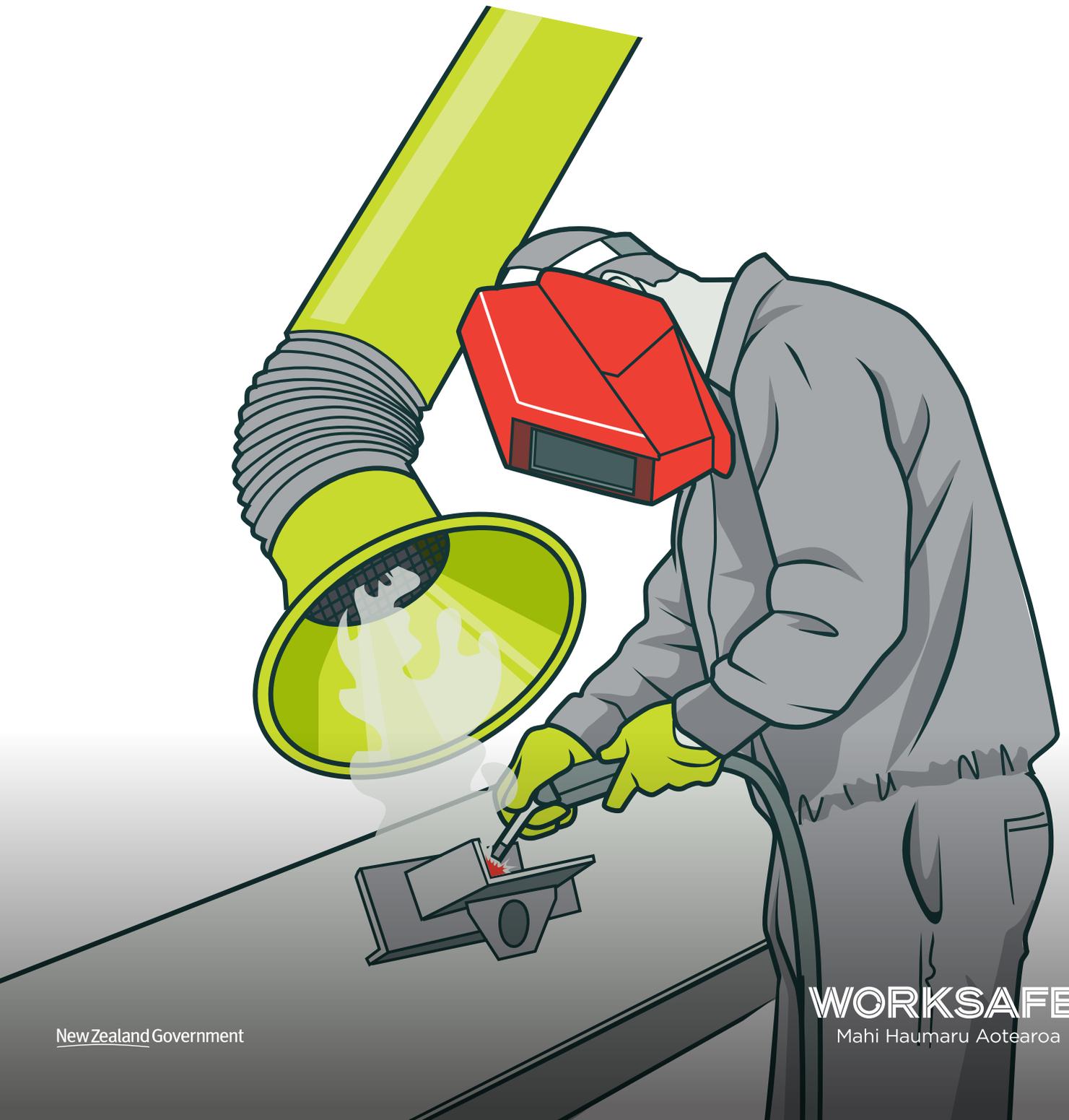




# Local exhaust ventilation

July 2019



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# 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

As a PCBU, 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 and where this is not possible you must minimise them.

You have a primary duty to monitor the health of workers and workplace conditions so far as is reasonably practicable. In addition, for work involving certain substances hazardous to health, you must carry out workplace exposure and/or worker health monitoring as described in regulations.

