How to manage work health and safety risks

Code of Practice

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Workplace Health and Safety Queensland
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Contents

Foreword

This Code of Practice on how to manage work health and safety risks is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the Work Health and Safety Regulation 2011 (WHS Regulation).

Under section 26A of the WHS Act duty holders must comply with an approved code of practice or follow another method, such as a technical or industry standard, if it provides an equivalent or higher standard of work health and safety than the standard required in this code.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and WHS Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice. This may include issuing an improvement notice for failure to comply with a code of practice where equivalent or higher standards of work health and safety have not been demonstrated.

Scope and application

This code is intended to be read by a person conducting a business or undertaking (PCBU). It provides practical guidance to PCBUs on how to manage risks to health and safety. Other approved codes of practice should be referenced for guidance on managing the risk of specific hazards.

This code may be a useful reference for other persons interested in the duties under the WHS Act and the WHS Regulation.

This code applies to all types of work and all workplaces covered by the WHS Act.

How to use this Code of Practice

This code includes various references to the legal requirements under the WHS Act and the WHS Regulation. These are included for convenience only and should not be relied on in the place of the full text of the WHS Act or the WHS Regulation. The words ‘must’, ‘requires’ or ‘mandatory’ indicate a legal requirement exists that must be complied with.

The word ‘should’ is used in this code to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

1. Introduction

1.1. Who has duties for managing work health and safety risks?

Duty holders who have a role in managing work health and safety risks include:

- persons conducting a business or undertaking (PCBUs)
- officers
- designers, manufacturers, importers, suppliers and installers of plant, substances or structures.

Workers and other persons at the workplace also have duties under the WHS Act, such as the duty to take reasonable care for their own health and safety at the workplace.

A person can have more than one duty and more than one person can have the same duty at the same time.

Person conducting a business or undertaking (PCBU)

WHS Act section 19

Primary duty of care

A PCBU must eliminate risks in the workplace, or if that is not reasonably practicable, minimise the risks so far as is reasonably practicable.

The WHS Regulation includes more specific requirements for PCBUs to manage the risks of hazardous chemicals, airborne contaminants and plant, as well as other hazards associated with the workplace.

PCBUs have a duty to consult workers about work health and safety and may also have duties to consult, cooperate and coordinate with other duty holders.

Examples of where a PCBU will have a health and safety duty include when:

- the PCBU engages workers to carry out work
- the PCBU directs or influences workers in carrying out work
- other people may be put at risk from work carried in their business or undertaking
- the PCBU manages or controls a workplace or fixtures, fittings or plant at the workplace.

Officers

WHS Act section 27

Duty of officers

Officers, such as company directors, have a duty to exercise due diligence to ensure the PCBU complies with the WHS Act and the WHS Regulation. This includes taking reasonable steps to gain an understanding of the hazards and risks associated with the operations of the business or undertaking, and ensure the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks to health and safety.

Designers, manufacturers, importers and suppliers of plant, substances or structures

WHS Act Part 2 Division 3

Further duties of persons conducting businesses or undertakings

Designers, manufacturers, importers and suppliers of plant, substances or structures must ensure, so far as is reasonably practicable, the plant, substance or structure they design, manufacture, import or supply is without risks to health and safety. This duty includes carrying out testing and analysis as well as providing specific information about the plant, substance or structure.

The WHS Regulation includes a number of specific requirements for consultation and information sharing to assist in meeting these duties, for example:

- manufacturers to consult with designers of plant
- importers to consult with designers and manufacturers of plant
- the person who commissions construction work to consult with the designer of the structure.

Workers

WHS Act section 28

Duties of workers

Workers have a duty to take reasonable care for their own health and safety and to not adversely affect the health and safety of other persons. Workers must comply with reasonable instructions, so far as they are reasonably able, and cooperate with reasonable health and safety policies or procedures that have been notified to workers.

If personal protective equipment (PPE) is provided by the business or undertaking, the worker must so far as they are reasonably able, use or wear it in accordance with the information and instruction and training provided.

Other persons at the workplace

WHS Act section 29

Duties of other persons at the workplace

Other persons at the workplace, like visitors, must take reasonable care for their own health and safety and must take reasonable care not to adversely affect other people's health and safety. They must comply, so far as they are reasonably able, with reasonable instructions given by the PCBU to allow the PCBU to comply with the WHS Act.

1.2. What is involved in managing risks?

Management commitment

Effective risk management starts with a commitment to health and safety from those who operate and manage the business or undertaking. You also need the involvement and cooperation of your workers, supply chain partners, and other businesses you work with. Management commitment is about demonstrating you are serious about health and safety and influencing other duty holders in the workplace.

To demonstrate your commitment, you should:

- get involved in health and safety issues so that you understand the hazards and risk associated with your operations
- consult workers and other duty holders on the hazards and risk, and how to control them
- invest time and money in health and safety
- ensure you and your workers clearly understand health and safety responsibilities and have the knowledge and skill to do tasks safely
- apply health and safety values and behaviours to your own work practices.

A step-by-step process

A safe and healthy workplace does not happen by chance or guesswork. You have to think about what could go wrong at your workplace and what the consequences could be. Then you must do whatever you can (in other words, whatever is 'reasonably practicable') to eliminate or minimise health and safety risks arising from your business or undertaking.

This process is known as risk management and involves the four steps set out in this Code (see Figure 1 below):

- Identify hazards—find out what could cause harm.
- Assess risks, if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. This step may not be necessary if you are dealing with a known risk with known controls.
- Control risks – implement the most effective control measure that is reasonably practicable in the circumstances and ensure it remains effective over time.
- Review hazards and control measures to ensure they are working as planned.

This process will be implemented in different ways depending on the size and nature of your business or undertaking. Larger businesses and those in sectors where workers are exposed to more or higher risks are likely to need more complex, sophisticated risk management processes.

Examples demonstrating how to manage work health and safety risks in consultation with workers are at Appendix B.

Determining what is 'reasonably practicable'

Deciding what is 'reasonably practicable' to protect people from harm requires taking into account and weighing up all relevant matters, including:

- the likelihood of the hazard or risk concerned occurring
- the degree of harm that might result from the hazard or risk
- knowledge about the hazard or risk, and ways of eliminating or minimising the risk
- the availability and suitability of ways to eliminate or minimise the risk
- after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.

The process of managing risk described in this Code will help you decide what is reasonably practicable in particular situations so that you can meet your duty of care under the WHS laws.

Figure 1 The risk management process

Many hazards and their associated risks are well known and have well established and accepted control measures. In these situations, the second step to formally assess the risk is unnecessary. If, after identifying a hazard, you already know the risk and how to control it effectively, you can implement the controls without undertaking a risk assessment.

Risk management is a proactive process that helps you respond to change and facilitate continuous improvement in your business. It should be planned, systematic and cover all reasonably foreseeable hazards and associated risks.

Consulting workers

WHS Act section 47

Duty to consult workers

WHS Act section 48

Nature of consultation

A PCBU must consult, so far as is reasonably practicable, with workers who carry out work for the business or undertaking and who are (or are likely to be) directly affected by a health and safety matter.

This duty to consult is based on the recognition that worker input and participation improves decision-making about health and safety matters and assists in reducing work-related injuries and disease.

The broad definition of a ‘worker’ under the WHS Act means a PCBU must consult, so far as is reasonably practicable, with contractors and sub-contractors and their employees, on-hire workers, outworkers, apprentices, trainees, work experience students, volunteers

and other people who are working for the PCBU and who are, or are likely to be, directly affected by a health and safety matter.

Workers are entitled to take part in consultations and to be represented in consultations by a health and safety representative who has been elected to represent their work group.

Consultation with workers and their health and safety representatives is required at each step of the risk management process. By drawing on the experience, knowledge and ideas of your workers you are more likely to identify all hazards and choose effective control measures.

You should encourage your workers to report any hazards and health and safety problems immediately so that risks can be managed before an incident occurs.

If you have a health and safety committee, you should engage the committee in the risk management process as well.

Consulting, cooperating and coordinating activities with other duty holders

WHS Act section 46

Duty to consult with other duty holders

The WHS Act requires that a PCBU to consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

There is often more than one business or undertaking involved in the same activities or who share the same workplace who may each have responsibility for the same health and safety matters, either because they are involved in the same activities or share the same workplace.

In these situations, each duty holder should exchange information to find out who is doing what and work together in a cooperative and coordinated way so risks are eliminated or minimised so far as is reasonably practicable.

For example, if you engage labour hire workers as part of your workforce you share a duty of care to these workers with the business that provides them. In these situations, you must discuss the hazards and risks associated with the work and what precautions will be taken with the labour hire firm.

Never assume that someone else is taking care of a health and safety matter. Find out who is doing what and work together with other duty holders in a cooperative and coordinated way so risks are eliminated or minimised as far as reasonably practicable.

When entering into contracts you should communicate your safety requirements and policies, review the job to be undertaken, discuss any safety issues that may arise and how they will be dealt with. Remember that you cannot transfer your responsibilities to another person.

Further guidance on WHS consultation is available in the:
Work health and safety consultation, cooperation and coordination Code of Practice.

1.3. When should a risk management approach be used?

Managing work health and safety risks is an ongoing process that needs attention over time, but particularly when any changes affect your work activities. Examples of when you should work through the steps in this Code include:

- starting a new business
- expanding or purchasing an existing business
- changing work practices, procedures or the work environment
- changing organisational structure or job roles
- introducing new workers or returning workers to the workplace
- purchasing new or used equipment or using new substances
- working with a new supplier or new commissioner of your services
- planning to improve productivity or reduce costs
- new information about workplace risks becomes available
- responding to workplace incidents (even if they have caused no injury)
- responding to concerns raised by workers, health and safety representatives or others at the workplace, or
- required by the WHS Regulation for specific hazards.

It is also important to use the risk management approach when designing and planning products, processes or places used for work, because it is often easier and more effective to eliminate hazards before they are introduced into a workplace by incorporating safety features at the design stage.

The risk management process outlined in this Code should be applied to both physical and psychological risks.

2. Step 1—How to identify hazards

Identifying hazards in the workplace involves finding things and situations that could potentially cause harm to people. Hazards generally arise from the following aspects of work and their interaction:

- physical work environment
- equipment, materials and substances used
- work tasks and how they are performed
- work design and management.

Table 1 below lists some common types of workplace hazards. Some hazards are part of the work process, such as mechanical hazards, noise or toxic properties of substances. Other hazards result from equipment or machine failures and misuse, chemical spills and structural failures, or where work demands exceed a worker's ability to cope.

A piece of plant, substance or a work process may have many different hazards. Each of these hazards needs to be identified. For example, a production line may have dangerous moving parts, noise, hazards associated with manual tasks and psychosocial hazards due to the pace of work.

Table 1 Examples of common hazards

Hazard	Example	Potential harm
Manual tasks	Tasks involving sustained or awkward postures, high or sudden force, repetitive movements or vibration	Musculoskeletal disorders such as damage to joints, ligaments and muscles
Gravity	Falling objects, falls, slips and trips of people	Fractures, bruises, lacerations, dislocations, concussion, permanent injuries or death
Psychosocial	Excessive time pressure, bullying, violence and work-related fatigue	Psychological or physical injury or illness
Electricity	Exposure to live electrical wires	Shock, burns, damage to organs and nerves leading to permanent injuries or death
Machinery and equipment	Being hit by moving vehicles, or being caught in moving parts of machinery	Fractures, bruises, lacerations, dislocations, permanent injuries or death
Hazardous chemicals	Acids, hydrocarbons, heavy metals, asbestos and silica	Respiratory illnesses, cancers or dermatitis
Extreme temperatures	Heat and cold	Heat can cause burns and heat stroke or injuries due to fatigue Cold can cause hypothermia or frost bite
Noise	Exposure to loud noise	Permanent hearing damage

Hazard	Example	Potential harm
Radiation	Ultraviolet, welding arc flashes, micro waves and lasers	Burns, cancer or blindness
Biological	Micro-organisms	Hepatitis, legionnaires' disease, Q fever, HIV/AIDS or allergies

2.1. How to find hazards

Inspect the workplace

As a PCBU regularly walking around the workplace and observing how things are done can help you predict what could or might go wrong. Look at how people actually work, how plant and equipment are used, what chemicals are around and what they are used for, what safe or unsafe work practices exist as well as the general state of housekeeping.

Things to look out for include the following:

- Does the work environment enable workers to carry out work without risks to health and safety (for example, space for unobstructed movement, adequate ventilation, lighting)?
- How is work performed, including the physical, mental and emotional demands of the tasks and activities?
- How suitable are the tools and equipment for the task and how well are they maintained?
- How do workers, managers, supervisors and others interact and how are inappropriate behaviours or conflicts dealt with?
- Have any changes occurred in the workplace which may affect health and safety?

Hazards are not always obvious. Some hazards can affect health over a long period of time or may result in stress (such as bullying) or fatigue (such as shiftwork). Also think about hazards that you may bring into your workplace with new, used or hired goods (for example, worn insulation on a hired welding set).

As you walk around, you may spot straightforward problems and action should be taken on these immediately, for example cleaning up a spill. If you find a situation where there is immediate or significant danger to people, move those persons to a safer location first and attend to the hazard urgently. Follow up on why the situation occurred to identify additional hazards and risks.

Make a list of the hazards you find, including the ones you know are already being dealt with, to ensure that nothing is missed. This list can be kept and updated next time you do an inspection. You may use a checklist designed to suit your workplace to help you find and make a note of hazards.

Good work design and safe design

The best chance to find ways to eliminate hazards and minimise risks is during the design phase.

Effective design of 'good work' considers the work tasks, work systems, the physical working environment, and the workers and others in the workplace.

Safe design of buildings, structures, equipment and vehicles accounts for the hazards and risks present at all stages of the product's lifecycle. For more information on safe design principles and how to achieve safe design, see the Safe design of structures Code of Practice.

Consult your workers

Ask your workers about any health and safety problems they have encountered in doing their work and any near misses or incidents that have not been reported.

Worker surveys may also be undertaken to obtain information about matters such as workplace bullying, as well as muscular aches and pains that can signal potential hazards.

Consult your supply chains and networks

Talk with your suppliers or those commissioning your services to understand each other's needs and identify any hazards and risks. For example, hazards may relate to frequent pressure to deliver services in very tight timeframes or to delay service delivery for long periods which reduce workers' opportunities to rest. Other hazards may relate to packaging products in ways that increase workers' risks of musculoskeletal injury or exposure to hazardous chemicals.

When people within a supply chain act cooperatively they can exert greater influence on health and safety than when acting alone.

Review available information

Information and advice about hazards and risks relevant to particular industries and types of work is available from regulators, industry associations, unions, technical specialists and safety consultants.

Manufacturers and suppliers can also provide information about hazards and safety precautions for specific substances (safety data sheets), plant or processes (instruction manuals).

Analyse your records of health monitoring, workplace incidents, near misses, worker complaints, sick leave and the results of any inspections and investigations to identify hazards. If someone has been harmed doing a particular task, then a hazard exists that could hurt someone else. These incidents need to be investigated to find the hazard that caused the injury or illness.

3. Step 2—How to assess risks

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of it happening. A risk assessment can help you, as a PCBU, to determine:

- how severe a risk is
- whether any existing control measures are effective
- what action you should take to control the risk
- how urgently the action needs to be taken.

Many hazards and their associated risks are well known and have well established and accepted control measures. In these situations, the second step to formally assess the risk is not required. If after identifying a hazard you already know the risk and how to control it effectively, you may simply implement the controls.

A risk assessment can be undertaken with varying degrees of detail depending on the type of hazard and the information, data and resources that you have available. It can be as simple as a discussion with your workers or involve specific risk analysis tools and techniques developed for specific risks or recommended by safety professionals. For some complex situations, expert or specialist advice may be useful when conducting a risk assessment.

3.1. When should a risk assessment be carried out?

A risk assessment should be done when:

- there is uncertainty about how a hazard may result in injury or illness
- the work activity involves a number of different hazards and there is a lack of understanding about how the hazards may interact with each other to produce new or greater risks, or
- changes at the workplace occur that may impact on the effectiveness of control measures.

In some circumstances, a risk assessment will assist to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing the risk
- identify if and what kind of control measures should be implemented
- check the effectiveness of existing control measures.

A risk assessment is mandatory under the WHS Regulation for certain activities that are high risk such as, but not limited to, entry into confined spaces, diving work and live electrical work.

Some hazards that have exposure standards, such as noise and airborne contaminants, may require scientific testing or measurement by a competent person to accurately assess the risk and to check that the relevant exposure standard is not being exceeded (for example, by using noise meters to measure noise levels and using gas detectors to analyse oxygen levels in confined spaces).

A risk assessment is not required when legislation requires a hazard or risk to be controlled in a specific way—these requirements must be complied with.

A detailed risk assessment may not be required in the following situations:

- A code of practice or other guidance sets out a way of controlling a hazard or risk that is applicable to your situation.
- There are well-known and effective controls that are in use in the particular industry that are suited to the circumstances in your workplace.

In these situations, you may be able to simply implement these control measures.

A risk assessment may be appropriate to reuse in situations where all the hazards, tasks, things, workers or circumstances are the same and no worker or other person will be exposed to greater, additional or different risks. However, as stated above, if there are any changes at the workplace, a new risk assessment should be performed.

3.2. How to do a risk assessment

Hazards have the potential to cause different types and severities of harm ranging from minor discomfort to a serious injury or death.

For example, heavy liquefied petroleum gas (LPG) cylinders can cause muscular strain when they are handled manually. However, if the cylinder is damaged causing gas to leak, which is then ignited, a fire could result in serious burns. If that leak occurs in a storeroom or similar enclosed space, it could result in an explosion that could destroy the building and kill or injure anyone nearby. Each of the outcomes involves a different type of harm with a range of severities, and each has a different likelihood of occurrence.

The risk will increase as the severity and likelihood of harm increases.

Work out how hazards may cause harm

In most cases, incidents occur as a result of a chain of events and a failure of one or more links in that chain. If one or more of the events can be stopped or changed, the risk may be eliminated or reduced.

One way of working out the chain of events is to determine the starting point where things begin to go wrong and then consider: 'If this happens, what may happen next?' This will provide a list of events that sooner or later cause harm. See the example in Appendix C.

In thinking about how each hazard may cause harm, you should consider:

- the effectiveness of existing control measures and whether they control all types of harm
- how work is actually done, rather than relying on written manuals and procedures
- infrequent or abnormal situations, as well as how things are normally meant to occur.

Consider how harm could be caused during maintenance and cleaning, as well as breakdowns of equipment and failures of health and safety controls.

Work out how severe the harm could be

To estimate the severity of harm that could result from each hazard you should consider the following questions:

- What type of harm could occur (for example muscular strain, injuries due to fatigue, psychological injury, burns, laceration)? How severe is the harm? Could the hazard cause death, serious injuries, illness or only minor injuries requiring first aid?
- What factors could influence the severity of harm that occurs? For example, the distance someone might fall or the concentration of a particular substance will determine the level of harm that is possible. The harm may occur immediately if something goes wrong (for example injury from a fall) or it may take time for it to become apparent (for example illness from long-term exposure to a substance or to excessive work demands).
- Do you need to use specific tools or processes to assess how severe the harm could be? This could include sending samples to a lab for testing or arranging noise exposure level testing.
- How many people are exposed to the hazard and how many could be harmed in and outside your workplace? For example, a mobile crane collapse on a busy construction site has the potential to kill or injure a large number of people.
- Could one failure lead to other failures? For example, could the failure of your electrical supply make any control measures that rely on electricity ineffective?

- Could a small event escalate to a much larger event with more serious consequences? For example, a minor fire can get out of control quickly in the presence of large amounts of combustible materials.

Work out the likelihood of harm occurring

The likelihood that someone will be harmed can be estimated by considering the following:

- How often is the task done? Does this make the harm more or less likely?
- How often are people near the hazard? How close do people get to it?
- Has it ever happened before, either in your workplace or somewhere else? How often?

Table 2 contains further questions that can help you estimate likelihood.

You can rate the likelihood as one of the following:

- Certain to occur—expected to occur in most circumstances.
- Very likely—will probably occur in most circumstances.
- Possible—might occur occasionally.
- Unlikely—could happen at some time.
- Rare—may happen only in exceptional circumstances.

Table 2 Questions to help estimate likelihood of harm occurring

Questions	Explanation and examples
How often are people exposed to the hazard?	A hazard may exist all of the time or it may only exist occasionally. The more often a hazard is present, the greater the likelihood it will result in harm. For example: • Meshing gears in an enclosed gearbox can cause crushing only if the gearbox is open during maintenance, and therefore the potential for harm will not occur very often. • Continuously lifting heavy boxes has the potential to cause harm whenever the work is done.
How long might people be exposed to the hazard?	The longer that someone is exposed to a hazard, the greater the likelihood that harm may result. For example: • The longer a person is exposed to noisy work, the more likely it is that they will suffer hearing loss.
How effective are current controls in reducing risk?	In most cases the risks being assessed will already be subject to some control measures. The likelihood of harm resulting from the risk will depend upon how adequate and effective the current measures are. For example: • Traffic management controls have been implemented in a warehouse to separate moving forklifts from pedestrians by using signs and painted lines on the floor. These controls may need to be upgraded to include physical barriers.
Could any changes in your organisation increase the likelihood?	The demand for goods or services in many organisations varies throughout the year. Changes in demand may be seasonal, depend on environmental conditions or be affected by market fluctuations that

	are driven by a range of events. Meeting increased demand may cause unusual loads on people, plant and equipment and systems of work. Failures may be more likely. For example: • Inner city restaurants and bistros are very busy in the period prior to Christmas, placing extra demands on kitchen and serving staff. The increase in volume of food to be prepared and serving a larger number of patrons increases the potential for human error and the likelihood of harm.
Are hazards more likely to cause harm because of the working environment?	Examples of situations where the risk of injury or illness may become more likely: • Environmental conditions change. For example, work performed in high temperatures in a small space increases the potential for mistakes because workers become fatigued more quickly; wet conditions make walkways and other things slippery. • People are required to work quickly. The rate at which work is done (for example, number of repetitions) can over-stress a person's body or make it more likely that mistakes will be made. • There is insufficient light or poor ventilation.
Could the way people act and behave affect the likelihood of a hazard causing harm?	The possibility that people may make mistakes, misuse items, become distracted or panic in particular situations needs to be taken into account. The effects of fatigue or stress may make it more likely that harm will occur.
Do the differences between individuals in the workplace make it more likely for harm to occur?	Workers are not all the same and individual variability should be considered, for example: • People respond to stress at work in different ways, which means some workers are more susceptible to harm. • People with disabilities may be more likely to suffer harm if the workplace or process is not designed for their needs. • New or young workers may be more likely to suffer harm because of inexperience. • People who do not normally work at the workplace will have less knowledge than employees who normally work there and may be more likely to suffer harm. These people include contractors, visitors or members of the public.

4. Step 3—How to control risks

The most important step in managing risks involves eliminating them so far as is reasonably practicable, or if that is not reasonably practicable, minimising the risks so far as is reasonably practicable.

In deciding how to control risks, as a PCBU, you must consult your workers and their representatives who will be directly affected by this decision. Their experience will help you choose appropriate control measures and their involvement will increase the level of acceptance of any changes that may be needed to the way they do their job.

There are many ways to control risks. Some control measures are more effective than others.

You must consider various control options and choose the control that most effectively eliminates the hazard or minimises the risk in the circumstances. This may involve a single control measure or a combination of different controls that together provide the highest level of protection that is reasonably practicable.

Some problems can be fixed easily and should be done straight away, while others will need more effort and planning to resolve. Of those requiring more effort, you should prioritise areas for action, focusing first on those hazards with the highest level of risk.

4.1. The hierarchy of control measures

The ways of controlling risks are ranked from the highest level of protection and reliability to the lowest as shown in Figure 2. This ranking is known as the hierarchy of control measures.

The hierarchy of control measures can be applied in relation to any risk. The WHS Regulation makes it mandatory for duty holders to work through this hierarchy when managing certain risks.

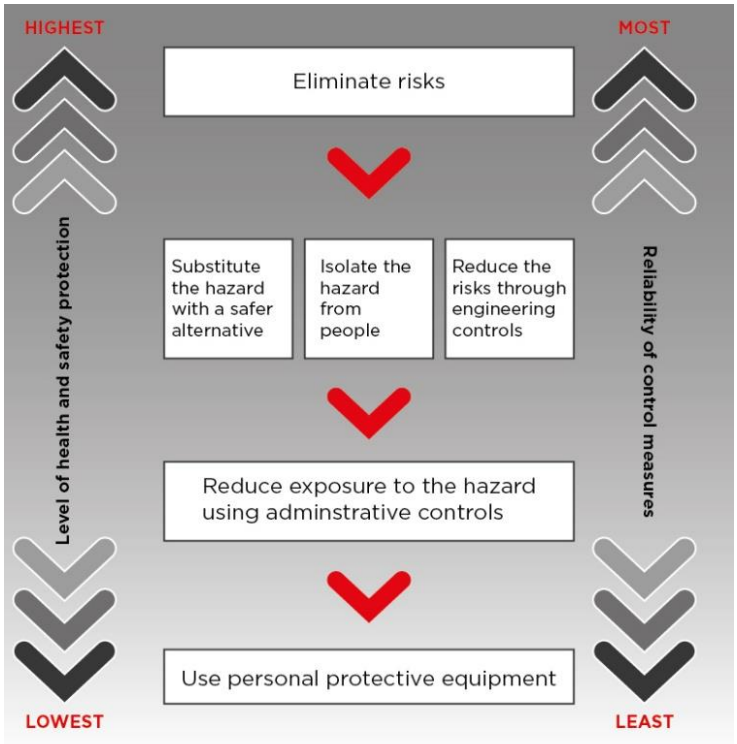

Figure 2 The hierarchy of control measures

You must always aim to eliminate the risk, which is the most effective control. If this is not reasonably practicable, you must minimise the risk by working through the other alternatives in the hierarchy.

The lower levels in the hierarchy are less effective because controls that change the hazard or minimise exposure to the hazard can only minimise the risk. You cannot eliminate the risk without eliminating the hazard.

Administrative controls and PPE are the least effective at minimising risk because they do not control the hazard at the source and rely on human behaviour and supervision. These control measures should only be used:

- to supplement higher level control measures (as a back-up)
- as a short-term interim measure until a more effective way of controlling the risk can be used, or
- when there are no other practical control measures available (as a last resort).

Elimination

The most effective control measure involves eliminating the hazard and associated risk. The best way to do this is by, firstly, not introducing the hazard into the workplace. For example, you can eliminate the risk of a fall from height by doing the work at ground level.

Eliminating hazards is often cheaper and more practical to achieve at the design or planning stage of a product, process or place used for work. In these early phases, there is greater scope to design out hazards or incorporate risk control measures that are compatible with the original design and functional requirements. For example, not using a noisy machine will be more effective than providing workers with personal hearing protectors.

You can also eliminate risks by removing an existing hazard, for example, by removing trip hazards on the floor, disposing of unwanted chemicals, or not working in an isolated or remote area.

It may not be reasonably practicable to eliminate a hazard if doing so means that you cannot make the end product or deliver the service. If you cannot eliminate the hazard, then you must minimise as many of the risks associated with the hazard as reasonably practicable.

Substitution, isolation and engineering controls

If it is not reasonably practicable to eliminate the hazards and associated risks, you must minimise the risks using one or more of the following approaches, so far as is reasonably practicable.

Substitute the hazard with something safer

For instance, replace solvent-based paints with water-based ones or allow workers to have more control of line speed instead of pacing line work by computer.

Isolate the hazard from people

This involves physically separating the source of harm from people by distance or using barriers. For instance, install guardrails around exposed edges and holes in floors; use remote control systems to operate machinery; store chemicals in a fume cabinet; place barriers between workers and customers where there is a risk of assault.

Use engineering controls

An engineering control is a control measure that is physical in nature, including a mechanical device or process. For instance, use mechanical devices such as trolleys or hoists to move heavy loads; place guards around moving parts of machinery; install residual current devices (electrical safety switches); set work rates on a production line to reduce fatigue; install sound dampening measures to reduce exposure to unpleasant or hazardous noise.

Administrative controls

If risks remain, they must be minimised by implementing administrative controls so far as is reasonably practicable. Administrative controls include work methods or procedures that are designed to minimise exposure to a hazard as well as the information, training and instruction needed to ensure workers can work safely.

For instance, develop procedures on how to operate machinery safely; provide training and support to managers and workers to identify and manage health and safety risks; implement anti-bullying policies; limit exposure time to a hazardous task; and/or use signs to warn people of a hazard.

Some administrative measures will be necessary to ensure substitution, isolation and engineering controls are implemented effectively, for example, following safe work procedures when using equipment.

See section 4.2 below for information on implementing control measures.

Personal protective equipment (PPE)

Any remaining risks must be minimised with suitable PPE.

Examples of PPE include ear muffs, respirators, face masks, hard hats, gloves, aprons and protective eyewear. PPE limits exposure to the harmful effects of a hazard but only if workers wear and use the PPE correctly.

WHS Regulation section 44

Provision to workers and use of personal protective equipment

If PPE is to be used at the workplace, you must ensure the equipment is:

- Selected to minimise risk to health and safety, including by ensuring that the equipment is suitable for the nature of the work and any hazard associated with the work and is of suitable size and fit and reasonably comfortable for the worker who is to use or wear it.
- Maintained, repaired and replaced so that is continues to minimise risk to the worker who uses it, including by ensuring that the equipment is clean and hygienic, and in good working order.

If you direct the carrying out of work, you must provide the worker with information, training and instruction in the proper use and wearing of PPE, and the storage and maintenance of PPE.

A worker must, so far as reasonably able, use or wear the PPE in accordance with any information, training or reasonable instruction and must not intentionally misuse or damage the equipment.

4.2. How to develop and implement control options

Information about suitable controls for many common hazards and risks can be obtained from:

- codes of practice and guidance material
- manufacturers and suppliers of plant, substances and equipment used in your workplace, or
- industry associations and unions.

In some cases, published information will provide guidance on the whole work process. In other cases, the guidance may relate to individual items of plant or how to safely use specific substances. You may use the recommended control options if they suit your situation and eliminate or minimise the risk.

Developing specific control measures

You may need to develop specific control measures if the available information is not relevant to the hazards and risks or circumstances at your workplace. This can be done by referring to the chain of events that were recorded during the risk assessment.

For each of the events in the sequence, ask: 'What can be done to stop or change the event occurring?' An example of this approach is shown in Appendix C.

Working through the events in the sequence will give you ideas about possible ways to eliminate or minimise the risk. There may be more than one solution for each of the events. The control option you choose should be:

- one or more controls that provide the highest level of protection for people and is the most reliable—that is, controls located towards the top of the hierarchy in Figure 2
- available—that is, it can be purchased, made to suit or be put in place
- suitable for the circumstance in your workplace—that is, it will work properly given the workplace conditions, work process and your workers.

Where the hazard or risk has the potential to cause death, serious injury or illness, more emphasis should be given to those controls that eliminate or reduce the level of harm, than those that reduce the likelihood of harm occurring.

Make sure that your chosen solution does not introduce new hazards. If this is not possible, any new hazards or risks introduced will also need to be managed.

You may prepare a risk register that identifies the hazards, what action needs to be taken, who will be responsible for taking the action and by when. An example is provided at Appendix D.

Cost of control measures

All risks can be controlled and it is always possible to do something, such as stopping the activity or providing instructions to those exposed to the risk. There will normally be a number of different options between these two extremes. Cost (in terms of time and effort as well as money) is just one factor to consider when determining the best control option.

The cost of controlling risk may be taken into account in determining what is reasonably practicable but cannot be used as a reason for doing nothing.

The greater the likelihood of harm occurring or the greater the extent of that harm, the less weight should be given to the cost of controlling the hazard or risk.

If two control measures provide the same level of protection and are equally reliable, you can adopt the less expensive option.

Cost cannot be used as a reason for adopting controls that rely exclusively on changing people's behaviour or actions when there are more effective controls available that can change the risk through substitution, engineering or isolation.

Implementing controls

The control measures you put into operation will usually require changes to the way work is carried out, for example, working with new or modified equipment or processes, new or different chemicals or new PPE. In these situations, it is necessary to support the control measures with the following:

Work procedures

Develop a safe work procedure that describes the task, identifies the hazards and documents how the task is to be performed to minimise the risks.

Training, instruction and information

Train your workers in the work procedure to ensure that they are able to perform the task safely. Training must cover the nature of the work, the associated risks and the control measures to be implemented.

Training should require workers to demonstrate that they are competent in performing the task according to the procedure. It is insufficient to simply give a worker the procedure and ask them to acknowledge that they understand and are able to perform it. Training, instruction and information must be provided in a form that can be understood by all workers.

Information and instruction may also need to be provided to others who enter the workplace, such as customers or visitors.

Supervision

The level of supervision required will depend on the level of risk and the experience of the workers involved. High levels of supervision are necessary where inexperienced workers are expected to follow new procedures or carry out difficult and critical tasks.

Maintenance

Control measures need regular monitoring and maintenance to ensure they remain effective. You should decide what is required when you implement the control and establish a schedule for routine checks and maintenance appropriate to the controls.

You may prepare a risk register identifying the hazards, what action needs to be taken, who will be responsible for taking the action and by when. An example is provided at Appendix D.

4.3. How to ensure controls remain effective

An important part of controlling risk is ensuring that your chosen control measures are maintained after their initial implementation. The following actions may help you monitor the control measures you have implemented and ensure that they remain effective.

Accountability for health and safety

Managers and supervisors should be provided with the authority and resources to implement and maintain control measures effectively. Accountability should be clearly allocated to ensure procedures are followed and maintained.

Maintenance of plant and equipment

This will involve scheduling and performing regular inspection and testing, repair or replacement of damaged or worn plant and equipment. It includes checking that any control measures are suitable for the nature and duration of work, are set up and used correctly.

Further information on maintaining plant and equipment is available in the Managing the risks of plant in the workplace Code of Practice.

Up-to-date training and competency

Most control measures depend on workers and supervisors having the appropriate competencies to do the job safely. Training must be provided to maintain competencies and to ensure new workers are capable of working safely.

Up-to-date hazard information

Information about hazards, such as plant and substances, may be updated by manufacturers and suppliers and should be checked to make sure controls are still relevant. New technology may provide more effective solutions than were previously available. Changes to operating conditions or the way activities are carried out may also mean that control measures need to be updated.

Regular review and consultation

Control measures are more effective where there is regular review of work procedures and consultation with your workers and their representatives.

If maintenance processes reveal new hazards, or existing hazards that are not being addressed, you will need to perform a review of your control measures.

5. Step 4—How to review controls

The control measures you, as a PCBU, put in place should be reviewed regularly to make sure they work as planned. Don't wait until something goes wrong.

The WHS Regulation requires a risk management process for specific risks. That process includes circumstances where you must review your control measures for those risks and, if necessary, change them. A review is required:

- when the control measure is not effective in controlling the risk
- before a change at the workplace that is likely to give rise to a new or different health and safety risk that the control measure may not effectively control
- if a new hazard or risk is identified
- if the results of consultation indicate that a review is necessary, or
- if a health and safety representative requests a review.

In any case, as part of your ongoing duties as a PCBU, you should regularly review your control measures, including in the above circumstances. Managing work health and safety risks is an ongoing process that needs attention over time, but particularly when any changes affect your work activities.

You may use the same methods as in the initial hazard identification step (Chapter 2—How to identify hazards) to check controls. Consult your workers and their health and safety representatives and consider the following questions:

- Are the control measures working effectively in both their design and operation?
- Have the control measures introduced new problems?
- Have all hazards been identified?
- Have new work methods, new equipment or chemicals made the job safer?
- Are safety procedures being followed?
- Have the instruction and training provided to workers on how to work safely been successful?
- Are workers actively involved in identifying hazards and possible control measures? Are they openly raising health and safety concerns and reporting problems promptly?
- Are the frequency and severity of health and safety incidents reducing over time?
- If new legislation or new information becomes available, does it indicate current controls may no longer be the most effective?

If problems are found, go back through the risk management steps (Chapter 4—How to control risks), review your information and make further decisions about risk control. Priority for review should be based on the level of risk. Control measures for high risks should be reviewed more frequently.

If you design, manufacture or supply products used for work, quality assurance processes may be used to check the product effectively minimises health and safety risks. Obtain feedback from users of the product to determine whether any improvements can be made to make it safer.

6. Keeping records

Keeping records of the risk management process demonstrates what you have done to comply with the WHS Act and the WHS Regulation. It also helps when undertaking subsequent risk management activities, including reviewing your control measures.

Keeping records of the risk management process has the following benefits. It:

- allows you to demonstrate how decisions about controlling risks were made
- assists in targeting training at key hazards
- provides a basis for preparing safe work procedures
- allows you to more easily review risks following any changes to legislation or business activities
- demonstrates to others (regulators, investors, shareholders, customers) that work health and safety risks are being managed.

The detail and extent of recording will depend on the size of your workplace and the potential for major work health and safety issues. It is useful to keep information on:

- the identified hazards, assessed risks and chosen control measures (including any hazard checklists, worksheets and assessment tools used in working through the risk management process)
- how and when the control measures were implemented, monitored and reviewed
- who you consulted with
- relevant training records
- any plans for changes.

There are specific record-keeping requirements in the WHS Regulation for some hazards, such as hazardous chemicals, plant and equipment. If such hazards have been identified at your workplace, you must keep the relevant records for the time specified.

You should ensure that everyone in your workplace is aware of record-keeping requirements, including which records are accessible and where they are kept.

Appendix A—Glossary

Term	Description
Control measure	An action taken to eliminate or minimise health and safety risks so far as is reasonably practicable. A hierarchy of control measures is set out in the WHS Regulation to assist duty holders to select the highest control measures reasonably practicable. Note: The WHS Regulation also refers to a control measure as a risk control measure or a risk control. In this Code, control measure is used throughout.
Duty holder	Any person who owes a work health and safety duty under the WHS Act including a person conducting a business or undertaking, a designer, manufacturer, importer, supplier, installer of products or plant used at work (upstream duty holder), officer or a worker.
Hazard	A situation or thing that has the potential to harm a person. Hazards at work may include noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace.
Health	Health includes both physical and psychological health.
Health and safety committee	A consultative body established under the WHS Act. The committee's functions include facilitating cooperation between workers and the person conducting a business or undertaking to ensure workers' health and safety at work, and assisting to develop work health and safety standards, rules and procedures for the workplace.
Health and safety representative	A worker who has been elected by their work group under the WHS Act to represent them on health and safety matters.
Managing risk	This is a process set out in the WHS Regulation to eliminate health and safety risks so far as is reasonably practicable, or if this is not reasonably practicable, minimise the risks so far as is reasonably practicable. It includes identifying hazards, assessing and implementing control measures, and reviewing and maintaining the control measures to ensure their ongoing effectiveness.
May	'May' indicates an optional course of action.
Must	'Must' indicates a legal requirement exists that must be complied with.
Officer	An officer under the WHS Act includes: • an officer under section 9 of the *Corporations Act 2001* (Cth) • an officer of the Crown within the meaning of section 247 of the WHS Act, and • an officer of a public authority within the meaning of section 252 of the WHS Act.

Term	Description
	A partner in a partnership or an elected member of a local authority is not an officer while acting in that capacity.
Person conducting a business or undertaking (PCBU)	A PCBU is an umbrella concept which intends to capture all types of working arrangements or relationships. A PCBU includes a: • company • unincorporated body or association • sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A volunteer association (defined under the WHS Act, see below) or elected members of a local authority will not be a PCBU.
Risk	The possibility harm (death, injury or illness) might occur when exposed to a hazard.
Should	'Should' indicates a recommended course of action.
Volunteer association	A group of volunteers working together for one or more community purposes where none of the volunteers, whether alone or jointly with any other volunteers, employs any person to carry out work for the volunteer association.
Work group	A group of workers established to facilitate the representation of workers by one or more health and safety representatives. A work group may be all workers at a workplace but it may also be appropriate to split a workplace into multiple work groups where workers share similar work conditions or are exposed to similar risks and hazards. For example all workers on night shift.
Worker	Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer.
Workplace	Any place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water.

Appendix B—Examples of the risk management process

Example 1

Two years ago, the Burbs Municipal Council implemented a number of written health and safety procedures used to train workers how to carry out particular tasks safely. As these procedures had not been reviewed since their implementation, the Safety Manager implemented a new approach to not only review these procedures but also promote health and safety more widely across the organisation by encouraging staff involvement and cooperation.

To do this, the Safety Manager established and facilitated safety workshops each Friday for an hour where a team would review a particular task and its procedures to identify hazards, assess risks and consider options to control these. The team included management, council workers, the respective health and safety representative and any contractors engaged to carry out the work.

The Safety Manager's approach was to facilitate the workshops but then hand this role over to the relevant team supervisor, who would then facilitate future meetings to review other tasks conducted by the workers. The written health and safety procedures were not used in the workshops as the Safety Manager wanted to learn more about the hazards, risks and controls from the workers without prompting. However, any changes discussed and agreed during the meeting would be included in the revised written safety procedures.

The first safety workshop was conducted in the Parks and Gardens Branch and involved management, workers, their health and safety representatives and a representative from the maintenance shop that supplied the Parks and Gardens Branch with a variety of vehicles and equipment. The task is outlined in Table 3.

Table 3 Example 1: Safety workshop—20 August 2010

	Safety workshop—20 August 2017
Team	Parks and Gardens Branch
Task being reviewed	Cleaning of the toilets in the council's parks
Description of task	Undertaken each Monday morning by two workers in a council truck who would clean the eight toilet blocks across the municipality
What does the task involve?	At the depot: • load the truck with the compressor and pressure hose along with cleaning chemicals and materials. At the park: • open toilet block • clean toilets • unload compressor and pressure hose, place them in toilet block and attach to tap, turn on compressor and hose walls and floors, • put compressor and pressure hose along with cleaning gear back on truck • dry out toilet block floor by sweeping • leave park and go to next one.

In order to gather advice and information from the team, the Safety Manager asked questions and shared the responses by writing them on a whiteboard or butchers paper, as shown in Table 4.

Table 4 Example 1: Questions asked by the Safety Manager and responses

	What hazards are encountered when doing the task?	What risks do these pose to health and safety?	How are these risks currently controlled?
Plant	• Truck • Compressor and pressure hose	• Truck—faulty truck could cause accident and cause injuries to workers and others • Compressor and pressure hose—faulty fuel line in compressor could cause burns and injuries through fire or explosion	• Truck and compressor have maintenance schedule • Checklist for visual inspection for plant before it leaves depot • Reporting and tagging system for defective plant
Manual handling	• Loading and unloading the compressor • Carrying the compressor to and from the toilet block • Sweeping water to dry the floor	• Heavy load, awkward, sustained postures and repetitive actions can cause sprains, strains, back injuries or fractures and cuts if dropped on foot	• Compressor has handles fitted to assist in lifting and carrying • Two persons required to lift and carry compressor • Only workers who have been trained able to lift and carry compressor • Floor sweeping roster
Chemical	• Cleaning agents used to clean toilets and basins	• Skin irritation, rashes and illness caused by exposure to chemicals and their vapours in confined space	• Only non-toxic cleaning agents used • Gloves provided to avoid skin contact
Infection at work	• Communicable disease • Non-communicable infection	• Contracting an infectious disease such as hepatitis • Contracting a bacterial infection	• Universal precautions plus specific protection for the route of exposure
Noise	• Operating the compressor in a closed space with hard surfaces	• Hearing loss from prolonged exposure to the noise levels generated by the compressor	• Hearing protection provided for wearing when hosing out the toilet block

Slips, trips and falls	• Wet floor when hosing out the toilet block	• Fractures or strains caused by slipping on wet surface	• Safety boots provided with slip-resistant soles

Many staff present at the workshop indicated it was a waste of time as everything discussed was covered by the health and safety procedure, which they knew backwards. The Safety Manager acknowledged this concern but then asked the team whether the way the task was being conducted could be changed to improve health and safety.

One staff member raised concerns about lugging the compressor around 16 times every Monday morning and that doing this tempted them to call in sick. The Safety Manager was curious about this and asked why it was necessary to take the compressor off the truck and place it in the toilet. The workers explained that the length of the hose on the pressure spray was short and could only be operated with the compressor in the toilet block.

After hearing this, the representative from the maintenance shop who supplied the compressor mentioned that they could attach a 10-metre hose to the compressor, which would mean the compressor would not have to be taken off the truck. The team agreed this was a good idea and would eliminate the manual handling risks associated with lifting and carrying the compressor. The Safety Manager asked what other impacts this would have. The team agreed this would also reduce the noise as the compressor would now be outside the toilet block, but that there could be new risks associated with handling and storing a 10-metre long hose. The team agreed to trial the new hose. It was then installed with a hose handling system.

Following the workshop, the Safety Manager asked the supervisor to ensure the modifications were made within two weeks and to revise the procedures and have them checked by the health and safety representative and workers.

Example 2

Jane Smith had been working at the local grocery store for the last 12 months. She had recently taken on a new role as the bakery supervisor and was eager to review the work activities and safety procedures. In preparing for the review, Jane considered how she would conduct the review and who she should speak with.

As a first step, Jane identified the different activities and tasks that were carried out by the workers. These included:

- preparing a number of different products such as bread, cakes, slices and doughnuts
- cleaning items used in product preparation
- general housekeeping.

The next step was to analyse what was involved in each activity. Jane spent three mornings that week with the four bakers who worked in the bakery department. She talked to them about the work activities and what they thought could be changed to improve the safety of the workplace. One of the bakers had been working in the store for over 10 years, while another had been working for over 25 years. The other two bakers were apprentices and had only been working with the store for around six months.

