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# ACCESSING SAFETY KNOWLEDGE (ASK) SHEET: AVOIDING OVEREXPOSURE TO WELDING FUMES AND GASES

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Overexposure to the fumes and gases associated with welding and cutting processes present health hazards for workers. These hazards should be abated through appropriate safety measures. Training workers in the avoidance of overexposure to fumes and gases resulting from welding and cutting operations is an important part of protecting worker's health and conducting these tasks safely.

Fumes are solid particles suspended in vapors originating from welding consumables such as the base metal, and any coatings present on the base metal. Gases are produced during the welding process or by the effects of process radiation on the surrounding environment. Additionally, shielding gases may be used during the welding or cutting processes.

Following are some recommended practices to help workers protect their health and safety:

- Conduct a thorough analysis of the work to be performed.
- Thoroughly inspect all components of welding and cutting systems before each task.
- Properly maintaining and operating welding and cutting systems according to manufacturer's recommended procedures is an essential element for safe operations.
- Have someone qualified repair or replace any defective or damaged parts.
- Workers should not breathe the gases or fumes generated by welding operations.
- Use enough ventilation or exhaust at the arc to keep fumes and gases away from the worker's breathing zone.
- Consult the Material Safety Data Sheet (MSDS) from the manufacturer or supplier for safety information.
- Working in confined spaces may offer additional risks and challenges. A careful analysis of the work to be performed and the conditions of the working environment are essential in providing a safe work environment in confined spaces. There are also specific OSHA rules that must be observed.
- Natural air movement may help. However, working outside or even in a seemingly well-ventilated building does not necessarily eliminate exposure if calm winds do not offer much air movement. Workers welding or cutting outside should also keep moving their bodies whenever possible to keep fumes and gases out of their breathing zone as air flow changes due to wind direction.
- In areas where ventilation is questionable, using air sampling will help in determining exposure levels and the need for abatement measures.
- If overexposure is identified, OSHA recommends that employers consider any one or a combination of the following abatement approaches, as applicable or feasible: eliminate the hazard; install engineering controls; or use personal protective equipment.
- Workers should use mechanical ventilation means to improve air quality whenever possible. If engineering controls are not feasible, then respirators may be the appropriate measure.
- Follow all OSHA guidelines for permissible exposure limits (PELs) for various fumes.
- Follow the American Conference of Governmental Industrial Hygienists recommendations for threshold limit values (TLVs) for fumes and gases.
- Have a recognized specialist in Industrial Hygiene or Environmental Services check the operation and air quality of the work area and make recommendations for specific welding or cutting situations.

Contractors may want to avail themselves with a variety of resources when preparing a comprehensive welding and cutting safety program. Some informational resources include: OSHA's C.F.R. 1926.350 – Gas Welding and Cutting ([www.osha.gov](http://www.osha.gov) or 800-321-6742); American Conference of Governmental Industrial Hygienists ([www.acgih.org](http://www.acgih.org) or 513-742-2020); American Welding Society ([www.aws.org](http://www.aws.org) or 800-443-9353); Mine Safety and Health Administration ([www.msha.gov](http://www.msha.gov) or 202-693-9400); and American National Standards Institute ([www.ansi.org](http://www.ansi.org) or 800-443-9353).