

NEWS FROM AROUND THE INDUSTRY...

Chartered Institute of Building Services Engineers

As some of you may have seen from your CIBSE journal, the Chief Technical Officer, Hywel Davies has now retired and has been replaced by Dr Anastasia Mylona. We would like to take this opportunity to wish Hywel a very happy retirement and thank him for his contributions to Building Services over the years.

British Occupational Hygiene Society

BOHS is launching a register of Occupational Hygiene Professionals this year, which has been accredited and will be supervised by the Professional Standards Authority. The Professional Standards Authority reports directly to Parliament and oversees the Registers of all Health Professions in the UK in the public interest

Building Engineering Services Association

The LEV CSCS SkillCard scheme is now up and running. Applications can be made at:

<https://www.skillcard.org.uk/how-to-apply>

Safety Assessment Federation

There is a meeting of SAFed TC8 — LEV, scheduled for the 20th of February 2024. No other updates to announce

ILEVE News

A letter from the editor:

Within this edition you'll find a number of different articles and events that are worth keeping on your calendar for the year to come.

You'll find a thought provoking article around the use of mobile capture hoods, which may leave you questioning exactly how we all use Table 9.

The latest prosecutions from the HSE and an extract that all LEV practitioners should take note of surrounding the use and testing of Dichloromethane (DCM)

I hope you enjoy this latest newsletter and if you would like to provide any content for the next edition or just give us some feedback please feel free to email in to ileve@cibse.org

—Lloyd Barker

IOHA Dublin 2024— Reminder



A date for the diary!

The date draws ever closer to the IOHA conference in Dublin.

The Occupational Hygiene Society of Ireland (OHSI) and the British Occupational Hygiene Society (BOHS) are jointly hosting the 13th IOHA International Scientific Conference. The conference theme has been confirmed as - 'Protecting workers from health hazards: Advancing in this changing world'.

When: Sunday 9th—Thursday 13th June

Where:

Aviva Stadium
Lansdowne Rd
Dublin 4
Ireland
D04 K5F9

[Click Here to Register](#)

Moveable capture hoods for the control of welding fume

The following article, written by ILEVE Vice Chairman, Adrian Sims gives an interesting perspective on the actions used for controlling welding fume:

The American Conference of Governmental Industrial Hygienists (ACGIH) says:

“The purpose of welding and cutting ventilation is to control *gases, fumes, and particulate* generated during the welding and cutting operations.”

Contaminants from welding may include:

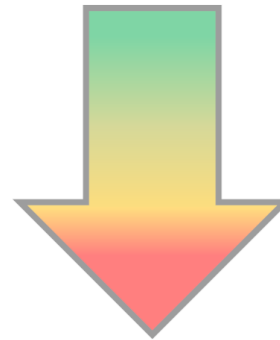
- o Fume from the base metals and filler or electrode metals
- o Fume from coatings (e.g., zinc oxide from galvanized surfaces, thoria from T.I.G. welding, and fluorides and NO₂ from electrode coatings)
- o Ozone due to ionization of oxygen by the ultraviolet light from arc welding
- o Carbon monoxide from ultraviolet effects on carbon dioxide in shield gas
- o Shield gases such as carbon dioxide, helium, and argon
- o Fluoride gases and other thermal decomposition products of fluxes and electrode coatings and
- o Flammable gases such as acetylene, not to mention propane (used during the brazing process) and almost pure oxygen used during both gas applications.

Even in the absence of such hazardous materials, any welding operation in a confined space is potentially lethal and requires:

- o A well designed monitoring program,
- o Appropriate use of respiratory protective equipment and
- o Local exhaust ventilation supplemented with
- o continuous and copious dilution ventilation.

It also reminds us that any flow patterns must not interfere with the collection effectiveness of the LEV.

In its General Recommendations it recommends, in descending order of effectiveness:



- Enclosing Hood
- Vacuum Nozzles (On-Tool)
- Fixed Slot/Plenum on a table or rectangular hood above a table
- Movable Hood hanging freely
- Ambient Filtration Tower
- Displacement Ventilation

It goes on to say...

“enclosing hoods are by far the most effective in controlling welding contaminants however, they restrict access and force reconsideration of material and production handling.

Capturing hoods are less effective than enclosures but can be adequate if properly used and acceptable exposures documented.”

On **General Ventilation** it does say that *“general ventilation should be used to compliment LEV”* and that *“a properly designed displacement ventilation system will provide much better protection from worker exposure to welding generated airborne contaminants than dilution ventilation.”*

Ambient filtration (such as welding towers or other filtration devices) can be used to dilute the build-up of contaminant in the environment and the returned air will ‘dilute’ the weld fume concentration in the work area however you must check the level of filtration they offer of the particulate AND the gasses.