From these discussions, Jane identified a number of key tasks the bakers carried out every day when preparing the baked products:

- moving the ingredients from their storage locations to the area of use
- mixing the ingredients together using specialised mixers
- transferring the mixture to the container for baking
- putting them in the oven and removing them from the oven
- slicing and decorating
- packaging the products.

During an inspection of the bakery, Jane and the bakers identified a number of hazards, including:

- the doughnut mixer was not guarded and the mixing bowl could be accessed when the machine was operating
- the concrete floors were slippery in the mixing room and flour was spilt where the bakers walked
- low lighting in the food preparation area
- there was narrow access and restricted movement in the storage area where the flour bags were kept.

Jane and the bakers discussed the risks associated with each of the hazards and what could be done to control these risks. In relation to the unguarded mixer, one of the bakers suggested purchasing or hiring a new model with an interlocking guard. After considering the ideas of the bakers, Jane completed the risk register shown in Table 5.

Table 5 Example 2: risk register

	Risk register: XYZ Grocery Store Pty Ltd
Work area	Bakery department
Form completed by	Jane Smith (Bakery supervisor)
Date form completed	05/11/2017

	Risk register: XYZ Grocery Store Pty Ltd
Hazard identification	Doughnut mixer not guarded and mixing bowl can be accessed when machine is operating.
Risk assessment	**What is the harm the hazard could cause**: The person operating the mixer could be entangled in and injured by the moving parts if their hand slipped in while the machine was operating. Harm could include cuts or crush injuries such as broken bones, potentially resulting in amputation or fatality. **What is the likelihood of this happening**: This machine is used several times a day. Two of the workers have not been working in the bakery for a long time and are not very experienced in using the equipment. **Persons at risk**: The four bakers who operate the machine. **Existing control measure**: Staff follow policy and operating instructions to use the mixer safely—not very effective because it relies on staff keeping hands away from the dangerous parts. **Consequence**: Serious injuries **Likelihood**: Very likely **Outcome**: High risk—the mixer must not be used again until the risk has been controlled.
Control measures	
Possible control options	**Elimination**—Eliminating the use of the mixer completely will mean the business cannot continue to sell baked products as the dough cannot be mixed. Business revenue will suffer. **Substitution**—Use of the mixer could be substituted by hand-mixing the dough. One day's production will be lost in the changeover. This method can only be considered an interim option as it is not sustainable for more than a day or two with present staff. However, part-time staff could be hired to mix the dough. Business income would be reduced and impact on revenue. Alternatively, the mixer could be replaced by purchasing a new, safer machine with a built-in guard. **Engineering**—The mixer could be modified by adding an interlocking guard. A mixer could be hired for the period the old mixer is in for repairs. One day's production will be lost in this option. The modifications are estimated to cost $1600. Other costs included are one day lost in production, plus hire of substitute machine for approximately 10 days and transport. Estimated cost is less than $6000. **Administrative or PPE**—Staff told to keep hands away from the mixing bowl while it is in use. Only the more experienced bakers are to operate the mixer.
Preferred control option	Purchase a new mixer, which would not cost much more than having the old one modified. Control measures have been planned to manage the health and safety risks of mixing by hand while waiting for replacement mixer to arrive. The costs involved are outweighed by worker safety and this option eliminates the risk of injury.
Implementation	

	Risk register: XYZ Grocery Store Pty Ltd
Associated activities	New mixer to be purchased. Mixing to be done by hand while waiting for new mixer. May require staff working more hours **Resources required**: Less than $6000 **Person(s) responsible**: Jane Smith—Bakery supervisor **Sign off and date**: J Smith 9/11/17
Associated activities	• Develop new work procedures • Provide training to bakers on using the new machine **Resources required**: 3 hours **Person(s) responsible**: Jane Smith—Bakery supervisor **Sign off and date**: J Smith 20/12/17

Jane repeated these steps for each hazard that she identified. The review of the work activities and the implemented control measures improved the safety in the bakery department at the grocery store.

Review	
Scheduled review date	31 January 2020
Are the control measures in place?	Yes—the new machine has an interlocking guard and bakers have been provided with training on how to use the machine in accordance with the manufacturer's instructions.
Are the controls eliminating or minimising the risk?	Yes—the interlocking guard prevents people from putting their hand in the mixing bowl.
Are there any new problems with the risk?	No.

Example 3

Kim Lee is the manager of a busy restaurant that serves meals and coffees from 7.00am to 10.00pm. The owners recently began using an external online ordering and delivery service. This service allows the business to focus on preparing meals without having to manage the delivery process, as the service arranges for a delivery person to pick up and deliver the order.

At the weekly staff meeting, one cook raised concerns about several tense exchanges between serving staff and the delivery service personnel, which has led to increased pressure on kitchen staff when fulfilling online orders. Kim is concerned these conflicts could impact the health and safety of staff and the quality of service they are providing to their customers. The popularity of the online ordering means these conflicts could occur multiple times a day. Kim talked with the kitchen staff and serving staff about what could be done to improve their safety and work organisation.

Together Kim and the staff identified that the delivery persons were usually upset when the order was not ready for pick-up when they arrived. One of the waiters noted the deliverers often appeared to be under considerable pressure to deliver on time. The kitchen staff noted they prepare orders as they are received, which can delay online orders if made during periods where high numbers of orders are received in a short time.

After considering this discussion, Kim consulted the restaurant's Workplace Behaviour Policy and decided to discuss the safety issues with the online delivery service and with individual deliverers to work with them to identify ways to eliminate or minimise the conflict. But Kim decided, in advance of any solution they might propose, to implement immediately some of the control measures discussed at the staff meeting to deal with the time pressures. Kim wrote down the summary shown in Table 6 for the owners.

Table 6 Example 3: WHS risk assessment report for owners

	Example 3 Busy Restaurant Pty Ltd—WHS Risk Assessment as at 18 February 2018
Hazards identified	1. Conflict between restaurant staff and online order deliverers. 2. Time pressures caused by popularity of online orders.
Risk assessment	
What is the harm the hazard could cause?	Conflict could escalate to harassment and unreasonable behaviour including violence, which can cause physical and psychological injury. Long-term exposure increases risk of anxiety and depression. More frequent exposure can also increase severity of harm. Increased time pressure can lead to rushing and fatigue, causing burns, cuts, slips and trips within the restaurant.
What is the likelihood of this happening?	Very likely. This conflict could happen multiple times a day because online orders are taken every day from 7.30am to 9.30pm. Orders are more likely to be delayed during very busy periods where time pressure is increased, between 11.30am and 2.00pm, 6.00 and 9.00pm.
Who is at risk?	• All of our staff who prepare or serve meals. • External delivery personnel.

	Example 3 Busy Restaurant Pty Ltd—WHS Risk Assessment as at 18 February 2018
What existing control measures are being applied?	Staff are effectively applying their training and the Workplace Behaviour Policy to address the conflicts. Staff have appropriately reported the repeated tense exchanges. The next step under the policy is for management to contact and work cooperatively with the online delivery service and with individual deliverers to resolve issues. Existing controls are not adequately addressing the increased time pressures. These controls include preparing as much as possible in advance, such as sauces and par-cooked vegetables, and reducing repetitive actions by using suitable kitchen equipment such as food processors. Further controls are needed to address time pressures associated with the online orders.
What are the consequences?	Serious psychological and physical harm to our staff and delivery personnel.
Initial assessment	High risk—immediate action is required to reduce the risk.
Control measures	
What additional controls could be implemented to eliminate or minimise the risk?	**Elimination**—Stop offering online order and delivery services. This would eliminate the hazards but also remove an income stream. **Substitution**—Use only in-house delivery person. Would require managing delivery process and additional delivery staff. Other controls would still be required, as this would only substitute the line of control, not the inherent risks. This may also increase the time pressure on staff dealing with the online orders. **Substitution**—Reduce the menu items available for delivery. At the moment the whole menu is available online. Records show that less than half of all food items have been ordered online. Staff could focus their preparation better if there were fewer items available for delivery. Substituting the menu would not significantly affect delivery sales. **Engineering**—Improve ordering system so that it automatically rearranges orders so the kitchen staff prepare online orders in time for pick-up, ahead of less urgent orders. One day of accepting online orders will be lost with this option while the changes are engineered. The modifications are estimated to cost approximately $200. All kitchen staff will need to be trained in the new order preparation procedure. **Administrative**—Increase expected delivery timeframes from 20 to 30 minutes on the ordering website so staff have more time to prepare orders for delivery. This administrative change may cause a minor reduction to order numbers but will better manage customer expectations.
Preferred controls	The benefits of reducing risks associated with the conflict and time pressure are far greater than the cost of implementing the following preferred controls: • Immediately consult with online delivery service to improve understanding of our respective needs and to identify solutions for the restaurant and for the delivery personnel. • At the same time, reduce the online menu and increase the expected delivery timeframes on ordering website to 30 minutes.

	Example 3 Busy Restaurant Pty Ltd—WHS Risk Assessment as at 18 February 2018
	• Implement changes to the order system within one month. • To support these changes, the manager and staff will be provided with information and training on the new menu and delivery timeframes, the changes to the order system, and the outcomes of consulting with the online delivery service and individual deliverers.
Maintenance	Use existing weekly meeting to plan and communicate when agreed changes will happen, and to get staff feedback on new safety measures.

Appendix C—Assessing how things can go wrong

It may be helpful to think through work processes or situations to identify what could go wrong. Note any hazards, risks and control measures identified as you go.

Once completed, you should consider the hazards and risks you identified and implement control measures in line with the hierarchy of control measures in order to eliminate or minimise the risks, so far as is reasonably practicable.

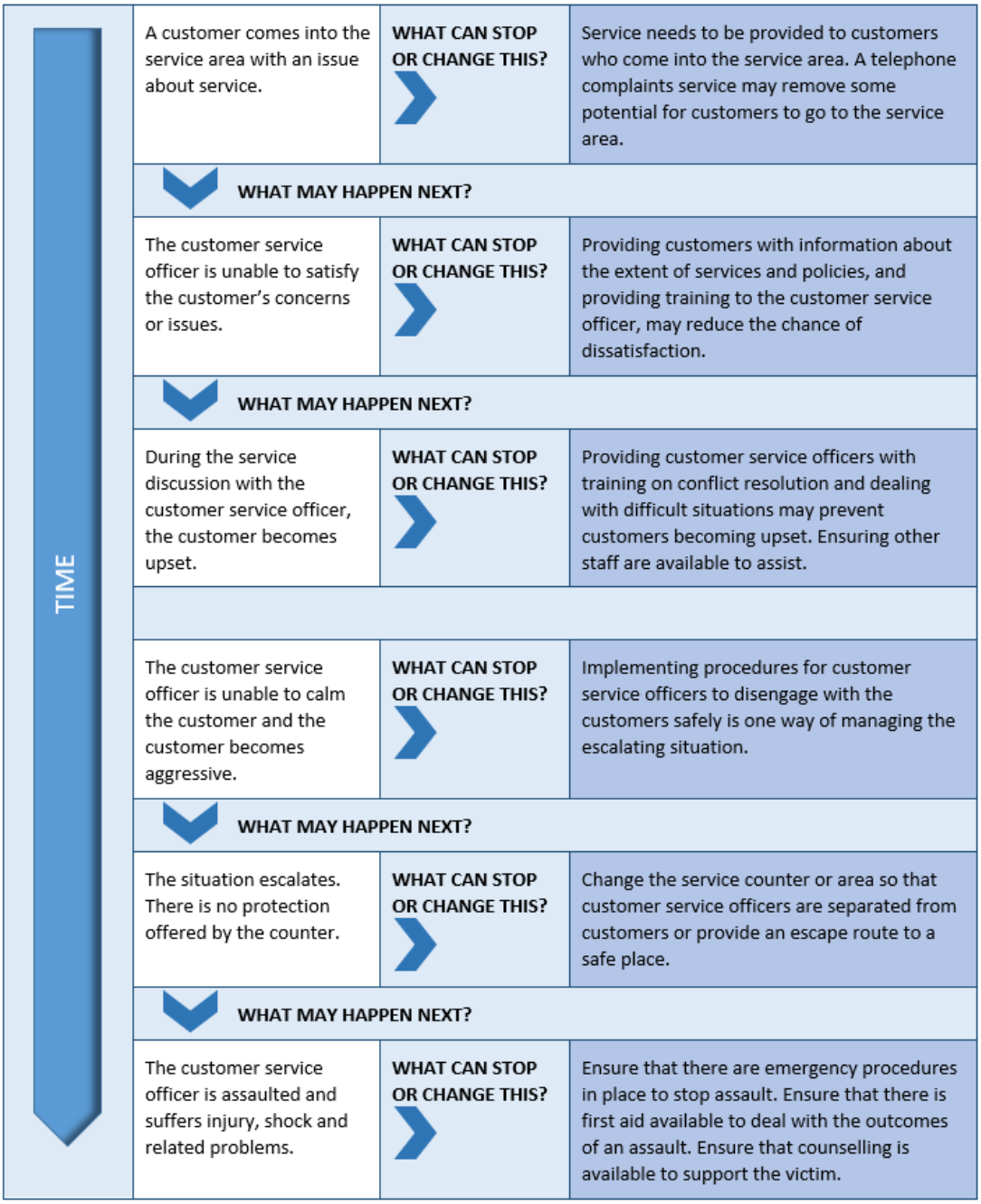

Figure 3 Assessing how things can go wrong

Appendix D—Risk register

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Hazard	What is the harm that the hazard could cause?	What is the likelihood that the harm would occur?	What is the level of risk?	How effective are the current controls?	What further controls are required?	Actioned by	Date due	Date complete	Maintenance and review
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Managing the risk of falls at workplaces

Code of Practice

2021

Workplace Health and Safety Queensland
worksafe.qld.gov.au

Queensland Government

PN12648

Contents

Foreword

This Code of Practice on how to manage the risk of falls at workplaces is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the Work Health and Safety Regulation 2011 (the WHS Regulation).

Under section 26A of the WHS Act duty holders must comply with an approved code of practice or follow another method, such as a technical or industry standard, if it provides an equivalent or higher standard of work health and safety than the standard required in this code.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and WHS Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice. This may include issuing an improvement notice for failure to comply with a code of practice where equivalent or higher standards of work health and safety have not been demonstrated.

Scope and application

This code is intended to be read by a person conducting a business or undertaking (PCBU). It provides practical guidance for PCBUs, including those persons who design, construct, import, supply or install plant or structures, on how to eliminate, or if that is not possible, minimise the risk of falls from height in workplaces.

This code applies to all types of work and all workplaces covered by the WHS Act and the WHS Regulation where there is a risk of a fall by a person from one level to another that is reasonably likely to cause injury.

This code may be a useful reference for other persons interested in the duties under the WHS Act and the WHS Regulation.

How to use this Code of Practice

This code includes references to the legal requirements under the WHS Act and the WHS Regulation. These are included for convenience only and should not be relied on in place of the full text of the WHS Act or the WHS Regulation. The words ‘must’, ‘requires’ or ‘mandatory’ indicate a legal requirement exists that must be complied with.

The word ‘should’ is used in this code to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

1. Introduction

Falls are a major cause of death and serious injury in Australian workplaces. Fall hazards are found in many workplaces where work is carried out at height, for example stacking shelves in warehouses and retail outlets, working on a roof, unloading a large truck or accessing silos. Falls can also occur at ground level into holes, for example trenches or service pits.

1.1. Who has health and safety duties in relation to falls?

There are a number of duty holders who have a role in managing the risk of falls in the workplace. These include:

- persons conducting a business or undertaking (PCBUs)
- designers, manufacturers, importers, suppliers and installers of plant, substances or structures
- officers.

Workers and other persons at the workplace also have duties under the WHS Act, such as the duty to take reasonable care for their own health and safety at the workplace.

A person can have more than one duty and more than one person can have the same duty at the same time.

Early consultation and identification of risks can allow for more options to eliminate risks and reduce the associated costs.

Person conducting a business or undertaking

WHS Act section 19

Primary duty of care

A PCBU must eliminate the risk of falls in the workplace, or if that is not reasonably practicable, minimise those risks so far as is reasonably practicable.

A PCBU has more specific obligations under the WHS Regulation to manage the risk of a fall by a person from one level to another, including requirements to:

- ensure, so far as is reasonably practicable, that any work involving the risk of a fall by a person from one level to another is carried out on the ground or on a solid construction
- provide safe means of access to and exit from the workplace and an area from which a person could fall, such as a platform or scaffolding
- if it is not reasonably practicable to eliminate the risk of a fall, minimise the risk of falls so far as is reasonably practicable by providing adequate protection against the risk, including by providing a fall prevention device if it reasonably practicable to do so, or if not, a work positioning system if it is reasonably practicable to do so, or if not, a fall arrest system.

A combination of the controls that are reasonably practicable to provide adequate protection against the risk may be used if a single control is not sufficient for the purpose.

The WHS Regulation classifies a number of activities as ‘high risk construction work’ for which a Safe Work Method Statement (SWMS) must be prepared before the work starts. High risk construction work includes work that involves a risk of a person falling more than 2 metres.

PCBUs have a duty to consult workers about work health and safety and may also have duties to consult, cooperate and coordinate with other duty holders.

Designers, manufacturers, importers and suppliers of plant, substances or structures

WHS Act Part 2 Division 3

Further duties of persons conducting businesses or undertakings

Designers, manufacturers, importers, suppliers and installers of plant, substances or structures that are to be used or could reasonably be expected to be used for work must ensure, so far as is reasonably practicable, that the plant or structure is without risks to health and safety.

This duty includes carrying out testing and analysis as well as providing specific information about the plant or structure.

To assist in meeting these duties, the WHS Regulation requires:

- manufacturers to consult with designers of plant
- importers to consult with designers and manufacturers of plant, and the person who commissions construction work to consult with the designer of the structure.

Designers of plant or structures have an important role in eliminating and minimising the risk of falls in the design stage—see Chapter 2.

Officers

WHS Act section 27

Duty of officers

Officers, such as company directors, have a duty to exercise due diligence to ensure that the PCBU complies with the WHS Act and the WHS Regulation. This includes taking reasonable steps to:

- gain an understanding of the hazards and risks associated with the operations of the business or undertaking
- ensure the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks of falls from one level to another that are likely to cause injury.

Workers

WHS Act section 28

Duties of workers

Workers have a duty to take reasonable care for their own health and safety and to not adversely affect the health and safety of other persons. Workers must comply with reasonable instructions, as far as they are reasonably able, and cooperate with reasonable health and safety policies or procedures that have been notified to workers. If personal protective equipment (PPE) is provided by the business or undertaking, the worker must so far as they are reasonably able, use or wear it in accordance with the information and instruction and training provided.

Other persons at the workplace

WHS Act section 29

Duties of other persons at the workplace

Other persons at the workplace, like visitors, must take reasonable care for their own health and safety and must take care not to adversely affect other people's health and safety. They must comply, so far as they are reasonably able, with reasonable instructions given by the PCBU to allow that person to comply with the WHS Act.

1.2. What is involved in managing the risk of falls?

WHS Regulation section 34

Duty to identify hazards

WHS Regulation section 35

Managing risks to health and safety

WHS Regulation section 36

Hierarchy of control measures

WHS Regulation section 37

Maintenance of control measures

WHS Regulation section 38

Review of control measures

This code provides guidance on how to manage the risks of falls in the workplace using the following systematic process:

- identify hazards—find out what could cause harm
- assess risks, if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. This step may not be necessary if you are dealing with a known risk with known controls
- eliminate risks so far as is reasonable practicable
- control risks—if it is not reasonably practicable to eliminate the risk, implement the most effective control measures that are reasonably practicable in the circumstances in accordance with the hierarchy of control measures, and ensure they remain effective over time
- review control measures to ensure they are working as planned

Further guidance on the risk management process is available in the How to manage work health and safety risks Code of Practice.

Guidance on the preparation of a SWMS is available in the Safe work method statement for high risk construction work – Information sheet.

Consulting workers

Consultation involves sharing information, giving workers a reasonable opportunity to express views and taking those views into account before making decisions on health and safety matters.

WHS Act section 47

Duty to consult workers

A PCBU must consult, so far as is reasonably practicable, with workers who carry out work for the business or undertaking and who are (or are likely to be) directly affected by a health and safety matter.

This duty to consult is based on the recognition that worker input and participation improves decision-making about health and safety matters and assists in reducing work-related injuries and disease.

The broad definition of a 'worker' under the WHS Act means a PCBU must consult, so far as is reasonably practicable, with employees, contractors and subcontractors and their employees, on-hire workers, outworkers, apprentices, trainees, work experience students, volunteers and other people who are working for the PCBU and who are, or are likely to be, directly affected by a health and safety matter.

Workers are entitled to take part in consultations and to be represented in consultations by a health and safety representative who has been elected to represent their work group.

By drawing on the experience, knowledge and ideas of workers, fall hazards are more likely to be identified and effective control measures implemented.

Consulting, cooperating and coordinating activities with other duty holders

WHS Act section 46

Duty to consult with other duty holders

The WHS Act requires a PCBU to consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

There is often more than one business or undertaking at a workplace, which may each have responsibility for the same health and safety matters, either because they are involved in the same activities or share the same workplace.

In these situations, each duty holder should exchange information to find out who is doing what and work together in a cooperative and coordinated way so risks are eliminated or minimised so far as is reasonably practicable.

For example, the owner of a transport company with large trucks should consult the goods suppliers as well as the businesses having the goods delivered about how the risk of falls will be controlled during loading and unloading. This may include checking whether equipment is available at each site so that workers do not have to climb on top of loads on the truck and be at risk of falling.

Further information is available in the Work health and safety consultation, cooperation and coordination Code of Practice.

1.3. Information, training, instruction and supervision

WHS Act section 19

Primary duty of care

WHS Regulation section 39

Provision of information, training and instruction

The WHS Act requires PCBUs to ensure, so far as is reasonably practicable, the provision of any information, instruction, training or supervision necessary to protect all persons from risks to their health and safety arising from work carried out as part of the conduct of that business or undertaking.

The PCBU must ensure that information, training or instruction provided to a worker is suitable and adequate having regard to:

- the nature of the work carried out by the worker
- the nature of the risks associated with the work at the time of the information, training and instruction
- the control measures implemented.

The PCBU must also ensure, so far as is reasonably practicable, that the information, training and instruction are provided in a way that is readily understandable for the person to whom it is provided.

Workers must be trained and have the appropriate skills to carry out a particular task safely. Training should be provided to workers by a competent person.

Information, training, instruction provided to workers exposed to potential falls from working at any height should include:

- the proper use, wearing, storage and maintenance of PPE
- the hazards and risks associated with work performed at these heights
- how to follow health and safety procedures associated with this work, including the contents of any SWMS
- the reasons fall protection measures have been put in place and how to use them properly.

Those supervising the work should also receive training. The amount and type of information, training and instruction required will depend on the nature of the work and the risk involved, as well as the type of fall protection measures used.

The information, training and instruction provided to workers should also include:

- procedures for emergency and rescue
- procedures for reporting fall hazards and incidents
- the correct selection, fitting, use, care, inspection, maintenance and storage of fall arrest and restraint equipment, if this equipment is to be used
- the correct use of tools and equipment used in the work, for example using a tool belt instead of carrying tools
- control measures for other potential hazards, for example electrical hazards and crushing or entanglement from the use of plant like elevating work platforms (EWPs).

Workers exposed to a risk of a fall should also be adequately supervised by a competent person, especially if they are undergoing training or are unfamiliar with the working environment. As a PCBU, you should check that:

- only workers who have received training and instruction in relation to the system of work are authorised to carry out the work
- workers use fall control measures in the correct manner.

WHS Regulation section 317

Duty to ensure worker has been trained

You must not direct or allow a worker to carry out construction work unless the worker has successfully completed general construction induction training. You must also ensure the worker holds a general construction induction training card or a general construction induction training certification.

2. The role of designers of plant and structures

2.1. Eliminating or minimising the risk of falls at the design stage

The design, manufacture or modification of any plant or structure can significantly affect the risk of falls. Thoughtful design and the early consideration of the potential risk of falls can result in the elimination of such risks. The design stage should consider the whole life cycle of the plant or structure, from manufacture and use through to demolition and disposal.

Safety considerations that may eliminate or minimise risks at the design stage should include:

- safer building design including:
  - low-level mounting of roof vents
  - locating air conditioning and similar plant at ground level
  - locating air conditioning units and other roof-mounted plant like satellite dishes away from edges
  - specifying non-fragile material for the roof
  - using permanent safety mesh
  - having safer gutters, for example by installing large volume gutters and downpipes to minimise the need to access the roof for cleaning; locating the gutters at ground level or away from edges; or the removal of gutters altogether, with a smooth transition from the roof to the walls with the gutters at ground level
  - safe entry to and exit from work areas, including scaffolding
  - designing permanent guardrails or other forms of edge protection, like parapet walls for permanent fall prevention on roofs
  - future maintenance requirements, for example in relation to air-conditioning units, sloping building exteriors and windows, to ensure maintenance can be carried out safely
  - specifying the strength of roof members and other points to which guardrails or anchor points for work positioning systems will be fixed
  - designing the prefabrication of structures on the ground before they are lifted into position
  - specific safety requirements for particular workers doing subsequent installation, maintenance or repair work. These groups include:
    - people installing and maintaining antennae and satellite dishes
    - contractors servicing air-conditioning equipment on the roof
    - window and gutter cleaners and repairers.

2.2. Plant

Safety considerations that may eliminate or minimise risks at the plant design stage could include:

- providing steps and handrails on vehicles (see Figure 1)
- incorporating one or more systems designed to prevent falls in silos and overhead conveyors
- ensuring workers who will be maintaining, repairing or cleaning the plant are able to do so safely, including safe access to and exit from the plant
- considering the safety of passengers.

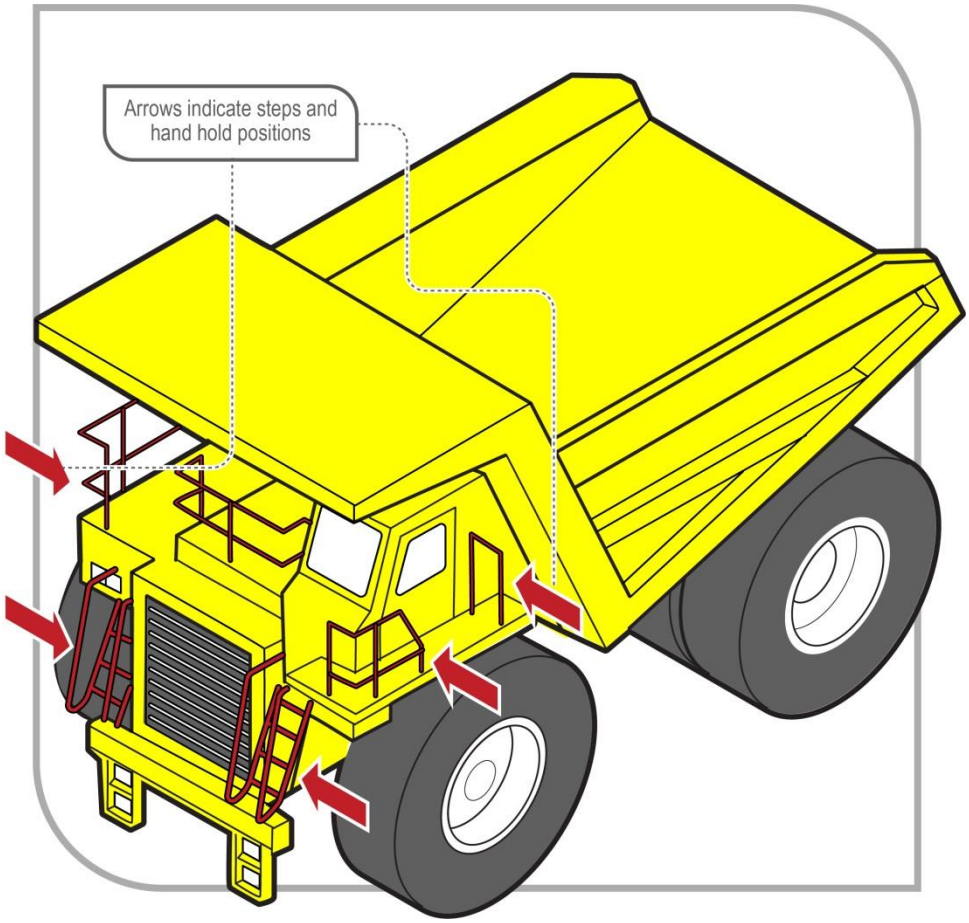

Figure 1 Steps and handrails on dump trucks

2.3. Buildings and structures

Designers or constructors of buildings or structures must ensure, so far as is reasonably practicable, that workers involved with the construction, use or subsequent maintenance are not exposed to the risks associated with work at height. Therefore, at the design and planning stage, it is important to consider providing one or more systems designed to prevent falls as part of the building or structure.

As it is unlikely that all design work on larger projects will be carried out by one designer, consultation, cooperation and coordination should occur between the builder and other designers to ensure the safe interaction of the different design aspects.

When risks remain in the design work, information must be included with the design to alert others to the risks. Providing information about safety issues is a key component to ensure proper, adequate and suitable design and installation.

Safety considerations that may eliminate or minimise risks at the construction stage should include:

- reducing the risk for those working at heights, for example installing guardrails
- to perimeter structural members before erection
- reducing the time spent working at heights by pre-fabricating modules on the ground, before lifting them into position
- sequencing of the work to be carried out at heights
- locating access roads to enable a crane to place building materials in the most accessible location rather than the materials being moved manually
- preparing the ground or floor below the work area—it should be compacted and level to support plant or equipment like cranes and elevating work platforms (EWPs)
- identifying underground services including drainage, for example for the safe setting up of cranes
- providing permanent safety mesh.

Planning for building maintenance

During the planning stage, consideration should also be given to the methods by which maintenance, repairs or cleaning will be carried out on a building or structure, for example:

- designing window cleaning bays or gangways integrated into the structural frame
- designing permanent anchorage and hoisting points into structures where maintenance needs to be carried out at height.

Planning the site layout

Factors to be considered when planning the site layout include:

- preparing firm, level surfaces below work areas for the support of plant and equipment like EWPs or mobile scaffolds
- the site and condition of access roads to enable plant to place material in and pick it up from the most favourable positions, reducing the need for manual handling at height
- the safe access to and exit from work areas and amenities including the provision and placement of stairways, ladders, catwalks, guardrails and barriers
- the need for a direct and unobstructed means of escape and rescue in the event of an emergency.

3. The risk management process

3.1. The risk management process

A risk assessment is not mandatory under the WHS Regulation. However, in many circumstances it will be the best way to determine the measures that should be implemented to control risks. It will help to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing that risk
- identify if and what kind of control measures should be implemented
- check the effectiveness of existing control measures.

Risk management is a systematic process to eliminate or minimise the potential for harm to people.

3.2. Identifying the hazards

The first step in the risk management process is to identify all fall hazards in the workplace. This involves finding things and situations which could potentially cause harm to people. Hazards generally arise from the following aspects of work and their interaction:

- physical work environment
- equipment, materials and substances used
- work tasks and how they are performed
- work design and management.

As a person conducting a business or undertaking (PCBU), you must identify all locations and work tasks that are reasonably likely to cause injury due to a fall. This includes access to and exit from the areas where work is to be carried out.

Inspect the workplace

Hazards may be identified by looking at the workplace and how work is carried out.

Walk around the workplace and talk to your workers to find out where work is carried out that could result in falls. A checklist may be useful in this process. Key things to look for include:

- edges — requiring protection for open edges of floors, working platforms, walkways, walls or roofs
- holes, openings or excavations—requiring guarding
- surfaces, including:
  - their stability, fragility or brittleness
  - their strength or capability to support loads
  - the potential to slip, for example where surfaces are wet, polished or glazed
  - the safe movement of workers where surfaces change
  - the slope of work surfaces.
- levels—where levels change and workers may be exposed to a fall from one level to another
- structures—the stability of temporary or permanent structures
- the ground—the evenness and stability of the ground for safe support of a scaffold or work platform
- the working area—whether it is crowded or cluttered
- safe means of access to and exit from the workplace and working area
- hand grip—places where hand grip may be lost.

Particular attention should also be given to work tasks that are carried out:

- near an unprotected open edge, for example near incomplete stairwells or leading formwork edges
- using equipment to work at the elevated level, for example when using elevating work platforms (EWPs) or portable ladders

- on any structure or plant being constructed or installed, demolished or dismantled, inspected, tested, repaired or cleaned
- on or alongside a fragile surface, for example cement sheeting roofs, rusty metal roofs, fibreglass sheeting roofs and skylights
- on a potentially unstable surface, for example areas where there is potential for ground collapse
- on a sloping or slippery surface where it is difficult for people to maintain their balance, such as on glazed tiles or wet surfaces
- near a hole, shaft or pit into which a worker could fall such as trenches, lift shafts, service pits or floor and column penetrations.

You may also need to talk to manufacturers, suppliers and health and safety specialists. In some situations, you may need to seek advice from technical specialists like structural engineers to check the stability or load-bearing capacity of structures.

Review available information including incident records

Records of previous workplace incidents (injuries and near misses) and worker complaints related to falls should be checked.

Information and advice about fall hazards and risks relevant to particular industries and work activities are also available from regulators, industry associations, unions, technical specialists and safety consultants.

Manufacturers and suppliers can also provide information about hazards and safety precautions for specific plant or processes (information manuals).

3.3. Assessing the risks

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of it happening. A risk assessment can help you determine:

- how severe a risk is
- whether any existing control measures are effective
- what action you should take to control the risk
- how urgently the action needs to be taken.

Hazards have the potential to cause different types and severities of harm, ranging from minor discomfort to a serious injury or death.

Many hazards and their associated risks are well known and have well established and accepted effective control measures. In these situations, the second step in the process outlined in section 1.2 of this code (to formally assess the risk) is not required. If after identifying a hazard you already know the risk and how to control it effectively, you may simply implement the controls.

In some circumstances, a risk assessment will assist to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing the risk
- identify if and what kind of control measures should be implemented
- check the effectiveness of existing control measures.

When assessing the risks of each fall hazard the following should be considered:

- what could happen if a fall did occur and how likely it is to happen
- the design and layout of elevated work areas including the distance of a potential fall
- the number and movement of people at the workplace
- the proximity of workers to unsafe areas where loads are placed on elevated working areas, for example loading docks, and where work is to be carried out above people and there is a risk of falling objects
- the adequacy of inspection and maintenance of plant and equipment, for example scaffolds
- the adequacy of lighting for clear vision

- weather conditions including the presence of rain, wind, extreme heat or cold which can cause slippery or unstable conditions
- the suitability of footwear and clothing for the conditions
- the suitability and condition of ladders including where and how they are being used
- the adequacy of current knowledge and training to carry out work safely, for example young, new or inexperienced workers may be unfamiliar with the work
- the adequacy of procedures for potential emergency situations—including effective procedures for response and evacuation, the provision of medical treatment and assistance (for example ensuring appropriate first aid is provided immediately and ambulances are called for when necessary), and effective communication
- the adequacy of current testing and training of the emergency procedures.

Generic risk assessment

If you are responsible for a number of different work areas or workplaces and the fall hazards are the same, you may complete a single—or generic—risk assessment. However, a generic risk assessment must be reviewed if there is any likelihood a person may be exposed to greater, additional or different risks at the specific work area or workplace.

3.4. Controlling the risks

Hierarchy of control measures

The WHS Regulation requires duty holders to work through the hierarchy of control measures when managing certain risks; however, the hierarchy can be applied to any risk. The hierarchy ranks control measures from the highest level of protection and reliability to the lowest.

Further guidance on the risk management process and the hierarchy of control measures is available in the How to manage work health and safety risks Code of Practice.

Managing the risk of falls

WHS Regulation section 78

Management of risk of fall

In managing the risk of falls, the WHS Regulation requires specific control measures to be implemented, where it is reasonably practicable to do so.

As a PCBU, you must manage risks to health and safety associated with a fall by a person from one level to another that is reasonably likely to cause injury to the person or any other person.

You must ensure, so far as is reasonably practicable, that any work involving a risk of a fall is carried out on the ground or on a solid construction (see Chapter 4).

You must also provide safe means of access to and exit from the workplace or any area within the workplace from or through which a person could fall, such as a platform or scaffolding.

Carrying out work on the ground or on a solid construction and providing a safe means of access to and exit from a workplace are intended to, as far as is reasonably practicable, eliminate the fall hazard and associated risk of a fall.

WHS Regulation section 79

Specific requirements to minimise risk of fall

If it is not reasonably practicable for you to eliminate the risk of a fall by working on the ground or on a solid construction, you must minimise the risk of a fall by providing adequate protection against the risk.

Adequate protection against the risk is provided if you provide and maintain a safe system of work, including by:

- providing a fall prevention device if it is reasonably practicable to do so (see Chapter 5), or
- if it is not reasonably practicable to provide a fall prevention device, providing a work positioning system (see Chapter 6), or
- if it not reasonably practicable to provide a fall prevention device or work positioning system, providing a fall arrest system, so far as is reasonably practicable (see Chapter 7).

- If a risk remains after considering all of the control measures mentioned above, you must minimise the remaining risk, so far as is reasonably practicable, by implementing administrative controls (see Chapter 8).

Administrative controls may also be used to support other control measures. However, the exclusive use of administrative controls to minimise the risk of falls is only appropriate when it is not reasonably practicable to use a higher order control.

Combining control measures

A combination of control measures may be used to minimise risks, so far as is reasonably practicable, if a single control is not sufficient for the purpose. In most cases, a combination of the control measures will provide the best solution to minimise the risk to the lowest level reasonably practicable.

You should also ensure that the control measures you select do not create new hazards, for example electrical risks from contact with overhead powerlines or crushing and entanglement from plant like EWPs. If any new hazards are created they must also be controlled.

Maintaining and reviewing control measures

WHS Regulation section 37

Maintenance of control measures

Control measures must be maintained so they remain fit for purpose, suitable for the nature and duration of the work and installed, set up and used correctly.

To allow the chosen control measures to operate effectively, you should develop work procedures on how to correctly install, use and maintain the control measures. The procedures should include a planned program of inspections and maintenance for the control measures. The inspection regime should include details of:

- the equipment to be inspected including its unique identification
- the frequency and type of inspection, for example pre-use checks, detailed inspections
- action to be taken on finding defective equipment
- means of recording the inspections
- training of users
- the system of monitoring the inspection regime to verify inspections are carried out appropriately.

The manufacturer or supplier of the equipment should be consulted for product specific requirements. If signs of excessive wear or other defects are found during the inspection the defective equipment must be withdrawn from use.

WHS Regulation section 38

Review of control measures

You must review and as necessary revise fall control measures in the following circumstances:

- when the control measure does not control the risk so far as is reasonably practicable
- before a change at the workplace that is likely to give rise to a new or different risk to health and safety that the control measure may not effectively control
- a new relevant hazard or risk is identified
- the results of consultation indicate that a review is necessary, or
- a health and safety representative requests a review if that person reasonably believes that:
    - a circumstance in any of the above points affects or may affect the health and safety of a member of the work group represented by the health and safety representative
    - the control measure has not been adequately reviewed in response to the circumstance.

4. Work on the ground or on a solid construction

The most effective control measure is to eliminate the risk of a fall, so far as is reasonably practicable. This can be achieved by working on the ground or from a solid construction. A person conducting a business or undertaking (PCBU) can only take steps to minimise the risk of a fall if it is not reasonably practicable to eliminate that risk.

4.1. Work on the ground

Eliminating the need to work at height is the most effective way of protecting workers from the risk of falls. Examples of tasks that may be carried out on the ground to eliminate the risk of falls are:

- prefabricating roofs at ground level
- prefabricating wall frames horizontally then standing them up
- installing air-conditioning units at ground level
- using mechanical tarp spreaders to cover loads on trucks from the ground
- reducing shelving heights so workers can access items from ground level
- using tools with extendable handles, for example paint rollers—however, the risk of musculoskeletal disorders will need to be considered when deciding whether to use such tools
- lowering a concert hall chandelier to repair it
- fitting outlets, inlets and controls of large tanks and silos near the ground—see Figure 2.

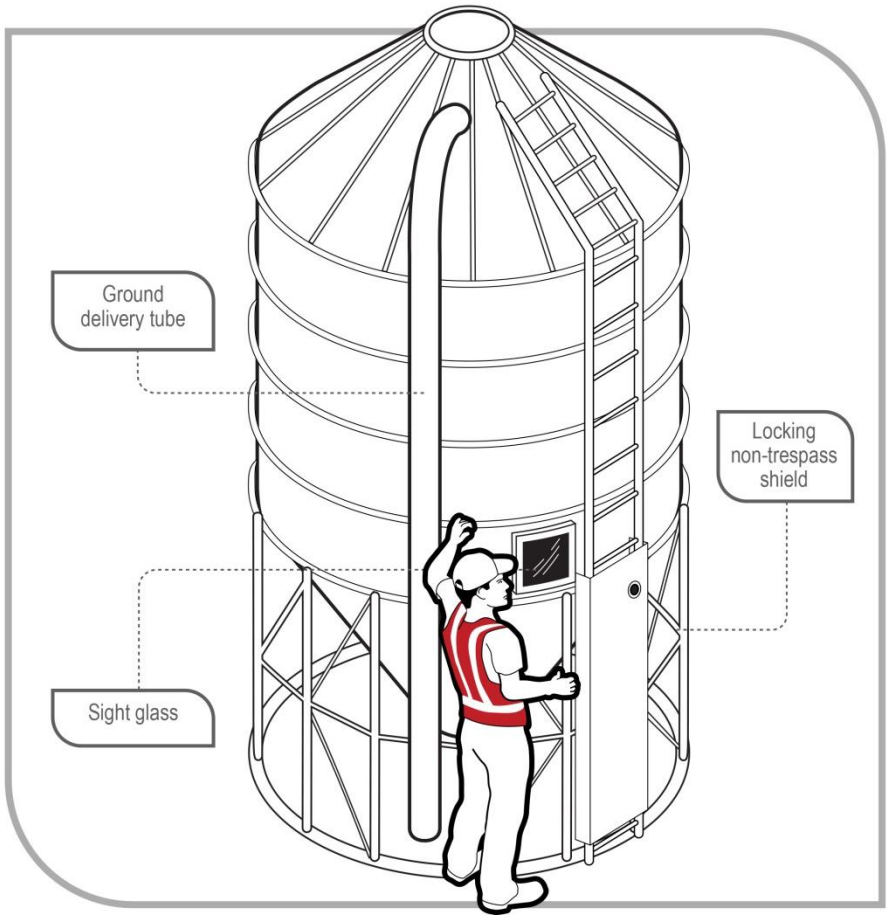

Figure 2 Silo with sight glass and ground delivery tube

4.2. Work on a solid construction

Working on a solid construction provides an environment where the likelihood of a fall may be eliminated. ‘Solid construction’ means an area:

- with a surface that is structurally capable of supporting workers, materials and any other loads applied to it
- provided with barriers around its perimeter and around any openings from or through which a person could fall
- with an even and readily negotiable surface and gradient
- with a safe means of entry and exit.

Structural strength

Different types of work involve different loads on the supporting surface. The surface and its supports must be able to safely carry the expected loads, including workers, materials, tools and equipment. When in doubt, have a structural engineer determine the safe load capacity before use.

Barriers

Barriers to prevent a person falling over edges and into holes must be provided on relevant parts of a solid construction. These include:

- the perimeters of buildings or other structures
- floors, including mezzanine floors—see Figure 3
- openings in floors
- the open edge of a stair, landing, platform or shaft opening—see Figure 4.

