

**CS Part 7. Welding and Cutting  
Compared With  
29 C.F.R. 1926 Subpart J – Welding and Cutting**

**Summary:** The significant differences between CS Part 7. Welding and Cutting and the regulations found in 29 C.F.R. 1926 Subpart J – Welding and Cutting are in:

- Employer and employee responsibilities
- Fuel gas use
- Hot metal warning
- Working in confined spaces
- Cylinders
- Hoses and connections
- Arc Welding and Cutting
- Personal protective equipment
- Fire precautions

The comparisons show only those provisions where MIOSHA rules are different than OSHA or where MIOSHA rules are not included in 29 C.F.R.

MIOSHA	OSHA
<p><b>R 408.40711 Employer and employee responsibilities.</b>  <b>Rule 711.</b> (1) An employer shall do all of the following:            (1)(a) Assure that each employee has received safety training in the use of equipment for welding operations and instruction in the rules of this part before allowing the employee to use the equipment.            (1)(b) Provide protection to an employee against toxic or hazardous materials or deficient oxygen, as prescribed by the department of labor and economic growth.</p>	<p><b>1926.350(d) Use of fuel gas.</b> The employer shall thoroughly instruct employees in the safe use of fuel gas, as follows...</p> <p><b>1926.351(d) Operating instructions.</b> Employers shall instruct employees in the safe means of arc welding and cutting as follows...</p> <p><b>1926.353(a) Mechanical ventilation.</b> For purposes of this section, mechanical ventilation shall meet the following requirements:  <b>1926.353(a)(1)</b> Mechanical ventilation shall consist of either general mechanical ventilation systems or local exhaust systems.  <b>1926.353(a)(2)</b> General mechanical ventilation shall be of sufficient capacity and so arranged as to produce the number of air changes necessary to maintain welding fumes and smoke within safe limits, as defined in subpart D of this part.  <b>1926.353(a)(3)</b> Local exhaust ventilation shall consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system shall be of sufficient capacity and so arranged as to remove fumes and smoke at the source and keep the concentration of them in the breathing zone within safe limits as defined in subpart D of this part.  <b>1926.353(a)(4)</b> Contaminated air exhausted from a working space shall be discharged into the open air or otherwise clear of the source of intake air.  <b>1926.353(a)(5)</b> All air replacing that withdrawn shall be clean and respirable.</p>

MIOSHA	OSHA
<p>(1)(c) Assure that employees wear personal protective equipment as required in R 408.40751.</p> <p>(1)(d) Assure that an employee in charge of the operation of oxygen or fuel gas supply equipment or of oxygen or fuel gas systems is instructed and judged competent for this work by the employer before being left in charge. Rules and instructions covering the operation and maintenance of oxygen or fuel gas distribution piping systems shall be readily available.</p> <p>(2) An employee shall do all of the following:</p> <p>(2)(a) Use welding and cutting equipment as trained and authorized.</p> <p>(2)(b) Use the protective equipment required by the hazard and this part.</p> <p>(2)(c) Not tamper with safety devices.</p> <p>(2)(d) Report to the supervisor any faulty or defective equipment.</p> <p>(3) ****</p>	<p><b>1926.353(e)(2)</b> Employees performing any type of welding, cutting, or heating shall be protected by suitable eye protective equipment in accordance with the requirements of subpart E of this part.</p> <p><b>No comparable OSHA provisions</b></p>
<p><b>R 408.40712 Requirements generally.</b></p> <p><b>Rule 712.</b> (1) A mixture of fuel gas with air or oxygen shall not be permitted except when consumed by a burner or torch.</p> <p>(2) Only apparatus designed for use with fuel gas or oxygen, such as a torch, regulator, pressure-reducing valve, acetylene generator, and manifold, shall be used for welding or cutting.</p> <p>(3) The total volume of acetylene used per hour shall not exceed 1/7 of the total volume of the acetylene supply in the system.</p> <p>(4) Fuel gas, oxygen, or compressed air shall not flow from a cylinder or manifold through a torch or other device equipped with a shutoff valve unless the pressure is reduced by a regulator attached to the cylinder or manifold.</p> <p>(5) ****</p> <p>(7) Oxygen shall only be used for welding or cutting.</p> <p>(9) After welding operations are completed, a sign or other means shall be used to provide a warning of the hot metal.</p>	<p><b>No comparable OSHA provisions except:</b></p> <p><b>1926.353(d) Use of fuel gas.</b></p> <p><b>1926.353(d)(3)</b> Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.</p> <p><b>1926.353(a)(6)</b> Oxygen shall not be used for ventilation purposes, comfort cooling, blowing dust from clothing, or for cleaning the work area.</p> <p><b>No comparable OSHA provisions</b></p>
<p><b>R 408.40713 Working in confined spaces.</b></p> <p><b>Rule 713.</b> (1) ****</p> <p>(1)(a) The records shall be maintained at the jobsite as prescribed in Construction Safety Standard Part 1 General Rules, R 408.40101 et seq.</p> <p>(2) ****</p>	<p><b>No comparable OSHA provision contained in 1926.353(b) Welding, cutting, and heating in confined spaces.</b></p>

