HSWA

QUICK GUIDE

Local exhaust ventilation

August 2023

Te Kāwanatanga o Aotearoa
New Zealand Government

WORKSAFE
Mahi Haumaru Aotearoa

CONTENTS

table

figures

1.0 Introduction

This guidance is for persons conducting a business or undertaking (PCBUs). It explains some factors to consider when selecting, using and maintaining a local exhaust ventilation (LEV) system.

Duty to manage work-related health risks

Under the Health and Safety at Work Act 2015 (HSWA), you must ensure the health and safety of workers and that others are not put at risk from your work. You must eliminate risks so far as is reasonably practicable. Where elimination is not possible, you must minimise risks so far as is reasonably practicable.

Exposure and health monitoring

Exposure monitoring, such as biological monitoring, allows you to see if your controls are effective or if there are additional areas where you need to put controls in place.

Health monitoring is a way to check if the health of workers is being harmed from exposure to substances hazardous to health while carrying out work. It aims to detect early signs of ill-health or disease.

Whether carrying out exposure monitoring is reasonably practicable will depend on your circumstances. To determine this, you should assess the risks of your work. You should engage with workers, and talk to a suitably qualified, trained and experienced health and safety professional to confirm if monitoring is appropriate for you (and if so, what type).

2.0
The importance of assessing work risks

Some work processes create harmful dusts, mists, vapours, gases and fumes that contaminate the air and are hazardous to health.

Breathing these substances can cause diseases such as occupational asthma, bronchitis, silicosis and cancers. Organs such as the liver, kidneys and brain may also be affected.

When assessing the risks of your work, think about:

- the potential consequences of exposure
- how likely the consequences are in usual business conditions
- the parts of your work that create dust, gases, mists, vapours and fumes
- the substances released into the air and their risks (see safety data sheets for more information)
- the products you make, including waste products and by-products
- the location of the work. For example, inside, outside or in a confined space. You need to put extra control measures in place for work in confined spaces: worksafe.govt.nz
- how concentrated is the air contamination? If you are not sure of the concentration, you should arrange for exposure monitoring to be done. Contact an occupational hygiene practitioner for more advice.

Choosing control measures

When deciding on control measures to minimise the risks of substances hazardous to health, you must use the hierarchy of controls (below).

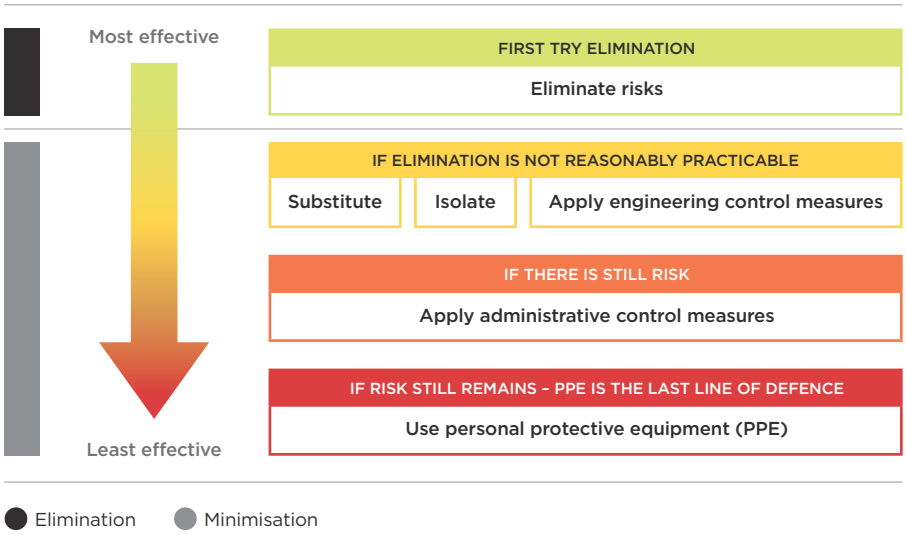

FIGURE 1:
Hierarchy of controls

WorkSafe expects PCBUs to choose effective control measures that protect multiple at-risk workers at the same time. For example, LEV protects multiple people in the workplace, while respiratory protective equipment (RPE) protects only the person wearing it. You must involve your workers in any decisions about control measures.

You have a duty under the Regulations to:

- maintain effective controls
- review these controls
- ensure workers are trained in how to correctly use the LEV system, including making basic daily checks before use.