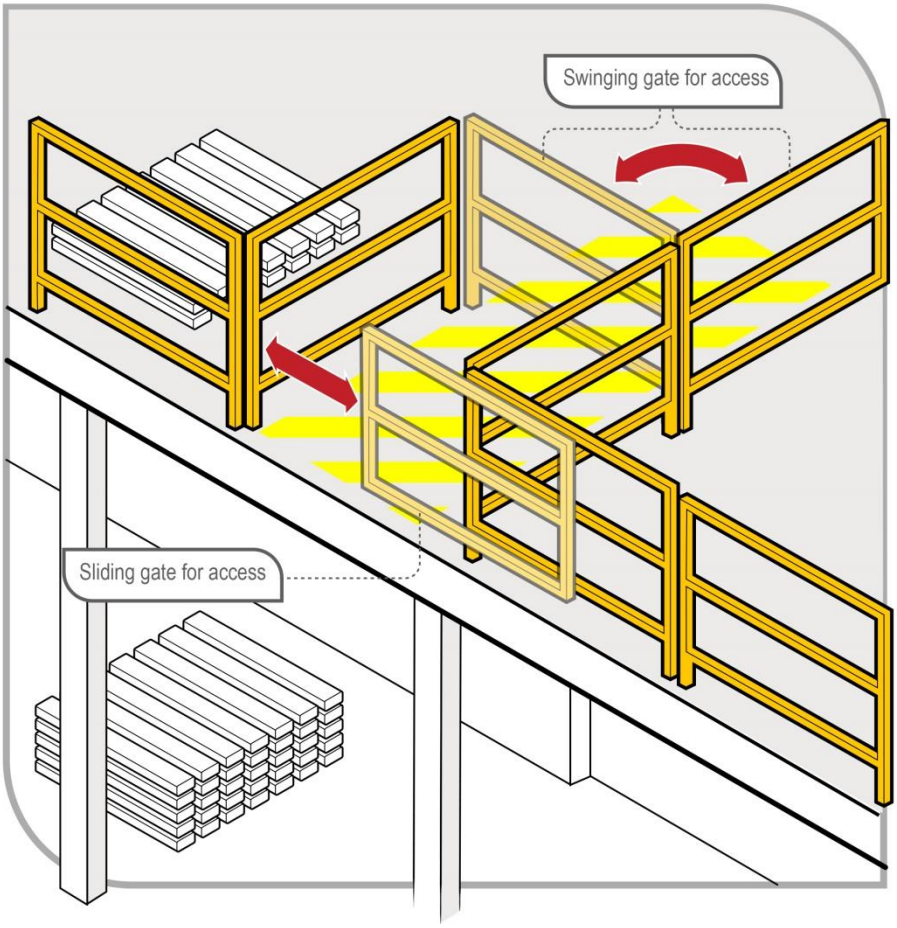

Figure 3 Mezzanine floor barrier

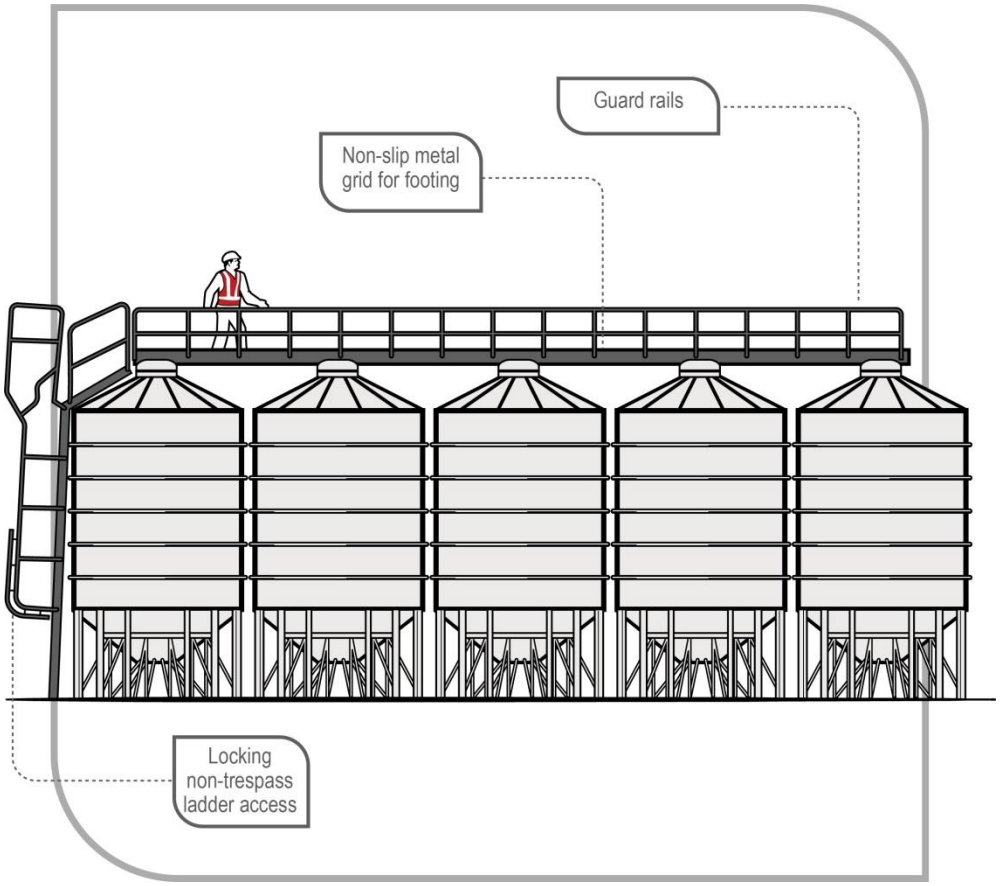

Figure 4 Silos with platform and guard rails

The barrier must be designed and constructed to withstand the force of someone falling against it.

Barriers should consist of guardrails, solid balustrades or other structural components, for example wire mesh supported by posts and provided with a reinforced top edge. The top of the guardrail or component should be between 900 mm and 1100 mm above the working surface. If a guardrail system is used, it should also have mid-rails and toe-boards or wire mesh infill panels.

If access is required to equipment, for example a hoist, it should be protected with gates or other means to prevent a person falling.

Protection around holes, penetrations and openings

A fall prevention device (for example a secure fence, edge protection, work platform or cover) must be used to provide and maintain a safe system of work where persons are working near and around holes, penetrations and openings through which a person could fall, if it is reasonably practicable to do so.

Holes, penetrations and openings must be made safe immediately after being formed, for example with covers, barricading or by embedded mesh—see Figure 5. When mesh is used, an additional cover should be used to prevent things falling through the mesh.

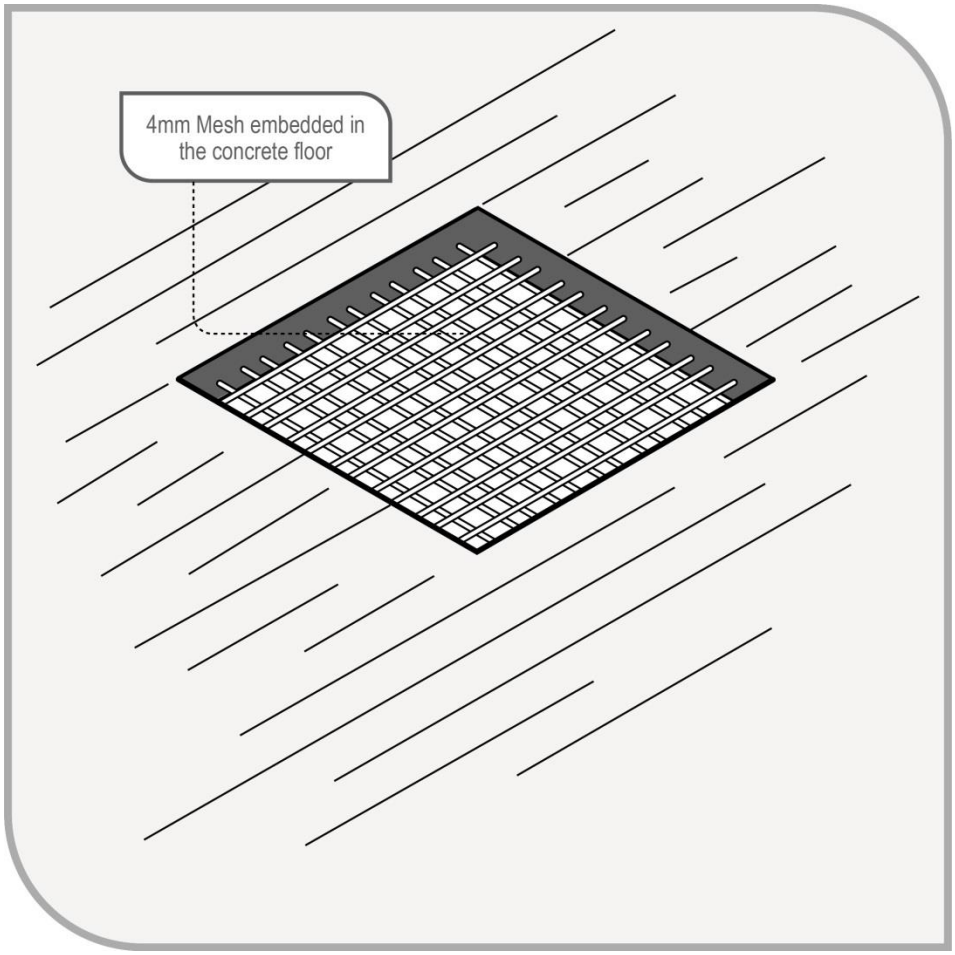

Figure 5 Mesh embedded in a concrete floor

If a cover is used as a control measure it must be made of a material strong enough to prevent people or objects falling through the hole, penetration or opening and should be securely fixed to prevent dislodgement or accidental removal.

Covers over penetrations should be designed to safely withstand a point load of at least 2 kilonewtons—that is, 200 kilograms.

Plywood covers on their own are not preferred because:

- the cover may be indistinguishable from other pieces of plywood
- it may be difficult to determine if the plywood is properly secured
- secured plywood covers can be unsecured to gain access and not be re-secured.

The cover should also include signage indicating its purpose as a cover, for example ‘DANGER HOLE BENEATH’—see Figure 6.

Figure 6 Cover danger sign

Surface and gradient

Surfaces of a solid construction must be non-slip, free from trip hazards and should generally not exceed 7 degrees—1 in 8 gradient. Cleated surfaces, which provide greater slip-resistance, should not be steeper than 20 degrees—1 in 3 gradient.

If grid mesh or checker plate flooring is used for walkways and working platforms you should, ensure:

- flooring panels are securely fixed and assembled in accordance with the manufacturer's specifications
- where possible, the flooring is fitted to the structure before being lifted into permanent position
- each panel is fixed securely before the next panel is placed in position
- during installation, this type of flooring is secured by tack welding, panel grips or other means to prevent movement before being fixed permanently
- if panels of grid mesh or checker plate flooring are removed, edge protection is provided and the gaps left due to removed panels are protected.

Entry and exit

The solid construction must have a safe means for people to enter and exit and to move around the work area, for example permanently installed platforms, ramps, stairways or fixed ladders.

Further information on fixed walkways, stairways and ladders is in AS 1657: *Fixed platforms, walkways, stairways and ladders – Design, construction and installation*. Other safety considerations for entrances and exits in a solid construction include:

- exposure of access systems to the weather, for example rain can make surfaces slippery and strong winds can cause loss of hand grip
- providing natural or artificial lighting to access ways
- clearing obstructions so people are able to move easily to and from the workplace.

Portable stepladders and trestle ladders should not be used for entries or exits and single or extension ladders should only be used where the use of safer systems is not reasonably practicable.

5. Fall prevention devices

When work cannot be performed on the ground or from a solid construction, you, as a person conducting a business or undertaking (PCBU), must minimise the risk of a fall by providing a fall prevention device, if it is reasonably practicable to do so.

A 'fall prevention device' is material or equipment—or a combination of both—designed to prevent a fall for temporary work at heights, that once in place after initial installation does not require any ongoing adjustment, alteration or operation by any person to ensure its integrity. Fall prevention devices include secure fencing, edge protection, working platforms and covers.

5.1. Temporary work platforms

A 'temporary work platform' is a working platform, other than a permanently installed fixed platform, used to provide a working area for the duration of the work. The design of the platform prevents workers from falling. Temporary work platforms include scaffolds, elevating work platforms (EWPs), mast climbers, workboxes, building maintenance units, portable or mobile fabricated platforms or any other platform that provides a working area designed to prevent a fall.

Scaffolds

Scaffolds can be very effective protection in preventing falls. Specific requirements apply to some types of scaffold under the WHS Regulation.

WHS Regulation section 225

Scaffolds

A person with management or control of a scaffold must not allow the use of a scaffold from which a person or object could fall more than 4 metres unless a competent person, who has inspected the scaffold, provides written confirmation that the scaffold has been completed.

The person with management or control of a scaffold must also ensure that:

- the scaffold and its supporting structure are inspected by a competent person:
  - before use of the scaffold is resumed after an incident occurs that may reasonably be expected to affect the stability of the scaffold (such as a severe storm or impact by mobile plant)
  - before use of the scaffold is resumed after any repairs
  - at least every 30 days.
- if an inspection indicates that a scaffold or its supporting structure creates a risk to health or safety, that any repairs, alterations and additions are made or carried out and the scaffold and its supporting structure are inspected again by a competent person before use is resumed, and
- unauthorised access is prevented on scaffolding that is incomplete and left unattended, for example by attaching danger tags and warning signs at appropriate locations.

The WHS Regulation also requires that the design of certain types of plant, such as prefabricated scaffolding, must be registered before the plant is used in the workplace. Further information on design registration is available in the Managing risks of plant in the workplace Code of Practice.

The WHS Regulation sets out requirements for erecting and dismantling scaffolding in construction work.

Scaffolding work platforms are generally rated as light, medium or heavy duty:

- **Light duty**—up to 225 kg per bay. Examples include painting, electrical work, many carpentry tasks and other light tasks. Platforms should be at least two planks wide (approximately 450 mm)
- **Medium duty**—up to 450 kg per bay. This is suitable for general trades work. Platforms should be at least four planks wide (approximately 900 mm)

- **Heavy duty**—up to 675 kg per bay. This is what is needed for bricklaying, concreting, demolition work and most other work tasks involving heavy loads or heavy impact forces. Platforms should be at least five planks wide (approximately 1000 mm)
- **Special duty**—has a designated allowable load as designed.

These safe load limits include the weight of people plus the weight of any materials, tools and debris on the working platform. For example, a properly constructed mobile scaffold with a light duty platform holding up to 225 kg per bay can safely support one 80 kg worker and 145 kg of tools and material, or two 80 kg workers and 65 kg of tools and materials.

Safety considerations when using scaffolds should include:

- scaffolding conforms to AS/NZS 4576: Guidelines for scaffolding and the AS/NZS 1576 Scaffolding (set)[1]
- scaffolding is erected, altered and dismantled by competent people. Scaffolds from which a person or object could fall more than 4 metres must be erected, altered and dismantled by a person who holds a scaffolding high risk work licence, or is enrolled in a training course to obtain a scaffolding high risk work licence and is under the direct supervision of a licensed scaffolder
- prefabricated scaffolds are of the same type and not mixed components, unless the mixing of components has been approved by the manufacturer
- safe access to and exit from the scaffold is provided
- edge protection like handrails, mid-rails and toe-boards is provided at every open edge of a work platform—see Figure 7.

Where work is carried out from a scaffold, workers must be provided with information, training and instruction on the nature of the scaffolding work, the risks associated with scaffolding and the control measures implemented to reduce that risk. This may include information, training and instruction on:

- emergency response procedures
- what loads the scaffold can safely take (Safe Working Load (SWL))
- not to make unauthorised alterations to the scaffold, such as removing guardrails, planks, ties, toe-boards and braces
- keeping working platforms clear of debris and obstructions along their length
- never accessing incomplete or defective scaffolds
- immediately reporting defects, if they occur
- isolating electrical leads from the metal frame of the scaffold with plastic lead hooks or an insulated rubber material where reasonably practicable (to prevent damage to the leads or electrifying the scaffold)
- the requirement for a written safe work method statement (SWMS) to be developed for any work carried out at or above 2 metres
- complying with any electrical ‘permit to work’ requirements issued by the electricity supply authority for work conducted from a scaffold that has been erected within the powerline ‘no go’ zone.

Where mobile scaffolds are used, workers should be trained in their use, including on how to ensure the scaffold:

- remains level and plumb
- is kept well clear of powerlines, open floor edges and penetrations
- is not accessed until the castors are locked to prevent movement
- is not moved while anyone is on it
- is accessed using an internal ladder (see Figure 8), except for low height platforms where this is not reasonably practicable.

[1] *AS/NZS 1576 (set):* Scaffolding *includes AS/NZS 1576.1:* Scaffolding – General requirements*; AS/NZS 1576.2:* Scaffolding – Couplers and accessories*; AS 1576.3:* Prefabricated and tube-and-coupler scaffolding*; AS 1576.4:* Scaffolding – Suspended scaffolding*; AS/NZS 1576.5:* Scaffolding – Prefabricated splitheads and trestles*; AS/NZS 1576.6:* Scaffolding – Metal tube-and-coupler scaffolding – Deemed to comply with AS/NZS 1576.3.

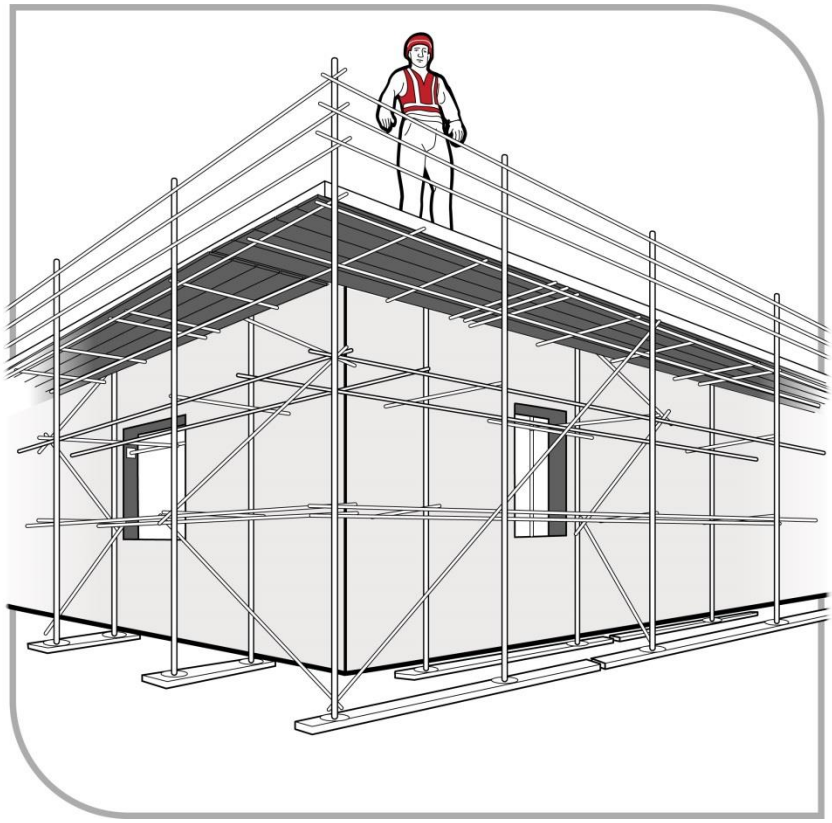

Figure 7 Perimeter scaffold with fully decked working platform, guardrails, mid-rails and toe-boards

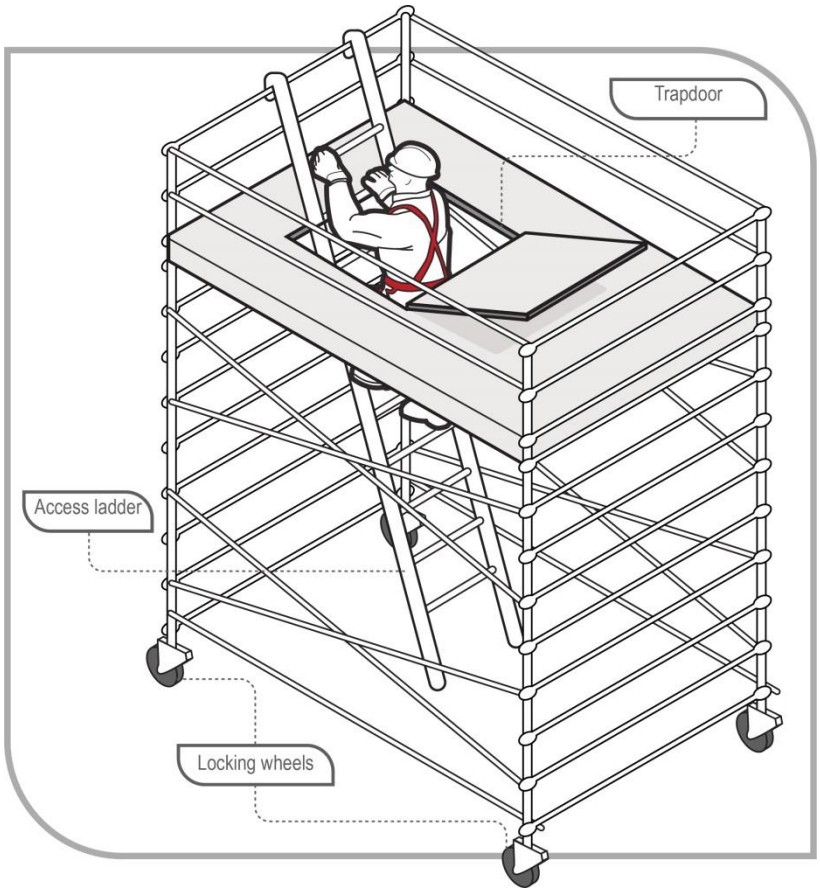

Figure 8 Mobile scaffold with access ladder and trapdoor

Suspended (swing stage) scaffold

A suspended scaffold incorporates a suspended platform capable of being raised or lowered when in use. Other terms often used are ‘suspended cradle’ and ‘swing stage’ scaffold. They are typically prefabricated modular units (see Figure 9) or permanently fabricated units, although they can be assembled from scaffolding.

Common types of suspended scaffold include:

- swing stages with cradles supported by a single row of suspension ropes
- double rope scaffolds with cradles supported by two rows of suspension ropes
- work cages which are small cradles supported by one suspension rope only
- false cars which are specialised forms of suspended scaffold and are often used in the construction of lifts before lift cars are installed.

In managing the risks of using swing stage scaffolds, you should ensure that:

- the working load and specifications are in accordance with AS 1576.4: Scaffolding – Part 4: Suspended scaffolding
- workers operating suspended scaffolds are trained in their safe operation
- workers installing or servicing a suspended scaffold must either:
    - hold an advanced rigging or advanced scaffolding high risk work licence, or
    - be enrolled in a training course to obtain an advanced rigging or advanced scaffolding high risk work licence and be supervised by the holder of an advanced rigging or advanced scaffolding high risk work licence.
- all occupants of the swing stage should wear a fall arrest harness attached to a suitable anchorage point in the swing stage
- the platform remains horizontal when it moves up or down.

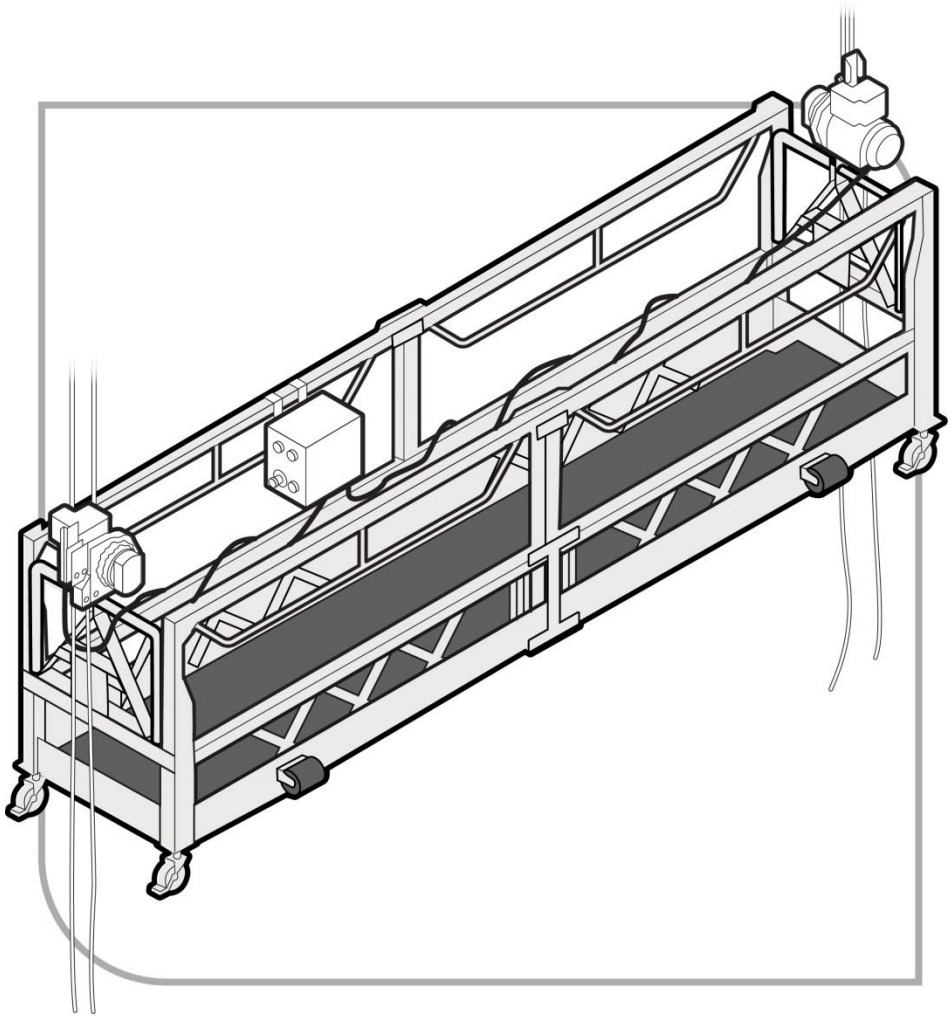

Figure 9 Suspended (swing-stage) scaffold – cradle (suspended) end

Elevating work platforms (EWPs)

EWPs include boom-type EWPs (see Figure 10) and scissor lifts (see Figure 11). Some are designed for hard flat surfaces only while others are designed to be operated on rough terrain. Some types are designed for indoor use and are not suitable for windy conditions outdoors.

If using an EWP at the workplace, you must identify the hazards associated with the use of the EWP and implement control measures to eliminate or minimise those risks so far as is reasonably practicable. The main hazards related to the use of EWPs are contact with electric lines, overturning the machine, falling from the work platform, and potential crushing hazards when elevating the platform or moving laterally.

Relevant risk control measures when using EWPs should include:

- training and instructing workers in the safe operating procedures for the particular brand and type of EWP, as well as safe work procedures to avoid crushing and electrical hazards
- training and instructing workers in the safe use of fall arrest equipment and emergency rescue procedures
- ensuring the EWP is only used as a working platform and not as a means of entering and exiting a work area unless the conditions set out in AS 2550.10: Cranes, hoists and winches – Safe use –Part 10: Mobile elevating work platforms are met
- ensuring the EWP is only used on a solid level surface, unless it is designed for use on rough terrain
- checking the surface area to make sure there are no penetrations or obstructions that could cause uncontrolled movement or overturning of the EWP.

In addition to the above, you must ensure:

- where it is not reasonably practicable to use a fall prevention device or a work positioning system to adequately protect against the risk of a fall, workers working in travel towers, boom lifts or cherry pickers wear a properly anchored fall arrest harness. The lanyard should be as short as possible and should be attached directly to the designated anchor point on the EWP, not to the handrail (unless the handrail is the manufacturer's specified anchor point)
- workers operating boom-type EWPs with a boom length of 11 metres or more either:
  - hold a boom-type EWP high risk work licence, or
  - are enrolled in a training course to obtain a boom-type EWP high risk work licence and are supervised by the holder of a boom-type EWP high risk work licence.

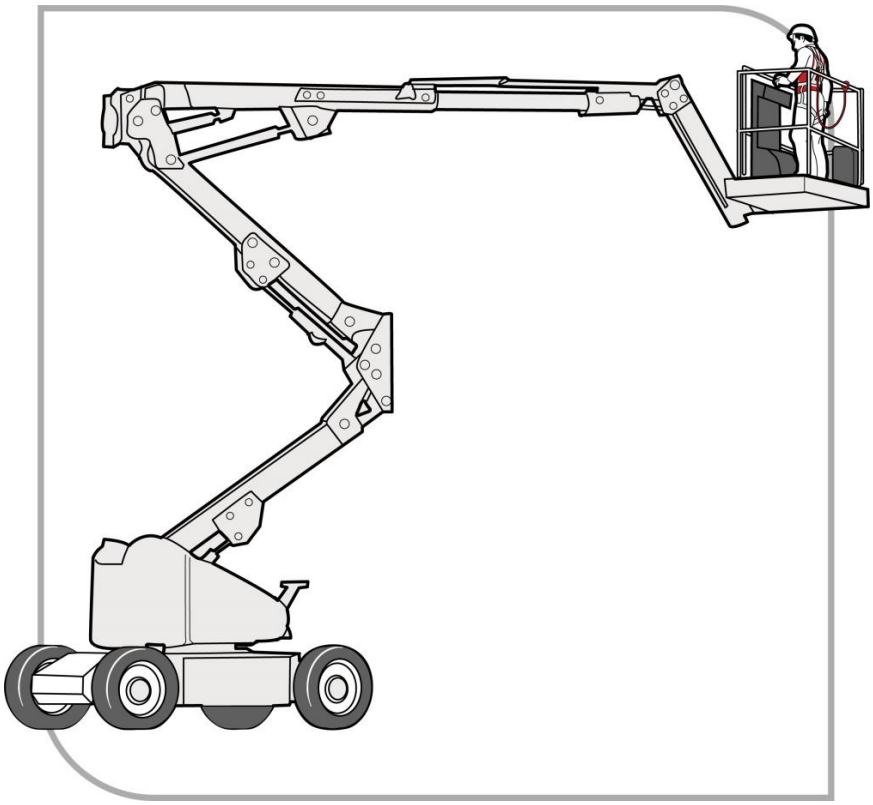

Figure 10 Boom-type elevating work platform

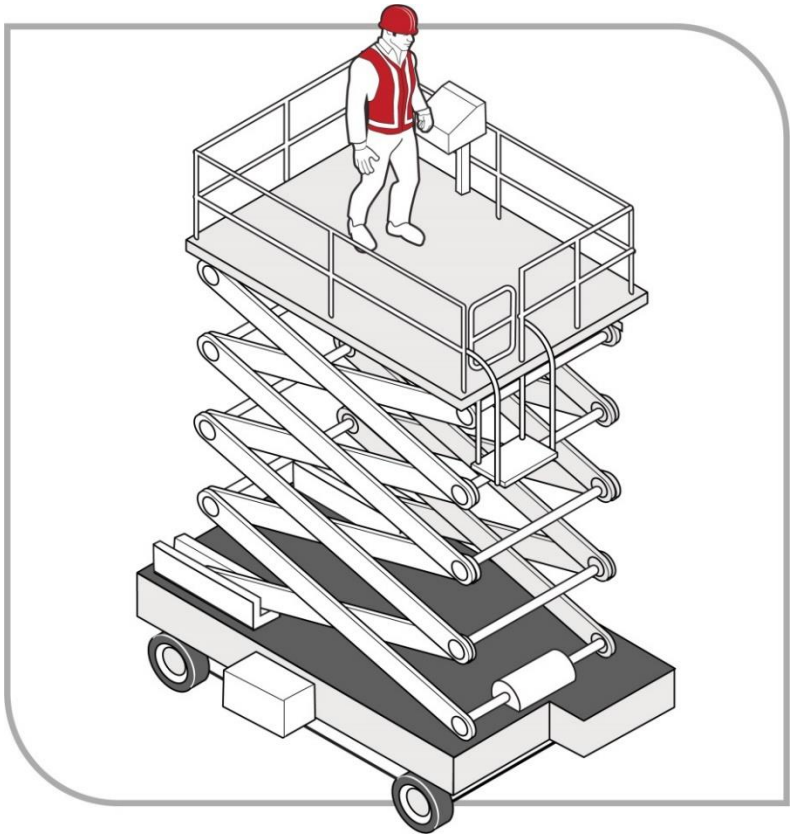

Figure 11 Scissor-lift elevating work platform

Mast climbing work platforms

Mast climbing work platforms are hoists with a working platform that is used to raise workers and material to a temporary working position (see Figure 12). They use a drive system mounted on an extendable mast which may need to be tied to a building under circumstances prescribed by the manufacturer.

Mast climbing work platforms can be set up in either single-mast or multi-mast configurations. They are generally not suitable for use if the profile of a structure changes at different elevations, for example if the upper floors of a building step back or balconies protrude from the building.

The erection and dismantling of mast climbing work platforms must be carried out by workers who:

- hold a basic rigging or intermediate scaffolding high risk work licence, or
- are enrolled in a training course to obtain a basic rigging or intermediate scaffolding high risk work licence and are being supervised by the holder of a basic rigging or intermediate scaffolding high risk work licence.

Further information on mast climbing work platforms is in AS 2550.16: Cranes – Safe Use – Part 16: Mast climbing work platforms.

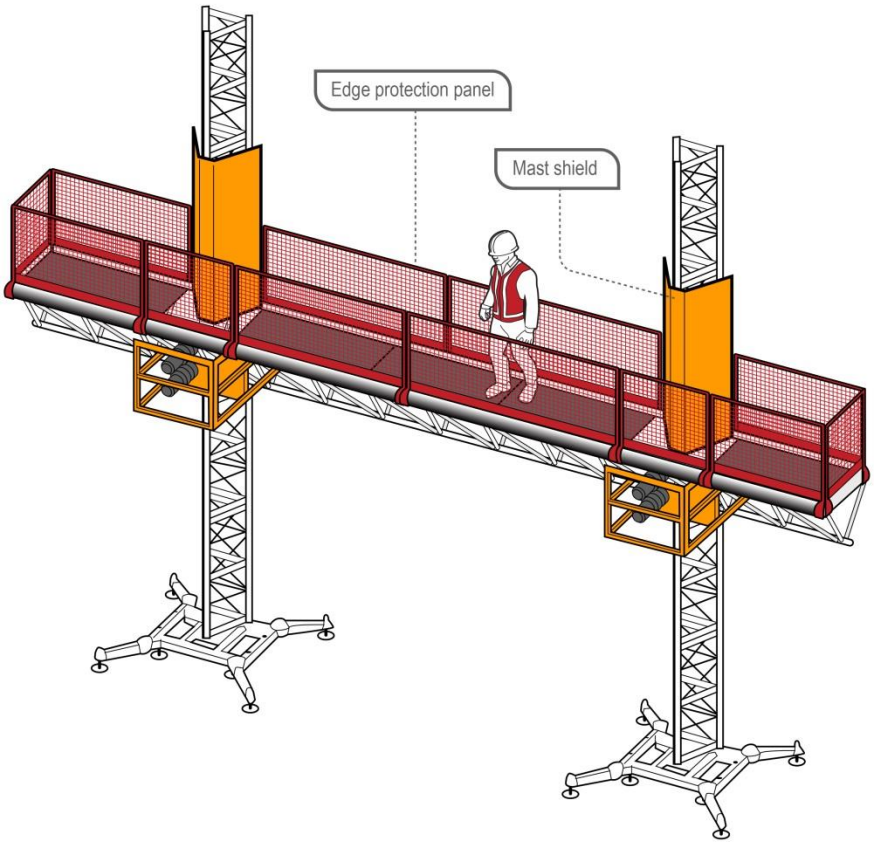

Figure 12 An example of a typical mast climbing work platform

Workboxes and Work platforms

Workboxes and work platforms consist of a platform surrounded by edge protection, designed to provide an elevated work area for people working from the box. Workboxes are designed to be supported from above by a crane, hoist, or other mechanical device whereas work platforms are designed to be supported from underneath or the side by forklifts or other mechanical devices.

Where reasonably practicable, other working platforms like EWPs or scaffolds should be used as an alternative to a workbox or work platform.

Certain safety precautions should be observed when using a workbox or work platform to provide an elevated work area. These include ensuring the workbox or work platform:

- is designed for the task and securely attached to the crane, hoist, forklift truck or other mechanical device
- is not suspended over people.

You should also ensure:

- there is an effective means of communication between any person in the workbox or work platform and the operator
- the operator remains at the controls of the crane, hoist, forklift truck or other mechanical device at all times
- lifting attachments and records are checked by a competent person before use.

Workboxes designed to be suspended from cranes

The WHS Regulation requires workboxes designed to be suspended from cranes to be ‘design registered’ before they are used in the workplace.

When using crane workboxes as an elevated work area, you should ensure that:

- the workbox is designed in accordance with AS 1418.17: *Cranes* (including hoists and winches) – Part 17: Design and construction of workboxes

- the workbox is fitted with an anchorage capable of withstanding the fall forces specified in AS/NZS 1891.4: Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance
- where there is a risk of a person falling from height, the person must be attached to the anchorage by a lanyard and harness unless the workbox is fully enclosed
- workers remain within the workbox while they are being lifted or suspended
- except in an emergency, workers do not enter or leave the workbox when it is elevated unless the conditions set out in section 6.19.3 of AS 2550.1: Cranes, hoists and winches – Safe use – Part 1: General requirements are met
- directions to the crane operator should be provided from the workbox by a person holding a dogging or rigging licence.

A crane used to elevate a workbox should:

- be fitted with the means to safely lower the workbox in an emergency or a power supply failure
- be suitably stabilised while the workbox is used
- have ‘drive up’ and ‘drive down’ controls on both the hoisting and luffing motions and those controls should be used. No declutching allowing free fall is to be used while a workbox is in use.

Further specifications for cranes used to lift workboxes and requirements relating to the use of crane workboxes is in AS 2550.1: Cranes, hoists and winches – Safe use – Part 1: General requirements.

Work platforms supported by forklifts

Work platforms used on forklifts to elevate people to work at height should be engineer-designed and constructed in accordance with AS 2359.1–2015: Powered Industrial Trucks – Part 1: General requirements (see Figure 13)**.**

The work platform should be securely attached to the forklift carriage to prevent it from sliding off the forks.

In managing the risks of using a work platform to provide an elevated work area you should ensure that:

- workers are only raised by a forklift when in a compliant work platform
- workers remain within the work platform when it is elevated or being raised or lowered
- no other device such as a ladder or pallet is used to gain additional height (see Figure 14 and Figure 15)
- the safety gate is self-closing and kept shut when in the elevated position.

Further information on the use of work platforms with forklifts is in AS 2359.2: Powered industrial trucks –Part 2: Operations.

Forklifts used to elevate people in a work platform should comply with the requirements of AS 2359.1–2015: Powered industrial trucks – Part 1: General requirements.

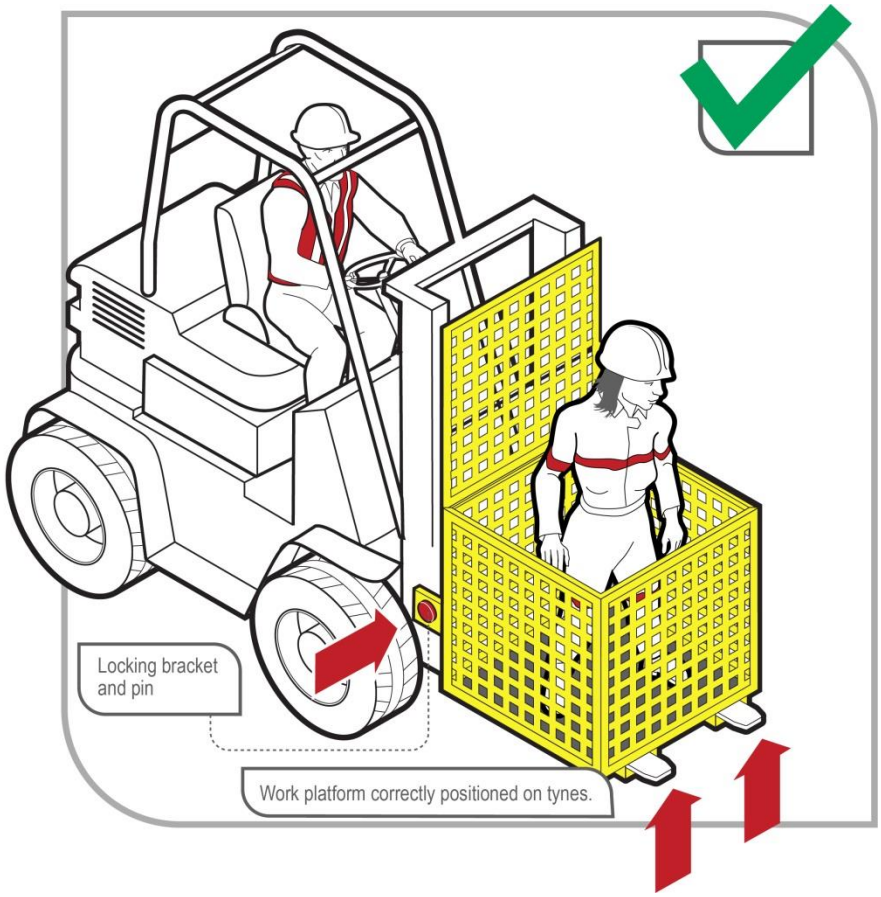

Figure 13 An engineer-designed work platform correctly positioned on tynes

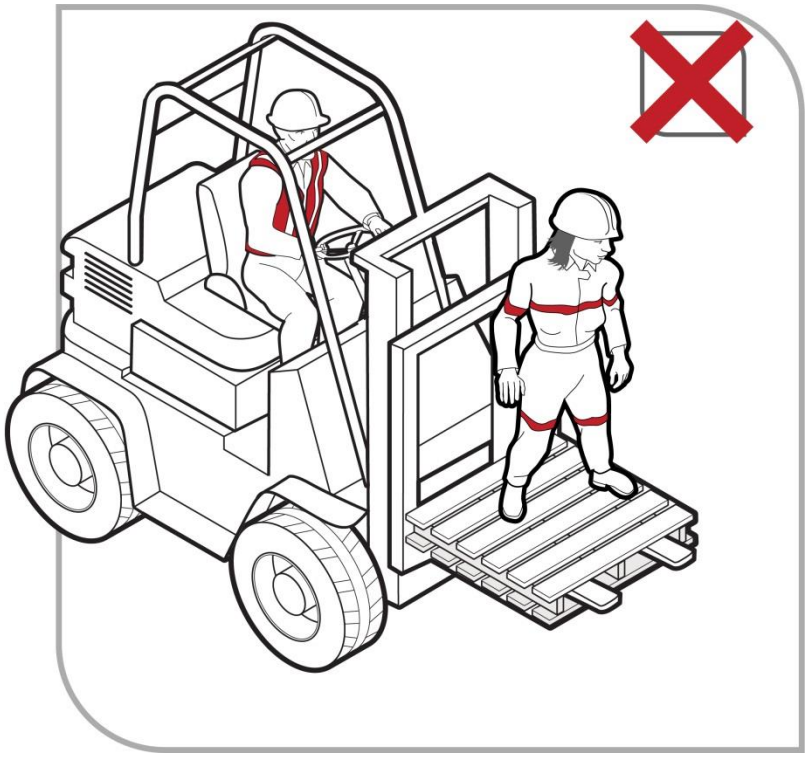

Figure 14 Using a forklift as a working platform or to gain extra height by standing on the tynes or a pallet is an unacceptable practice

Figure 15 Unacceptable practice with ladder on forklift

Building maintenance units

A building maintenance unit is a power-operated suspended working platform that is fixed permanently to a building or structure. It is used for access for building maintenance or window cleaning (see Figure 16).

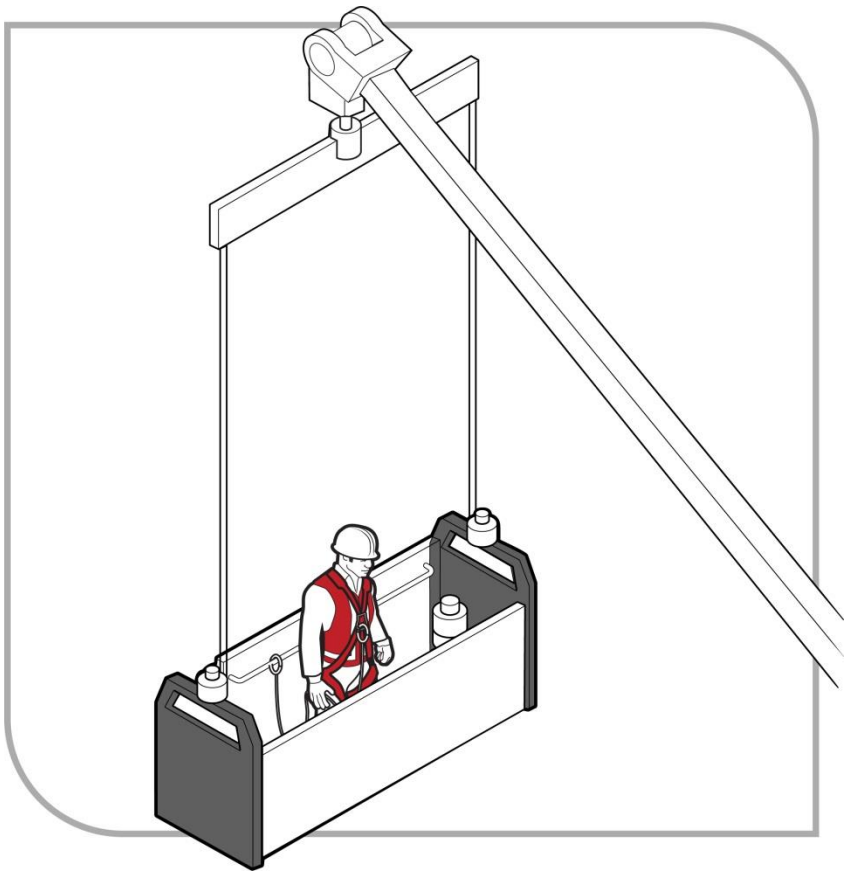

Figure 16 Building maintenance unit with harness and anchor rail

When using a building maintenance unit you should ensure that:

- the unit is designed in accordance with AS 1418.13: Cranes (including hoists and winches) –Part 13: Building maintenance units
- the unit has clearly designated fall arrest harness anchorage points designed to withstand the forces caused by a fall of a person located anywhere on the platform
- the unit is operated by competent people in accordance with AS 2550.13: Cranes – Safe Use – Building maintenance units
- operators possess a suitable attitude for working at height, including a responsible attitude to safety.

Platforms supported by trestle ladders

Trestle scaffolds are generally not suitable for working at heights of 2 metres or above. If they are used at heights greater than 2 metres, guardrailing and toe-boards should be used to prevent people and material from falling off the open side or end of the work platform.

Working platforms on trestle scaffolds should have a width of at least 450 mm (two planks) with exception to instances described in section 306O(3)a of the *Work Health and Safety Regulation 2011*. The use of plank locking devices will extend plank spans and reduce plank whip when walking along the platform. The system (including planks) should be assembled according to the manufacturer's specifications using only compatible components.

Except where the working platform is at or below 2 metres in height, if there is no guardrail or mid-rail provided adjacent to the working face of the structure, the distance between the platform edge and the working face of the structure should not be greater than one plank width (225 mm).

When adjusting the height of a brick layer's trestle scaffold, make sure that only the purpose-designed pins are used. Do not use nails or pieces of reinforcing bar. Pins should be attached to the trestle by a chain to prevent loss.

Some trestle ladder scaffolds include outriggers to increase stability (see Figure 17).

Most trestle ladder scaffolds are only suited to light duty work like painting and rendering.

Work should only be carried out between the trestles.

