



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

Filed with the Secretary of State on January 1, 1975 (as amended August 23, 2012)  
(as amended December 15, 2015) **(as amended December 12, 2018)**

These rules become effective 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 licensing and regulatory affairs 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, and 2011-4, MCL 330.3101, 445.2001, 445.2011, 445.2025, and 445.2030)

R 325.52901 of the Michigan Administrative Code is amended, and R 325.52902, R 325.52904, R 325.52905, R 325.52906, R 325.52907, R 325.52909, R 325.52910, R 325.52911, R 325.52912, R 325.52913, R 325.52920, R 325.52921, R 325.52922, R 325.52923, R 325.52924, R 325.52925, R 325.52926, R 325.52927, R 325.52930, and R 325.52931 are rescinded, as follows:

**PART 529, WELDING, CUTTING, AND BRAZING**

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**R 325.52901 Scope, adoption and availability of standards.**

**Rule 1.** (1) These rules are intended to provide, in, about or around places of employment, reasonable safety and health to persons involved in welding, cutting, brazing, soldering and acetylene generating and to those exposed to these processes and the equipment and compressed gases used.

(2) The federal Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1910.251(a) "Welder and welding operator" as amended December 14, 2007, are adopted by reference in these rules.

(3) The following rules contained in federal OSHA regulations 29 CFR 1910.252 "Welding, Cutting, and Brazing, General requirements," as amended March 26, 2012, are adopted by reference in these rules:

(a) 1910.252(b)(4)(i) to (ii) "Work in confined spaces."

(b) 1910.252(c)(1)(i) to (vi) "General."

(c) 1910.252(c)(2)(i) to (ii) "Ventilation for general welding and cutting."

(d) 1910.252(c)(3)(i) to (ii) "Local exhaust hoods and booths."

(e) 1910.252(c)(4)(i) to (v) "Ventilation in confined spaces."

(f) 1910.252(c)(5)(i) to (ii) "Fluorine compounds."

(g) 1910.252(c)(6)(i) to (ii) "Zinc."

(h) 1910.252(c)(7)(i) to (iii) "Lead."

(i) 1910.252(c)(8) "Beryllium."

(j) 1910.252(c)(9)(i) to (ii) "Cadmium."

(k) 1910.252(c)(10) "Mercury."

(l) 1910.252(c)(11)(i) to (ii) "Cleaning compounds."

(m) 1910.252(c)(12) "Cutting of stainless steels."

(n) 1910.252(c)(13) "First-aid equipment."

(o) 1910.252(d)(1)(i) to (ii) "Industrial applications."

(p) 1910.252(d)(1)(vii) "X-ray inspection."

(q) 1910.252(d)(2)(i) to (ii) "Mechanical piping systems."

(4) The federal OSHA regulations 29 CFR 1910.254(d)(1) "Operation and maintenance – General," as amended September 13, 2005, are adopted by reference in these rules.

(5) The federal OSHA regulations 29 CFR 1910.255(d)(1) "Ventilation and flash guard," as amended April 11, 1990, are adopted by reference in these rules.

(6) A reference to 29 CFR 1910.132 and 1910.133 means General Industry Safety and Health Standard Part 33. "Personal Protective Equipment."

(7) A reference to 29 CFR subpart Q, 1910.252(a) and (b), 1910.253, and 1910.254 means General Industry Safety Standard Part 12. "Welding and Cutting."

(8) A reference to 29 CFR 1910.1000 means Occupational Health Standard Part 301. "Air Contaminants for General Industry."

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

(10) The adopted federal regulations have the same force and effect as a rule promulgated under the Michigan occupational safety and health act, 1974 PA 154, MCL 408.1001 to 408.1094.

(11) 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.

(12) The regulations adopted in these rules are available for inspection at the Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services Section, 530 West Allegan Street, P.O. Box 30643, Lansing, Michigan, 48909-8143.

(13) The regulations adopted in these rules may be obtained from the publisher or the Department of Licensing and Regulatory Affairs, MIOSHA Regulatory Services 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.