Involving workers in decisions about their health and safety at work

You must, so far as is reasonably practicable, engage with workers on health and safety matters that directly affect them.[1]

Involve workers – get their ideas, ask them what they think the risks are of their work and what procedures, equipment and facilities they think are needed to make it safe. Get their feedback on how the control measures are working. For example, is there any dust that is not being collected? Is the PPE working/fit for purpose?

[1] ss 58-60, HSWA.

3.0
What is LEV?

Local exhaust ventilation is an engineering system that captures dust, vapours, and fumes at their source, minimising the risk of workers breathing in contaminated air. There are also other mechanisms for different ventilation requirements, such as:

- general exhaust ventilation (GEV)
- industrial vacuums
- portable extractors.

Multiple forms of ventilation and extraction can be used together in your ventilation strategy.

LEV and GEV

The key difference between GEV and LEV is:

- LEV is directed at the source of an airborne risk, such as a dusty workbench
- GEV provides less-targeted ventilation over a larger area, such as industrial fans in a hot garage.

GEV reduces the concentration of the air contaminants or controls the amount of heat that accumulates in hot industrial environments, by mixing (diluting) the contaminated air with fresh, clean, uncontaminated air. This ventilation system is also known as dilution ventilation.

Care should be taken when using GEV to ensure contaminated air is drawn away from the workers' breathing zone and is not directed towards other work areas.

LEV components

Most LEV systems will have the following components:

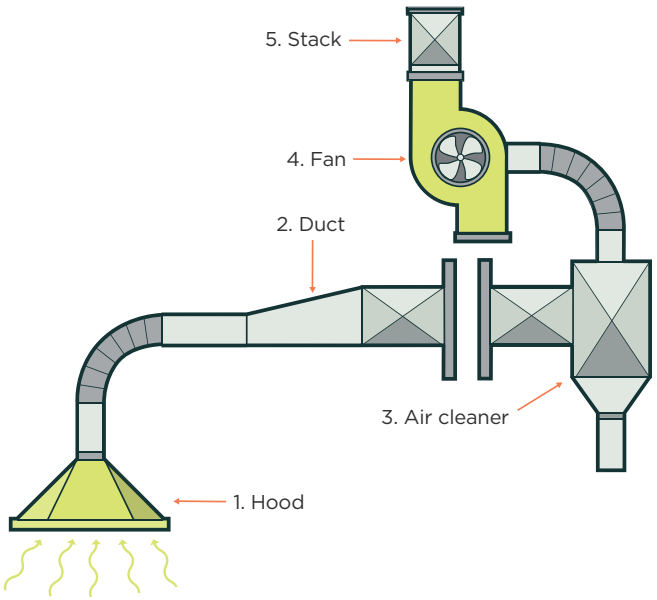

FIGURE 2:
A basic LEV system

1. Hood

The hood captures contaminated air. To be effective, the hood:

- should be as close as possible to the source of the contaminated air – ideally less than one hood diameter away - or enclose the source of this air

- should enclose the work area as much as possible. This helps avoid draughts that can blow contaminated air into the workplace
- must be suitable for the work being done and the type of substance produced (for example, dust or fumes).

Also:

- The LEV system needs to generate sufficient air flow at and around the process to 'capture' and draw in the airborne contaminant cloud. Consult an occupational hygienist or industrial ventilation engineer to make sure your LEV system is generating sufficient air flow.
- Workers should not stand between the source of contaminated air and the flow of this air into the hood.

2. Ducting

Contaminated air travels through the ducting system to the air cleaner. Choose a ducting system that has no sharp corners and which is easy to access for assessment, maintenance and cleaning.

Regularly inspect the ducting system and remove any buildup of dust. Ducting systems have been known to collapse under the weight of dust deposits, or to catch fire due to dust buildup.

3. Air cleaner

The air cleaner filters the contaminated air.

Choose air cleaners with filters that are suitable for the contaminant and that can be easily cleaned or replaced without creating further exposure.

Regularly remove contaminant from the air cleaner to ensure that it continues to work effectively.

4. Fan

The fan moves contaminated air though the hood and ducting system to the exhaust stack.

Consult an occupational hygienist or industrial ventilation engineer to help you choose the correct type and size of fan for your LEV system and to make sure it is operating effectively.

The fan should be positioned so that it can be easily maintained but does not create a noise hazard for nearby workers.

5. Exhaust stack

The exhaust stack releases contaminated air to the outside.

It should be positioned on the outside wall of the building, or through the roof, to a point 1.5 times the height of the highest point of the roof.

Ensure the air is not discharged into a public area or close to an air inlet for an air-conditioning system or neighbouring buildings.

