WAC 296-56-60235 Welding, cutting and heating (hot work) (see also definition of "hazardous cargo, material, substance or atmosphere"). (1) Employers must make sure hot work is not performed in confined space until all requirements of chapter 296-809 WAC, are met.

(2) Employers must provide fire protection for employees performing hot work as follows:

(a) To the extent possible, hot work must be performed in designated locations that are free of fire hazards.

(b) When hot work must be performed in a location that is not free of fire hazards, all necessary precautions must be taken to confine heat, sparks, and slag so that they cannot contact flammable or combustible material.

(c) Fire extinguishing equipment suitable for the location must be immediately available and must be maintained in readiness for use at all times.

(d) When the hot work operation is such that normal fire prevention precautions are not sufficient, additional personnel must be assigned to guard against fire during hot work and for a sufficient time after completion of the work to ensure that no fire hazard remains. The employer must instruct all employees involved in hot work operations as to potential fire hazards and the use of firefighting equipment.

(e) Drums and containers which contain or have contained flammable liquids must be kept closed. Empty containers must be removed from the hot work area.

(f) When openings or cracks in flooring cannot be closed, precautions must be taken to ensure that no employees or flammable or combustible materials are exposed to sparks dropping through the floor. Similar precautions must be taken regarding cracks or holes in walls, open doorways and open or broken windows.

(g) Hot work must not be performed:

(i) In flammable or potentially flammable atmospheres;

(ii) On or in equipment or tanks that have contained flammable gas or liquid or combustible liquid or dust-producing material, until a designated person has tested the atmosphere inside the equipment or tanks and determined that it is not hazardous; or

(iii) Near any area in which exposed readily ignitable materials such as bulk sulfur, baled paper or cotton are stored. Bulk sulfur is excluded from this prohibition if suitable precautions are followed, the person in charge is knowledgeable and the person performing the work has been instructed in preventing and extinguishing sulfur fires.

(h) Drums, containers or hollow structures that have contained flammable or combustible substances must either be filled with water or cleaned, and must then be ventilated.

(i) A designated person must test the atmosphere and determine that it is not hazardous before hot work is performed on or in such structures.

(ii) Before heat is applied to a drum, container or hollow structure, an opening to release built-up pressure during heat application must be provided.

(3) Employers must follow these requirements for gas welding and cutting:

(a) Compressed gas cylinders must be used only as follows:

(i) Must have valve protection caps in place except when in use, hooked up or secured for movement. Oil must not be used to lubricate caps;

(ii) Must be hoisted only while secured, as on a cradle or pallet, and must not be hoisted by magnet, choker sling or cylinder caps;

(iii) Must be moved only by tilting or rolling on their bottom edges;

(iv) Must be secured when moved by vehicle;

(v) Must be secured while in use;

(vi) Must have valves closed when cylinders are empty, being moved or stored;

(vii) Must be secured upright except when hoisted or carried;

(viii) Must not be freed when frozen by prying the valves or caps with bars or by hitting the valve with a tool;

(ix) Must not be thawed by boiling water;

(x) Must not be exposed to sparks, hot slag, or flame;

(xi) Must not be permitted to become part of electrical circuits or have electrodes struck against them to strike arcs;

(xii) Must not be used as rollers or supports;

(xiii) Must not have contents used for purposes not authorized by the supplier;

(xiv) Must not be used if damaged or defective;

(xv) Must not have gases mixed within, except by gas suppliers;

(xvi) Must be stored so that oxygen cylinders are separated from fuel gas cylinders and combustible materials by either a minimum distance of 20 feet (6.1 m) or a barrier having a fire-resistance rating of 30 minutes; and

(xvii) Must not have objects that might either damage the safety device or obstruct the valve placed on top of the cylinder when in use.

