Company Name: _____ Job Site Location: _____

Date: _____ Start Time: _____ Finish Time: _____ Foreman/Supervisor: _____

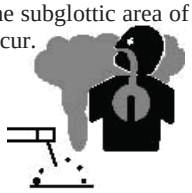
Topic 668: MIG and TIG Welding (Fumes and Gases)

Introduction: Only qualified workers should operate MIG and TIG welders. Following are safety guidelines for ensuring safe operations:

- ***Welding*** produces fumes and gases. Breathing these fumes and gases can be hazardous to your health. Keep your head out of the fumes. When inside, ventilate the area and use local forced ventilation at the arc to remove fumes and gases. When ventilation is poor, wear an air-supplied respirator.
- ***Work*** in a confined space only if it is well ventilated, or while wearing an air supplied respirator. Always have a trained watchperson nearby.
- ***Welding fumes*** and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- ***Read and understand*** the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers. Do not weld near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form toxic gases.
- ***Do not*** weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.
- ***At the point of generation,*** welding fumes are exhausted through the slots on the gun. The air can be exhausted by a welding fume extractor, passed through filters, and discharged back into the workplace. The air from the welder must be cleaned before it is recirculated back into the workplace.
- ***Because filters*** can have holes, there is a possibility of inadvertently recirculating contaminated air into the workplace. As a result, specific criteria for the recirculation of air from industrial exhaust systems should be used. In using this criterion, one must consider the probability and consequences of an air cleaner failure. In addition, a monitoring system must be used which provides adequate warning of an air cleaner failure.
- ***Try*** to use a welding system that involves a very low air flow. The air from the air cleaner can than be simply ducted outside.
- ***Remember,*** containers can be toxic, explosive, or flammable. All it takes is an errant spark to cause an explosion or flash fire if vapors are present.

Metal fumes: Welding fumes consist of oxides of the metal being welded and particulate contaminants from the welding rod or wire.

- ***Workers,*** who are welding, can develop metal fume fever from exposure to freshly generated welding fumes.
- ***Symptoms*** last for 24 hours and include chills, trembling, nausea, and vomiting. During this 24 hour period there is a reduction in lung function but no evidence of radiological changes in the lung. Worker exposure to welding fumes should be limited to 5 mg/m.
- ***The respiratory system*** is the primary target of injury. Metal fume fever and pneumonitis are the most common acute respiratory diseases associated with welding as a result of short-term exposures to high concentrations of fumes and gases.
- ***Chronic*** respiratory diseases such as cancer, pneumoconiosis, and bronchitis have been observed among welders exposed to welding fumes and gases (and possibly to asbestos in some instances over long periods). Cancers of the kidney and other urinary tract organs, and the subglottic area of the larynx, cardiovascular and gastrointestinal diseases, skin sensitization, hearing loss, and eye and musculoskeletal injury can occur.



- ***Remember,*** because of the diversity of welding techniques, processes, and materials used, most of these studies lack sufficient information to associate a specific chemical or physical agent with a particular health effect.
- ***Painted*** surfaces can burn and release decomposition products into the workers' breathing zone. Material safety data sheets for some automotive paints report that toxic metals such as chromium and lead are present in some formulations.

Iron oxide: Welding on iron surfaces produces an iron oxide fume. Excessive exposure to this fume can cause the development of lung changes that show up on X-rays. However, these lung changes do not appear to be associated with any physical impairment of the lung.

Chromium: Paints may contain chromates and hexavalent chromium as a pigment. These compounds can produce health effects such as contact dermatitis, irritation, and ulceration of the nasal mucosa, and perforation of the nasal septum. Certain insoluble hexavalent chromium compounds are suspect carcinogens. New data supports the danger associated with hexavalent chromium. Wear an air-supplied respirator.

Lead: Lead adversely affects several organs and systems. The four major target organs and systems are the central nervous system, the peripheral nervous system, kidney, and hematopoietic (blood-forming) system.

- ***Inhalation*** or ingestion of inorganic lead can cause loss of appetite, metallic taste in the mouth, constipation, nausea, pallor, blue line on the gum, malaise, weakness, insomnia, headache, muscle and joint pains, nervous irritability, fine tremors, encephalopathy, and colic.
- ***Exposure*** can result in a weakness in the wrist muscles known as "wrist drop," anemia (due to lower red blood cell life and interference with heme synthesis), proximal kidney tubule damage, and chronic kidney disease. Elevated blood pressure has been positively related to blood lead levels.

Ozone: Welding can generate ozone and nitrogen oxides. High concentrations of ozone can be emitted when welding is done on aluminum. Ozone is irritating to the eyes and upper respiratory tract.

Conclusion: Remember, your lungs are a vital organ for sustaining good health. Utilize these safety guidelines for MIG and TIG welding operations.

Work Site Review

Work-Site Hazards and Safety Suggestions: _____

Personnel Safety Violations: _____

Material Safety Data Sheets Reviewed: _____ (Name of Chemical)

Employee Signatures: ***(My signature attests and verifies my understanding of and agreement to comply with, all company safety policies and regulations, and that I have not suffered, experienced, or sustained any recent job-related injury or illness.)***

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Foreman/Supervisor's Signature: _____

These guidelines do not supercede local, state, or federal regulations and must not be construed as a substitute for, or legal interpretation of, any OSHA regulations.