



Controlling exposures to prevent  
occupational lung disease in  
**MANUFACTURING**

# An introduction to welding: why do workers need protecting?

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Welding is one of the most common activities carried out in industry. There is a wide range of activities ranging from professional, skilled welders to many other unskilled or semi-skilled welders who carry out welding as part of their job.

In 2017, the International Agency for Research on Cancer (IARC), classified Welding Fume at a Category 1, Carcinogenic to Humans. Consequently, awareness, minimizing exposures and safe work practices are required to protect welders health.



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There are a number of health hazards associated with welding in particular the following:

### Fumes

These are very fine solid particles temporarily suspended in the air.

### Gases

These may include ozone and, in the case of metal inert gas (MIG) and tungsten inert gas (TIG) welding, inert gases that can present a problem when working in confined spaces.

### UV radiation from the welding arc

This can affect the eye ("arc eye") and skin and is also responsible for the generation of ozone from atmospheric oxygen.

## Understanding welding fumes

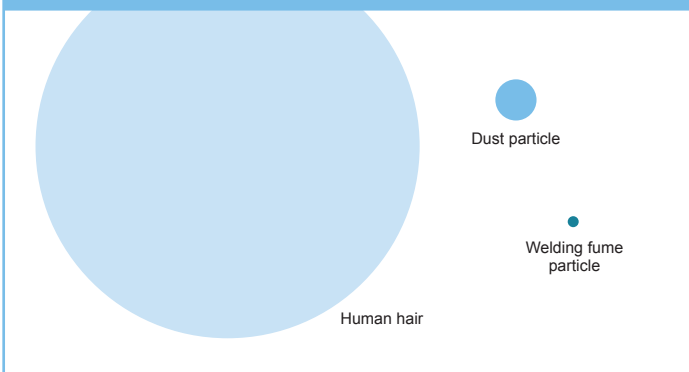
The main health hazard with many welding operations – particularly manual metal arc (MMA) (stick) and MIG welding – is the welding fume. This consists of very fine particles of metal oxides, mainly arising from the welding rod or wire.

The composition varies depending on the metal being welded. With mild steel the fume will mainly consist of iron oxide but there is also likely to be a small percentage of manganese which is used in welding rods.

Stainless steel welding is particularly hazardous as the fume contains nickel and chromium VI oxides which are highly toxic if inhaled – both are carcinogens and can also cause occupational asthma.

Repeated exposure to low concentrations of manganese have been shown to affect the nervous system, and there are proposals to significantly reduce the Workplace Exposure Limit for manganese in 2018.

### Relative size of welding fume particle



## Understanding welding gases

As well as the fume (which is particulate in nature), arc welders will also be exposed to gases. Ozone is produced by the action of the UV from the arc on oxygen in the air. It is highly irritant to the eyes and respiratory system.



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In some cases, particularly with thicker plate, atmospheric nitrogen can be converted to highly irritant nitrogen oxides. With MIG and TIG welding, the inert gas used to stop the weld oxidising will be released. This should not present a risk when welding outdoors or in a well ventilated area, but can present a serious risk of asphyxiation in a confined space.

## Health effects

The HSE estimates that exposure to welding fume causes more than 150 deaths due to cancer every year. Exposure to the fume and gases can also cause other illnesses, including:

- metal fume fever
- chronic obstructive pulmonary disease (COPD), which includes bronchitis and emphysema
- asthma
- and increase susceptibility to pneumonia



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## Control measures

Many welders are exposed unnecessarily to welding fume. Control measures are available – but it's important to make sure the right controls are used – there is not one solution that will be effective in all cases.

For example, local extraction systems with moveable arms are frequently used, but to be effective they need to be positioned close to and directly over the source of the fume. Other types of extraction, such as welding benches and on-gun extraction for MIG welding, are also readily available and, depending on the type of job, these are better options for many types of work.

Respiratory protection should always be the last resort, but it will be the most appropriate control measure for some types of work – particularly very large fabrications where the use of local extraction is impractical. Powered devices which are built into the welding visor are likely to be most effective.

In order to identify appropriate measures to control the health risks involved, each specific welding activity will need a risk assessment under the Control of Substances Hazardous to Health (COSHH) regulations.

See also:

[An Introduction to LEV](#) 

[RPE Programme for Welders](#) 

[Welding Hierarchy of Control](#) 