HSE

Health and Safety Executive

LEV Topic Inspection Pack

Assessing and inspecting Local Exhaust Ventilation (LEV) systems

Disease Reduction Programme

April 2009

1.0 HOW TO USE THIS TOPIC PACK

Don't read this Topic Inspection Pack (TIP)!

This is not a book, it is a reference document and no one expects you to read it cover-to-cover! Use the Contents pages to guide you, they are 'active' – click on the topic you want to go to. Use this TIP, together with the new HSE guidance on LEV http://www.hse.gov.uk/lev/index.htm and the LEV SIM (http://www.hse.gov.uk/foi/internalops/sectors/manuf/030805.htm#levbuying).

There are some sub-sections you should read. These are:

2.3 HSE LEV Project Key Points
2.4 HSE LEV project Key Messages
2.5 HSE LEV Strategy, Timescale and Targets

This TIP will be of most use to those inspectors who have attended the new LEV Inspector Training Course, familiarised themselves with the new LEV guidance and received their new personal-issue test equipment.

The Topic Inspection Pack (TIP):

- Describes the problems the HSE LEV Project seeks to tackle
- How this is going to be done
- Lists key messages for different audiences
- Identifies sources of information and standards for inspectors
- Describes how to assess and inspect LEV systems and control of exposure
- Runs through inspection procedures
- Contains detailed enforcement guidance including standard letters and Notice templates

Note: The term 'employer' is used throughout this Pack. This also includes the self-employed. The responsibilities of the self-employed, with regard to LEV systems, are the same as for employers.

2.0 INTRODUCTION TO THE HSE LEV PROJECT

2.1 Occupational health risk[1]

Airborne contaminants cause a range of occupational diseases. Over 1500 people contract occupational asthma (OA) each year in the UK. Chronic Obstructive Pulmonary Disease (COPD) due to occupational exposures to fumes, chemicals and dusts are estimated to account for around 4000 deaths each year. Exposures in certain industries, and due to certain processes, increase the risk of occupational cancers.

- In about 10% of UK businesses there maybe processes and operations that create respiratory risk[2]
- There are around 140,000 LEV systems in use.
- About 40% of these are 'annually' tested as required by COSHH Regulation 9, 60% aren't.
- Much less than 40% of systems are effectively checked and maintained over the year.
- Upwards of 500,000 people may rely on LEV systems to protect their health. Many of these systems are not reliable or effective enough. Figure 1 shows how the gap in LEV control effectiveness puts people's health at risk

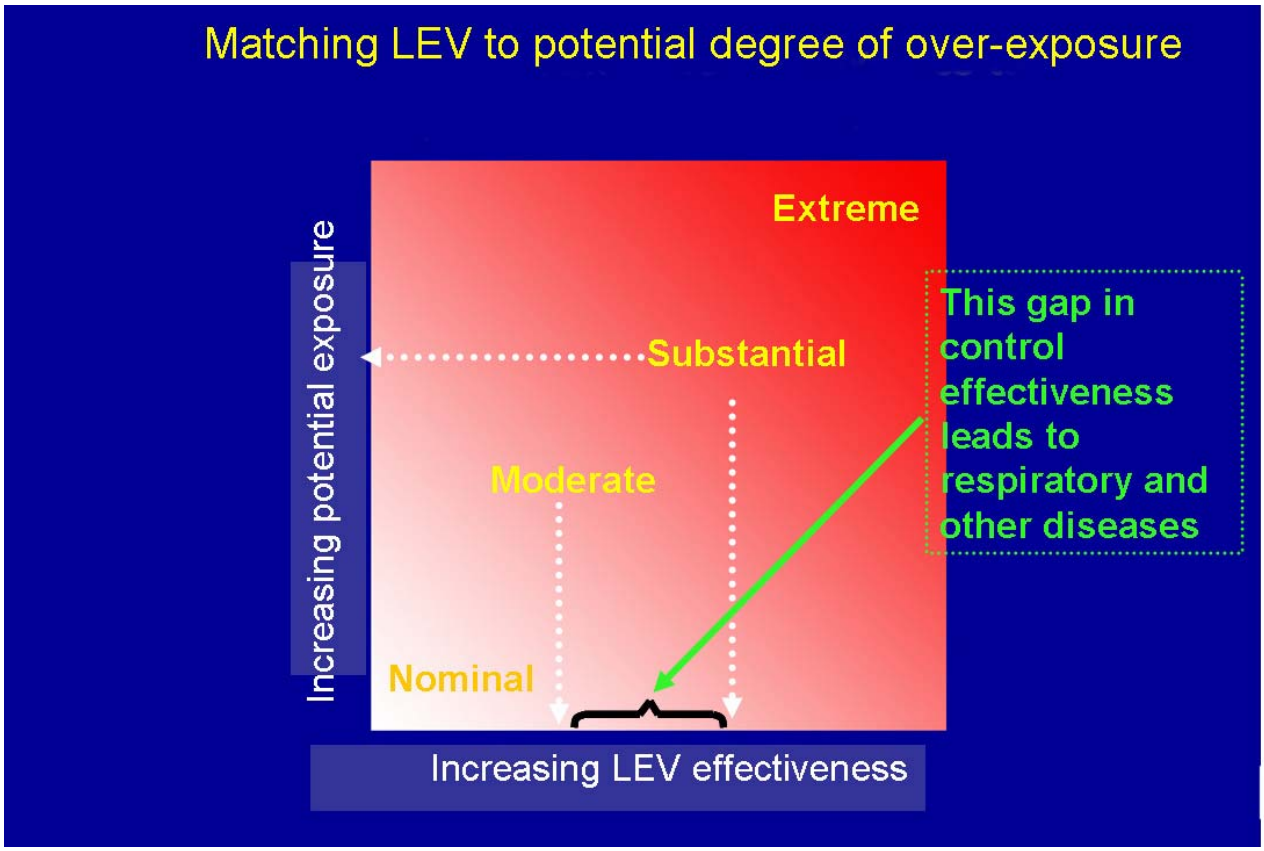

Figure 1 Matching LEV controls to potential exposure

[1] http://www.hse.gov.uk/statistics/causdis/asthma.htm

[2] *"Disease Reduction Programme cross-cutting LEV Project - Local Exhaust Ventilation (LEV) demography in the UK"* James Wheeler and Andrew Darnton

2.2 LEV exposure control problem summary

The main problems with exposure control and LEV system design and application are the poor level of knowledge and skills amongst duty holders and suppliers.

- Employer's don't appreciate the extent of exposure risk from their processes
- Suppliers, employers and employees, are over-optimistic about LEV capabilities
- LEV buying, there has, until HSE published INDG 408, been no guidance and employers are often mislead and mis-sold
- LEV design, often the LEV hood is not matched to the process and source(s) causing exposure
- LEV commissioning, rarely done thoroughly, often done uncritically and control effectiveness, matched to need, is not assessed.
- LEV checking and maintenance – suppliers provide little guidance and employers don't do it frequently or systematically enough
- LEV *thorough examination and test* – often not done and when done, it's often incomplete and uncritical.

2.3 LEV Project Aim

The overall LEV Project aim is "*To bring about a significant and measurable improvement in the coverage and effectiveness of engineering exposure controls, particularly LEV, in Great Britain"*.

- Employers need to demand LEV that works, has adequate instructions, and is effectively commissioned and instrumented. They then need to manage its use, maintenance and examination.
- Designers/Suppliers need to provide LEV which matches and controls all the processes and sources causing exposure, comes with adequate instructions and instrumentation and is effectively commissioned.
- Examiners need to thoroughly examine and test LEV systems, provide a full report and warn if a hood/system is failing
- Employees need to know how LEV works, how best to use it and what to check and report on.

The Project aims to improve the performance of four groups of stakeholders:

1. Employers (occupiers)
2. Designers/suppliers (designers, manufacturers and installers (including commissioning)
3. Examiners (who do thorough examinations and tests)
4. Employees

Your inspection needs to be aware of and examine the performance of all four groups. The Key Messages for each group overlap but are distinct. The Key Messages are on the LEV website http://www.hse.gov.uk/lev/index.htm on the first page for employers, employees and suppliers.

2.4 HSE LEV Project key messages

Introduction

Many of the requirements in HSG 258, INDG 408 and 409 are not new; they have been necessary and required by COSHH, other legislation and good practice standards for years. The new LEV guidance makes the key messages clearer for three broad stakeholder groups; suppliers, duty holders and employees. It also makes clear that, to develop and apply effective LEV, cooperation is needed between these three groups.

Employer key messages: Buying LEV

- **Work out which jobs and activities cause exposure** (you may need professional advice - see "Links"[3])
- **Write down what the LEV needs to do** - get a reputable supplier to advise you
- **Get the right type of LEV to control exposure** (you may need professional advice - see "Links"[1])
- **Involve your employees** in LEV design or selection
- **Make sure the LEV is installed properly and works effectively**
- **Make sure the LEV has airflow indicators (or equivalent)**
- **Make sure the supplier provides a User Manual and Log Book** (or equivalents)

Employer key messages: Using LEV

- **Manage the checking and maintaining of the LEV system**
- **Train employees to use the LEV properly** (ask supplier for help)
- **Follow instructions in the User Manual** (or equivalent)
- **Fill in the Log Book and get repairs done**
- **Get the LEV thoroughly examined and tested** 'annually'
- **Use the thorough examination report as an 'audit'.** Improve if necessary

LEV designer/supplier key messages

- **Help the employer to get the right type of LEV**
- **Provide a clear quotation that covers what the employer (client) needs**
- **Match the LEV hoods to control the processes and sources**
- **Provide a User Manual and Log Book**
- **Provide air-flow indicators (or equivalents)**

LEV installers/commissioner key messages

- **Don't alter the LEV system design** (if it will affect performance)
- **Commission the LEV system thoroughly** (i.e. check it controls exposure effectively)
- **Provide a full commissioning report**

LEV Examiners

- **Thoroughly examine and test the LEV system against the commissioning report** (or equivalent)
- **Use the full range of relevant assessment techniques**
- **Label all hoods tested; issuing a red label, or equivalent, for those that fail**
- **Provide a comprehensive thorough examination and test report**

[3] http://www.hse.gov.uk/lev/index.htm

Employee

- **Get involved in LEV design or selection**
- **Make sure you get training** (in how the LEV works and how best to use it)
- **The LEV you use should have an airflow indicator (or equivalent)**
- The LEV should be easy to use properly; tell your employer if it isn't

2.5 HSE LEV Project strategy, timescale and targets

2.5.1 Strategy

We are starting from a relatively ‘low base’. In the last two-and-a-bit years HSE has:

- Written new LEV guidance for employers (INDG 408), employees (INDG 409) and suppliers (HSG 258) – see “Guidance” on LEV Website

- Engaged key stakeholder organisations, mainly supply-side (see “Links” on new LEV Website)

- Agreed an introductory training course for LEV designers/suppliers (BOHS P602)

- Agreed amendments to the BOHS LEV examiners training course (P601)

- Piloted LEV user Road-Shows

- Marketed guidance and spoken at supplier meetings

- Developed and rolled out new LEV Training for HSE inspectors and provided you with new test equipment.

- Provided inspectors with a draft TIP (July 2008) and issued instructions in a SIM

- Arranged for the structured release to LEV trainers/advisers of the HSE LEV Training Course material via Briefing days run by HSL.

- Marketed the new HSE guidance via stakeholders

By these various means we are seeking to improve the capabilities, skills and quality of work of a whole range of stakeholders, including HSE inspectors.

2.5.2 Project timescale and good practice measures

Stakeholders, mainly supply-side, have been involved in development of the LEV guidance from 2006. Comments were taken on early drafts and in a meeting in December 2007. Even so, it will take time for stakeholders and duty holders to incorporate the good practice outlined in HSE guidance in their procedures and documentation.

Initially inspectors should use the letters in Chapter 6 to remind duty holders and stakeholders of the good practice measures, their importance and value. Next workplan year (2010-11) it would

be reasonable to expect the supply-side stakeholders to have adopted most of the good practice measures. A modified TIP will be developed for 2010-11.

Meantime, inspectors are asked to use their judgement. If a duty holder or stakeholder, by not adopting the good practice measures in the guidance may be, for instance, not selecting or applying LEV effectively or allowing ineffective LEV to continue being used, you should take appropriate enforcement action now, in proportion to the potential risk, as described in Chapter 6. The same approach applies to suppliers of LEV goods and services.

There are some practical implementation issues to be ironed out with stakeholders and duty holders. These are being dealt with via Frequently Asked Questions (FAQs) on the LEV Website. Currently the labelling of hoods/systems, during and after examination and the fitting of air-flow indicators are covered. Other issues, raised by stakeholders and duty holders, will also be addressed via FAQs.

If you have queries about how far to take a particular good practice issue, or any other query concerning LEV, contact your local friendly FOD and HID Specialist Occupational Hygiene Inspector. They are listed in Appendix 6.

2.5.3 Target industries and processes

The target industries and processes in 09-10 are listed in SIM 03/2008/05 (URL HERE) but wherever you come across LEV, which is performing ineffectively or being managed inadequately, you are encouraged to take the appropriate influencing and enforcement action.

By definition (see Figure 1) if an industry or process is causing occupational disease, due to airborne contaminant exposure or over-exposures regularly occur, and LEV is the main control, the LEV in many premises is not effective enough. The disease figures tell HSE, and the industry concerned, that this is the case.

In some industries involving specific processes there are common reasons and causes for LEV ineffectiveness. But, because this has been the custom and practice in the industries in question for years, the ineffectiveness of LEV controls isn't recognised by employers or by suppliers to that industry. It will take time, in such industries, for all parties to recognise and accept the problems and respond with better LEV design and application. HSE Sectors are working with and influencing such industries. This doesn't prevent local action by inspectors and, indeed, this can support and encourage sector influencing.

3.0 LEV GUIDANCE, TRAINING, INSPECTOR COMMUNICATION AND FEEDBACK

3.1 HSE LEV guidance and website

There is new HSE guidance on LEV for suppliers, employers and employees. It was developed, in consultation with the various stakeholder audiences, over the last two years. Order, via FOU, as many printed copies of the INDGs as you need for visits and other initiatives and get your copy of HSG 258 via FOU too.

Note: both INDGs can be downloaded as pdfs from the HSE LEV website as can an HSE LEV publications 'flyer' and ordering form. Please bring this to the attention of the duty holders you visit.

HSE publications The HSE Books site is at http://www.hsebooks.com/Books/ and the HSE Publications site is at http://www.hse.gov.uk/pubns/index.htm .

LEV Guidance for employees: Pocket card: *Time to clear the air! A pocket guide to local exhaust ventilation (LEV)* INDG409 (ISBN for priced packs 978 0 7176 6300 2) http://www.hse.gov.uk/lev/employees.htm

LEV Guidance for employers: *Clearing the air: A simple guide to buying and using local exhaust ventilation (LEV)* INDG408 (ISBN for priced packs 978 0 7176 6301 9) http://www.hse.gov.uk/lev/employers.htm

LEV Guidance for suppliers (and some employers & employees) HSG 258 *"Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)"* HSG258 (ISBN 978 0 7176 6298 2). This replaces the old guidance on LEV in HSGs 37 and 54. http://www.hse.gov.uk/lev/designers.htm

HSE LEV Website The HSE guidance on LEV is listed on the new LEV website http://www.hse.gov.uk/lev/index.htm. This Site will be developed and include (LIST HERE)

COSHH Essentials – general and specific guidance Specific outline generic guidance is available on substance control via COSHH Essentials http://www.coshh-essentials.org.uk/ .

You, duty holders and suppliers, can also get access to a range of specific process and industry-related COSHH Essentials control sheets via the same Site. Go to *"Choice 4"* on the first screen and chose *"Direct Advice Topics"*. Chose either *"Production industries"* or *"Service Industries"* and then select the relevant industry/process.

Sector-related guidance A range of HSE Sectors, working with their industry stakeholders have developed control guidance. Some of this is priced and some is free on the Internet, for instance, http://www.hse.gov.uk/pubns/wis24.pdf .