The filtration rate must also exceed the generation rate and the units need to be carefully positioned to ensure effective mixing of the work air.

“Since the devices allow the weld fume to evolve past the breathing zone...they should not be considered as a primary weld fume control strategy.” “...as with portable collection, their use should include documentation of acceptable exposures.”





Slot hoods are a bench or enclosure consisting of a series of slots with side shields where the work may be carried out in the enclosed area.

The benefit of these hoods is the welder can operate anywhere in the zone in front of the slots.

The downside is:

- o Bulky objects can block the airflow.
- o The plume can rise into the welders breathing zone.
- o The top slot must be above the height of the tallest point that is to be welded.
- o Inward velocity close to the slots may adversely affect the shielding gasses.



The rate of extraction will increase depending on the size of the welding rod to be used, from 0.5m³/sec for a 4mm rod to a whopping 2.25m³/sec for a 9mm rod (“for open areas where welding fume can rise away from the breathing zone, $Q = 0.83\text{m}^3/\text{sec}$ per kg/hour of welding rod used.” In areas where the fume cannot readily escape this figure will double!).

Movable Capture Hoods are the most common form of welding fume control in use.

The big issue with movable hoods is that the welder needs to keep moving the hood to ensure the **working zone** is within the effective **capture zone**.

To minimise this movement and disruption of the weld, the LEV designer needs to make the capture zone as large as possible. The critical dimension is the **capture distance (X)**.

Increasing X greatly increases the air volume requirement. Typical distances for X are:

- 150mm hood X=300mm
- 200mm hood X=450mm

In ACGIH it provides a “**Recommended Exhaust Rate (Q)**” for 150mm and 200mm arms based on a flanged or conical/45 tapered hood.

Due to the toxicity of welding fume and that welding processes are normally carried out in locations where there is likely to be other air movement (either from other air moving plant, processes, or traffic) we should use the higher end of the figures recommended.

So this give us:

Extraction arm diameter (mm)	Cross sectional area (m ²)	Air volume flow rate (m ³ /sec)	Air volume flow rate (m ³ /Hr)	Face velocity (m/sec)	Capture distance (Fletchers) (mm)
150	0.018	0.35	1260	19.44	195
200	0.032	0.60	2160	118.75	255

By using Fletchers and a capture velocity of 1m/sec this will give us a Capture Distances of between 195mm and 255mm.

However we also need to be considerate of removing shielding gases.

ACGIH states....

”Hood location too close to the weld or velocities above 0.75m/s at the point of the weld may disturb shield gas.”

Hang on....Velocities >0.75m/sec may disturb shield gas? But HSG258, Table 9 says we should be looking for a capture velocity of 1.0m/sec (due to toxicity, draughty location etc).

So, if we comply with HSG258, are we at risk of removing shielding gasses?

Or, dare I say....

Should we be looking at the accuracy of HSG258?

Let’s consider the famous Table 9 printed in HSG258. Quoted by many an LEV TEXT’er but not always fully understood.

HSG258 is a guidance document. It is not a technical document.

Table 9 itself comes with a caveat...

“The capture velocities quoted in Table 9 are based on success through experience. In practice, the designer and supplier should check and, where necessary, make prototypes.”

As for the figure of 1.0m/sec being suitable for welding fume is not, how do we say, precise. It is, after all, just an example of the sort of process that may be controlled by capture velocities in that range.

Table 9 Capture velocities

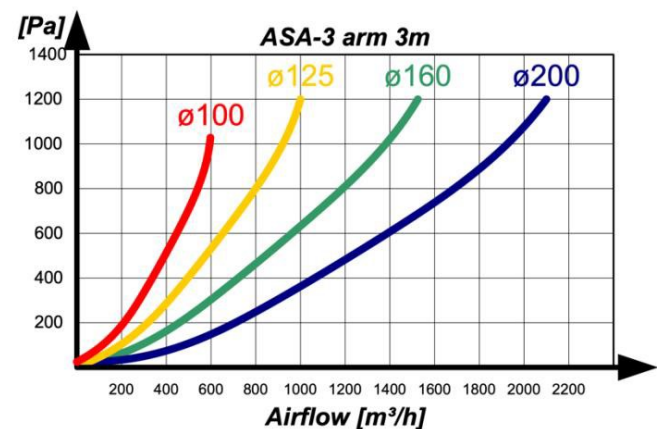
Contaminant cloud release	Example of process	Capture velocity range, m/s
Into still air with little or no energy	Evaporation, mist from electroplating tanks	0.25 to 0.5
Into fairly still air with low energy	Welding, soldering, liquid transfer	0.5 to 1.0
Into moving air with moderate energy	Crushing, spraying	1.0 to 2.5
Into turbulent air with high energy*	Cutting, abrasive blasting, grinding	2.5 to >10

*These types of cloud are difficult to control using capturing hoods.