As a person conducting a business or undertaking (PCBU) you must always consider what is reasonably practicable to maintain a safe system of work in the circumstances. It may be that a trestle scaffold is not the most appropriate means of minimising the risk of a fall in the circumstances. Therefore, alternative types of temporary work platforms should be considered, for example EWPs like small scissor lifts and other types of fall prevention devices like light duty aluminium mobile scaffolds and modular scaffolding.

The WHS Regulation sets out requirements on the use of platforms supported by trestle ladders in construction work.

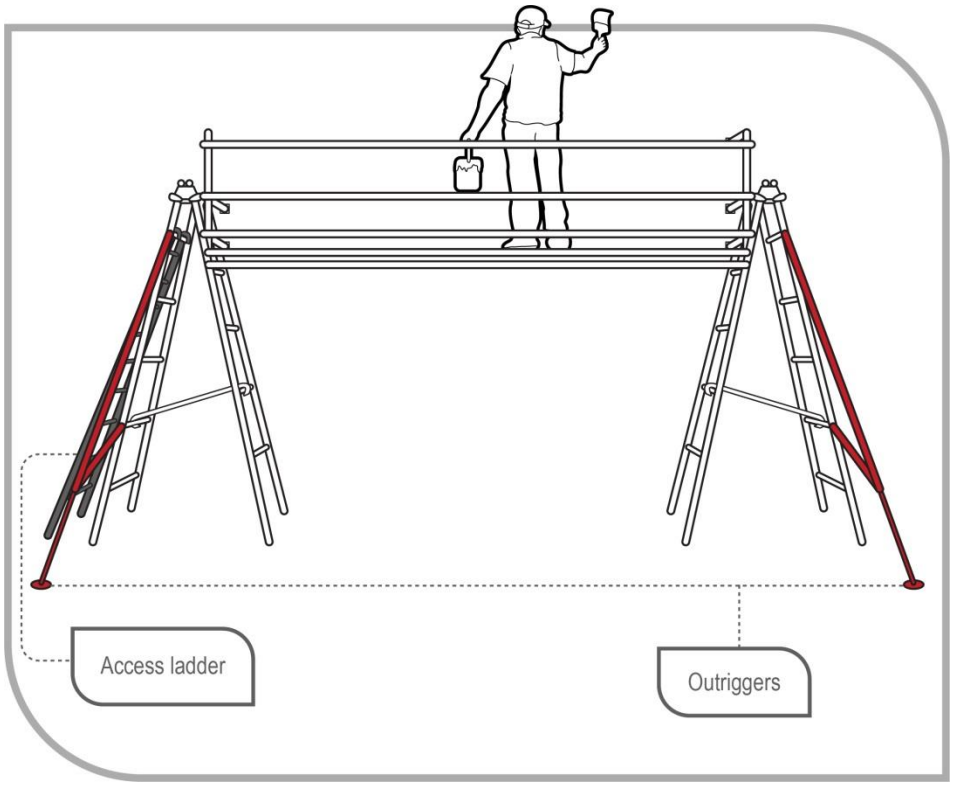

Figure 17 Trestle ladder scaffold with guard rails and outriggers for stability

5.2. Perimeter guardrails

Guardrails may be used to provide effective fall prevention:

- at the edges of roofs
- at the edges of mezzanine floors, walkways, stairways, ramps and landings
- on top of plant and structures where access is required (see Figure 18)
- around openings in floor and roof structures
- at the edges of shafts, pits and other excavations.

Guardrails should incorporate a top rail 900 mm to 1100 mm above the working surface, a mid-rail and a toe-board.

The guardrail system, method of attachment and the supporting structure should be capable of withstanding the loads that will be applied.

The required load resistance will depend on the momentum of a falling person. For example, the momentum of a person falling from a pitched roof will increase as the pitch, that is, the angle, of the roof increases.

Further information is contained in AS/NZS 4994 (set)[2]: Temporary edge protection.

The WHS Regulation sets out requirements on the use of edge protection in construction work.

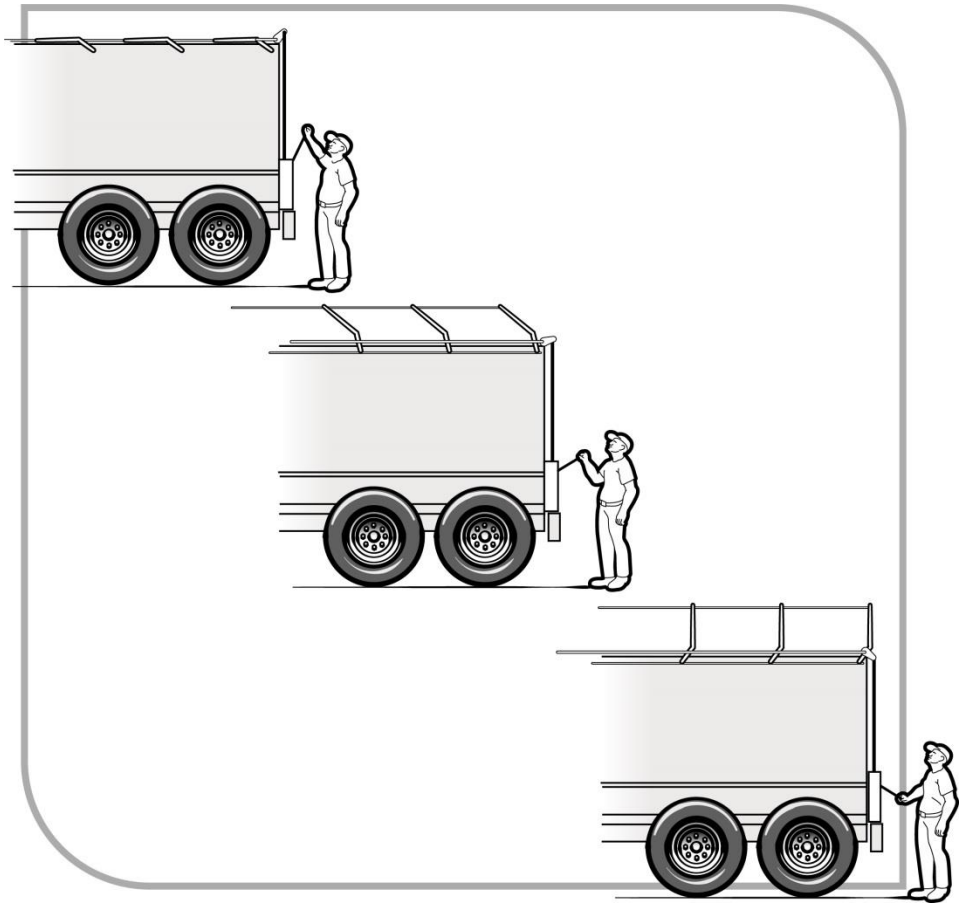

Figure 18 Guardrails installed on top of a tanker to enable safe access to tank hatches

Guardrails for trenching work

Where trenching works present a risk of a person falling into the trench, any such risk should be controlled by the provision of:

- guardrailing, including guardrails fitted to the top edges of trench shields, or
- a barrier approximately 1.5 metres back from the excavation, to prevent persons approaching the trench.

[2] *AS/NZS 4994 (set):* Temporary edge protection *includes AS/NZS 4994.1::* Temporary edge protection – General requirements*; AS/NZS 4994.2:* Temporary edge protection – Roof edge protection – Installation and dismantling*; AS/NZS 4994.3:* Temporary edge protection – Installation and dismantling for edges other than roof edges*; AS/NZS 4994.4:* Temporary edge protection – Perimeter protection screens.

5.3. Safety mesh

Safety mesh is designed to prevent internal falls through a roof. If securely fixed, safety mesh provides fall protection for roof installers and offers long-term protection against falling for maintenance and repair workers.

Safety mesh does not prevent falls from the edge of a roof or through holes in a roof so it should always be used in conjunction with other types of fall prevention devices such as edge protection (e.g. guardrails), or other control measures such as fall arrest systems.

Safety mesh should comply with AS/NZS 4389: Roof safety mesh, which specifies the minimum requirements for the design, construction, testing and installation of safety mesh for use in domestic, commercial and industrial building applications.

The mesh should be formed from 2 mm diameter wire, welded into a mesh with the longitudinal wires not more than 150 mm apart and the cross wires not more than 300 mm apart. Transverse wires should have a 450 MPa minimum tensile strength and longitudinal wires a 500 MPa minimum tensile strength.

Safety mesh should be installed by competent people in accordance with the manufacturer's instructions. Workers installing roof safety mesh must be protected against the risk of falling by using control measures like scaffolding, EWPs or fall arrest systems. The appropriate control measure will depend on what is reasonably practicable in the circumstances.

Particular care is required to ensure that the mesh is securely connected to the structure and the overlap between adjacent sections of mesh is sufficient to generate the necessary strength to resist the force of a person falling onto it. The safety mesh should be covered by the roof cladding as soon as is reasonably practicable after it has been installed.

6. Work positioning systems

A ‘work positioning system’ includes any plant or structure, other than a temporary work platform, that enables a person to be positioned and safely supported at a location in such a way that a fall is prevented.

The use of work positioning systems must only be considered if it is not reasonably practicable to carry out work on the ground or on a solid construction, or by providing a fall prevention device as detailed in Chapter 5, for example an elevating work platform (EWP).

Work positioning systems require a high level of competency on the part of the user and supervisors to ensure safe use. Users, including supervisors, should undertake a relevant competency based course of training before using a work positioning system.

Users should be competent in the technique and possess a suitable attitude for working at height, including a responsible attitude to safety.

Operators should be fit to perform the work and not be affected by alcohol or drugs including prescribed medication which may affect or impair their ability to work at height.

6.1. Restraint technique

A restraint technique controls a person’s movement by physically preventing the person from reaching a position at which there is a risk of a fall. It consists of a harness that is connected by a lanyard to an anchorage or horizontal lifeline. It must be set up to prevent the wearer from reaching an unprotected edge—see Figure 19.

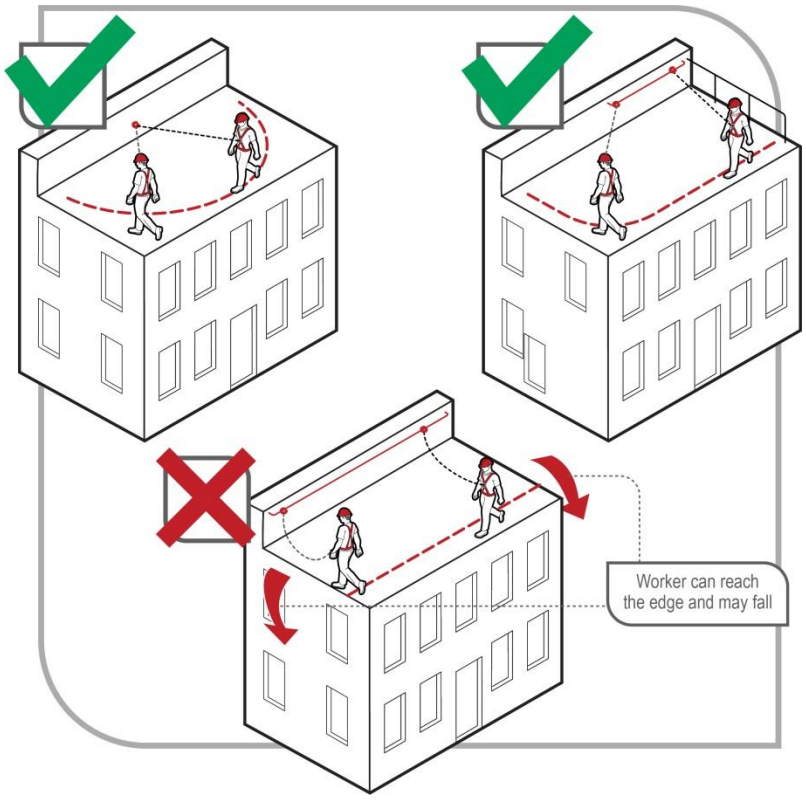

Figure 19 Restraint technique options

A restraint technique is suitable for use where:

- the user can maintain secure footing without having to tension the restraint line and without the aid of another handhold or lateral support. When deciding whether secure footing can be maintained, consider:
- the slope of the surface
- the supporting material type
- the texture of the surface and whether it is likely to be wet, oily or otherwise slippery.

Restraint techniques must only be used if it is not reasonably practicable to prevent falls by carrying out work on the ground or on a solid construction, or by minimising the risk using a fall prevention device, such as providing a physical barrier, for example a guardrail.

A restraint system should be installed by a competent person in accordance with the manufacturer's instructions. Restraint anchorage should be designed for fall arrest loading.

A purpose-designed roof anchor, when used in accordance with the designer's or manufacturer's/supplier's instructions, may be used as part of the restraint technique on metal deck or tiled roofs.

Where it is not reasonably practicable to provide a work positioning system such as a restraint technique, as a person conducting a business or undertaking (PCBU), you must provide a fall arrest system, so far as is reasonably practicable. Situations where it may not be reasonably practicable to use a restraint technique include when:

- the user can reach a position where a fall is possible
- the user has a restraint line that can be adjusted in length so that a free fall position can be reached
- there is a danger the user may fall through the surface, for example fragile roofing material
- the slope is over 15 degrees
- there is any other reasonably likely use or misuse of the system that could lead to a free fall.

In these circumstances it may be more appropriate to use an individual fall arrest system.

6.2. Industrial rope access systems

Industrial rope access systems are used for gaining access to and working at a workface, usually by means of vertically suspended ropes. Although fall arrest components are used in the industrial rope access system, the main purpose of the system is to gain access to a work area rather than to provide backup fall protection (see Figure 20).

Other methods of accessing a workface, for example EWPs or building maintenance units, must be considered before industrial rope access systems.

Before using an industrial rope access system, a risk assessment should be carried out that, amongst other things, considers the location of the work and any associated special features of the structure, anchor points, emergency access and weather conditions.

The use of industrial rope access systems is considered high risk construction work if it involves construction work where there is a risk of a person falling more than 2 metres. The WHS Regulation requires that high risk construction work must not be carried out unless a safe work method statement (SWMS) is prepared for the work. Some of the information contained within the risk assessment can be used in the SWMS.

Where it is necessary for industrial rope access systems to be used, you should ensure:

- rope access work is properly supervised—supervisors of rope access work should have the necessary experience and competence to supervise the rope access work and any potential rescue for each rope access project under their supervision
- operators are competent in the technique and possess a suitable attitude for working at height, including a responsible attitude to safety

- operators should be fit to perform the work and not affected by alcohol or drugs including prescribed medication which may affect or impair their ability to work at height
- operators do not work alone in case they require assistance in an emergency
- when using an industrial rope access system, personal protective equipment (PPE) appropriate for the tasks being undertaken is used, for example helmets, gloves, hearing protection, goggles or masks.

Where industrial rope access systems are used, you should also ensure:

- industrial rope access systems are installed in a location where it is possible to provide prompt assistance or rescue if required (see Chapter 10)
- equipment is checked regularly by a competent person
- fixed anchorage points are checked by a competent person before attaching the rope access lines
- a back-up system is used to protect the operator, for example use two independently anchored ropes for each person
- a person within 3 metres of an unguarded edge is adequately secured
- operators wear a full body or work positioning sit harness with shoulder straps
- supervisors can communicate with workers
- exclusion zones that exclude and alert the public that industrial rope access systems are in use are established and enforced on access areas below the working area and anchorage locations.

Further information on industrial rope access systems is available in AS/NZS 4488: (set)[3]: Industrial rope access systems.

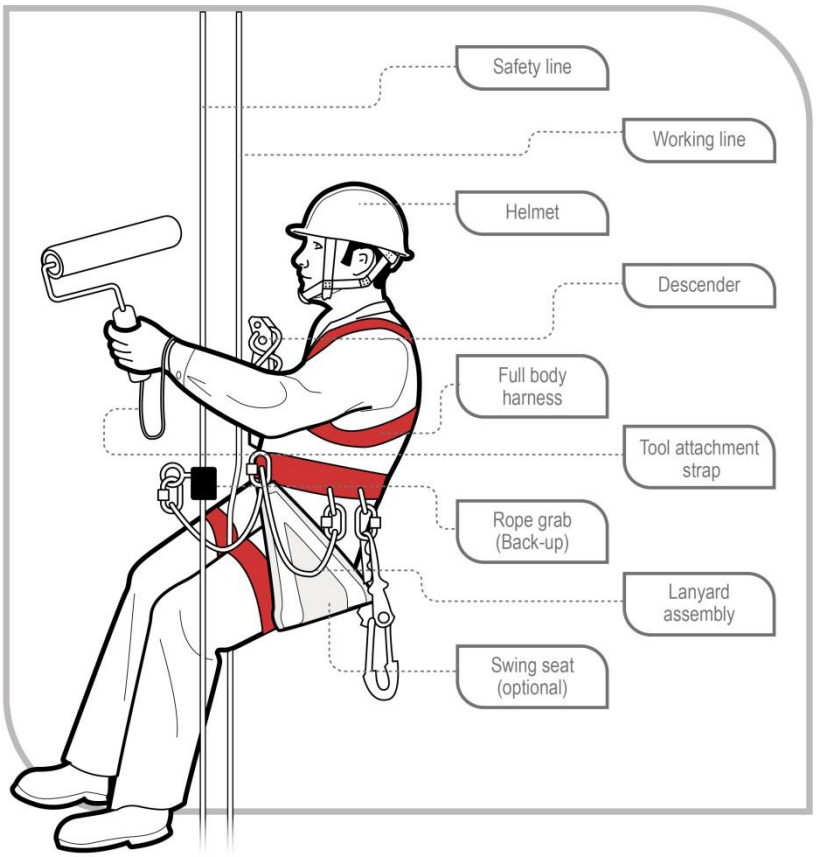

Figure 20 Operator using a descender in an industrial rope access system

[3] *AS/NZS 4488 (set):* Industrial rope access systems *includes AS/NZS 4488.1:* Industrial rope access systems – Specifications*; AS/NZS 4488.1/Amdt 1* Industrial rope access systems – Specifications*; AS/NZS 4488.2:* Industrial rope access systems – Selection, use and maintenance.

7. Fall arrest systems

Fall arrest systems, such as catch platforms, safety nets and individual fall arrest systems (including anchorage lines or rails), are intended to safely stop a worker falling an uncontrolled distance and reduce the impact of the fall. These systems must only be used if it is not reasonably practicable to use a fall prevention device or work positioning system or if these higher level controls might not be fully effective in preventing a fall on their own.

Equipment used for individual fall arrest systems should be designed, manufactured, selected and used in compliance with AS/NZS 1891(set)[4]: Industrial fall-arrest systems and devices.

When using fall arrest systems, the following key safety measures should be observed:

- fall arrest equipment is selected, installed and used correctly. Workers should be trained in the use of fall arrest equipment
- the equipment and anchorages are designed, manufactured and installed to be capable of withstanding the force applied to them as a result of a person's fall
- the system is designed and installed so that the person travels the shortest possible distance before having the fall stopped
- the WHS Regulation sets out requirements on the use of fall arrest harness systems in construction work.

7.1. Catch platforms

A catch platform is a temporary platform located below a work area to catch a worker in a fall. The platform should be of robust construction and designed to withstand the maximum potential impact load. Scaffolding components may be used to construct fixed and mobile catch platforms.

Catch platforms that include the use of a cantilevered, spur or tube and coupler scaffolding system must be installed by people who:

- hold a high risk work licence for intermediate or advanced scaffolding, or
- are enrolled in a training course to obtain an intermediate or advanced scaffolding high risk work licence and are being supervised by the holder of an intermediate or advanced scaffolding high risk work licence.

Catch platforms installed on prefabricated scaffolding systems from which a person or object could fall more than 4 metres must be installed by people who:

- hold a high risk work licence for basic scaffolding, or
- are enrolled in a training course to obtain a basic scaffolding high risk work licence and are being supervised by the holder of a basic scaffolding high risk work licence.

Catch platforms should:

- incorporate a fully planked-out deck
- be positioned so the deck extends at least 2 metres beyond unprotected edges of the work area, except where extended guardrailing is fitted to the catch platform
- be positioned as close as possible to the underside of the work area—the distance a person could fall before landing on the catch platform should be no more than 1 metre
- always be used with edge protection.

The WHS Regulation sets out requirements on the use of catch platforms in construction work.

[4] *AS/NZS 1891 (set):* Industrial fall-arrest systems and devices *includes AS/NZS 1891.1:* Industrial fall-arrest systems and devices – Harnesses and ancillary equipment*; AS/NZS 1891.1:/Amdt 1*: Industrial fall-arrest systems and devices – Harnesses and ancillary equipment*; AS/NZS 1891.1:/Amdt 2*: Industrial fall-arrest systems and devices – Harnesses and ancillary equipment*; AS/NZS 1891.2*:: Industrial fall-arrest systems and devices – Horizontal lifeline and rail systems*; AS/NZS 1891.2 Supp 1*:: Industrial fall-arrest systems and devices – Horizontal lifeline and rail systems – Prescribed configurations for horizontal lifelines*; AS/NZS 1891.3*:: Industrial fall-arrest systems and devices – Fall-arrest devices*; AS/NZS 1891.4*:: Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance.

7.2. Safety nets

Safety nets can provide a satisfactory means of protection while allowing workers maximum freedom of movement. They should not be used to enter or exit a work area or as a working platform.

Safety nets used in conjunction with basic rigging or scaffolding work must be erected and serviced by people who:

- hold a high risk work licence for Basic Rigging or Basic Scaffolding, or
- are enrolled in a training course to obtain a Basic Rigging or Basic Scaffolding high risk work licence and are supervised by the holder of a Basic Rigging or Basic Scaffolding high risk work licence.

When safety nets are used they should be:

- constructed of material strong enough to catch a falling person or thing
- securely anchored before work starts
- hung as close as is practicable to the underside of the working area, but no more than 2 metres below the working area
- sufficiently tensioned and have clearance to prevent a falling person contacting any surface or structure below the net
- inspected, particularly after installation, relocation or repair
- stored correctly in dry, shaded areas with good air circulation.

Other precautions when using safety nets include:

- no hot work like welding, oxy cutting, or any other work that may damage the safety net, should be performed above safety nets
- material and other refuse should not be allowed to accumulate in safety nets.

7.3. Individual fall arrest systems

Individual fall arrest systems consist of some or all of the following components:

- anchorages including rail system
- lifelines, lanyard, shock absorber and inertia reel
- rope and wire grabs
- harness
- snap hooks and karabiners—double or triple action to prevent rollout
- rescue equipment.

Individual fall arrest systems rely on workers wearing and using them correctly, therefore workers who will use such a system must be trained in its safe use. Users of individual fall arrest systems should possess a suitable attitude for working at height, including a responsible attitude to safety.

Workers using a fall arrest system should wear appropriate head protection to protect them in a fall.

- If the equipment has been used to arrest a fall, it should not be used again until it has been inspected and certified by a competent person as safe to use.
- Individual fall arrest systems must only be used where it is not reasonably practicable to use higher level control measures.

Individual fall arrest equipment should be permanently marked or labelled with relevant information aimed at reducing misuse of the equipment.

Fall arrest lines can fail if they come into contact with an edge. Fall arrest lines that can come into contact with edges such as concrete or steel beam edges should be of a type that has been shown to not fail during such use.

Anchorage points

Each anchorage point should comply with the anchor strength specified in AS/NZS 1891:4:2009: Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance.

Insert-type anchors, that is anchors installed in partial depth holes in concrete or other masonry, including friction, chemical and screw type anchors, should not be used for fall arrest anchors where the potential loading is a direct pull-out load.

Anchorages should be tested and approved by a competent person before use. For insert-type anchors this should include pull-out testing as the grip on the concrete below the surface cannot be assessed by a visual inspection.

Each anchorage point should be located so that a lanyard of the system can be attached to it before the person using the system moves into a position where they could fall.

Inspecting the system components

Each component of the individual fall arrest system should be inspected by a competent person:

- after it is installed but before it is used
- at regular intervals
- immediately after it has been used to arrest a fall.

Inspection of components should be conducted in accordance with the manufacturer's specifications and the relevant standards. If signs of excessive wear or other defects are found during the inspection those components should be withdrawn from use.

Limiting free fall distance

Harness-based fall arrest systems should be installed so that the maximum distance a person would free fall before the fall arrest system takes effect is 2 metres, although a lesser free fall distance is preferable. There should be sufficient distance between the work surface and any surface below to enable the system, including the action of any shock absorber, to fully deploy (see Figure 21). To work out whether there is enough distance available you should take into account:

- the worker's height
- the height and position of the anchorage point
- the length of the lanyard
- any slack in the horizontal lifeline
- any stretching of the lanyard or horizontal lifeline when extended by a fall
- the length of the energy absorber when extended by a fall.

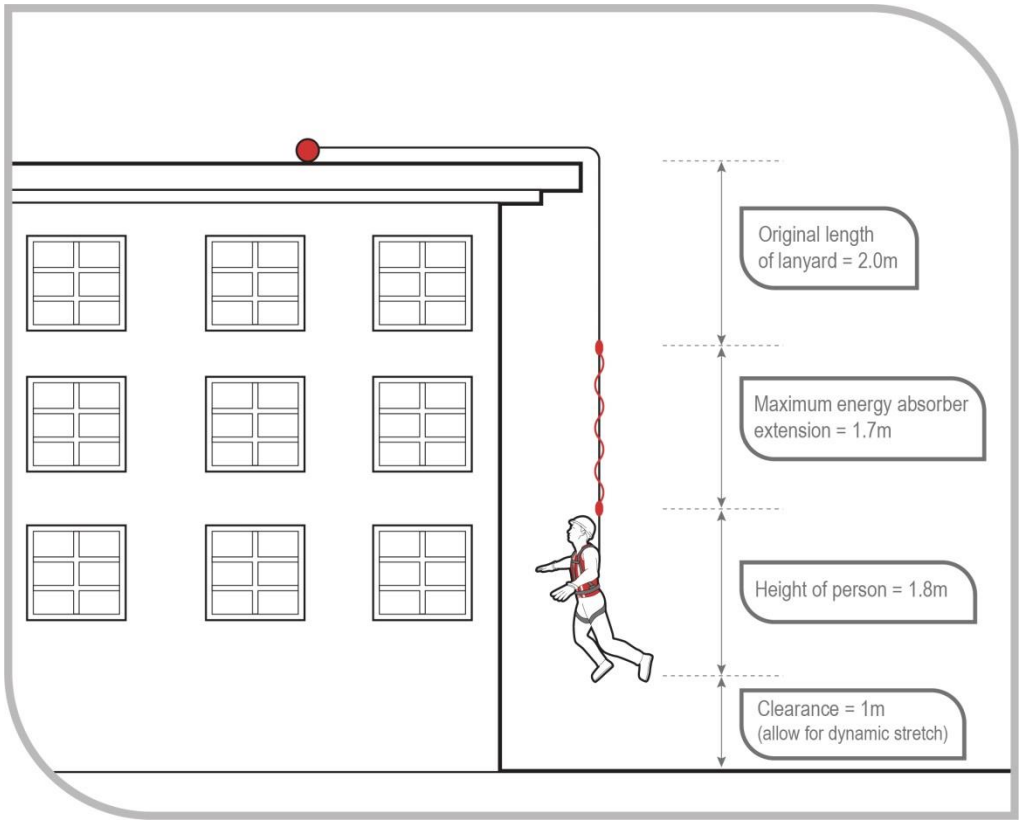

Figure 21 Total fall distance before this particular configuration would be effective in arresting a fall is 6.5 m

Do not use lanyards in conjunction with inertia reels as this can result in an excessive amount of free fall before the fall is arrested.

Harnesses

Full body harness should be worn and must be correctly fitted. Workers should connect the fall arrest line to the attachment point on their harness—dorsal attachment point or the chest connection—that will provide the best protection for the situation. Consideration should be given to the potential fall distance, potential impact with the structure, body position after a fall and the need to interact with equipment like rope-grabs.

Maintaining a minimum of slack in fall arrest lanyard

There should be a minimum of slack in the fall arrest lanyard between the user and the attachment. The anchorage point should be as high as the equipment permits. Work should be avoided above the anchor point, as this will increase the free fall distance in a fall, resulting in higher forces on the body and greater likelihood of the lanyard snagging on obstructions.

Use inertia reels correctly

The use of inertia reels may not be effective in certain situations. For example, if a worker falls down the inclined surface of a steeply pitched roof, the inertia reel line may keep extending from the reel as it may not lock.

Inertia reels should not be used as working supports (by locking the system and allowing it to support the user) during normal work as they are not designed for continuous support.

Inertia reels can be used as a control measure in connection with work carried out from bosun's chairs and ladders. Where such lines are used, only one person may be attached to one line.

Using compatible components

The use of non-compatible components may lead to 'roll-out' with some hook and karabiner configurations, resulting in injury or death to the user. The hazard cannot always be avoided by using components produced by the same manufacturer under the one brand name. If you are unsure

whether components of a fall arrest system are compatible you should contact the manufacturer for further information.

Snap hooks should be the double action type that requires at least two consecutive deliberate actions to open. Snap hooks should not be connected to each other as this could prevent the safe operation of the snap hook, for example roll-out may occur. Some double action hooks are susceptible to roll-out. Hex nut connectors may be appropriate for semi-permanent connections.

Further information is in AS/NZS 1891 (set): Industrial fall-arrest systems and devices series (details above).

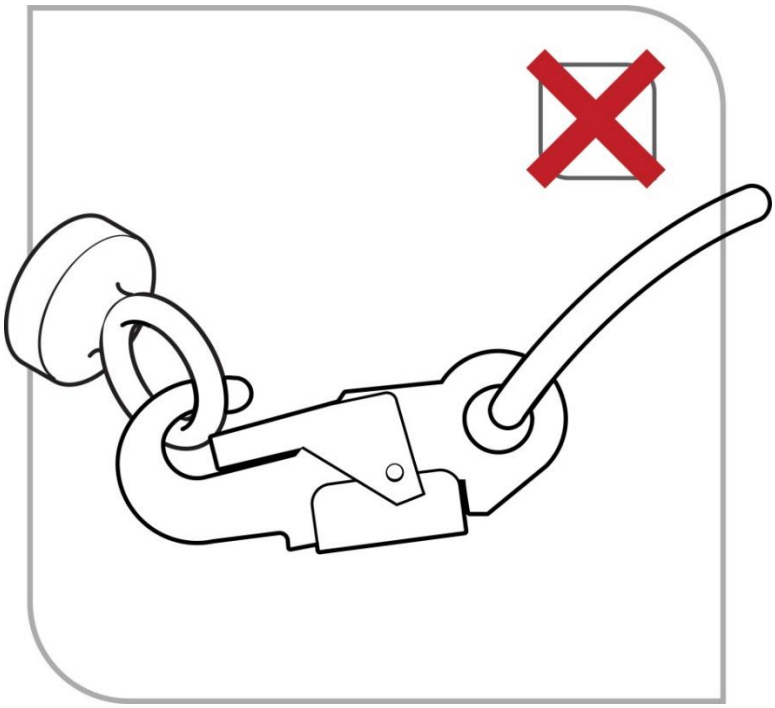

Figure 22 Roll-out on a small diameter eyebolt

Ensuring prompt rescue in event of fall

A PCBU who implements a fall arrest system as a control measure must establish emergency and rescue procedures. The emergency and rescue procedures must be tested to ensure that they are effective, and workers must be provided with suitable and adequate information, training and instruction in relation to the emergency procedures.

The rescue of a worker who is suspended in a full body harness should occur promptly to prevent suspension intolerance and to treat any injuries sustained during the fall and fall arrest.

A worker should not use a fall arrest system unless there is at least one other person on the site who can rescue them if they fall.

Individual fall arrest system: hazards

If a person using an individual fall arrest system falls, the system may act as a pendulum, and in some situations the user may hit the ground, which is called ‘swing down’ (see Figure 23), or swing back into the building or structure, which is called ‘swing back’ (see Figure 24).

‘Swing down’ can occur if the lanyard slides back along the perimeter edge of the roof until it is vertical. When this happens, the person may hit the ground or the lanyard may break as a result of its contact with the edge of the roof. Measures to address the risk of ‘swing down’ include:

- the installation of guardrails
- placing the anchorage point at a right angle to the position of the lanyard at the perimeter edge, for example by using a mobile anchorage
- the installation of a second anchorage point and belay devices—intermediate anchorages.

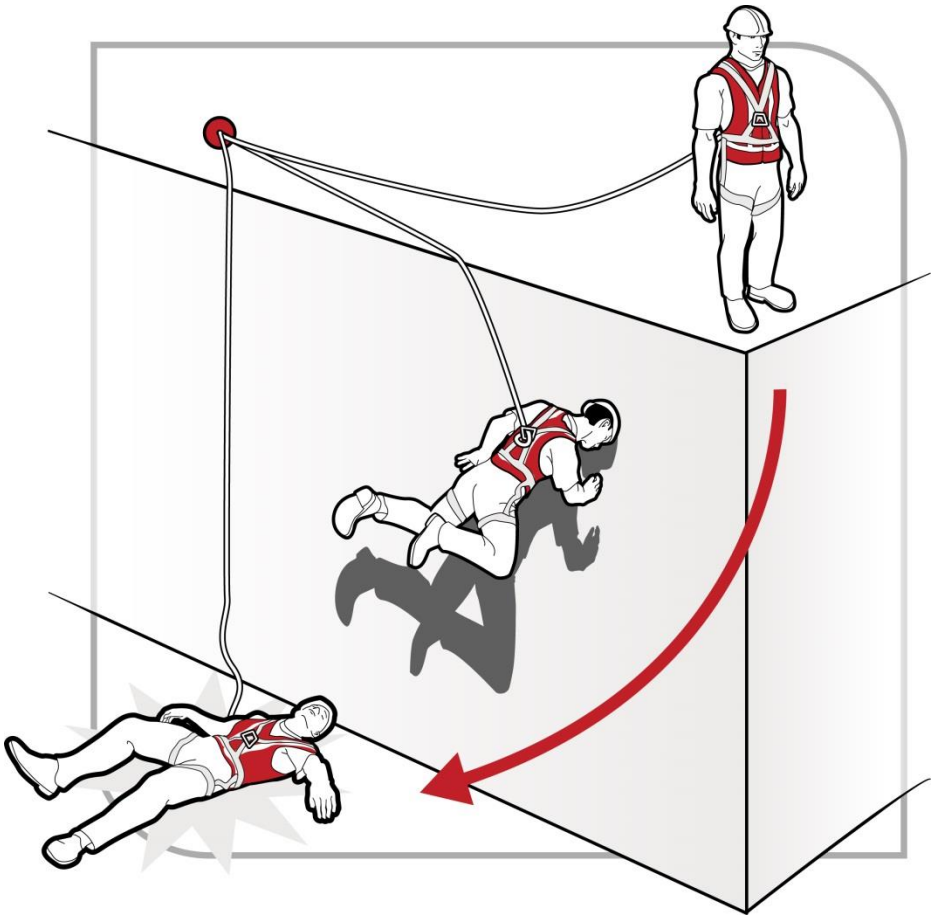

Figure 23 ‘Swing down’: the length of the lanyard and positioning of the anchor allow contact with the ground

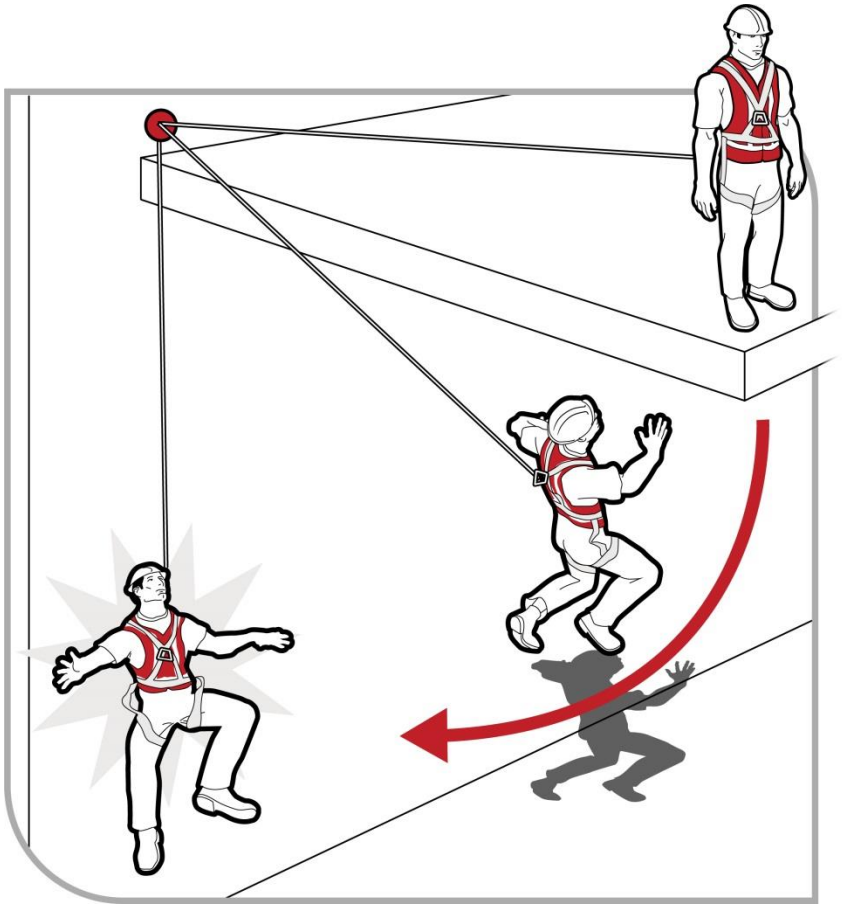

Figure 24 During ‘swing back’ the length of the lanyard and positioning of the anchor may allow the worker to hit the structure

7.4. Vertical anchorage lines or rails

Vertical anchorage lines or rails are temporary or permanent fall arrest systems which can be installed to provide continuous fall protection for workers using ladders or climbing towers. These can be used on plant like tower cranes as well as on buildings and structures.

With an anchorage line system, the person climbing has continuous fall protection by being attached to the anchorage line and harness.

Safety precautions when using vertical anchorage lines or rails include ensuring:

- systems comply with AS/NZS 1891 (set): Industrial fall-arrest systems and devices, including a suitable harness for the task and checking that the use by date has not passed
- the locking device is attached to the frontal attachment point of the harness and the lanyard assembly is a maximum of 300 mm length
- the point of connection onto the anchorage system is near the base of the ladder to allow the connection to be made before beginning to ascend and also to provide continuous connection to the disconnecting point when at a safe higher level
- free fall is limited to a maximum of 600 mm
- permanent systems are of wire or rail construction and are installed according to the manufacturer’s instructions.

After a fall, you should remove the system from service and have it inspected by a competent person before it is used again.

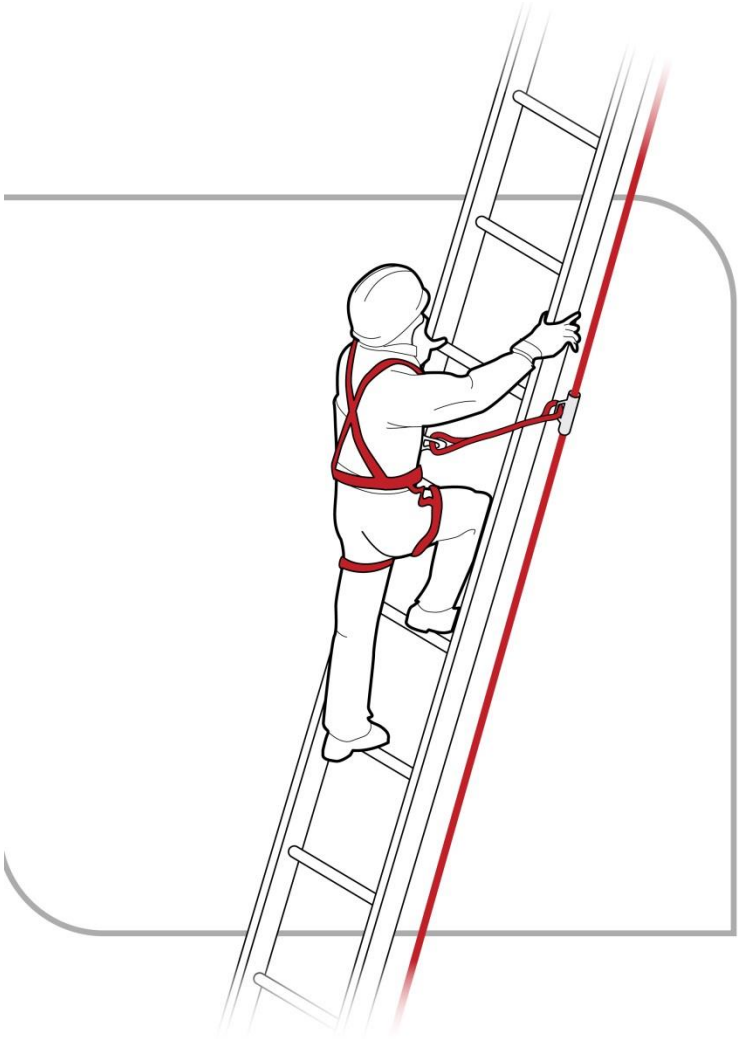

Figure 25 Anchorage line system

7.5. Double lanyards

An alternative to anchorage lines or rails is the use of a double lanyard—also known as a twin tail or ‘Y’ lanyard. Double lanyards should include double action connectors to prevent unintentional opening during use. Figure 26 shows how the use of a double lanyard means that the person climbing can always be connected to the ladder or structure.

However, double lanyards are easy to misuse—there should be no back hooking; they should not be wrapped around the body or passed between the legs; the chest connection should never be higher than the highest attachment point; they are not suitable for frequent use because of possible misuse or muscle injury; and the ladder or structure points must be capable of arresting forces generated by a fall with the double lanyard. Training should also be provided on their use.

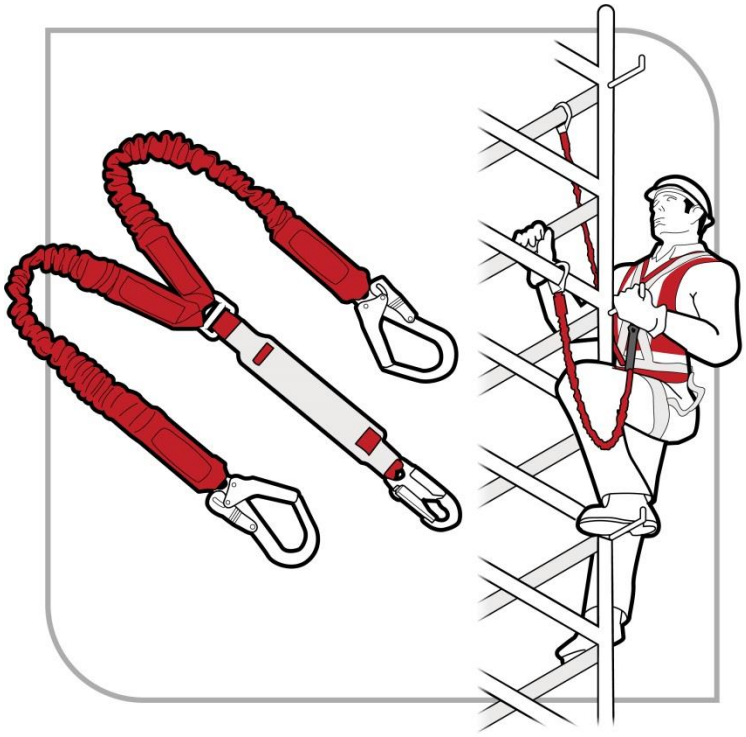

Figure 26 An example of a double lanyard

It is noted that in the application shown in Figure 26 the connectors will slide down to the lowest point on the rail and likely be subject to side loading. Side loading can be controlled by using soft connections like slings or the use of hooks rated to withstand side loading.

8. Administrative controls

Administrative controls may be used to support other control measures and may include ‘no go’ areas, permit systems and the sequencing of work. You must not use administrative controls exclusively to minimise the risk of falls unless it is not reasonably practicable to use a higher order control.

If relying on administrative controls, it may be necessary to provide a high level of supervision to ensure that they are being adhered to.

8.1. No go areas

No go areas can be an effective method of making sure people are not exposed to hazards like falls or being hit by a falling object. They require clear signs warning people not to access the hazardous area. They can be used to highlight the risks of entry to an area where there is an unguarded hazard, or to areas where work is being carried out overhead and there is a risk of falling objects.

Information and instruction should be provided about no go areas, with supervision to ensure that no unauthorised worker enters the no go area.

Barriers should be used in conjunction with signs to cordon off areas where there is a risk of falling or being hit by falling objects. They should be highly visible and securely fixed to prevent displacement.

Figure 27 No go area sign

8.2. Permit systems

Permit systems allow only competent people trained in the use of relevant control measures to work in an area where there is a hazard. Examples include:

- tagging access points to a scaffold with ‘only licensed scaffolders permitted on an incomplete scaffold’ to restrict unauthorised access during erection and dismantling
- requiring permits for access to areas where restraint systems or fall arrest systems are to be used.

8.3. Organising and sequencing of work

Work should be organised so that people do not interfere with other workers or increase the risk to themselves or others. For example, you can sequence jobs so that different trades are not working above or below each other at the same time. Plan so the work is not carried out for extended periods from a ladder, or so that work at height is minimised in extremely hot or cold weather.

9. Ladders

Falls from ladders have resulted in a significant number of serious and fatal injuries, even when working at relatively low heights. While ladders are often considered to be the first option when working at heights, they should only be considered after safer alternatives, for example elevating work platforms (EWPs) or scaffolding, have been considered first and found to be not reasonably practicable.

The WHS Regulation sets out requirements on the use of ladders in construction work.

9.1. Portable ladders

Extension or single ladders should only be used as a means of access to or exit from a work area or for short duration light work that can be carried out safely from the ladder.