3.2 Other LEV guidance

There are a number of standard textbooks and guides used by occupational hygienists, ventilation engineers and other professionals. Many of these are listed in HSG 258. A number of stakeholder organisations involved in the LEV Project, produce useful technical and general guidance. Examples include the Fan Manufacturer Association's (FMAs) guide to fan performance[4] and the Solid Handling and Processing Association (SHAPA) guide to dust extraction[5]. These, and other stakeholders, can be viewed via *"Links"* on the HSE LEV website http://www.hse.gov.uk/lev/index.htm .

3.3 LEV Training Courses

The British Occupational Hygiene Society (BOHS) has developed two LEV proficiency modules, P601 on LEV thorough examination and test and P602 introducing LEV design. Course details and providers are given on the Society's website at http://www.bohs.org/standardTemplate.aspx/Home/Examinations/ProficiencyModules

Other stakeholders, such as the Chartered Institute of Building Service Engineers (CIBSE) have developed ventilation course syllabi and run courses although not yet specifically on LEV design and application.

3.4 LEV Suppliers

Suppliers include LEV designers, supply companies and examiners. Representative organisations are listed on the LEV website (see "Links"). Where duty holders request advice on where to get an effective supplier, refer, in the first instance, to the supplier representative organisations listed. Other businesses/individuals may provide equally effective services.

Duty holders should be encouraged to follow the guidance in INDG 408. Please give them a copy. Suppliers should, within a reasonable time, follow and apply the good practice outlined in HSG 258 and INDG 408 or take equally effective actions. Key messages to suppliers are summarised in sub-section 2.5. Where supply-side stakeholder organisations have agreed to take various actions these may be posted on the HSE LEV website.

3.5 Inspector communication and feedback

Case studies Through the HSE LEV project and your inspection work the performance of many employers and suppliers will improve. To facilitate these improvements examples and case studies of improvements in LEV design, management and use are needed for the LEV website. HSE inspectors are in a very good position to identify examples of successful control, improved management and use of LEV.

Where you come across good performance which has the makings of a case study please contact your local, friendly Specialist Occupational Hygiene Inspector (see Appendix 6)

They will arrange for more detailed follow-up to develop your examples into case studies for the LEV website.

All examples and sub-sequent case studies that go on the LEV website will be credited.

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[4] *"Fan Installation Effects – A guide to installed fan performance"* (Guide 1)
[5] *"10 Key Steps for comparing dust extraction system proposals"*

4.0 LEV USER-SUPPLIER GOOD PRACTICE

4.1 HSE LEV guidance

The good practice requirements in the new guidance, that have been referred to in general terms in past guidance, are now made explicit and clearer. To get large-scale uptake and application will take time. The strategy is to raise awareness, influence and, ultimately, enforce to improve the practice of employers (duty holders) and suppliers especially in priority industries and for priority processes.

Recommendations in the new guidance, that will improve and sustain LEV exposure control include:

The LEV User Manual

- Employers buying LEV need instructions, guidance and training in how best to run, check and use the system and arrange thorough examination and test 'annually'.
- The Manual will enable employers to far more easily comply with the law. Relatively soon the intention is that most new LEV systems will come with a Manual.
- Older systems will also need Manuals or equivalents. This will take longer.

The LEV Log Book

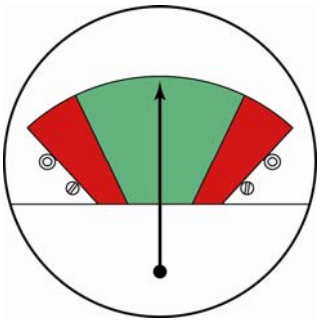
- Employers need to easily be able to record the findings of any checking and maintenance. Some do but often in an incomplete and haphazard way.
- The Log Book, provided by the supplier (or other) will enable employers to far more easily record findings, check and maintain LEV systems and use and comply with their legal responsibilities.
- Older systems will also need Log Books or equivalents and this will take longer).

LEV hood airflow indicators

Comments:

- It isn't possible for employees or supervisors, by 'feel' alone, to 'measure' or judge whether an LEV hood is drawing enough air. What's needed is a simple airflow indicator with a clear indication of adequate airflow (see Figure 2) or equivalent arrangements.

Figure 2 Diagram of an airflow indicator



- The need for such an indicator was mentioned in HSE's old LEV guidance (HSG 37) and is recommended in many COSHH Essentials control sheets and LEV textbooks.
- If employees and supervisors are to spot falling performance or, for instance, set up hood airflow using a damper indicators are very useful.
- As with Manuals and Log Books fairly soon new LEV systems should come with them already fitted.
- In time case studies of the success and usefulness of indicators will appear on the LEV website.
- See the FAQs on air-flow indicators for further information on air-flow indicators or equivalent arrangements http://www.hse.gov.uk/lev/index.htm

Employer's specification

- Often LEV systems that have been sold are not effective or workable because of simple errors, for instance, an important process and source of exposure has been missed. Or the LEV hood/system is ineffective (for various fundamental reasons). Employers need to be much clearer with suppliers about what they need and suppliers need to be more involved, impartial and helpful to employers.
- Employers, buying LEV systems, need to be clear in writing, about the processes and sources to be controlled by LEV and the degree of LEV control needed. They often need to take impartial, competent advice[6].
- INDG 408 will help employers (duty holders) to be much clearer in preparing written specifications and HSG 258 will help suppliers provide what is needed.
- Work with supply-side stakeholders will help as will support from supply-industry trade associations.
- Making large swathes of employers, as customers, more critical and savvy will take years. HSE needs to take a sensible and measured approach.
- Examples of effective LEV specification and negotiation with suppliers will help publicise what's needed. Please keep an eye out for examples of good practice

Supplier's quotation

- Guidance on ways suppliers can help employers (duty holders) and respond with effective quotations is provided in INDG 408 and HSG 258.

LEV hood classification and design criteria

- HSG 258, supplemented by material on the LEV website http://www.hse.gov.uk/lev/index.htm, provides guidance on hood design and application principles.
- Hoods are divided into three general types, enclosing, receiving and capturing. Applying the design principles helps suppliers (and employers) achieve effective exposure control

LEV commissioning

- This has often not been done effectively or indeed at all. The HSE guidance, especially HSG 258, spells out in outline what needs to be done.
- It will take some time before most systems are effectively commissioned. There is no getting away from the fact that effective commissioning is key to effective exposure control

LEV through examination and testing

- Thorough Examination and Test (TEXT) has been a requirement since COSHH came into force.
- Regulation 9, in particular ACoP paragraph 176 has spelt out in fair detail, the contents of a TEXT report. Quite a few examiners have not been following the letter and spirit of Regulation 9

[6] This is entirely understandable in that most organisations focus on their core business and many (most?) have little or no understanding of the design and application of LEV systems. They are often completely reliant the supplier for guidance on what type of LEV would be effective.

- HSG 258 provides a little more detail on certain areas of what a TEXT report should cover and contain and how it should be laid out.
- Stakeholder organisations whose members undertake examinations were involved in developing HSG 258.
- It's reasonable to expect a fairly rapid improvement in TEXT examinations and reports.
- TexT is key to the success of the HSE LEV project. Please examine reports critically using the guidance in Appendix 2

Labelling of LEV hoods

- Employees and employers need some indication that the LEV system has been thoroughly examined and tested.
- Hood labelling arrangements, clarifying the guidance, are described in the LEV Website FAQs http://www.hse.gov.uk/lev/index.htm
- All hoods examined should be labelled (e.g. Figure 3)
- Where hoods/systems have failed a short 'emergency' report should be issued together with a 'failed' label (e.g. Figure 4). If the 'client' agrees the examiner may put on 'failed' labels.
- Where LEV examiners are not following the guidance, including the FAQ, please send them the standard letter on labelling.

Figure 3 Example of a Test record

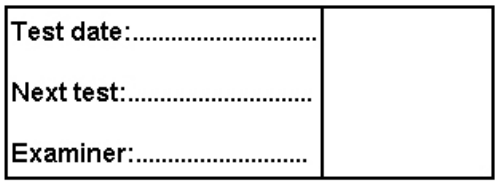
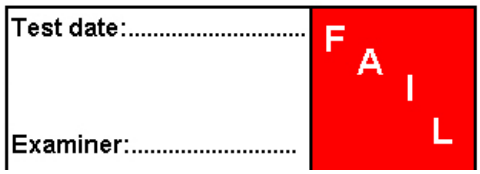


Figure 4 Example of a 'Failed' label



5.0 LEV SYSTEM INSPECTION; PROCEDURES, HINTS AND TIPS[7]

5.1 Inspection strategy and approach

You will come across three main scenarios.

1. Good LEV exposure control All processes and sources are well controlled by well designed and applied LEV which is regularly checked, well maintained and tested. You have confidence that the employer will continue to well manage the LEV system (and other control measures).

Action - Duty holder: Give the employer a copy of INDG 408. If LEV management and design is exemplary tell your local friendly SG Specialist Occupational Hygiene Inspector who will help write up your findings as a case study.

2. Poor LEV design, low consequence All processes and sources have LEV of poor design applied. But there is little or no evidence of airborne contaminant escape, emissions and exposures from the processes are 'low' and the substances hazardous to health are of relatively low toxicity.

Action - Duty holder: Give the employer a copy of INDG 408 and take him/her through the key LEV messages (see sub-section 2.4). Encourage modification and improvements in LEV design, application and management. Take formal enforcement action where, for instance, there's been no LEV thorough examination and test. Further action will depend on local factors. If the employer has been let down by a supplier, send appropriate letter (see Chapter 6).

3. Poor LEV design, high consequence All/many processes and sources have LEV of inadequate design applied. Some important sources of exposure have been missed. Emissions and exposures from the processes are 'high'. The substance(s) hazardous to health have the potential to cause serious acute or chronic harm (e.g. their asthmagens, carcinogen, mutagens (R42, R42/43, R45, R46 or R49) or otherwise capable of causing serious health risk, e.g. crystalline silica dust).

There is significant evidence of airborne contaminant escape (e.g. settled deposits, strong smell (if contaminant has an odour) and evidence from investigations using the inspection test kit.

Action - duty holder: Give the employer a copy of INDG 408 and take him/her through the key LEV messages. Gather evidence and take formal enforcement action proportionate to the potential health risk.

Action - supplier: If part of the responsibility for poor LEV exposure control appears to be due to a supplier take proportionate action.

There will be circumstances, especially those lying between examples (2) and (3), where you will need to take advice from the local SG Specialist and/or Sector colleagues.

[7] Sometimes COSHH doesn't apply to an LEV system. For instance, some LEV is installed for reasons of thermal comfort. In these cases the LEV will not be an exposure control measure under the COSHH Regulations and COSHH requirements will not apply.

5.2 Inspection preparation

To do the inspection, using the new HSE approach, you will, ideally:

- Have attended the LEV Training Course,
- Have your personal-issue equipment and practiced using it,
- Have copies of, and have read, INDGs 408 and 409,
- Have a copy of HSG 258, and,
- Have read the LEV SIM, and the, strategy, enforcement and inspection sections of this Pack

Local SG Specialist Occupational Hygiene Inspectors are available to undertake joint visits and to advise you.

Practical Inspection aids

To assist you with your inspection this Pack contains a set of Aide Memoires covering LEV hood design and application and LEV thorough examination and test. See Appendix 2, which also contains an Action Plan that could be used by a duty holder to review his/her selection and management of LEV. You, and/or the employer, might find the Plan a useful way of structuring an LEV management review.

5.3 Inspection visit

Office As with many inspections start by discussing the issue in general terms with the owner/manager. Find out about and record basic process and operational details. Ask to see the relevant paperwork. In this instance this will consist of:

- LEV checking and maintenance arrangements including a 'Log Book' or equivalent records
- The LEV thorough examination and test reports
- If LEV has been purchased recently also ask to see the employer's process description and LEV specification (see INDG 409) and the LEV supplier's quotation

5.4 Inspection questions, issues and actions

Make a note of the processes and activities to be controlled and ask yourself the following questions:

- **All processes?** Is LEV applied to all the processes and activities that need to be controlled? (if processes and activities have been missed – Describe and list in your Notebook)
- **Right hoods in right way?** Are the hoods applied capable of controlling the processes and exposure effectively enough? (Observe and apply aide memoires in Appendix 2)
- **Good hood design principles?** Are the hoods designed and applied according to the good practice guidance in HSG 258 (refer to guidance and use Aide Memoires)
- **Simple tests** Apart from observations what simple tests can I do with my equipment to check my assumptions and observations? (See Appendices 3, 4 and 5 and Record findings in your Notebook and on camera)
- **Does LEV work?** Are the LEV hoods applied likely to be controlling exposure effectively enough? (If the answer is "No" summarise reasons and evidence in your Notebook)

- **Airflow indicators (or equivalent)?** Do LEV hoods have airflow indicators or are equivalent arrangements in place? (Most at the moment will not. Give employer INDGs 408 and 409 and explain See http://www.hse.gov.uk/lev/faqs.htm)
- **LEV maintenance adequate?** Has the LEV been adequately checked and maintained? Is it in, *"…an efficient state, in efficient working order, in good repair and in a clean condition…"*? (Record your observations on the physical state of the LEV and ask employer to describe and show his/her management arrangements and identify the 'responsible person')
- **Manual, Log Book and Commissioning report (or equivalent)?** Has the employer (occupier) got a User Manual, a Log Book, A Commissioning Report (If the answer is "No" to the first two give employer the relevant letter and a copy of INDG 408. If the answer to the last question is "No" the LEV, unless it's a very simple system and it's easy to gauge its effectiveness, may need commissioning).
- **TexT done and thoroughly and properly done?** The employer should be able to show you an up-to-date TexT report and past reports (they should be kept for five years at least. Check whether the TexT report follows COSHH and HSG 258 guidance. Also see Aide Memoire in Appendix 2. Enforce as per Chapter 6 guidance.
- **Training?** Have the employees been consulted, briefed and trained in the best use of the LEV?
- **Likely to last?** How well designed and built is the LEV system as a whole? (Does it look like it will withstand the duty imposed?

5.5 When and how to use smoke tubes, dust-lamp and anemometer

There's probably an order of preferred use to your new LEV test kit.

Smoke tubes are probably most useful. For instance, you can assess the capture zone of a capturing hood, or whether an enclosing or receiving hood is containing contaminated air.

The dust-lamp can be used to show-up particle clouds coming off of a process. And can show-up in a dramatic and visual way failure of LEV to control such particle clouds. Use your camera to record dust-lamp observations (see Appendix 4).

The anemometer can be used to investigate LEV hood face air velocities.

1 Smoke tubes and generators Smoke tubes can be used in a number of ways including:

- To assess the capture zone of a capturing hood (probably the most common use)
- Show up leakage of air from an enclosing or receiving hood (release of smoke around the perimeter of a hood)
- Demonstrate the movement of contaminated air away from a source or process
- Show the movement and impact of draughts

Where you've demonstrated poor LEV control repeat the tests and arrange for someone on-site to video you doing so (your standard issue camera can record video clips. See Appendix 4 for further details on how to do this).

Usually the smoke tubes will be good enough but sometimes to assess, for instance a large booth or enclosing room such as a spray-bake booth, you'll need a smoke generator. Smoke generators are not standard issue equipment but are easy to use. Each Division has at least

three generators. Get one from the Divisional HSL Field Scientist. If it's regularly needed it may be possible to keep it permanently at your office.

2 Dust-lamp The dust-lamp can be used to:

- Make visible particle clouds that are invisible or partially visible
- Show escape of particle clouds from an LEV enclosing or receiving hood
- Show failure of a capturing hood to control particle clouds

There's a right and a wrong way to using a dust-lamp. See Appendix 4 for further details of how to use your dust-lamp and record your observations using a camera.

3 Anemometer The anemometer can be used to:

- Measure the average, and variation in face velocity of air entering an LEV hood.
- Measure the variation in face velocities for a series of LEV hoods
- Assess, in conjunction with smoke tubes, the 'capture velocity' of a process
- Measure the (approximate) velocity of a contaminant cloud emitted by a process

In practice inspectors will probably concentrate on measurement of hood face velocities.

For instance you could measure the average and variation face velocity of an LEV enclosure (booth) and judge whether it's high enough and varies too much. If it's too low typically <0.5 m/s, it will probably leak or poorly control operator exposure.

5.6 COIN Work recording for operational and specialist inspectors

All inspectors please include the acronym "LEV" in your inspection report titles.

Topic category - Please record your visits and associated work on COIN under the appropriate topic categories. It is very important that HSE records correctly all topic activity time. Also, follow the general guidance in OM on COIN recording.

