GOOD PRACTICE GUIDELINES

Health and safety in welding

GUIDANCE FOR PCBUs

July 2021

New Zealand Government

WORKSAFE
Mahi Haumaru Aotearoa

These guidelines provide practical advice about how to manage the health and safety risks of welding.

ACKNOWLEDGEMENTS

WorkSafe would like to thank the many people from within the organisation and from external industry and advisory groups who have contributed to the development of this guidance. With particular thanks to Engineering Services Rotorua Ltd and Naylor Love.

LEGISLATION REFERRED TO IN THIS GUIDANCE

- Health and Safety at Work Act 2015 (HSWA)
- Health and Safety in Employment Regulations 1995 (the HSE Regulations)
- Hazardous Substances and New Organisms Act 1996 (HSNO)
- Electricity (Safety) Regulations 2010 (the ES Regulations)
- Health and Safety at Work (General Risk and Workplace Management) Regulations 2016 (the GRWM Regulations)
- Hazardous Substances (Disposal) Notice 2017 (the HS Disposal Notice)
- Hazardous Substances (Hazardous Property Controls) Notice 2017 (the HPC Notice)
- Health and Safety at Work (Hazardous Substances) Regulations 2017 (the Hazardous Substances Regulations)

For more information, see: New Zealand legislation

Health and safety in welding

KEY POINTS

- The International Agency for Research on Cancer has classified all welding fume as a substance that may cause cancer.
- Workers exposed to welding fume and other welding hazards are at risk of serious injury or illness.
- There is no known safe level of exposure to welding fume.
- Effective control measures are critical for managing the risks presented by welding or work related to welding.

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NOTES

Use of 'must' and 'should'

This guidance uses 'must' and 'should' to indicate whether an action is required by law or is a recommended practice or approach.

TERM	DEFINITION
Must	Legal requirement that has to be complied with
Should	Recommended practice or approach

Key terms

Where this guidance refers to a 'competent person', this means a person who:

- has the relevant knowledge, experience and skill to carry out welding using appropriate techniques and procedures, and
- has a relevant qualification proving that they have the knowledge, experience, and skill required, or their business has evidence (such as training records) demonstrating that the person has the required knowledge, experience, and skill.

1.0 Introduction

IN THIS SECTION:

A worker is 15 times more likely to die from a work-related disease than from a work-related acute injury.[1]

1.1 Why it is critical to manage health and safety risks at work

Since 2019, the International Agency for Research on Cancer has classified all welding fume, including from mild steel, as a substance that may cause cancer.[2] Currently there is no known safe level of exposure to any type of welding fume. Risk assessment is critical to make sure the welder and people working nearby are protected from exposure.

1.2 Who this guidance is for

This guidance is for a person conducting a business or undertaking (PCBU) – whose work involves welding. In this guidance, 'you' means the PCBU.

This guidance may also be helpful for workers in welding or related industries, when carrying out work or engaging with a PCBU about health and safety matters.

1.3 What this guidance is about

This guidance is about helping you manage the risks to health and safety associated with welding or welding-related processes. Examples given do not cover every possible situation. If you need technical help or help that is more specific to your situation, refer to the relevant manuals, standards and technical notes that apply to your business, or get the advice of a competent person.

1.4 Worker engagement, participation and representation

Strong worker engagement, participation and representation leads to healthier and safer work. It is also good for business performance and productivity – because it helps inform better decisions. Workers who help shape safer work systems can suggest cost-effective, practical solutions. They are more likely to make them happen in practice.

[1] https://data.worksafe.govt.nz/editorial/work_related_health
Also see the document *Work-related health estimates: deaths and hospitalisations estimates and update of the ACC work-related health claims figure* (at the same link).

[2] The IARC has classified all welding fume as a Group 1 Carcinogenic Substance.

You have two main duties related to worker engagement and participation:

- to engage with workers on health and safety matters that affect or are likely to affect workers, so far as is reasonably practicable. For example:
  - on health and safety matters that directly affect them
  - when assessing risk and selecting control measures
  - when introducing exposure and/or health monitoring, and
- to have practices that give workers reasonable opportunities to participate effectively in the ongoing improvement of work health and safety.

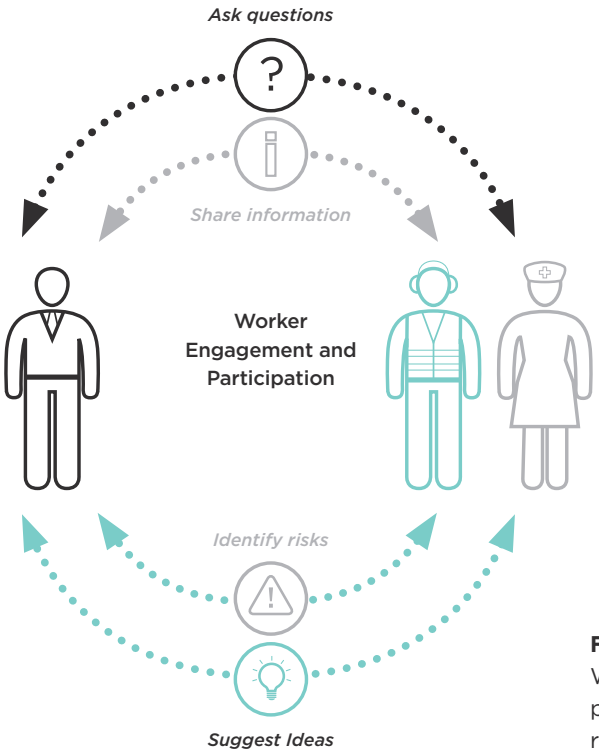


FIGURE 1: Worker engagement, participation and representation

You can engage with workers by:

- sharing information about health and safety matters so that workers are well-informed, know what is going on and can contribute to decision-making
- giving workers reasonable opportunities to have a say about health and safety matters
- listening to and considering what workers have to say at each step of the risk management process
- considering workers' views when health and safety decisions are being made
- updating workers about what decisions have been made.

Involve workers – get their ideas, ask them what they think the risks of their work are, and what procedures, equipment and facilities are needed to make their work safe.

Worker representation

Workers can be represented by a Health and Safety Representative (HSR), a union representing workers, or a person that workers authorise to represent them (for example, a community or church leader, or another trusted member of the community).

HSRs and Health and Safety Committees (HSCs) are two well-established methods of participation and representation. If workers are represented by an HSR, worker engagement must also involve that representative.

1.5 Training

You must make sure, so far as is reasonably practicable, that every worker who works with a substance capable of causing a risk in the workplace:

- has adequate knowledge and experience of the substance, or
- is adequately supervised by a person with that knowledge and experience.

You must make sure workers are adequately trained in:

- the safe use of substances they use or handle, or that they may be required to use or handle, and
- all protective personal equipment (PPE) and respiratory protective equipment (RPE) they wear or use, or may be required to wear or use.

You must, so far as is reasonably practicable, engage with workers when making decisions about health and safety training and information.

Provide ongoing training as needed, including refresher training so that skills and knowledge are kept up-to-date.

It is good practice for workers in the welding industry to also be aware of:

- work health and safety legislative requirements
- the potential health risks of welding.

Additional requirements for workers handling hazardous substances

There are additional requirements for the training, supervision, information and instruction of workers that handle hazardous substances. For more information, see Section 6.3 *Workers and hazardous substances*.

Example: Overcoming language and/or cultural barriers

At one of their recent projects, commercial construction company Naylor Love appointed engineering contractors who would not only complete the site work and supervise workers – but who could also translate work processes, such as site safety procedures and inductions, for them.

Richard Wilson, health and safety advisor at Naylor Love, said when there were language and cultural barriers, workers could "often feel pressured or obliged to take unnecessary risks. It is important that as PCBUs we manage this risk." He said, "We try to keep the same site team to minimise potential mistakes."

1.6 First aid

You must ensure that an adequate number of workers are trained to administer first aid or that workers have access to an adequate number of other persons who have been trained to administer first aid.

It is good practice for workers trained in administering first aid to also be trained in the symptoms of electric shock, arc flash and the consequences of exposure to heated coatings on metals (for example, when galvanised metal is welded).

1.7 Emergency plans

You must have a written plan for your workplace that instructs people what to do in an emergency. The plan must include information about how to evacuate the site and how to notify emergency services. You must consider the size and location of the worksite, the number and composition of workers, the nature of the work and its hazards.

