



Protecting Our Welder's Lungs

One of the most hazardous occupations is welding. Each day, welders face injury from burns, electrical shock, retinal and ocular damage, in addition to bodily harm caused by handling metal objects day in and day out. But another risk that is not often considered is exposure to toxic fumes.

When conducting welding safety training the motto is, *"If you can smell the fumes, you are breathing in toxic metals that WILL end up in your bloodstream."* This is because the metal-based mixtures that are a result of the welding process emit very fine particles and gases, known as "fume". Fume is extremely toxic.

When in proximity to melted or heated metal elements such as copper, zinc, cadmium and magnesium and other substances (listed below), metal fume fever can occur. Even more common is chronic pulmonary bronchitis (a type of COPD) which is not curable—leaving one to deal with the ups and downs of its symptoms such as cough with mucus, shortness of breath, fatigue and chest discomfort.

Toxic substances:

- Chromium
- Nickel
- Arsenic
- Asbestos
- Manganese
- Silica
- Beryllium
- Cadmium
- Nitrogen Oxides
- Phosgene
- Acrolein
- Fluorine compounds
- Carbon Monoxide
- Cobalt
- Copper
- Lead
- Ozone
- Selenium
- Zinc

OSHA 29 CFR 1910.134 requires employers to implement a respiratory program which encompasses medical clearance, training and fit testing.

In addition to OSHA regulations, NIOSH has developed a widely accepted [HIERARCHY OF CONTROLS](#) as a means to the risk of illness, injuries and even death. The [HIERARCHY OF CONTROLS](#) is used to help employers control exposures in the planning and engineering of work environments, and provides the most effective safety control measure (listed at the top), to the least effective control measure. They include:

1. **ELIMINATION: Physically remove the hazard**
 - a. The goal in any workplace should be to eliminate the hazard verses just protecting against it. In an ideal situation, physically removing the hazard is the most effective hazard control, such as eliminating the need to weld or providing machinery that removes the worker from the environment (i.e., robotics).
2. **SUBSTITUTION: Replace the hazard**
 - a. Involves replacing something that produces a hazard (similar to elimination) with something that is less hazardous, such as replacing the welding material or metal with something with reduced toxic impact or risk (i.e., riveting a widget vs. welding it).
3. **ENGINEERING CONTROLS: Isolate people from the hazard**
 - a. Engineering controls isolate people from the hazard, such as local ventilation at the source of the hazard. This is seen most often in welding with the use of vents, hoods and extractors.
4. **ADMINISTRATIVE CONTROLS: Change the way people work**
 - a. Administrative controls change the way people work to minimize the exposure. Examples include procedural changes, employee training and installation of signs and warning labels.
5. **PERSONAL PROTECTIVE EQUIPMENT (PPE): Protect workers with Personal Protective Equipment**
 - a. Although a strong seller of PPE, PPE is frequently the control option that is utilized to prevent exposure if the preceding controls cannot be implemented.

PPE for welding involved a variety of respiratory options:

- **Negative Pressure Respirators:**
 - Tight fitting disposable, ½-mask and full-face respirators that rely on the employee to forcefully breath air through a filter on their face.
 - There are nine categories of filters (N95 – P100) available and the style selected is partially based on the type of welding fume the worker is exposed to.
 - Some challenges with disposables (and other negative pressure respirators) are:
 - Poor protection (if not fitted correctly)
 - Compliance (hot, breathing resistance, fogging)
 - High consumable costs, waste and disposal
 - Require frequent filter exchange to do plugging
 - Strenuous to breathe through
- **Positive or Powered Air Purifying Respirators (PAPR) and Airlines:**
 - Motor/Fan or supplied-air respirators (like the ones found on airplanes).

When choosing respiratory PPE for welders, consider the following:

- **PROTECTION:** Is the welder working in confined spaces, what is the exposure time, what are the air quality levels?
 - Some employers are now mandating that PAPRs or airlines must be worn with all welding applications. This makes the choice simpler. In confined spaces, airlines or SCBA must be considered due to the potential for lack of oxygen.
- **COMFORT:** Respirators may be needed for long periods of time and during high temperatures.
 - Comfort, breathability, and cool air are extremely important to ensure a welder is focused and able to complete the welding task at hand. The respirator needs to fit comfortably with a welding mask and it needs to be light.
- **COST:** For large welding operations or during long periods of wear, disposable masks are considered an expensive, low-protection option.

CleanSpace® Welding Respirators offer newer technologies to meet the demands and concerns for the modern-day welder.

As a distributor of **CleanSpace®** products, Conney Safety has received many positive reviews of these reasonably priced respirators. We encourage customers to consider these air-purifying, PAPR respirators as they offer additional comfort that lends to welders' productivity. As always, our Safety Services Team is happy to assist with any questions or concerns, or to arrange a demonstration so customers can see how this remarkable technology works and fit under most welding helmets.



[CleanSpace Respirators Website](#)