There are lots of different types of welding (MIG, TIG, MMA etc etc) and many variations of each type (e.g. differing amperage, thickness of rods, rate of weld etc etc) so it is very unlikely that a ‘one size fits all’ solution would work.

There are further issues. Extracting at the suggested rates also increases the pressure drop through the flexible duct (see below example taken from the [Geovent range of ASA-3 arm](#)).

At these high velocities and pressures there is a high risk that the flexible hoses will collapse, potentially blocking the ducting and could lead to ducting collapse and an increase in noise through the arm and ducting (>57dB). So, perhaps, movable capture hoods are not the solution for welding fume control. Is an alternative?



So let's re-cap the issues, Movable Capture hoods...

- o Have small capture zones,
- o The welder must keep moving the hood,
- o The HSE recommended minimum capture velocity will (according to ACGIH) remove the shielding gasses,
- o The extraction rates are high to the point: o the flexible duct will collapse and
- o They are noisy.
- o There are lots of variation of welding and it's not a one size fits all.

Is there an alternative?

Well, yes there is.

ACGIH states, 'For high toxicity welding, consider an enclosing hood and respiratory protection.'

Isn't all welding fume high toxicity?

This is backed up by the HSE in their document WL3...

Where they also advise for larger items/work pieces, on-tool or on-gun extraction is used. Or as a last resort...

"Use a movable fume capture hood on a flexible extraction arm for large to extra-large workpieces when other, more effective LEV designs are not practical."



Welding table where the welding fume is captured and extracted by the airflow at the back

As most welders wear respiratory protection (ideally Personal Air Powered Respirators or PAPR units fitted with suitable filters – remember, most respirators do not protect from the gasses that are given off by welding such as argon, helium and nitrogen, or argon-based mixtures containing carbon dioxide, oxygen or both) these can cause asphyxiation

(suffocation from lack of oxygen), usually resulting from accumulation of the gases in confined spaces and/or displacement of the oxygen.

The HSE advise you to...

'Ensure extracted air is discharged ideally outside the building to a safe place away from doors, windows and air inlets.'

If you chose to use portable or mobile filter units, then the air *'needs to be thoroughly cleaned e.g. filtered before returning it to the workplace.'*

Also, according to HSG258, any recirculating unit should have...

- o *'an alarm for a blocked or failed filter, e.g. a pressure gauge for continuous monitoring;*
- o *an advanced detection system connected to alarms and a system to divert recirculated air out of the workplace.'*

As part of the Thorough Examination and Test, the examiner needs to check the efficiency of the filter to ensure the air being recirculated is clean.

So, is portable a better alternative or is it simpler, as the HSE advise, to extract the fume to a safe place outside?

What is the environmentally friendly approach? To filter (and then dispose to land fill) or to vent to atmosphere and pollute?

Phew! So what's our advice?

There isn't a single solution. Control of welding fume is a 3-pronged solution. Due to the high level of toxicity (carcinogen) to achieve effective control to prevent exposures it should include:

1. RPE for the welder (ideally PAPR with suitable filters)

Looking to take the next step towards becoming competent in LEV?

vent-tech 
industrial environment control

Industry recognised LEV courses in design, commissioning, and testing

The industry recognised BOHS LEV modules provide in-depth knowledge and skills in the design, commissioning, testing, and servicing of LEV systems. They will provide you with theoretical and practical skills. Delivered in an engaging manner by our trainer Adrian Sims, courses can be attended either in person or online.

As part of our promotion of best practice, all CIBSE ILEVE members are entitled to a 10% discount

For booking information email: enquiries@vent-tech.co.uk or visit us at www.vent-tech.co.uk

2. LEV in the form of:

- a. partial enclosure or
- b. on-tool. If neither of these are practical, then consider...
- c. movable welding hood with large capture zone and suitable capture velocity.

3. General or dilution ventilation

So when we are undertaking our TExT on the control solution, do we test just one of these three elements, or do we need to test all three?

Please note, this article does not consider the effective control of grinding dust.

Documents quoted within this article are:



Do you have any opinions on the article above? We invite all those with experience to put forward their thoughts on the subject to ileve@cibse.org

Updated Government Guidance

The HSE released an e-bulletin on 2 August 2023 covering when an LEV assessor should deem a system unsatisfactory and the type of problems you should look out for.