1.8 Notifying WorkSafe

You must notify WorkSafe if any of the following events occur because of work that your business is responsible for:

- a death
- a notifiable illness or injury (a specified serious work-related illness or injury)
- a notifiable incident (for example, an electric shock).

To notify WorkSafe:

- **If someone has been killed, call 0800 030 040 immediately.**
- For all other notifications, use the WorkSafe tool

1.9 More information

Worker engagement, participation and representation

Providing information, training, instruction or supervision for workers

First aid at work

Workplace emergency plans

Notify WorkSafe

2.0
Managing risk

IN THIS SECTION:

A risk management approach will help you identify and manage welding risks at work.

Risks to health and safety arise from people being exposed to a hazard (a source or cause of harm).

You must first try to **eliminate** a risk so far as is reasonably practicable. If this is not possible, you must **minimise** the risk so far as is reasonably practicable.

When identifying and assessing risks and choosing control measures, you must engage with workers and their representatives.

You must use the risk management process below to work out the most effective control measures to use for:

- remote or isolated work
- substances hazardous to health
- working in an atmosphere with the potential for fire or explosion
- working with ignition sources, working under objects that could fall, and
- working under raised objects, and working with loose but enclosed materials.

2.1 Risk management process

STEP 1 Identify hazards that could give rise to work risks

With your workers, identify what could harm the health or endanger the safety of one or more workers or others (such as visitors or bystanders).

STEP 2 Assess work risks

With your workers, identify and assess the risks arising from each work hazard. Ask:

- Who might be exposed to the hazard?
- What could happen?
- How severe could the resulting injuries be?
- How could people's health be affected?
- How likely are these consequences?

Decide which risks to deal with immediately. For example, risks with potentially significant consequences such as serious injury or death, chronic ill-health, or those which are very likely to occur.

STEP 3 Decide how to manage each risk

With your workers, decide how to manage work risks.

Multiple control measures may be needed to deal with a given risk. Give preference to control measures that protect many workers at the same time (for example, safety barriers, safety nets).

Use the hierarchy of control measures (Figure 2) to work out the most effective control measures to use.

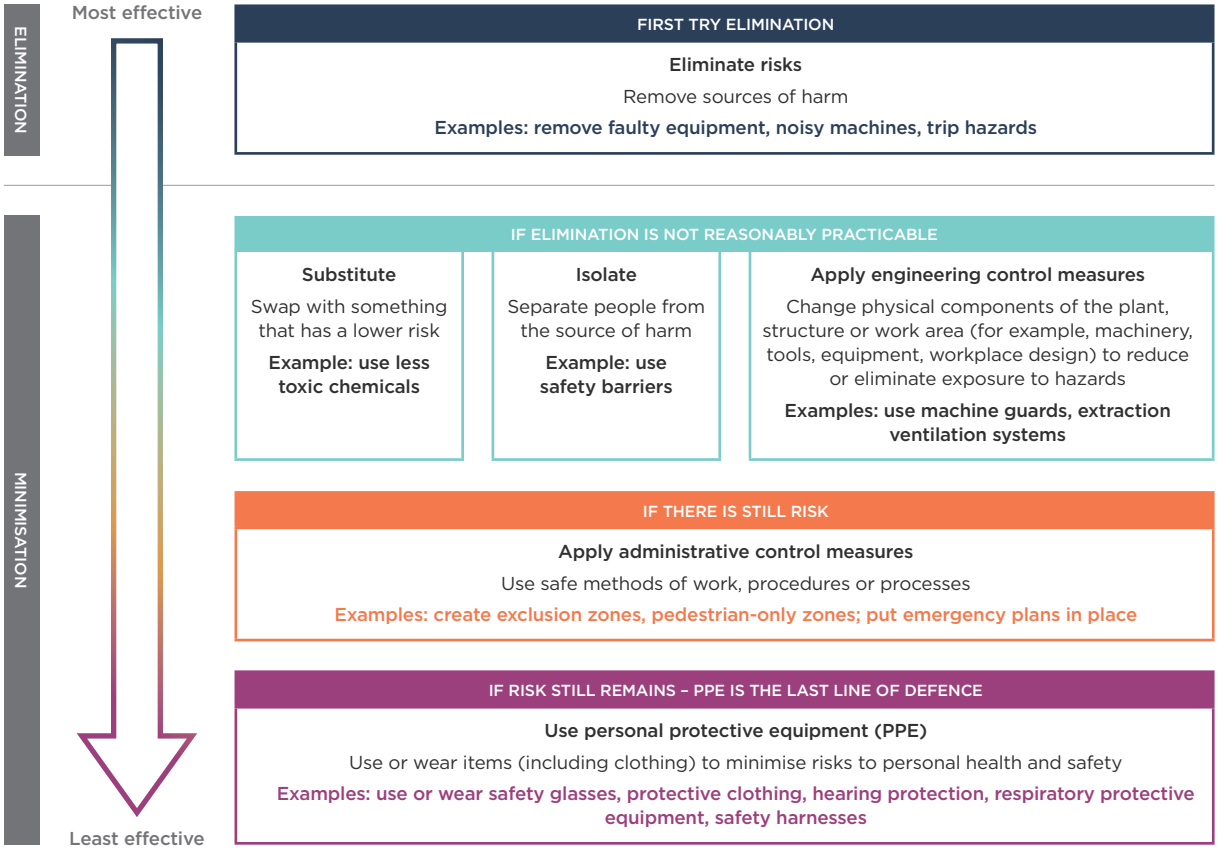


FIGURE 2: Hierarchy of control measures

FIRST TRY TO ELIMINATE

First try to eliminate the risk, if this is reasonably practicable. This can be done by removing the source or cause of harm (such as faulty equipment, a noisy machine or a trip hazard). Consider if the welding process itself can be eliminated (by using cold joining techniques such as machine bolting, for example).

THEN TRY TO MINIMISE

If it is not reasonably practicable to eliminate the risk, the risk must be minimised so far as is reasonably practicable.

Minimise the risk using one or more of the following actions:

- substitute/swap with something that has a lower risk
- isolate the hazard by separating people from the source of harm
- apply engineering control measures (change physical components of the plant, structure or work area to reduce or eliminate exposure to hazards).

If the risk still remains after taking one or more of the actions above, try to minimise the risk with administrative control measures (such as safe methods of work, procedures or processes).

If there is still risk, use PPE to minimise the risk and make sure workers are trained in how to use, wear and maintain it correctly. PPE is the least effective control measure and should only be used when other control measures alone cannot adequately manage the risk. For more information, see Section 9.1: *PPE for welding*.

Example: Control measures in practices

Rotorua-based company Engineering Services Rotorua Ltd makes specialised machinery for the logging industry. The machinery includes log and pallet forks for front-end loaders and rotating grapples for hydraulic excavators. The company employs 22 welders who mostly do metal inert gas (MIG) welding.

Controlling exposure to noise, welding flash and sparks

The company recently installed permanent welding bays to replace old portable welding screens. The worn-out screens had holes in them and would often be blown over by the wind. The welding bays have curtain screens that are two metres high and can be unhooked as necessary. The bays have reduced the noise and exposure to welding flash and sparks for nearby workers and other people in the vicinity.

Controlling welding fume

In 2020, the company undertook exposure monitoring in its workplaces. The results of the monitoring indicated the company needed to improve its control measures for welding fume. The company considered installing a fixed extraction unit but, after talking to other welding companies, decided to trial local exhaust ventilation which has been working well. All of the company's welders use powered air-purifying respirators (PAPRs).

STEP 4 Put control measures in place

After engaging with your workers, you should, as soon as possible after you have decided on control measures:

- put the control measures in place
- instruct and train workers (including new workers) about the control measures, why it is important to use them and how to apply them. For more information, see Section 1.5: *Training*.

STEP 5 Review and improve control measures

Control measures should remain effective, be fit-for-purpose, be suitable for the nature and duration of the work and be used correctly. With your workers, regularly monitor control measures to confirm that the measures are still effective.

You should review control measures:

- when a new risk is identified
- when there is a change at the workplace or to the work, or new equipment is introduced
- when workers or their health and safety representatives ask for a review
- when there is evidence that control measures may not be working effectively to manage the risk (for example, when you receive monitoring results or a report following an incident investigation).

