

# FOCUS ON WELDING

## BREATHE EASY...Solutions for Clean, Safe Air



Micro Air dust collectors, downdraft tables, portables, and source capture arms provide solutions for clean, safe, air in welding processes, capturing weld smoke and fumes, leaving the work place free of harmful contaminants.

## Hazards of Weld Smoke and Fumes in the Workplace

Overexposure to weld smoke and fumes can cause a wide range of health problems.



Work Area Prior to Source Capture of Weld Smoke and Fumes



Work Area After Source Capture of Weld Smoke and Fumes

**Metal dust particles** in welding fumes are a leading cause of eye irritation in factories. Metal dust also can cause upper respiratory irritation with black material being coughed and sneezed from workers who are exposed to welding fumes. Metal dust particles are also known to cause headaches.

**Manganese**, the primary metal in welding wire, can cause workers to feel exhausted, apathetic and weak. It is also a primary cause of headaches. Chronic overexposure to such fumes leads to a condition known as “**manganism**” which is characterized by neurological and neurobehavioral health problems. The permissible exposure limit (PEL) for manganese is 5.0 milligrams per cubic meter TWA. Manganese is the trigger for EPA Rule 6x.

**Hexavalent Chromium or CR(VI)** is a carcinogenic substance produced during welding or other types of “hot work” on stainless steel and other metals that contain or are coated with chromium. Hex chrome overexposure can result in short-term upper respiratory symptoms, and eye or skin irritations. Long-term, the greatest health danger associated with hex chrome exposure is lung cancer. Other major health effects include damage to the upper respiratory system, and allergic and irritant contact dermatitis. Respiratory tract problems can include inhalation damage to mucus membranes, perforation of septum tissue between the nostrils of the nose, and damage to the lungs. In addition there may be injury to the eyes, skin, liver and kidneys. Once in the body, hex chrome typically targets some of the body’s organs. A worker exposed to hex chrome may also experience symptoms such as sinus irritation, nosebleeds, stomach and nose ulcers, skin rash, chest tightness, wheezing and shortness of breath. OSHA Permissible Exposure Levels: OSHA has defined two levels of exposure for hexavalent chromium.

- The current OSHA PEL for hex chrome was reduced in 2006 from 52 µg/m<sup>3</sup> to 5.0 µg/m<sup>3</sup> (micrograms per cubic meter) as an 8 hr. TWA.
- The second level is called the Action Level (AL) at 2.5 µg/m<sup>3</sup>. This is where employers are required to take specific actions, and failure to take these actions may result in penalties.

**Zinc Oxide** is a pollutant generated by hot work on galvanized steel. Exposure can result in a condition known as “metal fume fever”, a short-term illness in which severe flu-like symptoms occur after a break from work. Due to the delayed reaction, it is often confused with regular influenza and in many cases goes undiagnosed. The current PEL is 5.0 milligrams per cubic meter TWA.

It is imperative to follow OSHA exposure guidelines for these and other metals, particularly where workers are at risk for long-term health effects.



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### Best Practices for Smoke / Fume Removal

In the past, when weld fumes became excessive, the simple solution was to open the shop door and exhaust the fumes outside. Due to today's more stringent EPA regulations, that is no longer an option. If visible fumes are exhausted outdoors, the air is subject to stringent monitoring under EPA National Emission Standard for Hazardous Air Pollutants (**NESHAP**) **Rule 6x**. This rule went into effect in 2011 and is highly applicable to welding shops.

### Methods of Collection

Whether you opt to exhaust filtered air outdoors or recirculate air indoors, the use of a cartridge dust and fume collector is the best method of clearing the air of hazardous contaminants, and is identified under Rule 6x as an acceptable control device to eliminate visible emissions. There are four general types of cartridge dust and fume collection systems used to clean up welding processes:

- **Source Capture** systems typically utilize a flexible **source capture arm** ducted to a collector, a **downdraft table** with back and side shields, a **portable collector** equipped with a source capture arm, or a **complete enclosure** around the operation, such as an enclosure around a robotic weld cell. Source capture is widely considered the best method of collection as it pulls the contaminants into the filtration system, away from the worker's vision and breathing zones, leaving clean safe air in the work zone.
- **Clean Air Booth (CAB)** pulls smoke and fumes from work zone, away from the worker, and into a cartridge filtration system in the back wall of the booth and returns clean air to the facility.
- **Ambient** systems that filter all the air in the shop, using a central system or multiple smaller collectors are often chosen to serve larger areas because they allow a facility involved in multiple operations to capture all the fumes.
- **Canopy hoods** ducted to a cartridge collector are often utilized if the area is not too large. Curtains or hard walls may be added to the sides to create a booth or enclosure.

Keeping weld fumes under control is necessary for, not only regulatory compliance, but for employee safety and health. Good indoor air cleaning also prevents buildup of nuisance dust on electrical components, machinery and employee work stations.



Downdraft Tables provide source capture of weld smoke and fumes.



Smoke and fumes pulled away from worker breathing / vision zones.



Source Capture Arms ducted to central system located outdoors returns clean, heated/cooled air to facility.



Source Capture Arms ducted to ceiling hung cartridge collector.



Clean Air Booth clears breathing zone.



Portable TM1000 cartridge collector with source capture arm.