MIOSHA	OSHA
<b>CYLINDERS</b>	
<p><b>R 408.40721 Cylinders manufacturing, labeling, periodic testing, and marking.</b>  <b>Rule 721. (1) ****</b>  (3) An unlabeled cylinder shall not be used.  (4) An empty cylinder shall be so marked at the time of depletion.</p>	<p><b>No comparable OSHA provision</b></p>
<p><b>R 408.40722 Storage.</b>  <b>Rule 722. (1) ****</b>  (2) A cylinder shall be stored away from any source of heat in excess of 125 degrees Fahrenheit.  (3) ****  (4) Storage shall be set up to ensure first in, first out usage.  (5) A cylinder storage area shall be posted with the names of the individual gases stocked, and a warning shall be posted against tampering by an unauthorized employee.  (6) Where different gases are stored, they shall be grouped by types. Groupings shall separate the fuel gases from the oxidizing gases as specified in subrule (1) of this rule.  (7) ****  (8) A cylinder shall not be stored in basements or pits.  (9) All storage of fuel gas or oxygen within a building shall be in accordance with the specifications of National Fire Protection Association Standard NFPA 58, 1974 edition Liquefied Petroleum Gas Code, which is adopted by reference in R 408.40709.</p> <p>(10) Where a liquid or gaseous oxygen system is used to supply gaseous oxygen for welding and cutting and the system has a storage capacity of more than 20,000 cubic feet (560 cubic meters), measured at 14.7 psia and 70 degrees Fahrenheit, including unconnected reserves at the site, the system shall be as prescribed in National Fire Protection Association Standard NFPA 50, 1974 edition, Standards for Bulk Oxygen Systems at Consumer Sites, which is adopted by reference in R 408.40709.</p>	<p><b>No comparable OSHA provision except:</b></p> <p><b>1926.350(a)(10)</b> Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.</p> <p><b>1926.350(a)(11)</b> Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 feet (6.1 m) from highly combustible materials such as oil or excelsior. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage places shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.</p> <p><b>1926.350(a)(12)</b> The in-plant handling, storage, and utilization of all compressed gases in cylinders, portable tanks, rail tankcars, or motor vehicle cargo tanks shall be in accordance with Compressed Gas Association Pamphlet P-1-1965.</p> <p><b>1926.350(b)(3)</b> Fuel gas cylinders shall be placed with valve end up whenever they are in use. They shall not be placed in a location where they would be subject to open flame, hot metal, or other sources of artificial heat.</p> <p><b>1926.350(c)(2)</b> No person other than the gas supplier shall attempt to mix gases in a cylinder. No one except the owner of the cylinder or person authorized by him, shall refill a cylinder. No one shall use a cylinder's contents for purposes other than those intended by the supplier. All cylinders used shall meet the Department of Transportation requirements published in 49 CFR part 178, subpart C, Specification for Cylinders.</p> <p><b>1910.253(c) Manifolding of cylinders</b>  <b>1910.253(c)(2)(v)</b> An oxygen manifold or oxygen bulk supply system which has storage capacity of more than 13,000 cubic feet (364 cubic meters) of oxygen (measured at 14.7 psia (101 kPa) and 70 degrees F. (21.1 degrees C.), connected in service or ready for service, or more than 25,000 cubic feet (700 cubic meters) of oxygen (measured at 14.7 psia (101 kPa) and 70 degrees F. (21.1 degrees C.), including unconnected reserves on hand at the site, shall comply with the provisions of the Standard for Bulk Oxygen Systems at Consumer Sites, NFPA No. 566-1965.</p>

