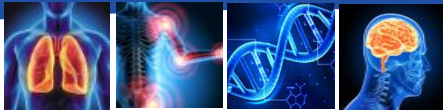




Health risks of welding fume



Re-classification of welding fume

**International Agency
Research on Cancer**



**World Health
Organization**

**IARC Monograph on the Evaluation of
Carcinogenic Risks to Humans Volume 118
Welding, Molybdenum Trioxide, and
Indium Tin Oxide**

<http://publications.iarc.fr/569>



What are the substances of concern?

- Metal fume from wire or rod
- Vapours & gases produced during the welding process
- Surface coatings and contaminants on the base metal





What are the health effects?

- Acute (short term)
 - Metal fume fever
- Chronic (long term)
 - Linked to Asthma
 - Elevated risk of lung cancers
 - COPD (current evidence suggest a link)
 - Increased susceptibility to pneumonia



Manual metal arc (MMA)

- An arc is formed between parent metal and metal rod (electrode).
The end of the rod melts in the heat of the arc
- Molten metal particles are carried by the arc stream into the molten pool of parent metal, forming the filler of the weld
- The rod has a flux coating which protects the weld from the surrounding atmosphere



MIG / MAG welding

- An arc is formed between parent metal and a metal electrode in the form of a solid wire. The wire is fed at a steady rate through the centre of a welding gun.
- A steady stream of gas flows around the metal electrode to protect the parent and molten weld metal from oxidising.
- There are numerous mixes of shielding gases on the market, the choice of which depends upon its own specialist purpose.

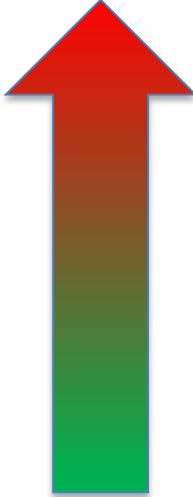


Tungsten inert gas (TIG) welding

- An arc is formed between parent metal to be welded and a metal electrode made from tungsten, which does not melt.
- The joint may be made by melting the parent metal - autogenous welding (running in) or from a filler rod melted into the joint.



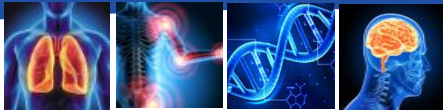
Fume levels of welding types and allied processes

- Arc-air gouging *very high*
 - MMA / Stick *high*
 - Flame cutting *moderate/high*
 - MIG / MAG *moderate*
 - TIG *low*
- 

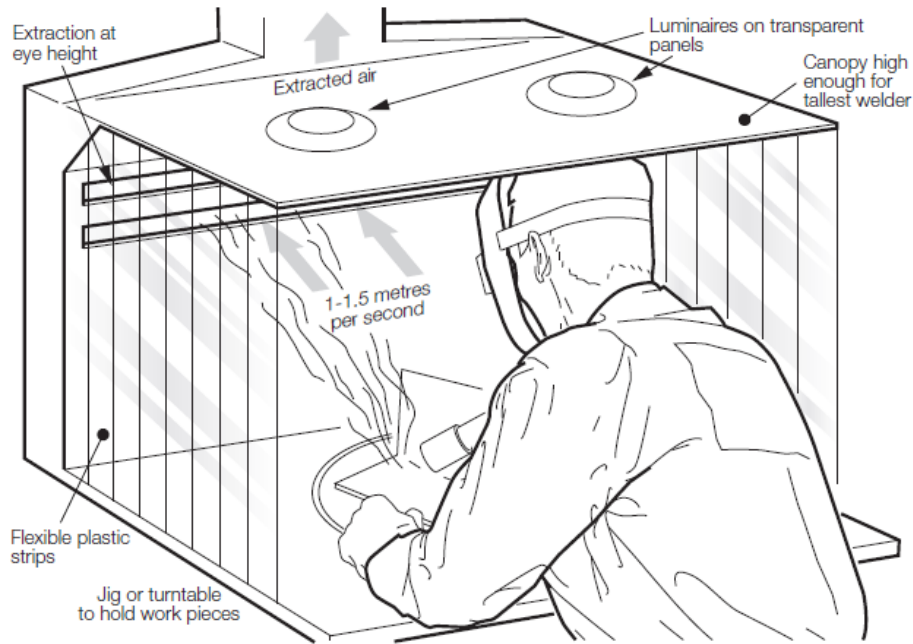


Control measures

- Local exhaust ventilation
 - Welding bench
 - On-gun extraction
 - Swing arm hoods
 - Flexible ducts
 - Mobile fume extractors
- Respiratory Protective Equipment (RPE)



LEV Control – Welding Bench and On-gun Extraction



Extracted booth with turntable





Respiratory Protective Equipment

- RPE is required where residual fume may remain even after the use of Local exhaust ventilation
- RPE must have a minimum assigned protection factor of 20 (e.g. FFP3)



Health Surveillance

- Early detection of work related ill-health
- Check on adequacy of control measures
- Likely to be required when welding stainless steel where there is a known asthmagen e.g. chromium
- Advice should be sought from an occupational health provider
- Could include questionnaire and lung function test –
(see G402 – Health surveillance for occupational asthma)



Moving forward

- No one control solution will be effective for all cases (decisions informed by an assessment of risk)
- Exposure controls required will be:
 - The provision of suitable engineering controls e.g. LEV for all welding fume inside
 - Any residual fume will require the use of RPE by operators
 - The provision of appropriate RPE for welding outdoors



Further information

- [BOHS Breathe Freely Campaign](#)
- [BOHS Welding Fume Control Selector](#)
- [IARC Welding Monograph](#)
- [Video resources for health and safety in welding](#)
- HSENI / HSE webpages