Specialist Occupational Hygiene Inspectors: LEV Project Master Case

There is a Project Master Case (Case Number ID (4078004)) to which you can link your Case reports. Can all Field Specialist Occupational Hygiene Inspectors link their Case reports to the Master Case.

All Field Specialist Occupational Hygiene Inspectors should have received more detailed guidance on Master Case work recording.

6.0 ENFORCEMENT GUIDANCE

6.1 Deriving the authority of EMM standards

The following are relevant to deriving the authority of standards for use in Table 5.1 of the EMM and therefore deciding the initial enforcement expectation.

Title	Authority
Control of Substances Hazardous to Health Regulations ACoP	Defined
HSG258 *"Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)"* (ISBN 978 0 7176 6298 2)	Established
Guidance Note EH16 (REV 9/99) *Isocyanates: health hazards and precautionary measures*	Established
INDG408 *"Clearing the air: A simple guide to buying and using local exhaust ventilation (LEV)"* (ISBN for priced packs 978 0 7176 6301 9)	Established
INDG409 *"Time to clear the air! A pocket guide to local exhaust ventilation (LEV)"* (ISBN for priced packs 978 0 7176 6300 2)	Established
COSHH Essentials: Easy steps to control chemicals http://www.coshh-essentials.org.uk/ (substance and process advice (see Direct Advice Topics))	Established
HSE Website "Local Exhaust Ventilation systems (LEV)" http://www.hse.gov.uk/lev/index.htm	Interpretive
SIM 03/2008/05 "Local exhaust ventilation: assessment and inspection" http://www.hse.gov.uk/foi/internalops/sectors/manuf/030805.htm#levbuying	Interpretive
MDHS 82 *"The dust lamp A simple tool for observing the presence of airborne particles"* *http://www.hse.gov.uk/pubns/mdhs/pdfs/mdhs82.pdf*	Interpretive
HSE Sectoral guidance e.g. http://www.hse.gov.uk/pubns/woodindx.htm	
Professional or Industrial publications, for instance: *"10 KEY STEPS FOR COMPARING DUST EXTRACTION SYSTEM PROPOSALS"* http://www.shapa.co.uk/pdf/techdata6.pdf	Interpretive
Industrial Ventilation: A Manual of Recommended Practice, 25th Edition (American Conference of Governmental Industrial Hygienists)	Interpretive

The EMM considers COSHH assessment as an administrative measure. The standard for COSHH assessment is a defined standard found in the *Control of Substances Hazardous to Health Regulations 2002 (as amended).* Any absence or inadequacies of an assessment should be considered using Table 5.2 of the EMM.

6.2 Enforcement Management Model (EMM)

The following is a guide to when enforcement action may be appropriate and is based upon operational version 2.0 of the Enforcement Management Model (EMM) and the general guidance on the application of EMM principles to health risks, available on the intranet[8]. Action taken by inspectors should reflect any subsequent changes to the EMM. The final decision on enforcement action should also take account of local factors.

[8] http://intranet/operational/emm/em_model/index.htm

Risk Exposure to certain substances hazardous to health, in the industries and processes targeted, can lead to various work-related health effects including occupational asthma, a permanent and usually irreversible condition which can restrict work capabilities and reduce quality of life[9], bronchitis, emphysema and a mix of lung conditions called chronic obstructive pulmonary disorder (COPD) with similar disabling effects. Some substances can also cause cancer.

Immediacy of risk A failure to adopt appropriate control measures, including effective LEV, can result in over-exposure to substances hazardous to health and the possible risk of a serious health effect. Where there is a serious risk of a serious health effect, inspectors may need to consider issuing a PN following the guidance in Section 2 of the EMM.

Benchmark standards The benchmark set should be considered as a nil or negligible risk of serious health effect. It can be achieved by a package of measures including:

- Risk control systems (engineering controls including LEV). Note: LEV may be part of, or the main, engineering control.
- Work place precautions (e.g. instruction and training), and,
- Management arrangements (including appointment of a 'responsible person', control checking and maintenance, exposure assessment/measurement and health surveillance, where there are valid techniques (see the 'three tests' in Regulation 11 guidance)).

Risk gap The risk gap, as derived from EMM, for common tasks is summarised in EMM Table 1 (see OC130/5 *"General guidance on application to health risks"*[10]). Inspectors may use the control measure problems as a guide to making their assessment of actual risk and the subsequent risk gap. However, they must ensure that they base their assessment of risk on the factors they find at the site.

Incumbent Inspection Rating You will need to form a judgement on the general management of health and safety risks and enter scores in the Risk Rating System using the Inspection Rating Form (IRF) following the new scoring system[11].

Risk Control Indicators (RCI) – Assessment Scale This Topic Pack focuses on LEV and health risk control. This is part of what an employer needs to do to comply with the law and doesn't include compliance with other parts of COSHH. The relevant RCI topic, to which LEV contributes, against which to score employers is:

"COSHH – is there effective organisation and arrangements, including adequate assessment, information, instruction and supervision, with evidence of management commitment; are controls adequate, including substitution, engineering controls or PPE; is there suitable health surveillance with records and appropriate reporting and are cases of ill health reported under RIDDOR, where required?"

An RCI score of 1 should only be allocated where all relevant elements are in place. A score of 5/6 would indicate that enforcement action would probably be appropriate. For scores of 3 and 4 enforcement action **may** be appropriate.

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[9] The longer someone continues to be exposed to an asthmagen, to which they have started to respond, the worse their occupational asthma and general respiratory health will get, and the worse their prognosis. Some people get to the stage whether they respond to a wide variety of non-specific respiratory insults/stimuli such as perfume or diesel exhaust or cold air.

[10] http://intranet/operational/ocs/100-199/130_5/

[11] See http://intforms/forms/inspection-investigation/irf1.pdf

Make a judgement against the COSHH RCI topic using the following criteria:

Risk Control Indicators – Assessment Scale: each risk control indicator should be assessed against the following 1-6 scale.					
1	**2**	**3**	**4**	**5**	**6**
High standards with some aspects meeting best practice.	Good standards meeting minimum legal requirements.	One or more minor shortcomings are present. As these shortcomings are not serious, they can be dealt with informally with oral advice.	Standards are patchy. It is necessary to address one or more shortcomings by giving formal instructions for remedial action to be taken. Formal instructions may be implemented by, eg, obtaining a verbal undertaking from the company to take specific action, sending a letter, or physical removal/ disposal of items.	Standards generally unsatisfactory. Typically, at least one contravention that gives rise to a discernible risk gap.	Standards unacceptable. Unless application of the EMM identifies duty holder factors that provide strong mitigation, the issuing of a notice and/or prosecution is likely to be appropriate.

6.3 Enforcement guidance

The issues to consider during inspection are shown in three tables (2.1, 2.2 and 2.3) and deal with three overlapping but distinct groups; employers, LEV suppliers and LEV examiners.

Table 2.1 LEV enforcement Guidance – Employers

Issue	Benchmark (see INDG 408)	Evidence	Risk Gap	Indicative Action
LEV specification	**The requirements for a new LEV system should be clearly specified by the employer (often with advice). He/she should include work and process descriptions and the type of LEV (hoods) which will control exposure.** **The same applies if an LEV system has to be altered substantially. It should be fit-for-purpose.** Note: Usually if an LEV system is extended or altered in an unplanned way, it fails to control exposure effectively. Specification should include the requirement for an LEV User Manual, Log Book (or equivalents), commissioning and suitable instrumentation including airflow indicators on the hoods (or equivalents).	New (or old and altered) LEV has been poorly specified and ineffectively controls exposure, especially to substances that cause asthma or, potentially, long-latency diseases No User Manual and/or Log Book (or equivalents), no commissioning, no instrumentation especially airflow indicators on the hoods	Moderate/ Substantial May contribute to increased Risk Gap	Letter with INDG 408 Letter (see standard paragraphs) with reference to HSG 258

Table 2.1 LEV enforcement Guidance – Employers				
Issue	**Benchmark (see INDG 408)**	**Evidence**	**Risk Gap**	**Indicative Action**
Management of LEV	**LEV systems need managing. This includes checking, maintenance, training and supervision. Normally the employer should appoint a 'responsible person'. Note: The requirement in COSHH Regulation 9 to maintain is an absolute duty (see Redgrave 2.61 for details)**	**No responsible person or person is incompetent. No system of checking and maintenance.** Clear evidence of poorly checked and maintained LEV system Necessary remedial work not carried out	Moderate/ Substantial	Letter with INDG 408 (IN if risk is substantial)
LEV examination	All LEV systems should be thoroughly examined and tested at least every 14 months (and some more frequently – see Schedule 4 COSHH).	Evidence that not ALL LEV systems have been thoroughly examined and tested in the last 14 months. Note: Sometimes only, a proportion of the systems have been examined but not all.	Moderate/ Substantial	Letter with INDG 408 and reference to HSG 258 (IN if risk is substantial)

Table 2.1 LEV enforcement Guidance – Employers				
Issue	**Benchmark (see INDG 408)**	**Evidence**	**Risk Gap**	**Indicative Action**
	LEV systems (and other engineering controls) should be thoroughly examined and tested (TEXT). For LEV, at least every 14 months and more frequently in some cases (see Schedule 4 of COSHH).	**No LEV thorough examination and test certificate (i.e. the employer cannot show that TEXT has been done)** **No test points on the LEV system** **HSE guidance recommends that a red 'Failed' certificate should be put on any hoods (or system) that has failed, to warn supervisors and operators directly and explicitly. Alternatively, the label may be issued to the employer's "responsible person."**	Moderate/ Substantial	Letter with INDG 408 (IN if risk is substantial)
	The examiner should prepare a report as described in COSHH Regulation 9 (guidance and ACoP) in particular Paragraphs 175 – 177 and HSG 258 Chapter 10 with all Actions and remedial measures listed and described at the start. The employer should arrange for remedial actions to be taken especially where hoods (or indeed systems) have been found and judged to have failed.	**No action taken on receipt of TEXT report**	Moderate/ Substantial	Letter with INDG 408 (IN if risk is substantial)

Table 2.1 LEV enforcement Guidance – Employers				
Issue	**Benchmark (see INDG 408)**	**Evidence**	**Risk Gap**	**Indicative Action**
	Employer should treat TEXT report as an 'audit' of his/her management of the LEV system over the previous 'year'. If the TEXT report contains a long list of remedial actions, it is 'telling' the employer that the system of checking and maintenance is not good enough and needs improving.	**No use of TEXT report as audit 'tool'**	May contribute to increased Risk Gap	**Letter**

Suppliers of LEV goods and services

Table 2.2 Enforcement Guidance – Suppliers				
Issue	**Benchmark**	**Issue/Evidence**	**Risk Gap**	**Indicative Action**
Note: Suppliers have always had duties under HSW Act to protect the health and safety of people not in their employment and to offer effective, competent advice HSW Act 1974 Section 3 **Suppliers are responsible for the health and safety of others not in their employment. If, by their actions, they put people's health at risk in theory you could issue an IN against the supplier under S3 to put right ineffective LEV. In practice the course of action is unlikely to work in that it would require the employer (occupier) to allow the supplier back into the workplace; the supplier that had just failed him/her. In reality S3 could be used to require a supplier to become more competent (see IN templates) or in any PR of a supply business if people's health has been put at serious risk.** HSW Act 1974 Section 36 **Or Section 36.1 can be used when the duty holders default is because of gross failure by a third party, for instance, and LEV supplier.**				
Supply	Supplier's quotation matches needs in occupier's (clients) specification/requirements. Supplier should help employer work out what he/she needs, especially identification of the processes and sources that need controlling.	Supplier has not matched quotation against employer's specification. There will degrees of mis-match. If they are gross e.g. processes and sources have been missed, or the LEV offers little or no exposure control, the risk gap could be significant and the suppliers will not have been following good practice guidance.	Moderate/ Substantial	Letter with INDG 408 and reference to HSG 258 (IN if risk is substantial)

Table 2.2 Enforcement Guidance – Suppliers				
Issue	**Benchmark**	**Issue/Evidence**	**Risk Gap**	**Indicative Action**
Effective control	**LEV system must match and 'cope' with and effectively control the process(es) and the sources they create.** **Note: This requirement applies to specialist LEV suppliers and retail suppliers of machinery and equipment. If LEV is 'built-in' the supplier requirements still apply.**	LEV controls do not effectively control emissions and exposure – various reasons connected with ineffective LEV design and application.	Moderate/ Substantial	Letter with INDG 408 and reference to HSG 258 (IN if risk is substantial)
User Manual & Log Book	**Supplier should provide a User Manual and Log Book (or equivalent) as per HSG 258.**	No, or inadequate, User Manual or Log Book (or equivalent) supplied. May not lead to immediate risk but is likely to lead to deterioration in control performance and increased exposure.	Moderate/ Substantial	Letter with INDG 408 and reference to HSG 258
LEV instrument-ation	**LEV system should be adequately instrumented. Hoods especially should have airflow indicators (or equivalent arrangements see http://www.hse.gov.uk/lev/faqs.htm .**	No LEV system instrumentation in particular hoods. May not lead to immediate risk but is likely to lead to deterioration in control performance and increased exposure.	Moderate/ Substantial	Letter with INDG 408 and reference to HSG 258
Commission-ing	**System must be commissioned properly and be shown to reduce exposure effectively. Commissioning is critical to effective checking, maintenance and 'yearly' thorough examination and test of LEV systems.**	No or inadequate commissioning. System may need effective commissioning especially where evidence suggests emissions and exposures are inadequately controlled.	Moderate/ Substantial	Letter with INDG 408 and reference to HSG 258 (IN if risk is substantial)

Table 2.3 Enforcement Guidance – Examiners				
Issue	**Benchmark**	**Issue/Evidence**	**Risk Gap**	**Indicative Action**
Note: Examiners may be asked by the duty holders to test only some of the LEV systems or to test some LEV systems one years and the rest the next. It is the responsibility of the duty holder to have ALL LEV systems tested. Examiners should make a clear note in the TEXT report that they have been instructed to test only certain LEV systems and not ALL.				
Examination procedures	See COSHH Regulation 9 guidance (guidance and ACoP) in particular Paragraphs 175 – 177 plus INDG 408 and HSG 258 especially Chapter 10.	**Examples:** **Examination too cursory and incomplete – not "thorough".** **No visual or structural examination of LEV system.** **No qualitative and/or quantitative tests or assessment of system performance.** **No assessment of exposure control effectiveness against commissioning findings and report (or equivalent)** See also Appendix 3	Moderate/ Substantial	Letter or IN, or PN if gross exposure and significant risk gap

Table 2.3 Enforcement Guidance – Examiners				
Issue	**Benchmark**	**Issue/Evidence**	**Risk Gap**	**Indicative Action**
Examination report	See COSHH Regulation 9 (guidance and ACoP) in particular Paragraphs 175 – 177 and HSG 258 Chapter 10.	**Examples:** **System declared "Satisfactory" but significant faults reported (or identified during inspection soon after examination).** **Repair and remedial action incomplete and/or buried in report, not at start.** **No, or incomplete, system schematic and identifiers.** **Repair and remedial action not listed.** **Full range of assessment methods (qualitative & quantitative) not listed or used.** **LEV hood/system failed but no warning or report for 'responsible person'** **See also Appendix 3**	Moderate/ Substantial	Letter or IN, or PR if gross exposure and significant risk gap

Table 2.3 Enforcement Guidance – Examiners				
Issue	**Benchmark**	**Issue/Evidence**	**Risk Gap**	**Indicative Action**
Examiner competence	Carries out a thorough examination against clear standards of performance including an assessment of exposure control. Ideally this is done against a clear commissioning standard. If this is not available (often the case) then the examiner is very clear about the criteria used to make judgements. Uses the full range of appropriate assessment and measurement techniques (see HSG 258 and other guidance). Prepares a full TexT report as laid out in COSHH Regulation 9 (guidance and ACoP) in particular Paragraphs 175 – 177 and HSG 258 Chapter 10. The report should start with a list of any remedial actions necessary. All hoods/systems examined should be labelled Where a hood or system has failed an 'emergency' report should be prepared and given to the 'responsible person' and a red label either attached or issued	**See Examination procedures and Reports**	Moderate/ Substantial	Letter or IN, or PR if gross exposure and significant risk gap

6.4 Standard paragraphs to suppliers[12]

The LEV Project aims, over time, to improve the performance and effectiveness of LEV control of exposure to substances hazardous to health and thereby reduce the burden of occupational disease.

