

Hot Work Ventilation and Protection

Why is ventilation important during welding and cutting procedures?

When welding/cutting is conducted on metal, it releases fumes into the air which are capable of being inhaled into human lungs. Ventilation is important because overexposure, through inhalation, of some welding fumes can be harmful. Proper ventilation removes contaminated air from the work area and replaces it with fresh air preventing overexposure to welding fumes.

Is ventilation the only control needed to prevent overexposure?

No, sometimes the use of respirators and even self-contained breathing apparatuses (SCBA) is suggested for protection from overexposure to metal fumes.

How do I know if I am being overexposed to harmful welding fumes?

You will not know by yourself. This guide will provide ventilation requirements to be used whenever specific metals are being welded to eliminate the possibility of overexposure altogether. By following these requirements employee protection from overexposure to welding fumes can be achieved. It is also very likely that air sampling in work areas will need to be conducted to evaluate employee exposure levels to welding fumes.

What are these protective requirements?

The following table lists the metals that are being welded and the requirements for operators during welding procedures in general industry settings.

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Metal Compound	Requirements Confined Space	Requirements Indoors	Requirements Outdoors
Fluorine Compound	Air replacement or airline respirator or self-contained breathing apparatus needed	Air sample tests to determine if exhaust hood, booth, airline respirator is suggested	Same as Indoors
Lead	Air replacement or airline respirator or self-contained breathing apparatus needed	Exhaust hood or booth	Combination particulate and vapor-and-gas removing type respirator if tests indicate need
Zinc (Galvanized Metals)			
Beryllium	Exhaust hood or booth or airline respirator if air sample tests indicate need	Exhaust hood or booth and airline respirator if air sample tests indicate need	Exhaust hood and airline respirator if air sample tests indicate need
Cadmium	Exhaust hood or booth or airline respirator if air sample tests indicate need	Exhaust hood or booth or airline respirator if air sample tests indicate need	Combination particulate and vapor-and-gas removing type respirator if tests indicate need
Mercury			



What if I am welding a metal that is not listed on the chart above?

Mechanical ventilation at 2,000 cubic feet of air per minute per welder is suggested in general industry settings during the following:

- When welding or cutting on metals other than the ones described in the chart above.
- There is less than 10,000 cubic feet of space per welder.
- Where the ceiling height is less than 16 feet.
- In confined spaces.
- Where structural barriers (such as partitions or balconies) significantly obstruct cross ventilation.

Is there a difference between general industry and construction?

Yes, there is a difference between the general industry requirements and the construction requirements. The following table lists the metals that are being welded and the requirements for operators during welding procedures in construction settings.

Metal Compound	Requirements Confined Space	Requirements Enclosed Space	Requirements Open Air
All Metals	Mechanical ventilation or exhaust hood		
Zinc-bearing base or filler metals; lead base metals; cadmium-bearing filler materials; chromium bearing metals	Mechanical ventilation or exhaust hood	Mechanical ventilation or exhaust hood	Combination particulate and vapor-and-gas removing type respirator if tests indicate the need
Metals containing lead or coated with lead-bearing materials; cadmium-bearing or cadmium coated base metals; mercury-bearing metals	Mechanical ventilation or exhaust hood	Exhaust hood or airline respirator	Combination particulate and vapor-and-gas removing type respirator if tests indicate the need
Beryllium containing base or filler metals	Mechanical ventilation or exhaust hood	Exhaust hood or airline respirator	Airline respirator if tests indicate the need

*When conducting general welding/cutting procedures that do not involve welding/cutting/heating in confined spaces, welding/cutting/heating of metals of toxic significance (Zinc, Lead, Cadmium, Chromium, Mercury, Beryllium, etc.), and/or inert-gas metal-arc welding in construction may normally be done without mechanical ventilation or respiratory protective equipment. Where, because of unusual physical or atmospheric conditions, an unsafe accumulation of contaminant exists; suitable mechanical ventilation or respiratory protective equipment should be provided.

Are there other sources of information to assist with overexposure prevention?

Yes, each metal being welded has a Safety Data Sheet (SDS). The SDS will provide information on the chemical make-up of the metal, firefighting precautions, and will also provide additional information on the personal protective equipment suggested, overexposure limits, and protection from overexposure. SDSs for each metal being welded should be looked at before welding operations beginning.

Are there any other requirements for welding/cutting in a confined space?

Yes, airline or SCBA¹ are suggested in a confined space classified as Immediately Dangerous to Life or Health (IDLH).

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