Use guidance from WorkSafe or others (for example, industry associations), to help identify, assess and manage risks, and review control measures. If you need help, we recommend getting advice from a suitably qualified and experienced health and safety professional. For more information, see: Health and Safety Association NZ (HASANZ)

Reviewing control measures for hazardous substances

The Hazardous Substances Regulations require control measures to be reviewed, and if necessary revised, after certain significant changes and/or a notifiable event, and at least once every five years. For more information, see Section 6.6: *Reviewing your control measures*.

2.2 Other things to consider

When identifying hazards and assessing the risks at your work, other things to consider include:

- Worker training:
  - Have workers, including vulnerable workers such as trainees and apprentices, been trained for the work they do?
  - Is there adequate supervision by a competent person?
- Which workers are most at risk of being exposed to welding hazards? (As well as welders, this may also include workers not directly doing welding work, such as workers who move between the office and the factory floor.)
- How often and for how long are workers exposed to welding hazards?
- Where and how your welding equipment is stored:
  - Is it stored securely?
  - Are hazardous substances stored securely?
  - Are the safety data sheets readily available for workers to access?
- The location where the welding is carried out:
  - Ventilation: will natural ventilation be enough or will you need local exhaust ventilation?
  - Are there flammable materials nearby?
  - Will welding be carried out in or around vehicles and/or heavy plant?
- The type of welding or related process being carried out, such as: manual arc welding (stick welding), tungsten arc welding or tungsten inert gas welding (TIG), MIG welding, flux core arc welding, grinding, oxygen and acetylene gas cutting, plasma cutting and air gouging.
- Other materials that may be used in the work such as galvanised steel, aluminium, stainless steel, or mild steel.
- Will the work produce a large amount of fume and gas?
- Has asbestos been used on pipe insulation or gaskets?
- Are welding surfaces coated or painted with substances such as lead-based paint, epoxy resins or degreasing agents?

Example

While working on a recent project, Naylor Love detected lead-based paint on surfaces which needed to be welded. To remove the paint, the company used an organic product then washed the surfaces clean. As part of the control measures, welding contractors wore GP2 half-face welding respirators, and Naylor Love arranged for welders' overalls to be washed and dried daily to avoid any residual airborne lead-based particles going into household washing. The company put in place a health monitoring programme and, as part of their exposure monitoring programme, monitored the levels of carbon dioxide within two metres of each welder.

2.3 More information

Managing work risks

3.0 Exposure to welding fume

IN THIS SECTION:

Workers have the right to work in environments where the risks to their health and safety are properly controlled.

Working in hazardous conditions can adversely affect workers' health in both the short-term (acute) and long-term (chronic).

All of the following welding or welding-related illnesses or injuries can be prevented by putting in place appropriate control measures. This section also discusses how exposure and health monitoring can be used to effectively manage health risks to your workers that arise from your work.

3.1 Chronic respiratory health risks

Chronic respiratory health risks that may develop gradually into serious disease after exposure to welding fume include:

- **Cancer**. Exposure to welding fume, including mild steel welding fume, is a known cause of lung cancer and possibly kidney cancer in welders. There is no known safe level of exposure to welding fume.
- **Chronic obstructive pulmonary disease (COPD)**. For example, emphysema or chronic bronchitis. Symptoms include progressive shortness of breath, chest tightness, wheezing, fatigue.
- **Occupational asthma**. Exposure to metals such as chromium, nickel and cobalt in welding fume may cause occupational asthma. Symptoms include severe shortness of breath, wheezing, coughing, chest tightness, and short-term reduction in lung function.
- **Welder's lung (Pneumosiderosis)**. Exposure to iron particles in welding fume may cause welder's lung, a benign type of pneumoconiosis. If a worker also has COPD, welder's lung can make these symptoms worse.

3.2 Acute respiratory health risks

Acute respiratory health risks that may develop soon after exposure to welding fume include:

- **Acute pneumonia**. Breathing in welding fume can increase the risk of workers developing pneumococcal pneumonia.
- **Irritant-induced asthma**. This may occur in workers exposed to very high levels of welding fume.
- **Irritated throat**. Symptoms include dry throat, coughing, chest tightness particularly if exposed to ozone (in tungsten inert gas welding) and nitrous oxides (in arc welding).
- **Metal fume fever**. This has similar symptoms to flu and is usually worse at the beginning of the working week. It is usually linked to welding or hot work on galvanised metals (commonly aluminium oxide, magnesium oxide and zinc oxide fumes).

3.3 Other health and safety risks from welding

- **Arc-eye**. This is an injury to the front of the eye (the cornea) caused by exposure to radiation generated by welding. A few hours after welding, the eye becomes red and painful. Other parts of the eye may also be damaged.
- **Burns**. Burns may be due to fire, explosion, electric shock, and/or UV radiation generated when welding.
- **Electric shock**.
- **Heat stress and heat exhaustion**. Working in extreme heat (indoors where there is high humidity and/or radiant heat being generated, and/or outdoors) can cause serious illness and injury.
- **Neurological damage**. Some studies suggest exposure to manganese, present in mild steel welding fume, may lead to neurological symptoms similar to Parkinson's disease.
- **Damaged hearing or hearing loss**. Welders often work in noisy environments and carry out noisy operations such as needle scaling and grinding. They are also exposed to the noise of the work being carried out around them.
- **Ocular melanoma**. This is a rare eye cancer that may be associated with welding, particularly the intense flame and arc emitted by UV radiation.
- **Skin damage**. This includes allergic contact dermatitis from materials containing chromium (see also Burns above).
- **Suffocation**. Welders working in confined spaces are at risk of suffocating due to:
  - lack of oxygen (asphyxiation). During welding, oxygen in the atmosphere is burnt or displaced by other gases (such as argon, helium, nitrogen, argon-based mixtures with carbon dioxide)
  - the introduction or build-up of carbon monoxide from combustion engines

  For more information about confined spaces, see: worksafe.govt.nz
- **Trips, slips and falls** (including when working from height).
- **Vibration-induced pain and disorders**. Workers carrying out needle scaling and grinding may be at risk from harmful levels of vibration which can cause painful and disabling disorders of the blood vessels, nerves and joints.

3.4 Exposure and health monitoring

You must ensure, so far as is reasonably practicable, the health and safety of workers, and that other people are not put at risk by your work. In some circumstances, this could mean monitoring worker exposure and/or the health of workers.

Exposure monitoring can be used to:

- identify, assess and confirm health risks
- identify where new control measures are needed
- monitor how well current control measures are performing, and
- identify when control measures need to be reviewed, updated or removed.

Biological exposure monitoring

- Biological exposure monitoring is another type of exposure monitoring. It usually involves taking blood or urine samples to test for a substance (or a metabolite of a substance) workers are working with.
- Blood or other invasive samples must be taken by a health practitioner such as an occupational health nurse or phlebotomist (for blood).
- A suitably qualified, trained and experienced person is needed to interpret the results.

Health monitoring can tell you if workers are experiencing health effects from potential exposures. For example:

- carrying out hearing tests to check for hearing loss from being exposed to noise
- checking for skin damage from being exposed to chemicals
- checking for nerve, muscle or circulation damage from being exposed to vibration.

Health monitoring can also confirm that control measures are preventing harm.

Well-being programmes, employment pre-screening and fitness-to-work examinations are **not** health monitoring.

3.5 What type of monitoring should you do?

The type of monitoring depends on the kind of work being carried out. Talk to a suitably qualified and experienced health and safety professional to find out if monitoring is appropriate – and if so, what type and how often. You could need initial monitoring carried out, and then regular (ongoing) monitoring. For more information, see our guidance: Exposure monitoring and health monitoring – guidance for businesses

Where workers are exposed to welding fume, WorkSafe recommends that you carry out exposure monitoring to assess the air quality.

Monitoring is not a control measure. It does not replace the need for control measures to eliminate or minimise worker exposure to harm.

If you intend to carry out monitoring:

- Get help and advice from health and safety professionals with the knowledge, skills, training and experience to carry out the monitoring required, including interpreting the results.
- You should pay for monitoring costs.
- You must work together with other businesses if you share monitoring duties.
- You must engage with your workers and their representatives when making decisions about monitoring.
- Workers must give their written informed consent for biological exposure monitoring or health monitoring.
- You should try to find a solution if workers do not want to take part in monitoring.
- You must keep any personal information collected during monitoring secure and confidential.
- You must take care when sharing monitoring results that contain personal information. Use monitoring results only for the purposes they were collected for (such as managing health risks).
- Take immediate action if the monitoring results show your workers are being harmed or are at risk because of work.

