

## 4 warnings of welding fume problems

Check health concerns, air quality standards, fume build-up and equipment



---

*June 1, 2018*

*Jon Ladwig*

---

Many manufacturers use one of two options to clear the air of welding fumes – filter the dirty air and recirculate clean air inside the facility, or exhaust the dirty air outside and provide clean replacement air from outside.

If you are recirculating cleaned air, you'll need to keep below OSHA permissible exposure limit (PEL) thresholds for metal contaminants generated by welding processes.

If you are exhausting the air outdoors, you are subject to EPA emission requirements.

When you are using a collection system to capture weld fumes, you have to make sure your equipment is doing its job.

Recognizing warning signs that you may have problems with your fume extraction equipment and addressing them promptly is key to protecting workers' health and your facility and keeping your operation in compliance. Here are a few important indicators that you may have a welding fume problem:

### **Employee health concerns**

If your employees experience health problems consistent with overexposure to fumes, pay attention. In general, watch out for eye, nose and throat irritation, dizziness and nausea.

Manganese, the primary metal in welding wire, can cause headaches, exhaustion, listlessness and weakness. Prolonged exposure to manganese fume can cause neurological symptoms.

Exposure to hexavalent chromium, a carcinogenic substance produced during welding on metals that contain chromium, can result in short-term upper respiratory symptoms, eye or skin irritations. The most serious long-term danger associated with hex chrome exposure is lung cancer.

Zinc oxide, generated by hot work on galvanized steel, can result in "metal fume fever," a short-term illness in which severe flu-like symptoms occur after a break from work, such as after a weekend or during a vacation.

Signs and symptoms of beryllium exposure can include shortness of breath, an unexplained cough, fatigue, weight loss, fever and night sweats.

### **Exceeding air quality standards**

If air quality testing shows your facility no longer meets OSHA exposure limits for the materials you are welding, you are exposing your workers to dangerous welding fumes. OSHA has established PELs based on an eight-hour time-weighted average (TWA) for hundreds of dusts, including metals contained in welding fumes. They are listed in OSHA's annotated PEL tables.<sup>1</sup> OSHA's Fact Sheet, "Controlling Hazardous Fume and Gases during Welding"<sup>2</sup> includes links to OSHA standards applicable to welding.

The OSHA PEL requirements will determine the minimum level of filtration efficiency that your fume collector must be able to achieve. Note, though, even if your facility is in compliance with PELs set for your metals, some of your workers might still experience fume-related health symptoms. When this happens, you may need to set even lower exposure limits to ensure air quality safety for all of your employees.

If visible fumes are exhausted outdoors, the air is subject to monitoring under EPA National Emission Standard for Hazardous Air Pollutants (NESHAP) Rule 6x.<sup>3</sup> Within this standard are materials that contain 1.0% by weight manganese or 0.1% by weight cadmium, chromium, lead or nickel. If you opt to exhaust the air straight outdoors, you must perform an EPA Method 22 Fugitive Emission test per NESHAP Rule 6x.

### **Excessive build-up of fumes**

If you still have welding fumes building up in your facility, pay attention to your equipment. If you have a source capture system, it may need adjustments to get back to the original performance level. Or your process may have changed, and your source points are no longer effective.

If you are using an ambient ventilation system, you might see a light cloud during working hours. These light fumes should dissipate when the work stops and the filter system stays running. Watch out for a fume cloud that thickens throughout the day and hangs in the air long after welding activity ends. If you can see heavy fume accumulation, it doesn't necessarily mean that your fume extraction system isn't working. Many successful companies increase production and outgrow the fume extraction system and need to re-evaluate to accommodate the uptick in activity.

## **Equipment issues**

Whether you choose to exhaust air outdoors or recirculate air indoors, one strategy that offers multiple benefits is the use of a dust and fume collector with high-efficiency cartridge filtration. If your system isn't working sufficiently to handle the welding fumes created from your facility's workload, you'll notice the effects in the performance of your equipment.

If the filters in your fume extraction system are failing prematurely and requiring frequent change-out, the culprit may be excessive airflow for the filter media area. This could indicate that the collector may be too small for the job.

Another area to watch is the compressed air system. If the compressed air pressure is too low, the pulse-cleaning system will not clean the filters properly. If the compressed air moisture content is too high or there is oil present, the filters may plug or it could cause problems with the solenoid and diaphragm valves. Moisture problems in compressed air systems are especially prevalent in cold winter months.

## **Proactive weld fume control**

A well-designed cartridge system will properly filter welding fumes and other hazardous contaminants, and the filtered air can either be exhausted outside or recirculated back into the facility. These systems use self-cleaning mechanisms that pulse dirt off the filters, allowing units to run for extended periods between filter change-outs.

## **Regular inspections & periodic service**

Verify that dampers are in position, valves are working and pulse-cleaning systems are functioning properly. Check pressure drop on filters to make sure it has not exceeded the manufacturer's recommended limit. Check compressed air pressure and purge the compressed air header, looking for signs of moisture. If you are located in a cold climate, make sure that your compressed air has a dew point that is below the lowest temperatures your equipment will be exposed to.

## **Test your dust**

If you're experiencing any of the warning signs for welding fume problems, bring in an environmental engineer to perform air sample testing. This will allow you to pinpoint what pollutants are occurring and to determine whether you are below OSHA PEL thresholds. Also, if you haven't tested your dust for flammability and explosion potential, NFPA guidelines call for you to do so. An environmental engineer or your fume collection equipment supplier can connect you with a lab that specializes in explosion testing.

---

## References:

1. <https://www.osha.gov/dsg/annotated-pels/>
2. [https://www.osha.gov/Publications/OSHA\\_FS-3647\\_Welding.pdf](https://www.osha.gov/Publications/OSHA_FS-3647_Welding.pdf)
3. <https://www.epa.gov/stationary-sources-air-pollution/metal-fabrication-and-finishing-source-categories-national-emission>

Recent Articles By Jon Ladwig

**Active & passive explosion protection systems for dust collectors**

**Control dust and fumes in metalworking and welding operations**

**Dusts, fumes & mist: How to control beryllium exposures**

**What to do when cold weather prevents opening doors**

Jon Ladwig is a metal industry specialist for Camfil Air Pollution Control (APC). Camfil APC is a global manufacturer of dust, fume and mist collection equipment and is part of Camfil, the largest air filter manufacturer in the world. Telephone 800-479-6801 or 870-933-8048; [www.camfilapc.com](http://www.camfilapc.com).

Copyright ©2018. All Rights Reserved BNP Media.

Design, CMS, Hosting & Web Development :: ePublishing