

## About Welding Fumes

The potential hazards of welding operations include metal fumes, toxic gases, and ultraviolet and infrared radiation. Fume particles are formed from vaporization of molten metal. They are very fine in size, generally one micron or smaller, and may join together to form larger particles. Fumes can be sampled by drawing air through a special filter at a controlled rate. The adverse health effects of overexposure to welding fumes and gases include chronic or acute systemic poisoning, metal fume fever (a short-term painful ailment with symptoms of fever and chills), pneumoconiosis (lung disease due to accumulation of mineral or metallic particles), and irritation of the respiratory tract.

The welding fumes produced at welding operations depend primarily on the composition of the metals being welded and the welding rods. When the base metal is iron or steel, with welding rods of similar composition the main component of the fume will be iron oxide. When welding on stainless steel, fumes containing nickel and chromium may be produced. Welding on plated, galvanized, or painted metals may generate fumes containing cadmium, zinc oxide, or lead. In addition, welding rods can generate fluoride in the fume as well as free silica, depending on the composition of the welding rod coating. In summary, welding processes may generate many different metal fumes and other toxic components. It is important that the hazards of a welding operation be controlled properly. Toxic gases that arise in welding include carbon monoxide, nitrogen dioxides, and ozone. If welding or cutting operations are conducted in the presence of chlorinated hydrocarbons, such as the form of solvents either on the metals or in the air, hazardous concentrations of phosgene and hydrogen chloride, which are highly toxic irritant gases, may be produced.

In addition to the health hazards of metal fumes and toxic gases, welding operations involve the hazard of burns from flame arc, molten metal, and heated surfaces and also that of metal splatter. Welding operations in general require face neck and eye protection for the welder - against sparks, splatter of molten metal, and the radiations (ultraviolet, infrared, and intense visible) of the arc or flame. Normally this means that a welder will wear a welding hood, or helmet, though in some cases gas welding may properly be done with adequate goggles, gloves, and other protective clothing of neck and arms.

Normally, good local or general ventilation is required to control exposures to the metal fumes and gases of welding operations. The most effective control is local exhaust ventilation in which an exhaust hood is placed near the welding arc or flame, and the contaminants are drawn away from the welder's breathing zone. The system may consist of moveable exhaust hoods, flexible and stationary ducts, a powered fan, and a fume or dust collector. It is important that, during the welding operation, the exhaust hoods are placed or set so that welding fumes are not drawn across the worker's face or into the breathing zone. Welding in confined spaces such as tanks, cabs of mobile equipment, and large shovels may be especially hazardous and requires additional ventilation. If you have any questions about this or any other occupational health matter, feel free to ask us.