

WELDING EXPOSURES IN MANITOBA



The results of a two year study sponsored by a grant from the Community Initiatives and Research Program of Workers Compensation Board of Manitoba involving 40 companies across Manitoba showed that half of the Metal Inert Gases (MIG) welders tested who were not using respiratory protection or local exhaust ventilation were overexposed to welding fumes. By contrast, where controls such as local exhaust ventilation or respiratory protection were used, workers were consistently found to be exposed to safe levels of welding fumes.



**SAFE
WORK**

**S
A
F
E** SPOT THE HAZARD
ASSESS THE RISK
FIND A SAFER WAY
EVERYDAY

Health Effects of Welding

Welding fumes are inhaled by the welder and can cause several different types of health disease.

Lung Effects: Welder's Lung (or Siderosis of the lung) is an occupational illness often associated with welding fumes.

Central Nervous System Effects: The primary target of manganese toxicity is the nervous system, and common symptoms including dementia, anxiety, a 'mask-like' face, and manganism, a syndrome similar to Parkinson's disease.

Reproductive Effects: There is an excess of infertility among welders that led to studies on sperm quality and welding exposures.

Nature of the Study

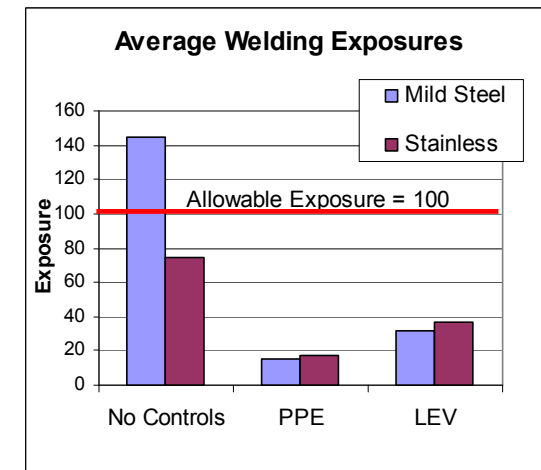
Air testing was performed by OHG Consulting on welders performing MIG welding to measure the air they were breathing. The samples were analyzed for 27 metals at an accredited laboratory. The results were compared to the occupational exposure guidelines for welding metals including welding fume.

Study results

The study found that over half of the workers who were not using either respiratory protection or local exhaust ventilation were overexposed to welding fumes.

Summary of Findings

Controls such as local exhaust ventilation (LEV) and respiratory protection (PPE) were found to protect workers 100 percent of the time.



Contrary to what many welders believe, welding on mild steel results in higher exposure than welding on stainless steel. That is because up to 95% of the exposure is from the welding wire and not the metal being welded.

How Do I know if My Workplace Has Safe Levels of Welding Exposure?

The best way to know what the welding exposures are in your workplace is to have air testing done by a qualified person. Small sampling pumps were worn by the workers so to capture air from their breathing zone. This is the best way to measure the welder's exposure to welding fume.

Welding Fume Controls

There are a number of proven methods to reduce exposure to welding fumes.

Substitution: Often a majority of the exposure comes from manganese in the welding wire. Switching to a welding wire with a lower manganese content is a no-cost way to reduce exposure.

Work Practices: Sometimes the position of the welder or the work can be changed so that the welder is not directly in the welding plume. Work tables or jigs that tilt can significantly reduce worker exposure.

Welding Exposures when Welding on Horizontal vs. Vertical Surfaces

Measures	Horizontal	Vertical
Maximum	38.0 µg/m ³	2.5 µg/m ³
Median	4.5 µg/m ³	0.8 µg/m ³

Local Exhaust Ventilation: An exhaust duct is used to capture the plume at the source. This provides excellent fume extraction. Because it uses a low air volume and the air can be filtered and released back into the welding shop, it has modest operating costs.



General Exhaust Ventilation: The amount of air brought into the welding area is increased thus diluting and purging the welding fumes from the shop air.

Respiratory Protection: Normally used when other controls are impracticable, respiratory protection filters the air that the welder breaths and significantly reduces exposure.

The study also included retesting some workplaces once welding controls had been put in place. Some of the results of the retests are provided below:

By switching to a low manganese welding wire, a company reduced their average welding exposure of 192% to 52% of the allowable exposure.

Overall average exposure of 139% was reduced to 53%. This was achieved by expanding the local exhaust system. Improved design of the local exhaust system reduced worker exposure using the system by another 20%.

Improving airflow over welding benches with a general ventilation upgrade reduced average welding exposures from 130% to 66% of the allowable.

Overall, all of the workplaces retested showed significantly lower levels of welding exposure. This demonstrates that existing methods are practical ways to reduce worker exposure

The study was performed by Doug Wylie of OHG Consulting. To request a free electronic copy of the study including information on better controlling welding fumes, Mr. Wylie can be reached at:

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