BREATHE FREELY Australia

Controlling Exposures to prevent occupational lung disease in the construction industry

Steel Erector/Fabricator

HAZARDS AND RISKS

The biggest respiratory health risk to steel erectors/fabricators comes from inhaling welding fume. Numerous welding tasks are carried out on steel frames, columns, beams and girders that are used for assembling scaffolding, frameworks and other steel components of buildings and structures. There may also be a risk of disturbing asbestos in existing buildings.

Welding fume

The fume given off by welding and hot cutting processes is a varying mixture of airborne gases and very fine particles that can cause a range of respiratory ill health effects if inhaled.

Stainless steel fume is considered more harmful than mild steel fume as it contains chromium oxide (CrO3) and nickel oxide, which are both asthmagens and carcinogens - although there is a higher risk of lung cancer for all welders. Flu-like symptoms of "metal fume fever" are caused by short-term exposure to high fume concentrations. Metal fume fever is a temporary effect, however, prolonged and repeated exposure to welding fume is associated with the neuro physiological and psychological effects of manganism (due to inhalation of manganese fume); respiratory irritation, bronchitis and possibly pulmonary oedema (due to inhalation of ozone and nitrous oxides); and chronic obstructive pulmonary disease (COPD) including emphysema.

Welders are known to be particularly susceptible to lung infections that can, in some cases, lead to pneumonia. Other health hazards include asphyxiation through using inert gases that reduce the amount of oxygen in enclosed spaces.

CONTROL OPTIONS

Elimination/prevention

- Design the job so there is less hot work, eg. through CAD/3D design techniques, cold jointing techniques, use of mechanical fasteners and newer adhesive technologies; use thinner gauge material; use MIG brazing which produces less fume than a full penetration weld.

Engineering controls

- Control fume at source through local exhaust ventilation (LEV) or other engineering control equipment, or on-tool extraction if possible –LEV is unlikely to be feasible for outside work.
- Enclosed spaces may also need general mechanical ventilation to remove fume and ensure oxygen levels are maintained.
- Portable extraction units should be used where possible when on-gun extraction isn't available – especially when working indoors. It's important to make sure that the extraction inlet is positioned as close as possible to the welding point.
- Small bore high flow fume extractors can help remove fume when welding in tight corners.

Safe working methods

- Use MIG/MAG techniques for stainless steel welding (fume tends to be less toxic).
- Where protective coatings are present, these must be dressed back in order to provide a clean welding area.
- Minimise the amount of work carried out in enclosed or confined spaces.
- Make it easier for the welder to work with their head out of the fume cloud: a welder in a crouching position will be more likely to have fume passing their nose and mouth than if standing while they weld, and a seated welder will tend to have the least fume round their face.
- Ensure good general ventilation wherever possible.

PPE

- Powered respiratory protective equipment (RPE), in conjunction with a welding visor and/or a purified air-powered helmet, should normally be worn in addition to other controls. There are various types available which offer different levels of protection. Particulate filter respirators do not remove gases such as oxides of nitrogen, and so are not suitable for this purpose.

MANAGING THE RISK

Training & communication, supervision, maintenance & testing of controls and **air monitoring*** are all vital aspects of managing the risk, in addition to health surveillance which can be a requirement in certain circumstances.

See our introductory *Respiratory Health Hazards in Construction Fact Sheet Series:* ***Overview*** for more information about what things to consider and implement.

Air monitoring*

Air monitoring is a specialist activity. It may be needed as part of a risk assessment, as a periodic check on control effectiveness and to assess compliance with relevant WES, or where there has been a failure in a control (for example if a worker reports respiratory symptoms). A qualified Occupational Hygienist can ensure it is carried out in a way that provides meaningful and helpful results.

See reverse for Workplace Exposure Standards (WES)

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WORKPLACE EXPOSURE STANDARDS (WES) & EXPOSURE LEVELS

Agent or substance	Control/Exposure Limit	Exposure Levels
Welding fume	Welding fume (Not otherwise classified): 5 mg/m³ (8 hr TWA)	There is a separate Welders Breathe Freely Australia respiratory health hazards fact sheet which provides further advice for situations where high exposures may occur eg; welding in confined areas. The levels of exposure and subsequent risks to health vary depending on what type of welding process is undertaken, the base metal, the composition of the filler rod (core) and flux, any surface contaminants, the work environment (for example, whether indoors or outdoors, or in an enclosed space or an area that is well ventilated) as well as the exposure time (or 'arcing time').
Welding fume components	**Iron oxide fume** (as Fe): 5 mg/m³ (8 hr TWA), **Chromium** (VI): 0.05 mg/m3 (8 hr TWA) **Manganese (dust /fume)** 1 mg/m3 (8hr TWA) WES are in place for many other individual metals used in filler wires. Refer to SDS for the metals present and to Safe Work Australia Workplace Exposure Standards *www.safeworkaustralia.gov.au* The occupational exposure limits (WES): **Nitrogen dioxide** (NO2): 3 ppm (8 hr TWA), 5 ppm(15 min TWA)	
Asbestos (all types)	0.1 fibres/ml (8 hr TWA)	

Further information