Selecting ladders

Ladders should be selected to suit the work to be carried out. In doing this, you should consider the duration of the work, the physical surroundings of where the work is to be carried out and the prevailing weather conditions.

Depending on the specific task and how it is carried out, step platforms (see Figure 28) should provide an improved level of fall protection over traditional step or single ladders as they include a small working platform and a partial handrail.

Ladders should have a load rating of at least 120 kg and be manufactured for industrial use. Domestic or 'homemade' ladders should not be selected for industrial use or for use on construction sites.

Figure 28 A step platform can provide a stable work surface

Using ladders safely

Workers must be provided with information and training on how to use ladders safely. You should only use a ladder if you have been trained in how to inspect, set up and use ladders correctly.

Positioning and setting up ladders

Before setting up a ladder, it should be inspected for visible damage or faults, for example broken rungs, stiles and footings. Faulty or damaged ladders must be removed from service.

When setting up a ladder you should check that:

- the ladder is the correct height for the work to avoid over-reaching or stretching
- locking devices on the ladder are secure
- the ladder is not placed so that the weight of the ladder and any person using the ladder is supported by the rungs.

Ladders used at a workplace should be set up on a solid and stable surface, and to prevent the ladder from slipping. Single and extension ladders can be prevented from slipping by:

- ensuring the ladder has non-slip feet
- placing ladders at a slope of 4:1 (the distance between the ladder base and the supporting structure should be about 1 metre for every 4 metres of working ladder height)
- securing ladders at the top or bottom, or if necessary, at both ends (see Figure 29).

Stepladders should be set up in the fully opened position and may require a second person to ‘foot’ the ladder for added stability.

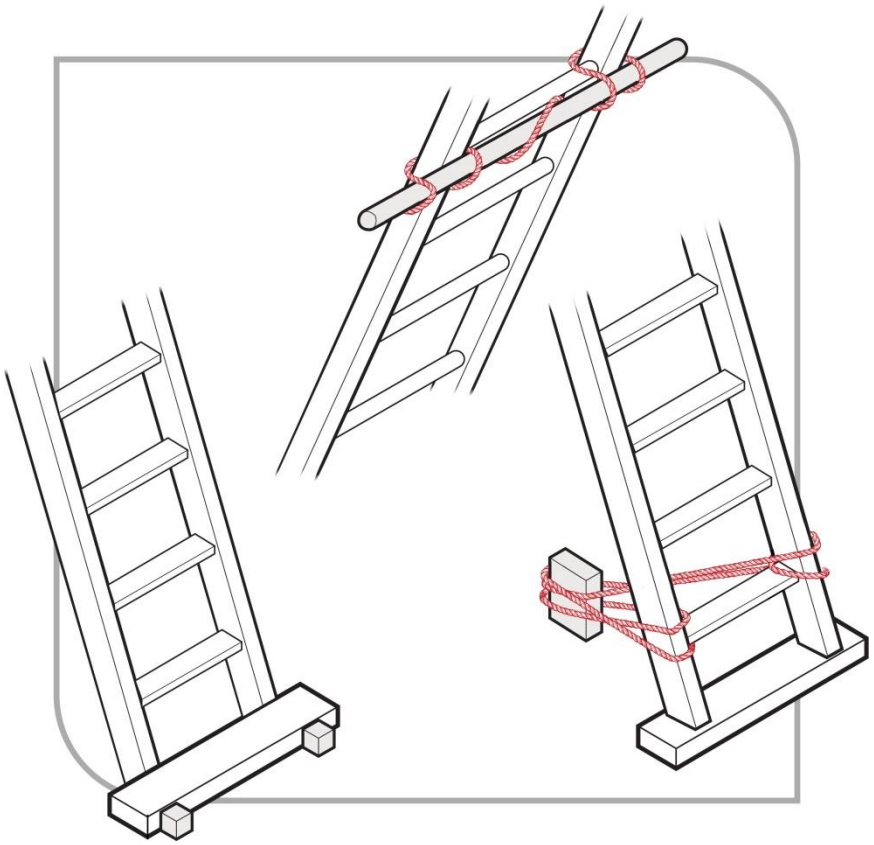

Figure 29 Examples effectively securing a ladder

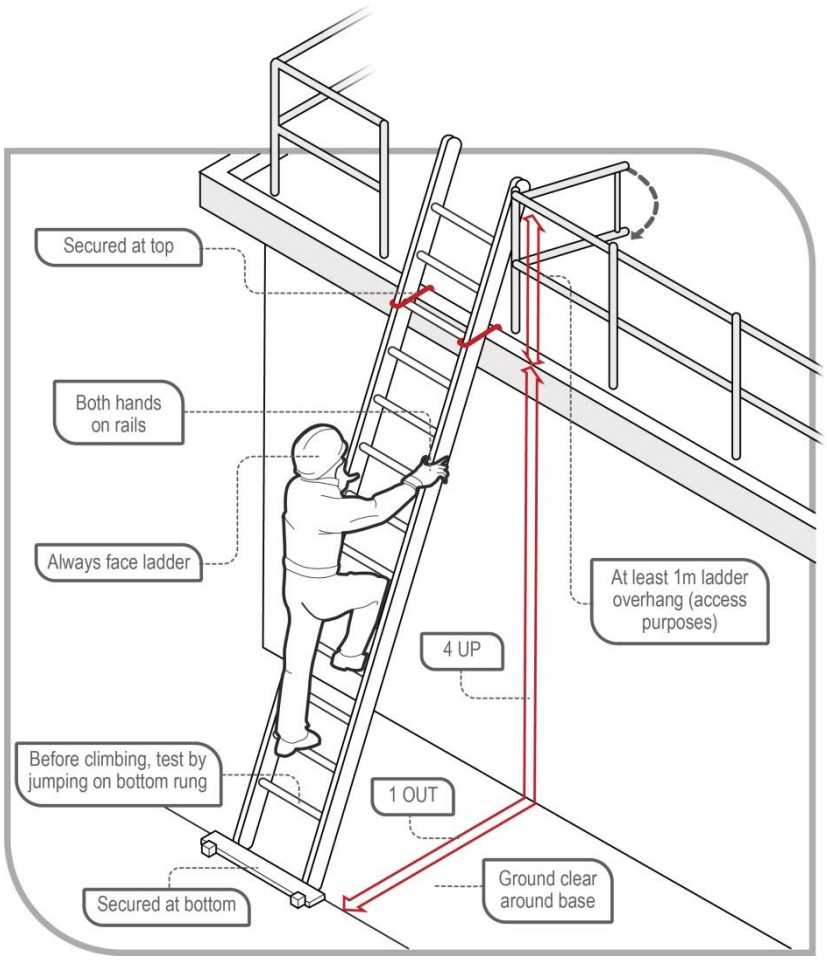

Figure 30 Example of acceptable ladder use

Safe use of ladders

When using a ladder:

- always maintain ‘three points of contact’ as follows:
  - when going up or down a ladder, always have two feet and one hand, or one foot and two hands, on the ladder
  - when working from a ladder, have two feet and one other point of contact with the ladder, such as a hand or thighs leaning against the ladder
  - use a tool belt or side pouch so that materials or tools are not carried in the hands while climbing the ladder
  - ensure only light duty work is carried out while on the ladder, where tools can be operated safely with one hand
  - make sure that no-one works underneath the ladder
  - do not allow anyone else on the ladder at the same time
  - do not straddle the ladder
  - wear slip-resistant footwear.

When using ladders it is not safe to:

- use metal or metal reinforced ladders when working on live electrical installations, or
- carry out ‘hot’ work like arc welding or oxy cutting.

Except where additional fall protection equipment is used in conjunction with the ladder, it is not safe to:

- use a stepladder near the edge of an open floor, penetration or beside a railing
- over-reach—the centre of the torso should be within the ladder stiles throughout the work

- use power or hand tools requiring two hands to operate, for example concrete cutting saws and circular saws
- use tools that require a high degree of leverage force which, if released, may cause the user to over-balance or fall from the ladder, for example stillsons or pinch bars
- face away from the ladder when going up or down, or when working from it
- stand on a rung closer than 900 mm to the top of a single or extension ladder, or
- stand higher than the second tread below the top plate of a stepladder with the exception of three-rung stepladders, unless working through an overhead opening of the building or structure that provides appropriate additional support above the ladder.

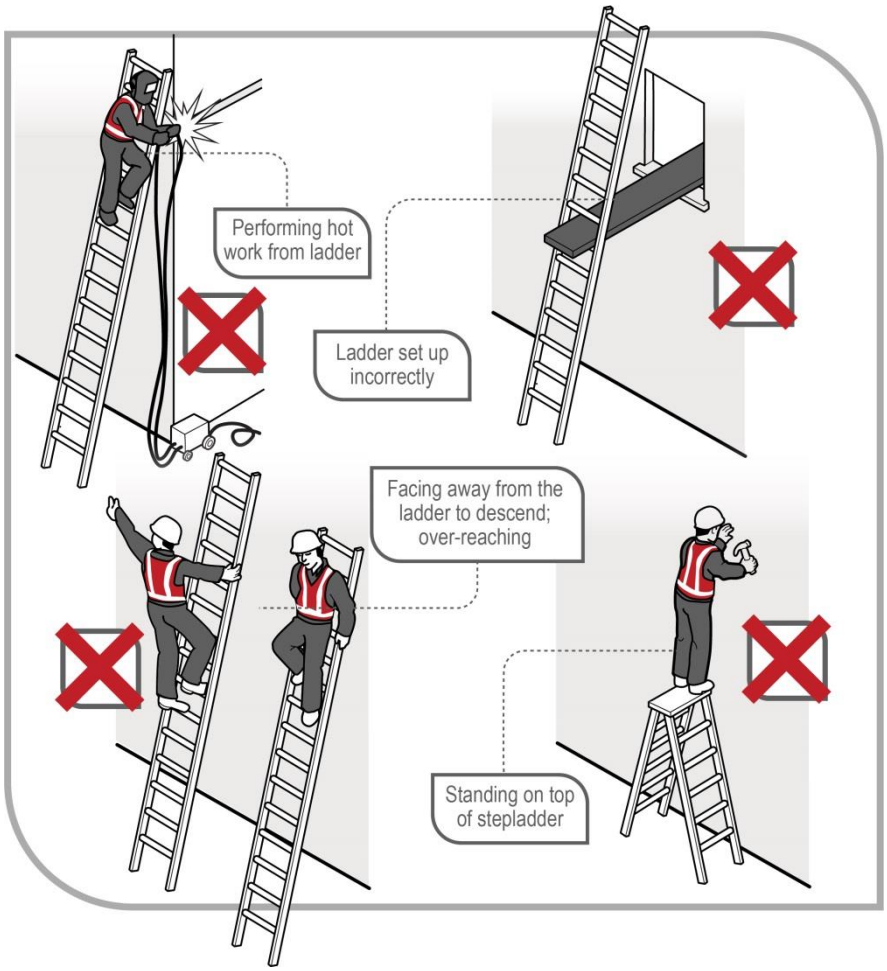

Figure 31 Examples of unsafe ladder use

Ladder use in the following situations should only be carried out with additional safety precautions in place:

- in access areas or doorways—if necessary, erect a barrier or lock the door shut
- next to powerlines, unless the worker is trained and authorised and the correct ladder for the work is being used
- in very wet or windy conditions
- next to traffic areas, unless the working area is barricaded.

Where single or extension ladders are used for entry and exit, you should check that:

- there is a firm, stable work platform, free from obstructions, to step onto from the ladder
- the ladder is securely fixed
- the ladder extends at least 1 metre above the stepping-off point on the working platform
- fall protection is provided at the stepping-off point where people access the working platform.

As an alternative to using ladders as a means of access in stairwells, you should consider having the staircase installed as soon as possible.

Further information on the selection, safe use and care of portable ladders is set out in AS/NZS 1892 (set)[5]: Portable ladders.

The ladder manufacturer's recommendations on safe use should also be followed.

9.2. Fixed ladders

Fixed ladders should be installed in accordance with AS 1657: Fixed platforms, walkways, stairways and ladders – Design, construction and installation.

Ladder cages on vertical fixed ladders, that is, over 75 degrees to the horizontal, do not stop a fall but simply funnel a fall and, in some cases, more injuries can occur from striking the protective backguards on the way down. The cages may also hinder rescues. Therefore, fixed ladders with angles exceeding 75 degrees to the horizontal should be fitted with a permanent or temporary fall arrest system using anchorage lines or rails.

The ladder's angle of slope should not be less than 70 degrees to the horizontal and not greater than 75 degrees to the horizontal. In no case should the ladder overhang the person climbing the ladder. If the angle is more than 75 degrees, a safe system of work to prevent falls should be provided, for example a permanent fall arrest system or a full body harness with double lanyard.

A specifically designed rescue procedure should be developed for use in ladder cage situations. Training in rescue procedures should occur before using the fixed ladder.

[5] *AS/NZS 1892 (set):* Portable ladders *includes AS/NZS 1892.1:* Portable ladders – Metal*; AS 1892.2–*: Portable ladders – Timber*; AS/NZS 1892.3:* Portable ladders – Reinforced plastic*; AS/NZS 1892.5:* Portable ladders – Selection, safe use and care.

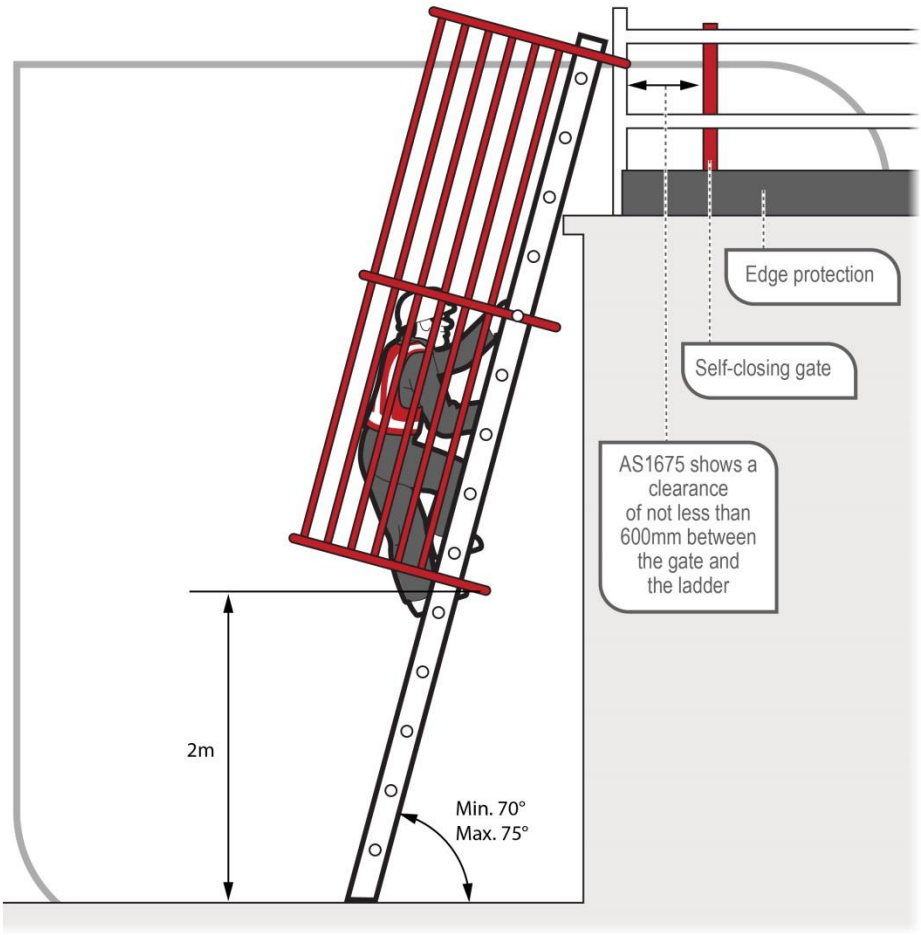

Figure 32 Fixed ladder with ladder cage

9.3. Ladder maintenance

Ladders should be regularly inspected by a competent person in accordance with the manufacturer's recommendations. Ladders with any of the following faults should be replaced or repaired:

- fibreglass stiles cracked, chipped or severely faded with fibres exposed
- timber stiles warped, splintered, cracked or bruised
- metal stiles twisted, bent, kinked, crushed or with cracked welds
- rungs, steps, treads or top plates that are missing, worn, damaged or loose
- tie rods missing, broken or loose
- ropes, braces or brackets that are missing, broken or worn
- timber members that are covered with opaque paint or other treatment that could disguise faults in the timber
- missing, loose, bent or worn fasteners, that is rivets, bolts and pins, and/or
- worn or damaged feet including non-slip material.

10. Emergency procedures for falls

Whenever there are risks from working at height, emergency procedures must be established and first aid equipment provided. Typical injuries from falls can include unconsciousness, blocked airway, impalement, serious head or abdominal injuries and fractures. A person using a fall arrest system could also suffer suspension intolerance as a result of being suspended in a harness after a fall.

WHS Regulation section 80

Emergency and rescue procedures

A person conducting a business or undertaking (PCBU) who provides a fall arrest system as a measure to control risk must establish emergency and rescue procedures.

The procedures must be tested so that they are effective. Workers must be provided with suitable and adequate information, instruction and training in relation to the emergency procedures.

When developing emergency procedures, the different types of emergency and rescue scenarios that might arise should be considered. Information from the risk assessment will help in this task.

WHS Regulation section 42

Duty to provide first aid

You must ensure that workers have access to first aid equipment and facilities for the administration of first aid. You must also ensure that workers are trained to administer first aid or that workers have access to people who are trained in first aid.

Further information is contained in the First aid in the workplace Code of Practice.

The emergency procedures for falls should be incorporated into the emergency plan required for the workplace under the WHS Regulation.

Table 1 lists a number of considerations when establishing emergency procedures for falls.

Table 1 Considerations when establishing emergency procedures for falls

Relevant consideration	Questions
Location of the work area	Is the work at height being carried out in a remote or isolated place? How accessible is it in an emergency and how far away is it from medical facilities? Can the rescue of a person after an arrested fall be provided immediately, without relying on emergency services?
Communications	How can workers working at height communicate in an emergency?
Rescue equipment	What kinds of emergencies may arise? The provision of suitable rescue equipment will depend on the nature of the work and the control measures used, for example an emergency rapid response kit with man-made fibre rope, according to AS/NZS 4142.3: Fibre ropes— Part 3: Man-made fibre rope for static life rescue lines. Selected rescue equipment should be kept in close proximity to the work area so that it can be used immediately.

Relevant consideration	Questions
Capabilities of rescuers	Are rescuers properly trained, sufficiently fit to carry out their task and capable of using equipment provided for rescue, for example breathing apparatus, lifelines and firefighting equipment? Have emergency procedures been tested to demonstrate that they are effective?
First aid	Is first aid available for injuries associated with falls? Are trained first aid officers available to make proper use of necessary first aid equipment?
Local emergency services—if they are to be relied on for rescue	How will the local emergency services, like ambulance, be notified of an incident? What is the likely response time?

10.1. Suspension intolerance

Suspension intolerance can occur with a fall arrest system when a person has an arrested fall and is suspended in an upright, vertical position. The capacity of the lower legs to store large amounts of blood reduces the return of blood to the heart, slowing the heart rate, which can cause the person to faint. This may lead to renal failure and eventually death, depending on a person's susceptibility. This condition may be worsened by heat and dehydration.

The quick rescue of a person suspended in a harness, as soon as possible, is vital. For this reason, workers should be capable of conducting a rescue of a fallen worker and be familiar with on-site rescue equipment and procedures.

Relevant workers must be trained in the rescue procedures. It is important for workers to be able to recognise the risks of suspension intolerance and act quickly in the rescue of a person.

Preventing suspension intolerance

To prevent suspension intolerance occurring as a result of an arrested fall, you should ensure that:

- workers never work alone when using a harness as fall protection
- workers use a harness, which allows legs to be kept horizontal
- where the rescue is likely to take more than five minutes the harness and connection point used should allow the suspended worker to raise their legs to near horizontal, or the worker should carry straps to provide footholds
- workers are trained to do the following when they are hanging in their harness after a fall:
    - move their legs in the harness and push against any footholds, where these movements are possible. In some instances, the harness design and any injuries received may prevent this movement
    - move their legs or legs and body to a near horizontal position, where these movements are possible.

10.2. Training for rescues

The training for rescuing workers who have fallen should address the following factors:

- the rescue process should start immediately
- training frequency should take into account the worker's competence and their ability to retain competence through regular exposure to the equipment and skills needed to perform a rescue
- workers should not put themselves at risk during a rescue.

Appendix A—Glossary

Term	Description
Anchorage	A secure point for attaching a lanyard, lifeline or other component of a travel restraint system technique or fall arrest system. Anchorages require specific load and impact capacities for their intended use.
Competent person	A person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.
Double or triple action device	A self-closing hook or karabiner with a keeper latch which will automatically close and remain closed until manually opened. These units have a minimum of at least two distinct and deliberate consecutive actions to manually open them.
Duty holder	Any person who owes a work health and safety duty under the WHS Act including a person conducting a business or undertaking, a designer, manufacturer, importer, supplier, installer of products or plant used at work (upstream duty holder), officer or a worker.
Energy absorber	A device that reduces the deceleration force imposed when a fall is suddenly arrested, and correspondingly reduces the loadings on the anchorage and the person's body. The energy absorber may either be a separate item or manufactured as part of the lanyard.
Fall	A fall by a person from one level to another.
Fall arrest system	Plant or material designed to arrest a fall.
Free fall	Any fall or part of a fall where the person falling is under the unrestrained influence of gravity over any fall distance, either vertically or on a slope on which it is not possible to walk without the assistance of a handrail or hand line.
Hazard	A situation or thing that has the potential to harm a person. Hazards at work may include: noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace.
Health and safety committee	• A consultative body established under the WHS Act. The committee's functions include facilitating cooperation between workers and the person conducting a business or undertaking to ensure workers' health and safety at work, and assisting to develop work health and safety standards, rules and procedures for the workplace.
Health and safety representative	• A worker who has been elected by their work group under the WHS Act to represent them on health and safety matters.

Term	Description
Inertia reel	A type 2 or 3 fall arrest device, as classified in AS/NZS 1891.3, that arrests a fall by stopping the payout of the anchor line. Also known as a self-retracting lanyard or fall arrest block.
Karabiners	Usually a 'D'-shaped or oblong metal ring, with a spring-hinged opening on one side, used as a connector between components of a fall arrest system. They come in a variety of sizes, shapes and locking mechanisms to suit various applications. They should be self-closing and self- or manual-locking and capable of being opened only by at least two consecutive deliberate manual actions.
Lanyard	An assembly consisting of a line and components which will enable connection between a harness and an anchorage point and will absorb energy in the event of a fall.
May	• 'May' indicates an optional course of action.
Must	• 'Must' indicates a legal requirement exists that must be complied with.
Officer	An officer under the WHS Act includes: • an officer under section 9 of the *Corporations Act 2001* (Cth) • an officer of the Crown within the meaning of section 247 of the WHS Act, and • an officer of a public authority within the meaning of section 252 of the WHS Act. A partner in a partnership or an elected member of a local authority is not an officer while acting in that capacity.
Person conducting a business or undertaking (PCBU)	PCBU is an umbrella concept which intends to capture all types of working arrangements or relationships. A PCBU includes a: • company • unincorporated body or association, and • sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A volunteer association (defined under the WHS Act, see below) or elected members of a local authority will not be a PCBU.
Restraint line	The line securing workers to a point of anchorage which is used to prevent a person from reaching a point from which he or she could fall.
Risk	• The possibility harm (death, injury or illness) might occur when exposed to a hazard.
Risk control	Taking action to eliminate health and safety risks so far as is reasonably practicable, and if that is not possible, minimising the risks so far as is reasonably practicable. Eliminating a hazard will also eliminate any risks associated with that hazard.

Term	Description
Risk of a fall	A circumstance that exposes a worker while at work, or other person while at or in the vicinity of a workplace, to a risk of a fall that is reasonably likely to cause injury to the worker or other person. This includes circumstances in which the worker or other person is: • in or on plant or a structure that is at an elevated level • in or on plant that is being used to gain access to an elevated level • in the vicinity of an opening through which a person could fall • in the vicinity of an edge over which a person could fall • on or in the vicinity of a surface through which a person could fall • on or near the vicinity of a slippery, sloping or unstable surface.
Scaffold	A temporary structure specifically erected to support access or working platforms.
Scaffolding	The individual components, for example tubes, couplers or frames and materials, that when assembled form a scaffold.
Scaffolding work	Erecting, altering or dismantling a temporary structure that is or has been erected to support a platform and from which a person or object could fall more than 4 metres from the platform or the structure.
Should	'Should' indicates a recommended course of action.
Solid construction	An area that has: • a surface that is structurally capable of supporting all people and things that may be located or placed on it • barriers around its perimeter and any openings to prevent a fall • an even and readily negotiable surface and gradient, and • a safe means of entry and exit.
Static line	A horizontal or substantially horizontal line to which a lanyard may be attached and which is designed to arrest a free fall.
Total fall distance	The total distance a person is likely to fall during both the free and restrained parts of a fall and includes the maximum dynamic extension of all supporting components.
Volunteer association	A group of volunteers working together for one or more community purposes where none of the volunteers, whether alone or jointly with any other volunteers, employs any person to carry out work for the volunteer association.
Work group	A group of workers established to facilitate the representation of workers by one or more health and safety representatives. A work group may be all workers at a workplace but it may also be appropriate to split a workplace into multiple work groups where workers share similar work conditions or are exposed to similar risks and hazards. For example all workers on night shift.

Term	Description
Worker	Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer.
Workplace	Any place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water.
Work positioning system	Any plant or structure, other than a temporary work platform, that enables a person to be positioned and safely supported at a location for the duration of the relevant work being carried out.

Appendix B—References and other information sources

Australian Standards and Australian/New Zealand Standards

AS 1418.13: Cranes (including hoists and winches) –Part 13: Building maintenance units

AS 1418.17: Cranes (including hoists and winches) – Part 17: Design and construction of workboxes

AS/NZS 1576 (set): Scaffolding including:

- AS/NZS 1576.1: Scaffolding – Part 1: General requirements
- AS/NZS 1576.2: Scaffolding – Part 2: Couplers and accessories
- AS/NZS 1576.3: Prefabricated and tube-and-coupler scaffolding
- AS/NZS 1576.4: Scaffolding – Suspended scaffolding
- AS/NZS 1576.5: Scaffolding – Part 5: Prefabricated splitheads and trestles
- AS/NZS 1576.6: Scaffolding – Metal tube-and-coupler scaffolding – Deemed to comply with AS/NZS 1576.1

AS/NZS 1657: Fixed platforms, walkways, stairways and ladders – Design, construction and installation
AS/NZS 1891.1: Industrial fall-arrest systems and devices – Harnesses and ancillary equipment
AS/NZS 1891.2 Supp 1: Industrial fall-arrest systems and devices – Horizontal lifeline and rail systems – Prescribed configurations for horizontal lifelines
AS/NZS 1891.3: Industrial fall-arrest systems and devices – Fall-arrest devices
AS/NZS 1891.4: Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance

AS/NZS 1892 (set): Portable ladders including:

- AS/NZS 1892.1: Portable ladders – Metal
- AS 1892.2: Portable ladders – Timber
- AS/NZS 1892.3: Portable ladders – Reinforced plastic
- AS/NZS 1892.5: Portable ladders – Selection, safe use and care

AS/NZS 4488 (set): Industrial rope access systems including:

- AS/NZS 4488.1: Industrial rope access systems – Specifications
- AS/NZS 4488.1: Industrial rope access systems – Specifications
- AS/NZS 4488.2: Industrial rope access systems – Selection, use and maintenance

AS/NZS 4576: Guidelines for scaffolding

AS/NZS 4994 (set): Temporary edge protection including:

- AS/NZS 4994.1: Temporary edge protection – General requirements
- AS/NZS 4994.2: Temporary edge protection – Roof edge protection – Installation and dismantling
- AS/NZS 4994.3: Temporary edge protection – Installation and dismantling for edges other than roof edges
- AS/NZS 4994.4: Temporary edge protection – Perimeter protection screens

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Managing the risks of plant in the workplace

Code of Practice

2021

Workplace Health and Safety Queensland
worksafe.qld.gov.au

PN12678

Contents

1. Foreword

This Code of Practice on how to manage risks of plant in the workplace is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the Work Health and Safety Regulation 2011 (the WHS Regulation).

Under section 26A of the WHS Act duty holders must comply with an approved code of practice or follow another method, such as a technical or industry standard, if it provides an equivalent or higher standard of work health and safety than the standard required in this code.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and WHS Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice. This may include issuing an improvement notice for failure to comply with a code of practice where equivalent or higher standards of work health and safety have not been demonstrated.

Scope and application

This Code is intended to be read by a person conducting a business or undertaking (PCBU). It provides practical guidance to PCBUs on how to manage health and safety risks associated with managing risks of plant in the workplace.

This Code may be a useful reference for other persons interested in the duties under the WHS Act and the WHS Regulation.

This Code applies to all workplaces covered by the WHS Act and the WHS Regulation where plant is operated and where plant equipment is used or stored.

How to use this Code of Practice

This Code includes references to the legal requirements under the WHS Act and the WHS Regulation. These are included for convenience only and should not be relied on in place of the full text of the WHS Act or the WHS Regulation. The words ‘must’, ‘requires’ or ‘mandatory’ indicate a legal requirement exists that must be complied with.

The word ‘should’ is used in this Code to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

2. Introduction

2.1. What is ‘plant’?

Plant includes machinery, equipment, appliances, containers, implements and tools and any components or anything fitted or connected to those things. Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools, quad bikes, mobile plant and amusement devices.

The general duty of care under the WHS Act applies to this type of plant. Plant that relies exclusively on manual power for its operation and is designed to be primarily supported by hand, for example a screwdriver, is not covered by the WHS Regulation.

Plant is a major cause of work-related death and injury in Australian workplaces. There are significant risks associated with using plant and severe injuries can result from the unsafe use of plant including:

- limbs amputated by unguarded moving parts of machines
- being crushed by mobile plant
- sustaining fractures from falls while accessing, operating or maintaining plant
- being crushed by a quad bike rollover
- electric shock from plant that is not adequately protected or isolated
- burns or scalds due to contact with hot surfaces, or exposure to flames or hot fluids.

Other risks include hearing loss due to noisy plant and musculoskeletal disorders caused by manually handling or operating poorly designed plant.

2.2. Who has health and safety duties for plant at the workplace?

There are a number of duty holders who have a role in managing the risks of plant in the workplace. These include:

- persons conducting a business or undertaking (PCBUs)
- PCBU involving the management or control of fixtures, fittings or plant
- designers, manufacturers, importers and suppliers of plant, substances or structures
- installers
- officers.

Workers and other persons at the workplace also have duties under the WHS Act, such as the duty to take reasonable care for their own health and safety at the workplace.

A person can have more than one duty and more than one person can have the same duty at the same time.

Early consultation and identification of risks can allow for more options to eliminate or minimise risks and reduce the associated costs.

Person conducting a business or undertaking

WHS Act section 19

Primary duty of care

A PCBU must eliminate risks arising from plant in the workplace, or if that is not reasonably practicable, minimise the risks so far as is reasonably practicable.

The WHS Regulation includes more specific requirements for PCBUs to manage the risks of hazardous chemicals, airborne contaminants and plant, as well as other hazards associated with the workplace.

This duty includes ensuring, so far as is reasonably practicable:

- the provision and maintenance of safe plant
- the safe use, handling, storage and transport of plant.

PCBUs have a duty to consult workers about work health and safety and may also have duties to consult, cooperate and coordinate with other duty holders.

Persons who conduct a business or undertaking involving the management or control of fixtures, fittings or plant

WHS Regulation section 203

Management of risks to health and safety

WHS Regulation section 204

Control of risks arising from installation or commissioning

WHS Regulation section 205

Preventing unauthorised alterations to or interference with plant

WHS Regulation section 206

Proper use of plant and controls

WHS Regulation section 207

Plant not in use

WHS Regulation section 208

Guarding

WHS Regulation section 209

Guarding and insulation from heat and cold

WHS Regulation section 210

Operational controls

WHS Regulation section 211

Emergency stops

WHS Regulation section 212

Warning devices

WHS Regulation section 213

Maintenance and inspection of plant

Multiple duties

The WHS Regulation includes specific duties for PCBUs involving the management or control of plant including requirements to:

- manage the health and safety risks associated with plant
- prevent unauthorised alterations to or interference with plant, and
- use plant only for the purpose for which it was designed unless the proposed use does not increase the risk to health or safety.

There are generally a number of people involved with plant during its lifecycle. For example, different people will be involved from its design through to its use and eventual disposal, and throughout this process a person can have more than one duty and more than one person can have the same duty at the same time.

For example, if you own and operate plant in your workplace and you decide to modify it yourself, you will have the duties of a designer and manufacturer as well as a person with management or control of plant at the workplace.

Further information is available in SWA's Guidance material for the safe design, manufacture, import and supply of plant.

Designers, manufacturers, importers and suppliers of plant, substances or structures

WHS Act section 22

Duties of persons conducting businesses or undertakings that design plant, substances or structures

WHS Act section 23

Duties of persons conducting business or undertakings that manufacture plant, substances or structures

WHS Act section 24

Duties of persons conducting businesses or undertakings that import plant, substances or structures

WHS Act section 25

Duties of persons conducting businesses or undertakings that supply plant, substances or structures

WHS Act section 26

Duties of persons conducting businesses or undertakings that install, construct or commission plant or structures

Designers, manufacturers, importers and suppliers of plant, substances or structures must ensure, so far as is reasonably practicable, the plant, substances or structure they design, manufacture, import or supply is without risks to health and safety. This duty includes carrying out testing and analysis as well as providing specific information about the plant or substance.

To assist in meeting these duties, the WHS Regulation requires:

- manufacturers to consult with designers of the plant
- importers to consult with designers and manufacturers of plant
- the person who commissions construction work to consult with the designer of the structure.

Officers

WHS Act section 27

Duty of officers

Officers, for example company directors, have a duty to exercise due diligence to ensure the PCBU complies with the WHS Act and the WHS Regulation. This includes taking reasonable steps to ensure the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks to health and safety.

Workers

WHS Act section 28

Duties of workers

Workers have a duty to take reasonable care for their own health and safety and to not adversely affect the health and safety of other persons. Workers must comply with reasonable instructions, as far as they are reasonably able, and cooperate with reasonable health and safety policies or procedures that have been notified to workers. If personal protective equipment (PPE) is provided by the business or undertaking, the worker must so far as they are reasonably able, use or wear it in accordance with the information and instruction and training provided.

Other persons at the workplace

WHS Act section 29

Duties of other persons at the workplace

Other persons at the workplace, like visitors, must take reasonable care for their own health and safety and must take care not to adversely affect other people's health and safety. They must comply, so far as they are reasonably able, with reasonable instructions given by the PCBU to allow that person to comply with the WHS Act.

2.3. What is involved in managing risks associated with plant?

WHS Regulation Part 3.1 Regulation 32–38

Managing risks to health and safety

WHS Regulation section 203

Management of risks to health and safety

This Code provides guidance on how to manage the risks associated with plant in the workplace using the following systematic process:

- Identify hazards—find out what could cause harm.
- Assess risks, if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. This step may not be necessary if you are dealing with a known risk with known controls.
- Eliminate risks so far as is reasonably practicable
- Control risks—if it is not reasonably practicable to eliminate the risk, implement the most effective control measures that are reasonably practicable in the circumstances in accordance with the hierarchy of control measures, and ensure they remain effective over time.
- Review control measures to ensure they are working as planned.

Chapter 3 of this Code provides guidance on how to manage the risks associated with managing plant in the workplace by following the hierarchy of control.

Further guidance on the risk management process is in the How to manage work health and safety risks Code of Practice.

Providing and obtaining information

Designers, manufacturers, importers and suppliers have duties to provide information about the plant to enable other duty holders to fulfil the responsibilities they have in managing the risks associated with it. This information must be given to each person to whom the plant or its design is provided. Information must be passed on from the designer through to the manufacturer and supplier to the end user. This information includes:

- the purpose for which plant was designed or manufactured
- the results of calculations, analysis, testing or examination
- conditions necessary for the safe use of the plant.

Consulting workers

WHS Act section 47

Duty to consult workers

WHS Act section 48

Nature of consultation

A PCBU must consult, so far as is reasonably practicable, with workers who carry out work for the business or undertaking and who are (or are likely to be) directly affected by a health and safety matter.

This duty to consult is based on the recognition that worker input and participation improves decision-making about health and safety matters and assists in reducing work-related injuries and disease.

The broad definition of a 'worker' under the WHS Act means a PCBU must consult, so far as is reasonably practicable, with contractors and subcontractors and their employees, on-hire workers, outworkers, apprentices, trainees, work experience students, volunteers and other people who are working for the PCBU and who are, or are likely to be, directly affected by a health and safety matter.

Workers are entitled to take part in consultations and to be represented in consultations by a health and safety representative who has been elected to represent their work group.

Workers usually know the hazards and risks associated with the plant they use. By drawing on the experience, knowledge and ideas of workers it is more likely hazards will be identified so that effective control measures can be implemented.

Workers should be encouraged to report hazards and health and safety problems immediately so the risks can be managed before an incident occurs.

It is important to consult workers as early as possible when planning to introduce new plant or change the way plant is used.

Consultation requires that:

- relevant work health and safety information is shared with workers
- workers are given a reasonable opportunity to express their views and to raise health or safety issues
- workers are given a reasonable opportunity to contribute to the decision-making process relating to the health and safety matter
- the views of workers are taken into account
- workers are advised of the outcome of any consultation in a timely manner
- if the workers are represented by a health and safety representative, consultation must include that representative.

Management commitment and open communication between managers and workers is important in achieving effective consultation. Workers are more likely to engage in consultation when their knowledge and ideas are actively sought and concerns about health and safety are taken seriously.

Consultation does not mean telling workers about a health and safety decision or action after it has been taken. Workers should be encouraged to:

- ask questions about health and safety
- raise concerns and report problems
- make safety recommendations
- be part of the problem-solving process.

While consultation may not always result in agreement, agreement should be the objective as it will make it more likely the decisions are effective and actively supported.

Consulting, cooperating and coordinating activities with other duty holders

WHS Act section 46

Duty to consult with other duty holders

The WHS Act requires a PCBU to consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

There is often more than one business or undertaking involved in managing risks of plant in the workplace, that may each have responsibility for the same health and safety matters, either because they are involved in the same activities or share the same workplace.

In these situations, each duty holder should exchange information to find out who is doing what and work together in a cooperative and coordinated way, so risks are eliminated or minimised so far as is reasonably practicable.

Examples of where a PCBU will have a health and safety duty include where:

- the PCBU engages workers to carry out work
- the PCBU directs or influences workers in carrying out work
- other persons may be put at risk from work carried out in their business or undertaking
- the PCBU manages or controls a workplace or the fixtures, fittings or plant at a workplace
- the PBCU's business or undertaking involves designing, manufacturing, importing or supplying plant, substances or structures for use at a workplace
- the PBCU's business or undertaking involves installing, constructing or commissioning plant or structures at a workplace.

For example, if the owner or manager of an on-hire business has workers carry out work at other workplaces then the owner or manager should exchange information with the host business to determine:

- if workers could be exposed to hazardous plant
- what each party will do to control associated risks.

If using plant, for example a crane, at a workplace shared with other businesses the plant owner or manager should talk to those businesses about the risks the plant could cause

them and work together in a cooperative and coordinated way to manage the risks.

Further guidance on consultation requirements is available in the *Work health and safety consultation, cooperation and coordination Code of Practice*.

2.4. Information, training, instruction and supervision

WHS Act section 19

Primary duty of care

WHS Regulation section 39

Provision of information, training and instruction

The WHS Act requires that a PCBU ensure, so far as reasonably practicable, the provision of any information, training, instruction or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out as part of the conduct of the business or undertaking.

The PCBU must ensure that information, training or instruction provided to a worker are suitable and adequate having regard to:

- the nature of the work carried out by the worker
- the nature of the risks associated with the work at the time of the information, training and instruction
- the control measures implemented.

The PCBU must also ensure, so far as is reasonably practicable, that the information, training and instruction are provided in a way that is readily understandable for the person to whom it is provided.

Workers must be trained and have the appropriate skills to carry out a particular task safely. Training should be provided to workers by a competent person.

Before a PCBU's workers or other persons use the plant in a workplace, a PCBU must, as far as is reasonably practicable, provide them with information, training, instruction and organise ongoing supervision as necessary to protect them from risks arising from the use of the plant.

As a PCBU you must also provide the necessary safety information to persons who are involved in installing, commissioning, testing, maintaining or repairing plant, as well as decommissioning, dismantling or disposing of plant. This should include information on the types of hazards and risks the plant may pose to the person when they are carrying out these activities.

This information may be supported with safe work procedures including instructions on:

- the correct use of guarding and other control measures
- how to safely access and operate the plant
- who may use an item of plant, for example, only authorised or licensed operators
- how to carry out inspections, shut-down, cleaning, repair and maintenance
- traffic rules, rights of way, clearances and no-go areas for mobile plant
- procedures when plant malfunctions
- emergency procedures

- the proper use, wearing, storage and maintenance of personal protective equipment (PPE).

Emergency instructions relating to an item of plant should be clearly displayed on or near it. Training programs should be practical and 'hands on' and take into account the particular needs of workers. For example, literacy levels, work experience and specific skills required for safe use of the plant should all be taken into account.

Supervisors should take action to correct unsafe work practices associated with plant as soon as possible. Otherwise workers may think unsafe work practices are acceptable.

2.5. Registering plant

Certain items of plant and types of plant designs must be registered. A list of registrable plant designs and registrable items of plant is provided at Appendix B. Registrable plant designs must be design registered prior to being supplied.

Registrable items of plant must be item registered prior to being commissioned for use by a PCBU.

Design registration

Design registration is the registering of a completed design, from which any number of individual items can be manufactured. The original designer or a person with management or control of the item of plant may apply for design registration.

Item registration

Plant item registration applies to a specific item of plant. Each item requires registration. The purpose of registering an item of plant is to ensure it is inspected by a competent person and is safe to operate. A person with management or control of plant should obtain a copy of the design registration from the supplier of the plant to ensure all registrable plant items are registered.

Further information on registering plant is provided in Chapter 5 of this Code.

3. The risk management process

WHS Regulation section 34

Duty to identify hazards

WHS Regulation section 35

Managing risks to health and safety

WHS Regulation section 36

Hierarchy of control measures

WHS Regulation section 37

Maintenance of control measures

WHS Regulation section 38

Review of control measures

WHS Regulation section 297

Management of risks to health and safety

WHS Regulation section 299

Safe work method statement required for high risk construction work.

3.1. Identifying the hazards

The first step in the risk management process is to identify all hazards associated with plant in the workplace. This involves finding things and situations that could potentially cause harm to people. Hazards generally arise from the following aspects of work and their interaction:

- physical work environment
- equipment, materials and substances used
- work tasks and how they are performed
- work design and management.

Hazards may be identified by looking at the workplace and how work is carried out. It is also useful to talk to workers, manufacturers, suppliers and health and safety specialists and review relevant information, records and incident reports.

Typical hazards found in managing risks of plant in the workplace can include:

- The plant itself. For example, hazards associated with a bridge and gantry crane include hazards relating to worn or damaged mechanical components; background noise causing problems with communication; lighting; and multiple cranes on the same runway
- Traffic movements in the workplace. For example, vehicles including powered mobile plant moving in and around a workplace, reversing, loading and unloading are frequently linked with death and injuries to workers and members of the public
- The environment in which the plant is used. For example, there may be hazards associated with using a tower crane as a result of structural failure, collapse or contact or collision with other plant and structures.

Further information on identifying these types of hazards is in SWA's Workplace traffic management guidance material.

When plant is being used to lift or suspend persons or things, the person with management or control of plant at a workplace must ensure, so far as is reasonably practicable, that the plant used is specifically designed to lift or suspend the load.

If it is not reasonably practicable to use plant that is specifically designed to lift or suspend the load, the person must ensure that:

- the plant does not cause a greater risk to health and safety than if specifically, designed plant were used
- if the plant is lifting or suspending persons, the use of the plant complies with WHS Regulation 220: Exception—Plant not specifically designed to lift or suspend a person.

The person must ensure that the lifting and suspending is carried out:

- with lifting attachments that are suitable for the load being lifted or suspended
- within the safe working limits of the plant.

The person must ensure, so far as reasonably practicable, that:

- no loads are suspended or travel over a person unless the plant is specifically designed for that purpose
- loads are lifted or suspended in a way that ensures that the load remains under control during the activity
- no load is lifted simultaneously by more than one item of plant unless the method of lifting ensures that the load placed on each item of plant does not exceed the design capacity of the plant.

Inspect the plant

A person with management or control of plant at a workplace must review safety information and inspect each item of plant in the workplace and observe how it is used. Talk to your workers and their health and safety representatives to find out what their experience is with the plant they operate, inspect or maintain. You should also review the manufacturer's and the supplier's instruction for safe set-up and use of the plant.

If you have hired or leased plant, you should also consult the person who owns the plant about potential hazards, because you both have responsibility for ensuring, so far as is reasonably practicable, the plant is safe and without risk to health and safety.

When identifying hazards, you should think about all the activities that may be carried out during the life of the plant at your workplace, for example installation, commissioning, operation, inspection, maintenance, repair, transport, storage and dismantling. For each of these activities, you should consider whether the plant could:

- cause injury due to entanglement, falling, crushing, trapping, cutting, puncturing, shearing, abrasion or tearing
- create hazardous conditions due to harmful emissions, fluids or gas under pressure, electricity, noise, radiation, friction, vibration, fire, explosion, moisture, dust, ice, hot or cold parts, cleaning, and undisclosed asbestos-containing materials
- cause injury when an operator responds to common failure modes. For example, machine jams cause injury due to poor ergonomic design; if operator controls are difficult to reach or require high force to operate.