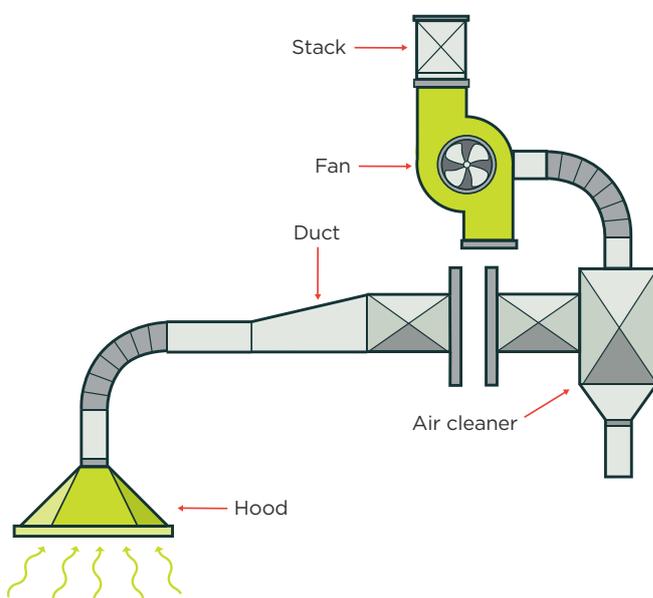
For information about the monitoring specified in regulations, see Part 1 of WorkSafe's interpretive guidelines *General Risk and Workplace Management*.

### What is LEV?

Many work processes create harmful dusts, vapours and fumes that contaminate the air. Breathing substances hazardous to health can cause lung diseases such as occupational asthma, bronchitis and silicosis. It may also result in harm to other organs, such as the liver, kidneys and brain.

LEV is an engineering system that captures dusts, vapours, and fumes at their source and transports them away from the worker's breathing zone. This prevents workers

from inhaling these substances and reduces contamination of the general workplace air.



**FIGURE 1:**  
A basic LEV system

## **LEV components**

Most LEV systems will have the following components:

### **1. Hood**

The hood captures the contaminated air. To be effective:

- the hood should be positioned as close as possible to the source, or even enclose the source, ideally less than one hood diameter away
- enclose the process as much as possible to avoid draughts that will blow the fumes away from the hood and further into the workplace
- the hood must be the right design for the process and type of contaminant
- the capture velocity must be sufficient to overcome the movement of the contaminant cloud and draw it into the hood
- the worker must not stand between the process and the flow of air to the hood.

### **2. Ducting**

The ducting system carries the contaminated air away from the work area and ideally sharp corners should be avoided in the ducting.

### **3. Air cleaner**

The air cleaner filters and cleans the air before it's released (outside, away from air intakes).

### **4. Fan**

The fan draws the contaminated air through the hood and ducting to the exhaust stack.

The fan must generate sufficient airflow to achieve a capture velocity that draws the contaminant away from the worker's breathing zone.

### **5. Exhaust stack**

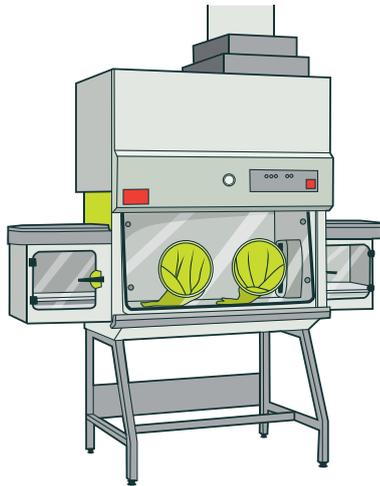
The exhaust stack releases the clean air to the outside.

## **Types of LEV hoods**

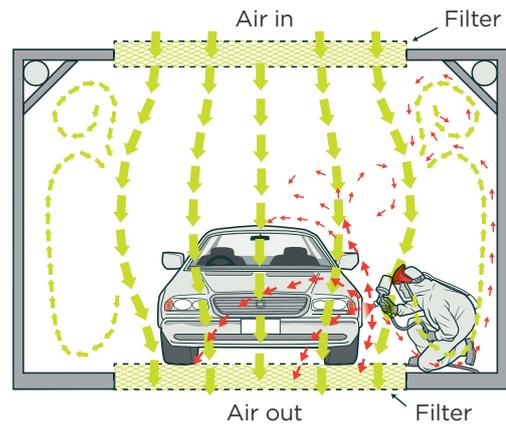
One of the common reasons LEV systems are ineffective is because the hood doesn't capture and contain the contaminated air. There are different designs of LEV hood for different processes.

## ENCLOSING HOODS

Enclosing hoods are an effective type of hood because the contaminated air is completely contained. A glove box encloses the process, protecting the operator and preventing the contaminant from entering the workplace. Spray booths enclose the process and the operator. The contaminated air is contained but further controls such as personal protective equipment (PPE) are needed to protect the operator.



