

Managing welding fumes

Legislative requirements

In January 2024 Work Health and Safety Ministers agreed to an immediate reduction to the [workplace exposure standard](#) (WES) for welding fumes (not otherwise classified) from an 8-hour time weighted average (TWA) of 5 mg/m³ to 1 mg/m³.

In Queensland, the requirement to **not exceed** the exposure standard is provided in the [Work Health and Safety Regulation 2011 s49](#)

Welding fumes

Welding fumes form when metal heats beyond boiling point. Welding fumes are complex mixtures of metallic oxides, silicates and fluorides and differ depending on the type of welding process, composition of welding rod, coatings etc. The health effects are [varied](#) and can be acute or chronic.

Control options

Student exposure to welding fumes is limited due to the restricted duration of timetabled lessons. Teacher exposure will be dependent on an individual's scheduled teaching load. Exposure for staff and students will be well below the 8-hour equivalent that the WES is calculated around. However, it is important that controls are in place to minimise welding fume exposure. Specific [risk controls](#) to ensure the exposure standard is not exceeded can include:

Elimination of, or reduction of the number of, welding tasks

Substitution - Changes to the preparation of materials to reduce contaminants or choosing a welding technique and consumables that make less fume and/or UV radiation. (refer to Welding processes Code of practice – p 26)

Engineering - Using local exhaust ventilation systems to reduce exposure to fumes and other contaminants. Local exhaust ventilation (LEV) systems remove gases, fumes, dusts and vapours at the source before they can mix with the room air. A combination of local exhaust and forced dilution ventilation (e.g. fans) is best practice.

Isolation of people from the welding task, PPE and training

Administration – dedicated areas with controlled access, robust maintenance and record keeping and personal protective equipment (PPE) – suitable for the task.

Breathe Freely Aust – Welding hierarchy of control : <https://breathefreelyaustralia.org.au/wp-content/uploads/2019/05/hierarchy-of-control-v3-AIOH-1.pdf>

Local exhaust systems

To be effective, local exhaust ventilation systems should be designed to provide a minimum capture velocity at the fume source of 0.5 m/second away from the welder.

Schools with fume extraction systems (LEV) that align with the current design standards have standard capture velocities that meet the recommended 0.5 m/second. When this capture velocity is achieved, in turn the WES is not exceeded.

Testing of fixed mechanical ventilation in welding bays is important to ensure the capture velocity remains at 0.5m/s. Annual inspection of fume extraction is now included in the Service Maintenance Program (SMP).

Service Maintenance Program

Ensure your welding fume extraction systems are updated in the Plant and Equipment (P&E) asset registration data held by the department and used to inform QBuild of the service maintenance requirements.

- The following link will give you information on [How to complete the plant and equipment registration template \(PDF, 287KB\)](#)
- You can submit your updated P&E asset registration using [Plant and equipment registration template \(XLSX, 228KB\)](#)
- Service maintenance program – <https://intranet.qed.qld.gov.au/Services/facilities/asset-management/education-management/school-maintenance/Pages/service-maintenance.aspx>

Resources

- [Safe Work Australia Workplace exposure standards](#)
- WHSQ - [Welding processes - Code of Practice 2021](#)
- WHSQ - Code of Practice – Welding processes 2021
https://www.worksafe.qld.gov.au/_data/assets/pdf_file/0025/72646/welding-processes-cop-2021.pdf
 - 3.1. Airborne contaminants - page 13
 - 4.1. Ventilation - page 26
 - 4.2. Personal protective equipment (PPE) - page 29

- Table 1 - Procedures to minimise the risk of electric shock page 17
- WorkSafe Qld – Welding webpage: <https://www.worksafe.qld.gov.au/safety-and-prevention/hazards/hazardous-exposures/welding>
- HSE – Welding controls: <https://www.hse.gov.uk/welding/welding-controls.htm>
- Weld Australia – free online courses:
<https://weldaustralia.com.au/training/welding-safety-courses/>
- An introduction to welding: why do workers need protecting? :
<https://breathefreelyaustralia.org.au/wp-content/uploads/2019/05/An-introduction-to-welding-AIOH.pdf>
- Practical design and technology (ITD) practical handbook:
<https://education.qld.gov.au/initiativesstrategies/Documents/industrial-technology-and-design-guideline.pdf>
 - 12.6 Welding protection – pages 55 to 57
 - 13.2 Lock-out/Tag-out of machinery, plant and equipment – pages 60 & 61
 - 14. Activity information sheets -Electric arc welding – page 66 & 67

Note: This information focusses on welding fume hazards. The resources listed above address the range of hazards that are associated with welding.