Other factors to consider include:

- the **condition** of the plant, for example its age, maintenance history and how frequently the plant is used
- the **suitability** of the plant, for example is it actually being used for its intended purpose? Has it been modified from its intended use?
- the **location** of the plant, for example what is its impact on the design and layout of the workplace and are workers able to access the plant without risk of slips, trips or falls?
- **Abnormal situations, for example** what abnormal situations, misuse or fluctuation in operating conditions can you foresee?

A checklist to assist in identifying hazards associated with plant is at Appendix C.

Review safety information

Information about hazards, risks and control measures relating to plant in your workplace can be obtained from:

- manufacturers, importers or suppliers of the plant
- maintenance technicians or specialists, for example engineers
- your workers
- regulators, unions and other organisations
- businesses or undertakings similar to your own
- Australian, International or other technical standards.

Review incident records and data

Check your records of workplace injuries and illness, dangerous incidents, plant inspection reports and maintenance logs, workers compensation records and the results of investigations to collect information about plant hazards.

3.2. Assessing the risks

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of it happening. A risk assessment can help you determine:

- how severe a risk is
- whether existing control measures are effective
- what action you should take to control the risk
- how urgently the action needs to be taken.

Hazards have the potential to cause different types and severities of harm, ranging from minor discomfort to a serious injury or death.

Many hazards and their associated risks are well known and have well established and accepted control measures. In these situations, the second step to formally assess the risk is not required. If after identifying a hazard you already know the risk and how to control it effectively, you may simply implement the controls.

In some circumstances, a risk assessment will assist to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing the risk
- identify if and what kind of control measures should be implemented
- check the effectiveness of existing control measures.

The nature and severity of risks will depend on various factors. To assess the risk associated with plant hazards you have identified, you should consider the following.

What is the potential impact of the hazard?

- How severe could an injury or illness be? For example, lacerations, amputation, serious or fatal crush injury, burns or loss of hearing.
- What is the worst possible harm the plant hazard could cause? For example, a crane could overturn or collapse causing harm to the operator, workers and others below.

How likely is the hazard to cause harm?

- How frequently are workers exposed to the hazard?
- What condition is the plant used in? For example, in a confined space, muddy or dusty environment
- What is the condition of the plant? For example, is it old and missing safety features found on new plant? Is it reliable or often needing emergency maintenance?
- If there are other people or items of plant in the vicinity, what effect do they have on the likelihood or consequence?
- Where and when is access required during the installation, operation or maintenance of plant and in an emergency?
- What work practices and procedures exist for plant safety? For example, is isolation required to carry out maintenance?
- What kinds of information, training, instruction and supervision are provided to workers and other persons who may be exposed to plant?
- Does the plant's safety depend on the competency of its operators?
- How is work organised? For example, consider:
  - the speed of the process line
  - pedestrian and vehicular traffic around the plant
  - time spent on repetitive tasks
  - shiftwork arrangements
  - production incentives that may affect health and safety.

3.3. Controlling the risks

The WHS Regulation requires duty holders to work through a hierarchy of control measures when managing risks to health and safety associated with plant.

Specific controls are required under the WHS Regulation for certain types of plant, including:

- powered mobile plant
- plant that lifts or suspends loads
- plant used in connection with tree lopping
- industrial robots
- lasers
- pressure equipment
- scaffolds
- plant with presence-sensing safeguarding systems.

Hierarchy of control measures

The WHS Regulation requires duty holders to work through the hierarchy of control measures when managing certain risks; however, it can be applied to any risk. The hierarchy

ranks control measures from the highest level of protection and reliability to the lowest. Further guidance on the risk management process and the hierarchy of control measures is in the *How to manage work health and safety risks Code of Practice*.

Eliminating the risk

You must always aim to **eliminate the risk**. For example, you may design items of a size, shape and weight so they can be delivered, handled or assembled at the location where they will be used without the need for a crane.

If eliminating the hazards and associated risks is not reasonably practicable, you must minimise the risk by one or more of the following:

- **Substitution**—minimise the risk by substituting or replacing a hazard or hazardous work practice with something that gives rise to a lesser risk. For example, installing a conveyor system to replace forklifts will eliminate the risks associated with moving plant but will introduce other risks associated with conveyors. The new system should reduce the overall risks of transporting material.
- **Isolation**—minimise the risk by isolating or separating the hazard or hazardous work practice from any person exposed to it. For example, use concrete barriers to separate mobile plant from workers
- **Engineering controls**—engineering controls are physical control measures to minimise risk. For example:
  - emergency brakes in a lift that are applied automatically when the lift exceeds its maximum speed
  - an automatically applied control system that prevents tower cranes from colliding while sharing the same air space
  - interlocked guards on machinery.

If risk remains, it must be minimised by implementing **administrative controls**, so far as is reasonably practicable. For example, a tag-out system could be used to ensure the plant is isolated from its power source and is not operated while maintenance or cleaning work is being done.

Any remaining risk must be minimised with suitable **personal protective equipment (PPE)**. For example, providing workers with breathing protection, hard hats, gloves, aprons and protective eyewear.

Administrative control measures and PPE do not control the hazard at the source. They rely on human behaviour and supervision and used on their own tend to be the least effective in minimising risks.

The control measures you apply may change the way work is carried out. In these situations, you must consult your workers and develop safe work procedures, and provide your workers with training, instruction, information and supervision on the changes.

Combining control measures

In most cases, a combination of the control measures will provide the best solution to minimise the risk to the lowest level reasonably practicable. For example, protecting workers from flying debris when using a concrete cutting saw may involve guarding the blade, isolating the work area and using PPE such as a face shield.

You should check whether your chosen control measures introduce new hazards. For example, hiring a forklift to control hazardous manual tasks introduces risks involving moving plant that also need to be controlled.

Working near overhead and underground electric lines

Electrical Safety Regulation Part 5

Overhead and underground electric lines

As a person conducting a business or undertaking (PCBU) at a workplace, you must ensure, so far as is reasonably practicable, that no person, plant or thing at the workplace comes within an unsafe distance of an overhead or underground electric line.

If it is not reasonably practicable to ensure the safe distance, you must ensure that a risk assessment is conducted for the proposed work and control measures implemented are consistent with the risk assessment and the requirements of an electricity supply entity where it is responsible for the electric line.

Electric lines pose significant risks, including electrocution, arcing, explosion, fire causing burns, unpredictable cable whiplash and electrifying other objects including signs, poles, trees or branches. Whether energised overhead or underground electric lines are carrying voltage of 400,000V or 230V, contact with these lines can be fatal. It is not necessary to touch an overhead electric line to be electrocuted. A ‘flashover’ or ‘arc’ can electrocute a person close to a line conductor.

The following should be considered:

- Are workers or plant likely to go near electric lines? If so, how high are the electric lines and the plant?
- Are overhead electric lines hard to see in the sky or are they hidden by trees?
- Have underground electric lines been accurately located?
- Is a safety observer in place to watch plant when it is operating close to electric lines?
- Has the relevant state or territory electricity supply authority been contacted for information about specific requirements when working near electric lines, including the qualifications required for those people working near electric lines?
- Have emergency rescue procedures been established, including calling the electricity supply authority to isolate the electricity supply before trying to rescue a person receiving an electric shock?

Most risks can be addressed by observing safe working distances for people and plant near electric lines. Safe working distances will depend on the type of work being carried out and the voltage of the electric lines. You should contact the relevant electricity supply authority to determine unsafe distances and the type of control measures needed. This may include isolating the line.

Further information about electrical safety can be obtained from your Electricity Regulator.

3.4. Maintaining and reviewing control measures

WHS Regulation section 37

Maintenance of control measures

WHS Regulation section 38

Review of control measures

Control measures must be maintained so they remain fit for purpose, suitable for the nature and duration of work and are installed, set up and used correctly.

The control measures put in place to protect health and safety should be regularly reviewed to make sure they are effective. If the control measure is not working effectively it must be revised to ensure it is effective in controlling the risk.

You must review and as necessary revise control measures so as to maintain, so far as is reasonably practicable, a work environment that is without risks to health or safety. For example:

- when the control measure does not control the risk so far as is reasonably practicable
- before a change at the workplace that is likely to give rise to a new or different health and safety risk that the measure may not effectively control
- a new or relevant hazard or risk is identified
- the results of consultation indicate that a review is necessary, or
- a health and safety representative requests a review if that person reasonably believes that:
  - a circumstance in any of the above points affects or may affect the health and safety of a member of the work group represented by the health and safety representative
  - the control measure has not been adequately reviewed in response to the circumstance.

Common review methods include workplace inspection, consultation, testing and analyzing records and data.

You can use the same methods as in the initial hazard identification step to check control measures. You must also consult your workers and their health and safety representatives. If problems are found, go back through the risk management steps, review your information and make further decisions about control measures.

4. Controlling risks: from purchase to disposal

4.1. Purchasing and hiring plant

Many injuries and illnesses associated with plant occur due to a failure to select the right equipment for the job. Before you purchase plant, check it is suitable for the intended use including the environment it will be used in and the workers using it. Discuss your needs with the plant supplier, who must provide you with information about:

- the purpose for which the plant was designed or manufactured
- the results of calculations, analysis, testing or examination carried out to determine that the plant, so far as is reasonably practicable, is without risk to health and safety
- conditions necessary for the safe use of the plant
- alterations or modifications made to the plant.

Before purchasing, hiring or leasing plant you should also determine:

- the hazards and risks associated with installation, commissioning, operation, inspection, maintenance, repair, transport, storage and dismantling of the plant
- control measures needed to minimise these hazards and risks
- the manufacturer's recommendations for the frequency and type of inspection and maintenance needed
- special skills required for people who operate the plant or carry out inspection and maintenance, including preventative maintenance
- special conditions or equipment required to protect the health and safety of people carrying out activities. For example, installation, operation and maintenance, and
- alterations or modifications to be made to the plant.

You should check whether the plant includes some or all of the following controls:

- contact with or access to dangerous parts is prevented. For example, by using guards and protective structures
- it is of sturdy construction and has tamper-proof design
- there are no obstructions to the plant operator
- it has fail-safe operation
- it is easy to inspect and maintain
- it does not introduce other hazards, for example manual handling problems or excessive noise, into your workplace
- it incorporates measures to minimise risks during use, for example low noise.

Duties of suppliers and purchasers of second-hand plant

Second-hand plant

WHS Act section 25

Duties of persons conducting businesses or undertakings that supply plant, substances or structures

WHS Regulation section 198

Information to be obtained and provided by supplier

WHS Regulation section 199

Supply of second-hand plant—duties of supplier

WHS Regulation section 200

Second-hand plant to be used for scrap or spare parts

Suppliers' duties apply whether the plant is new, second-hand or hired out. There are also some additional duties that apply when the plant is second-hand. Some examples of suppliers of second-hand plant include a person conducting a business or undertaking (PCBU) who:

- sells second-hand plant at a retail outlet or directly sells their own second-hand plant
- imports second-hand plant for on-sale
- auctions second-hand plant, excepting certain clearing sales (see below).

A supplier of plant must:

- take all reasonable steps to obtain the information required to be provided by the manufacturer under sections 23(4)(a), (b) and (c) of the WHS Act, and
- when the plant is supplied, ensure the person to whom the plant is supplied is given the information obtained by the supplier.

A supplier of second-hand plant must ensure, so far as is reasonably practicable, that any faults in the plant are identified.

Before plant is supplied, the supplier of second-hand plant must ensure that the person to whom the plant is supplied is given written notice:

- of the condition of the plant
- of any faults identified
- if appropriate, that the plant should not be used until the faults are rectified.

A supply of a thing does not include the supply of a thing by a person who does not control the supply and has no authority to make decisions about the supply, for example an auctioneer without possession of the thing or a real estate agent acting in their capacity as a real estate agent.

Suppliers' duties apply to a PCBU whether the sale is a one-off sale or forms part of the business's day-to-day operations.

Duty to supply safe plant

Suppliers of second-hand plant must ensure, so far as is reasonably practicable, the plant is without risks to the health and safety of persons who are at or in the vicinity of a workplace. This includes, so far as is reasonably practicable, identifying faults in the plant.

Suppliers of second-hand plant, other than scrap or spare parts, must give written notice to a person to whom the plant is supplied stating:

- the condition of the plant, including identified faults
- if appropriate, that the plant should not be used until the faults are rectified.

Suppliers of second-hand plant must also take all reasonable steps to obtain information about how to use the plant correctly and safely from the manufacturer or original supplier.

Suppliers of second-hand plant must give the buyer:

- this information
- all available records of the plant kept by the previous owner.

The information may include data sheets, test certificates, operations and service manuals, reports and a safety manual.

Out-dated or non-existent safety features of second-hand plant

Second-hand plant is more likely to have outdated or missing safety features. In these circumstances suppliers of second-hand plant must do what is reasonably practicable to supply equipment safe for use at work.

The degree of risk posed by the plant must be weighed up against the cost of implementing measures to minimise it. Suppliers of second-hand plant should consider:

- if it is reasonably practicable to retrofit or modify the plant to improve its safety having regard to improvements to that type of plant since its manufacture
- what information needs to be given to the buyer about relevant matters including the purpose for which the plant was designed or manufactured and conditions necessary to ensure the plant is without risks to health and safety when properly used
- their duty to ensure the plant is safe and has all the required safety features before bringing it into service.

Adequate information to be provided about the condition of second-hand plant

Adequate information must be given to the buyer about the purpose for which the plant was designed or manufactured and conditions necessary to ensure its safe use.
Information about using second-hand plant safely, including its condition, may be obtained from:

- the previous owner of the plant
- a ‘competent person’ engaged to assess the plant and develop this information.

Without this kind of information, suppliers of second-hand plant have no way of knowing whether they have met their suppliers’ duties under the WHS Act.

Suppliers’ duties and agents or auctioneers selling used plant at clearing sales

Suppliers’ duties apply to sellers’ agents like auctioneers, **unless** the agent does not take control of the supply and has no authority to make decisions about the supply.

Agents selling used plant at clearing sales usually do not take possession of the plant and have no authority to make decisions about the supply and are not considered to be suppliers.

In these limited circumstances the suppliers' duties will only apply to the seller—not their agent.

Supplying scrap and spare parts

Plant sold for scrap or spare parts is usually not intended to be used at a workplace so does not need to be made safe or supplied with instructions for use.

However, the supplier must tell prospective buyers that the plant is being supplied for scrap or spare parts only and that it cannot be used safely in its current form for other purposes. This must be done in writing or by marking the item of plant.

Hiring plant

When you hire plant, both you and the person you have hired it from must ensure, so far as is reasonably practicable, the plant is safe to use. During the time the plant is in your possession you will have control over the way the plant is used in the workplace.

Before you hire the plant, you should assess whether the plant is suitable for its intended use. You should also check the plant has been inspected and maintained by the supplier according to the manufacturer's specifications. This may involve checking the logbook or maintenance manual. You should also ensure the supplier provides you with the manufacturer's information about the purpose of the plant and its proper use.

A person who hires or leases plant to others will have duties as a supplier of plant and as a person with management or control of plant. This means they must ensure, so far as is reasonably practicable, the plant is safe to use and properly maintained. They must also provide specific information with the plant about how to operate it safely.

In most cases the supplier will be responsible for inspecting and maintaining the plant. However, if the plant is to be hired for an extended period of time, you and the supplier may develop arrangements to ensure the plant is properly inspected and maintained throughout the lease. This may involve the supplier coming to your workplace to maintain the plant, or you maintaining the plant while it is at your workplace.

The arrangements you make will depend on your ability to inspect and maintain the plant in accordance with the manufacturer's specifications. If you choose to maintain the plant yourself during the lease, you should provide all information and records about the maintenance to the hirer at the end of the lease.

4.2. Installation and commissioning of plant

WHS Regulation section 204

Control of risks arising from installation or commissioning

A person with management or control of plant at a workplace must:

- not commission the plant unless the person has established that the plant is, so far as reasonably practicable, without risks to the health and safety of any person
- not decommission or dismantle the plant unless the decommissioning and dismantling can be carried out, so far as is reasonably practicable, without risks to the health and safety of any person
- ensure that a person who installs, assembles, constructs, commissions, decommissions or dismantles the plant is a competent person, and is provided with all the information necessary to minimise risks to health and safety
- ensure that the processes for the installation, construction, commissioning, decommissioning and dismantling of plant include inspections that ensure, so far as is reasonably practicable, the risks associated with these activities are monitored.

Installing plant

An installer should ensure:

- plant is erected or installed having regard to the manufacturer's instructions including ensuring specialised tools, jigs and appliances necessary to minimise risk of injury during installation are used
- entry to and exit from plant complies with relevant standards
- plant is stable during installation
- the interaction of plant with people, work processes and other plant is considered
- environmental factors affecting installation and use, for example wet conditions, are considered
- electrical installations associated with plant comply with AS/NZS 3000, also known as the Australian/New Zealand Wiring Rules, as far as is relevant.

The installer should notify the designer, manufacturer, supplier and person with management or control of plant of new risks identified during the plant installation.

Positioning plant in the workplace

Plant should be positioned so:

- risks from hot plant, for example, friction, molten material, hot gases, are controlled through restricted access, guarding or insulation
- there is sufficient space (suggested 600 mm, the minimum width of a walkway) for safe access to the plant for operation, cleaning, maintenance, inspection and emergency evacuation
- the plant does not obstruct doorways and emergency exits
- the proximity to other plant does not have a negative effect on operation of the plant or work processes
- the plant rests on a suitable foundation where required, for example on a floor or other support that ensures the plant is stable and secure
- ventilation can deal with the nature and volume of emissions from the plant
  workers and others are not exposed to noise levels greater than those stated in the exposure standard for noise under the WHS Regulation. Consideration could also be given to placing plant in areas with sound insulation or mounting to decrease reverberations which will decrease noise levels.

Commissioning plant

Commissioning plant involves performing the necessary adjustments, tests and inspections to ensure plant is in full working order to specified requirements before the plant is used. Commissioning includes recommissioning.

The person who commissions plant should ensure:

- the commissioning sequence is in accordance with the design specifications
- tests are carried out to check the plant will perform within the design specifications.

4.3. Using plant in the workplace

WHS Regulation section 205

Preventing unauthorised alterations to or interference with plant

WHS Regulation section 206

Proper use of plant and controls

A person with management or control of plant at a workplace must:

- so far as is reasonably practicable, prevent alterations to or interference with the plant that they have not authorised
- take all reasonable steps to ensure the plant is only used for the purpose for which it is designed, unless they have assessed that the proposed use does not increase the risk to health and safety
- in determining whether or not the proposed use of plant increases the risk to health and safety, ensure that the risk associated with the proposed use is assessed by a competent person
- take all reasonable steps to ensure that all safety features, warning devices, guarding, operational controls, emergency stops are used in accordance with instructions and information that they have provided.

Workers who operate plant should be competent or suitably supervised during training, so they do not put themselves or others at risk. It is important to retain all operating manuals and instructional material provided by the manufacturer in order to correctly operate and maintain the plant once it is in the workplace. The person with management or control of plant should also consider and address the risks that may arise from:

- operator fitness for work, such as fatigue
- carrying out routine or repetitive tasks
  local conditions and working procedures.

Work platforms and boxes

WHS Regulation section 219

Plant that lifts or suspends loads

WHS Regulation section 220

Exception—Plant not specifically designed to lift or suspend a person

If plant is being used to lift or suspend persons and it is not reasonably practicable to use plant that is specifically designed to lift or suspend them, the person with management or control of the plant must ensure:

- the plant does not cause a greater risk to health and safety than if specifically, designed plant were used
- the persons are lifted or suspended in a work box that is securely attached to the plant
- the persons in the work box remain substantially within the workbox while they are being lifted or suspended
- a safety harness is worn if there is a risk of a worker falling from a height, and
- means are provided by which the persons being lifted or suspended can safely exit from the plant in the event of a failure in its normal operation.

High risk work licences

WHS Regulation section 85

Evidence of licence—duty of person conducting business or undertaking

As a PCBU, you must not direct or allow a worker to carry out high risk work for which a high risk work licence is required unless you see written evidence provided by the worker that the worker has the relevant high risk work licence for that work.

Certain types of work, for example operating industrial trucks and some cranes or scaffold and rigging work, require the worker to have a high-risk work licence before they can operate the plant or undertake the work. Schedule 3 of the WHS Regulation sets out the classes of high-risk work licences and the types of plant involved, and Schedule 4 sets out the competency requirements for a high-risk work licence.

4.4. Making changes

If the person with management or control of the plant intends to alter the design of the plant, change the way the plant is used or change a system of work associated with the plant, the person should carry out the risk management process again.

If the person with management or control of the plant intends to use the plant in a different way or for a purpose it was not designed for, the person must ensure the risks associated with the new use are assessed by a competent person. For example, if an item of plant designed to cut wood is to be used to cut metal, all hazards associated with that use should be identified and controls implemented.

The competent person's assessment should:

- include all aspects of the proposed task
- outline the reasons a purpose-designed item of plant cannot be used for the proposed task. For example, the impracticability of using it
- take into account the recommendations of the designer, manufacturer or supplier of the plant and ensure the proposed use is not outside its capabilities
- identify differences between the item of plant and one that is purpose-designed for the task, and describe the measures that will be used to control the risks the purpose-designed plant was designed to control
- amend relevant documentation. For example, operator and maintenance manuals and signage.

If a competent person decides the plant is not suitable for the proposed task, it must not be used for that task.

Making alterations to plant

Before making alterations to plant, the person with management or control of the plant should consult with the designer and manufacturer to ensure all relevant safety issues have been considered. If the original designer and manufacturer of the plant design implement alterations, then relevant obligations imposed by the WHS Regulations still apply. If the person with management or control of the plant makes alterations to the plant then the person will also be a designer or manufacturer, and those obligations will apply to that person.

If the original designer or manufacturer cannot be contacted about older plant or imported plant, the alterations should be carried out by a competent person in accordance with the relevant technical standards. See Appendix D for examples of published technical standards.

If the plant is subject to design registration requirements, the altered design must be registered if the alteration may affect health and safety.

Plant should be isolated from power sources and be unable to be switched on or activated accidentally before alterations begin or while alterations are being carried out.
Before returning altered plant to service you should:

- have control measures in place to eliminate or, where that is not reasonably practicable, minimise risks created by the alteration including providing information and training for users and supervisors about the changes
- inspect and test the plant, having regard to the altered design specifications and relevant technical standards.

4.5. Inspecting plant

WHS Regulation section 213

Maintenance and inspection of plant

The person with management or control of plant at a workplace must ensure that maintenance, inspection and, if necessary, testing of plant is carried out by a competent person.

The maintenance, inspection and testing must be carried out:

- in accordance with the manufacturer's recommendations, if any
- if there are no manufacturer's recommendations, in accordance with the recommendations of a competent person
- in relation to inspection, if it is not reasonably practicable to comply with the above, annually.

Plant inspection should be conducted in accordance with a regular maintenance system to identify:

- potential problems not anticipated during plant design or task analysis
- deficiencies in plant or the equipment associated with use of the plant, for example wear and tear, corrosion and damaged plant parts
- adverse effects of changes in processes or materials associated with plant
- inadequacies in control measures that have been previously implemented.

Inspecting associated work processes should be conducted regularly to identify:

- unsafe work practices associated with the use of plant
- negative effects of changes in processes or materials associated with plant
- inadequacies in control measures that have been previously implemented.

Regularly inspect hand-held powered plant and repair or replace when necessary, and replace damaged or worn parts, for example grinding wheels.

Control measures implemented, for example guards and warning devices, must be regularly inspected and tested to ensure they remain effective.

You should keep an up-to-date register of the items of plant requiring regular inspection and maintenance. It should include information on:

- allocated responsibilities for people dealing with inspections
- standards against which plant should be inspected
- the frequency of inspections
- critical safety instructions to be followed during inspection. For example, the isolation procedure
- the procedures for particular types of inspections including:
  - periodic inspections
  - specific tests
  - repaired or modified plant
- variations from normal operation or dangerous occurrences and trends that may be occurring.

Reasonably practicable control measures must be implemented to ensure the health and safety of the person conducting the inspection. For example, you may need to ensure the plant is switched off and isolated from the energy source to avoid accidental re-energising of dangerous parts.

Guards that are removed must be replaced correctly to prevent access to the hazardous part of the plant when it is returned to use.

4.6. Maintenance, repair and cleaning of plant

Plant must be maintained and repaired according to the manufacturer's specifications. If you identify deficiencies in the specifications, you should contact the manufacturer. In the absence of a manufacturer's specifications, plant energy sources should be maintained in accordance with a competent person's recommendations. For example, ensure fluid levels and pressures are correct and ensure brakes are functioning properly.

Plant should usually be isolated before maintenance or cleaning starts.
Isolated or disengaged plant should:

- not hinder or interfere with other plant operation
- have guards in place where a risk of injury is identified
- not obstruct access.

A process should be put in place to enable effective communication and consultation with affected workers and other persons conducting a business or undertaking to prevent any risk to health and safety arising from restarting plant operation when plant has been shut down due to inspection, maintenance or cleaning.

Where plant cannot be isolated, methods to prevent accidental operation should be implemented. The work should be carried out under controlled procedures to allow for maintenance and cleaning without risk to the health and safety of the person performing the work.

WHS Regulation section 210

Operational controls

If plant needs to be operated while being maintained or cleaned, the person with management or control of the plant must ensure that the operator's controls:

- permit operation of the plant while a person is undertaking maintenance or cleaning of the plant
- while the plant is being maintained or cleaned, either:
  - cannot be operated by a person other than the person carrying out the maintenance or cleaning of the plant, or
  - if the plant must be operated by a person other than the person carrying out maintenance or cleaning, cannot be operated except by a person authorised by the person with management or control of the plant for that purpose
- allow the plant to be operated in such a way that eliminates risks or, if that is not reasonably practicable, minimises the risks so far as reasonably practicable.

Following maintenance or cleaning, all guarding must be replaced before plant is used. Plant with damage that poses a risk to health and safety should be withdrawn from service until those risks have been controlled.

4.7. Storing plant

WHS Regulation section 207

Plant not in use

The person with management or control of plant at a workplace must ensure, so far as is reasonably practicable, that plant that is not in use is left in a state that does not create a risk to the health or safety of any person.

Plant not in use should be stored so it does not create a risk to workers or other people in the workplace. Where plant is to be placed in storage, you should:

- ensure relevant health and safety information supplied by the designer or manufacturer is provided to the person who is to dismantle or store the plant
- implement control measures to eliminate, or if that is not reasonably practicable, minimise the risk to health and safety to people during storage. For example, release stored energy, lower moving parts that lower under gravity and provide support to prevent toppling
- implement control measures to eliminate or, if that is not reasonably practicable, minimise the risks of damage to plant during storage. For example, risks may arise from corrosion as a result of exposure to residues of hazardous substances and deteriorating consumables.

Before plant is used after an extended period of storage, the plant should be re-commissioned by carrying out the same level of testing and inspection as when it was first commissioned.

Plant that has been taken off-line is plant not in use. For example, an automatic robot on a welding line may be taken off-line due to a product design modification no longer requiring the use of the robot for the particular product. The robot is therefore still fully functional but is no longer in use. The robot must not be left in a state that presents a risk to health or safety.

This may be done by isolating the workstation from the power supply, employing lock-out and tag-out systems, and providing physical stops to prevent movement if the plant is accidently powered. Further information on isolating energy sources is provided at section 5.5 of this Code.

Powered mobile plant

WHS Regulation section 214

Powered mobile plant—general control of risk

WHS Regulation section 215(2)

Powered mobile plant—specific control measures

The person with management or control of powered mobile plant must manage risks to health and safety associated with the following:

- the plant overturning
- things falling on the operator of the plant
- the operator being ejected from the plant
- the plant colliding with any person or thing
- mechanical failure of pressurised elements of plant that may release fluids that pose a risk to health and safety.

A person with management or control of powered mobile plant at a workplace must ensure, so far as is reasonably practicable, that a suitable combination of operator protective devices for the plant is provided, maintained and used.

Powered mobile plant may present a risk to health or safety if measures are not taken to prevent the plant moving of its own accord, for example rolling down a sloping surface, or to prevent unauthorised operation. For example, an industrial lift truck at the end of or during a shift is plant that is frequently not in use and is unattended for short periods of time. The person with management or control should ensure the operator of the industrial lift truck understands the required safety procedures when leaving the industrial lift truck unattended.

This would include ensuring the industrial lift truck has been parked on a firm, level surface with the handbrake applied, the motor switched off and rendered inoperable, for example by removing the key.

4.8. Decommissioning, dismantling and disposing of plant

WHS Regulation section 204

Control of risks arising from installation or commissioning

Section 4.2 of this Code provides an outline of obligations imposed on persons with management or control of plant in relation to controlling risks arising from installing and commissioning plant.

A person with management or control of plant at a workplace should follow the same procedures to identify any hazards inherent in the process of decommissioning and dismantling the plant, for example exposure to hazardous substances. The plant should be dismantled in accordance with the designer's and manufacturer's instructions.

Disposing of plant may include reselling, in full or part, scrapping, waste disposal or recycling. If the plant is to be resold, the seller will take on the duties of a person supplying the plant. The seller should ensure the plant is safe to load, transport, unload and store. Information relating to the plant design, registration, installation, operation and maintenance must be provided with the plant to the reseller or buyer.

The supplier must ensure, so far as reasonably practicable, the plant they import, or supply is without risks to health and safety to people at or in the vicinity of a workplace.

If the plant is to be scrapped, you should consult with local recycling or local waste disposal authorities or organisations so the plant can be made safe to load, transport, unload and dispose of.

If the plant is to be used for scrap or spare parts, you must inform the person you are supplying the plant to that the plant is being supplied as scrap or spare parts and the plant in its current form is not to be used as plant. This must be done in writing or by marking the item of plant.

5. Specific control measures

5.1. Guarding plant

A guard is a physical or other barrier that can perform several functions including:

- preventing contact with moving parts or controlling access to dangerous areas of plant
- screening harmful emissions, for example radiation
- minimising noise through applying sound-absorbing materials
- preventing ejected parts or off-cuts from striking people.

More than one type of guarding system may be required to ensure the safe operation of machinery or plant (see Figure 1).

WHS Regulation section 208

Guarding

If guarding is used, the person with management or control of the plant must ensure that one of the following is complied with:

- if access to the area of plant requiring guarding is not necessary during operation, maintenance or cleaning of the plant, the guarding is a permanently fixed barrier
- if access to guarded areas is necessary during operation, maintenance or cleaning, the guarding is an interlocked physical barrier that allows access to the area being guarded at times when that area does not present a risk and prevents access to that area at any other time.

If it is not reasonably practicable to use a permanently fixed barrier or an interlocked physical barrier in accordance with the above dot points:

- the guarding is a physical barrier that can only be altered or removed using a tool
- if it is also not reasonably practicable to use a physical barrier fixed in position, the guarding includes a presence-sensing safeguarding system that eliminates risk arising from the area of the plant requiring guarding when a person or any part of a person is in the area being guarded.

A person with management or control of the plant must ensure that the guarding:

- is of solid construction and securely mounted so as to resist impact or shock
- makes by-passing or disabling the guarding, whether deliberate or accidental, as difficult as is reasonably practicable
- does not create a risk in itself. For example, it must not obstruct operator visibility, weaken the plant, cause discomfort to operators or introduce new hazards, such as pinch points, rough or sharp edges
- is properly maintained
- controls, so far as is reasonably practicable, any risk from potential broken or ejected parts and work pieces, and
- is able to be removed when the plant is not in normal operation to allow for maintenance and cleaning and, when the guarding is removed, that, so far as is reasonably practicable, the plant cannot be restarted unless the guard is replaced.

Removal of guarding

If the guarding required by the WHS Act or the WHS Regulation is removed for the purposes of maintenance or cleaning, it must be replaced before the plant is put back into normal operation. Where reasonably practicable, the plant should not be able to restart unless the guarding is in place. When removing guarding, eliminate the energy source by disconnecting the power supply or by locking out motive power sources.

Permanently fixed physical barriers

Permanently fixed physical barriers are designed to be welded or incorporated into the body of the machine. In Figure 1, the plant's power transmission is not required to be accessed during normal operation, maintenance or cleaning. It is therefore practicable to have the gear arrangements enclosed in gearbox housing to prevent access to moving gears. This has eliminated the risk associated with entanglement.

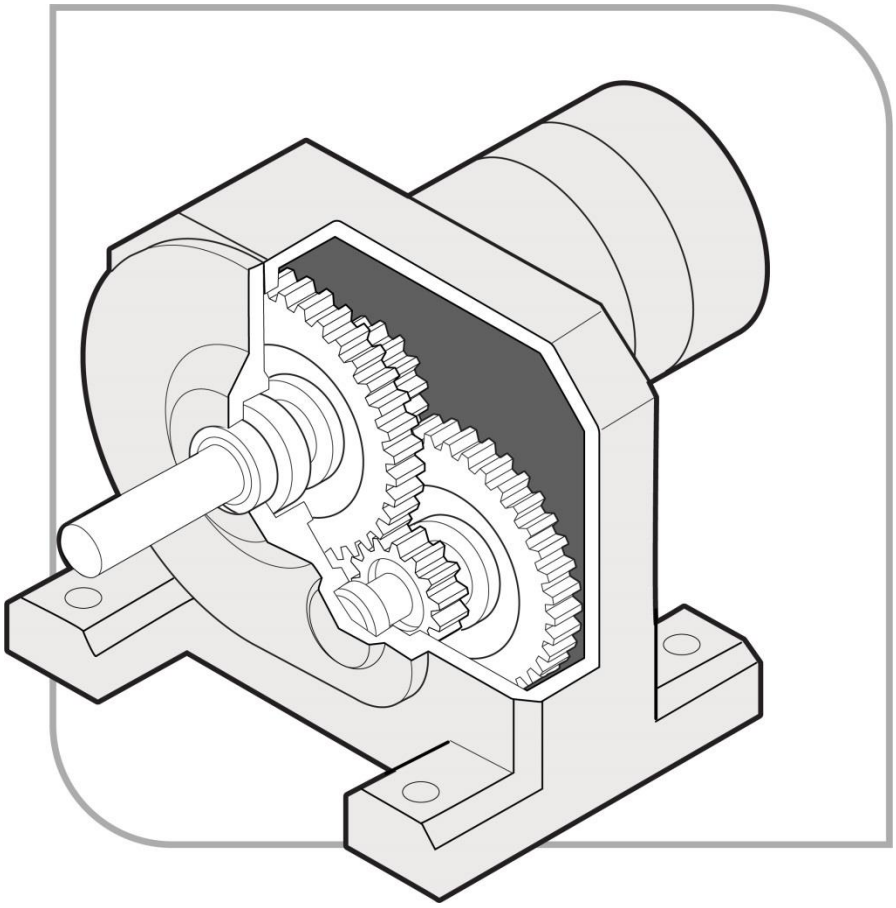

Figure 1 Cut-away view of a fixed physical barrier encasing the gear assembly and electric motor

Interlocked physical barriers

An interlock guard is connected to the plant's operational controls, so the plant is prevented from operating until the guard is closed. The guard can either:

- remain locked while the plant is in operation and, where it takes time for the dangerous parts to come to rest, incorporate a delay before it can be opened
- not be locked but stop the operation of the machine when opened.

In Figure 2, the hinged top guard on the food mixer has a positively operating insertion key which automatically cuts off the plant's power when the lid is opened or removed. This allows the blades to come to rest. If the moving parts do not stop immediately once the power is cut off, then a guard should be designed to delay release of the locking mechanism until the moving parts have stopped.

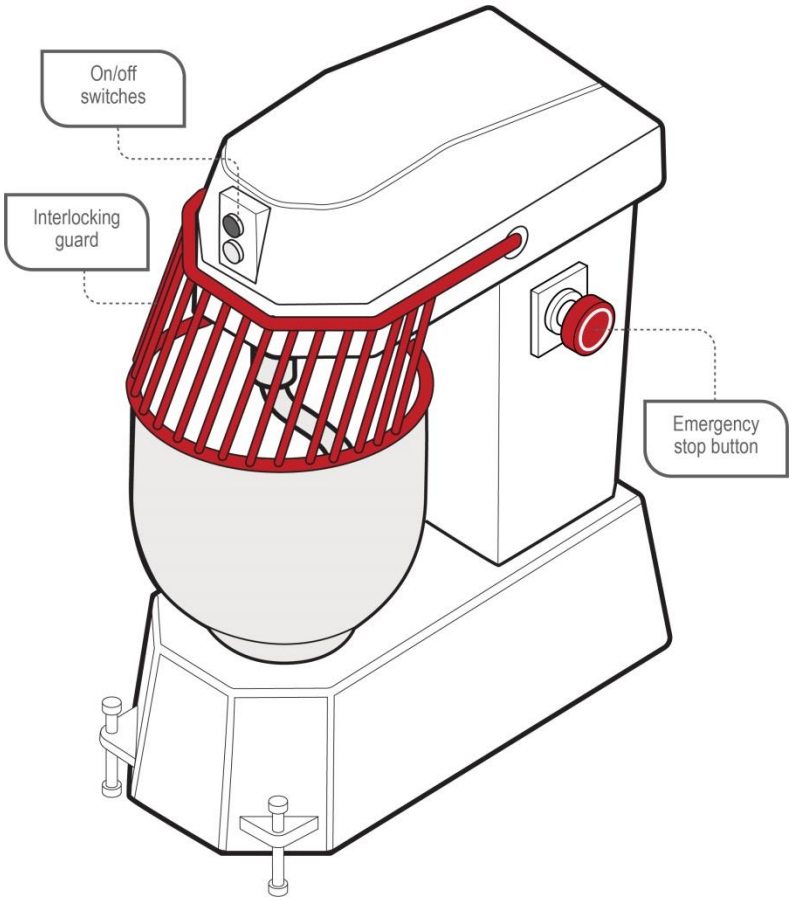

Figure 2 Food mixer with interlocking guard.

Physical barriers fixed in position

Physical barriers securely fixed in position should be easy to remove and replace but only with the aid of a special tool, for example a spanner, Allen key or similar tool. They should only be opened when the machine is not in operation (see Figure 3). The special tool should not be the same as any tool issued to and used by the operator of the plant when the operator is performing their normal work. Devices that can be operated using fingers, for example wing nuts or wedge inserts, should not be used.

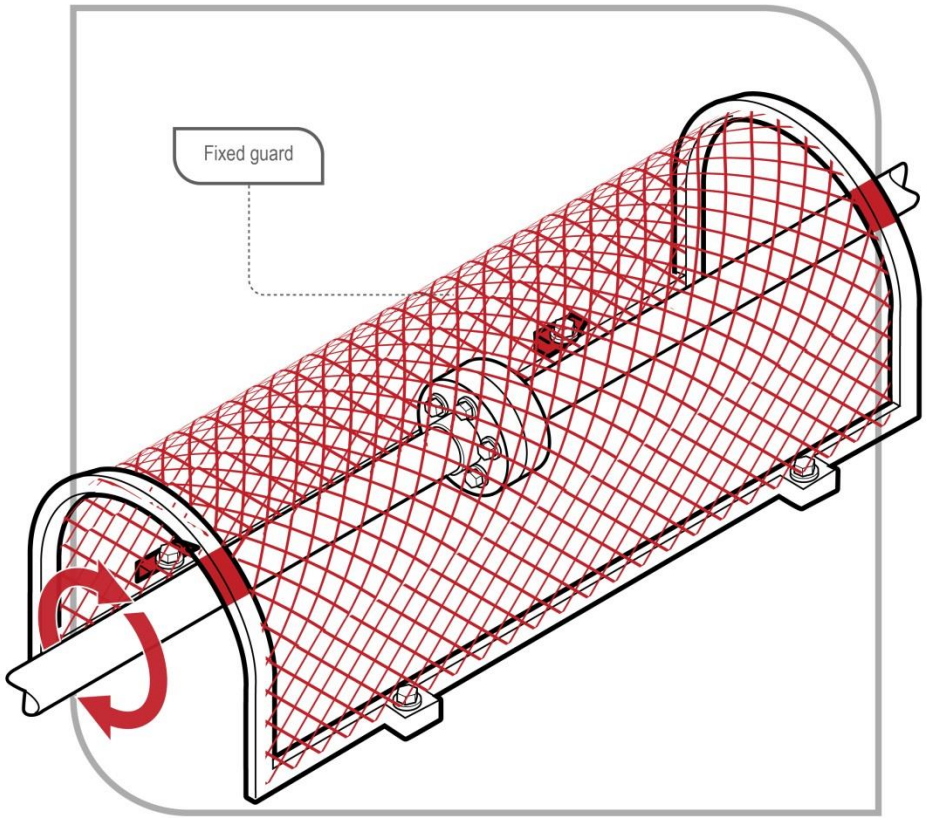

Figure 3 Fixed guard on rotating shaft or coupling

Physical barriers, for example perimeter fences securely fixed in position, may prevent access to dangerous areas. Any access points, for example gates and doors, should be secured with a lock and key or an interlocking system (see Figure 4). Isolation procedures may be necessary where there is a danger of machines activating while a person is inside the barrier. For example, when an interlocked door is accidentally closed the machine should not automatically restart.

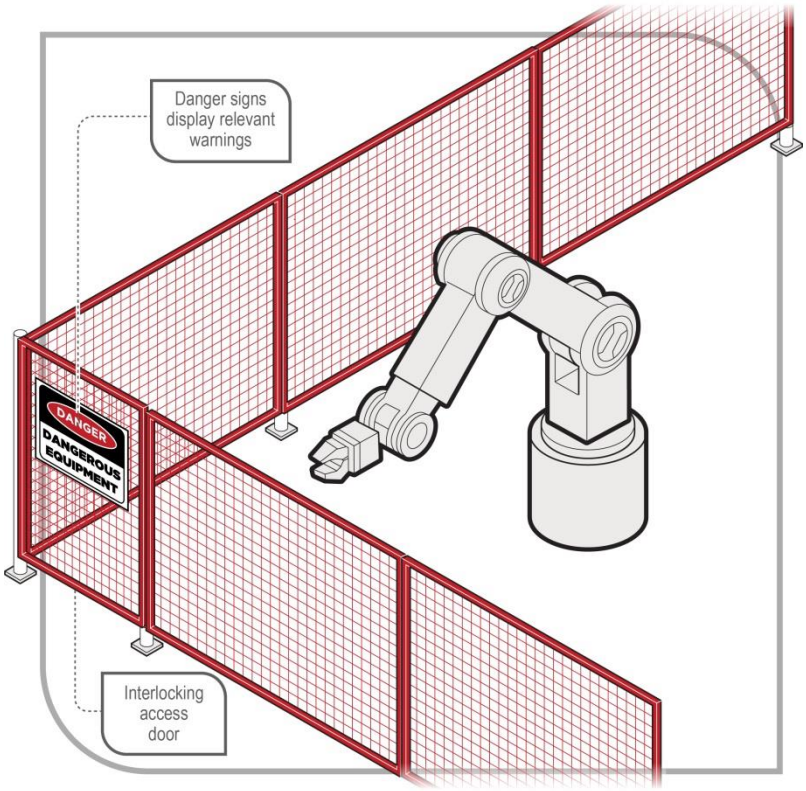

Figure 4 Perimeter fence guard with fixed panels and interlocking access door

Adjustable guarding incorporates movable sections or panels of the guard to allow materials to be fed into the guarded area while still preventing physical contact (see Figure 5).

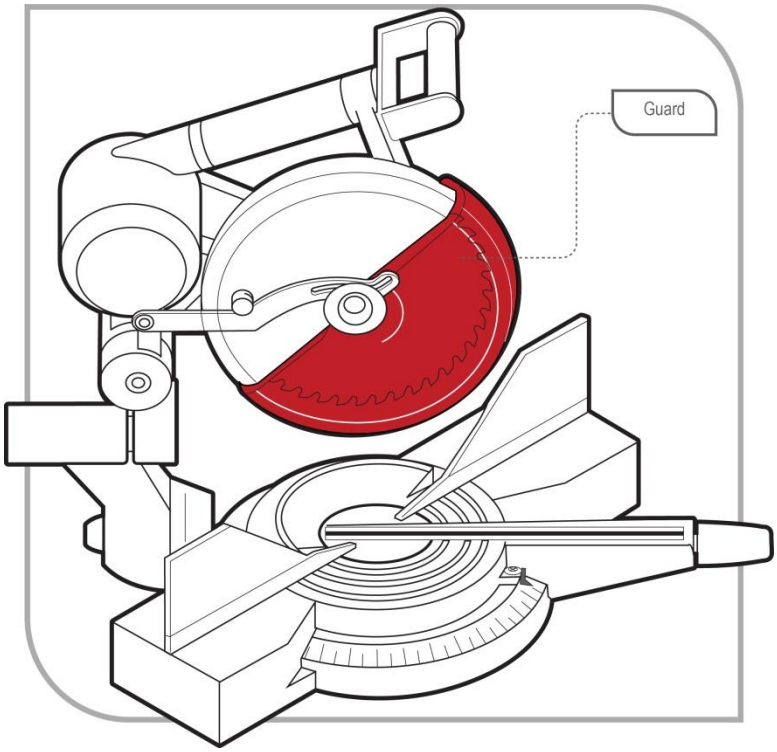

Figure 5 Self-adjusting guard for a drop saw

Physical barrier guarding should be strong enough to resist normal wear and shock that may arise from failure of the parts or processes being guarded, and to withstand prolonged use with a minimum of maintenance.

Presence-sensing systems

WHS Regulation section 226

Plant with presence-sensing safeguarding system—records

The person with management or control of plant with a presence-sensing safeguarding system at a workplace must keep a record of safety integrity tests, inspections, maintenance, commissioning, decommissioning, dismantling and alterations of the plant.