(b) Fuel gas must be used only as follows:

(i) Before regulators are connected to cylinder valves, the valves must be opened slightly (cracked) and closed immediately to clear away dust or dirt. Valves must not be cracked if gas could reach possible sources of ignition;

(ii) Cylinder valves must be opened slowly to prevent regulator damage and must not be opened more than one and one-half turns. Any special wrench required for emergency closing must be positioned on the valve stem during cylinder use. For manifolded or coupled cylinders, at least one wrench must be immediately available. Nothing must be placed on top of a cylinder or associated parts when the cylinder is in use;

(iii) Pressure-reducing regulators must be attached to cylinder valves when cylinders are supplying torches or devices equipped with shut-off valves;

(iv) Cylinder valves must be closed and gas released from the regulator or manifold before regulators are removed;

(v) Leaking fuel gas cylinder valves must be closed and the gland nut tightened. If the leak continues, the cylinder must be tagged, removed from service, and moved to a location where the leak will not be hazardous. If a regulator attached to a valve stops a leak, the cylinder need not be removed from the workplace but must be tagged and may not be used again before it is repaired; and

(vi) If a plug or safety device leaks, the cylinder must be tagged, removed from service, and moved to a location where the leak will not be hazardous.

(c) Hose must be used only as follows:

(i) Fuel gas and oxygen hoses must be easily distinguishable from each other by color or sense of touch. Oxygen and fuel hoses must not

be interchangeable. Hoses having more than one gas passage must not be used.

(ii) When oxygen and fuel gas hoses are taped together, not more than four of each 12 inches (10.16 cm of each 30.48 cm) must be taped.

(iii) Hose must be inspected before use. Hose subjected to flashback or showing evidence of severe wear or damage must be tested to twice the normal working pressure but not less than 200 p.s.i. (1378.96 kPa) before reuse. Defective hose must not be used.

(iv) Hose couplings must not unlock or disconnect without rotary motion.

(v) Hose connections must be clamped or securely fastened to withstand twice the normal working pressure but not less than 300 p.s.i. (2068.44 kPa) without leaking.

(vi) Gas hose storage boxes must be ventilated.

(d) Torches must be used only as follows:

(i) Torch tip openings must only be cleaned with devices designed for that purpose.

(ii) Torches must be inspected before each use for leaking shut-off valves, hose couplings and tip connections. Torches must be inspected before each use for leaking shut-off valves, hose couplings and tip connections. Torches with such defects must not be used.

(iii) Torches must not be lighted from matches, cigarette lighters, other flames or hot work.

(e) Pressure regulators, including associated gauges, must be maintained in safe working order.

(f) Gas welding equipment must be maintained free of oil and grease.

(4) Employers must meet these requirements for arc welding and cutting:

(a) Manual electrode holders must be used as follows:

(i) Employers must ensure that only manual electrode holders intended for arc welding and cutting and capable of handling the maximum current required for such welding or cutting must be used.

(ii) Current-carrying parts passing through those portions of the holder gripped by the user and through the outer surfaces of the jaws of the holder must be insulated against the maximum voltage to ground.

(b) Welding cables and connectors must be used as follows:

(i) Arc welding and cutting cables must be insulated, flexible and capable of handling the maximum current required by the operation, taking into account the duty cycles.

(ii) Only cable free from repair or splice for 10 feet (3 m) from the electrode holder must be used unless insulated connectors or splices with insulating quality equal to that of the cable are provided.

(iii) When a cable other than the lead mentioned in (b)(ii) of this subsection wears and exposes bare conductors, the portion exposed must not be used until it is protected by insulation equivalent in performance capacity to the original.

(iv) Insulated connectors of equivalent capacity must be used for connecting or splicing cable. Cable lugs, where used as connectors, must provide electrical contact. Exposed metal parts must be insulated.

(c) Ground returns and machine grounding must be used as follows:

(i) Ground return cables must have current-carrying capacity equal to or exceeding the total maximum output capacities of the welding or cutting units served.

(ii) Structures or pipelines, other than those containing gases or flammable liquids or conduits containing electrical circuits, may

be used in the ground return circuit if their current-carrying capacity equals or exceeds the total maximum output capacities of the welding or cutting units served.

(iii) Structures or pipelines forming a temporary ground return circuit must have electrical contact at all joints. Arcs, sparks or heat at any point in the circuit must cause rejection as a ground circuit.

(iv) Structures or pipelines acting continuously as ground return circuits must have joints bonded and maintained to ensure that no electrolysis or fire hazard exists.

(v) Arc welding and cutting machine frames must be grounded, either through a third wire in the cable containing the circuit conductor or through a separate wire at the source of the current. Grounding circuits must have resistance low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

(vi) Ground connections must be mechanically and electrically adequate to carry the current.

