Welding, Cutting and Brazing Part 3: Health Hazards

Welding, cutting and brazing methods and materials can result in health hazards associated with welding gases and fumes. These hazards can cause immediate and long-term illnesses as well as damage to your ability to see and hear. You will receive training from your employer about the specific hazards and controls associated with your work.

Common Health Hazards

When you are welding, cutting and brazing, you may be exposed to health hazards when:

- You inhale toxic gases or fumes
- Grinding activities generate dust that you inhale
- You ingest chemicals or metals that are on your hands when you eat, drink, apply cosmetics or lip balm, or use tobacco

Exposure to ultraviolet (UV) rays or light and infrared (IR) radiation can burn your eyes and skin and may cause blindness or cancer. Exposure to noise can temporarily or permanently damage your hearing.

All welding processes involve or produce hazardous **gases** that are invisible and may be odorless. The heat and UV rays or light associated with gas torch and electrical arc welding produce gases such as carbon monoxide, carbon dioxide, nitrogen oxides and ozone. Other gases and vapors may be produced as by-products from the breakdown of solvents or coatings on the metal. Gases used for arc shielding or as a fuel are also emitted during welding, cutting and brazing.

Welding, cutting and brazing produces **fumes** when hot metal vapors cool and condense into small particles that stay suspended in the air. Fumes from welding include vapors from heated welding rods, wires, fluxes, filler metals, base metals, metal coatings such as zinc on galvanized steel, and cadmium plating. Welding smoke is an example of a visible fume, but some particles in fumes are so small that they may not be visible. Even if you can't see fumes, their particles are present.

Without proper controls, the method and materials involved in a welding, cutting and brazing task can expose people to the chemicals in fumes, like:

- Zinc
- Cadmium
- Beryllium
- Iron
- Mercury
- Lead
- Paint and coatings

- Fluorides
- Chlorinated hydrocarbon solvents
- Carbon monoxide
- Ozone
- Nitrogen oxides
- Hexavalent chromium

You will be trained about the specific chemicals to which you may be exposed. You may be able to test for some materials, such as lead, in paint and coatings so that you may take appropriate precautions to prevent exposures.

To determine the chemicals that you may be exposed to and what their health effects may be, use job hazard analyses, process and procedure documentation, Safety Data Sheets (SDSs) and training materials. If you do not have or understand the contents of these sources, contact your supervisor.

The short-term health effects of overexposure to welding fumes may include:

- Difficulty breathing
- Nausea, loss of appetite and weight loss
- Diarrhea or constipation
- Head, chest or stomach pain
- Eye, nose, throat and skin irritation
- Fatigue
- Weakness
- Tremors
- Changes in vision and hearing
- Flu-like symptoms (metal fume fever)

Long-term health effects of overexposure to welding fumes may include chronic breathing problems and lung conditions; damage to tissues and organs; damage to the circulatory, nervous and reproductive systems; cancer; or death.

Immediately get away from fumes if you begin to experience any symptoms of exposure. Follow first aid and emergency instructions in your employer's procedures and the SDS. Report symptoms to your employer so they may identify and correct exposure concerns and arrange for medical care, if necessary.

Controls for Health Hazards

To control people's exposure to health hazards associated with welding, cutting and brazing, we must use a combination of elimination, substitution, engineering controls, work practices and personal protective equipment (PPE).

Eliminate situations in which you may be exposed to chemicals. For example, remove paints or coatings from surfaces before welding, cutting or brazing them.

Substitute a hazardous chemical or process with one that is less dangerous. For example, use a different welding method, change base materials, use low-manganese filler metals or change your shielding gas.

Use **engineering controls** to capture or dilute the concentration of hazardous gases and fumes before they reach people. For example, use local exhaust and general ventilation to maintain acceptable air quality.

Use **work practices** to reduce your exposure to chemicals. For example, position your body to keep your head out of the weld plume, keep chlorinated solvent containers away from welding areas, and allow metals cleaned with chlorinated solvents to dry in a well-ventilated place away from the welding area.

Wear PPE, such as a respirator, to supplement other controls.