If physical guards are not reasonably practicable, then a presence-sensing system can be used to control the risks. These systems detect when a person or part of a person's body enters a defined area and stop the machine before the person or part reaches the danger zone. Photoelectric light beams, laser scanners and foot pressure mats are examples of this type of guarding. They rely on sensitive trip mechanisms and the machine being able to stop quickly, which may be assisted by a brake (see Figures 6 and 7).

Effective presence-sensing safeguard systems require selecting a trip device appropriate for the work being done, and the correct location of beams with light-activated devices, taking into account speed of entry and machine stopping time.

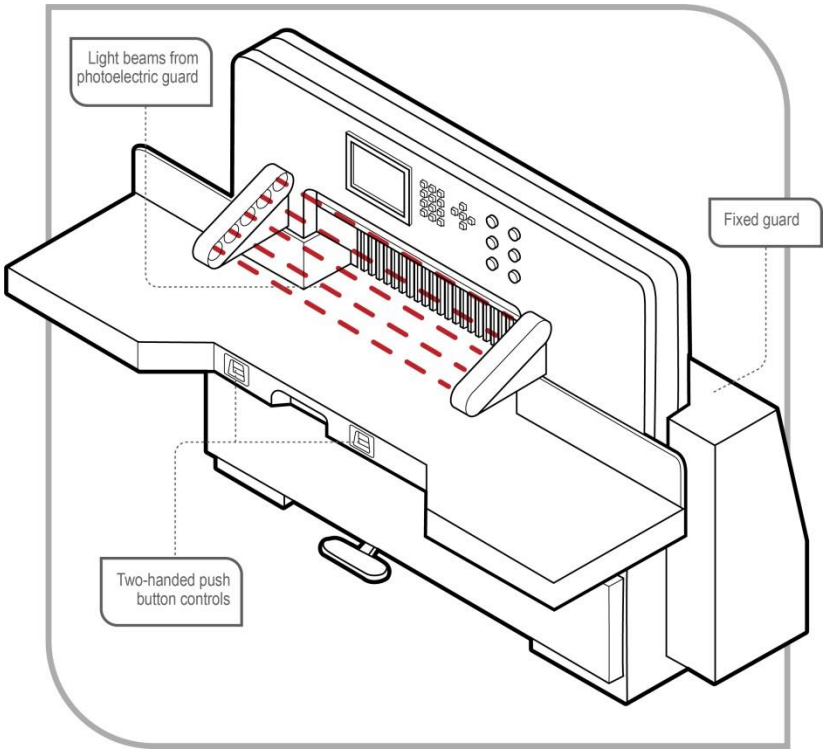

Figure 6 Paper cutting guillotine with a combination of guards including a photoelectric light curtain

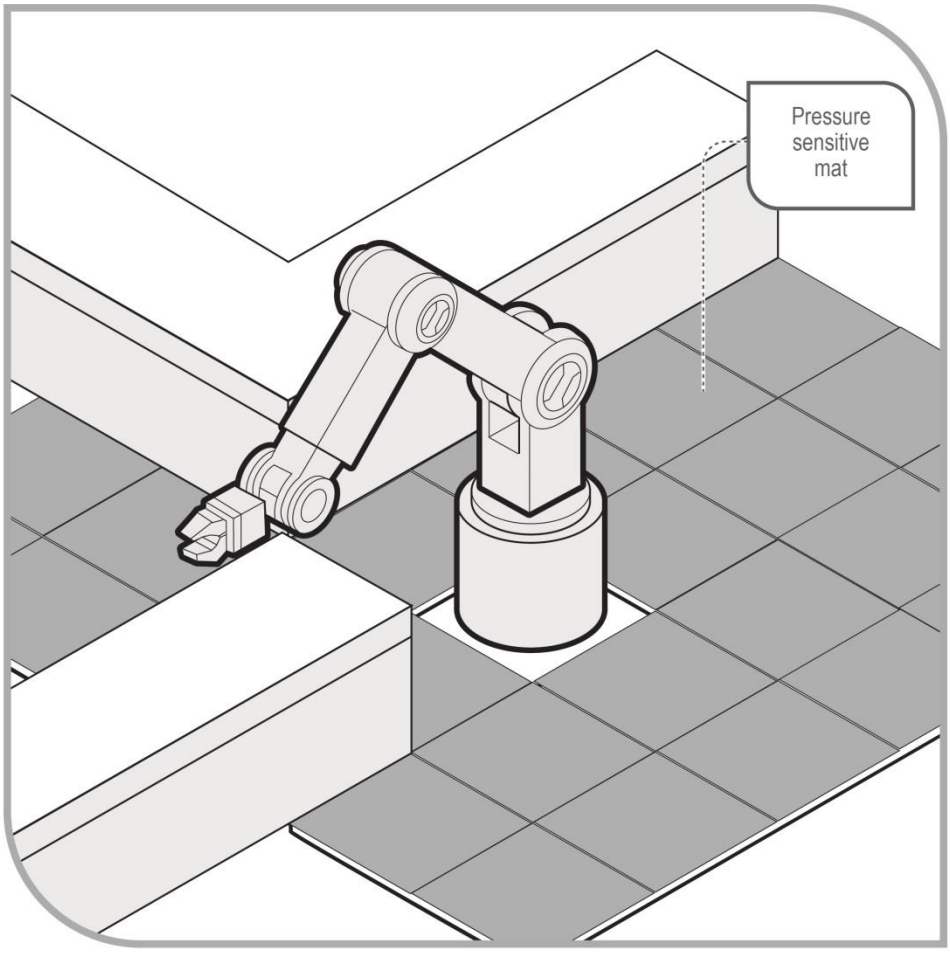

Figure 7 Pressure sensitive unit

Environmental factors

When using a guard, you should consider the environment in which it may be used. Some examples of poor guard selection include guards on high frequency welders that become electrically charged; heating of guards in hot processes; and wire mesh guards on machines emitting splashes.

If a guard is likely to be exposed to corrosion, the person with management or control of the plant should consider corrosion-resistant materials or surface coatings.

Colour coding

It is good practice for all guards to be painted the same colour. For example:

- use high visibility yellow or red, provided it is different to the plant's colour, so it can be clearly seen when a guard has been removed or when it is not in its proper place
- paint the surfaces behind the guard a contrasting or bright colour so that when the guard is removed the exposed colour is clearly visible and it is easy to identify that the guard has been removed, alerting workers to possible danger.

For some types of plant, it may be necessary to choose colours that contrast with work pieces, where these are visible through the guarding.

5.2. Operational controls

WHS Regulation section 210

Operational controls

A person with management or control of plant at a workplace must ensure that any operator controls are:

- identified on the plant to indicate their nature and function and direction of operation
- located so they can be readily and conveniently operated by each person using the plant
- located or guarded to prevent unintentional activation
- able to be locked into the 'off' position to enable disconnection from energy sources.

Poorly designed operator controls can lead to plant moving unexpectedly or not being able to be operated safely. For example, a control for setting the speed on a saw should not be a simple slider or rotary control that may be accidentally adjusted during operation. It should be graduated in fixed lockable steps.

Operational control devices should be designed:

- to enable the plant to be 'fail safe', for example when hand pressure is released on a lever controlling up and down movement, the lever will return to the neutral position and movement will stop
- to be within easy access of the operator
- so the intended function can be easily read and understood, especially in the case of dials and gauges
- so the movement of the control is consistent with established convention, for example anticlockwise to open, clockwise to close
- so the desired effect can only occur by intentional control operation, for example providing a starting control
- to withstand the rigours of normal use, undue forces and environmental conditions
- so they are located outside danger zones
- so they are readily accessible for maintenance
- so they are positioned to maximise visibility of the whole plant.

5.3. Emergency stops

WHS Regulation section 211

Emergency stops

If the design of plant at a workplace includes an emergency stop control, the person with management or control of the plant must ensure that:

- the stop control is prominent, clearly and durably marked and immediately accessible to each operator of the plant
- any handle, bar or push button associated with the stop control is coloured red
- the stop control cannot be adversely affected by electrical or electronic circuit malfunction.

Where the plant is designed to be operated or attended by more than one person and more than one emergency stop control is fitted, the person with management or control of the plant must ensure that the multiple controls are of the 'stop and lock-off' type so that the plant cannot be restarted after an emergency stop control has been used unless each activated stop control is reset.

Emergency stop devices should not be the only method of controlling risks. They should be designed as a back-up to other control measures.

Once engaged, the emergency stop controls should remain that way. It should only be possible to disengage the emergency stop controls by a deliberate action. Disengaging the emergency stop control should not restart the plant. It should only allow the normal starting sequence to be activated.

In the case of plant or parts of plant designed to work together, stop controls, including the emergency stop control, should also stop all the equipment related to the plant's operation, where continuing to operate this related equipment may be dangerous.

Figure 8 Emergency stop button

5.4. Warning devices

WHS Regulation section 212

Warning devices

WHS Regulation section 215

Powered mobile plant—specific control measures

If the design of plant includes an emergency warning device or it is necessary to include one to minimise risk, the person with management or control of the plant must ensure that the device is positioned on the plant to ensure that the device will work to best effect.

If there is a possibility of the plant colliding with pedestrians or other powered mobile plant, the person with management or control of the plant must ensure that the plant has a warning device that will warn persons who may be at risk from the movement of the plant. There are a number of warning devices that can be fitted to moving plant to alert the operator and others in the workplace.

Warning devices should be fitted to fixed plant to warn workers of an impending risk. For example, these may warn of start-up movement or release of steam or overpressure.

Automatic audible alarms

Automatic audible alarms are usually fitted to warn of forward or reversing movement. These alarms emit an intermittent sound which is activated when the gear or drive lever is engaged.

If automatic audible alarms are used, the sound should be distinct and clearly audible only in the hazard area. If several items of plant are using the same warning device, it may be difficult for workers to be aware of which item of plant is moving or is about to move. It is also possible that workers will become desensitised to the sound. For this reason, it may be more effective to combine audible alarms with other warning devices, for example flashing lights.

Motion sensors

Motion sensors are used to activate an integrated or separately located alarm. Motion sensors also warn with sound. They are sensitive to movement and are activated by motion in the required direction. These devices are suitable for plant that moves suddenly in any direction, for example rollers, bulldozers, excavators, boom lifts or scissor lifts.

Motion sensor alarms usually deactivate after a short time. They should not be deactivated if the operator has restricted vision when reversing.

Lights

Lights are usually used to warn of forward and reversing movement. These lights are wired to operate continuously or in hazard mode by flashing, usually when reversing. They generally work when the gear or drive lever is engaged.

It is important to choose the intensity and colour of lights appropriate to your workplace to ensure the moving plant can be seen. For example, an orange warning light may be suitable inside a warehouse but may not be seen in sunlight.

Flashing lights

Rotary flashing lights are coloured revolving lights and are usually mounted in a prominent place, for example the top of a vehicle cabin. They can be wired to operate continuously or can be activated by a switch. They are suitable to be used on any items of plant that move in the workplace, for example forklifts or skid steer loaders.

Flashing lights may not be suitable for plant that:

- is stationary for long periods of time
- operates in restricted areas, for example trucks travelling on defined site roads.

Percussion alarms

Percussion alarms are mechanical devices fitted to an axle or gearshift. When plant moves, a cam raises a hammer that drops repeatedly onto a bell or sounding plate. These alarms are relatively cheap to install. However, they require regular maintenance to ensure they continue functioning effectively.

Radio sensing devices

Radio sensing devices activate when the operator selects reverse. A light and alarm sound inside the cabin to alert the operator if a pedestrian is within a predetermined distance from the rear of the plant.

Air horns

Horns are suitable for powered mobile plant with long braking distances, for example trucks. Some large workplace or sites may require a truck to ‘stop and sound horn before continuing’.

5.5. Isolating energy sources

An isolation procedure is a set of predetermined steps that should be followed when workers are required to perform tasks, for example maintenance, repair, installation and cleaning of plant.

Isolation procedures involve isolating potentially hazardous energy, so the plant does not move or start up accidentally. Isolating plant also ensures entry to a restricted area is controlled while the specific task is being carried out.

The lock-out process is the most effective isolation procedure. The process is as follows:

- shut down the machinery and equipment
- identify all energy sources and other hazards
- identify all isolation points
- isolate all energy sources
- control or de-energise all stored energy
- lock out all isolation points
- tag machinery controls, energy sources and other hazards
- test by ‘trying’ to reactivate the plant without exposing the tester or others to risk.

Failure to reactivate the plant may mean the main power has been isolated. However, it does not guarantee all stored energies have dissipated. Further measures to safely release

these energies, for example hydraulic or pneumatic pressure, suspended weight or compressed springs, may be required.

In order for the isolation procedure to be effective, you should identify all energy sources likely to activate the plant or part of it and isolate or de-energise these to avoid the plant being inadvertently powered. Energy sources include:

- electricity (mains)
- battery or capacitor banks
- solar panels
- fuels
- heat
- steam
- fluids or gases under pressure. For example, water, air, steam or hydraulic oil
- stored energy. For example, compressed springs
- gravity
- radiation.

In order to isolate plant, you should use a device that effectively locks out the isolation points. These devices include switches with built-in locks and lock-out circuit breakers, fuses and valves. Other devices include chains, safety lock-out jaws (also known as hasps) and safety padlocks.

When isolating an energy source, you should, where possible, use a lock that allows one or more padlocks to be fitted. If more than one person is working on the plant at the same time, you should ensure each worker is able to attach a padlock to the device (see Figure 9). This will prevent access to the energy sources while the work is being carried out.

Figure 9 Example of lock-out with a tag and the padlocks of two workers

Another way to allow multiple locks to be used is to have one padlock on the isolation point, with the keys locked in a box that has been locked separately by each worker.

Each worker involved in the maintenance, cleaning or repair of the plant should have a lock, tag and key for each isolation point. There should be no duplicate key for any lock, except a master key that is kept in a secure location and which should only be used in an emergency. If more than one energy source needs to be isolated to enable safe shut-down of the plant, the single key to each lock-out device should be held by the same person.

Tags should only be used as a means of providing information to others at the workplace. A tag should not be used on its own as an isolation device; only a lock is effective in isolating the energy source.

Tags and locks should only be removed by the person who applied them or by the supervisor after consultation with the signatory of the tag.

In the event that the person who applied the tag is unavailable, their tag or lock may only be removed in accordance with a management approved procedure.

6. Plant registration

Schedule 5 of the WHS Regulation requires certain plant designs and items of plant to be registered (registrable plant). Schedule 5 is reproduced at Appendix B.

A person with management or control of plant in the workplace must not direct or allow a worker to use registrable plant in the workplace if it has not been registered.

6.1. Design and altered design registration

You must register the plant design if:

- it has not already been design registered
- the person conducting the business or undertaking (PCBU) alters the plant design by modifying the plant and the alterations to the design may affect health and safety.

Design registration

In order to register a plant design, the design must be verified by a design verifier who must provide a statement stating the design has been produced in accordance with published technical standards or engineering principles specified by the designer. Examples of published technical standards are provided at Appendix D.

A design can only be verified by a person who is eligible to be a design verifier under the WHS Regulation. The types of people who would be competent to verify the design of plant may include someone who:

- has educational or vocational qualifications in an engineering discipline relevant to the design to be verified
- has knowledge of the technical standards relevant to the design to be verified
- has the skills necessary to independently verify the design was produced in accordance with the published technical standards and engineering principles used in the design
- is certified by a body accredited or approved by the Joint Accreditation System—Australia and New Zealand or an equivalent overseas body to undertake conformity assessments of the design against the relevant technical standards.

For example, this could include someone who is registered on the National Professional Engineers Register administered by the Institution of Engineers Australia and is determined by the Institution to be competent to design or inspect the relevant type of plant, or is a member of the Institution of Engineers Australia with the status of Chartered Professional Engineer.

When registering a plant design, the regulator will issue a plant design registration number. The person to whom this number is issued must give this number to the manufacturer, importer or supplier of plant manufactured to that design. These duty holders must ensure the design registration number is provided to the person with management or control of that plant at the workplace.

The person with management or control of plant at the workplace must then ensure the design registration number is kept readily accessible in the vicinity of the plant at all times. A reliable way to achieve this is to permanently mark the design registration number on the plant.

Altered design registration

WHS Regulation section 244

Altered plant designs to be registered

WHS Regulation section 282

Changes to information

If a registered plant design is altered and the altered design may affect health and safety, the altered design must be registered. This is because altering a plant design may require the introduction of new risk control measures. The application for registration of the altered design must be made in the jurisdiction that registered the original design. If the original design was not registered before the specified date, the altered design must be registered as a new design.

6.2. Item registration

A person must not use a registrable item of plant in the workplace if it has not been registered.

A PCBU must not direct or allow a worker to use a registrable item of plant in the workplace if it has not been registered. Part 2 of Schedule 5 of the WHS Regulation lists registrable items of plant.

In order to have an item of plant registered, the item must be inspected, and a statement provided by a competent person stating the plant is safe to operate. A person is competent to inspect an item of plant if the person has educational or vocational qualifications in an engineering discipline relevant to the plant, or knowledge of the technical standards relevant to the plant to be inspected.

If the design of the plant was also required to be registered, the design registration number must be included with the application.

Once the item of plant is registered

When the item of plant is registered, the regulator will issue a registration document. This document will list the name of the registration holder, any associated business name, the registration number and the date of effect of the registration. The registration holder must keep this document and make it available for any inspection required under the Act.

If it is lost, stolen or destroyed, the registration holder will need to apply to the WHS regulator that registered the plant for a replacement document as soon as possible, outlining the reasons for needing a replacement.

The regulator may impose conditions on registering items of plant including conditions about the use and maintenance of the plant, record keeping or providing information to the regulator.

The registration holder must ensure the item registration number is marked on the item of plant. It will generally be a simple task to mark large items of plant with the item registration number by either etching the number in place or by fixing the number in place on a plate in a position that will not lead to damage or removal over time.

On some items, for example a tower crane comprising many parts assembled in a variable configuration to suit a particular site, it may not be feasible to mark each component of the plant. In such cases the item registration number should be marked on those components readily accessible and able to be seen when the crane is fully assembled.

Registration renewal

The WHS Regulation requires annual renewal of registration for items of plant. To renew the registration for the item of plant the registration holder must apply to the regulator before the registration expires.

Changes to item registration

If there is a change to the information provided at the time of item registration, or about the registration itself, the registration holder has 14 days to advise the regulator of the change. This must be done in writing. Without limiting this requirement, the registration holder must provide written notice to the regulator if:

- the item of plant is altered to the extent it requires new risk control measures
- the item of plant is usually fixed and is relocated
- the registration holder no longer has management or control of the item of plant.

7. Keeping records

7.1. Record keeping—plant

WHS Regulation section 237

Records of plant

WHS Regulation section 226

Plant with presence-sensing safeguarding system—records

The person with management or control of plant that is required to be registered at a workplace must keep a record of all tests, inspections, maintenance, commissioning, decommissioning, dismantling and alterations of the registered plant for the period that the plant is used or until the person relinquishes control of the plant.

The person with management or control of plant with a presence-sensing safeguarding system must keep a record of safety integrity tests, inspections, maintenance, commissioning, decommissioning, dismantling or alterations of the plant. The record must be kept for:

- five years
- the life of the plant or until the person relinquishes control of the plant if the plant is registered plant or has been altered.

It is also good practice to keep records for other types of plant in your workplace. Keeping records of the risk management process helps demonstrate compliance activities with the WHS Act and the WHS Regulation. It also helps when undertaking subsequent risk assessments.

Records on items of plant that may be kept include:

- the unique plant identification number
- plant design registration information
- relevant data from commissioning
- compliance statements and/or test certificates
- manufacturer's specifications and user manuals
- results of inspections
- results of tests on the plant including safety devices, for example protective earth continuity tests, testing of mechanical guarding, stop time measurement
- information on maintenance and major repairs carried out
- information on alterations
- information on use deviating from intended operating or design conditions
- results of risk assessments carried out on plant
- information, instruction and training provided to workers
- competencies of operators.

Appendix A—Glossary

1. **Table 1** List of key terms used in this Code of Practice

Term	Description

Competent person	A person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.
	A competent person has a more specific meaning in the following circumstances:
	• For design verification, the person must have the skills, qualifications, competence and experience to design the plant or verify the design.
	• For inspecting plant for registration purposes, the person must have:
	  - educational or vocational qualifications in an engineering discipline relevant to the plant being inspected
	  - knowledge of the technical standards relevant to the plant being inspected.
	For inspecting mobile cranes, tower cranes and amusement devices the person must:
	• have the skills, qualifications, competence and experience to inspect the plant, and be registered under a law that provides for the registration of professional engineers in jurisdictions where such a law exists
	• be determined by the regulator to be a competent person.

Duty holder	Any person who owes a work health and safety duty under the WHS Act including a person conducting a business or undertaking, a designer, manufacturer, importer, supplier, installer of products or plant used at work (upstream duty holder), officer or a worker.
Fail safe	A state or condition where, if a component or function of the plant fails, a system exists to prevent an increase in the risks. For example, if the primary hoist brake fails on a crane lifting a person in a workbox, the secondary hoist brake will prevent uncontrolled dropping of the workbox. However, once the secondary brake is engaged, a lower level of safety has been reached. The situation must be made safe and the fault rectified so the fail-safe capability is re-established.
Health and safety committee	A consultative body established under the WHS Act. The committee's functions include facilitating cooperation between workers and the person conducting a business or undertaking to ensure workers' health and safety at work, and assisting to develop work health and safety standards, rules and procedures for the workplace.
Health and safety representative	A worker who has been elected by their work group under the WHS Act to represent them on health and safety matters.
May	'May' indicates an optional course of action.

Term	Description
Must	'Must' indicates a legal requirement exists that must be complied with.
Officer	An officer under the WHS Act includes: • an officer under section 9 of the Corporations Act 2001 (Cth) • an officer of the Crown within the meaning of section 247 of the WHS Act • an officer of a public authority within the meaning of section 252 of the WHS Act. A partner in a partnership or an elected member of a local authority is not an officer while acting in that capacity
Person conducting a business or undertaking (PCBU)	A PCBU is an umbrella concept which intends to capture all types of working arrangements or relationships. A PCBU includes a: • company • unincorporated body or association • sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A volunteer association (defined under the WHS Act, see below) or elected members of a local authority will not be a PCBU.
Plant	Plant includes machinery, equipment, appliance, container, implement and tool components or anything fitted or connected to those things. Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools, quad bikes, mobile plant and amusement devices. Plant that relies exclusively on manual power for its operation and is designed to be primarily supported by hand, for example a screwdriver, is not covered by the WHS Regulation. The general duty of care under the WHS Act applies to this type of plant. Certain kinds of plant, for example forklifts, cranes and some pressure equipment, require a licence from the regulator to operate and some high-risk plant must also be registered with the regulator.
Should	'Should' indicates a recommended course of action.
Volunteer association	A group of volunteers working together for one or more community purposes where none of the volunteers, whether alone or jointly with any other volunteers, employs any person to carry out work for the volunteer association.
Work group	A group of workers established to facilitate the representation of workers by one or more health and safety representatives. A work group may be all workers at a workplace, but it may also be appropriate to split a workplace into multiple work groups where workers share similar work conditions or are exposed to similar risks and hazards. For example, all workers on night shift.
Worker	Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or

Term	Description
	subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer.
Workplace	Any place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water.

Appendix B—Registrable plant designs and items of plant

Plant requiring registration of design in Schedule 5 (Part 1) of the WHS Regulation

- Pressure equipment, other than pressure piping, and categorised as hazard level A, B, C or D according to the criteria in section 2.1 of AS 4343–2005: *Pressure equipment—hazard levels*
- Gas cylinders covered by section 1 of AS 2030.1–2009: *Gas cylinders—General requirements*
- Tower cranes including self-erecting tower cranes
- Lifts, escalators and moving walkways
- Building maintenance units
- Hoists with a platform movement exceeding 2.4 metres, designed to lift people
- Work boxes designed to be suspended from cranes
- Amusement devices classified by section 2.1 of AS 3533.1–2009: *Amusement rides and devices—Design and construction* except amusement devices noted below
- Concrete placing booms
- Prefabricated scaffolding
- Boom-type elevating work platforms
- Gantry cranes with a safe working load greater than five tonnes or bridge cranes with a safe working load of greater than 10 tonnes, and any gantry crane or bridge crane which is designed to handle molten metal or Schedule 11 hazardous chemicals
- Vehicle hoists
- Mast climbing work platforms
- Mobile cranes with a rated capacity of greater than 10 tonnes.

Plant not requiring registration of design in Schedule 5 (Part 1) of the WHS Regulation

- A heritage boiler
- Any pressure equipment (other than a gas cylinder) excluded from the scope of AS/NZS 1200: Pressure equipment. See section A1 of Appendix A to AS/NZS 1200
- A crane or hoist that is manually powered
- A reach stacker
- An elevating work platform that is a scissor lift or a vertically moving platform
- A tow truck
- Amusement devices classified by section 2.1 of AS 3533.1 (Amusement rides and devices—Design and construction) that are:
  - class 1 devices
  - playground structures
  - water slides where water facilitates patrons to slide easily, predominantly under gravity, along a static structure
  - wave generators where patrons do not come into contact with the parts of machinery used for generating water waves, and
  - inflatable devices, other than inflatable devices—continuously blown—with a platform height of three metres or more.

Items of plant requiring registration in Schedule 5 (Part 2) of the WHS Regulation

- Boilers categorised as hazard level A, B or C according to criteria in section 2.1 of AS 4343: Pressure equipment—hazard levels.
- Pressure vessels categorised as hazard level A, B or C according to the criteria in section 2.1 of AS 4343: Pressure equipment—hazard levels, except for gas cylinders; LP Gas fuel vessels for automotive use, and serially produced vessels
- Tower cranes including self-erecting tower cranes.
- Lifts, escalators and moving walkways
- Building maintenance units
- Amusement devices classified by section 2.1 of AS 3533.1: Amusement rides and devices—Design and construction except amusement devices noted below
- Concrete placing booms
- Mobile cranes with a rated capacity of greater than 10 tonnes.

Items of plant not requiring registration in Schedule 5 (Part 2) of the WHS Regulation

- Any pressure equipment (other than a gas cylinder) excluded from the scope of AS/NZS 1200: Pressure equipment. See section A1 of Appendix A to AS/NZS 1200
- A manually powered crane or hoist
- A reach stacker
- Lifts installed in a private residence within the meaning of AS 1735.1 (Lifts escalators and moving walks- General requirements)
- Amusement devices classified by section 2.1 of AS 3533.1: Amusement rides and devices—Design and construction that are:
  - class 1 devices
  - playground devices
  - water slides where water facilitates patrons to slide easily, predominantly under gravity, along a static structure
  - wave generators where patrons do not come into contact with the parts of machinery used for generating water waves, and
  - inflatable devices, other than inflatable devices—continuously blown—with a platform height of three metres or more.

Appendix C—Hazard checklist

Plant description: Click here to enter text.

Activities for example use, cleaning and maintenance: Click here to enter text.

Assessed by: Click here to enter text.

Date: Click here to enter a date.

'Yes' to any of the following indicates the need to implement control measures		
Entanglement	**Yes**	**No**
Can a person's hair, clothing, gloves, necktie, jewellery, cleaning brush or rag become entangled with moving parts of the plant?	☐	☐
Crushing	**Yes**	**No**
Can anyone be crushed due to: • material falling off the plant? • uncontrolled or unexpected movement of the plant? • lack of capacity for the plant to be slowed, stopped or immobilised? • the plant tipping or rolling over? • parts of the plant collapsing? • coming into contact with moving parts of the plant during testing, inspection, operation, maintenance, cleaning or repair? • being thrown off or under plant? • being trapped between the plant and materials or fixed structures? • other factors not mentioned?	☐	☐
Cutting, Stabbing or Puncturing	**Yes**	**No**
Can anyone be stabbed or punctured due to: • coming in contact with sharp or flying objects? • coming in contact with moving parts during testing, inspection, operation, maintenance, cleaning or repair? • the plant, parts of the plant or work pieces disintegrating? • work pieces being ejected? • the mobility of the plant? • uncontrolled or unexpected movement of the plant? • other factors not mentioned?	☐	☐
Shearing	**Yes**	**No**
Can anyone's body parts be sheared between two parts of the plant, or between a part of the plant and a work piece or structure?	☐	☐
Striking	**Yes**	**No**

'Yes' to any of the following indicates the need to implement control measures		
Can anyone be struck by moving objects due to: • uncontrolled or unexpected movement of the plant or material handled by the plant? • the plant, parts of the plant or work pieces disintegrating? • work pieces being ejected? • mobility of the plant? • other factors not mentioned?	☐	☐
High Pressure Fluid	**Yes**	**No**
Can anyone come into contact with fluids under high pressure, due to plant failure or misuse of the plant?	☐	☐
Electrical	**Yes**	**No**
Can anyone be injured by electrical shock or burnt due to: • the plant contacting live electrical conductors? • the plant working in close proximity to electrical conductors? • overload of electrical circuits? • damaged or poorly maintained electrical leads and cables? • damaged electrical switches? • water near electrical equipment? • lack of isolation procedures? • other factors not mentioned?	☐	☐
Explosion	**Yes**	**No**
Can anyone be injured by explosion of gases, vapours, liquids, dusts or other substances, triggered by the operation of the plant or by material handled by the plant?	☐	☐
Slipping, Tripping and Falling	**Yes**	**No**
Can anyone using the plant, or in the vicinity of the plant, slip, trip or fall due to: • uneven or slippery work surfaces? • poor housekeeping, for example offcuts, cables, hoses obstructing walkways, spills not cleaned up? • obstacles being placed in the vicinity of the plant? • other factors not mentioned?	☐	☐

'Yes' to any of the following indicates the need to implement control measures		
Can anyone fall from a height due to: • lack of a proper work platform? • lack of proper stairs or ladders? • lack of guardrails or other suitable edge protection? • unprotected holes, penetrations or gaps? • poor floor or walking surfaces, for example the lack of a slip-resistant surface? • steep walking surfaces? • collapse of the supporting structure? • other factors not mentioned?	☐	☐
Ergonomic	**Yes**	**No**
Can anyone be injured due to: • poorly designed seating? • poorly designed operator controls? • high forces? • repetitive movements? • awkward body posture or the need for excessive effort? • vibration? • other factors not mentioned?	☐	☐
Hazard combination	**Yes**	**No**
Can anyone be injured due to unexpected start-up, unexpected over-run/over-speed or similar malfunction from: • failure/disorder of the control system, for example a hydraulic system? • restoring energy supply after an interruption? • external influences on electrical equipment? • other environmental factors, for example gravity and wind? • errors in the software? • errors made by the operator?	☐	☐
Other hazards	**Yes**	**No**
Can anyone be injured due to: • noise? • inadequate or poorly placed lighting? • entry into any confined spaces of the plant? • failure to select plant suitable for its intended use? • contact with hot or cold parts of plant? • exposure to hazardous chemicals, radiation or other emissions released by the plant? • lack of operator competency? • other factors not mentioned?	☐	☐

Appendix D—Examples of technical standards

The following table is a list of published technical standards providing guidance on the design, manufacture and use of certain types of plant. These technical standards provide guidance only and compliance with them does not guarantee compliance with the WHS Act and the WHS Regulation in all instances. This list is not exhaustive.

2. **Table 2** List of published technical standards

Plant description	Reference number	Standard title	Design	Make	Use
Amusement structures	AS 3533 (series)	*Amusement rides and devices*	•	•	•
Cranes including hoists and winches	AS 1418 (series)	*Cranes, hoists and winches*	•	•	
	AS 4991	*Lifting devices*	•	•	•
	AS 2550 (series)	*Cranes, hoists and winches—Safe use*			•
Conveyers	AS/NZS 4024 (series)	*Safety of machinery conveyors*	•	•	•
Earthmoving machinery	AS 2294.1	*Earth-moving machinery—Protective structures—General*	•	•	
	AS 2958.1	*Earth-moving Machinery—Safety—Wheeled machines—Brakes*	•	•	•
	ISO 6165	*Earth-moving machinery—Basic types—Identification and terms and definitions*	•		
	ISO 6746–1	*Earth-moving machinery—Definitions of dimensions and codes—Part 1: Base machine*	•		
	ISO 6746–2	*Earth-moving machinery—Definitions of dimensions and codes—Part 2: Equipment and attachments*	•		

Plant description	Reference number	Standard title	Design	Make	Use
	ISO 7133	*Earth-moving machinery—Scrapers—Terminology and commercial specifications*	•		
Electrical installation	AS/NZS 3000	*Electrical installations (known as the Aust/NZ Wiring Rules)*			•
Electrical installation within an industrial plant	AS 60204.1 (IEC 60204.1)	*Safety of machinery: Electrical equipment of machines—General requirements*	•	•	
Hand-held electric tools	AS/NZS 60745 (series)	*Hand-held motor-operated electric tools—Safety*	•	•	•
Fall arrest	AS/NZS 1891 (series)	*Industrial fall-arrest systems and devices*	•	•	•
	BS EN 1263–1	*Temporary works equipment—Safety nets—Part 1: Safety requirements, test methods*	•		
Gas cylinders	AS 2030.1	*Gas cylinders—General requirements*	•	•	
	AS 2030.5	*Gas cylinders—Filling, inspection and testing of refillable cylinders*			
	AS 2337.2	*Gas cylinder test stations—LP Gas fuel vessels for automotive use*			•
	AS/NZS 3509	*LP Gas fuel vessels for automotive use*	•	•	
Industrial (forklift) trucks	AS 2359 (series)	*Powered industrial trucks*	•	•	•
Industrial rope access systems	AS 4488.2	*Industrial rope access systems—Selection, use and maintenance*	•	•	•
Ladders	AS/NZS 1892 (series)	*Portable ladders*	•	•	

Plant description	Reference number	Standard title	Design	Make	Use
Lasers	AS/NZS IEC 60825.1	*Safety of laser products—Equipment classification and requirements*	•	•	•
	AS/NZS IEC 60825.14	*Safety of laser products—A user's guide*			
	AS 2397	*Safe use of lasers in the building and construction industry*			•
Lifts	AS 1735 (series)	*Lifts, escalators and moving walks (known as the SAA Lift Code)*	•	•	•
Machinery	AS 4024 (series)	*Safety of machinery*	•	•	•
	AS 1657	*Fixed platforms, walkways, stairways and ladders—Design, construction and installation*	•	•	
	AS 1788.2	*Abrasive wheels—Selection, care and use*	•	•	•
	AS/NZS IEC 60947.3	*Low-voltage switchgear and control gear—Switches, disconnectors, switch-disconnectors and fuse-combination units*	•		•
	AS 61508(series)	*Functional safety of electrical / electronic / programmable electronic safety-related systems*	•	•	•
	AS/IEC 61511 (series)	*Functional safety—Safety instrumented systems for the process industry sector*	•	•	•
	AS 62061	*Safety of machinery: Functional safety of safety-related electrical, electronic and programmable electronic control systems*	•	•	•
	ISO 13849.1	*Safety of machinery: Safety-related parts of control systems—Part 1 General principles for design*	•	•	•

Plant description	Reference number	Standard title	Design	Make	Use
	BS EN 61496–1:2013	*Safety of machinery—Electro-sensitive protective equipment—Part 1: General requirements and tests*	•		•
	AS 1121.1–2007	*Agricultural tractor power take-offs—Rear-mounted power take-off types 1, 2 and 3—General specifications, safety requirements, dimensions for master shield and clearance zone*	•	•	
	AS 1636 (series)	*Tractors—Roll-over protective structures—Criteria and tests*	•	•	
	AS/NZS 2153.1	*Tractors and machinery for agriculture and forestry—Technical means for ensuring safety—General*	•	•	
	SAE J 167	*Overhead protection for agricultural tractors—Test procedures and performance requirements*	•	•	
	ILO Code of Practice	*Safety and Health in the Use of Machinery*			
Machinery guarding	AS 4024 (series)	*Safety of machinery*	•	•	•
	ISO 12100:2010	*Safety of machinery—General principles for design—Risk assessment and risk reduction*	•	•	•
Miniature boilers	AMBSC Code—Part 1	*Copper Boilers—Issue 7–2001*	•	•	
	AMBSC Code—Part 2	*Steel Boilers—Issue 5–12012*	•	•	
	AMBSC Code—Part 3	*Sub-Miniature Boilers—Issue 1–2006*	•	•	
	AMBSC Code—Part 4	*Duplex Boilers—Issue 1–2010*	•	•	

Plant description	Reference number	Standard title	Design	Make	Use
Passenger ropeways	AS 4722	*Passenger ropeways and passenger conveyors*			
Pressure equipment	AS/NZS 1200	*Pressure equipment*	•	•	•
	AS 2593	*Boilers—Safety management and supervision systems*	•		•
	AS 2971	*Serially produced pressure vessels*	•	•	
	AS/NZS 3788	*Pressure equipment—In-service inspection*			•
	AS 3873	*Pressure equipment—Operation and maintenance*			•
	AS 3920	*Pressure equipment—Conformity assessment*	•	•	
	AS 4343	*Pressure equipment—Hazard levels*			
	ASME IPV Code 1	*Boiler and pressure vessel code- Rules for construction of power boilers*	•	•	
	ASME IPV Code 2	*Boiler and pressure vessel code- Materials*	•	•	
	ASME IPV Code 5	*Boiler and pressure vessel code- Non-destructive examination*	•	•	
	ASME PV Code 8 Div 1	*Boiler and pressure vessel code- Rules for construction of pressure vessels*	•	•	
	ASME PV Code 8 Div 2	*Boiler and pressure vessel code- Rules for construction of pressure vessels—Alternative rules*	•	•	
	ASME PV Code 8 Div 3	*Boiler and pressure vessel code- Alternative rules for construction of high-pressure vessels*	•	•	

Plant description	Reference number	Standard title	Design	Make	Use
	ASME PV Code 9	*Boiler and pressure vessel code- Welding and brazing qualifications*	•	•	
	ANSI NGV2	*compressed natural gas vehicle fuel containers*	•	•	
			•	•	
	ISO 11439	*Gas cylinders—High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles*	•	•	
	ISO 21009–2 (series)	*Cryogenic vessels—Static vacuum insulated vessels—Part 2: Operational requirements*	•	•	•
Pressure piping	AS 4041	*Pressure piping*	•	•	
Scaffolding	AS/NZS 1576.1	*Scaffolding—general requirements*	•	•	
	AS 1577	*Scaffold decking components*	•	•	
	AS/NZS 4576	*Guidelines for scaffolding*			•
Spray painting	AS/NZS 4114.1	*Spray painting booths—Design, construction and testing*	•	•	•
	AS/NZS 4114.2	*Spray painting booths—Installation and maintenance*			•
Steam turbines	BIS IS 1498.2	*Rules for steam turbine thermal acceptance tests*	•		
	API 612	*Petroleum, petrochemical and natural gas industries—Steam turbines—Special purpose applications*	•		
Ventilation	AS 1668.2	*The use of ventilation and air conditioning in buildings—Mechanical ventilation in buildings*	•	•	•

Plant description	Reference number	Standard title	Design	Make	Use
Work boxes—crane lifted	AS 1418.17	*Cranes (including hoists and winches)—Design and construction of workboxes*	•	•	
	AS 2550.1	*Cranes, hoists and winches—Safe use—General requirements*			•
	ISO 2374	*Lifting appliances—Range of maximum capacities for basic models*	•	•	

3. **Table 3** Key to abbreviations

Key	Abbreviations name
AMBSC	Australian Miniature Boiler Safety Committee
ANSI	American National Standards Institute
API	American Petroleum Institute
AS	Australian Standard
ASME	American Society of Mechanical Engineers
AS/NZS	Australian Standard / New Zealand Standard
BS	British Standard
CSA	Canadian Standards Association
EN	Europaische Norm (European Standard)
IEC	International Electrochemical Commission
ISO	International Standards Organisation
NZS	New Zealand Standards
SAE	Society of Automotive Engineers

How to manage work health and safety risks

Code of Practice

2021

Workplace Health and Safety Queensland
worksafe.qld.gov.au

PN12647

Contents

Foreword

This Code of Practice on how to manage work health and safety risks is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the Work Health and Safety Regulation 2011 (WHS Regulation).

Under section 26A of the WHS Act duty holders must comply with an approved code of practice or follow another method, such as a technical or industry standard, if it provides an equivalent or higher standard of work health and safety than the standard required in this code.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and WHS Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice. This may include issuing an improvement notice for failure to comply with a code of practice where equivalent or higher standards of work health and safety have not been demonstrated.

Scope and application

This code is intended to be read by a person conducting a business or undertaking (PCBU). It provides practical guidance to PCBUs on how to manage risks to health and safety. Other approved codes of practice should be referenced for guidance on managing the risk of specific hazards.

This code may be a useful reference for other persons interested in the duties under the WHS Act and the WHS Regulation.

This code applies to all types of work and all workplaces covered by the WHS Act.

How to use this Code of Practice

This code includes various references to the legal requirements under the WHS Act and the WHS Regulation. These are included for convenience only and should not be relied on in the place of the full text of the WHS Act or the WHS Regulation. The words ‘must’, ‘requires’ or ‘mandatory’ indicate a legal requirement exists that must be complied with.

The word ‘should’ is used in this code to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

1. Introduction

1.1. Who has duties for managing work health and safety risks?

Duty holders who have a role in managing work health and safety risks include:

- persons conducting a business or undertaking (PCBUs)
- officers
- designers, manufacturers, importers, suppliers and installers of plant, substances or structures.

Workers and other persons at the workplace also have duties under the WHS Act, such as the duty to take reasonable care for their own health and safety at the workplace.

A person can have more than one duty and more than one person can have the same duty at the same time.

Person conducting a business or undertaking (PCBU)

WHS Act section 19

Primary duty of care

A PCBU must eliminate risks in the workplace, or if that is not reasonably practicable, minimise the risks so far as is reasonably practicable.

The WHS Regulation includes more specific requirements for PCBUs to manage the risks of hazardous chemicals, airborne contaminants and plant, as well as other hazards associated with the workplace.

PCBUs have a duty to consult workers about work health and safety and may also have duties to consult, cooperate and coordinate with other duty holders.

Examples of where a PCBU will have a health and safety duty include when:

- the PCBU engages workers to carry out work
- the PCBU directs or influences workers in carrying out work
- other people may be put at risk from work carried in their business or undertaking
- the PCBU manages or controls a workplace or fixtures, fittings or plant at the workplace.

Officers

WHS Act section 27

Duty of officers

Officers, such as company directors, have a duty to exercise due diligence to ensure the PCBU complies with the WHS Act and the WHS Regulation. This includes taking reasonable steps to gain an understanding of the hazards and risks associated with the operations of the business or undertaking, and ensure the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks to health and safety.

Designers, manufacturers, importers and suppliers of plant, substances or structures

WHS Act Part 2 Division 3

Further duties of persons conducting businesses or undertakings

Designers, manufacturers, importers and suppliers of plant, substances or structures must ensure, so far as is reasonably practicable, the plant, substance or structure they design, manufacture, import or supply is without risks to health and safety. This duty includes carrying out testing and analysis as well as providing specific information about the plant, substance or structure.

The WHS Regulation includes a number of specific requirements for consultation and information sharing to assist in meeting these duties, for example:

- manufacturers to consult with designers of plant
- importers to consult with designers and manufacturers of plant
- the person who commissions construction work to consult with the designer of the structure.

Workers

WHS Act section 28

Duties of workers

Workers have a duty to take reasonable care for their own health and safety and to not adversely affect the health and safety of other persons. Workers must comply with reasonable instructions, so far as they are reasonably able, and cooperate with reasonable health and safety policies or procedures that have been notified to workers.

If personal protective equipment (PPE) is provided by the business or undertaking, the worker must so far as they are reasonably able, use or wear it in accordance with the information and instruction and training provided.

Other persons at the workplace

WHS Act section 29

Duties of other persons at the workplace

Other persons at the workplace, like visitors, must take reasonable care for their own health and safety and must take reasonable care not to adversely affect other people's health and safety. They must comply, so far as they are reasonably able, with reasonable instructions given by the PCBU to allow the PCBU to comply with the WHS Act.

1.2. What is involved in managing risks?

Management commitment

Effective risk management starts with a commitment to health and safety from those who operate and manage the business or undertaking. You also need the involvement and cooperation of your workers, supply chain partners, and other businesses you work with. Management commitment is about demonstrating you are serious about health and safety and influencing other duty holders in the workplace.

To demonstrate your commitment, you should:

- get involved in health and safety issues so that you understand the hazards and risk associated with your operations
- consult workers and other duty holders on the hazards and risk, and how to control them
- invest time and money in health and safety
- ensure you and your workers clearly understand health and safety responsibilities and have the knowledge and skill to do tasks safely
- apply health and safety values and behaviours to your own work practices.

A step-by-step process

A safe and healthy workplace does not happen by chance or guesswork. You have to think about what could go wrong at your workplace and what the consequences could be. Then you must do whatever you can (in other words, whatever is 'reasonably practicable') to eliminate or minimise health and safety risks arising from your business or undertaking.

This process is known as risk management and involves the four steps set out in this Code (see Figure 1 below):

- Identify hazards—find out what could cause harm.
- Assess risks, if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. This step may not be necessary if you are dealing with a known risk with known controls.
- Control risks – implement the most effective control measure that is reasonably practicable in the circumstances and ensure it remains effective over time.
- Review hazards and control measures to ensure they are working as planned.

This process will be implemented in different ways depending on the size and nature of your business or undertaking. Larger businesses and those in sectors where workers are exposed to more or higher risks are likely to need more complex, sophisticated risk management processes.

Examples demonstrating how to manage work health and safety risks in consultation with workers are at Appendix B.