The new guidance includes a range of necessary improvements in LEV design, application and management, some of which will be new to employers (duty holders) and suppliers (of LEV-related goods and services).

In the first instance the aim is to make employers and suppliers aware of the new and necessary requirements. As time goes by, and good practice starts to be taken up, it will become reasonable to expect most employers and suppliers to act.

- Supplier re design of LEV system
- Supplier re installation and commissioning
- Supplier re responsibilities under HSW Act (1974) Sections 3 and 36

***** Supplier re design and application of LEV system**

Dear XXXXX,

I understand that you supplied the LEV system (ABC) to XYZ Ltd. I would like to draw your attention to the following:

HSG 258 *"Controlling airborne contaminants at work: A guide to local exhaust ventilation".* It is essential reading for anyone designing and installing such systems. This guidance deals with both hood design and application and also with the design of the rest of the LEV system. There is also a number of free leaflets available and further information, details of which are given on the HSE web site at: www.hse.gov.uk/lev.

From my initial examination of the system at XYZ Ltd, I am of the opinion that the performance of the system is inadequate leading to potential exposure to the operators and to others in the vicinity. Systems need to be carefully designed/supplied and commissioned with suitably instructions in the form of a User Manual and Log-0Book for checking and maintenance records.

Please make yourself familiar with the good practice guidance in the HSE LEV guidance http://www.hse.gov.uk/lev/flyer.pdf

***** Supplier re installation and commissioning.**

Dear XXXXX,

I understand that you supplied the LEV system to XYZ Ltd. I would like to draw your attention to the following:

[12] A supplement to this Topic Inspection Pack covering paragraphs on employers (duty holders) responsibilities and, possibly others issues, will be produced in 2009-10

HSG 258 *"Controlling airborne contaminants at work: A guide to local exhaust ventilation*" and other LEV guidance http://www.hse.gov.uk/lev/flyer.pdf It is essential reading for anyone designing, installing and commissioning such systems. This guidance deals with both installation and commissioning and also with the design of the rest of the LEV system.

From my initial examination of the system at XYZ Ltd, I am of the opinion that the system is leading to potential exposure to the operator and to others in the vicinity. Systems need to be carefully designed, installed and commissioned. It would appear that you did not properly commission the LEV system (as described in HSE LEV guidance, particularly HSG 258) and I understand that there is no commissioning report for the system. The report should cover:

- Verifying that the system was installed as designed.
- Showing that the system meets the required technical performance.
- Demonstrates adequate control
- Reports readings as benchmarks for subsequent examinations and tests.

***** Supplier re responsibilities under HSW Act etc (1974) Sections 3 and 36.**

Every employer has duties and the Health and Safety at Work Act (1974) to themselves, their employees, and other people not in their employment. Companies who sell LEV or provide other related services also fall into this category. For example, someone who sells an unsuitable LEV system that causes someone to be exposed to a harmful substance may be in breach of Sections 3 or possibly 36 of HSW Act.

In my opinion the LEV system (ABC) that your company provided/installed at ZXY Ltd is not fit-for-purpose and inadequately controls operator exposure to airborne substances hazardous to health. I would ask you to become familiar with HSG 258 *"Controlling airborne contaminants at work: A guide to local exhaust ventilation*" and other LEV guidance http://www.hse.gov.uk/lev/flyer.pdf It is essential reading for anyone designing, installing and commissioning such systems. This guidance deals with both installation and commissioning and also with the design of the rest of the LEV system.

APPENDIX 1 Notice Templates

Note. The following notices cover some of the circumstances you are likely to encounter when assessing LEV exposure controls. They cover more than LEV controls and touch on other aspects of effective exposure control.

The wording of the Notices may need modifying according to the specific circumstances you find on site.

- **Standard Generic Notes**
- **Substances Hazardous to Health Prohibition Notice (PN) template**
- **Substances Hazardous to Health COSHH Assessment**
- **Preventing and adequately controlling exposure**
- **Commissioning exposure control measures including LEV**
- **Personal Protective Equipment**
- **Thorough examination and test of local exhaust ventilation system**
- **Thorough examination and test of engineering controls (other than LEV)**
- **Incompetent/inadequate examiner of LEV system**
- **Checking and maintenance of engineering controls including local exhaust ventilation system**
- **Checking and maintenance of systems of work, supervision and other measures**
- **Occupational Health Surveillance**
- **Information, instruction and training**
- **Incompetent LEV designer/supplier**
- **Incompetent supplier as employer – prosecution**
- **Incompetent supplier as individual – prosecution**

1.1 Standard Generic Notes

The standard *"Notes"* section, at the end of each Notice, has been omitted to save a little space. Here are the generic Notes and References:

Further information relevant to this Notice is contained in various HSE publications including:

L5, *COSHH ACoP, Control of Substances Hazardous to Health 2002 (as amended)* (ISBN 0717629813)

I attach the following free information leaflets: *"Time to clear the air! A pocket guide to local exhaust ventilation (LEV)"* for employees INDG409 (ISBN for priced packs 978 0 7176 6300 2) *"Clearing the air: A simple guide to buying and using local exhaust ventilation (LEV)"* INDG408 (ISBN for priced packs 978 0 7176 6301 9)

Both leaflets, details of the book on LEV design and application (*"HSG 258 Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)"* (ISBN 978 0 7176 6298 2)) and further information on exposure control can be found on http://www.hse.gov.uk/lev/index.htm Books can be purchased from HSE Books. 01787 881 165 or Fax: 01787 313 995

1.2 Substances Hazardous to Health Prohibition Notice (PN) template

You as an employer have failed so far as is reasonably practicable to ensure the health of your employees (and/or other persons who are not your employees) because you failed to ensure that the exposure of your employees to substances hazardous to health, namely X and Y, is either prevented or, where this is not reasonably practicable, adequately controlled.

Describe details of breach on which you issue your PN e.g. You have failed to control exposure to a substance hazardous to health by spraying 2-pack isocyanate paint in an open workshop with no protection for the sprayer or other people in the workroom.

The Health and Safety at Work etc. Act 1974, Section 2 & 3

The Control of Substances Hazardous to Health Regulations 2002 (as amended), Regulation 7(1)

See “Standard Generic Notes”

1.3 Substances Hazardous to Health COSHH Assessment

Page 1

Control of Substances Hazardous to Health Regulations 2002 (as amended), Regulation 6(1)

Health and Safety at Work etc. Act 1974, Sections 2(1) and 3

You as an employer are carrying out work which is liable to expose your employees to a substance hazardous to health namely (list substance(s) here) and you have not carried out a suitable and sufficient assessment of the risks created by that work and identified the steps that need to be taken to control those risks.

Schedule (page 2)

In order to comply with this notice you should:

Carry out a suitable and sufficient assessment of the health risks to employees from working with (list substance(s) here) which are (list potential health effect here). The assessment should include the following;

- the hazardous properties of the substance;
- information on the health effects provided by the supplier including information contained in any safety data sheet and other reliable sources;
- the level, type and duration of exposure;
- the work circumstances including the amount of the substance involved;
- activities such as maintenance, where there may be the potential for a high level of exposure;
- the effect of preventive or control measures provided in accordance with Regulation 7;
- whether supplementary personal protective equipment (PPE) will be needed to ensure effective exposure control;
- the results of any monitoring of exposure in accordance with Regulation 10;
- the results of any relevant health surveillance (if relevant);
- any additional relevant information.

You should make provisions to ensure that this assessment is reviewed. Those provisions should extend to systems to ensure that changes are made where there is reason to believe that the assessment is no longer valid or there has been a significant change in the work to which the assessment relates and where as a result of the review changes to the assessment are required.

OR

You should institute any other measures which are as equally effective as the above to achieve compliance with the Notice.

Notes: Add “Standard Generic Notes” HERE

1.4 Preventing and adequately controlling exposure

You, as an employer are contravening the following statutory provisions:

Health and Safety at Work etc. Act 1974, Sections 2(1) and/or 3

Control of Substances Hazardous to Health Regulations 2002 (as amended), Regulation 7

The reasons for my said opinion are:

You have failed to ensure that the exposure of your employees (and/or persons not in your employment) to substances hazardous to health, namely (list substance(s) here, is either prevented or, where this is not reasonably practicable, adequately controlled.

Schedule (page 2)

1. In order to comply with the requirements of this Notice you should:

Apply the following Principles of good practice for the control of exposure to substances hazardous to health:

(a) Design and operate processes and activities to minimise emission, release and spread of substances hazardous to health.

(b) Take into account all relevant routes of exposure – inhalation, skin absorption and ingestion – when developing control measures.

(c) Control exposure by measures that are proportionate to the health risk.

(d) Choose the most effective and reliable control options which minimise the escape and spread of substances hazardous to health.

(e) Where adequate control of exposure cannot be achieved by other means, provide, in combination with other control measures, suitable personal protective equipment.

(f) Check and review regularly all elements of control measures for their continuing effectiveness.

(g) Inform and train all employees on the hazards and risks from the substances with which they work and the use of control measures developed to minimise the risks.

(h) Ensure that the introduction of control measures does not increase the overall risk to health and safety.

AND

2. Ensure that any workplace exposure limit (WEL) approved for the substance is not exceeded. For (add substance(s) HERE the relevant WEL is XX mg/m^3 (8 hour Time Weighted Average) and YY mg/m^3 (15 minute Time Weighted Average).

3. Ensure that you reduce exposure to (Add substance(s) HERE) which carry the risk phrases R45, R46 or R49 or are listed as "Asthmagens" in HSE publication *"Asthmagens? Critical Assessments of the evidence for agents implicated in occupational asthma"* or any other substance which the risk assessment shows has the potential to cause occupational asthma or is listed as a substance or process that may cause cancer in COSHH Schedule 1, exposure is reduced as far as is reasonably practicable

OR

Take other equally effective measures which will ensure compliance with your legal obligations.

Notes: Add “Standard Generic Notes” HERE

Guidance on control Principles (taken from COSHH ACOP):

"295 The objective of COSHH is to prevent, or adequately control, exposures to substances hazardous to health so as to prevent ill health. This guidance on good practice for the control of exposure to substances hazardous to health is to help employers after they have considered the overriding duty in regulation 7(1) to prevent exposure.

296 Employers have a responsibility to manage and minimise the risks from work activities. They must develop suitable and sufficient control measures and ways of maintaining them. They should:

(a) identify hazards and potentially significant risks;

(b) take action to prevent and control risks; and

(c) keep control measures under regular review.

297 To be effective in the long--term, control measures must be practical, workable and sustainable."

1.5 Commissioning exposure control measures including LEV

Page 1

You, as an employer are contravening the following statutory provisions:

Health and Safety at Work etc. Act 1974, Sections 2(1) and/or 3

Control of Substances Hazardous to Health Regulations 2002 (as amended), Regulations 6 and 7

The reasons for my said opinion are:

You have failed to ensure that the exposure of your employees (and/or persons not in your employment) to substances hazardous to health, namely (list substance(s) here, is either prevented or, where this is not reasonably practicable, adequately controlled and that the control measures effectively control exposure

Page 2 Schedule

An employer shall not carry out any work which is liable to expose any employees to any substance hazardous to health unless he has –

(a) made a suitable and sufficient assessment of the risk created by that work to the health of those employees and of the steps that need to be taken to meet the requirements of these Regulations; and
(b) implemented the steps referred to in sub-paragraph (a)."

And - Every employer shall ensure that the exposure of his employees to substances hazardous to health is either prevented or, where this is not reasonably practicable, adequately controlled"

Employers, as outlined, should develop adequate, effective and reliable exposure control measures. To do this they need to identify the measures, arrange for them to be put in place and to check that they work. The engineering control parts of the control measures, including LEV, need to be installed and commissioned in a systematic way.

OR

Take other equally effective measures which will ensure compliance with your legal obligations

Include in Generic IN Schedule Notes The practical details of what needs to be done concerning LEV are summarised in HSG 258.

1.6 Personal Protective Equipment

Page 1

Control of Substances Hazardous to Health Regulations 2002 (as amended), Regulation 7(9)

Health and Safety at Work etc. Act 1974, Sections 2(1) and 3(1)

Personal Protective Equipment at Work Regulations (1992)

You have failed to provide persons exposed to (list substance(s) here) with Personal Protective Equipment, which, with other measures, adequately controls their exposure.

Schedule (page 2)

(List substance(s) here) are (list potential health effects here) and are harmful by inhalation and/or skin absorption and/or ingestion (choose whichever combination is appropriate).

Where it is necessary to use Personal Protective Equipment (RPE) either solely or in addition to other control measures, you should ensure.

- that the PPE is suitable for purpose and capable of adequately controlling exposure
- that it fits the wearer
- that the wearer is shown and trained in effectively putting on and taking off the PPE
- that it is stored correctly
- that it is kept clean and regularly checked and maintained or replaced

OR

You should institute any other measures which are as equally effective as the above to achieve compliance with the Notice.

Notes: Add “Standard Generic Notes” HERE you are reminded that people who need to use PPE to control exposure should be trained in its correct use.

1.7 Thorough examination and test of local exhaust ventilation system

Page 1

Control of Substances Hazardous to Health Regulations 2002, Regulation 9(4)

Health and Safety at Work etc. Act 1974, Sections 2(1) and 3(1)

You have failed to provide a suitable record of the thorough examination and test of the Local Exhaust Ventilation system provided for the control of (List substance(s) here) which is/are a substance(s) hazardous to health.

Schedule (page 2)

To comply with this notice you should take the following actions:

Either

A. 1. The local exhaust ventilation system, provided to meet the requirements of Regulation 7 of COSHH 2002 (as amended), should be thoroughly examined and tested and a suitable record kept. The record should contain at least the following particulars:

(a) The name and address of the employer responsible for the plant;

(b) Identification and location of the LEV plant, process and hazardous substance concerned;

(c) Date of last thorough examination and test;

(d) Conditions at time of test; normal production or special conditions;

(e) Information about the LEV plant which shows:

(i) its intended operating performance for controlling the hazardous substance for the purpose of Regulation 7 (e.g., air velocities, volume flow rate, clearance time);

(ii) whether the plant now still achieves the same performance;

(iii) if not, the repairs required to achieve that performance;

(f) methods used to make judgement at (e)(ii) and (e)(iii) (e.g. visual, smoke, pressure measurements, airflow measurements, dust lamp, air sampling, filter integrity tests);

(g) date of examination and test;

(h) name, designation and employer of person carrying out examination and test;

(i) details of repairs required and carried out

2. The record should be kept and acted upon by the employer responsible for the plant.

OR

Take other equally effective measures which will ensure compliance with your legal obligations.

Notes: Add “Standard Generic Notes” HERE

See HSE 258 (*“HSG 258 Controlling airborne contaminants at work: A guide to local exhaust ventilation (LEV)”* in particular for further details of the thorough examination and test work needed and the contents and layout of any report.

1.8 Thorough examination and test of engineering controls (other than LEV)

Page 1

Control of Substances Hazardous to Health Regulations 2002, Regulation 9(2) (b)

Health and Safety at Work etc. Act 1974, Sections 2(1) and 3(1)

You have failed to have the engineering controls provided for the control of (List substance(s) here) which (list potential health effects here) and is/are a substance(s) hazardous to health, thoroughly examined and tested at suitable intervals.

Schedule (page 2)

To comply with this notice you should take the following actions:

Either

1. The engineering controls, provided to meet the requirements of Regulation 7 of COSHH 2002 (as amended), should be thoroughly examined and tested and a suitable record kept. The record should contain at least the following particulars:

(a) The name and address of the employer responsible for the plant;

(b) Identification and location of the engineering controls, process and hazardous substance concerned;

(c) Date of last thorough examination and test;

(d) Conditions at time of test; normal production or special conditions;

(e) Information about the engineering controls which shows:

(i) its operating parameters, states and performance (where relevant);

(ii) whether the engineering controls are still effective and performing as required;

(iii) if not, the repairs required to rectify any significant fall in performance;

(f) methods used to make judgement at (e);

(g) date of examination and test;

(h) name, designation and employer of person carrying out examination and test;

2. The record should be kept and acted upon by the employer responsible for the engineering controls.

OR

You should institute any other measures which are as equally effective as the above to achieve compliance with the Notice.