3.6 More information

Burns

Eye protection

Heat stress and heat exhaustion

Working safely in a confined space

Monitoring

Noise

Trips, slips and falls

Vibration

Working safely at height

4.0
Welding fume

IN THIS SECTION:

There is no known safe level of exposure to any type of welding fume.

4.1 What could go wrong

Since 2019, the International Agency for Research on Cancer has classified all welding fume as a substance that may cause cancer.[3] This includes mild steel welding fume.

There is no known safe level of exposure to any type of welding fume. A risk assessment is critical to make sure the welder and people working nearby are protected from exposure. Adequate ventilation is essential whenever welding is carried out.

Welding fume is created when metal is heated above its boiling point and melts to create very fine particles (particulates). The plume is often visible as a haze which can remain in the air for long periods because the particles are so small. Associated processes such as brazing and soldering also create fume.

Gases produced by burning consumables, surface coatings and shielding gases mix with the particles, producing toxic gases (such as phosgene). In arc welding, the electric arc also generates ozone, an irritant gas, as the oxygen burns.

RISKS	POSSIBLE CAUSES
Welders or other workers nearby could contract lung cancer, chronic obstructive pulmonary disease (COPD), occupational asthma, welder's lung (pneumosiderosis), acute pneumonia, irritant-induced asthma, irritated throat, metal fume fever, neurological damage.	No control measures are in place for welding fume. Control measures are in place for welding fume but they are not effective.

TABLE 1:
Risks – welding fume

Your work may have risks to health and safety that are not identified in this table, which you will need to assess. You must engage with workers and their representatives when identifying hazards, assessing risks, and choosing control measures.

[3] IARC has classified all welding fume as a Group 1 Carcinogenic Substance.

4.2 Eliminate the risk or implement control measures

Consider how you could eliminate the risk of exposure to welding fume. For example, mechanise or automate the welding process or use cold joining techniques such as machine bolting.

If elimination is not reasonably practicable, you must minimise the risk, so far as is reasonably practicable. Use the hierarchy of control measures to choose the most effective control measures.

Consider the:

- welding process, volume of work and level of fume generated
- size of the component being welded
- type of metal being welded
- consumable being used
- type of air contaminant generated
- ventilation required
- working environment.

4.3 Suggested control measures

Control measures may include:

- arranging the workpiece so the welder's head is away from the fume
- reading the safety data sheet for each welding flux or filler metal used and understanding the risks and recommended control measures
- using a welding process that generates less fume, such as MIG welding instead of MMA (stick) welding
- setting time limits on how long workers work without stopping to get some fresh air
- using local exhaust ventilation (LEV). LEV captures fume at its source, protecting the worker and stopping fume from spreading. Types of LEV include:
  - on-torch extraction
  - extraction benches
  - extraction booths.

For more information about LEV, including a table of examples of the types of extraction that can be used for welding, see our quick guide: Welding and local exhaust ventilation

LEV is not effective when welding outdoors. In this case, workers should wear suitable RPE to control exposure to fume.

Respiratory protective equipment (RPE)

Even after you have put in place control measures such as LEV, you may need to use RPE to protect workers against residual welding fume. RPE is in the last level of the hierarchy of control measures. RPE only protects the person wearing it – it must be the right type of RPE for the job, and be fit-tested and worn correctly or it will not be effective.

> All workers wearing RPE should be clean-shaven (with a few exceptions such as workers who wear a PAPR). See Figure 3 on the next page.

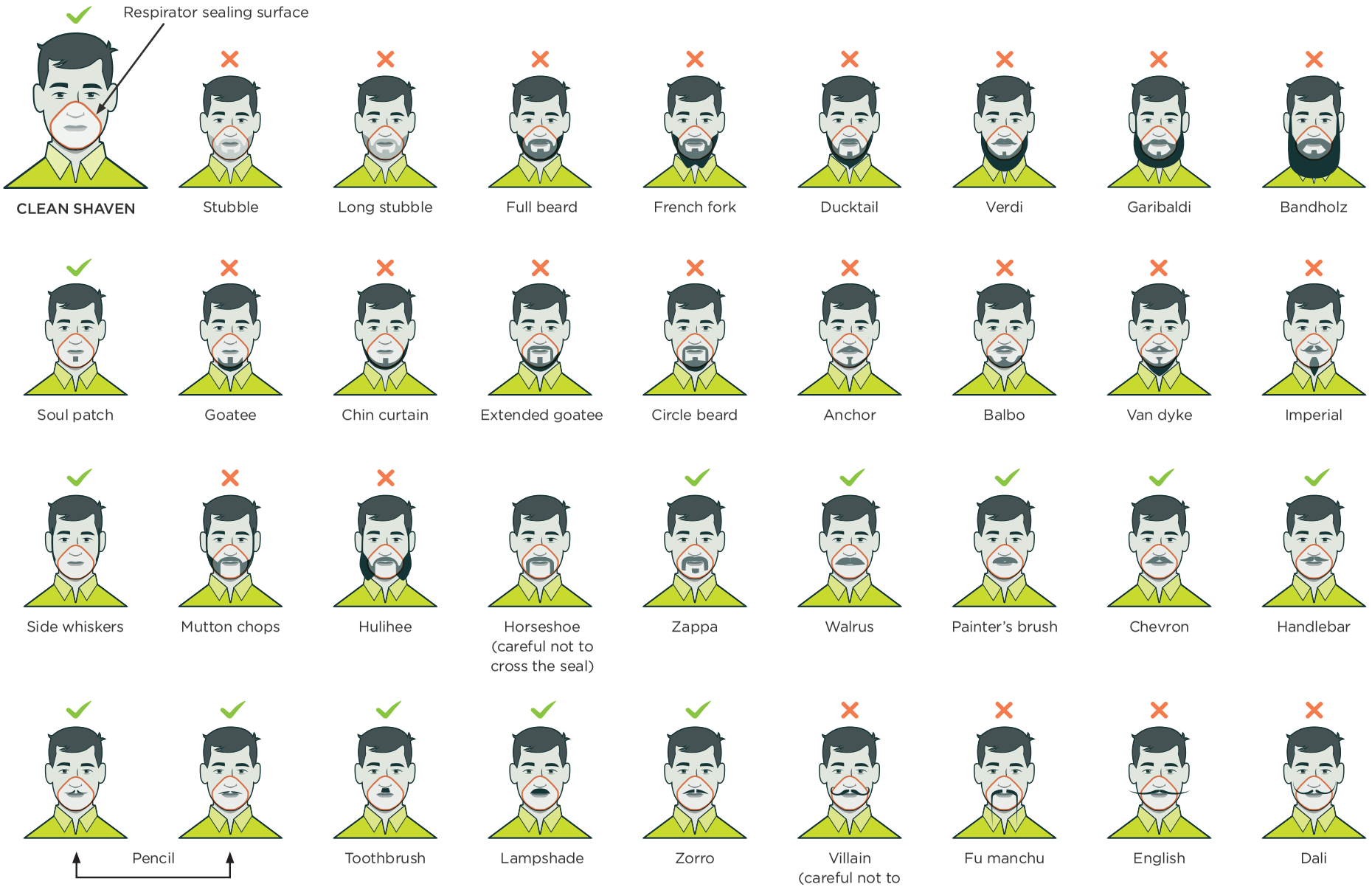


FIGURE 3: Facial hair

4.3 Seek expert advice

Seek advice from an occupational hygienist if you need further help selecting effective control measures to minimise exposure to welding fume.

4.4 More information

Respiratory protective equipment (RPE)

Welding and local exhaust ventilation (LEV)

5.0 Electrical welding

IN THIS SECTION:

Electrical welding exposes workers to the risks of death or serious injury from electric shock or fire.

5.1 What could go wrong

The risk of injury from electricity is strongly linked to where and how it is used.

RISKS	POSSIBLE CAUSES
Electric shock **Burns**	Direct contact with the electrode or other live welding parts, the work piece, or other device (such as an unearthed cable or tool). Moisture, high humidity, confined spaces, and conductive locations (such as metal gratings, scaffolds) can increase the risk.