Access the bulletin here:

[HSE Updated Guidance—Thorough Examination and Testing.](#)

Corporate Grading

Now that the Grading Committee is fully staffed and running as efficiently as you would expect.

If you would like to join the growing list of independently assessed LEV professionals then download your grading forms [here](#) and start the process today.

Guidance for TExT Assessors

ILEVE have recently released a guidance document for TExT Assessors undertaking any testing relating to Dichloromethane (DCM). Below is an excerpt from the document:

Dichloromethane (aka methylene chloride (CAS number 75-09-2))

From January 2024, the HSE are undertaking inspections at alloy wheel stripping sites suspected of using Dichloromethane (DCM) also known as methylene chloride.

This means you may be asked by clients to go to site and look at potential control measures or to test existing extraction systems. If this is the case, you will need to carry out your own risk assessment of the situation, and implement the necessary controls to protect yourself. You need to be particularly careful as DCM is extremely harmful - small volumes rapidly evaporate and can lead to high air-

You should:

1. Understand the hazards from the use of DCM and any other hazardous chemicals used in the stripping process.
2. Do a progressive risk assessment to determine whether it is safe to approach the stripping tank.
3. Minimise any risk to yourself if working near the tank.

borne concentrations which can cause narcosis, impaired consciousness and death ([Apprentice was overcome by fumes - SHP - Health and Safety News, Legislation, PPE, CPD and Resources \(shponline.co.uk\)](#), Alloy wheel refurbishment firm fined £80,000 for failing to protect its workers | HSE Media Centre, [HTTPS://WWW.BBC.CO.UK/NEWS/UK-SCOTLAND-TAYSIDE-CENTRAL-34682689](https://www.bbc.co.uk/news/uk-scotland-tayside-central-34682689))

To read the full document [click here](#)

Health and Safety Executive Actions

A Lincolnshire-based engineering firm has been fined after failing to protect workers from carcinogenic fumes.

Inspectors with the Health and Safety Executive (HSE) found employees at W.S. Barrett and Son Limited's site, on the Riverside Industrial Estate in Boston, were being potentially exposed to welding fume and dusts from powder coating. Welding fume is carcinogenic and can cause other serious illnesses such as occupational asthma. Exposure to coating powders can also cause occupational asthma and skin irritation.

An inspection on 25 March 2022 found that an on-tool extraction system on the welding tools was in a poor state of repair and that local exhaust ventilation systems, provided to capture hazardous substances, had not been thoroughly examined and tested.

A subsequent HSE investigation found the firm had failed to ensure examination and testing of the same equipment.

The company had previously been warned about its ventilation systems in 2018 and was served with enforcement notices. It was prosecuted when it failed to comply.

W.S. Barrett & Son Limited pleaded guilty to breaching Regulation 9(1) and Regulation 9(2) of the Control of Substances Hazardous to Health Regulations 2002.

It was fined £10,000 and ordered to pay £3,625.20 in costs at Lincoln Magistrates' Court on 22 November 2023.

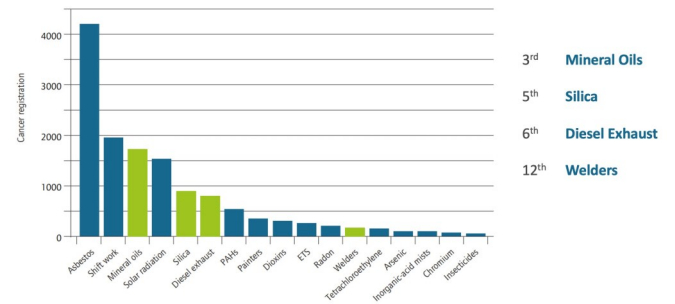
HSE inspector Stacey Gamwell said: "This case highlights the importance of regular maintenance and inspection of control measures including local exhaust ventilation, to ensure equipment remains in an efficient state, in efficient working order, in good repair and in a clean condition."

Original Article can be found [here](#)

We thank the HSE for all the hard work they put into their investigations and for keeping the industry held to the high standards we have all grown to expect.

With prosecutions like this on the rise we believe it important to remind people that you must protect your employees from all types of carcinogens in the workplace. The below graph shows the most frequent exposures by substance.

Most frequent UK carcinogens and exposures at work



Eliminating occupational cancer in Europe and globally - Jukka Takala



Commissioning of New LEV Equipment

As the Health and Safety Executive continues to carry out its inspections of thousands of workplaces across the UK, here at ILEVE we want to take this opportunity to remind all Duty Holders that you have a legal obligation to ensure your LEV systems are Thoroughly Examined and Tested (TEXT) at least every 14 months.

