

WELDING FUMES AND GASES

The high temperature of electric welding melts both the rod and the metal being welded and produces fumes. Fumes are extremely fine, solid particles formed by the condensation of material from a vapour state. The welding fumes of greatest concern are cadmium, chromium, iron oxide, nickel, and zinc.

Gases are also produced during welding. Ozone, nitrogen oxides, carbon monoxide, and carbon dioxide are produced when welding unprimed metals and metals treated with primers, paints, degreasing solvents and rust inhibitors.



The Risk:

Short term:

- ◆ There may be eye irritation or irritation of the nose, throat, and lungs with excessive mucus secretion and coughing. Symptoms can become more severe and lead to fluid in the lungs and pneumonia.

- ◆ Metal Fume fever is caused by welding galvanized steel (zinc, copper or magnesium) Other metals shown to cause metal fume fever are aluminum, antimony, cadmium, iron, manganese, nickel, selenium, silver and tin.

- Symptoms occur 4-12 hrs. after exposure and usually last 24 hrs.
- Initial symptoms may include a metallic or sweet taste in the mouth, dry and irritated throat, and coughing
- Symptoms resemble the flu (Eg. sweating, shivering, headache, fever, chills, thirst, muscle aches, nausea, vomiting, weakness, tiredness)
- Recovery is complete with no permanent disability

- ◆ Cadmium poisoning may resemble metal fume fever initially but conditions worsen after a short period of time. Slight exposure may result in irritation of the upper airways, sneezing, and a metallic taste. Cadmium poisoning leads to toxic effects in the entire body.

- ◆ Ozone (sweet smelling gas) poisoning results in irritation of the eyes, nose, and throat, chest tightness, cough, and shortness of breath.

Long term:

- ◆ Siderosis is the accumulation of iron oxide in the lungs.

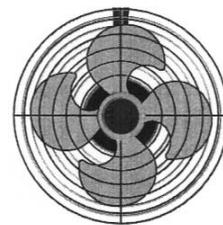
- ◆ Welding for long periods in a confined space can produce oxygen deficiency in the air leading to suffocation.
- ◆ Repeated respiratory irritation over many years can lead to diseases such as bronchitis or emphysema.
- ◆ Cadmium exposure may cause a loss of smell due to damage to the olfactory nerve.
- ◆ Fatalities have been reported in welders exposed to high concentrations of fumes and gases over short periods of time.

Substitution:

Manufacturers have used product substitution to make welding safer. For example, lithium silicate or an organic binder substituted for sodium or potassium silicates has greatly reduced chromium fumes during stainless steel welding.

Safe Work Practices:

- ◆ Try to weld outdoors. Never weld in a confined space without a ventilation hood.
- ◆ Fumes are reduced with decreasing the current and voltage.
- ◆ A shorter arc length produces less fumes.
- ◆ A larger diameter of the electrode produces less fumes.
- ◆ Welding DC negative or AC produces less fumes.
- ◆ Keep your head away from the welding smoke.
- ◆ If possible, remove rust inhibitors, paints, degreasers and other coatings from metals before welding.
- ◆ If you are using a degreasing solvent, do not use it immediately before the welding process.



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Reference list available upon request.

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