TABLE 2:
Risks – electrical risks

There may be risks that are not identified in this table. You must identify and assess health and safety risks arising from your own work and engage with workers and their representatives when identifying risks and choosing control measures.

5.2 PCBU responsibilities

You should ensure, so far as is reasonably practicable, the health and safety of workers who carry out electric welding at your work.

As a PCBU, you should ensure that:

- you provide safe working procedures for workers to follow when carrying out electrical welding
- workers have adequate knowledge or experience to safely carry out electric welding or are supervised by someone with the relevant knowledge and experience
- workers are adequately trained in the safe use of all plant, substances, and equipment they may be required to handle in their work, and in the risks associated with using electricity, as well as all PPE they are required to wear or use
- that any associated equipment and PPE is arranged, designed, made, tested, inspected, and maintained so that it is safe for workers to use. We recommend that you keep maintenance records
- immediately before the start of the work, workers check that the associated equipment and PPE is in good order and condition.

5.3 Electric shock and serious injuries

You must notify WorkSafe if an electric shock exposes a worker or any other person to a serious risk to their health and safety, or if someone is seriously injured.

To notify WorkSafe:

- **If someone has been killed, call 0800 030 040 immediately.**
- For all other notifications, use the WorkSafe tool

You must notify WorkSafe as soon as possible.

You must notify WorkSafe even if Emergency Services attend.

5.4 Eliminate the risk or implement control measures

Consider how you could eliminate electrical welding risks. If elimination is not reasonably practicable, you must minimise the risk, so far as is reasonably practicable. Use the hierarchy of control measures to choose the most effective control measures.

5.5 Suggested control measures

The control measures you choose, in consultation with workers, will depend on the specific risks of the work carried out. You could:

- put in place a programme of regular checks by a competent worker of the electrical welding equipment, PPE, associated safety equipment, and the electrical installation for electricity supply to the equipment
- put in place a maintenance programme which includes regular inspections and servicing by a competent person (such as the equipment manufacturer or supplier) of the electrical welding equipment, associated safety equipment, PPE, and the electrical installation for electricity supply
- make sure suitable safety equipment, including – but not limited to – residual current devices (RCDs) and hazard reduction devices, are used for work carried out in a damp, wholly conductive location (such as steel) or a confined space
- only purchase electrical welding equipment:
  - that has the rated voltage of 230V or 400V marked on the name plate
  - where the current rating of the plug is compatible with the rating marked on the welding machine
- arrange leads and cords so that people will not trip on them
- turn off all electrical welding equipment when it is not in use
- ensure that the installation of fixed electrical welding equipment is carried out in accordance with the manufacturer's instruction by a registered electrician.

5.6 Good practice for workers

Workers should:

- check that the electrical welding equipment is suited to the environment where it will be used. For example, whether it will be used indoors or outdoors, or in humid or damp conditions
- follow the procedures approved by the PCBU to carry out the work
- follow manufacturer's instructions when using electrical welding equipment
- only use electrical welding equipment with the rated voltage of 230V or 400V marked on the name plate of the equipment

- only use a plug with a rating compatible with the rating of the welding machine. The plug must be the original plug without any modification
- never use an adaptor plug (for example, a double adaptor or piggy-back plug)
- stop using the equipment immediately if they feel anything unusual such as tingling or hear the equipment making strange noises, or if they have other concerns about it. Workers should report concerns to a supervisor or manager
- only wear dry PPE. If protective clothing becomes damp or wet, workers should change into a fresh set
- avoid direct contact with the live parts of the welding equipment such as the welding electrode and the workpiece
- wear welding gloves on **both** hands when replacing the electrode. Workers should make sure the gloves are dry before wearing them
- turn off electrical welding equipment when not in use.

5.7 More information

Electric welding machines

Electrical safety on small construction sites

Energy isolation and locking out machinery

6.0 Hazardous substances and airborne contaminants

IN THIS SECTION:

The control measures for hazardous substances depend on the classification of a substance.

6.1 What could go wrong

A hazardous substance is any product or chemical with properties that are explosive, flammable, oxidising, toxic, corrosive or hazardous to the environment (eco-toxic). Hazardous substances when used in welding produce airborne contaminants, exposing workers to toxic fumes, gases and vapours. If this exposure is not adequately controlled, workers are at risk of death, or serious illness or injury.

RISKS	POSSIBLE CAUSES
Unconsciousness, brain injury and/or death	Lack of oxygen. Airborne contaminants building to a dangerous level in a confined space. Exposure to toxic fumes or vapours while welding and/or when using solvents or adhesives.
Fire, explosion	Gases, fumes or vapours coming into contact with an ignition source (such as welding or grinding sparks, or an open flame).
Lung cancer or other serious lung disease	Exposure to fumes, gases, dust or other substances.

TABLE 3:
Risks – hazardous substances and airborne contaminants

Your work may have risks to health and safety that are not identified in this table, which you will need to assess. You must engage with workers and their representatives when identifying hazards, assessing risks, and choosing control measures.

6.2 Eliminate the risk or implement control measures

Consider how you could eliminate the risks associated with hazardous substances. If elimination is not reasonably practicable, you must minimise the risk, so far as is reasonably practicable. Use the hierarchy of control measures to choose the most effective control measures.

You must take the following into account when managing the risks associated with hazardous substances:

- the quantity of hazardous substances used, stored, handled or manufactured
- health and physico-chemical hazards associated with the hazardous substance (for example, explosions, fire, toxicity, corrosiveness)

- potential chemical or physical reactions between the hazardous substance and another substance, including a substance that may be generated by the reaction
- ignition sources (for example, flame, heat, sparks) that might ignite the hazardous substance
- any structure, plant or system of work used in the use, handling, manufacture, or storage of the hazardous substance
- the nature of the work to be carried out by workers with the hazardous substance, including the workers' risks of exposure to the substance and the likely degree of exposure
- the prescribed exposure standard for the hazardous substance. For more information, see: worksafe.govt.nz
- the restricted entry interval for the substance if one has been set.

Control measures to manage the risks associated with substances that are hazardous to the environment are covered in the Hazardous Substances (Hazardous Property Controls) Notice 2017 (the HPC Notice)

6.3 Suggested control measures

You need to implement the control measures that apply for a substance's classification(s) to manage its risks. The control measures vary depending on the risk of the hazardous substance, its hazardous properties, how much of it there is and how it is used.

Some control measures, such as preparing an inventory or labelling, always apply no matter what hazardous substances you use and store. Other control measures, such as signage or certified handlers, apply only if you have specific hazardous substances over certain limits (thresholds).

For more information on control measures, see: Working safely with hazardous substances

6.4 Workers and hazardous substances

You must make sure workers:

- know there are hazardous substances in their work area
- know where information such as safety data sheets (SDS) or other reference material about the hazards, safe handling, and storage of hazardous substances is kept at the workplace
- are trained in:
  - the hazards associated with each substance
  - procedures for working safely with and around hazardous substances
  - what to do in an emergency involving hazardous substances.

6.5 Inventory

You must prepare, keep and maintain an inventory of all hazardous substances used, handled, manufactured or stored in your workplace. The hazardous substances calculator can help you create an inventory of the hazardous substances and a list of control measures for them.

6.6 Safety data sheets

A safety data sheet (SDS) contains comprehensive information about the properties of a hazardous substance, how these affect health and safety, the substance's classification, and control measures to put in place.

You must obtain a current SDS from your supplier for each hazardous substance at your work when:

- the substance is first supplied to you
- the substance is first supplied to you after the SDS is amended, and
- when the supply is the first supply of the substance to your workplace after five years.

Workers must be able to easily access a copy of the SDS – or a condensed version of the key information – at their work. Some workers carry out work in more than one location. You can keep the SDS at your principal place of business provided that these workers can immediately access the key information in an emergency, wherever they are working.

6.7 Reviewing your control measures

You must review your control measures for hazardous substances:

- after a significant change in an SDS or to the information about the hazardous substance in the inventory
- after a notifiable event involving the relevant hazardous substance, and
- at least once every five years.

Pickling paste

Pickling paste is a hazardous substance. It is primarily used to clean post-weld stainless steel. It can also be used on aluminium to create a bright polished surface. In the past, pickling paste has been used in a pickling bath, or by spraying, brushing or rolling on the surface of the object to be treated.