(14) 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 Licensing and Regulatory Affairs, MIOSHA Regulatory Services 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, at the time of adoption of these rules, is 4 cents per page.

(a) General Industry Safety Standard Part 12. "Welding and Cutting," R 408.11201 to R 408.11299.

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

(c) General Industry Safety and Health Standard Part 33. "Personal Protective Equipment," R 408.13301 to R 408.13398.

(d) Occupational Health Standard Part 301. "Air Contaminants for General Industry," R 325.51101 to R 325.51107.

R 325.52902 Rescinded. R 325.52920 Rescinded.

R 325.52904 Rescinded. R 325.52921 Rescinded.

R 325.52905 Rescinded. R 325.52922 Rescinded.

R 325.52906 Rescinded. R 325.52923 Rescinded.

R 325.52907 Rescinded. R 325.52924 Rescinded.

R 325.52909 Rescinded. R 325.52925 Rescinded.

R 325.52910 Rescinded. R 325.52926 Rescinded.

R 325.52911 Rescinded. R 325.52927 Rescinded.

R 325.52912 Rescinded. R 325.52930 Rescinded.

R 325.52913 Rescinded. R 325.52931 Rescinded.

## WELDING, CUTTING, AND BRAZING

### 1910.252 GENERAL REQUIREMENTS

#### 1910.252(b) Protection of personnel.

##### 1910.252(b)(4) Work in confined spaces.

**1910.252(b)(4)(i) General.** As used herein confined space is intended to mean a relatively small or restricted space such as a tank, boiler, pressure vessel, or small compartment of a ship.

**1910.252(b)(4)(ii) Ventilation.** Ventilation is a prerequisite to work in confined spaces. For ventilation requirements see paragraph (c) of this section.

#### 1910.252(c) Health protection and ventilation.

##### 1910.252(c)(1) General.

**1910.252(c)(1)(i) Contamination.** The requirements in this paragraph have been established on the basis of the following three factors in arc and gas welding which govern the amount of contamination to which welders may be exposed:

1910.252(c)(1)(i)(A) Dimensions of space in which welding is to be done (with special regard to height of ceiling).

1910.252(c)(1)(i)(B) Number of welders.

1910.252(c)(1)(i)(C) Possible evolution of hazardous fumes, gases, or dust according to the metals involved.

**1910.252(c)(1)(ii) Screens.** When welding must be performed in a space entirely screened on all sides, the screens shall be so arranged that no serious restriction of ventilation exists. It is desirable to have the screens so mounted that they are about 2 feet (0.61 m) above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding.

**1910.252(c)(1)(iii) Maximum allowable concentration.** Local exhaust or general ventilating systems shall be provided and arranged to keep the amount of toxic fumes, gases, or dusts below the maximum allowable concentration as specified in 1910.1000 of this part.

**1910.252(c)(1)(iv) Hazard communication.** The employer shall include the potentially hazardous materials employed in fluxes, coatings, coverings, and filler metals, all of which are potentially used in welding and cutting, or are released to the atmosphere during welding and cutting, in the program established to comply with the Hazard Communication Standard (HCS) (§ 1910.1200). The employer shall ensure that each employee has access to labels on containers of such materials and safety data sheets, and is trained in accordance with the provisions of § 1910.1200. Potentially hazardous materials shall include but not be limited to the materials itemized in paragraphs (c)(5) through (c)(12) of this section.

**1910.252(c)(1)(v) Additional considerations for hazard communication in welding, cutting, and brazing.**

1910.252(c)(1)(v)(A) The suppliers shall determine and shall label in accordance with § 1910.1200 any hazards associated with the use of their materials in welding, cutting, and brazing.

1910.252(c)(1)(v)(B) In addition to any requirements imposed by § 1910.1200, all filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes, or other containers:

Do not use in areas without adequate ventilation. See ANSI Z49.1-1967 Safety in Welding, Cutting, and Allied Processes published by the American Welding Society.