A system must be commissioned after it has been put in to use. The commissioning documentation creates the benchmark for all subsequent testing. Commissioning must also be conducted whenever you alter (e.g. add/change hoods) or move (e.g. to a new premises). This ensures that your system will still be functioning as intended and protecting your employees correctly.

If you would like any assistance or require LEV services the ILEVE accredited member page is a great place to start:

[ILEVE Accredited Members](#)

AMI 310
The most versatile workmate that fits in your hand!

[Learn more](#)

sauermann

Technical Committee Updates

TC01 TExT & Commissioning Reports

An update for TC01 is due early 2024

TC02 ILEVE Partnership Scheme

We have had some queries on the Partnership Scheme but, as yet there have been no others coming forward to align their Business with ILEVE. With competence of us all being looked at like never before the Partnership Scheme is one which will assist our Members' Businesses in showing accreditation of their competence.

TC03 Recirculating Filters

The Health and Safety Executive are currently performing numerous tests of the efficacy of recirculating filters. This is currently in the internal verification stage. We will update once there is more information.

TC04 On torch extraction

The first meeting of TC-04 was held on 3rd January 2024. We have had the great fortune of Rob Williams – HSE Specialist Inspector joining the committee. Rob brings a plethora of knowledge and real-world experience with him, all from the viewpoint of a Regulator. This gives us an opportunity to generate and deliver a cohesive plan that can be utilised by both the wider LEV industry and the HSE. This once again showcases the partnership between ILEVE and the Health and Safety Executive.

The current vision of TC-04 is to generate a series of short videos initially focussing on the safe and correct use of On-Torch extraction within the welding industry. The intent of these videos is to create a simple reference platform for Duty Holders, Operators and Regulators, in which they can visually determine correct usage and offer practical solutions when needed.

If you would like to get involved with the Technical Committee, volunteer your assistance or want to share common problems you would like us to investigate, please email Lloyd Barker directly at extrac-tion@ebsbarkergroup.co.uk

TC05 BOHS BESA Qualifications

Awaiting further information from BESA with regards to the skill cards.

TC06 Direct Reading Instruments

The committee on direct reading instruments is on hold at present until such time as sufficient resource can be put into the subject.

TC07 Stack Design

Actively recruiting for a new chair of the technical committee. If stack design is your passion let us know.

TC08 LEV Guidance Document

Following a meeting with CIBSE on 22nd May, CIBSE are reviewing the best format in which to publish the guidance. CIBSE are looking to move away from paper and PDF publications and are wanting to have an easier updateable format, along the lines of 'Wikipedia for Building Services' and in our case 'LEV'. Unfortunately this has not been done before and, frustratingly, we are likely to experience a delay whilst this is looked into.

Fume cupboard competency matrix

Good news! After many months of work, this document is now live and available for members to peruse and use as they see fit.

It will be used to form the basis of new competencies on the ILEVE Competency Card and has highlighted gaps in the market for training requirements and guidance. The document can be viewed on the ILEVE website or by clicking on this link. Please send any feedback or comments to ileve@CIBSE.org

Positions vacant!

The ILEVE Steering committee has several positions vacant which we are keen to fill.

Like all positions on the ILEVE committees they are all voluntary roles and apart from the reimbursement of the occasional travelling expenses from CIBSE, we do this to help develop the industry and to promote best practice in all matters relating to LEV.

We are looking to fill the following positions...

Events Organiser

Working with the marketing committee, we are looking for an individual who would be able to organise and run our events.

Typically, we organise three events each year including:

- o LEV Conference (joint with BOHS)
- o Annual General Meeting (on-line)
- o Technical Training Day

We also see potential in organising one-day training seminars on specific topics or short webinars.

The organiser will be responsible for organising content, booking venues and promotion of the events.

ILEVE Business Plan Co-ordinator

As ILEVE grows over the coming years, we are looking for someone to join the committee to develop a business plan for the next 1, 3 & 5 year periods, to develop our interaction with our industry partners and to develop our offer for our members.

Once the plan is in place we would then look for guidance and management of the plan along with updates and amendments.

You will be working with members of the Steering Committee and reporting back on a quarterly basis via TEAMS meetings.

If you think you have what it takes to carry out any of the above roles and have a few precious hours to give each month, then please contact us at ileve@cibse.org

Conference Committee Members

ILEVE are currently looking to on-board a number of proactive people to look at and plan future conferences in the interest of furthering ILEVE's presence within the industry.

The role would consist of monthly teams meetings with a view to identifying and managing any potential new conferences.

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- **Downdraught Benches**
- **Dust Extraction Booths**
- **Mist Extraction**