Pickling paste contains hydrofluoric acid and nitric acid. It is acutely toxic and corrosive. It can cause very deep burns to skin and eyes and if inhaled, can result in severe respiratory burns and lung damage.

A small amount absorbed through the skin can be fatal.

Calcium gluconate gel should be available to immediately treat hydrofluoric acid burns. First aiders should be trained in treating these burns.

Consider if you can use a less hazardous option – for example, mechanical (blasting, brushing, grinding) or chemical (electrochemical) cleaning, or a lower concentration or higher-viscosity paste.

If you use pickling paste, you should do a risk assessment which includes consulting the product's SDS.

Due to the potential for very serious health effects, the minimum PPE that should be worn when using pickling paste is:

- face/eye protection
- waterproof, acid-resistant, chemical protective clothing, and
- neoprene rubber gloves.

RPE is needed when spraying pickling paste onto an object, and potentially for tasks where large areas of pickling paste will be applied.

A good standard of general ventilation should be provided, with 5–10 air changes per hour with a thorough draught to dilute the acid fumes from the application of pickling paste. If you are applying pickling paste over a large area, consider using local exhaust ventilation.

6.8 More information

Approvals, hazard classifications and control measures

Hazardous substances toolbox and calculator

Managing your hazardous substances

Storing flammable substances

Training workers in the safe use of hazardous substances

Working safely with hazardous substances in the metal finishing industry

7.0 Fire and explosion

IN THIS SECTION:

Before welding, remove all traces of flammable or combustible substances from drums, vessels, tanks, pipes and other containers.

7.1 What could go wrong

RISKS	POSSIBLE CAUSES
Burns **Smoke inhalation** **Death**	Fire and smoke. Hot metal components, sparks and droplets of molten metal and slag can easily start a fire. Welding and cutting inside ships, buildings and other enclosed spaces is particularly dangerous as smoke from fires cannot escape and will quickly overcome people working nearby. Explosion. Acetylene is an extremely flammable gas, even in small amounts. Fires and explosions, many resulting in fatalities, have been caused by welding, cutting, brazing, soldering, and hot work around flammable materials or sources of ignition.

TABLE 4:
Risks – fire and explosion

Your work may have risks to health and safety that are not identified in this table, which you will need to assess. You must engage with workers and their representatives when identifying hazards, assessing risks, and choosing control measures.

7.2 Eliminate the risk or implement control measures

Consider how you could eliminate the risks from fire and explosion. If elimination is not reasonably practicable, you must minimise the risk, so far as is reasonably practicable. Use the hierarchy of controls to choose the most effective control measures.

7.3 Establishing a hazardous area for certain substances

Under the Hazardous Substances Regulations, a hazardous area is an area in which an explosive gas atmosphere is, or may be expected to be, present in such quantities as to require special precautions for the construction, installation and use of equipment.

The Hazardous Substances Regulations require you to establish a hazardous area within your workplace that complies with *AS/NZS 60079.10.1:2009: Explosive atmospheres. Classification of areas – explosive gas atmospheres* or a relevant safe work instrument, if applicable, when working with class 2.1.1A, 2.1.1B, 2.1.2A, 3.1A, 3.1B, or 3.1C substances.

7.4 Sources of ignition

Welding (and associated processes such as grinding) generates heat, flames and sparks, which are all sources of ignition. When combined with sources of fuel and oxygen, they present a significant risk of fire and explosion.

Common sources of fuel in workplaces that carry out welding include:

- flammable gases, such as acetylene, hydrogen, methane, natural gas, and LPG
- flammable liquids such as mineral turpentine and petrol, and
- materials such as wood, wood chaff/shavings, leaves, cardboard boxes and flammable metal or self-burning dusts.

Neighbouring properties may have containers of fuel and other flammable liquids, dried grass or leaves which can also present a hazard if ignited. Heat, sparks and drips of metal and slag can travel a considerable distance and start fires.

The risk of fire and explosion can be increased by exposure to an oxygen-rich atmosphere at the workplace. Fires in oxygen-rich atmospheres are very difficult to extinguish. When oxygen comes in contact with oil, grease, other hydrocarbons or oil-based substances, it can spontaneously ignite and result in a fire or explosion.

7.5 Welding on tanks and drums

If a welding torch is used on a tank or drum containing a flammable substance (solid, liquid or gas), the tank or drum may explode. Flammable substances include petrol, diesel, fuel oil, paint, solvents, glue, lacquer and cleaning agents.

Containers which have held petrol, white spirit or other flammable substances are highly dangerous to work on and a pinpoint of heat can be enough to cause an explosion or fire. Pipes or tanks which have held substances like linseed oil, soap, diesel oil, acids that react with metals to produce hydrogen, or combustible solids which may have left a residue of dust, are just as dangerous.

Before welding, remove all traces of flammable or combustible substances from drums, vessels, tanks, pipes and other containers.

7.6 Suggested control measures

- Consider other methods instead of hot work such as cold cutting or cold repair techniques.
- Before starting to weld, remove all traces of flammable substances from drums, vessels, tanks, pipes and other containers. The preferred method is to steam clean and then either fill with an inert gas such as carbon dioxide or nitrogen, or fill with water, leaving a very small vented space at the point where the repair is to be made. (Allow for the expansion of liquid in small-bore pipes.)
- Do not wash drums, vessels, tanks and pipes with cold or hot water or blow them with air.
- Cleaning drums, vessels, tanks and pipes with trichloroethylene should be done with care – it is toxic and decomposes when heated and may form phosgene gas.
- Replace a drum or tank rather than repair it.
- Isolate the welding process by using fire-resistant barriers to prevent sparks, flames and heat accidently reaching flammable liquids and combustible materials.
- Ensure work areas are well-ventilated to prevent the build-up of flammable vapours.
- Clear away potential sources of ignition such as wood, fabric, cardboard, dust, or rubbish before starting any hot work.

- Fit flashback arrestors at the blow pipe and regulator end of both the oxygen and fuel gas lines. See Figure 4.
- Drain and purge equipment, such as gas hoses, and lock the gas off at the valve immediately after use.
- Use a hot work permit that clearly states the control measures required to carry out the work safely.
- Nominate someone to act as a fire watcher. They should remain on watch for at least 30 minutes after the hot work finishes.
- Wear fire-resistant clothing such as a welding hood, welding spats or a welding jacket. Wear long welding gloves, not rigger's gloves.

Example: Control measures in practices

A shopping complex with several thousand shoppers and workers was the site of a recent project of Naylor Love's. To reduce the chances of a large fire occurring during trading hours and endangering people and property, the company carried out site welding during the night.

There were five full-time welders working each night with five independent spotters who had in-house training as fire watch, and two full-time supervisors.

Welding contractors used silica-based welding blankets instead of fibreglass or leather. They were more expensive but also more durable and resistant to sparks than blankets made from fiberglass or leather.

Flashback arrestors

Flashback occurs when flame moves from the welding nozzle into the blowpipe. At the same time, there is usually a loud bang or shrill hissing noise. Flashback happens too quickly for the gas to be turned off manually before damage or harm occurs.

If a flashback arrestor is not attached, the flame will travel about 13 metres a second up the gas supply hoses to the regulator and possibly into the gas cylinders, potentially causing them to explode.

Flashback arrestors should be fitted at the blow pipe and regulator end of both the oxygen and fuel gas lines in all oxy-fuel welding, cutting or heating work. Flashback arrestors should be inspected weekly, tested every year, and replaced every five years.

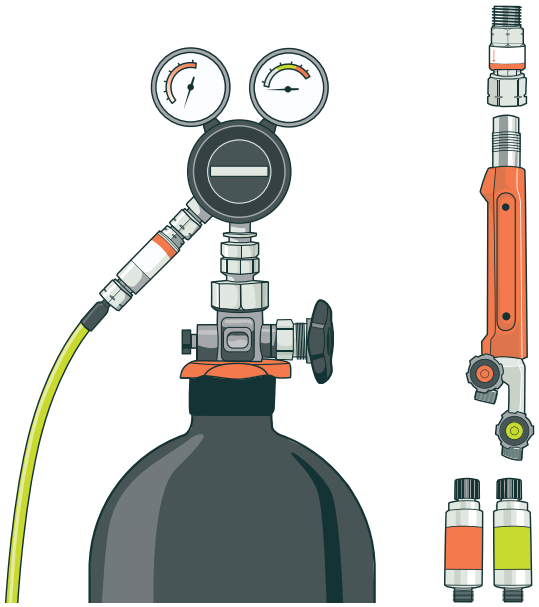


FIGURE 4: Flashback arrestors

7.7 More information

Flammable liquids and fire risk

Hot work permit form

Managing your hazardous substances

Storing flammable liquids

8.0
Welding gases

IN THIS SECTION:

Certain gases must be secured so that only workers who have permission can access the cylinders.