Notes: Add “Standard Generic Notes” HERE

1.9 Incompetent/inadequate examiner of LEV system.

Page 1

Control of Substances Hazardous to Health Regulations 2002, Regulation 12(4)

Health and Safety at Work etc. Act 1974, Sections 3 and/or 36

You have failed to ensure that Mr XYZ who carried out the thorough examination and test on the ABC system at 123 is competent to do so. Mr XYZ's omissions may have put other people's health at risk due to the LEV system inadequately controlling exposure to substances hazardous to health. People involved in carrying out examinations and tests on LEV plant must have adequate knowledge, training and expertise in examination methods and techniques.

Schedule (page 2)

To comply with this notice you should take the following actions:

Either

Ensure that Mr XYZ attends and passes British Occupational Hygiene Society (BOHS) module "P601- Initial appraisal and Thorough Examination and Testing of Local exhaust Ventilation systems".

OR

Take other equally effective measures which will ensure compliance with your legal obligations.

Notes: Add "Standard Generic Notes" HERE

1.10 Checking and maintenance of engineering controls including local exhaust ventilation system

Page 1

Control of Substances Hazardous to Health Regulations 2002, Regulation 9(1) (a)

Health and Safety at Work etc. Act 1974, Sections 2(1) and 3(1)

You have failed to have the enginering controls including the Local Exhaust Ventilation system provided for the control of (List substance(s) here) which (list potential health effects here) and is/are a substance(s) hazardous to health, checked and maintained and kept in an efficient state, in efficient working order, in good repair and in a clean condition.

Schedule (page 2)

To comply with this notice you should take the following actions:

Either

A. 1. The engineering controls including the local exhaust ventilation system, provided to meet the requirements of Regulation 7 of COSHH 2002 (as amended), should be regularly checked and maintained and suitable records kept. The records should contain at least the following particulars:

(a) The name and address of the employer responsible for the engineering controls including local exhaust ventilation;

(b) Identification and location of the engineering controls including LEV plant, process and hazardous substance concerned;

(c) Date of last checking and maintenance;

(d) Condition of the engineering controls

(e) Repairs needed to maintain performance including date by which work should be completed

(f) Date of checking;

(g) Name and designation of the person doing the checking and/or maintenance ;

(h) details of repairs required or carried out.

OR

You should institute any other measures which are as equally effective as the above to achieve compliance with the Notice.

Notes: Add “Standard Generic Notes” HERE

1.11 Checking and maintenance of systems of work, supervision and other measures

Page 1

Control of Substances Hazardous to Health Regulations 2002, Regulation 9(1) (b)

Health and Safety at Work etc. Act 1974, Sections 2(1) and 3(1)

You have failed to have the systems of work, supervision and other measures devised to contribute to the control of (List substance(s) here) which (list potential health effects here) and is/are a substance(s) hazardous to health, reviewed and revised at suitable intervals.

Schedule (page 2)

To comply with this notice you should take the following actions:

Either

A. 1. The systems of work, supervision and other measures devised to meet the requirements of Regulation 7 of COSHH 2002 (as amended), should be reviewed and revised at suitable intervals and suitable records kept. The records should contain at least the following particulars:

(a) The name and address of the employer responsible for the systems of work, supervision and other measures

(b) A description of the systems of work, supervision and other measures;

(c) Date of last review and revision (if it was necessary);

(d) Continuing effectiveness of the systems of work, supervision and other measures;

(e) Modifications to the systems of work, supervision and other measures including date by which this should be done;

(f) Date of review;

(g) Name and designation of the person doing the review.

OR

You should institute any other measures which are as equally effective as the above to achieve compliance with the Notice.

Notes: Add “Standard Generic Notes” HERE

1.12 Occupational Health Surveillance

Page 1:

Control of Substances Hazardous to Health Regulations 2002, Regulation 11

Health and Safety at Work etc. Act 1974, Sections 2(1) and 3(1)

You have failed to ensure that employees exposed to a substance which is hazardous to health and is a (list health effects here), who may be significantly exposed, and for which there are valid and useful surveillance methods, are under suitable health surveillance.

Schedule (page 2)

To comply with this notice you should take the following action:

Either

A. Develop a system of health surveillance for those persons exposed to (list substance(s) here), which (list potential health effects here).

Health surveillance for those exposed to (list substance(s) here), will normally need to be carried out by an occupational health nurse or medical practitioner who is familiar with the risks of the process and principles of occupational health surveillance.

This should allow for and include:

1. A self-reporting system for relevant symptoms;

2. Completion of suitable questionnaires;

3. Measurement of, for instance, lung function; and

4. The completion and review of health records, including monitoring of sickness absence.

It is recommended, where appropriate, that health surveillance be conducted at pre-exposure examination; six weeks, six months and annually thereafter while significant exposure continues.

Where health surveillance is carried out you must keep and maintain a health record for at least 40 years from the date of the last entry.

Or

B. You should institute any other measures which are as equally effective as the above to achieve compliance with the Notice.

1.13 Information, instruction and training

Control of Substances Hazardous to Health Regulations 2002, Regulation 12(1)

Health and Safety at Work etc. Act 1974, Sections 2(1) and 3(1)[13]

Those employees who may be exposed to (list substance(s) here) have not been provided with suitable and sufficient information, instruction and training about the risks from exposure and the control measures to minimize them.

Schedule

In order to comply with this notice you should provide those employees (and people under your control) who may be exposed to (list substance(s) here) with information, instruction and training on;

- the names of the materials containing (list substance(s) here) and the risk they present to health;
- access to safety data sheets and information on any other legislative provisions relevant to the hazardous properties of the substance(s);
- the significant findings of the COSHH risk assessment;
- the appropriate precautions and actions to be taken to safeguard themselves and others including effective use of any local exhaust ventilation (LEV) system;
- training on the control measures including systems of work adopted and how to use them properly;
- training in the proper use of PPE including requirements in relation to wearing, cleaning, storage and disposal procedures;
- the results of any exposure monitoring;
- the role of health surveillance, their duty to attend, arrangements for access to individual health records and collective results of health surveillance;
- training in emergency procedures.

Employees should also be informed about, and trained in the procedures to be followed in an emergency

OR

You should institute any other measures which are as equally effective as the above to achieve compliance with the Notice.

[13] An employer has responsibilities to train others not in his/her employment if they work on premises/sites control by him/her. If the labour is supplied by, for instance, a contractor it could be argued that they should provide the training. In most instances this will not be practical and the employer (controller of the premises/site) should do the training.

1.14 Incompetent LEV designer/supplier

Page 1

You, as an employer are contravening the following statutory provisions:

Health and Safety at Work etc. Act 1974, Sections 3

Control of Substances Hazardous to Health Regulations 2002 (as amended) Regulation 12(4)

The reasons for my said opinion are:

1.15 Incompetent/inadequate designer of LEV system.

Page 1

Control of Substances Hazardous to Health Regulations 2002, Regulation 12(4)

Health and Safety at Work etc. Act 1974, Sections 3 and/or 36

You have failed to ensure that Mr XYZ who designed the ABC system at 123 is competent to do so. People involved in the design of LEV plant must have adequate knowledge, training and expertise in both hood design and application and also in the design of the rest of the system including ductwork, filters and fans.

Schedule (page 2)

To comply with this notice you should take the following actions:

Either

Ensure that Mr XYZ attends and passes British Occupational Hygiene Society (BOHS) module *“P602- Basic Design Principles Of Local Exhaust Ventilation Systems”.*

OR

Take other equally effective measures which will ensure compliance with your legal obligations.

Notes: Add “Standard Generic Notes” HERE

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1.15 Competence of supplier of LEV goods and services as an employer

Page 1

You, as an employer are contravening the following statutory provisions:

Health and Safety at Work etc. Act 1974, Sections 3

The reasons for my said opinion are:

You have failed to conduct your undertaking in such a way as to ensure, so far as is reasonably practicable, that persons, not in your employment, are not exposed to risks to their health and safety (list circumstances including processes, substance(s) and inadequacies of LEV)

Page 2 Schedule

An employer supplying LEV goods and services shall undertake such work so that the exposure to substances hazardous to health of people, not in his employment is controlled so far as is reasonably practicable.

Employers should develop adequate, effective and reliable exposure control measures. To do this they need to identify the measures, arrange for them to be put in place and to check that they work. The engineering control parts of the control measures, including LEV, need to be installed and commissioned in a systematic way.

XYZ company relied upon your expertise in LEV design, supply, installation and commissioning to adequately control exposure. The inadequacies of the design, supply, installation and commissioning services you provided lead to the over-exposure of employees of XYZ company (details HERE).

Include in Generic Notes The practical details of what competencies are needed by different suppliers are outlined in Chapter 2 of HSG 258 and LEV design and application are also covered in some detail.

1.16 Competence of individual supplier of LEV goods and services

You, as an individual have contravened the following statutory provisions:

Health and Safety at Work etc. Act 1974, Sections 36

The reasons for my said opinion are:

You have caused another person (name of organisation or individual HERE) to commit an offence under COSHH Regulation 7 (details HERE), by your omissions and/or commissions (details HERE)

Include in Generic Notes The practical details of what competencies are needed by different suppliers are outlined in Chapter 2 of HSG 258 and LEV design and application are also covered in some detail.

Appendix 2 Some relevant law

Employer legal responsibilities The need to control risks to health from substances hazardous to health has been a requirement of health and safety regulations in Great Britain for well over a century. In modern times it was clearly stated in the HSW Act (1974) in general terms and in some detail in the Control of Substances Hazardous to Health or COSHH Regulations in 1988. There have been additions to the legislation since but the fundamental responsibilities have not changed.

Employers should assess the risks, develop and apply suitable control measures, check and maintain these measures, inform employees and others and, generally manage the risks and controls. In the case of "engineering controls", including LEV, they need to identify what these are and get them checked, maintained and examined.

COSHH[14]

Issue covered and some relevant law - Design, installation and commissioning of exposure control measures

"Regulation 6 Assessment of the risk to health created by work involving substances hazardous to health

(1) An employer shall not carry out any work which is liable to expose any employees to any substance hazardous to health unless he has –

(c) made a suitable and sufficient assessment of the risk created by that work to the health of those employees and of the steps that need to be taken to meet the requirements of these Regulations; and

(d) implemented the steps referred to in sub-paragraph (a)."

"Regulation 7 Prevention or control of exposure to substances hazardous to health

(1) Every employer shall ensure that the exposure of his employees to substances hazardous to health is either prevented or, where this is not reasonably practicable, adequately controlled"

Employers, via the COSHH Reg 6 Assessment process and complying with Reg 7 should develop adequate, effective and reliable exposure control measures. To do this they need to identify the measures, arrange for them to be put in place and to check that they work. The engineering control parts of the control measures, including LEV, need to be installed and commissioned in a systematic way. This requirement is explicit in Regs 6 and 7 and there are practical details of what needed to be done re LEV in HSG 258.

[14] [14] COSHH OC 273/20 on Intranet http://intranet/operational/ocs/200-299/273_20/index.html#_Appendix_1_–

Issue covered and some relevant law - Checking and maintenance of "*engineering controls"*

Regulation 9(1)

"Every employer who provides any control measure to meet the requirements of Regulation 7 shall ensure that –

(a) In the case of plant and equipment, including engineering controls and personal protective equipment, it is maintained in an efficient state, in efficient working order, in good repair and in a clean condition;

Under Regulation 9(1) all employers need to check and maintain their engineering controls including LEV systems. Engineering controls can sometimes be extensive and maintaining them can overlap with process plant checking and maintenance. For instance, a sealed powder conveyor system may leak dust if seals and valves are not regularly checked and replaced. This work forms part of the employer's responsibility to check and maintain "engineering controls" and is probably best managed and undertaken by competent internal staff. It may be that certain engineering control components have a limited and predictable lifetime and need regularly replacing. This work should be built into engineering and maintenance schedules. LEV systems often deteriorate slowly and imperceptibly in a way that employees and supervisors don't detect. Hence the requirement in HSG 258 for airflow indicators on LEV hoods (or equivalent arrangements (see http://www.hse.gov.uk/lev/faqs.htm). Daily, weekly and monthly checks are needed to keep LEV systems working and used properly.

Issue covered and some relevant law - Review of systems of work, supervision and other measures

Control of Substances Hazardous to Health Regulations 2002 (as amended), Regulation 9(1)(b)

Every employer who provides any control measure to meet the requirements of regulation 7 shall ensure that –

(b) in the case of the provision of systems of work and supervision and of other measures, it is reviewed at suitable intervals and revised if necessary

Systems of work and supervision are often vital to the successful and sustained application of LEV controls. Operators need methods of working that allow them to get the job done and, at the same time, allow them to get maximum protection from the LEV. Such systems of work should be devised and agreed when the LEV is designed or selected and the operators should be actively involved.

As well as maintenance of the LEV system the employer is required, by this Regulation, to review methods of working and systems of work and any other "measures" that contribute to exposure reduction. Other *"measures"* could include how the process is run and organised and this may shade into production planning and management. If it is a *"measure"* that significantly affects exposure then it is part of the control measures that minimise exposure and it is covered by the COSHH Regulations.

Systems of work and supervision, process organisation and running are often not seen as an important element of exposure control measures. They are often critical and the addition of Regulation 9(1) b (in 2004) was intended to remind and reinforce the need to take these factors seriously.

Issue covered and some relevant law - The principles of good control practice

Regulation 7.7

"…control of that exposure shall only be treated as adequate if –

(a) the principles of good (control) *practice…are applied*
(b) any workplace exposure limit...is not exceeded
*(c) A*sthmagens, mutagens and carcinogens = AFAIRP (*R42 or R42/R43 R45, R46 or R49)*

The principles of good control practice Regulation 7.7 (a) Schedule 2a

"To be effective long-term, control measures must be practical, workable and sustainable" para 297

In the past the tendency has been to focus on the 'hardware' of control and not to consider sufficiently the so-called 'software' issues such as the systems and methods of work people need to adopt to minimise their exposure.

The key point to emphasise is that to control risk from exposure to substances hazardous to health (and achieve the Disease Reduction Programme (DRP) targets) control measures must work long-term. Not just on the day the inspector visits, but the next day, and the next week and after that the next year; hence the emphasis, in the Principles. Unless control measures are *"…practical, workable and sustainable"* exposures will be poorly and erratically controlled and people's health may be permanently harmed.

Summary of principles of good practice:

1. Processes designed and run to minimise emission and spread of contaminant
2. Think about all routes of exposure - by breathing, on/through skin or swallowing
3. Choose measures that will control the risk
4. Make sure that controls are effective, easy to use and reliable
5. Is supplementary protective equipment needed? Gloves? A respirator?
6. Regularly check controls work and keep simple records
7. Tell workers about the dangers, how controls work and how to use them properly
8. Don't increase other health and safety risks

Issue covered and some relevant law - Employers should explain and ensure that employees use and adopt the correct working practices

"Regulation 8 Use of control measures etc

Every employer who provides any control measure...shall take reasonable steps to ensure that it is properly used or applied..."

"Regulation 12 Information, instructions and training of persons who may be exposed to substances hazardous to health

(1) Every employer who undertakes work which is liable to expose an employee to a substance hazardous to health shall provide the employee with suitable and sufficient information, instruction and training."

Understand of what control measures are, how they work and what methods of working need to be adopted to get the best out of, for instance, LEV should be included in instructions and training.

Issue covered and some relevant law - Checking and maintenance of "*engineering controls"* Regulation 9(1)

"Every employer who provides any control measure to meet the requirements of Regulation 7 shall ensure that –

(a) In the case of plant and equipment, including engineering controls and personal protective equipment, it is maintained in an efficient state, in efficient working order, in good repair and in a clean condition;

Extract from Regulation 9 ACoP/Guidance:

*"The objective ...is to ensure that every element of a control measure performs as originally intended, and continues to adequately control the exposure of employees..."(*160)

All employers need to check and maintain their engineering controls including LEV.

Issue covered and some relevant law - Competence

Employers should employ competent people and suppliers of goods and services should be competent.