1910.252(c)(1)(v)(C) Where brazing (welding) filler metals contain cadmium in significant amounts, the labels shall indicate the hazards associated with cadmium including cancer, lung and kidney effects, and acute toxicity effects.

1910.252(c)(1)(v)(D) Where brazing and gas welding fluxes contain fluorine compounds, the labels shall indicate the hazards associated with fluorine compounds including eye and respiratory tract effects.

**1910.252(c)(1)(vi) Prior to June 1, 2015, employers may include the following information on labels in lieu of the labeling requirements in paragraph (c)(1)(v) of this section:**

1910.252(c)(1)(vi)(A) All filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes, or other containers:

#### CAUTION

Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z49.1-1967 Safety in Welding and Cutting published by the American Welding Society.

1910.252(c)(1)(vi)(B) Brazing (welding) filler metals containing cadmium in significant amounts shall carry the following notice on tags, boxes, or other containers:

**WARNING**  
**CONTAINS CADMIUM—POISONOUS FUMES MAY BE FORMED ON HEATING**

Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1-1967. If chest pain, cough, or fever develops after use call physician immediately.

1910.252(c)(1)(vi)(C) Brazing and gas welding fluxes containing fluorine compounds shall have a cautionary wording to indicate that they contain fluorine compounds. One such cautionary wording recommended by the American Welding Society for brazing and gas welding fluxes reads as follows:

**CAUTION**  
**CONTAINS FLUORIDES**

This flux when heated gives off fumes that may irritate eyes, nose and throat.

1. Avoid fumes—use only in well-ventilated spaces.
2. Avoid contact of flux with eyes or skin.
3. Do not take internally.

**1910.252(c)(2) Ventilation for general welding and cutting.**

**1910.252(c)(2)(i) General.** Mechanical ventilation shall be provided when welding or cutting is done on metals not covered in paragraphs (c)(5) through (c)(12) of this section. (For specific materials, see the ventilation requirements of paragraphs (c)(5) through (c)(12) of this section.)

1910.252(c)(2)(i)(A) In a space of less than 10,000 cubic feet (284 m<sup>3</sup>) per welder.

1910.252(c)(2)(i)(B) In a room having a ceiling height of less than 16 feet (5 m).

1910.252(c)(2)(i)(C) In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation.

**1910.252(c)(2)(ii) Minimum rate.** Such ventilation shall be at the minimum rate of 2,000 cubic feet (57 m<sup>3</sup>) per minute per welder, except where local exhaust hoods and booths as per paragraph (c)(3) of this section, or airline respirators approved by the U.S. Bureau of Mines for such purposes are provided. Natural ventilation is considered sufficient for welding or cutting operations where the restrictions in paragraph (c)(2)(i) of this section are not present.

**1910.252(c)(3) Local exhaust hoods and booths.**

Mechanical local exhaust ventilation may be by means of either of the following:

**1910.252(c)(3)(i) Hoods.** Freely movable hoods intended to be placed by the welder as near as practicable to the work being welded and provided with a rate of air-flow sufficient to maintain a velocity in the direction of the hood of 100 linear feet (30 m) per minute in the zone of welding when the hood is at its most remote distance from the point of welding. The rates of ventilation required to accomplish this control velocity using a 3-inch (7.6 cm) wide flanged suction opening are shown in the following table:

Welding zone	Minimum airflow <sup>(1)</sup> cubic feet/minute	Duct diameter Inches <sup>(2)</sup>
4 to 6 inches from arc or torch	150	3
6 to 8 inches from arc or torch	275	3 1/2
8 to 10 inches from arc or torch	425	4 1/2
10 to 12 inches from arc or torch	600	5 1/2
Footnote <sup>(1)</sup> When brazing with cadmium bearing materials or when cutting on such materials increased rates of ventilation may be required.		
Footnote <sup>(2)</sup> Nearest half-inch duct diameter based on 4,000 feet per minute velocity in pipe.		

**1910.252(c)(3)(ii) Fixed enclosure.** A fixed enclosure with a top and not less than two sides which surround the welding or cutting operations and with a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet (30 m) per minute.