8.1 What could go wrong

RISKS	POSSIBLE CAUSES
Death	Incorrect handling of gases under pressure.
Serious injury or ill health	Uncontained fume and vapour.

TABLE 5:
Risks – welding gases

There may be risks that are not identified in this table. You must identify and assess health and safety risks arising from your own work and engage with workers and their representatives when identifying risks and choosing control measures.

8.2 Eliminate the risk or implement control measures

Consider how you could eliminate the risks from welding gases. If elimination is not reasonably practicable, you must minimise the risk, so far as is reasonably practicable. Use the hierarchy of control measures to choose the most effective level of control measures.

8.3 Types of gases

Gases used in welding and cutting processes include:

- shielding gases such as carbon dioxide, argon, helium
- fuel gases such as acetylene, propane, butane
- oxygen, used with fuel gases and also in small amounts in some shielding gas mixtures.

Gases produced from welding and cutting processes include:

- carbon dioxide from the decomposition of fluxes
- carbon monoxide from the breakdown of carbon dioxide shielding gas in arc welding
- ozone from the interaction of electric arc with atmospheric oxygen
- nitrogen oxides from the heating of atmospheric oxygen and nitrogen
- hydrogen chloride and phosgene produced by the reaction between ultraviolet light and the vapours from chlorinated hydrocarbon degreasing solvents (for example, trichloroethylene).

Gases are also produced from the thermal breakdown of coatings:

- polyurethane coatings can produce hydrogen cyanide, formaldehyde, carbon dioxide, carbon monoxide, oxides of nitrogen, and isocyanate vapours

- epoxy coatings can produce carbon dioxide and carbon monoxide
- vinyl paints can produce hydrogen chloride
- phosphate rust-inhibiting paints can release phosphine during welding processes.

Cylinders, including cryogenic containers and fire extinguishers (but not aerosol dispensers), must meet the requirements in 15.7(1) of the Hazardous Substances Regulations before being supplied or used in New Zealand.

8.4 Suggested control measures

Assess the risks of the welding gases used at your work. You will need to know the classification of each substance you use so that you can make sure you have the appropriate control measures in place and can manage risk in accordance with the Hazardous Substances Regulations. See the SDS for information about the classification of each substance, including gases that are mixtures.

8.5 Gases: general storage

Cylinders must be handled and stored safely so far as is reasonably practicable. Store your gas cylinders in a location that is:

- suitable for the type and quantity stored
- well-ventilated
- in the case of flammable gases, constructed of fire-resistant material
- in the case of flammable or oxidising gases, is suitably separated from potential ignition sources and has sufficient fire extinguishers available
- in the case of flammable or toxic gases, not a person's work area; the quantities stored must meet the required separation distances from protected and public places
- suitable for cylinders to be stored in an upright position wherever possible, unless they have been specifically designed for horizontal use
- designed to make sure incompatible substances are kept separate from each other.

If you have to carry a gas cylinder inside a vehicle, always close the main cylinder valve to prevent gas leaks.

You must have an emergency response plan and hazardous substance warning signage in place, where required by the Hazardous Substances Regulations in relation to the quantities stored.

Certain gases must be secured so that only workers who have permission can access the cylinders. The hazardous substances calculator can help you determine if you have substances which must be secured in this way.

You may need a location compliance certificate issued by a compliance certifier for the substances you have at your workplace. The hazardous substances calculator will help you determine if this is required.

It is also good practice for the cylinders to be protected from the weather.

8.6 More information

Guide to gas cylinders

Hazardous substances calculator

9.0
Personal protective equipment (PPE)

IN THIS SECTION:

PPE is generally considered the last resort when protecting workers from harm.

9.1 PPE for welding

PPE should be used if there is still risk remaining after all other reasonably practicable control measures have been put in place.

All PPE must meet basic PPE requirements for fit, function and performance. Workers must receive training on how to wear, use and store their PPE correctly.

PROCESS	HAZARD	PPE
Flame cutting	Radiation burns (heat)	– Goggles with appropriate filters[4] – Adequate clothing, gloves and footwear – Suitable head protection for overhead welding
Gas welding	Radiation burns	– Goggles with appropriate filters – Adequate clothing, gloves
Plasma cutting (power source)	– Radiation burns (heat) – Noise – Fume	– Full face protection shield with filters – Adequate clothing – Ear protection
Arc gouging/cutting	– Radiation burns – Electric shock – Noise – Fume	– Goggles with appropriate filters – Adequate clothing, gloves and footwear – Dry gloves, clothes and footwear – Ear protection
Arc welding (manual) – Additional protection from burns, hot or molten particles will be needed in overhead and some positional (for example, vertical up) welding	– Radiation burns – Electric shock – Fume	– Full face protection shield with filters – Adequate clothing, gloves and footwear – Dry gloves, clothes and footwear
Arc welding (mechanised) – Operator not adjacent to arc (for example, submerged arc, electroslag, electrogas, fully automatic Gas Metal Arc Welding (MIG/MAG)	– Radiation burns – Electric shock – Fume	– Goggles with appropriate filters – Adequate clothing – Dry clothing
Grinding	– Hard particles – Noise	– Eye protection (goggles with lens) – Adequate clothing – Ear protection
Chipping	– Hard particles (possibly hot) – Noise	– Eye protection (goggles with lens) – Adequate clothing – Ear protection

Table courtesy of Weld Australia's *Technical Note 7* (2020)

TABLE 6: PPE for welding

[4] See: Weld Australia, Technical Note 7 (2020), chapter 19

Appendices

IN THIS SECTION:

Appendix 1: Health and Safety at Work Act duties

The Health and Safety at Work Act 2015 (HSWA) is New Zealand's key work health and safety law.

All work and workplaces are covered by HSWA unless they have been specifically excluded. For example, HSWA does not apply to the armed forces in certain situations.

HSWA sets out the work health and safety duties that duty holders must comply with.

There are four types of duty holder under HSWA:

- a person conducting a business or understanding (PCBU)
- an officer
- a worker
- an 'other person' at the workplace.

Most duties under HSWA relate to **how** work is carried out. However some duties are linked to **where** work is carried out: the workplace.

> A **workplace** is a place where work is being carried out or usually carried out for a business or undertaking. It includes any place where a worker goes or is likely to be while at work section 20 of HSWA

DUTY HOLDER	WHO THEY ARE?	EXAMPLES	WHAT ARE THEIR DUTIES?	FOR MORE INFORMATION
Person Conducting a Business or Undertaking (PCBU)	A person conducting a business or undertaking (PCBU) may be an individual person or an organisation	– a business – a self-employed person – partners in a partnership – a government agency – a local council – a school or university.	A PCBU has many duties. Key duties are summarised below. **Primary duty of care** section 36 of HSWA A PCBU must ensure, so far as is reasonably practicable, the health and safety of workers, and that other persons are not put at risk by its work.	Introduction to the Health and Safety at Work Act 2015 Appendix 2 of this guidance for an explanation of 'so far as is reasonably practicable'
	The following **are not** PCBUs: – officers – workers – other persons at a workplace – volunteer associations that do not have employees – home occupiers (such as home owners or tenants) who pay someone to do work around the home section 17 of HSWA		**Managing risks** section 30 of HSWA Risks to health and safety arise from people being exposed to hazards (anything that can cause harm). A PCBU must manage work health and safety risks. – A PCBU must first try to **eliminate** a risk so far as is reasonably practicable. This can be done by removing the source of harm – for example, removing faulty equipment or a trip hazard. – If it is not reasonably practicable to eliminate the risk, it must be **minimised** so far as is reasonably practicable.	Identifying, assessing and managing work risks Section 2 of this guidance
			Overlapping duties: working with other PCBUs section 34 of HSWA A PCBU with overlapping duties must, so far as is reasonably practicable, consult, cooperate and coordinate activities with other PCBUs they share duties with.	Appendix 3 of this guidance

