(f)(2) Wherever 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, they shall nonetheless be used to reduce exposures to the lowest practicable level, and shall be supplemented by respiratory protection in accordance with paragraph (g) of this section. A program shall be established and implemented 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 feasible.

1910.1017(f)(3) Written plans for such a program shall be developed and furnished upon request for examination and copying to authorized representatives of the Assistant Secretary and the Director. Such plans must be updated at least annually.

**1910.1017(g) Respiratory protection.**

**1910.1017(g)(1) General.** For employees who use respirators required by this section, the employer must provide each employee an appropriate respirator that complies with the requirements of this paragraph.

**1910.1017(g)(2) Respirator program.** The employer must implement a respiratory protection program in accordance §1910.134 (b) through (d) (except (d)(1)(iii), and (d)(3)(iii)(B)(1) and (2)), and (f) through (m) which covers each employee required by this section to use a respirator.

**1910.1017(g)(3) Respirator selection.**

1910.1017(g)(3)(i) Employers must:

1910.1017(g)(3)(i)(A) Select, and provide to employees, the appropriate respirators specified in paragraph (d)(3)(i)(A) of 29 CFR 1910.134.

1910.1017(g)(3)(i)(B) Provide an organic vapor cartridge that has a service life of at least one hour when using a chemical cartridge respirator at vinyl chloride concentrations up to 10 ppm.

1910.1017(g)(3)(i)(C) Select a canister that has a service life of at least four hours when using a powered air-purifying respirator having a hood, helmet, or full or half facepiece, or a gas mask with a front-or back-mounted canister, at vinyl chloride concentrations up to 25 ppm.

1910.1017(g)(3)(ii) When air-purifying respirators are used:

1910.1017(g)(3)(ii)(A) Air-purifying canisters or cartridges must be replaced prior to the expiration of their service life or the end of the shift in which they are first used, whichever occurs first.

1910.1017(g)(3)(ii)(B) A continuous-monitoring and alarm system must be provided when concentrations of vinyl chloride could reasonably exceed the allowable concentrations for the devices in use. Such a system must be used to alert employees when vinyl chloride concentrations exceed the allowable concentrations for the devices in use.

**1910.1017(h) Hazardous operations.**

1910.1017(h)(1) Employees engaged in hazardous operations, including entry of vessels to clean polyvinyl chloride residue from vessel walls, shall be provided and required to wear and use;

1910.1017(h)(1)(i) Respiratory protection in accordance with paragraphs (c) and (g) of this section; and

1910.1017(h)(1)(ii) Protective garments to prevent skin contact with liquid vinyl chloride or with polyvinyl chloride residue from vessel walls. The protective garments shall be selected for the operation and its possible exposure conditions.

1910.1017(h)(2) Protective garments shall be provided clean and dry for each use.

**1910.1017(i) Emergency situations.**

A written operational plan for emergency situations shall be developed 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 that:

1910.1017(i)(1) Employees engaged in hazardous operations or correcting situations of existing hazardous releases shall be equipped as required in paragraph (h) of this section;

1910.1017(i)(2) Other employees not so equipped shall evacuate the area and not return until conditions are controlled by the methods required in paragraph (f) of this section and the emergency is abated.

**1910.1017(j) Training.**

Each employee engaged in vinyl chloride or polyvinyl chloride operations shall be provided training in a program relating to the hazards of vinyl chloride and precautions for its safe use.

1910.1017(j)(1) The program shall include:

1910.1017(j)(1)(i) The nature of the health hazard from chronic exposure to vinyl chloride including specifically the carcinogenic hazard;

1910.1017(j)(1)(ii) The specific nature of operations which could result in exposure to vinyl chloride in excess of the permissible limit and necessary protective steps;

1910.1017(j)(1)(iii) The purpose for, proper use, and limitations of respiratory protective devices;

1910.1017(j)(1)(iv) The fire hazard and acute toxicity of vinyl chloride, and the necessary protective steps;

1910.1017(j)(1)(v) The purpose for and a description of the monitoring program;

1910.1017(j)(1)(vi) The purpose for, and a description of, the medical surveillance program;

1910.1017(j)(1)(vii) Emergency procedures;

1910.1017(j)(1)(viii) Specific information to aid the employee in recognition of conditions which may result in the release of vinyl chloride; and

1910.1017(j)(1)(ix) A review of this standard at the employee's first training and indoctrination program, and annually thereafter.