**1910.252(c)(4) Ventilation in confined spaces.**

**1910.252(c)(4)(i) Air replacement.** All welding and cutting operations carried on in confined spaces shall be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. All air replacing that withdrawn shall be clean and respirable.

**1910.252(c)(4)(ii) Airline respirators.** In circumstances for which it is impossible to provide such ventilation, airline respirators or hose masks approved for this purpose by the National Institute for Occupational Safety and Health (NIOSH) under 42 CFR part 84 must be used.

**1910.252(c)(4)(iii) Self-contained units.** In areas immediately hazardous to life, a full-facepiece, pressure-demand, self-contained breathing apparatus or a combination full-facepiece, pressure-demand supplied-air respirator with an auxiliary, self-contained air supply approved by NIOSH under 42 CFR part 84 must be used.

**1910.252(c)(4)(iv) Outside helper.** Where welding operations are carried on in confined spaces and where welders and helpers are provided with hose masks, hose masks with blowers or self-contained breathing equipment approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health, a worker shall be stationed on the outside of such confined spaces to insure the safety of those working within.

**1910.252(c)(4)(v) Oxygen for ventilation.** Oxygen shall never be used for ventilation.

**1910.252(c)(5) Fluorine compounds.**

**1910.252(c)(5)(i) General.** In confined spaces, welding or cutting involving fluxes, coverings, or other materials which contain fluorine compounds shall be done in accordance with paragraph (c)(4) of this section. A fluorine compound is one that contains fluorine, as an element in chemical combination, not as a free gas.

**1910.252(c)(5)(ii) Maximum allowable concentration.** The need for local exhaust ventilation or airline respirators for welding or cutting in other than confined spaces will depend upon the individual circumstances. However, experience has shown such protection to be desirable for fixed-location production welding and for all production welding on stainless steels. Where air samples taken at the welding location indicate that the fluorides liberated are below the maximum allowable concentration, such protection is not necessary.

**1910.252(c)(6) Zinc.**

**1910.252(c)(6)(i) Confined spaces.** In confined spaces welding or cutting involving zinc-bearing base or filler metals or metals coated with zinc-bearing materials shall be done in accordance with paragraph (c)(4) of this section.

**1910.252(c)(6)(ii) Indoors.** Indoors, welding or cutting involving zinc-bearing base or filler metals coated with zinc-bearing materials shall be done in accordance with paragraph (c)(3) of this section.

**1910.252(c)(7) Lead.**

**1910.252(c)(7)(i) Confined spaces.** In confined spaces, welding involving lead-base metals (erroneously called lead-burning) shall be done in accordance with paragraph (c)(4) of this section.

**1910.252(c)(7)(ii) Indoors.** Indoors, welding involving lead-base metals shall be done in accordance with paragraph (c)(3) of this section.

**1910.252(c)(7)(iii) Local ventilation.** In confined spaces or indoors, welding or cutting operations involving metals containing lead, other than as an impurity, or metals coated with lead-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators. Such operations, when done outdoors, must be done using respirators approved for this purpose by NIOSH under 42 CFR part 84. In all cases, workers in the immediate vicinity of the cutting operation must be protected by local exhaust ventilation or airline respirators.

**1910.252(c)(8) Beryllium.**

Welding or cutting indoors, outdoors, or in confined spaces involving beryllium-containing base or filler metals shall be done using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentrations defined by 1910.1000 of this part. In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators.

**1910.252(c)(9) Cadmium.**

**1910.252(c)(9)(i) General.** In confined spaces or indoors, welding or cutting operations involving cadmium-bearing or cadmium-coated base metals must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the acceptable concentrations specified by 29 CFR 1910.1000. Such operations, when done outdoors, must be done using respirators, such as fume respirators, approved for this purpose by NIOSH under 42 CFR part 84.

**1910.252(c)(9)(ii) Confined space.** Welding (brazing) involving cadmium-bearing filler metals shall be done using ventilation as prescribed in paragraph (c)(3) or (c)(4) of this section if the work is to be done in a confined space.