(d) When electrode holders are left unattended, electrodes must be removed and holders placed to prevent employee injury.

(e) Hot electrode holders must not be dipped in water.

(f) Employers must ensure that when arc welders or cutters leave or stop work or when machines are moved, the power supply switch is kept in the off position.

(g) Arc welding or cutting equipment having a functional defect must not be used.

(h) Arc welding and cutting operations must be separated from other operations by shields, screens, or curtains to protect employees in the vicinity from the direct rays and sparks of the arc.

(i) Employees in areas not protected from the arc by screening must be protected by appropriate filter lenses in accordance with subsection (8) of this section.

(ii) When welders are exposed to their own arc or to each other's arc, they must wear filter lenses complying with the requirements of subsection (8) of this section.

(i) The control apparatus of arc welding machines must be enclosed, except for operating wheels, levers, and handles.

(j) Input power terminals, top change devices and live metal parts connected to input circuits must be enclosed and accessible only by means of insulated tools.

(k) When arc welding is performed in wet or high-humidity conditions, employees must use additional protection, such as rubber pads or boots, against electric shock.

(5) Employers must meet the following requirements in ventilation and employee protection in welding, cutting and heating:

(a) Employers must ensure that general mechanical ventilation or local exhaust systems must meet the following requirements:

(i) General mechanical ventilation must maintain vapors, fumes and smoke below a hazardous level;

(ii) Local exhaust ventilation must consist of movable hoods positioned close to the work and must be of such capacity and arrangement as to keep breathing zone concentrations below hazardous levels;

(iii) Exhausts from working spaces must be discharged into the open air, clear of intake air sources;

(iv) Replacement air must be clean and respirable; and

(v) Oxygen must not be used for ventilation, cooling or cleaning clothing or work areas.

(b) Employers must ensure that when hot work is performed in a confined space, in addition to the requirements of chapter 296-809 WAC and except as specified in (c)(ii) and (iii) of this subsection, the following requirements for ventilation are met:

(i) General mechanical or local exhaust ventilations must be provided; or

(ii) Employees in the space must wear respirators in accordance with chapter 296-842 WAC.

(c) Requirements for welding, cutting or heating of toxic metals are as follows:

(i) In confined or enclosed spaces, hot work involving the following metals must only be performed with general mechanical or local exhaust ventilation that ensures that employees are not exposed to hazardous levels of fumes:

(A) Lead base metals;

(B) Cadmium-bearing filler materials; and

(C) Chromium-bearing metals or metals coated with chromium-bearing materials.

(ii) In confined or enclosed spaces, hot work involving the following metals must only be performed with local exhaust ventilation meeting the requirements of this subsection or by employees wearing supplied air respirators in accordance with chapter 296-842 WAC;

(A) Zinc-bearing base or filler metals or metals coated with zinc-bearing materials;

(B) Metals containing lead other than as an impurity, or coated with lead-bearing materials;

(C) Cadmium-bearing or cadmium-coated base metals; and

(D) Metals coated with mercury-bearing materials.

(iii) Employees performing hot work in confined or enclosed spaces involving beryllium-containing base or filler metals must be protected by local exhaust ventilation and wear supplied air respirators or self-contained breathing apparatus, in accordance with the requirements of chapter 296-842 WAC.

(iv) Employers must ensure that employees performing hot work in the open air that involves any of the metals listed in (c)(i) and (ii) of this subsection must be protected by respirators in accordance with the requirements of chapter 296-842 WAC and those working on beryllium-containing base or filler metals must be protected by supplied air respirators, in accordance with the requirements of chapter 296-842 WAC.

(v) Any employee exposed to the same atmosphere as the welder or burner must be protected by the same type of respiratory and other protective equipment as that worn by the welder or burner.

(d) Employers must make sure employees will not engage in and not be exposed to the inert-gas metal-arc welding process unless the following precautions are taken:

(i) Chlorinated solvents must not be used within 200 feet (61 m) of the exposed arc. Surfaces prepared with chlorinated solvents must be thoroughly dry before welding is performed on them.

(ii) Employees in areas not protected from the arc by screening must be protected by appropriate filter lenses in accordance with the requirements of subsection (7) of this section. When welders are exposed to their own arc or to each other's arc, filter lenses complying with the requirements of subsection (7) of this section must be worn to protect against flashes and radiant energy.