1910.1017(j)(2) All materials relating to the program shall be provided upon request to the Assistant Secretary and the Director.

**1910.1017(k) Medical surveillance.**

A program of medical surveillance shall be instituted for each employee exposed, without regard to the use of respirators, to vinyl chloride in excess of the action level. The program shall provide each such employee with an opportunity for examinations and tests in accordance with this paragraph. All medical examinations and procedures shall be performed by or under the supervision of a licensed physician, and shall be provided without cost to the employee.

1910.1017(k)(1) At the time of initial assignment, or upon institution of medical surveillance;

1910.1017(k)(1)(i) 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 A).

1910.1017(k)(1)(ii) A medical history shall be taken, including the following topics:

1910.1017(k)(1)(ii)(A) Alcohol intake;

1910.1017(k)(1)(ii)(B) Past history of hepatitis;

1910.1017(k)(1)(ii)(C) Work history and past exposure to potential hepatotoxic agents, including drugs and chemicals;

1910.1017(k)(1)(ii)(D) Past history of blood transfusions; and

1910.1017(k)(1)(ii)(E) Past history of hospitalizations.

1910.1017(k)(1)(iii) A serum specimen shall be obtained and determinations made of:

1910.1017(k)(1)(iii)(A) Total bilirubin;

1910.1017(k)(1)(iii)(B) Alkaline phosphatase;

1910.1017(k)(1)(iii)(C) Serum glutamic oxalacetic transaminase (SGOT);

1910.1017(k)(1)(iii)(D) Serum glutamic pyruvic transaminase (SGPT); and

1910.1017(k)(1)(iii)(E) Gamma glutamyl transpeptidase.

1910.1017(k)(2) Examinations must be provided in accordance with this paragraph at least annually.

1910.1017(k)(3) Each employee exposed to an emergency shall be afforded appropriate medical surveillance.

1910.1017(k)(4) A statement of each employee's suitability for continued exposure to vinyl chloride including use of protective equipment and respirators, shall be obtained from the examining physician promptly after any examination. A copy of the physician's statement shall be provided each employee.

1910.1017(k)(5) If any employee's health would be materially impaired by continued exposure, such employee shall be withdrawn from possible contact with vinyl chloride.

1910.1017(k)(6) Laboratory analyses for all biological specimens included in medical examination shall be performed by accredited laboratories.

1910.1017(k)(7) If the examining physician determines that alternative medical examinations to those required by paragraph (k)(1) of this section will provide at least equal assurance of detecting medical conditions pertinent to the exposure to vinyl chloride, the employer may accept such alternative examinations as meeting the requirements of paragraph (k)(1) of this section, if the employer obtains 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 to authorized representatives of the Assistant Secretary and the Director.

**1910.1017(l) Communication of hazards.**

**1910.1017(l)(1) Hazard communication—general.**

1910.1017(l)(1)(i) Chemical manufacturers, importers, distributors and employers shall comply with all requirements of the Hazard Communication Standard (HCS) (§1910.1200) for vinyl chloride and polyvinyl chloride.

1910.1017(l)(1)(ii) In classifying the hazards of vinyl chloride at least the following hazards are to be addressed: Cancer; central nervous system effects; liver effects; blood effects; and flammability.

1910.1017(l)(1)(iii) Employers shall include vinyl chloride in the hazard communication program established to comply with the HCS (§1910.1200). Employers shall ensure that each employee has access to labels on containers of vinyl chloride and to safety data sheets, and is trained in accordance with the requirements of HCS and paragraph (j) of this section.