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<p><b>R 408.40729 Manifolding.</b>  <b>Rule 729.</b> Manifolding used for a welding operation shall be as prescribed in the general industry safety standard Part 12 Welding and Cutting, R 408.11231 to R 408.11252.</p>	<p><b>See Comparison for General Industry Safety Standard Part 12 Welding and Cutting</b></p>
<b>HOSES AND REGULATORS</b>	
<p><b>R 408.40731 Hoses and connections.</b>  <b>Rule 731.</b> (1) Hose and hose connections used for a welding operation shall be as prescribed in paragraph 3.5.6 of the American National Standard Institute Standard ANSI/AWS Z49.1, 1973 edition, Safety in Welding and Cutting and Allied Processes, which is adopted by reference in R 408.40709.  (2) ****  (3) Parallel hoses shall be color coded as follows:  (3)(a) Red—fuel gases. See subrule (4) of this rule.  (3)(b) Green—oxygen.  (3)(c) Black—inert gas or air.  (4) The employer shall assure that only approved hose is used for LP gas.  (5) A hose and its connections shall be inspected before each shift for burns, leaks, worn places, or other defects which could affect the safety of an employee. Suspected leaks shall be checked by use of a grease-free soap solution.  (6) ****</p>	<p><b>1926.350(f) Hose.</b>  <b>1926.350(f)(1)</b> Fuel gas hose and oxygen hose shall be easily distinguishable from each other. The contrast may be made by different colors or by surface characteristics readily distinguishable by the sense of touch. Oxygen and fuel gas hoses shall not be interchangeable. A single hose having more than one gas passage shall not be used.</p> <p><b>1926.350(f)(3)</b> All hose in use, carrying acetylene, oxygen, natural or manufactured fuel gas, or any gas or substance which may ignite or enter into combustion, or be in any way harmful to employees, shall be inspected at the beginning of each working shift. Defective hose shall be removed from service.</p>
<b>ARC WELDING AND CUTTING</b>	
<p><b>R 408.40742 Open circuit and no-load voltages of arc welding machines.</b>  <b>Rule 742.</b> (1) When an arc welding machine is operated without being connected to a load, the open circuit voltage shall not exceed the values shown in table 1 when rated voltage is applied to the primary winding or when a generator-type arc welding machine is operating at maximum rated no-load speed.  (2) ****  (3) Equipment working through resistors from DC trolley voltages or 250 to 600 volts shall have a protective device for automatically disconnecting the power during arc off periods.  (4) ***  (5) Table 1 reads as follows:</p>	<p><b>1910.254 Arc welding and cutting</b>  <b>1910.254(3)Voltage.</b> The following limits shall not be exceeded:  <b>1910.254(3)(i)</b> Alternating – current machines  <b>(1910.254(3)(i)A)</b> Manual arc welding and cutting – 80 volts.  <b>1910.254(3)(i)(B)</b> Automatic (machine or mechanized) arc welding and cutting – 100 volts.  <b>1910.254(3)(ii)</b> Direct-current machines  <b>1910.254(3)(ii)(A)</b> Manual arc welding and cutting – 100 volts.  <b>1910.254(3)(ii)(B)</b> Automatic (machine or mechanized) arc welding and cutting – 100 volts  <b>1910.254(3)(iii)</b> When special welding and cutting processes require values of open circuit voltages higher than the above, means shall be provided to prevent the operator from making accidental contact with the high voltage by adequate insulation or other means.  <b>1910.254(3)(iv)</b> For a.c. welding under wet conditions or warm surroundings where perspiration is a factor, the use of reliable automatic controls for reducing no load voltage is recommended to reduce the shock hazard.</p>

MIOSHA	OSHA															
<p style="text-align: center;">TABLE 1</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="3" style="background-color: #cccccc;">Maximum Open Circuit Voltages of Welding Machines</th> </tr> <tr> <th style="text-align: center;">Welding current</th> <th style="text-align: center;">Maximum open circuit (no-load) Manual &amp; semi automatic machines</th> <th style="text-align: center;">Voltage Automatic machines</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">ac</td> <td style="text-align: center;">80 rms</td> <td style="text-align: center;">100 rms</td> </tr> <tr> <td style="text-align: center;">dc&gt;10% Ripple voltage</td> <td style="text-align: center;">80 rms</td> <td style="text-align: center;">100 average</td> </tr> <tr> <td style="text-align: center;">dc&lt;10% Ripple voltage</td> <td style="text-align: center;">100 average</td> <td style="text-align: center;">100 average</td> </tr> </tbody> </table>	Maximum Open Circuit Voltages of Welding Machines			Welding current	Maximum open circuit (no-load) Manual & semi automatic machines	Voltage Automatic machines	ac	80 rms	100 rms	dc>10% Ripple voltage	80 rms	100 average	dc<10% Ripple voltage	100 average	100 average	
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<p><b>R 408.40743 Design requirements for arc welding machines.</b>  <b>Rule 743.</b> (1) ****  (2) Control apparatus shall be enclosed except for the operating wheels, levers, or handles. The handles and wheels shall be large enough to be grasped by a gloved hand.  (3) ****</p>	<p><b>1910.254(b) Application of arc welding equipment</b>  <b>1910.254(b)(4) Design</b>  <b>1910.254(b)(4)(ii)</b> On all types of arc welding machines, control apparatus shall be enclosed except for the operating wheels, levers, or handles.</p>															
<p><b>R 408.40744 Installation.</b>  <b>Rule 744.</b> (1) ****  (4) An arc welder shall meet the applicable requirements of article 630, Electric Welders of the National Fire Protection Association NFPA 70 National Electrical Code, 1978 edition, which is adopted by reference in R 408.40709.  (5) ****</p>	<p><b>No comparable OSHA provisions</b></p>															
<p><b>R 408.40746 Operation.</b>  <b>Rule 746.</b> (1) ****  (9) An employee working in the vicinity of arc welding operations and exposed to the direct rays of the arc shall be shielded by a noncombustible or flameproof screen provided by the employer, at no expense to the employee.</p> <p>(10) When a welding machine used indoors is powered by an internal combustion engine, the atmosphere indoors to which an employee is exposed shall be maintained in accordance with the requirements of the department of labor and economic growth.</p>	<p><b>1926.353(d)(ii)</b> Employees in the area not protected from the arc by screening shall be protected by filter lenses meeting the requirements of subpart E of this part. When two or more welders are exposed to each other's arc, filter lens goggles of a suitable type, meeting the requirements of subpart E of this part, shall be worn under welding helmets. Hand shields to protect the welder against flashes and radiant energy shall be used when either the helmet is lifted or the shield is removed.</p> <p><b>1926.353(d)(iii)</b> Welders and other employees who are exposed to radiation shall be suitably protected so that the skin is covered completely to prevent burns and other damage by ultraviolet rays. Welding helmets and hand shields shall be free of leaks and openings, and free of highly reflective surfaces.</p> <p><b>No comparable OSHA provision</b></p>															

