



## ***A Guide to Welding Fume Control***

Arc Welding Safety  
[www.lincolnelectric.com/safety](http://www.lincolnelectric.com/safety)

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# Welding Fume Control Methodology

Employers are responsible for providing a safe and healthy workplace for their employees. Under OSHA's Hazard Communication Standards, employers are required to evaluate the hazards of the chemicals in their workplace, train their employees in the identity, hazard, and means to protect themselves, and provide information about the hazards identified on labels on shipped containers, material safety data sheets (MSDS) and other information available to them.

Under OSHA's Air Contaminant Standards, an employee's potential exposure is measured and compared to the OSHA Permissible Exposure Limit. If a company has a policy setting its own Occupational Exposure Limit [such as the ACGIH Threshold Limit Value (TLV) if lower than the OSHA PEL] then the employee's potential exposure would be compared to that value.

Employers train their employees about the identity, hazard, and means to protect themselves from hazardous chemicals. Employees are expected to participate in their employers' protective programs and take steps to protect themselves.

## **Methods of Compliance: Engineering & Work Practice Controls**

Employers shall use Engineering and Work Practice Controls as the primary means to reduce and maintain employee exposures to or below the PEL or TLV, unless the employer can demonstrate that such control measures are not feasible.

- A. **Engineering Controls:** include substitution, isolation and ventilation.
- B. **Work Practice Controls:** involve adjustments in the way a task is performed, as well as the periodic inspection and maintenance of engineering control equipment. Work practice controls should complement engineering controls in providing employee protection.
- C. **Personal Protective Equipment:** When engineering and work practice controls cannot reduce employee exposure to or below the PEL, employers must provide respirators. OSHA's Methods of Compliance states that:

*"To achieve compliance with paragraphs (a) through (d) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with 1910.134."*[29CFR1910.1000(e)]

Respirators may be used during the period necessary to install or implement feasible engineering controls and during maintenance, repair and emergency situations.

No one solution will fit all applications. Solutions frequently involve one or more methods of control to properly and adequately control employee exposure.

## **Welding Fume Control Methodology**

To thoroughly explore your welding fume control options, you should clearly identify and assess your actual needs and operating conditions. The following Welding Fume Control Methodology, along with your Lincoln Electric Technical Sales Representative, can help you through this process, as he or she can bring expertise and resources to assist you.

### **A. Engineering Controls**

#### **1. Substitution**

Is it feasible and practical to modify or replace your current welding process, consumable, gas, welding procedure or equipment technology with an alternative process, consumable, gas, welding procedure or equipment technology that generates less welding fume?

#### **2. Isolation**

Is it feasible and practical to isolate and separate your welding operation by moving it to a regulated area, by automating/ventilating the welding process and/or by placing a barrier between the employee and the source?

#### **3. Ventilation**

Is it feasible and practical to control the welding fume path between the source and the worker through source, local and/or general shop extraction/ventilation equipment?

### **B. Safe Work Practice Controls**

Safe work practices complement each level of Engineering Controls and are designed to control the manner in which work is performed. These practices include such areas as safe welding habits (keeping your head out of the fumes, keeping fumes and gases away from your breathing zone and proper training and use of fume extraction equipment) as well as housekeeping, maintenance and general administrative procedures such as scheduling operations/tasks at a time to minimize potential exposure.

