WAC 296-304-04001 Ventilation and protection in welding, cutting and heating. (1) Mechanical ventilation requirements. For the purposes of this section, mechanical ventilation must meet the following requirements:

(a) Mechanical ventilation must consist of either general mechanical ventilation systems or local exhaust systems.

(b) General mechanical ventilation must 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.

(c) Local exhaust ventilation must consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system must 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.

(d) Contaminated air exhausted from a working space must be discharged into the open air or otherwise clear of the source of intake air.

(e) All air replacing that withdrawn must be clean and respirable.

(f) Oxygen must not be used for ventilation purposes, comfort cooling, blowing dust or dirt from clothing, or for cleaning the work area.

(2) Welding, cutting and heating in confined spaces.

(a) Except as provided in (c) of this subsection and subsection (3)(b) of this section, either general mechanical or local exhaust ventilation meeting the requirements of subsection (1) of this section must be provided whenever welding, cutting or heating is performed in a confined space.

(b) The means of access must be provided to a confined space and ventilation ducts to this space must be arranged in accordance with WAC 296-304-05011 (2)(a) and (b).

(c) When sufficient ventilation cannot be obtained without blocking the means of access, employees in the confined space must be protected by air line respirators in accordance with the requirements of chapter 296-842 WAC, and an employee on the outside of such a confined space must be assigned to maintain communication with those working within it and to aid them in an emergency.

(3) Welding, cutting or heating of metals of toxic significance.

(a) Welding, cutting or heating in any enclosed spaces aboard the vessel involving the metals specified in this subsection must be performed with either general mechanical or local exhaust ventilation meeting the requirements of subsection (1) of this section.

(i) Zinc-bearing base or filler metals or metals coated with zinc-bearing materials.

(ii) Lead base metals.

(iii) Cadmium-bearing filler materials.

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

(b) Welding, cutting, or heating in any enclosed spaces aboard the vessel involving the metals specified in this subsection must be performed with local exhaust ventilation in accordance with the requirements of subsection (1) of this section or employees must be protected by air line respirators in accordance with the requirements of chapter 296-842 WAC.

(i) Metals containing lead, other than as an impurity, or metals coated with lead-bearing materials.

(ii) Cadmium-bearing or cadmium coated base metals.

(iii) Metals coated with mercury-bearing metals.

(iv) Beryllium-containing base or filler metals. Because of its high toxicity, work involving beryllium must be done with both local exhaust ventilation and air line respirators.

(c) Employees performing such operations in the open air must be protected by filter type respirators in accordance with the requirements of WAC 296-304-09003, except that employees performing such operations on beryllium-containing base or filler metals must be protected by air line respirators in accordance with the requirements of chapter 296-842 WAC.

(d) Other employees exposed to the same atmosphere as the welders or burners must be protected in the same manner as the welder or burner.

(4) Inert-gas metal-arc welding. Since the inert-gas metal-arc welding process involves the production of ultraviolet radiation of intensities of five to 30 times that produced during shielded metal-arc welding, the decomposition of chlorinated solvents by ultraviolet rays, and the liberation of toxic fumes and gases, employees must not be permitted to engage in, or be exposed to the process until the following special precautions have been taken:

(a) The use of chlorinated solvents must be kept at least 200 feet from the exposed arc, and surfaces prepared with chlorinated solvents must be thoroughly dry before welding is permitted on such surfaces.

(b) Helpers and other employees in the area not protected from the arc by screening as provided in WAC 296-304-04011(5) must be protected by filter lenses meeting the requirements of Tables I-1A and B (see below). When two or more welders are exposed to each other's arc, filter lens goggles of a suitable type meeting the requirements of WAC 296-304-09001 (1) and (3) must be worn under welding helmets or hand shields to protect the welder against flashes and radiant energy when either the helmet is lifted or the shield is removed.

(c) Welders and other employees who are exposed to radiation must be suitably protected so that the skin is covered completely to prevent burns and other damage by ultraviolet rays. Welding helmets and hand shields must be free of leaks and openings, and free of highly reflective surfaces.

(d) When inert-gas metal-arc welding is being performed on stainless steel, the requirements of subsection (3)(b) of this section must be met to protect against dangerous concentrations of nitrogen dioxide.

(5) General welding, cutting and heating.

(a) Welding, cutting and heating not involving conditions or materials described in subsection (2), (3), or (4) of this section may normally be done without mechanical ventilation or respiratory protective equipment, but where, because of unusual physical or atmospheric conditions, an unsafe accumulation of contaminants exists, suitable mechanical ventilation or respiratory protective equipment must be provided.

(b) Employees performing any type of welding, cutting or heating must be protected by suitable eye protective equipment in accordance with the requirements of Tables I-1A and B (see below).

(6) Residues and cargos of metallic ores of toxic significance must be removed from the area or protected from the heat before welding, cutting or heating has begun.

TABLE I-1A

FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

OPERATIONS	ELECTRODE SIZE 1/32 IN	ARC CURRENT	MINIMUM PROTECTIVE SHADE
Shielded metal arc welding	Less than 3	Less than 60	7
	3-5	60-160	8
	5-8	160-250	10
	More than 8	250-550	11
Gas metal arc welding and flux cored arc welding		Less than 60	7
		60-160	10
		160-250	10
		250-500	10
Gas Tungsten arc welding		Less than 50	8
		50-150	8
		150-500	10
Air carbon	(Light)	Less than 500	10
Arc cutting	(Heavy)	500-1000	11
Plasma arc welding		Less than 20	6
		20-100	8
		100-400	10
		400-800	11
Plasma arc cutting	(Light)**	Less than 300	8
	(Medium)**	300-400	9
	(Heavy)**	400-800	10
Torch brazing	—	—	3
Torch soldering	—	—	2
Carbon Arc welding	—	—	14

** These values apply where the actual arc is clearly seen. Lighter filters may be used when the arc is hidden by the workplace.

TABLE I-1B

FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

OPERATIONS	PLATE THICKNESS... INCHES	PLATE THICKNESS... MM	MINIMUM* PROTECTIVE SHADE
Gas welding:			
Light	Under 1/8	Under 3.2	4
Medium	1/8 to 1/2	3.2 to 12.7	5
Heavy	Over 1/2	Over 12.7	6
Oxygen cutting:			
Light	Under 1	Under 25	3
Medium	1 to 6	25 to 150	4
Heavy	Over 6	Over 150	5

* As rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the viable light of the (spectrum) operation.

Note: A worker may use an auto-darkening helmet that allows for the selection of final filtration settings inside the appropriate range as described in the tables above. The auto-darkening helmet must be in good working order and maintained in accordance with the manufacturers recommendations and guidance.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 22-23-144, § 296-304-04001, filed 11/22/22, effective 12/26/22; WSR 17-18-075, § 296-304-04001, filed 9/5/17, effective 10/6/17; WSR 05-03-093, § 296-304-04001, filed 1/18/05, effective 3/1/05; WSR 03-04-099, § 296-304-04001, filed 2/4/03, effective 8/1/03. Statutory Authority: Chapter 49.17 RCW. WSR 95-04-006, § 296-304-04001, filed 1/18/95, effective 3/10/95; WSR 93-19-142 (Order 93-04), § 296-304-04001, filed 9/22/93, effective 11/1/93; Order 74-25, § 296-304-04001, filed 5/7/74.]