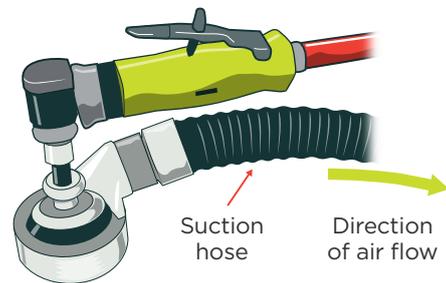
**FIGURE 2:** Glove box



**FIGURE 3:** Spray booth

## CAPTURING HOODS

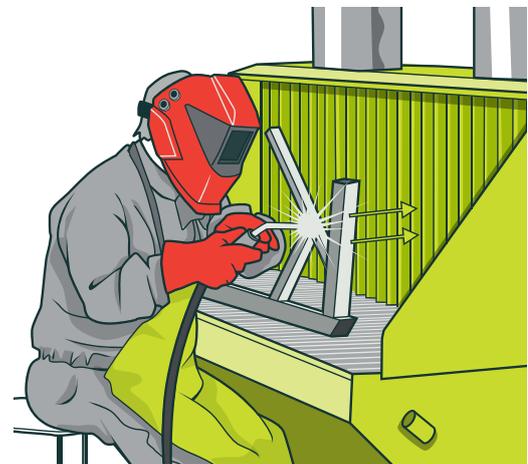
Capturing hoods are the most common type of LEV hood. The work process occurs outside the hood. This type of hood requires the LEV system to generate enough air-flow to draw in the contaminated air. There are several types of capturing hoods: on-tool, moveable capturing hoods, fixed, portable or flexible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



**FIGURE 4:** On-tool extraction



**FIGURE 5:** Flexible capturing hood



**FIGURE 6:** Extracted workbench

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# 2.0

## Managing risks from airborne contaminants

### Are airborne contaminants a work risk you must deal with?

You first need to work out if airborne contaminants are a work risk. If they are, you need to eliminate the risk so far as is reasonably practicable. If this is not possible, you must minimise the risk so far as is reasonably practicable. Cost may only be used as a reason not to do something when it is grossly disproportionate to the risk.

Think about:

- Which work processes create dusts, vapours and fumes?
- What substances are released into the air, what are the risks from them?
- Information can be found in Safety Data Sheets.
- How concentrated are the contaminants in the air?
  - If you are not sure on reasonable grounds whether the substance hazardous to health in the workplace exceeds the prescribed exposure standard, you must conduct exposure monitoring in accordance with the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016 to determine the concentration (See Part 1 of WorkSafe's interpretive guidelines *General Risk and Workplace Management*)
- Where is the process causing the contamination located (inside, outside or in a confined space)?
  - Work in confined space needs further control measures.
- Who is exposed to the hazard and for how long?

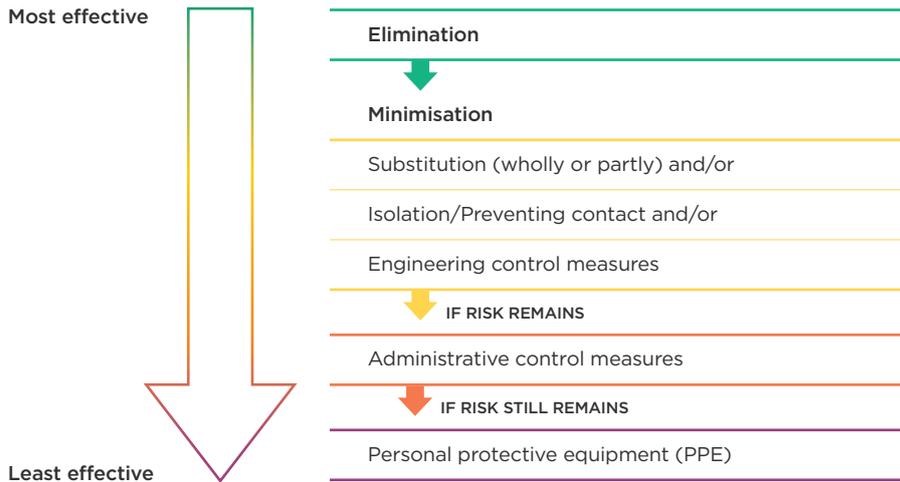
Seek advice from professionals such as occupational hygienists, industrial ventilation engineers and LEV suppliers.

Talk to occupational practitioners for advice on exposure monitoring. To find out about occupational health practitioners in your area, see the Health and Safety Association NZ website: [www.hasanz.org.nz](http://www.hasanz.org.nz) or the New Zealand Occupational Hygiene Society: [www.nzohs.org.nz](http://www.nzohs.org.nz)

If you have identified contaminated air as a hazard, you must put control measures in place.

### How to manage risks from airborne contaminants

You must first try to eliminate the risk so far as is reasonably practicable before you apply minimisation control measures. For work involving substances hazardous to health, you must use the hierarchy of the controls (Figure 7) to determine what control measures to use. Table 1 describes the different types of control measures.