Regulation 9 ACoP/Guidance on competence

Design of control measures:

"Whoever designs control measures needs appropriate knowledge, skills and experience. The competencies needed will depend on the scope and complexity of the exposure problems to be addressed and solved." para 335

Checking, maintenance and examination:

"Anyone who checks the effectiveness of any element of a control measure should have the competence to do so" (162)

"Employers must ensure that whoever carries out maintenance, examination and tests is competent..." (167)

MHSW Regulations and competence

"Simple situations may require only the following:

(a) An understanding of relevant best practice;
(b) An awareness of the limitations of one's own experience and knowledge; and
(c) The willingness and ability to supplement existing experience…more complicated situations will require the competent assistant to have a higher level of knowledge and experience…Employers are advised to check the appropriate health and safety qualifications" (Paras 51 & 52 of the MHSW Guidance)

Issue covered and some relevant law - Thorough examination and test of engineering controls

Regulation 9(2) *"Where engineering controls are provided to meet the requirements of regulation 7, the employer shall ensure that thorough examination and testing of these controls is carried out –*
(a) in the case of local exhaust ventilation plant, at least once every 14 months…
(b) in any other case, at suitable intervals"

Employers should arrange for the thorough examination and test of all engineering controls that form part of the exposure control measures including LEV. The employer needs to be clear exactly what constitutes the "engineering controls". Sometimes they are only LEV but often they include critical components such as seals or process controls such as thermostats. Often an employer will contract out the examination of the LEV but it's probably more practical and easily managed for internal staff to examine other engineering controls.

LEV should be examined and tested at least every 14 months. There are legal exceptions (see Schedule 1) and in practice 14 months is taken to mean 'annually'. Note that the Regulation phrasing says *"...**at least** every 14 months…".* If the LEV system is subject to severe wear and tear it may be necessary to thoroughly examine and test it more frequently.

Other engineering controls also need thoroughly examining and testing *"…at suitable intervals"*. As with LEV systems how frequently this should be done depends on how likely and how much the controls will degrade. The frequency and the detail of what examinations involve depend on how predictable is wear and tear. All engineering controls should probably be examined *"…at least every 14 months"* but, where wear is severe examinations and remedial action may need to be more frequent.

Issue covered and some relevant law - Thorough examination and test report

Regulation 9 ACoP

Contents of *"thorough examination and test"* report: Para 176 *"A suitable record...should contain at least the following details:*

Reg 9 ACoP para 176
(a) the name and address of the employer ...
(b) the identification and location of the LEV plant, and the process and hazardous substance concerned;
(c) the date of the last thorough examination and test;
(d) the conditions at the time of test and whether this was normal production or special conditions;

(e) information about the LEV plant, which shows:
(i) its intended operating performance for adequately controlling the hazardous substance for the purposes of regulation 7...
whether the plant is still achieving the same performance;
(iii) if not, the adjustments or repairs needed to achieve that performance;
(f) the methods used to make a judgment at (e) (ii) and (e) (iii), eg visual, pressure measurements, air flow measurements, dust lamp, air sampling, tests to check the condition and effectiveness of the filter;
(g) the date of examination and test;
(h) the name, job title, e.g. senior engineer, and employer of the person carrying out the examination and test;
(i) the signature, or other acceptable means of identifying the person carrying out the examination and test;
(j) the details of repairs carried out. The details should be completed by employers responsible for the LEV plant. The effectiveness of the repairs should be proved by a re-test.

Note: This is a **not** and inclusive list. Examiners must cover at least what's in the list but may need to do more. HSG 258 guidance on thorough examination and test reports overlaps with and expands on paragraph 176 ACoP.

Issue covered and some relevant law - Suppliers have legal responsibilities

Health and Safety at Work etc Act 1974

- Section 6 applies to the safety of supplied goods – this includes LEV
- Section 3 Duty to employees (not necessarily yours). Applies to self-employed.
- Section 36.1 says '*(1) Where the commission by any person of an offence under any of the relevant statutory provisions is due to the act or default of some other person, that other person shall be guilty of the offence, and a person may be charged with and convicted of the offence by virtue of this subsection whether or not proceedings are taken against the first-mentioned person'*

Suppliers have other legal responsibilities under SMSR

- Supply of Machinery Regulations (SMSR 1992) and relevant standards, enable the Machinery Directive
- The Regulations apply where machines emit airborne contaminants while carrying out their normal function.
- 'Essential Health and Safety Requirements' (EHSR) requirements include: *'Where a hazard exists, the machinery must be so equipped that the said substances can be contained and/or evacuated'.*
- Annex 4 of the Directive stipulates EN 'A' and 'B' standards, with 'C' standards for specified machines.
- The machine designer may specify an extraction rate. The provision of *"sufficient extract air"* is the responsibility of the installation contractor or machine owner.
- See also HSG 258 Appendix 2

Appendix 3 Inspection Aide Memoires and employer Action Plan

These aide memoires should be used in conjunction with the guidance in HSG 258, INDGs 408 and 409 and other reliable sources.

Inspection Aide Memoires include:

- Assessment of three basic LEV hood types
- Thorough examination and test reports;
- Employers Action Plan

LEV hoods

Small partial enclosure hood (booth)

Question[15]	Y	N	M	Comments	Notes
Is the hood large and deep enough?				For the process(es) and source(s) undertaken in the hood	
Is the face velocity adequate and even?				Usually >0.5 m/s (absolute min) and ±20% average velocity at any measurement point	In draughty environments and for energetic processes, such as spraying or disc cutting, face velocity will need to be >0.5 m/s. Probably in the range 0.7 – 1.0 m/s or above will be needed to contain contaminant clouds.
Is the airflow rate adequate to cope with the process being controlled?				Where the process generates large directional airflows (e.g. spraying) the hood will need to empty as fast as it's filled and cope with the turbulence created	
Is the hood entrance designed to create an even airflow?				Are the hood edges smoothed to minimise airflow separation?	
Has the wake-effect been minimised or mitigated?				See HSG 258 and http://www.hse.gov.uk/lev/index.htm for some ways and means of doing this	
Is the inside of the hood cluttered					

[15] Y = Yes; N = No; M = May be

Question[15]	Y	N	M	Comments	Notes
(especially near the front)?					
Has the enclosure been designed on good ergonomic principles?				Consider height, width, lighting, field-of-view	
Can objects, to be worked on, easily got into and out of the hood?				Are handling and positioning aids needed and available?	
Does the hood have an airflow indicator?				See Appendix 6	
Do your observations, and tests, suggest the hood is effective enough?					
What improvements are needed? (Add Notes here)					

Large partial enclosure hood ('Walk-in' booth)

Question[16]	Y	N	M	Comments	Notes
Is the hood large and deep enough?				For the process(es) and source(s) undertaken in the hood	
Is the face velocity adequate and even?				Usually >0.5 m/s (absolute min) and ±20% average velocity at any measurement point	In draughty environments and for energetic processes, such as spraying or disc cutting, face velocity will need to be >0.5 m/s. Probably in the range 0.7

[16] Y = Yes; N = No; M = May be

Question[16]	Y	N	M	Comments	Notes
					– 1.0 m/s or above will be needed to contain contaminant clouds.
Is the airflow rate adequate to cope with the process being controlled?				Where the process generates large directional airflows (e.g. spraying) the contaminant cloud may flow and swirl around within the hood, enveloping the operator.	
Is the hood entrance designed to create an even airflow?				Are the hood edges smoothed to minimise airflow separation?	
Has the enclosure been designed on good ergonomic principles?				Is the hood big enough? Is it well lit?	
Can objects, to be worked on, easily got into and out of the hood?				Are handling and positioning aids needed and available? If not operator may work outside the booth	
Does the hood have an airflow indicator?				See Appendix 6	
Do your observations, and tests, suggest the hood is effective enough?					
What improvements are needed? (Add Notes here)					

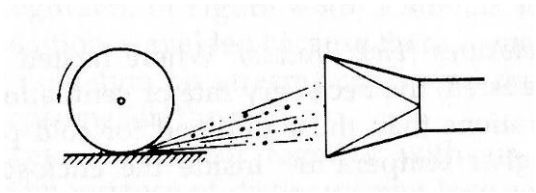
Large enclosing rooms (booths, 'cabins')

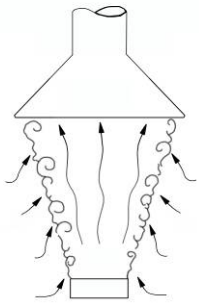
Question[17]	Y	N	M	Comments	Notes
Is the hood large enough for process?					
Is the room kept under sufficient negative pressure?				Negative pressure means any air leakage is inwards	
Is the clearance time of the room known and on display?				Everyone using a room should know the clearance time which should be prominently displayed	
Does the room user have suitable and sufficient supplementary RPE?				Depending on the substance(s) and process(es) the type of RPE needed will vary. If the process is paint spraying and the paint is a 2-pack isocyanate then RPE should be air-fed breathing apparatus.	
Has the enclosure been designed on good ergonomic principles?				Room should be well lit. Appropriate handling and positioning aids should be available	
Does the room have a manometer?				All enclosing rooms should be kept under negative pressure and a manometer is the minimum instrumentation required. See also Appendix 6	
Do your observations, and tests, suggest the room, and supplementary RPE is effective enough?					
What improvements are needed? (Add Notes here)					

[17] Y = Yes; N = No; M = May be

Question[17]	Y	N	M	Comments	Notes

Receiving hoods (including canopy)



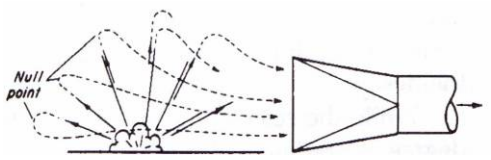


Question[18]	Y	N	M	Comments	Notes
Does the process to be controlled generate a directional contaminant cloud?				If no directional contaminant cloud movement then receiving hoods cannot be applied. The classic mistake is to place a canopy hood over a 'cold'/room temperature process	
Is the hood face area and depth big enough to receive the contaminant cloud?				The process-induced contaminant 'jet' will expand as it moves. The hood size should always be bigger than the 'source' size. See ACGIH (and others) for rules-of-thumb re canopy hoods and hot processes	
Is the hood airflow rate sufficient to empty it as fast as it is filled?				Smoke tests should show whether this is the case.	
Is hood applied as close as possible to the source?				The closer the hood the lower the control airflow rate. Sometimes canopy hoods are placed so far from the (hot) source that the is very little 'reception' of the contaminant cloud	
Has enclosure of the process and source been				Enclosure will reduce the airflow rate needed and protect against draughts	

[18] Y = Yes; N = No; M = May be

Question[18]	Y	N	M	Comments	Notes
maximised?					
Does the (canopy) hood protect the operators?				If people are intimately involved in the process then it's unlikely that a canopy hood will reduce or control their exposure. Another type of hood will be needed e.g. side-draught enclosing	
Does the hood have an airflow indicator?				See Appendix 5	
Do your observations, and tests, suggest the hood is effective enough?					
What improvements are needed? (Add Notes here)					

Capturing hoods



Question[19]	Y	N	M	Comments	Notes
Is hood size and airflow enough to create the right size ‘capture zone’?				The 'job' of a capturing hood is to create a capture zone that encompasses the 'working zone'. If this isn't done or isn't possible a capturing hood cannot be very effective.	
For 'energetic' processes, that create 'strong' directional contaminant cloud				To control 'energetic' processes capturing hoods have to be very closely applied. If the process generates fast-moving, high	

[19] Y = Yes; N = No; M = May be

Question[19]	Y	N	M	Comments	Notes
airflow, is the hood applied close enough?				volume, contaminant clouds certain designs of capturing hood (e.g. movable) or often/usually not effective	
Does the 'capture zone' encompass the 'working zone'?				Test by observation and use of smoke tracer/generator	
Has the process and source been enclosed as much as possible (inc flanges, side-pieces etc)?				All capturing hoods should have at least flanges. Enclosure of the process and source should be maximised.	
Have process-induced and external draughts been minimised?				Capturing hoods are very sensitive to draughts which can, if large and 'strong' enough more-or-less destroy their effectiveness	
Are the hood and work methods based on ergonomic principles?				All people using a capturing hood need to know the size of the capture zone. If the hood is movable and the operator is expected to keep the process/source in the capture zone is this practicable and sustainable? If not a larger capturing or different hood type will be needed (e.g. an enclosing hood)	
Does the hood have an airflow indicator?				See Appendix 5	
Do your observations, and tests, suggest the hood is effective enough?					
What improvements are needed? (Add Notes here)					

Question[19]	Y	N	M	Comments	Notes

LEV thorough examination and test report

- Start with prioritised remedial actions including details of repairs or modifications needed
- What process and substance(s) are being controlled
- Simple LEV diagram showing location and test points
- Condition of the LEV system including photos (where appropriate), serial numbers etc
- Qualitative and quantitative methods used to judge performance
- Record of qualitative and quantitative assessment
- Comparison of required and assessed LEV system performance
- Comments on operator methods of working
- Comments on system wear and tear
- Date next examination and test required by
- Signature
- If a hood/system has failed the recommendation is that a red label and 'emergency' report is issued to the 'responsible person' on site (see LEV Website FAQ for further details)

Problems to watch out for in thorough examination and test reports

- No visual or structural examination of LEV system
- System declared "Satisfactory" but significant faults reported
- No, or incomplete, system schematic & identifier
- No photos (where they would be appropriate) and identification of parts
- Repair and remedial action not listed
- Repair and remedial action buried in report not at start
- Qualitative & quantitative judgement criteria not listed
- Incomplete use of qualitative & quantitative assessment methods
- No assessment of exposure control effectiveness

See COSHH Regulation 9 ACoP paragraph 176, HSG 258 and INDG 408 for further guidance and standards.

Employers Local Exhaust Ventilation (LEV) – Action Plan

Minimising the risk of work-related diseases with LEV. What you need to do, and who is going to do what by when.

Topic	Things to cover	Y/N	Answer / Thoughts…	What we need to do….	By when?
Health	Do you know the potential health risks in your industry/company?				
Processes and sources	Do you know which processes can cause exposure?				
	Have all the important sources been identified?				
LEV design and selection	Is LEV applied to all the processes that need it?				
	Do the LEV hoods match, cope with and control the contaminant clouds created by your processes?				
Responsible person	Do you have a 'responsible person' in charge of your LEV?				
	Are they competent to do this work?				
LEV checking and maintenance	Do you check that the LEV is maintained as recommended?				
	Are there regular checks that the LEV is working?				
	Are records kept of the checks in, for instance, a Log Book?				
	Are remedial actions taken quickly following the checks?				
Employees	Were employees consulted and involved in LEV design/selection?				
	Have employees had training in how to use the LEV system properly?				
	Do they know what to do if the LEV system isn't working properly?				
LEV buying and use	Have you got a specification for the LEV system?				
	Have you got a full LEV commissioning report?				

Topic	Things to cover	Y/N	Answer / Thoughts…	What we need to do….	By when?
	Have you got a User Manual?				
	Has the LEV system or process being controlled been changed?				
	Does the LEV system have airflow indicators fitted?				
Managing LEV system thorough examination and test (TexT)	Has the LEV system been thoroughly examined and tested (TexT)?				
	Was the examiner competent?				
	Does the TexT report follow HSE LEV guidance?				
	Have you read the TexT report?				
	Have you taken the action recommended by the examiner in the TexT report?				
	Have test labels been attached to hoods/system?				
	Has the examiner issued an 'emergency' report and 'failed' red labels?				
	If red labels - have you taken rapid action to get LEV working?				
	Does the TexT report show that your checking and maintenance, over the year, is adequate?				

Date of Action Plan…… **Signed**……..

Appendix 4 Inspector's Test Equipment

Anemometer ETA 6000 are not made anymore but have been refurbished and re-calibrated for HSE inspector use

Anemometer
Kestrel 1000 ~£70
Replacement impeller ~£17
Suppliers include:
http://www.w eathershop.co.uk
http://www.anemometer.co.uk
http://www.aceselectronics.co.uk
http://www.inds.co.uk

Dust lamp
Draper RHL 120 ~£11
Suppliers include:
http://www.justoffbase.co.uk
http://www.toolshopdirect.co.uk

Tripod
Suppliers include:
Jessops ~£40
Hama Star 61 tripod ~£7
http://www.amazon.co.uk/

Smoke tubes
MSA smoke tubes kit (includes 6 tubes, an aspirator, and rubber sealing caps)

MSA smoke tubes ~£70 for a pack of 12
Suppliers include:
http://www.sitebox.ltd.uk/

Note: Each Divisional HSL Scientist has three Colt 4 smoke generators which can generate large amounts of smoke. This is useful for testing large booths and enclosing rooms such as spray-bake booths used in motor vehicle repair.