DUTY HOLDER	WHO THEY ARE?	EXAMPLES	WHAT ARE THEIR DUTIES?	FOR MORE INFORMATION
			Involving workers: worker engagement, participation and representation Part 3 of HSWA A PCBU must, so far as is reasonably practicable, engage with their workers (or their workers' representatives) about health and safety matters that will directly affect the workers. A PCBU must have worker participation practices that give their workers reasonable opportunities to participate in improving health and safety on an ongoing basis.	Section 1.4 of this guidance
Upstream PCBU	A PCBU in the supply chain	– a designer – a manufacturer – a supplier – an importer – an installer, constructor, or commissioner.	**Upstream PCBU** sections 39–43 of HSWA An upstream PCBU must ensure, so far as is reasonably practicable, that the work they do or the things they provide to other workplaces do not create health and safety risks.	Introduction to the Health and Safety at Work Act 2015
Officer	A specified person or a person who exercises significant influence over the management of the business or undertaking section 18 of HSWA	– a company director – a partner or general partner – a chief executive.	**Officer** section 44 of HSWA An officer must exercise due diligence that includes taking reasonable steps to ensure that the PCBU meets their health and safety duties.	Introduction to the Health and Safety at Work Act 2015
Worker	An individual who carries out work for a PCBU section 19 of HSWA	– an employee – a contractor or sub-contractor – an employee of a contractor or sub-contractor – an employee of a labour hire company – an outworker (including homeworker) – an apprentice or trainee – a person gaining work experience or on work trials – a volunteer worker.	**Worker** section 45 of HSWA A worker must take reasonable care of their own health and safety, and take reasonable care that they do not harm others at work. A worker must cooperate with reasonable policies and procedures the PCBU has in place that the worker has been told about. A worker must comply, as far as they are reasonably able, with any reasonable instruction given by the PCBU so the PCBU can meet their legal duties.	Introduction to the Health and Safety at Work Act 2015
Other person at the workplace	An individual present at a workplace (not a worker)	– a workplace visitor – a casual volunteer (not a volunteer worker) – a customer.	**Other person at the workplace** section 46 of HSWA An 'other person' has a duty to take reasonable care of their own health and safety, and not adversely affect the health and safety of anyone else. They must comply with reasonable instructions relating to health and safety at the workplace.	Introduction to the Health and Safety at Work Act 2015

Appendix 2: So far as is reasonably practicable

section 22 of HSWA

Certain PCBU duties (the section 36–43 duties including the primary duty of care) must be carried out 'so far as is reasonably practicable'.

What to consider when deciding what is 'reasonably practicable'

Just because something is possible to do, does not mean it is reasonably practicable in the circumstances.

Consider:

- What possible actions can be taken to ensure health and safety?
- Of these possible actions, at a particular time, what is reasonable to do?

Think about the following questions.

WHAT IS KNOWN ABOUT THE RISK?

- How likely is the risk to occur?
- How severe is the illness or injury that might occur if something goes wrong?
- What is known, or should reasonably be known, about the risk?

WHAT IS KNOWN ABOUT POSSIBLE CONTROL MEASURES?

- What is known, or should reasonably be known, about the ways (control measures) to eliminate or minimise the risk?
- What control measures are available?
- How appropriate (suitable) are the control measures to manage the risk?
- What are the costs of these control measures?
- Are the costs grossly disproportionate to the risk? Cost must only be used as a reason to not do something when that cost is grossly out of proportion to the risk.

Example

If workers are regularly exposed to harmful levels of airborne contaminants, having local exhaust ventilation in place to remove the airborne contaminants at their source (in addition to other control measures such respiratory protective equipment) is probably not grossly disproportionate.

While PCBUs should check if there are widely used control measures for that risk (such as industry standards), they should always keep their specific circumstances in mind. A common industry practice might not be the most effective or appropriate control measure to use.

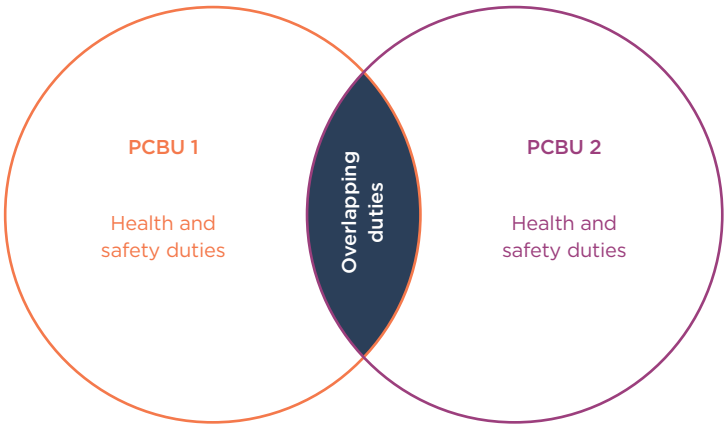
If PCBUs are not sure what control measures are appropriate, WorkSafe recommends getting advice from a suitably qualified and experienced health and safety professional.

For more information, see our guidance: Reasonably practicable

Appendix 3: Working with other PCBUs – overlapping duties

section 34 of HSWA

More than one PCBU can have a duty in relation to the same matter. These PCBUs have overlapping duties – this means that the duties are shared between them.



Duties regularly overlap:

- in a shared workplace (for example, a building site or a port) where more than one business has control and influence over the work on site.
- in a contracting chain, where contractors and subcontractors provide services to a head contractor or client and do not necessarily share the same workplace.

A PCBU must, so far as is reasonably practicable, consult, cooperate and coordinate activities with all other PCBUs they share duties with so that all PCBUs can meet their joint responsibilities.

A PCBU cannot transfer or contract out of their duties, or pass liability to another person.

However a PCBU can make an agreement with another PCBU to fulfil specific duties. Even if this occurs, all PCBUs are still responsible for meeting their legal duties.

Example

A local hotel contracts out housekeeping services to an agency. The hotel and agency both have a duty to ensure the health and safety of the housekeeping workers, so far as is reasonably practicable. This includes the duty to provide first aid facilities.

The agency reaches an agreement with the hotel – if their workers need first aid while working at the hotel they can use the hotel's first aid facilities.

For more information, see our guidance: Overlapping duties

Appendix 4: More information

WorkSafe guidance

Approvals, hazard classifications and control measures

Burns

Confined spaces

Electrical safety on small construction sites

Electric welding machines

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Energy isolation and locking out machinery

Eye protection

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The absolutely essential health and safety toolkit

Training workers in the safe use of hazardous substances

Trips, slips and falls

Vibration

Welding and local exhaust ventilation

Working safely at height

Working safely with hazardous substances in the metal finishing industry

Workplace exposure standards

Legislation

Health and Safety at Work Act 2015

Hazardous Substances and New Organisms Act 1996

Health and Safety in Employment Regulations 1995

Health and Safety at Work (General Risk and Workplace Management) Regulations 2016)

Health and Safety at Work (Hazardous Substances) Regulations 2017

Electricity (Safety) Regulations 2010

Hazardous Substances (Hazardous Property Controls) Notice 2017

Hazardous Substances (Disposal) Notice 2017

Weld Australia

Weld Australia Tech Note 7, 2020

Health monitoring professional associations

Australian and New Zealand Society of Occupational Medicine (ANZSOM)

New Zealand Occupational Health Nurses' Association (NZOHNA)

Exposure monitoring professional associations

Health and Safety Association of New Zealand (HASANZ)

New Zealand Occupational Hygiene Society

Standards

Standards that apply to welding include (but may not be limited to):

- *AS/NZS 1338.1 Filters for eye protectors*
- *AS/NZS 1337 and AS/NZS1337.1 Personal eye protection*
- *AS1674 Safety in Welding and Allied Processes*
- *AS/NZS 1716 Respiratory protective devices*
- *AS/NZS 3957 Light-transmitting screens and curtains for welding operations.*

Notes

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.

ISBN 978-1-98-856783-9 (online)

Published: July 2021

PO Box 165, Wellington 6140, New Zealand

worksafe.govt.nz

WSNZ_3851_JUL 2021

ISBN 978-1-98-856783-9 (online)

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