

ILEVE

Institute of Local Exhaust
Ventilation Engineers

Welding fume Control Options

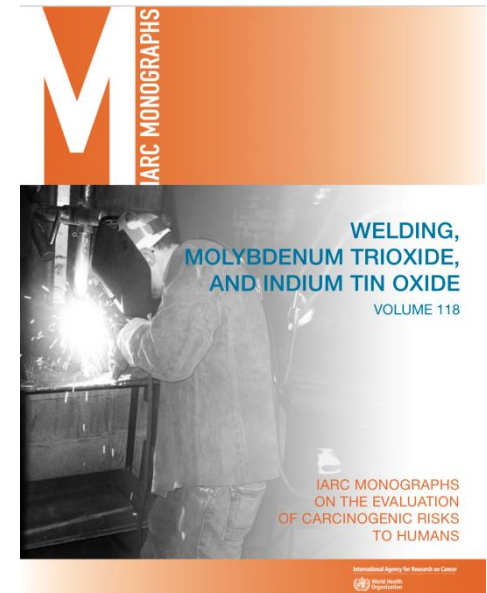
Presenter Dean Greer ILEVE

Welding Fume

In January this year the HSE announced that, following scientific research by the International Agency for **Research on Cancer** (IARC) and published in their Monograph V118 WELDING, MOLYBDENUM TRIOXIDE, AND INDIUM TIN OXIDE, that **ALL** welding fume is to be recognised as a cancer inducing substance in humans.

This is as of immediate effect and as such will have consequences across industry on how employers control welders and other employees exposure to welding fumes.

As with all carcinogens, the employers legal responsibility is to reduce exposure to As Low As Reasonably Practicable (ALARP).



There are multiple options available when it comes to the control of welding fumes using Local Exhaust Ventilation or LEV systems. This document explores some of the pro's and con's of each type of system.

COSHH states that the employer **MUST** consider using engineering controls for example extraction systems, prior to using PPE and can only use PPE in conjunction with other controls.

Movable Capture Hoods

This is the most common form of LEV control sold in the UK.

This is a movable hood that has a hood on the end of an articulated arm.

Typical capture distance (i.e. the effective distance from the face of the hood) is equal to the diameter of the hood.

Research shows that round or square hoods fitted with a flange are more effective than oval or rectangular shaped hoods.



Pros:

Ease of use

Variety of different sizes –
useful for bench work or
working on large components

Good for small / local welds

Typically low capital cost

Can be portable / mobile

Cons:

Level of control achieved (typically 1/10th reduction
of hazardous substance)

Capture zone within which welding must take place

Requires high level of user input – open to human
error

Not good for long or seam welds

Easily damaged – high level of maintenance

Not effective in draughty environments (i.e. open
doors or moving vehicles)

On-tool Extraction



The extraction system is attached directly to the tool and draws the contaminant through the tool directly at the source.

On-tool extraction

Pros:

Depending on the type of weld being worked can be up to 80% effective

Captures the contaminant at source

Integrated with tool – pull torch trigger extraction comes on

Less affected by draughts

Good on large structures - can be portable / mobile

Can be very effective on controlling grinding dust (from 110mm diameter grinders)

Can be used for clean-up / vacuum

Cons:

Does not capture 100%. Can be very poor levels of control on certain types of weld

Can make torches heavy but new technology is improving this all the time

Can remove shielding gasses if set up incorrectly

Will not capture fume from welds once welder has moved on – high residual fume

High kW rating of fan – potentially expensive running cost

High capital cost

Downflow benches

Air flow is pulled down through a table or bench and is taken away.

Typical down flow velocity at the face of the bench is 2.5m/sec.
Duct velocities 10m/sec if welding only, 20m/sec if used for welding and grinding.



Downflow benches

Pros:

Very good levels of control of the hazardous substance (typical reduction factor 1/400th)

Easy to use – minimal human input

Good for grinding and gas burning

Control levels can be improved in draughty areas by fitting side shields

Range of sizes available

Bench can be fitted with jigs or vices

Cons:

Fixed location

Not good on large components

Can remove a lot of air from workshop

Potentially high capital costs especially when filtering grinding dust

Welding Booths

The welding is carried out in a fixed location either on a bench or in a booth.

The air flow across the open face needs to be in the range of 0.5m/sec and 1m/sec.

You should always look to use the higher of these two values to give improved levels of control.



Welding Booths

Pros:

Minimal human input

Very good level of control.
Reduction factor up to 1/500th

Can be good for control of
grinding dust

Cons:

Restrictive – fixed location

Useless if work taken out of
enclosure

If a walk-in booth the welder
will still require suitable RPE

This is not LEV since it is not local.

Must be used in conjunction with other engineering controls such as those listed previously in this presentation.



Pros:

Continuous running
will continuously filter
and clean the air

Cons:

Continuous running – high running cost
& maintenance requirement

Does not control the fumes at source

Does not control grinding dust

High capital cost

Large units will take up floor space

Potential increase in noise in workplace

HSE are considering what guidance might be required for the use of filters in LEV devices that recirculate the air. There are currently a few device standards (Welding LEV and Industrial vacuum cleaners) and filter standards that could be considered for inclusion and recommendation in a future good practice guide. The device and filter standards are:

Device Standard BS EN ISO 15012-1:2013 for welding fume

Device Standard BS EN 60335-2-69:2012 for industrial vacuum

BS EN ISO 16890-1:2016 - Particle filter testing (replaces BS EN 779:2012)

BS EN 1822-1:2019 - HEPA filter classification

ASHRAE 52/2 - minimum efficiency reporting value (MERV)

All forms of engineering controls and LEV have issues. There is no one solution fits all applications. To achieve adequate control of the hazardous substance you will almost certainly require a combination of systems as a solution.

Generally the more you can enclose or the more air you move the higher level of control you will achieve however the more restrictive the solution is.

When looking for your solution you **MUST** consider **ALL** sources of exposure. Typically in a fabrication workshop this will be from activities such as welding, grinding, cleaning and opening doors (draughts / wind disturbing dust).

Who can Help?

Should you require any help or guidance in considering the control measures you currently have in place or in implementing training plans, new or modifications to systems or testing and servicing existing systems, ILEVE can direct you to industry leading qualified engineers who can provide you with clear competent advice and what is the best and most effective approach for your business



Ask to see the ILEVE Competency Card, our engineers are always happy to show it!

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