



Health and Safety Bulletin No. 26

Reducing exposure to carcinogenic welding fumes

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Background

The International Agency for Research on Cancer (IARC) classifies welding fumes as carcinogenic. Amounts and types of fumes produced vary greatly depending on the process involved and the materials being used such as metals, solvents, flux, paint and plastics.

The health effects of exposure to welding fumes, dust, vapour and gases can vary. Effects may include irritation of the upper respiratory tract (nose and throat), metal fume fever, increased susceptibility to pneumonia (including pneumococcal pneumonia), pneumonitis, asthma, chronic obstructive pulmonary disease (COPD) which includes bronchitis and emphysema, and neurological effects.

In Western Australia, the workplace exposure standard (WES) for welding fumes is **1 mg/m³**. This is measured as the time-weighted average concentration inside a welder's helmet over an 8-hour workday. Under the work health and safety legislation, a person conducting a business or undertaking (PCBU) must ensure that workers' exposure to welding fumes does not exceed this exposure standard. The WES acknowledges the risks linked with long-term, cumulative exposure and the potential for the development of cancer decades after exposure.

WorkSafe's data from 2024 – 2025 shows approximately two thirds of welding fume samples submitted to the department exceeded the WES, highlighting ongoing health risks and the need for effective control measures. In most of these cases, respiratory protective equipment was used to reduce exposure.

Summary of hazard

Welding fumes are classified as a Group 1 carcinogen, meaning it can cause cancer in humans. The risk is affected by factors such as:

- type of welding process used
- use of ventilation controls
- personal protective equipment worn
- length of time welding.

Further contributory factors

Worker exposure to welding fumes and other airborne hazards is increased when:

- welding or cutting painted or coated metals, due to toxic pyrolysis products
- welding galvanised or cadmium coated metals, causing metal fume fever

- welding stainless steel, which can generate chromium (Cr(VI)) and nickel oxide(s) fume
- metals that have previously been exposed to process chemicals are welded, cut, or gouged, they can release unpredictable and potentially harmful fumes and gases
- performing high-fume activities such as arc air gouging or stick welding
- welding thicker materials, requiring higher electrical currents and producing more fumes
- working in poorly ventilated or confined spaces, often because of inadequate engineering controls, such as the absence of effective local exhaust ventilation (LEV) designed to capture and remove fume from the worker's breathing zone.

Controls

PCBUs must take a risk management approach that includes eliminating or substituting high fume generating processes where practicable. For example, replace welding with mechanical fastening, use lower-fume techniques such as TIG, robotic aids or low-emission consumables.

When set up and used correctly, on-torch fume extraction can significantly reduce exposure by capturing fumes at the source. Regular checks and maintenance keep it working effectively and help protect weld quality. Another engineering control is local exhaust ventilation. Administrative controls such as worker rotation, scheduling high-fume tasks during periods of low occupancy, comprehensive training and health monitoring are also important.

Finally, suitable respiratory protective equipment (RPE), such as powered air purifying respirators fitted with a P3-rated particulate filter, should be selected, provided and maintained to reduce worker exposure. Powered air purifying respirators are more comfortable than non-powered respirators and are likely to be used more reliably.

If non-powered air purifying respirators are to be used, filters should be selected that provide a protection factor of at least 50, which typically means selecting a P3-rated particulate filter with 99.96% or better filtration efficiency.

Air sampling and health monitoring are not control measures. However, they are essential tools for verifying that control measures are effective and that exposure to atmospheric contaminants does not exceed the WES (as required by regulation 49 of the Work Health and Safety (Mines) Regulations 2022).

Note

Australia is transitioning to the [workplace exposure limits \(WEL\) for airborne contaminants](#). From 1 December 2026, airborne contaminants must not exceed the WEL list. Until then, PCBUs must still comply with the WES list.

Further information

- WorkSafe: [Welding processes](#) - Code of practice
- WorkSafe: [RPE - Fit testing requirements](#) - Information sheet
- Safe Work Australia: [Welding fumes](#)
- Cancer Council: [Welding](#)
- Breathe Freely Australia: [Breathe Freely in Welding](#)
- Weld Australia:
 - [Fume Minimisation Guidelines: Welding, Cutting, Brazing & Soldering](#)
 - [Health and Safety in Welding, TN7-20](#)