**1910.1017(l)(2) Signs.**

1910.1017(l)(2)(i) The employer shall post entrances to regulated areas with legible signs bearing the legend:

DANGER  
VINYL CHLORIDE  
MAY CAUSE CANCER  
AUTHORIZED PERSONNEL ONLY

1910.1017(l)(2)(ii) The employer shall post signs at areas containing hazardous operations or where emergencies currently exist. The signs shall be legible and bear the legend:

DANGER  
VINYL CHLORIDE  
MAY CAUSE CANCER  
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA  
AUTHORIZED PERSONNEL ONLY

1910.1017(l)(2)(iii) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(i) of this section:

CANCER-SUSPECT AGENT AREA  
AUTHORIZED PERSONNEL ONLY

1910.1017(l)(2)(iv) Prior to June 1, 2016, employers may use the following legend in lieu of that specified in paragraph (l)(2)(ii) of this section:

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

**1910.1017(l)(3) Labels.**

1910.1017(l)(3)(i) In addition to the other requirements in this paragraph (l), the employer shall ensure that labels for containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride are legible and include the following information:

CONTAMINATED WITH VINYL CHLORIDE  
MAY CAUSE CANCER

1910.1017(l)(3)(ii) Prior to June 1, 2015, employers may include the following information on labels of containers of polyvinyl chloride resin waste from reactors or other waste contaminated with vinyl chloride in lieu of the labeling requirements in paragraphs (l)(3)(i) of this section:

CONTAMINATED WITH VINYL CHLORIDE  
CANCER-SUSPECT AGENT

1910.1017(l)(4) Prior to June 1, 2015, employers may include the following information for containers of polyvinyl chloride in lieu of the labeling requirements in paragraphs (l)(1)(i) of this section:

POLYVINYL CHLORIDE (OR TRADE NAME)  
Contains  
VINYL CHLORIDE  
VINYL CHLORIDE IS A CANCER-SUSPECT AGENT

1910.1017(l)(5)(i) Prior to June 1, 2015, employers may include either the following information in either paragraph (l)(5)(i) or (l)(5)(ii) of this section on containers of vinyl chloride in lieu of the labeling requirements in paragraph (l)(1)(i) of this section:

VINYL CHLORIDE  
EXTREMELY FLAMMABLE GAS UNDER PRESSURE  
CANCER-SUSPECT AGENT

1910.1017(l)(5)(ii) In accordance with 49 CFR Parts 170-189, with the additional legend applied near the label or placard:

CANCER-SUSPECT AGENT

1910.1017(l)(6) 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.

**1910.1017(m) Records.**

1910.1017(m)(1) All records maintained in accordance with this section shall include the name and number of each employee where relevant.

1910.1017(m)(2) Records of required monitoring and measuring and medical records shall be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.1020 (a) through (e) and (g) through (i). These records shall be provided upon request to the Director. Authorized personnel rosters shall also be provided upon request to the Assistant Secretary and the Director.

1910.1017(m)(2)(i) Monitoring and measuring records shall:

1910.1017(m)(2)(i)(A) State the date of such monitoring and measuring and the concentrations determined and identify the instruments and methods used;

1910.1017(m)(2)(i)(B) Include any additional information necessary to determine individual employee exposures where such exposures are determined by means other than individual monitoring of employees; and

1910.1017(m)(2)(i)(C) Be maintained for not less than 30 years.

1910.1017(m)(2)(ii) [Reserved]

1910.1017(m)(2)(iii) Medical records shall be maintained for the duration of the employment of each employee plus 20 years, or 30 years, whichever is longer.

1910.1017(n) The employer must, within 15 working days after the receipt of the results of any monitoring performed under this section, notify each affected employee of these results and the steps being taken to reduce exposures within the permissible exposure limit either individually in writing or by posting the results in an appropriate location that is accessible to affected employees.

## 1910.1017 APPENDIX A SUPPLEMENTAL MEDICAL INFORMATION

When required tests under paragraph (k)(1) of this section 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:

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



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