**1910.252(c)(10) Mercury.**

In confined spaces or indoors, welding or cutting operations involving metals coated with mercury-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the acceptable concentrations specified by 29 CFR 1910.1000. Such operations, when done outdoors, must be done using respirators approved for this purpose by NIOSH under 42 CFR part 84.

**1910.252(c)(11) Cleaning compounds.**

**1910.252(c)(11)(i) Manufacturer's instructions.** In the use of cleaning materials, because of their possible toxicity or flammability, appropriate precautions such as manufacturers instructions shall be followed.

**1910.252(c)(11)(ii) Degreasing.** Degreasing and other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation. In addition, trichloroethylene and perchlorethylene should be kept out of atmospheres penetrated by the ultraviolet radiation of gas-shielded welding operations.

**1910.252(c)(12) Cutting of stainless steels.**

Oxygen cutting, using either a chemical flux or iron powder or gas-shielded arc cutting of stainless steel, shall be done using mechanical ventilation adequate to remove the fumes generated.

**1910.252(c)(13) First-aid equipment.**

First-aid equipment shall be available at all times. All injuries shall be reported as soon as possible for medical attention. First aid shall be rendered until medical attention can be provided.

**1910.252(d) Industrial applications.**

**1910.252(d)(1) Transmission pipeline.**

**1910.252(d)(1)(i) General.** The requirements of paragraphs (b) and (c) of this section and 1910.254 of this part shall be observed.

**1910.252(d)(1)(ii) Field shop operations.** Where field shop operations are involved for fabrication of fittings, river crossings, road crossings, and pumping and compressor stations the requirements of paragraphs (a), (b), and (c) of this section and 1910.253 and 1910.254 of this part shall be observed.

**1910.252(d)(1)(vii) X-ray inspection.**

The use of X-rays and radioactive isotopes for the inspection of welded pipeline joints shall be carried out in conformance with the American National Standard Safety Standard for Non-Medical X-ray and Sealed Gamma-Ray Sources, ANSI Z54.1-1963, which is incorporated by reference as specified in Sec. 1910.6.

**1910.252(d)(2) Mechanical piping systems.**

**1910.252(d)(2)(i) General.** The requirements of paragraphs (a), (b), and (c) of this section and 1910.253 and 1910.254 of this part shall be observed.

**1910.252(d)(2)(ii) X-ray inspection.** The use of X-rays and radioactive isotopes for the inspection of welded piping joints shall be in conformance with the American National Standard Safety Standard for Non-Medical X-ray and Sealed Gamma-Ray Sources, ANSI Z54.1-1963.

[39 FR 23502, June 27, 1974, as amended at 40 FR 23073, May 28, 1975; 43 FR 49750, Oct. 24, 1978; 49 FR 5323, Feb. 10, 1984; 51 FR 34562, Sept. 29, 1986; 54 FR 24334, June 7, 1989; 55 FR 13696, Apr. 11, 1990; 61 FR 9227, March 7, 1996; 63 FR 1152, Jan. 8, 1998; 74 FR 46357, Sept. 9, 2009; 77 FR 17777, March 26, 2012]

## **1910.254 ARC WELDING AND CUTTING**

### **1910.254(d) Operation and maintenance**

**1910.254(d)(1) General.** Workers assigned to operate or maintain arc welding equipment shall be acquainted with the requirements of this section and with 1910.252 (a), (b), and (c) of this part.

[55 FR 13709, Apr. 11, 1990; 61 FR 9227, March 7, 1996; 70 FR 53929, Sept. 13, 2005]

## **1910.255 RESISTANCE WELDING**

### **1910.255(d)(1) Ventilation and flash guard.**

Flash welding machines shall be equipped with a hood to control flying flash. In cases of high production, where materials may contain a film of oil and where toxic elements and metal fumes are given off, ventilation shall be provided in accordance with 1910.252(c) of this section.

[39 FR 23502, June 27, 1974, as amended at 40 FR 18426, Apr. 28, 1975; 55 FR 13710, Apr. 11, 1990]



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