Regularly check the exhaust stack for corrosion.

Consult an occupational hygienist or industrial ventilation engineer to make sure the system is discharging the correct volume of air and that there are no leakages.

Types of LEV hoods

An LEV system will not be effective if the hood does not capture and contain contaminated air.

The different types of LEV hoods are:

ENCLOSING HOODS

Enclosing hoods such as a glove box (figure 3) and a spray booth (figure 4) enable contaminated air to be contained. A glove box protects the operator and prevents contaminated air from entering the work area. A spray booth is a specially designed enclosure in which the operator works and the contaminated air is contained. Spray-booth operators need to wear appropriate personal protective equipment (PPE).

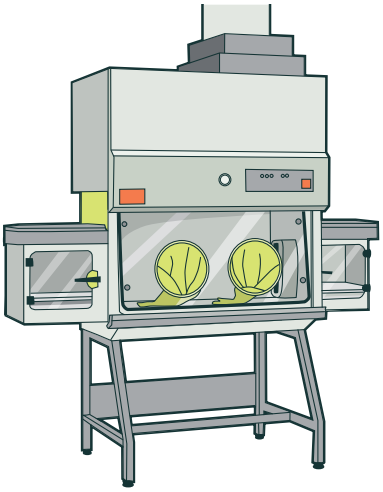

FIGURE 3: Glove box

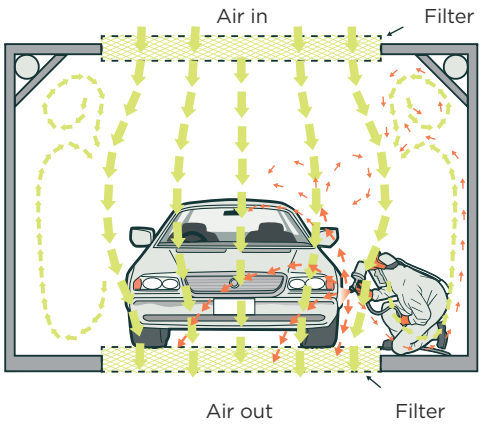

FIGURE 4: Downdraft spray booth

CAPTURING HOODS

Capturing hoods are the most common type of LEV hood. The work occurs outside the hood. This type of hood requires the LEV system to generate enough airflow to draw in the contaminated air. There are several types of capturing hoods: on-tool, moveable capturing hoods, fixed, portable or flexible capturing hoods and extracted workbenches.

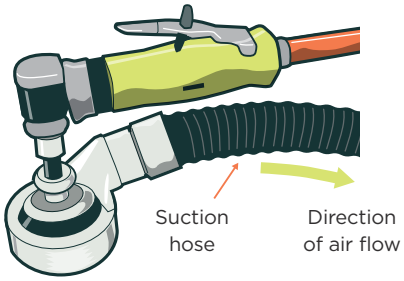

FIGURE 5: On-tool extraction

FIGURE 6: Flexible capturing hood

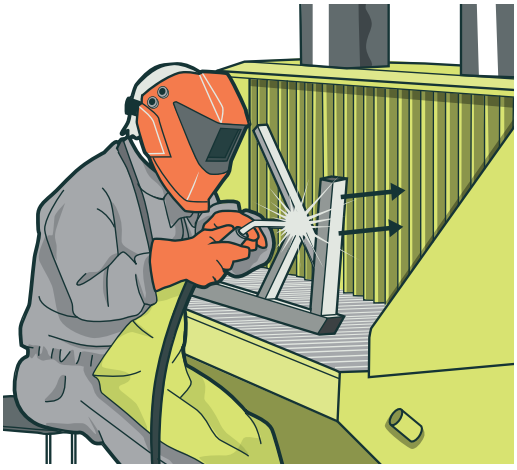

FIGURE 7: Extracted workbench

Selecting and installing LEV

If your risk assessment has identified LEV as a suitable engineering control measure, it is crucial that a suitable LEV system is selected for the job and is:

- designed to meet your workplace's needs
- professionally installed
- tested by an appropriately qualified person once installed to ensure the system works as designed and is effective.

- Selecting the right LEV system can be confusing. Poor design, installation and maintenance can reduce its capability to capture and contain contaminated air and may introduce new risks to the workplace such as excessive noise, or vapours or dust in a ventilation duct catching on fire. For these reasons, an LEV system should only be designed and installed by a competent and qualified professional.
- Consult an occupational hygienist, industrial ventilation engineer or LEV supplier to assess your ventilation needs.
- Contact your local council to find out if you need a building consent to install an LEV.
- An LEV system may not capture all the contaminated air, so you may still need to put in place additional controls such as RPE. You should arrange for exposure monitoring to find out if your workers will need RPE.
- When selecting LEV and other control measures, you must include your workers in the process.