Replacements and calibration

Replacement smoke tubes should be obtained via the local HSL Field Scientist. He/she will also arrange calibration of your anemometer. There's further information on equipment on the Intranet.

Appendix 5 Guidance on using a dust lamp and camera

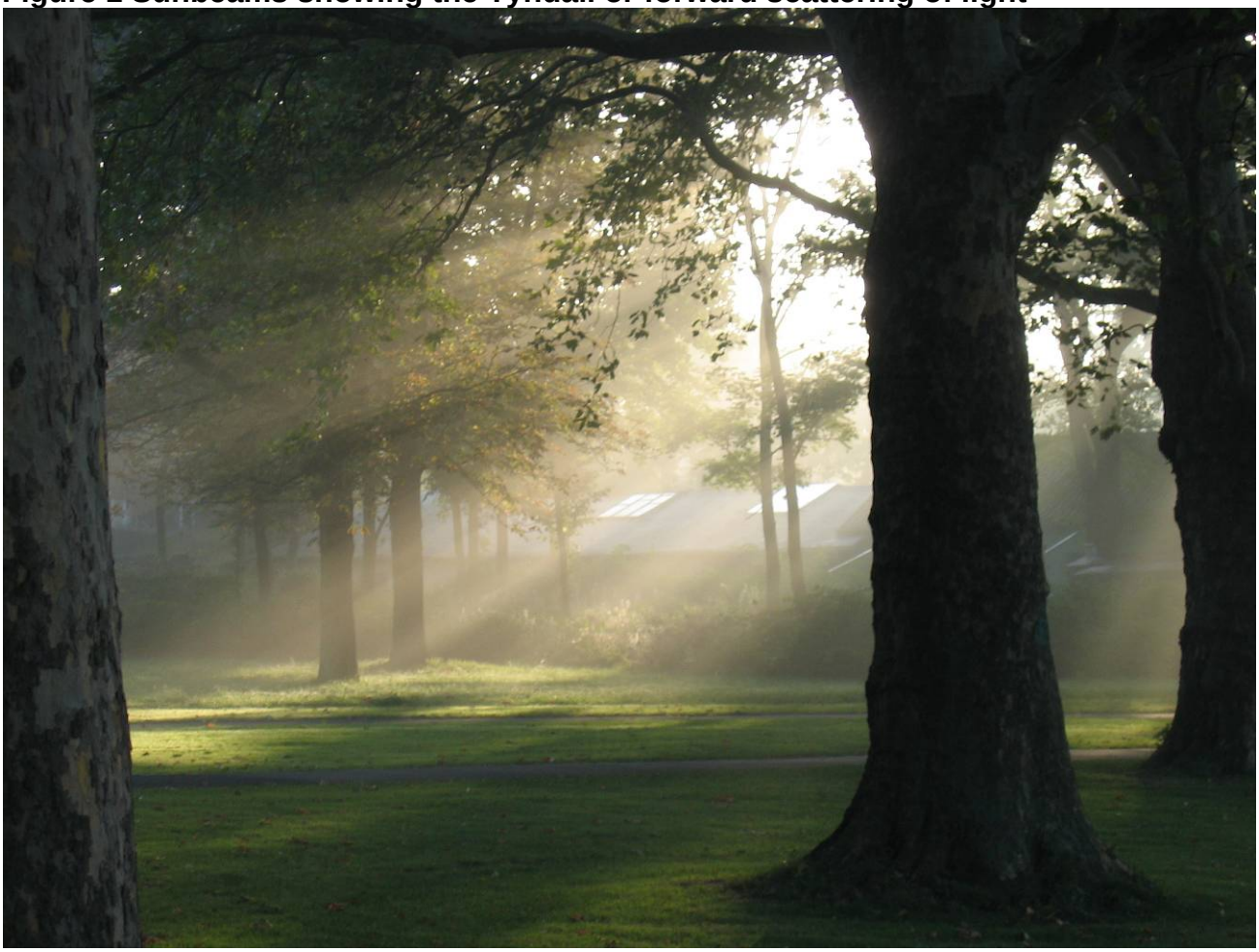
This appendix is written for HSE inspectors and as a basic introduction for employers, suppliers and others

1.0 Introduction

Fine particle clouds Many work processes, if not effectively controlled, can release fine particle clouds. Such clouds flow and mix with workplace air and will spread a long way from the original source by general air movement. Fine particle clouds are also more-or-less invisible under normal lighting so the employee and employer may not be aware of their presence.

'Tyndall illumination The earth's atmosphere always contains fine particles in suspension. Normally you don't see them but, on a sunny day, you do as the particles diffract sunlight. John Tyndall first scientifically investigated this effect in the 19th century. It is called the Tyndall effect - anyone who has looked at a sunbeam will be familiar with it. (Figure 1). This forward, or Tyndall scattering, can be used to show up fine particle clouds in a workplace.

Figure 1 Sunbeams showing the Tyndall or forward scattering of light



The dust-lamp The 'Tyndall effect' can be artificially created by use of a so-called ‘dust-lamp’. This consists of a powerful lamp which produces a parallel beam of light. It is a remarkably powerful tool in the right hands. The very fact that the technique makes the

invisible visible explains its impact on employers, employees and suppliers. Nowadays relatively cheap high-powered torches can be used as ‘dust-lamps’ (see below) and all businesses that have to control airborne particle clouds should use a dust lamp. It is an essential tool in the control of exposure.

All operational inspectors should know how to use their personal-issue dust-lamp and record still and moving images. These can be used on-site, in follow-up letters and as evidence in formal enforcement. The images can be very persuasive and powerful evidence in courts or tribunals.

2.0 Dust-lamps can be used:

1) To make ‘invisible’ fine airborne particle clouds visible.
2) To enhance the visibility of dust clouds containing coarse and fine particles (such as generated by wood working operations).
3) To observe the extent, pattern and direction of a particle cloud’s movement.
4) To assess the performance of an LEV hood and identify, for instance, any escape of particle clouds.

Notes:

1. Dust-lamps aren’t quantitative tools and cannot easily be used to assess particle cloud concentration.
2. The dust-lamp’s pencil beam gives limited view of a particle cloud. The user may need to move the lamp several times to show-up the cloud’s full extent. There can be a tendency to focus on the part of the cloud illuminated by the pencil beam and not appreciate the full extent of the cloud. Be aware that you’ll often only see a part of the cloud.

3.0 DIY dust-lamps

Not every spot lamp or ‘high-powered’ torch can be used successfully as a dust lamp but many can adapted. The essential features are:

1) A lamp which produces high intensity near parallel beam of light (The parallel beam is required so that the forward scattering from the fine particles can be seen easily, separate from the main illuminating beam).
2) A mount for holding and positioning the lamp, for instance, an internal thread fitting for a tripod.
3) An on-off switch so that the lamp can be left on unattended.
4) A dust lamp should normally be battery powered. (240V mains power is not always available and a trailing cable can make use awkward or impractical and create a tripping hazard).

4.0 How to use your camera and the new HSE dust lamp

Notes:

- Before you first use the HSE dust-lamp it needs a 20 hours charge. After that ~5 hours will be adequate.
- The dust-lamp is not intrinsically safe and should not be used in a potentially flammable atmosphere

Use guidance:

1) Mount the dust-lamp on a tripod, or other stand, and align the lamp to shine through the area where the particle cloud is thought to be present.
2) If possible lower the ambient lighting by, for instance, arranging for the normal lighting to be temporarily turned off. This will improve the contrast and make it easier to observe the dust cloud.
3) With the locking switch up, press the trigger and slide the locking switch down. The lamp will now stay on without having to hold the trigger. (To release, slide the locking switch up).
4) Look at a slight angle, up the beam, through the airborne dust/fume, back towards the dust lamp. See Figure 2.
5) Shield your eyes from main beam using the workers body or equipment etc. See Figure 3.

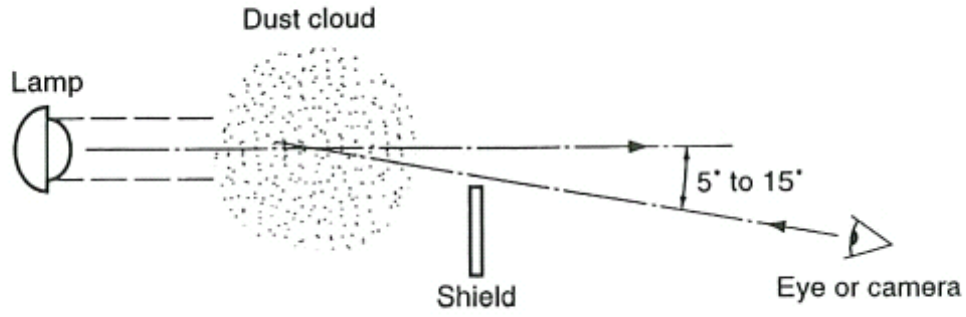


Figure 2 The principle of using a dust lamp to observe a particle cloud by "forward scattering" of light

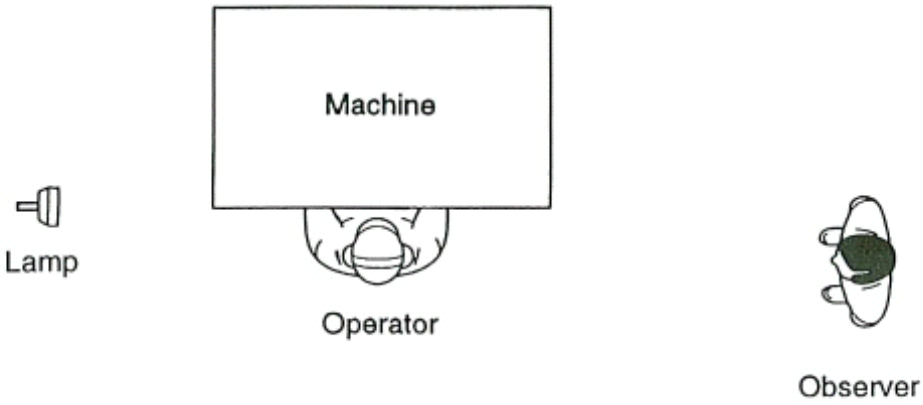


Figure 3 Setting-up a dust lamp; always look 'up' the light beam.

It is a point worth emphasising that you must set up the dust-lamp to observe forward-scattering of light. Fine particle clouds illuminated from 'behind' reflect very little light compared with the amount they refract forward as Figures 4a and 4b of hot and cold mugs of water show.

Figure 4a Hot and cold water illuminated from behind = reflected light

Figure 4b Hot and cold water illuminated from the front ('beam' shining towards observer) = forward scattered light

5.0 How to record a dust lamp image (still and video) using the standard issue camera

5.1 Still images

The standard issue inspector's camera is ideal for recording dust lamp images.

For the best results:

1) Set the camera to ‘Auto’ and turn the flash ‘off’. (The flash tends to overwhelm any forward-scattering effect; the effect you are looking to record.)
2) Take the pictures looking 'up' the dust-lamp beam towards the dust-lamp (see instructions in sub-section 4).
3) Ensure you can’t see the dust-lamp or main beam by shielding the camera frame using the operator or part of the equipment (if the main lamp beam is visible the forward-scattered light will be swamped and will not be 'seen' by the camera).
4) If possible suppress background lighting by, for instance, arranging for the lights to be temporarily turned off.

Figure 5a and 5b show photos taken of a sanding process with and without the dust lamp. Both photos were taken using the standard issue camera and dust lamp.

Figure 5a. Sanding process in normal lighting conditions

Figure 5b. The same sanding process using the dust-lamp

5.2 Video

Video clips can also be successfully recorded using the standard issue camera. You cannot alter the camera settings except the 'zoom' facility. Often it's worth standing back from the process being illuminated and zooming in on the forward-scattered light. You will need to zoom before you starting videoing and cannot zoom-in once videoing has started.

Be aware that the camera, in video mode, will not be as good as the human eye. Maximising the contrast between the forward-scattered light from the dust cloud and the background is important.

When videoing always use the camera in landscape orientation. You cannot rotate a video file through 90 degrees as you can a still image, see Figures 5a – 5d.

Figure 5a Landscape = Correct

Figure 5b Portrait = Wrong

Figure 5c Frame from a video clip where the camera was correctly held in 'Landscape

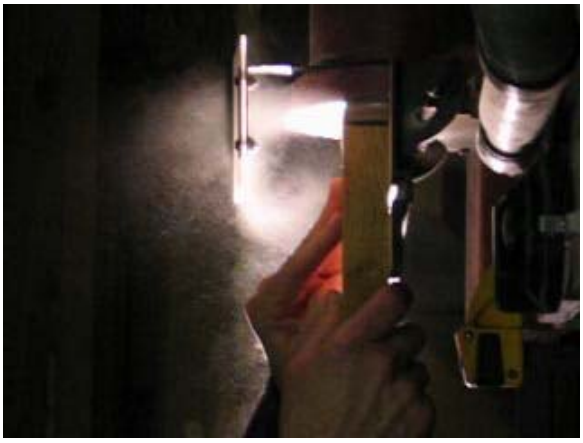


Figure 5d Frame of a video clip where the camera was incorrectly held in 'portrait

6.0 Common mistakes

There are a number of common mistakes that people, new to using a dust-lamp, often make:

- The user shines the beam and looks into the cloud in the same direction. With this arrangement the dust lamp is not set up to observe the forward-scattered light and only the far weaker reflected light is observed (Always set up the dust-lamp and 'look up' the beam towards the dust-lamp);
- There is insufficient contrast between the scattered light and the background against which the particle cloud is being observed (Maximise the contrast by arranging for all the lights to be turned out and/or observe against a dark background);
- The user tries to observe or to take photographs or video footage of a particle cloud while the dust lamp and the main beam are fully visible and illuminating the observer/camera. The camera is blinded and contrast is dramatically reduced. (Always shield your view of the dust-lamp beam using a convenient object such as the operator's body or equipment).

7.0 Encouraging and/or requiring greater ownership and use of dust-lamps

Businesses which are known to involve processes that emit particulate airborne contaminants (dusts, fumes and mists) should own or have easy access to a dust-lamp. A similar requirement applies to contractors designing, installing and examining controls including LEV. This requirement is stated in HSG 258 as follows, "*The competent LEV contractor must have a dust lamp, and know how to use it."*

In the past dust-lamps were specialist items of equipment and cost several hundred pounds. It wasn't realistic to expect businesses and contractors assisting them to automatically own a dust-lamp. Nowadays there are several makes of powerful battery-operated lamps that will serve as dust-lamps and, with a stand such as a tripod, might cost less than £20. The easy availability of affordable dust-lamps means that businesses can easily purchase and use them to check and maintain LEV systems. Similarly, contractors of all types involved in LEV design, installation and examination should own and know how to use a dust-lamp. It's an essential and affordable tool. HSL has tested and reviewed some

commonly available lamps. The range wasn't comprehensive and there may well be other lamps which would fit the dust-lamp bill. The HSL report (see Further Information) identifies the key qualities a lamp needs for it to be used as a dust-lamp.