**FIGURE 7:**  
Hierarchy of controls

	TYPE	EXAMPLES
	<b>Eliminating</b> - Removing the sources of harm (eg equipment, substances or work processes).	Buy ready-made components so the process that produces the contaminant is not needed.
<b>Minimising</b>	<b>Substituting</b> - Using a safer alternative.	Use a less toxic substance.
	<b>Isolating/preventing contact or exposure to risk</b> - Isolating the hazard giving rise to the risk to prevent any person coming into contact with it.	Marking the hazardous area, fitting screens or putting up safety barriers around the hazard.
	<b>Engineering control measures</b> - Using physical control measures including mechanical devices or processes.	<b>Install a LEV system</b> or otherwise modify the process to reduce worker's exposure.
	<b>Administrative control measures</b> - Using safe methods of work, processes or procedures designed to minimise risk.	Limit the time a worker is exposed. Limit the number of workers exposed.
	<b>Personal protective equipment (PPE)</b> - Using safety equipment to protect against harm. PPE reduces exposure to, or contact with the hazard. - Of the control measures above, PPE is the least effective and should not be the first or only control measure considered.	Provide respiratory protective equipment (RPE) that has been fit tested for the wearer.  <b>Note:</b> Installing LEV will usually reduce the grade of RPE needed and may remove the need for RPE altogether.

**TABLE 1:**  
Control measures

Seek your workers' views on which control measures to use. WorkSafe expects PCBUs to choose effective control measures that protect multiple at-risk workers at the same time. For example, LEV protects everyone in the workplace, while respiratory protective equipment (RPE) protects only the person wearing it. Section 3 provides advice if you choose to use LEV.

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# 3.0

## Using LEV

### Selecting the right LEV

Selecting the right LEV system for your workplace can be confusing. Poor design, installation and maintenance of any one part will reduce the ability of the system as a whole to capture and contain the contaminated air. Include your workers in the selection process.

Have your ventilation needs assessed by professionals such as occupational hygienists, industrial ventilation engineers and LEV suppliers.

You should be aware that the LEV system may not capture all the contaminated air, so you may need to put other control measures in place. You should conduct further exposure monitoring to find out whether RPE is needed.

Installing LEV is likely to require a building consent, depending on the impact it has on the existing building and its systems (such as ventilation). Contact your local council to find out if this is necessary.

### What to expect from your LEV supplier

Make sure the supplier you choose is competent. Ask about their professional qualifications, experience and industry membership. Table 2 describes the duties your supplier has.<sup>1</sup>

DUTY	REQUIREMENT
<b>Duty to, so far as is reasonably practicable, ensure plant, substances, or structures are without health and safety risks</b>	Make sure, so far as is reasonably practicable, the LEV is without health and safety risks to people who: <ul style="list-style-type: none"><li>- use the LEV at a workplace for its designed or manufactured purpose</li><li>- 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</li><li>- 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.</li></ul>
<b>Duty to test</b>	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).
<b>Duty to provide information</b>	Provide adequate information to people who are supplied with LEV. This includes information about: <ul style="list-style-type: none"><li>- each purpose for which the LEV was designed or manufactured</li><li>- the results of any calculations, analyses, tests or examinations carried out to ensure the LEV is without health and safety risks</li><li>- 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).</li></ul> 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

<sup>1</sup> These duties do not apply if the LEV is second-hand and sold as is.

In addition, the supplier should 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).

### **Looking after the LEV**

Workers must be trained in how to correctly use the LEV including basic daily checks before use.

Checks and maintenance should cover:

- moving parts that wear out such as fan bearings
- non-moving parts such as hoods, ducts and seals
- replaceable/consumable parts such as filters.

Workers should report any defects to you. Fix any faults before use to ensure the system continues to work effectively.

- Keep records of the checks and maintenance completed.
- Have the system serviced by an industrial ventilation engineer.

### **Checking the effectiveness of the LEV**

It's important to monitor and review the effectiveness of control measures on an ongoing basis. Periodic exposure monitoring and worker health monitoring are ways you can do this.

If the results of the monitoring indicate that the control measures you have in place are not working effectively you should review them and put in place further control measures to manage the risk.

### **Making changes to the LEV**

Fitting extra hoods to an LEV system will reduce the effectiveness of the fan and the capture velocity at the hoods. A stronger fan may be needed to ensure the system continues to operate effectively.

An industrial ventilation engineer should review any proposed changes or additions to the system.

Arrange exposure monitoring following any modifications to the LEV system or after other changes to the process.



## 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](http://worksafe.govt.nz) to confirm that your copy is the current version.

ISBN: 978-0-908336-88-3 (online)

Published: July 2019

PO Box 165, Wellington 6140, New Zealand

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