What to expect from your LEV supplier

Make sure your supplier is competent. Ask about their professional qualifications, experience and industry membership. The table below describes the duties of an LEV supplier under HSWA:

DUTY	REQUIREMENT
Duty to, so far as is reasonably practicable, ensure plant, substances, or structures are without health and safety risks	Make sure, so far as is reasonably practicable, the LEV is without health and safety risks to people who: – use the LEV at a workplace for its designed or manufactured purpose – carry out reasonably foreseeable workplace activities (such as inspection, cleaning, maintenance or repair) in relation to the assembly or use of the LEV for its designed or manufactured purpose, or for proper storage, decommissioning, dismantling, or disposal – are at or in the vicinity of a workplace, and are affected by the LEV, or whose health and safety may be affected by a work activity listed above.
Duty to test	Carry out calculations, analysis, tests or examinations needed to make sure the LEV is without health and safety risks so far as is reasonably practicable (or arrange the carrying out of such tests). This should include performance assessment (commissioning) that demonstrates that the installed system is sufficient to remove contaminants without further exposing workers.
Duty to provide information	Provide adequate information to people who are supplied with LEV. This includes information about: – each purpose for which the LEV was designed or manufactured – the results of any calculations, analyses, tests or examinations carried out to ensure the LEV is without health and safety risks – any conditions necessary to make sure the LEV is without health and safety risks (when used for its designed or manufactured purpose, or when being inspected, cleaned maintained or repaired etc). On request, make reasonable efforts to give the current relevant specified information to a person who carries out or is to carry out work activities listed above with the LEV.

TABLE 2: Duties of suppliers

The supplier should also provide:

- training for workers on how to use, check and maintain the system
- a user manual and logbook
- maintenance and replacement schedules
- a list of consumable parts (including part numbers for ordering).

Managing your LEV

Effective management of your LEV includes:

- appointing a responsible person to ensure the system remains effective
- making sure your workers are trained in working safely with the system
- following a maintenance routine such as replacing moving parts, such as fan bearings that wear out, or non-moving parts, such as hoods, ducts and seals which may have become worn down from use
- ensuring that workers report defects in the system to you
- fixing faults in the system as soon as they occur
- arranging to service the LEV as per the manufacturer's recommendations
- keeping records of completed checks and maintenance.

The importance of regular maintenance and checks

The Regulations require you to maintain and review effective control measures.[2]

One method of maintaining control measures is to service the LEV as per the manufacturer's recommendations, or using your risk assessment process if you do not have access to the manufacturer's recommendations.

Another way of maintaining control measures is to test your LEV at least every 12 months. This will help ensure your LEV system keeps operating effectively, that the ducts are undamaged and unblocked, filters are free of contaminants, bacteria or fungus does not build up and fan blades are dust-free. Consult an occupational hygienist or industrial ventilation engineer to assist with testing.

To check that your control measures continue to be effective, you should arrange for regular exposure and health monitoring.

Making changes to your LEV

Making changes to your LEV system may reduce its effectiveness. For example, fitting extra hoods could mean you need a more powerful fan to ensure the system operates effectively.

Consult an industrial ventilation engineer to review any changes or additions you are thinking of making to the system.

You should arrange for exposure monitoring after making any changes to your LEV to ensure the system is still an effective control.

[2] Regulations 7–8, GRWM.

4.0
More information

WorkSafe guidance

Identifying, assessing and managing work risks

Health and exposure monitoring

Welding and local exhaust ventilation

Industrial vacuums and portable extractors

LEV guidance for upstream duty holders

Working safely in a confined space

Involving your workers in health and safety decisions

Advice for businesses about RPE

Workplace exposure standards (WES)

To contact an occupational hygiene practitioner

Health and Safety Association New Zealand

New Zealand Occupational Hygiene Society

Disclaimer

This publication provides general guidance. It is not possible for WorkSafe to address every situation that could occur in every workplace. This means that you will need to think about this guidance and how to apply it to your particular circumstances.

WorkSafe regularly reviews and revises guidance to ensure that it is up-to-date. If you are reading a printed copy of this guidance, please check worksafe.govt.nz to confirm that your copy is the current version.

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