(iii) Employees exposed to radiation must have their skin covered completely to prevent ultraviolet burns and damage. Helmets and hand shields must not have leaks, openings or highly reflective surfaces.

(iv) Inert-gas metal-arc welding on stainless steel must not be performed unless exposed employees are protected either by local exhaust ventilation or by wearing supplied air respirators in accordance with the requirements of chapter 296-842 WAC.

(6) Employers must meet these requirements for welding, cutting and heating on preservative coatings:

(a) Before hot work is commenced on surfaces covered by a preservative coating of unknown flammability, a test must be made by a designated person to determine the coating's flammability. Preservative coatings must be considered highly flammable when scrapings burn with extreme rapidity.

(b) Appropriate precaution must be taken to prevent ignition of highly flammable hardened preservative coatings. Highly flammable coatings must be stripped from the area to be heated. An uncoiled fire hose with fog nozzle, under pressure, must be immediately available in the hot work area.

(c) Surfaces covered with preservative coatings must be stripped for at least four inches (10.16 cm) from the area of heat application or employees must be protected by supplied air respirators in accordance with the requirements of chapter 296-842 WAC.

(7) Employers must protect employees against radiant energy as follows:

(a) Employees must be protected from radiant energy eye hazards by spectacles, cup goggles, helmets, hand shields or face shields with filter lenses complying with the requirements of this subsection.

(b) Filter lenses must have an appropriate shade number, as indicated in Table G-1, for the work performed. Variations of one or two shade numbers are permissible to suit individual preferences.

(c) If filter lenses are used in goggles worn under the helmet, the shade numbers of both lenses equals the value shown in Table G-1 for the operation.

Table G-1
Filter Lenses for Protection Against Radiant Energy

Operation	Shade No.
Soldering	2
Torch Brazing	3 or 4
Light Cutting, up to 1 inch	3 or 4
Medium Cutting, 1-6 inches	4 or 5
Heavy Cutting, over 6 inches	5 or 6
Light Gas Welding, up to 1/8 inch	4 or 5
Medium Gas Welding, 1/8-1/2 inch	5 or 6
Heavy Gas Welding, over 1/2 inch	6 or 8
Shielded Metal-Arc Welding 1/16 to 5/32-inch electrodes	10
Inert Gas Metal-Arc Welding (nonferrous) 1/16 to 5/32-inch electrodes	11
Shielded Metal-Arc Welding:	
3/16 to 1/4-inch electrodes	12
5/16 and 3/8-inch electrodes	14

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060, 70.54.480, and chapter 49.17 RCW. WSR 26-07-053, s 296-56-60235, filed 3/17/26, effective 4/20/26. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. WSR 15-24-102, § 296-56-60235, filed 12/1/15, effective 1/5/16. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060 and 29 C.F.R. 1910 Subpart Z. WSR 14-07-086, § 296-56-60235, filed 3/18/14, effective 5/1/14. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. WSR 09-15-144, § 296-56-60235, filed 7/21/09, effective 9/1/09; WSR 05-03-093, § 296-56-60235, filed 1/18/05, effective 3/1/05. Statutory Authority: RCW 49.17.010, [49.17].040, and [49.17].050. WSR 00-21-103, § 296-56-60235, filed 10/18/00, effective 2/1/01. Statutory Authority: RCW 49.17.010, [49.17].040 and [49.17].050. WSR 99-10-071, § 296-56-60235, filed 5/4/99, effective 9/1/99. Statutory Authority: Chapter 49.17 RCW. WSR 95-04-007, § 296-56-60235, filed 1/18/95, effective 3/1/95. Statutory Authority: Chapter 49.17 RCW and RCW 49.17.040, [49.17].050 and [49.17].060. WSR 92-22-067 (Order 92-06), § 296-56-60235, filed 10/30/92, effective 12/8/92. Statutory Authority: RCW 49.17.040 and 49.17.050. WSR 86-03-064 (Order 86-02), § 296-56-60235, filed 1/17/86; WSR 85-10-004 (Order 85-09), § 296-56-60235, filed 4/19/85; WSR 85-01-022(Order 84-24), § 296-56-60235, filed 12/11/84.]