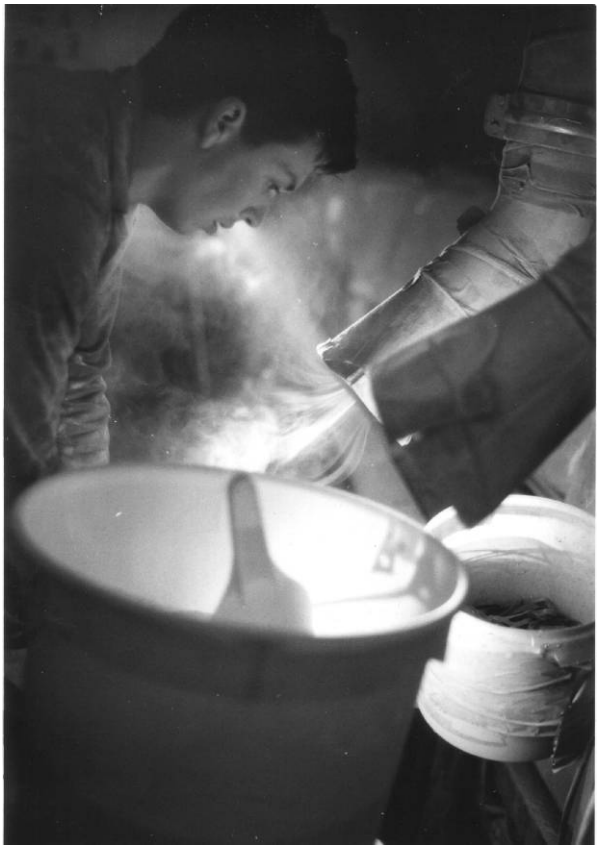


Figure 6 A dust-lamp shows a small capturing LEV hood ineffectively controlling dust exposure

7.0 Further information

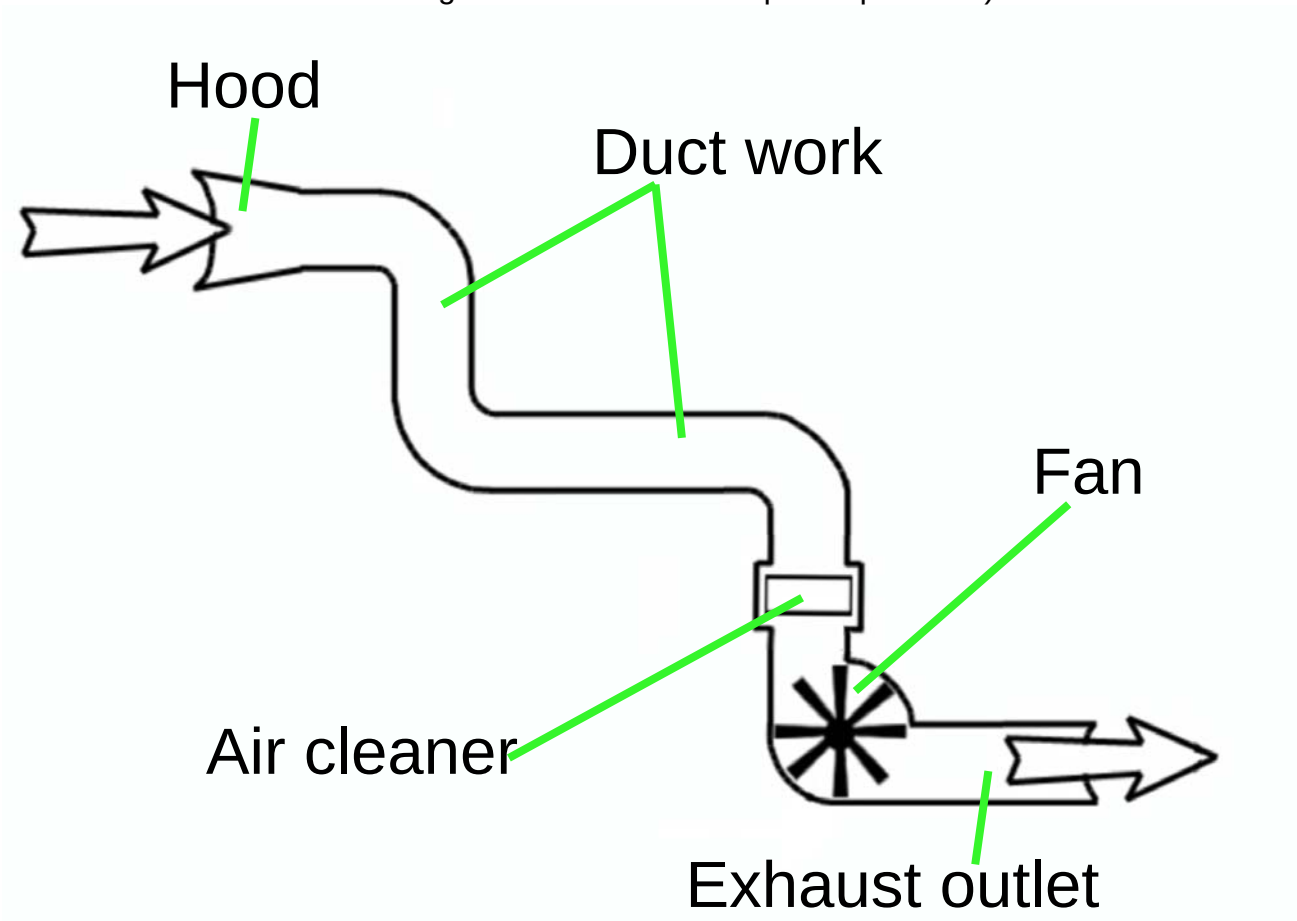
"The dust lamp: A simple tool for observing the presence of airborne particles" MDHS 82 (1997). (http://www.hse.gov.uk/pubns/mdhs/pdfs/mdhs82.pdf)

Evaluation of commercial spot lamps for use as Tyndall Dust lamps. HSL report ECO/06/12.

Appendix 6 Airflow indicators and air velocity measurement

This appendix is written for HSE inspectors and as a basic introduction for employers and LEV-related suppliers. Figure 1 shows the typical elements of a basic LEV system.

Figure 1 Elements of a basic LEV system (Note that the air pressure in the duct between the hood and the fan will be negative i.e. below atmospheric pressure)



Indicating LEV performance

LEV systems are usually constructed from relatively thin metal sheet, contain filter material which is easily damaged and are (usually) powered by rotating fans. They are designed to draw in or contain and then convey airborne contaminants which can collect in, and impact on, all internal parts. Given the construction materials, and the purpose and function of LEV systems, it is inevitable, if nothing is done, that their performance will degrade over time. Whether this happens or how quickly it happens will depend on design, construction materials, the 'aggressiveness' of the airborne contaminants and how effective are the arrangements for checking and maintenance.

If the system commissioning showed that the LEV effectively controlled exposure this will continue to be the case as long as the system integrity is maintained, the operator uses the LEV as planned and instructed and the air volume flow-rate through the LEV hood(s) stays the same. Daily or weekly checks on physical integrity should show up any problems but assessing airflow rate is a different matter.

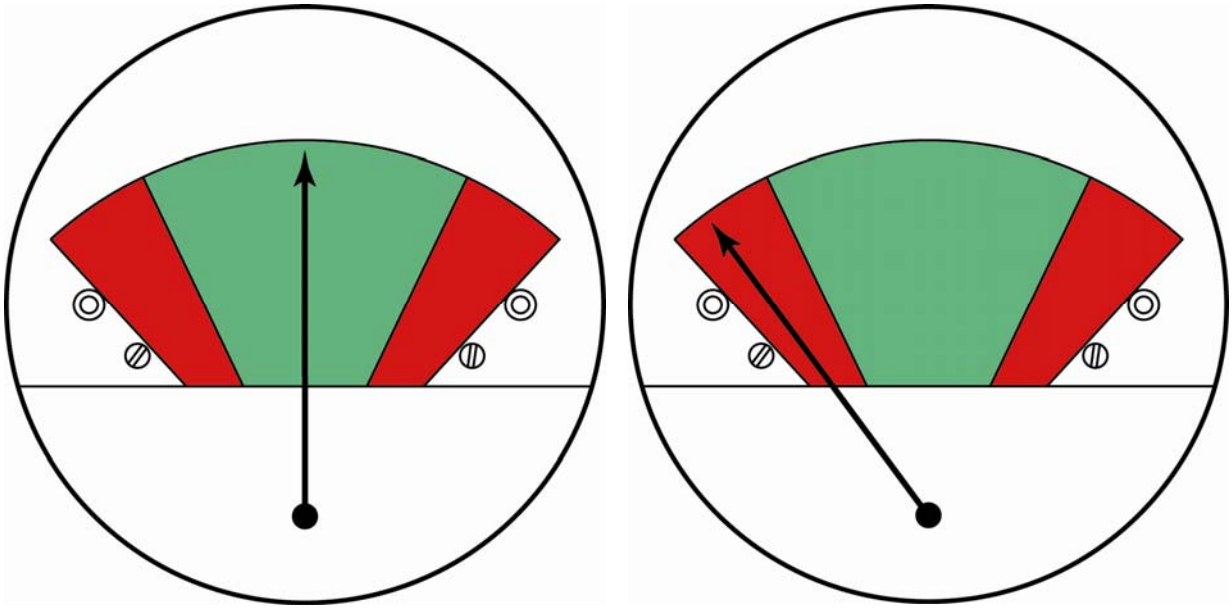
The structure and fabric of LEV systems usually mean they don't suddenly and completely fail. Usually the airflow rate falls off slowly and imperceptibly as, for instance, filters and/or ducts slowly block. Slow change in anything is difficult to spot but air flow is particularly difficult to assess because none of our senses enable us to gauge airflow apart from 'some' and 'none'. As airflow falls away the operator or supervisor will notice nothing until the failure to control exposure is gross and obvious. And by the time failure is noticed over-exposure may have been occurring for weeks if not months.

The only practical way the operator, or supervisor, can tell that a LEV system is likely to be operating effectively is:

- If the fabric of the system appears to be in a good condition
- There are no blockages, and,
- The hood is known to be drawing the required volume of air.

It isn't usually possible to measure airflow rates 'by hand' or other signs like the sound of the fan. In fact the sound of an LEV system is the same over a wide range of volume flow rates (unless the system is completely blocked). To gauge the volume of air flowing into an LEV hood the operator or supervisor (or other person) needs some form of airflow indicator. This requirement is clearly spelt out in HSE guidance HSG 258 and INDG 408. To assist both the operator and supervisors further it would be useful if the airflow indicator clearly showed when airflow was adequate, for instance, using a simple red and green colour coding scheme (e.g. Figure 2).

Figure 2 Examples of colour-coded airflow indicators



Suppliers of new LEV systems should soon be fitting indicators as standard. See FAQs on LEV website for further details.

Airflow indicators

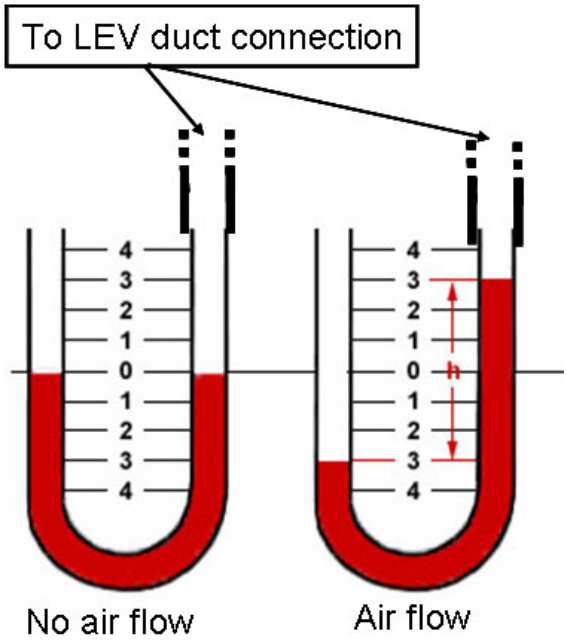
Airflow into an LEV hood, and within the system, can be measured in a number of ways. Probably the most common and easy way is to measure static pressure in the LEV ductwork with a manometer (Figure 2).

Amongst other things static pressure measurements can be used to:

- Indicate airflow rate into an LEV hood
- Indicate blockages or partial blockages in ductwork and filters

Another way of indicating airflow is by connecting a tapered tube with a bead in to the hood ducting. Air sucked through the tube causes the bead to float. The greater the negative air pressure in the ductwork, the greater the airflow through the tube and the higher the bead floats (see Table 1).

Figure 2 A simple fluid-filled U-tube manometer



From the operator and supervisors point-of-view airflow into the LEV hood controlling exposure is the most direct and important parameter to measure.

Where to connect airflow indicator

Air flowing out of an LEV hood into the hood duct often flows asymmetrically and initial flow can be very turbulent. These effects often make measurement of airflow in the hood duct near the hood variable and inaccurate. Flexible corrugated ducting is often used to connect LEV hoods to solid ducting. The corrugations add to the turbulence of the airflow and can make measurement even more difficult. The recommended measurement place is several duct diameters behind the hood in a straight section of duct. At this point air flow will be more even and less turbulent. If this isn't practical then it may be possible to connect the airflow indicator to the hood duct at several points around the duct. This arrangement can average out the variability of airflow measurement.

The employer should take advice from a competent person on where and how to fit airflow indicators.

The acceptable hood static pressure depends upon the LEV system design and flow rate, but typically hood static pressures range from a few hundred Pascals to several Kilopascals (kPa) (see simple unit converter on LEV Website).

Instruments

Manometers are used to measure static pressure (e.g. Figure 2). Prices vary depending upon accuracy and complexity. However, relatively inexpensive manometers can be used. A selection is shown in Fig. 1. Undoubtedly there are other makes and models available at

a similar price and possible cheaper. Some may not be based on measuring static pressure e.g. the Dwyer 'Air meter'.

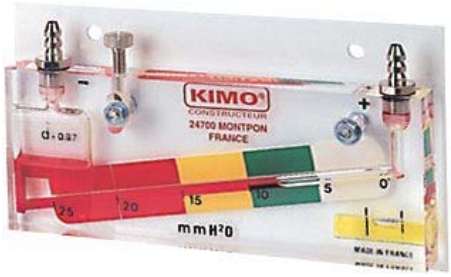
The simplest manometer is based upon a liquid filled U-tube and shows pressure from the difference in height of the liquid between the two arms of the manometer. This could be homemade and use water or commercially available manometer liquids such as red oil. Manometer liquids are preferred because they evaporate more slowly than water and, being denser, result in physically smaller instruments.

Installation and accuracy

Once the airflow indicator has been installed it needs to be calibrated. This should be done when the LEV system is commissioned. It should be re-checked at the annual thorough examination and test when hood airflow rates are measured. A decision needs to be made on what deterioration in airflow is acceptable before the action needs to be taken (e.g. ACGIH[20] recommends action limit values for ±20% of the installation/commissioning value).

Dwyer Air Meter

Dwyer Flex-Tube U-tube manometer



Kimo CP25 inclined manometer

Monument 'U' Gauge

Table 1 Some airflow meters

Type	Comments	Full scale Pressure readings	Typical cost	Some manufactures
U-tube vertical manometer	Can be bulky but cheap	4 – 85 in water, 0.3 – 21 kPa	£20 - £35	Kimo, Dwyer
Inclined liquid manometer	More compact, for lower pressures	0.1– 8 in water 0.02 – 2 kPa	£20 - £150	Kimo, Dwyer
Gas	Designed as portable	4 - 15 in	£6 - £20	Dwyer, Monument

[20] Industrial Ventilation: A manual of recommended practice for operation and maintenance. ACGIH, 2007

Type	Comments	Full scale Pressure readings	Typical cost	Some manufactures
pressure manometer	meters for testing for leaks in natural gas systems	water, 0.3 - 3.7kPa		
Air Meter	A flow meter that can also be used for pressure measurement	0.1– 1 in water 0.02 – 0.2 kPa	£26	Dwyer
Homemade U-tube	1 Piece of flexible clear tube bent into a U shape 2 Manometer fluid	4 – 85 in water, 0.3 – 21 kPa	1. <£5 2. £12 for 250ml red fluid,. £27 for 20ml blue fluid	Fluids from Kimo, Dwyer.

Different instruments have their specific limitations, and many commercially available anemometers for field use are not accurate at air velocities below 0.2 m/s.

Appendix 7 FOD and HID Specialist Occupational Hygiene Inspectors

Scotland.

Mr Sandy Ritchie VPN 520 2085

Ms Marjorie Mitchell VPN 520 2112

North West.

Mr Martin Dilworth VPN 516 8209

North East

Mr John Cain VPN 515 4364

Midlands

Mr John Healy VPN 510 6231

Mr Nigel Black VPN 513 2864

London, South East & South

Mr Bob Daunton VPN 508 4224

Ms Sam Lord VPN 501 6009

Ms Karen Parkinson VPN 503 4269

Wales & West

Ms Julie Helps VPN 511 3023

Mr Martin Belcher VPN 511 3039

HID (Offshore)

Mr Ahsan Saleem VPN 523 3040

Mr Damian Stear VPN 523 4656