MIOSHA	OSHA
<b>PERSONAL PROTECTIVE EQUIPMENT</b>	
<p><b>R 408.40751 Personal protective equipment.</b>  <b>Rule 751.</b> (1) Face and eye protection shall be worn by a welder when performing welding operations and by other employees exposed to a risk of injury from spatter or flash, or both. The protective devices shall be provided for as prescribed in construction safety standard Part 6 Personal Protective Equipment, R 408.40617, R 408.40623, and R 408.40624.            (2) Welding gloves shall be provided for by the employer, at no expense to the employee, and shall be worn to protect the hands and wrists.            (3) When necessary, such as when performing overhead arc welding, sleeves shall be provided for by the employer, at no expense to the employee, and shall be worn to protect the arms when arc welding.            (4) Leather shoes or other appropriate apparel that cover the ankle shall be worn. The employee shall provide leather shoes or other appropriate apparel unless specifically otherwise provided for in a collective bargaining agreement or other employer-employee agreement.            (5) Other protective devices, such as, but not limited to, body protection, chaps, and curtains shall be provided for by the employer, at no expense to the employee, and shall be used when an employee is exposed to a risk of injury by flash burn, sparks, and foreign bodies.</p>	<p><b>1910.252 General requirements.</b>  <b>1910.252(b) Protection of personnel</b>  <b>1910.252(b)(iii)(3) Protective clothing –General requirements.</b> Employees exposed to the hazards created by welding, cutting, or brazing operations shall be protected by personal protective equipment in accordance with the requirements of 1910.132 of this part. Appropriate protective clothing required for any welding operation will vary with the size, nature, and location of the work to be performed.</p>
<b>GENERAL FIRE RULES</b>	
<p><b>R 408.40761 Fire precautions.</b>  <b>Rule 761.</b> (1) ****            (4) A minimum of 1 2A-10BC portable fire extinguisher shall be immediately available to the work area during welding operations.            (5) Conveyor and exhaust systems within 35 feet of a welding operation that might carry sparks or hot slag shall be protected or shut down.            (6) ****            (7) The connection, by welding, of branches to a pipeline carrying a flammable substance shall be performed in accordance with the regulations of the department of transportation, 49 C.F.R. Part 192, Minimum Federal Safety Standards for Gas Pipelines, which are adopted by reference in R 408.40709.            (8) Before welding, cutting, or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made by a competent person to determine its flammability. Preservative coatings shall be considered to be highly flammable when scrapings burn with extreme rapidity.            (9) Precautions shall be taken to prevent ignition of highly flammable hardened preservative coatings. When coatings are determined to be highly flammable, they shall be stripped from the area to be heated to prevent ignition.</p>	<p><b>No comparable OSHA provision except:</b>  <b>1910.252 General requirements</b>  <b>1910.252(a)(ii) Fire extinguishers.</b> Suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use. Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed.</p>

<b>MIOSHA</b>	<b>OSHA</b>
<p><b>R 408.40762 Welding drums, barrels, tanks, or other containers.</b> <b>Rule 762. (1) ****</b> (5) Welding on natural gas pipelines shall be as prescribed by the regulations of the department of transportation, 49 C.F.R. Part 192, Minimum Federal Safety Standards for Gas Pipelines, which are adopted by reference in R 408.40709.</p>	<p><b>See 49 C.F.R. Part 192, Minimum Federal Safety Standards for Gas Pipeline</b></p>

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