

Welding fume - Do you need extraction or RPE?

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This isn't a grey area, the answer does however depend on several factors. The variation in these factors means that it is often not possible to make general statements such as "yes you do" or "no you don't".

The factors you will need to consider are:

- What process you use (resistance welding, arc welding, flame or plasma cutting or gouging, automated or manual etc)
- Where you'll be welding and cutting (indoor, outdoor, confined or restricted space)
- How long the welder will be creating fume. This is usually less than the total time on shift. Typically a production welder will spend about half the shift time creating fume. A jobbing welder/ fabricator may spend significantly less time that this.)
- What filler wire/ consumables you are using (aluminium, carbon steel, stainless or hardfacing wires)
- Are you welding or cutting through any coatings, plating or contamination
- Is extraction suitable for the job? For many manual welding and cutting jobs it is not practical to use fixed or flexible extraction systems and you may need to use airfed RPE to protect the welder.

The COSHH Essentials welding guidance offer useful guidance.

- [Task Specific COSHH guidance for welding cutting and allied jobs](#)^[1]

A useful online selector tool has been developed by the Scottish Centre for Healthy Working Lives

- [Online RPE selector tool used for welding](#)^[2]

Some examples of circumstances where extraction is normally needed

- Moderate to high volume MIG/MAG production welding, small or medium sized parts, welding on a bench; or in a screened off area. Welding on carbon (mild) steels and aluminium;

- High volume production welding using TIG on stainless steels or aluminium ;
- Welding of stainless steels using MIG, MAG, Flux cored or MMA (stick welding);
- Arc air gouging (you'll normally need RPE + fume extraction);
- Welding or hot cutting galvanised materials (zinc plated);
- Welding or hot cutting materials containing cadmium, or painted with lead or chromate paints. It is better to remove the coating before welding but if you can't then effective fume extraction and RPE is needed;
- automated cutting (eg flame or plasma). Many cutting machines already have extraction systems built in to the cutting table;
- automated multi-head resistance welding machines.

Some examples where you will not normally need extraction

All examples assume the work piece is free from contaminants (dirt, grease, excessive oil, etc) and surface coatings (plating, paints, etc).

- Welding and hot cutting outdoors;
- flame welding (oxy/acetylene welding);
- a few minutes every hour of manual arc welding to tacking or small repairs (except on stainless steels)
- a few minutes every hour of flame or plasma cutting;

If you do use extraction, it'll only work if it's used properly

- In most situations welding fume can be easily seen. If you can see that most of the fume is going up the extractor then your positioning is about right.

How far away should the moveable extraction duct be?

To work this out, first note the dimensions of the 'face' or opening on the extraction duct. Many common extractors have an elliptical hood. Take the shortest dimension (typically about 300mm). The extraction should be positioned about 1-2 times the diameter of the hood, vertically above the welding point. If it's much closer, the welder will often have problems seeing past the hood. If it's too far away (over 2x diameter) then fume will tend to disperse and a large proportion of the fume will not be captured.

Placing the hood on a flat surface can help extend the 'range' of the hood. This is particularly useful if you are welding small items on a desktop or sheet materials. A hood placed on a flat surface is often effective at 2 x the diameter of the extractor hood. See [video resources](#)^[3] for 3 short video demonstrations.

Positioning a flexible extraction hood

The correct positioning of flexible extraction systems is vital to their effectiveness. When positioned properly, extraction does not affect the quality of welds.

If you're making long runs of weld you may need to reposition the moveable extraction hood. Most welders routinely reposition themselves after about an arms length of weld so they can maintain the correct welding. In practice this is often after laying a weld of about 300 – 400 mm. Positioning the extraction hood centrally over the weld run will usually be sufficient. See [video resources](#)^[4] for 3 short video demonstrations.

If you are making several smaller welds that are well spaced eg welding butt joints on tubular steel furniture, then you may be able to position the hood so that it is effective for several welding locations. It depends on the dimensions of the work piece. It is usually not practical to move the hood after every short weld so if you can't find a position that will extract fume from several welds without being moved then you may need to consider alternative fume extraction methods such as extracted welding booths or RPE (to protect the welder) combined with good general mechanical ventilation (to protect everyone else in the workshop).

Take account of the direction of drafts. Welding fume is easily blown by drafts. If there is a general air movement then try to position flexible hoods slightly 'downwind' so the fume moves toward the hood. If the air currents are swirling then you may need to position the hood closer and move it more frequently to maintain a reasonable performance.

Check the fume control systems (fans, extraction, and filtering face masks) are working properly

Just like any other piece of equipment you use, extraction systems and non-disposable PPE needs maintenance. Common faults include blocked filters, split or crushed ductwork, extract hoods bent, broken or removed.

You must get your local exhaust extraction systems thoroughly examined by a competent person at least every 14 months.

Non-disposable filtering masks/ welding visors must also be examined at suitable intervals. There is no specific time limit for examinations. You will need to set an appropriate schedule taking into account

- the environment the respirator is used in,
- advice in the manufacturers instructions
- the amount of use.

Monthly examinations (3 monthly for less well used respirators) would be normal practice.

For further information see the HSE [Local Exhaust Ventilation](#)^[5] (LEV) and [Respiratory Protective Equipment](#)^[6] (RPE) pages

Fume control of automated welding and cutting machines

With the exception of submerged arc welding, automated and robotic welding processes will normally need fume extraction. This is particularly true with machines that have several welding or cutting heads as multi-head machines can generate large amounts of fume even when cutting or welding mild steels. When resistance welding mild steel, much of the visible fume created comes from the oil and other contamination that is on the material.

Extraction systems can be fitted directly to the heads utilising relatively low volume extraction methods. However systems fitted on or near the welding heads can restrict the movement and flexibility of the machine. Larger volume extraction systems, fitted above the entire welding machine, can also be used. However the larger air handling units and filters usually mean that these systems cost more to buy and run.

Disposable versus non-disposable RPE?

Disposable 'FFP3' dust masks can offer reasonable protection for short jobs but they must be properly; 'fitted' to the person using it. One type of mask does not fit all. This type of RPE is relatively cheap but they are often replaced on a daily basis meaning costs involved in their long term use may be significant.

Battery powered filtering welding visors are more expensive but are good when it is not practical to use extraction and the welder is doing a reasonable amount of welding. This type of equipment can last a long time if it is well looked after. It may be the cheapest long term option when compared to daily disposable masks.

Link URLs in this page

1. Task Specific COSHH guidance for welding cutting and allied jobs
<http://www.hse.gov.uk/welding/guidance/index.htm>
2. Online RPE selector tool used for welding
<http://www.hse.gov.uk/welding/links.htm>
3. video resources
<http://www.hse.gov.uk/welding/videos.htm>
4. video resources
<http://www.hse.gov.uk/welding/videos.htm>
5. Local Exhaust Ventilation
<http://www.hse.gov.uk/lev/index.htm>

6. Respiratory Protective Equipment

<http://www.hse.gov.uk/respiratory-protective-equipment/index.htm>

Is this page useful? Yes No