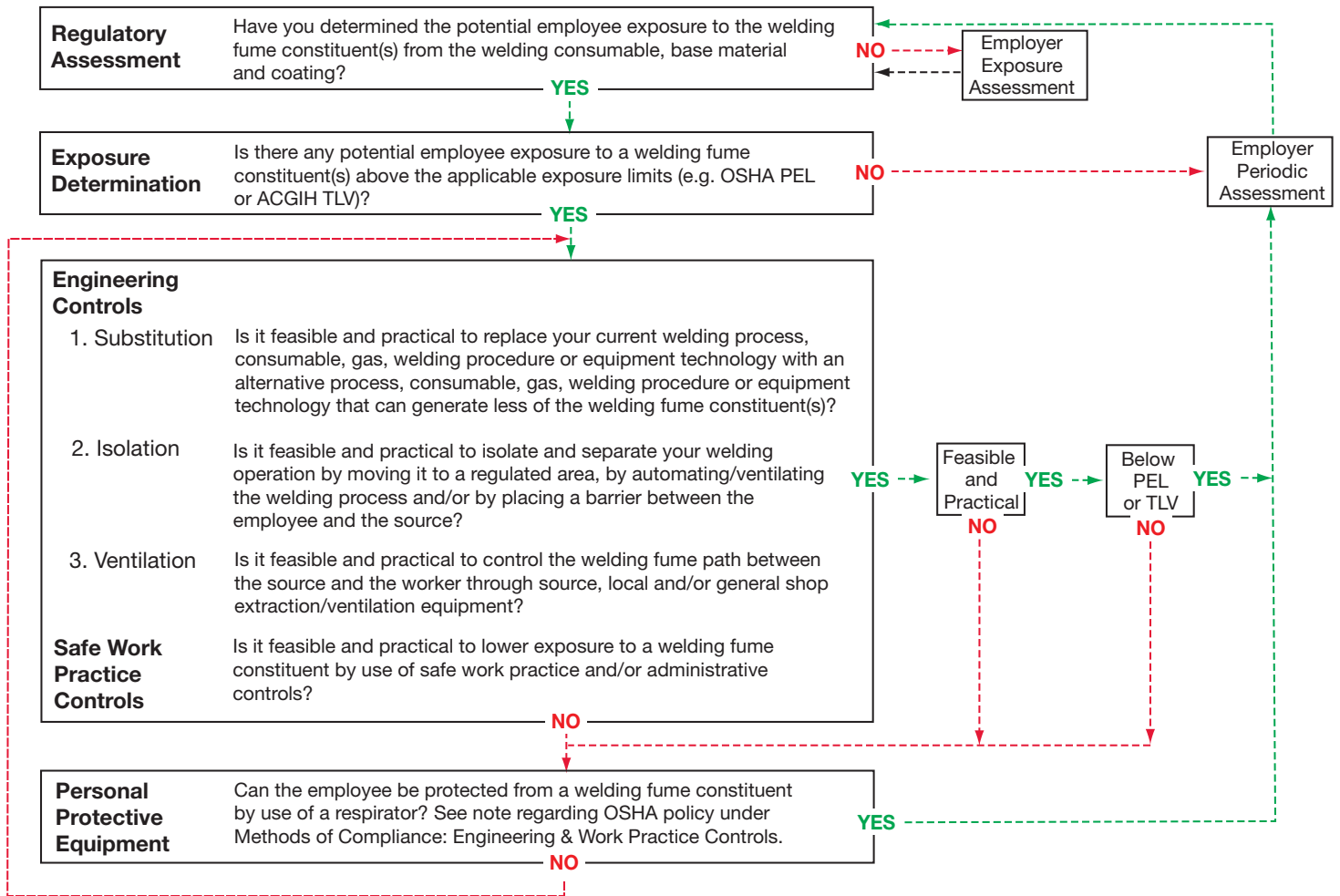
### **C. Personal Protective Equipment (PPE)**

An important method of protecting employees in certain situations can be the use of PPE, including respirators. However, employers are required to establish a respirator program in compliance with OSHA's respirator standard, which requires an initial employee medical evaluation, more frequent evaluation of worker exposure levels, training and recordkeeping. In addition, the OSHA PPE evaluation may determine the need for additional personal protection practices, including specific requirements for additional work clothing and equipment, as well as the need for a separate change room, shower and laundering service<sup>(1)</sup>.



<sup>(1)</sup> May be required by OSHA regulations. For example:  
Chromium: 29CFR1910.10269(h)  
Cadmium: 29CFR1910.1027(i)

# Lincoln Electric's Suggested Welding Fume Control Methodology



Important Compliance Note: Employers must refer to applicable OSHA and state regulations for specific legal requirements. This information should be used for informational purposes only.

## Additional Support Material Available From Lincoln Electric.

To order, fax 1-800-959-2727 or visit Lincoln's website.



Fume Hood Positions Poster - Order No. WC516



FAQ's Brochure - Order No. MC08-31






Safety Brochure - Order No. E205



Fume Hood Video - Order No. MC08-75

For more resources on environmental system products, ANSI Z49.1 Safety in Welding, Cutting and Allied Processes, OSHA hexavalent chromium regulations, AWS recommendations, etc. visit Lincoln Electric's arc welding safety website.

# Methods for Controlling the Employee's Route of Exposure

Source	Pathway	Employee
		
<p><b>Substitution</b></p> <ul style="list-style-type: none"> <li>• Process</li> <li>• Consumable</li> <li>• Gas</li> <li>• Procedure</li> <li>• Advanced Welding Technology</li> </ul>	<p><b>Isolation</b></p> <ul style="list-style-type: none"> <li>• Automate and Ventilate</li> <li>• Regulated Work Area</li> </ul> <p><b>Ventilation</b></p> <ul style="list-style-type: none"> <li>• Source Extraction</li> <li>• Local Exhaust Ventilation</li> <li>• General Shop Extraction and Ventilation</li> </ul>	<p><b>Proper Work Practices</b></p> <p><b>Personal Protective Equipment</b></p> <p><b>Medical Surveillance</b> <sup>(2)</sup></p> <p><b>Housekeeping</b></p> <p><b>Clothing and Hygiene</b></p>
Air monitoring—initial assessment to compare potential fume exposure level to the applicable standard.	Air monitoring—periodic assessment of ventilation controls to demonstrate continued fume control below applicable standard.	Air monitoring—to assure adequacy of respirator protection factor.
Training—Welding work practice controls.	Training—Welding and ventilation work practice controls.	Training—PPE training, proper work practices, personal hygiene, medical surveillance, hazard communication, recordkeeping, etc.
Equipment maintenance	Ventilation equipment maintenance	PPE and respirator maintenance

<sup>(2)</sup> May be required by OSHA regulations. For example:  
Chromium: 29CFR1910.1026(k)  
Cadmium: 29CFR1910.1027(l)

The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

## CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company® is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

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