Determining what is 'reasonably practicable'

Deciding what is 'reasonably practicable' to protect people from harm requires taking into account and weighing up all relevant matters, including:

- the likelihood of the hazard or risk concerned occurring
- the degree of harm that might result from the hazard or risk
- knowledge about the hazard or risk, and ways of eliminating or minimising the risk
- the availability and suitability of ways to eliminate or minimise the risk
- after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.

The process of managing risk described in this Code will help you decide what is reasonably practicable in particular situations so that you can meet your duty of care under the WHS laws.

Figure 1 The risk management process

Many hazards and their associated risks are well known and have well established and accepted control measures. In these situations, the second step to formally assess the risk is unnecessary. If, after identifying a hazard, you already know the risk and how to control it effectively, you can implement the controls without undertaking a risk assessment.

Risk management is a proactive process that helps you respond to change and facilitate continuous improvement in your business. It should be planned, systematic and cover all reasonably foreseeable hazards and associated risks.

Consulting workers

WHS Act section 47

Duty to consult workers

WHS Act section 48

Nature of consultation

A PCBU must consult, so far as is reasonably practicable, with workers who carry out work for the business or undertaking and who are (or are likely to be) directly affected by a health and safety matter.

This duty to consult is based on the recognition that worker input and participation improves decision-making about health and safety matters and assists in reducing work-related injuries and disease.

The broad definition of a ‘worker’ under the WHS Act means a PCBU must consult, so far as is reasonably practicable, with contractors and sub-contractors and their employees, on-hire workers, outworkers, apprentices, trainees, work experience students, volunteers

and other people who are working for the PCBU and who are, or are likely to be, directly affected by a health and safety matter.

Workers are entitled to take part in consultations and to be represented in consultations by a health and safety representative who has been elected to represent their work group.

Consultation with workers and their health and safety representatives is required at each step of the risk management process. By drawing on the experience, knowledge and ideas of your workers you are more likely to identify all hazards and choose effective control measures.

You should encourage your workers to report any hazards and health and safety problems immediately so that risks can be managed before an incident occurs.

If you have a health and safety committee, you should engage the committee in the risk management process as well.

Consulting, cooperating and coordinating activities with other duty holders

WHS Act section 46

Duty to consult with other duty holders

The WHS Act requires that a PCBU to consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

There is often more than one business or undertaking involved in the same activities or who share the same workplace who may each have responsibility for the same health and safety matters, either because they are involved in the same activities or share the same workplace.

In these situations, each duty holder should exchange information to find out who is doing what and work together in a cooperative and coordinated way so risks are eliminated or minimised so far as is reasonably practicable.

For example, if you engage labour hire workers as part of your workforce you share a duty of care to these workers with the business that provides them. In these situations, you must discuss the hazards and risks associated with the work and what precautions will be taken with the labour hire firm.

Never assume that someone else is taking care of a health and safety matter. Find out who is doing what and work together with other duty holders in a cooperative and coordinated way so risks are eliminated or minimised as far as reasonably practicable.

When entering into contracts you should communicate your safety requirements and policies, review the job to be undertaken, discuss any safety issues that may arise and how they will be dealt with. Remember that you cannot transfer your responsibilities to another person.

Further guidance on WHS consultation is available in the:
Work health and safety consultation, cooperation and coordination Code of Practice.

1.3. When should a risk management approach be used?

Managing work health and safety risks is an ongoing process that needs attention over time, but particularly when any changes affect your work activities. Examples of when you should work through the steps in this Code include:

- starting a new business
- expanding or purchasing an existing business
- changing work practices, procedures or the work environment
- changing organisational structure or job roles
- introducing new workers or returning workers to the workplace
- purchasing new or used equipment or using new substances
- working with a new supplier or new commissioner of your services
- planning to improve productivity or reduce costs
- new information about workplace risks becomes available
- responding to workplace incidents (even if they have caused no injury)
- responding to concerns raised by workers, health and safety representatives or others at the workplace, or
- required by the WHS Regulation for specific hazards.

It is also important to use the risk management approach when designing and planning products, processes or places used for work, because it is often easier and more effective to eliminate hazards before they are introduced into a workplace by incorporating safety features at the design stage.

The risk management process outlined in this Code should be applied to both physical and psychological risks.

2. Step 1—How to identify hazards

Identifying hazards in the workplace involves finding things and situations that could potentially cause harm to people. Hazards generally arise from the following aspects of work and their interaction:

- physical work environment
- equipment, materials and substances used
- work tasks and how they are performed
- work design and management.

Table 1 below lists some common types of workplace hazards. Some hazards are part of the work process, such as mechanical hazards, noise or toxic properties of substances. Other hazards result from equipment or machine failures and misuse, chemical spills and structural failures, or where work demands exceed a worker's ability to cope.

A piece of plant, substance or a work process may have many different hazards. Each of these hazards needs to be identified. For example, a production line may have dangerous moving parts, noise, hazards associated with manual tasks and psychosocial hazards due to the pace of work.

Table 1 Examples of common hazards

Hazard	Example	Potential harm
Manual tasks	Tasks involving sustained or awkward postures, high or sudden force, repetitive movements or vibration	Musculoskeletal disorders such as damage to joints, ligaments and muscles
Gravity	Falling objects, falls, slips and trips of people	Fractures, bruises, lacerations, dislocations, concussion, permanent injuries or death
Psychosocial	Excessive time pressure, bullying, violence and work-related fatigue	Psychological or physical injury or illness
Electricity	Exposure to live electrical wires	Shock, burns, damage to organs and nerves leading to permanent injuries or death
Machinery and equipment	Being hit by moving vehicles, or being caught in moving parts of machinery	Fractures, bruises, lacerations, dislocations, permanent injuries or death
Hazardous chemicals	Acids, hydrocarbons, heavy metals, asbestos and silica	Respiratory illnesses, cancers or dermatitis
Extreme temperatures	Heat and cold	Heat can cause burns and heat stroke or injuries due to fatigue Cold can cause hypothermia or frost bite
Noise	Exposure to loud noise	Permanent hearing damage

Hazard	Example	Potential harm
Radiation	Ultraviolet, welding arc flashes, micro waves and lasers	Burns, cancer or blindness
Biological	Micro-organisms	Hepatitis, legionnaires' disease, Q fever, HIV/AIDS or allergies

2.1. How to find hazards

Inspect the workplace

As a PCBU regularly walking around the workplace and observing how things are done can help you predict what could or might go wrong. Look at how people actually work, how plant and equipment are used, what chemicals are around and what they are used for, what safe or unsafe work practices exist as well as the general state of housekeeping.

Things to look out for include the following:

- Does the work environment enable workers to carry out work without risks to health and safety (for example, space for unobstructed movement, adequate ventilation, lighting)?
- How is work performed, including the physical, mental and emotional demands of the tasks and activities?
- How suitable are the tools and equipment for the task and how well are they maintained?
- How do workers, managers, supervisors and others interact and how are inappropriate behaviours or conflicts dealt with?
- Have any changes occurred in the workplace which may affect health and safety?

Hazards are not always obvious. Some hazards can affect health over a long period of time or may result in stress (such as bullying) or fatigue (such as shiftwork). Also think about hazards that you may bring into your workplace with new, used or hired goods (for example, worn insulation on a hired welding set).

As you walk around, you may spot straightforward problems and action should be taken on these immediately, for example cleaning up a spill. If you find a situation where there is immediate or significant danger to people, move those persons to a safer location first and attend to the hazard urgently. Follow up on why the situation occurred to identify additional hazards and risks.

Make a list of the hazards you find, including the ones you know are already being dealt with, to ensure that nothing is missed. This list can be kept and updated next time you do an inspection. You may use a checklist designed to suit your workplace to help you find and make a note of hazards.

Good work design and safe design

The best chance to find ways to eliminate hazards and minimise risks is during the design phase.

Effective design of 'good work' considers the work tasks, work systems, the physical working environment, and the workers and others in the workplace.

Safe design of buildings, structures, equipment and vehicles accounts for the hazards and risks present at all stages of the product's lifecycle. For more information on safe design principles and how to achieve safe design, see the Safe design of structures Code of Practice.

Consult your workers

Ask your workers about any health and safety problems they have encountered in doing their work and any near misses or incidents that have not been reported.

Worker surveys may also be undertaken to obtain information about matters such as workplace bullying, as well as muscular aches and pains that can signal potential hazards.

Consult your supply chains and networks

Talk with your suppliers or those commissioning your services to understand each other's needs and identify any hazards and risks. For example, hazards may relate to frequent pressure to deliver services in very tight timeframes or to delay service delivery for long periods which reduce workers' opportunities to rest. Other hazards may relate to packaging products in ways that increase workers' risks of musculoskeletal injury or exposure to hazardous chemicals.

When people within a supply chain act cooperatively they can exert greater influence on health and safety than when acting alone.

Review available information

Information and advice about hazards and risks relevant to particular industries and types of work is available from regulators, industry associations, unions, technical specialists and safety consultants.

Manufacturers and suppliers can also provide information about hazards and safety precautions for specific substances (safety data sheets), plant or processes (instruction manuals).

Analyse your records of health monitoring, workplace incidents, near misses, worker complaints, sick leave and the results of any inspections and investigations to identify hazards. If someone has been harmed doing a particular task, then a hazard exists that could hurt someone else. These incidents need to be investigated to find the hazard that caused the injury or illness.

3. Step 2—How to assess risks

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of it happening. A risk assessment can help you, as a PCBU, to determine:

- how severe a risk is
- whether any existing control measures are effective
- what action you should take to control the risk
- how urgently the action needs to be taken.

Many hazards and their associated risks are well known and have well established and accepted control measures. In these situations, the second step to formally assess the risk is not required. If after identifying a hazard you already know the risk and how to control it effectively, you may simply implement the controls.

A risk assessment can be undertaken with varying degrees of detail depending on the type of hazard and the information, data and resources that you have available. It can be as simple as a discussion with your workers or involve specific risk analysis tools and techniques developed for specific risks or recommended by safety professionals. For some complex situations, expert or specialist advice may be useful when conducting a risk assessment.

3.1. When should a risk assessment be carried out?

A risk assessment should be done when:

- there is uncertainty about how a hazard may result in injury or illness
- the work activity involves a number of different hazards and there is a lack of understanding about how the hazards may interact with each other to produce new or greater risks, or
- changes at the workplace occur that may impact on the effectiveness of control measures.

In some circumstances, a risk assessment will assist to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing the risk
- identify if and what kind of control measures should be implemented
- check the effectiveness of existing control measures.

A risk assessment is mandatory under the WHS Regulation for certain activities that are high risk such as, but not limited to, entry into confined spaces, diving work and live electrical work.

Some hazards that have exposure standards, such as noise and airborne contaminants, may require scientific testing or measurement by a competent person to accurately assess the risk and to check that the relevant exposure standard is not being exceeded (for example, by using noise meters to measure noise levels and using gas detectors to analyse oxygen levels in confined spaces).

A risk assessment is not required when legislation requires a hazard or risk to be controlled in a specific way—these requirements must be complied with.

A detailed risk assessment may not be required in the following situations:

- A code of practice or other guidance sets out a way of controlling a hazard or risk that is applicable to your situation.
- There are well-known and effective controls that are in use in the particular industry that are suited to the circumstances in your workplace.

In these situations, you may be able to simply implement these control measures.

A risk assessment may be appropriate to reuse in situations where all the hazards, tasks, things, workers or circumstances are the same and no worker or other person will be exposed to greater, additional or different risks. However, as stated above, if there are any changes at the workplace, a new risk assessment should be performed.

3.2. How to do a risk assessment

Hazards have the potential to cause different types and severities of harm ranging from minor discomfort to a serious injury or death.

For example, heavy liquefied petroleum gas (LPG) cylinders can cause muscular strain when they are handled manually. However, if the cylinder is damaged causing gas to leak, which is then ignited, a fire could result in serious burns. If that leak occurs in a storeroom or similar enclosed space, it could result in an explosion that could destroy the building and kill or injure anyone nearby. Each of the outcomes involves a different type of harm with a range of severities, and each has a different likelihood of occurrence.

The risk will increase as the severity and likelihood of harm increases.

Work out how hazards may cause harm

In most cases, incidents occur as a result of a chain of events and a failure of one or more links in that chain. If one or more of the events can be stopped or changed, the risk may be eliminated or reduced.

One way of working out the chain of events is to determine the starting point where things begin to go wrong and then consider: 'If this happens, what may happen next?' This will provide a list of events that sooner or later cause harm. See the example in Appendix C.

In thinking about how each hazard may cause harm, you should consider:

- the effectiveness of existing control measures and whether they control all types of harm
- how work is actually done, rather than relying on written manuals and procedures
- infrequent or abnormal situations, as well as how things are normally meant to occur.

Consider how harm could be caused during maintenance and cleaning, as well as breakdowns of equipment and failures of health and safety controls.

Work out how severe the harm could be

To estimate the severity of harm that could result from each hazard you should consider the following questions:

- What type of harm could occur (for example muscular strain, injuries due to fatigue, psychological injury, burns, laceration)? How severe is the harm? Could the hazard cause death, serious injuries, illness or only minor injuries requiring first aid?
- What factors could influence the severity of harm that occurs? For example, the distance someone might fall or the concentration of a particular substance will determine the level of harm that is possible. The harm may occur immediately if something goes wrong (for example injury from a fall) or it may take time for it to become apparent (for example illness from long-term exposure to a substance or to excessive work demands).
- Do you need to use specific tools or processes to assess how severe the harm could be? This could include sending samples to a lab for testing or arranging noise exposure level testing.
- How many people are exposed to the hazard and how many could be harmed in and outside your workplace? For example, a mobile crane collapse on a busy construction site has the potential to kill or injure a large number of people.
- Could one failure lead to other failures? For example, could the failure of your electrical supply make any control measures that rely on electricity ineffective?

- Could a small event escalate to a much larger event with more serious consequences? For example, a minor fire can get out of control quickly in the presence of large amounts of combustible materials.

Work out the likelihood of harm occurring

The likelihood that someone will be harmed can be estimated by considering the following:

- How often is the task done? Does this make the harm more or less likely?
- How often are people near the hazard? How close do people get to it?
- Has it ever happened before, either in your workplace or somewhere else? How often?

Table 2 contains further questions that can help you estimate likelihood.

You can rate the likelihood as one of the following:

- Certain to occur—expected to occur in most circumstances.
- Very likely—will probably occur in most circumstances.
- Possible—might occur occasionally.
- Unlikely—could happen at some time.
- Rare—may happen only in exceptional circumstances.

Table 2 Questions to help estimate likelihood of harm occurring

Questions	Explanation and examples
How often are people exposed to the hazard?	A hazard may exist all of the time or it may only exist occasionally. The more often a hazard is present, the greater the likelihood it will result in harm. For example: • Meshing gears in an enclosed gearbox can cause crushing only if the gearbox is open during maintenance, and therefore the potential for harm will not occur very often. • Continuously lifting heavy boxes has the potential to cause harm whenever the work is done.
How long might people be exposed to the hazard?	The longer that someone is exposed to a hazard, the greater the likelihood that harm may result. For example: • The longer a person is exposed to noisy work, the more likely it is that they will suffer hearing loss.
How effective are current controls in reducing risk?	In most cases the risks being assessed will already be subject to some control measures. The likelihood of harm resulting from the risk will depend upon how adequate and effective the current measures are. For example: • Traffic management controls have been implemented in a warehouse to separate moving forklifts from pedestrians by using signs and painted lines on the floor. These controls may need to be upgraded to include physical barriers.
Could any changes in your organisation increase the likelihood?	The demand for goods or services in many organisations varies throughout the year. Changes in demand may be seasonal, depend on environmental conditions or be affected by market fluctuations that

	are driven by a range of events. Meeting increased demand may cause unusual loads on people, plant and equipment and systems of work. Failures may be more likely. For example: • Inner city restaurants and bistros are very busy in the period prior to Christmas, placing extra demands on kitchen and serving staff. The increase in volume of food to be prepared and serving a larger number of patrons increases the potential for human error and the likelihood of harm.
Are hazards more likely to cause harm because of the working environment?	Examples of situations where the risk of injury or illness may become more likely: • Environmental conditions change. For example, work performed in high temperatures in a small space increases the potential for mistakes because workers become fatigued more quickly; wet conditions make walkways and other things slippery. • People are required to work quickly. The rate at which work is done (for example, number of repetitions) can over-stress a person's body or make it more likely that mistakes will be made. • There is insufficient light or poor ventilation.
Could the way people act and behave affect the likelihood of a hazard causing harm?	The possibility that people may make mistakes, misuse items, become distracted or panic in particular situations needs to be taken into account. The effects of fatigue or stress may make it more likely that harm will occur.
Do the differences between individuals in the workplace make it more likely for harm to occur?	Workers are not all the same and individual variability should be considered, for example: • People respond to stress at work in different ways, which means some workers are more susceptible to harm. • People with disabilities may be more likely to suffer harm if the workplace or process is not designed for their needs. • New or young workers may be more likely to suffer harm because of inexperience. • People who do not normally work at the workplace will have less knowledge than employees who normally work there and may be more likely to suffer harm. These people include contractors, visitors or members of the public.

4. Step 3—How to control risks

The most important step in managing risks involves eliminating them so far as is reasonably practicable, or if that is not reasonably practicable, minimising the risks so far as is reasonably practicable.

In deciding how to control risks, as a PCBU, you must consult your workers and their representatives who will be directly affected by this decision. Their experience will help you choose appropriate control measures and their involvement will increase the level of acceptance of any changes that may be needed to the way they do their job.

There are many ways to control risks. Some control measures are more effective than others.

You must consider various control options and choose the control that most effectively eliminates the hazard or minimises the risk in the circumstances. This may involve a single control measure or a combination of different controls that together provide the highest level of protection that is reasonably practicable.

Some problems can be fixed easily and should be done straight away, while others will need more effort and planning to resolve. Of those requiring more effort, you should prioritise areas for action, focusing first on those hazards with the highest level of risk.

4.1. The hierarchy of control measures

The ways of controlling risks are ranked from the highest level of protection and reliability to the lowest as shown in Figure 2. This ranking is known as the hierarchy of control measures.

The hierarchy of control measures can be applied in relation to any risk. The WHS Regulation makes it mandatory for duty holders to work through this hierarchy when managing certain risks.

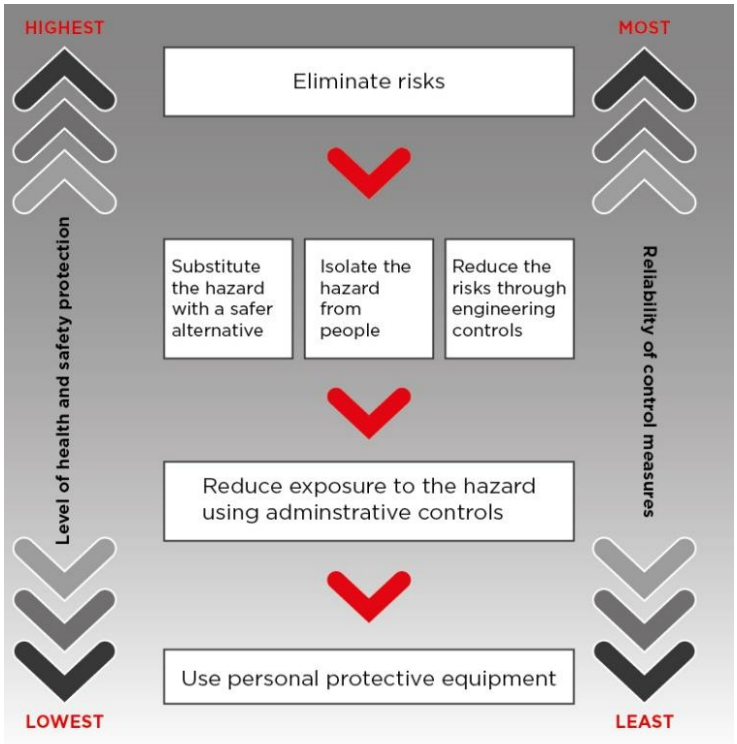

Figure 2 The hierarchy of control measures

You must always aim to eliminate the risk, which is the most effective control. If this is not reasonably practicable, you must minimise the risk by working through the other alternatives in the hierarchy.

The lower levels in the hierarchy are less effective because controls that change the hazard or minimise exposure to the hazard can only minimise the risk. You cannot eliminate the risk without eliminating the hazard.

Administrative controls and PPE are the least effective at minimising risk because they do not control the hazard at the source and rely on human behaviour and supervision. These control measures should only be used:

- to supplement higher level control measures (as a back-up)
- as a short-term interim measure until a more effective way of controlling the risk can be used, or
- when there are no other practical control measures available (as a last resort).

Elimination

The most effective control measure involves eliminating the hazard and associated risk. The best way to do this is by, firstly, not introducing the hazard into the workplace. For example, you can eliminate the risk of a fall from height by doing the work at ground level.

Eliminating hazards is often cheaper and more practical to achieve at the design or planning stage of a product, process or place used for work. In these early phases, there is greater scope to design out hazards or incorporate risk control measures that are compatible with the original design and functional requirements. For example, not using a noisy machine will be more effective than providing workers with personal hearing protectors.

You can also eliminate risks by removing an existing hazard, for example, by removing trip hazards on the floor, disposing of unwanted chemicals, or not working in an isolated or remote area.

It may not be reasonably practicable to eliminate a hazard if doing so means that you cannot make the end product or deliver the service. If you cannot eliminate the hazard, then you must minimise as many of the risks associated with the hazard as reasonably practicable.

Substitution, isolation and engineering controls

If it is not reasonably practicable to eliminate the hazards and associated risks, you must minimise the risks using one or more of the following approaches, so far as is reasonably practicable.

Substitute the hazard with something safer

For instance, replace solvent-based paints with water-based ones or allow workers to have more control of line speed instead of pacing line work by computer.

Isolate the hazard from people

This involves physically separating the source of harm from people by distance or using barriers. For instance, install guardrails around exposed edges and holes in floors; use remote control systems to operate machinery; store chemicals in a fume cabinet; place barriers between workers and customers where there is a risk of assault.

Use engineering controls

An engineering control is a control measure that is physical in nature, including a mechanical device or process. For instance, use mechanical devices such as trolleys or hoists to move heavy loads; place guards around moving parts of machinery; install residual current devices (electrical safety switches); set work rates on a production line to reduce fatigue; install sound dampening measures to reduce exposure to unpleasant or hazardous noise.

Administrative controls

If risks remain, they must be minimised by implementing administrative controls so far as is reasonably practicable. Administrative controls include work methods or procedures that are designed to minimise exposure to a hazard as well as the information, training and instruction needed to ensure workers can work safely.

For instance, develop procedures on how to operate machinery safely; provide training and support to managers and workers to identify and manage health and safety risks; implement anti-bullying policies; limit exposure time to a hazardous task; and/or use signs to warn people of a hazard.

Some administrative measures will be necessary to ensure substitution, isolation and engineering controls are implemented effectively, for example, following safe work procedures when using equipment.

See section 4.2 below for information on implementing control measures.

Personal protective equipment (PPE)

Any remaining risks must be minimised with suitable PPE.

Examples of PPE include ear muffs, respirators, face masks, hard hats, gloves, aprons and protective eyewear. PPE limits exposure to the harmful effects of a hazard but only if workers wear and use the PPE correctly.

WHS Regulation section 44

Provision to workers and use of personal protective equipment

If PPE is to be used at the workplace, you must ensure the equipment is:

- Selected to minimise risk to health and safety, including by ensuring that the equipment is suitable for the nature of the work and any hazard associated with the work and is of suitable size and fit and reasonably comfortable for the worker who is to use or wear it.
- Maintained, repaired and replaced so that is continues to minimise risk to the worker who uses it, including by ensuring that the equipment is clean and hygienic, and in good working order.

If you direct the carrying out of work, you must provide the worker with information, training and instruction in the proper use and wearing of PPE, and the storage and maintenance of PPE.

A worker must, so far as reasonably able, use or wear the PPE in accordance with any information, training or reasonable instruction and must not intentionally misuse or damage the equipment.

4.2. How to develop and implement control options

Information about suitable controls for many common hazards and risks can be obtained from:

- codes of practice and guidance material
- manufacturers and suppliers of plant, substances and equipment used in your workplace, or
- industry associations and unions.

In some cases, published information will provide guidance on the whole work process. In other cases, the guidance may relate to individual items of plant or how to safely use specific substances. You may use the recommended control options if they suit your situation and eliminate or minimise the risk.

Developing specific control measures

You may need to develop specific control measures if the available information is not relevant to the hazards and risks or circumstances at your workplace. This can be done by referring to the chain of events that were recorded during the risk assessment.

For each of the events in the sequence, ask: 'What can be done to stop or change the event occurring?' An example of this approach is shown in Appendix C.

Working through the events in the sequence will give you ideas about possible ways to eliminate or minimise the risk. There may be more than one solution for each of the events. The control option you choose should be:

- one or more controls that provide the highest level of protection for people and is the most reliable—that is, controls located towards the top of the hierarchy in Figure 2
- available—that is, it can be purchased, made to suit or be put in place
- suitable for the circumstance in your workplace—that is, it will work properly given the workplace conditions, work process and your workers.

Where the hazard or risk has the potential to cause death, serious injury or illness, more emphasis should be given to those controls that eliminate or reduce the level of harm, than those that reduce the likelihood of harm occurring.

Make sure that your chosen solution does not introduce new hazards. If this is not possible, any new hazards or risks introduced will also need to be managed.

You may prepare a risk register that identifies the hazards, what action needs to be taken, who will be responsible for taking the action and by when. An example is provided at Appendix D.

Cost of control measures

All risks can be controlled and it is always possible to do something, such as stopping the activity or providing instructions to those exposed to the risk. There will normally be a number of different options between these two extremes. Cost (in terms of time and effort as well as money) is just one factor to consider when determining the best control option.

The cost of controlling risk may be taken into account in determining what is reasonably practicable but cannot be used as a reason for doing nothing.

The greater the likelihood of harm occurring or the greater the extent of that harm, the less weight should be given to the cost of controlling the hazard or risk.

If two control measures provide the same level of protection and are equally reliable, you can adopt the less expensive option.

Cost cannot be used as a reason for adopting controls that rely exclusively on changing people's behaviour or actions when there are more effective controls available that can change the risk through substitution, engineering or isolation.

Implementing controls

The control measures you put into operation will usually require changes to the way work is carried out, for example, working with new or modified equipment or processes, new or different chemicals or new PPE. In these situations, it is necessary to support the control measures with the following:

Work procedures

Develop a safe work procedure that describes the task, identifies the hazards and documents how the task is to be performed to minimise the risks.

Training, instruction and information

Train your workers in the work procedure to ensure that they are able to perform the task safely. Training must cover the nature of the work, the associated risks and the control measures to be implemented.

Training should require workers to demonstrate that they are competent in performing the task according to the procedure. It is insufficient to simply give a worker the procedure and ask them to acknowledge that they understand and are able to perform it. Training, instruction and information must be provided in a form that can be understood by all workers.

Information and instruction may also need to be provided to others who enter the workplace, such as customers or visitors.

Supervision

The level of supervision required will depend on the level of risk and the experience of the workers involved. High levels of supervision are necessary where inexperienced workers are expected to follow new procedures or carry out difficult and critical tasks.

Maintenance

Control measures need regular monitoring and maintenance to ensure they remain effective. You should decide what is required when you implement the control and establish a schedule for routine checks and maintenance appropriate to the controls.

You may prepare a risk register identifying the hazards, what action needs to be taken, who will be responsible for taking the action and by when. An example is provided at Appendix D.

4.3. How to ensure controls remain effective

An important part of controlling risk is ensuring that your chosen control measures are maintained after their initial implementation. The following actions may help you monitor the control measures you have implemented and ensure that they remain effective.

Accountability for health and safety

Managers and supervisors should be provided with the authority and resources to implement and maintain control measures effectively. Accountability should be clearly allocated to ensure procedures are followed and maintained.

Maintenance of plant and equipment

This will involve scheduling and performing regular inspection and testing, repair or replacement of damaged or worn plant and equipment. It includes checking that any control measures are suitable for the nature and duration of work, are set up and used correctly.

Further information on maintaining plant and equipment is available in the Managing the risks of plant in the workplace Code of Practice.

Up-to-date training and competency

Most control measures depend on workers and supervisors having the appropriate competencies to do the job safely. Training must be provided to maintain competencies and to ensure new workers are capable of working safely.

Up-to-date hazard information

Information about hazards, such as plant and substances, may be updated by manufacturers and suppliers and should be checked to make sure controls are still relevant. New technology may provide more effective solutions than were previously available. Changes to operating conditions or the way activities are carried out may also mean that control measures need to be updated.

Regular review and consultation

Control measures are more effective where there is regular review of work procedures and consultation with your workers and their representatives.

If maintenance processes reveal new hazards, or existing hazards that are not being addressed, you will need to perform a review of your control measures.

5. Step 4—How to review controls

The control measures you, as a PCBU, put in place should be reviewed regularly to make sure they work as planned. Don't wait until something goes wrong.

The WHS Regulation requires a risk management process for specific risks. That process includes circumstances where you must review your control measures for those risks and, if necessary, change them. A review is required:

- when the control measure is not effective in controlling the risk
- before a change at the workplace that is likely to give rise to a new or different health and safety risk that the control measure may not effectively control
- if a new hazard or risk is identified
- if the results of consultation indicate that a review is necessary, or
- if a health and safety representative requests a review.

In any case, as part of your ongoing duties as a PCBU, you should regularly review your control measures, including in the above circumstances. Managing work health and safety risks is an ongoing process that needs attention over time, but particularly when any changes affect your work activities.

You may use the same methods as in the initial hazard identification step (Chapter 2—How to identify hazards) to check controls. Consult your workers and their health and safety representatives and consider the following questions:

- Are the control measures working effectively in both their design and operation?
- Have the control measures introduced new problems?
- Have all hazards been identified?
- Have new work methods, new equipment or chemicals made the job safer?
- Are safety procedures being followed?
- Have the instruction and training provided to workers on how to work safely been successful?
- Are workers actively involved in identifying hazards and possible control measures? Are they openly raising health and safety concerns and reporting problems promptly?
- Are the frequency and severity of health and safety incidents reducing over time?
- If new legislation or new information becomes available, does it indicate current controls may no longer be the most effective?

If problems are found, go back through the risk management steps (Chapter 4—How to control risks), review your information and make further decisions about risk control. Priority for review should be based on the level of risk. Control measures for high risks should be reviewed more frequently.

If you design, manufacture or supply products used for work, quality assurance processes may be used to check the product effectively minimises health and safety risks. Obtain feedback from users of the product to determine whether any improvements can be made to make it safer.

6. Keeping records

Keeping records of the risk management process demonstrates what you have done to comply with the WHS Act and the WHS Regulation. It also helps when undertaking subsequent risk management activities, including reviewing your control measures.

Keeping records of the risk management process has the following benefits. It:

- allows you to demonstrate how decisions about controlling risks were made
- assists in targeting training at key hazards
- provides a basis for preparing safe work procedures
- allows you to more easily review risks following any changes to legislation or business activities
- demonstrates to others (regulators, investors, shareholders, customers) that work health and safety risks are being managed.

The detail and extent of recording will depend on the size of your workplace and the potential for major work health and safety issues. It is useful to keep information on:

- the identified hazards, assessed risks and chosen control measures (including any hazard checklists, worksheets and assessment tools used in working through the risk management process)
- how and when the control measures were implemented, monitored and reviewed
- who you consulted with
- relevant training records
- any plans for changes.

There are specific record-keeping requirements in the WHS Regulation for some hazards, such as hazardous chemicals, plant and equipment. If such hazards have been identified at your workplace, you must keep the relevant records for the time specified.

You should ensure that everyone in your workplace is aware of record-keeping requirements, including which records are accessible and where they are kept.

Appendix A—Glossary

Term	Description
Control measure	An action taken to eliminate or minimise health and safety risks so far as is reasonably practicable. A hierarchy of control measures is set out in the WHS Regulation to assist duty holders to select the highest control measures reasonably practicable. Note: The WHS Regulation also refers to a control measure as a risk control measure or a risk control. In this Code, control measure is used throughout.
Duty holder	Any person who owes a work health and safety duty under the WHS Act including a person conducting a business or undertaking, a designer, manufacturer, importer, supplier, installer of products or plant used at work (upstream duty holder), officer or a worker.
Hazard	A situation or thing that has the potential to harm a person. Hazards at work may include noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace.
Health	Health includes both physical and psychological health.
Health and safety committee	A consultative body established under the WHS Act. The committee's functions include facilitating cooperation between workers and the person conducting a business or undertaking to ensure workers' health and safety at work, and assisting to develop work health and safety standards, rules and procedures for the workplace.
Health and safety representative	A worker who has been elected by their work group under the WHS Act to represent them on health and safety matters.
Managing risk	This is a process set out in the WHS Regulation to eliminate health and safety risks so far as is reasonably practicable, or if this is not reasonably practicable, minimise the risks so far as is reasonably practicable. It includes identifying hazards, assessing and implementing control measures, and reviewing and maintaining the control measures to ensure their ongoing effectiveness.
May	'May' indicates an optional course of action.
Must	'Must' indicates a legal requirement exists that must be complied with.
Officer	An officer under the WHS Act includes: • an officer under section 9 of the *Corporations Act 2001* (Cth) • an officer of the Crown within the meaning of section 247 of the WHS Act, and • an officer of a public authority within the meaning of section 252 of the WHS Act.

Term	Description
	A partner in a partnership or an elected member of a local authority is not an officer while acting in that capacity.
Person conducting a business or undertaking (PCBU)	A PCBU is an umbrella concept which intends to capture all types of working arrangements or relationships. A PCBU includes a: • company • unincorporated body or association • sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A volunteer association (defined under the WHS Act, see below) or elected members of a local authority will not be a PCBU.
Risk	The possibility harm (death, injury or illness) might occur when exposed to a hazard.
Should	'Should' indicates a recommended course of action.
Volunteer association	A group of volunteers working together for one or more community purposes where none of the volunteers, whether alone or jointly with any other volunteers, employs any person to carry out work for the volunteer association.
Work group	A group of workers established to facilitate the representation of workers by one or more health and safety representatives. A work group may be all workers at a workplace but it may also be appropriate to split a workplace into multiple work groups where workers share similar work conditions or are exposed to similar risks and hazards. For example all workers on night shift.
Worker	Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer.
Workplace	Any place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water.

Appendix B—Examples of the risk management process

Example 1

Two years ago, the Burbs Municipal Council implemented a number of written health and safety procedures used to train workers how to carry out particular tasks safely. As these procedures had not been reviewed since their implementation, the Safety Manager implemented a new approach to not only review these procedures but also promote health and safety more widely across the organisation by encouraging staff involvement and cooperation.

To do this, the Safety Manager established and facilitated safety workshops each Friday for an hour where a team would review a particular task and its procedures to identify hazards, assess risks and consider options to control these. The team included management, council workers, the respective health and safety representative and any contractors engaged to carry out the work.

The Safety Manager's approach was to facilitate the workshops but then hand this role over to the relevant team supervisor, who would then facilitate future meetings to review other tasks conducted by the workers. The written health and safety procedures were not used in the workshops as the Safety Manager wanted to learn more about the hazards, risks and controls from the workers without prompting. However, any changes discussed and agreed during the meeting would be included in the revised written safety procedures.

The first safety workshop was conducted in the Parks and Gardens Branch and involved management, workers, their health and safety representatives and a representative from the maintenance shop that supplied the Parks and Gardens Branch with a variety of vehicles and equipment. The task is outlined in Table 3.

Table 3 Example 1: Safety workshop—20 August 2010

	Safety workshop—20 August 2017
Team	Parks and Gardens Branch
Task being reviewed	Cleaning of the toilets in the council's parks
Description of task	Undertaken each Monday morning by two workers in a council truck who would clean the eight toilet blocks across the municipality
What does the task involve?	At the depot: • load the truck with the compressor and pressure hose along with cleaning chemicals and materials. At the park: • open toilet block • clean toilets • unload compressor and pressure hose, place them in toilet block and attach to tap, turn on compressor and hose walls and floors, • put compressor and pressure hose along with cleaning gear back on truck • dry out toilet block floor by sweeping • leave park and go to next one.

In order to gather advice and information from the team, the Safety Manager asked questions and shared the responses by writing them on a whiteboard or butchers paper, as shown in Table 4.

Table 4 Example 1: Questions asked by the Safety Manager and responses

	What hazards are encountered when doing the task?	What risks do these pose to health and safety?	How are these risks currently controlled?
Plant	• Truck • Compressor and pressure hose	• Truck—faulty truck could cause accident and cause injuries to workers and others • Compressor and pressure hose—faulty fuel line in compressor could cause burns and injuries through fire or explosion	• Truck and compressor have maintenance schedule • Checklist for visual inspection for plant before it leaves depot • Reporting and tagging system for defective plant
Manual handling	• Loading and unloading the compressor • Carrying the compressor to and from the toilet block • Sweeping water to dry the floor	• Heavy load, awkward, sustained postures and repetitive actions can cause sprains, strains, back injuries or fractures and cuts if dropped on foot	• Compressor has handles fitted to assist in lifting and carrying • Two persons required to lift and carry compressor • Only workers who have been trained able to lift and carry compressor • Floor sweeping roster
Chemical	• Cleaning agents used to clean toilets and basins	• Skin irritation, rashes and illness caused by exposure to chemicals and their vapours in confined space	• Only non-toxic cleaning agents used • Gloves provided to avoid skin contact
Infection at work	• Communicable disease • Non-communicable infection	• Contracting an infectious disease such as hepatitis • Contracting a bacterial infection	• Universal precautions plus specific protection for the route of exposure
Noise	• Operating the compressor in a closed space with hard surfaces	• Hearing loss from prolonged exposure to the noise levels generated by the compressor	• Hearing protection provided for wearing when hosing out the toilet block

Slips, trips and falls	• Wet floor when hosing out the toilet block	• Fractures or strains caused by slipping on wet surface	• Safety boots provided with slip-resistant soles

Many staff present at the workshop indicated it was a waste of time as everything discussed was covered by the health and safety procedure, which they knew backwards. The Safety Manager acknowledged this concern but then asked the team whether the way the task was being conducted could be changed to improve health and safety.

One staff member raised concerns about lugging the compressor around 16 times every Monday morning and that doing this tempted them to call in sick. The Safety Manager was curious about this and asked why it was necessary to take the compressor off the truck and place it in the toilet. The workers explained that the length of the hose on the pressure spray was short and could only be operated with the compressor in the toilet block.

After hearing this, the representative from the maintenance shop who supplied the compressor mentioned that they could attach a 10-metre hose to the compressor, which would mean the compressor would not have to be taken off the truck. The team agreed this was a good idea and would eliminate the manual handling risks associated with lifting and carrying the compressor. The Safety Manager asked what other impacts this would have. The team agreed this would also reduce the noise as the compressor would now be outside the toilet block, but that there could be new risks associated with handling and storing a 10-metre long hose. The team agreed to trial the new hose. It was then installed with a hose handling system.

Following the workshop, the Safety Manager asked the supervisor to ensure the modifications were made within two weeks and to revise the procedures and have them checked by the health and safety representative and workers.

Example 2

Jane Smith had been working at the local grocery store for the last 12 months. She had recently taken on a new role as the bakery supervisor and was eager to review the work activities and safety procedures. In preparing for the review, Jane considered how she would conduct the review and who she should speak with.

As a first step, Jane identified the different activities and tasks that were carried out by the workers. These included:

- preparing a number of different products such as bread, cakes, slices and doughnuts
- cleaning items used in product preparation
- general housekeeping.

The next step was to analyse what was involved in each activity. Jane spent three mornings that week with the four bakers who worked in the bakery department. She talked to them about the work activities and what they thought could be changed to improve the safety of the workplace. One of the bakers had been working in the store for over 10 years, while another had been working for over 25 years. The other two bakers were apprentices and had only been working with the store for around six months.

From these discussions, Jane identified a number of key tasks the bakers carried out every day when preparing the baked products:

- moving the ingredients from their storage locations to the area of use
- mixing the ingredients together using specialised mixers
- transferring the mixture to the container for baking
- putting them in the oven and removing them from the oven
- slicing and decorating
- packaging the products.

During an inspection of the bakery, Jane and the bakers identified a number of hazards, including:

- the doughnut mixer was not guarded and the mixing bowl could be accessed when the machine was operating
- the concrete floors were slippery in the mixing room and flour was spilt where the bakers walked
- low lighting in the food preparation area
- there was narrow access and restricted movement in the storage area where the flour bags were kept.

Jane and the bakers discussed the risks associated with each of the hazards and what could be done to control these risks. In relation to the unguarded mixer, one of the bakers suggested purchasing or hiring a new model with an interlocking guard. After considering the ideas of the bakers, Jane completed the risk register shown in Table 5.

Table 5 Example 2: risk register

	Risk register: XYZ Grocery Store Pty Ltd
Work area	Bakery department
Form completed by	Jane Smith (Bakery supervisor)
Date form completed	05/11/2017

	Risk register: XYZ Grocery Store Pty Ltd
Hazard identification	Doughnut mixer not guarded and mixing bowl can be accessed when machine is operating.
Risk assessment	**What is the harm the hazard could cause**: The person operating the mixer could be entangled in and injured by the moving parts if their hand slipped in while the machine was operating. Harm could include cuts or crush injuries such as broken bones, potentially resulting in amputation or fatality. **What is the likelihood of this happening**: This machine is used several times a day. Two of the workers have not been working in the bakery for a long time and are not very experienced in using the equipment. **Persons at risk**: The four bakers who operate the machine. **Existing control measure**: Staff follow policy and operating instructions to use the mixer safely—not very effective because it relies on staff keeping hands away from the dangerous parts. **Consequence**: Serious injuries **Likelihood**: Very likely **Outcome**: High risk—the mixer must not be used again until the risk has been controlled.
Control measures	
Possible control options	**Elimination**—Eliminating the use of the mixer completely will mean the business cannot continue to sell baked products as the dough cannot be mixed. Business revenue will suffer. **Substitution**—Use of the mixer could be substituted by hand-mixing the dough. One day's production will be lost in the changeover. This method can only be considered an interim option as it is not sustainable for more than a day or two with present staff. However, part-time staff could be hired to mix the dough. Business income would be reduced and impact on revenue. Alternatively, the mixer could be replaced by purchasing a new, safer machine with a built-in guard. **Engineering**—The mixer could be modified by adding an interlocking guard. A mixer could be hired for the period the old mixer is in for repairs. One day's production will be lost in this option. The modifications are estimated to cost $1600. Other costs included are one day lost in production, plus hire of substitute machine for approximately 10 days and transport. Estimated cost is less than $6000. **Administrative or PPE**—Staff told to keep hands away from the mixing bowl while it is in use. Only the more experienced bakers are to operate the mixer.
Preferred control option	Purchase a new mixer, which would not cost much more than having the old one modified. Control measures have been planned to manage the health and safety risks of mixing by hand while waiting for replacement mixer to arrive. The costs involved are outweighed by worker safety and this option eliminates the risk of injury.
Implementation	

	Risk register: XYZ Grocery Store Pty Ltd
Associated activities	New mixer to be purchased. Mixing to be done by hand while waiting for new mixer. May require staff working more hours **Resources required**: Less than $6000 **Person(s) responsible**: Jane Smith—Bakery supervisor **Sign off and date**: J Smith 9/11/17
Associated activities	• Develop new work procedures • Provide training to bakers on using the new machine **Resources required**: 3 hours **Person(s) responsible**: Jane Smith—Bakery supervisor **Sign off and date**: J Smith 20/12/17

Jane repeated these steps for each hazard that she identified. The review of the work activities and the implemented control measures improved the safety in the bakery department at the grocery store.

Review	
Scheduled review date	31 January 2020
Are the control measures in place?	Yes—the new machine has an interlocking guard and bakers have been provided with training on how to use the machine in accordance with the manufacturer's instructions.
Are the controls eliminating or minimising the risk?	Yes—the interlocking guard prevents people from putting their hand in the mixing bowl.
Are there any new problems with the risk?	No.

Example 3

Kim Lee is the manager of a busy restaurant that serves meals and coffees from 7.00am to 10.00pm. The owners recently began using an external online ordering and delivery service. This service allows the business to focus on preparing meals without having to manage the delivery process, as the service arranges for a delivery person to pick up and deliver the order.

At the weekly staff meeting, one cook raised concerns about several tense exchanges between serving staff and the delivery service personnel, which has led to increased pressure on kitchen staff when fulfilling online orders. Kim is concerned these conflicts could impact the health and safety of staff and the quality of service they are providing to their customers. The popularity of the online ordering means these conflicts could occur multiple times a day. Kim talked with the kitchen staff and serving staff about what could be done to improve their safety and work organisation.

Together Kim and the staff identified that the delivery persons were usually upset when the order was not ready for pick-up when they arrived. One of the waiters noted the deliverers often appeared to be under considerable pressure to deliver on time. The kitchen staff noted they prepare orders as they are received, which can delay online orders if made during periods where high numbers of orders are received in a short time.

After considering this discussion, Kim consulted the restaurant's Workplace Behaviour Policy and decided to discuss the safety issues with the online delivery service and with individual deliverers to work with them to identify ways to eliminate or minimise the conflict. But Kim decided, in advance of any solution they might propose, to implement immediately some of the control measures discussed at the staff meeting to deal with the time pressures. Kim wrote down the summary shown in Table 6 for the owners.

Table 6 Example 3: WHS risk assessment report for owners

	Example 3 Busy Restaurant Pty Ltd—WHS Risk Assessment as at 18 February 2018
Hazards identified	1. Conflict between restaurant staff and online order deliverers. 2. Time pressures caused by popularity of online orders.
Risk assessment	
What is the harm the hazard could cause?	Conflict could escalate to harassment and unreasonable behaviour including violence, which can cause physical and psychological injury. Long-term exposure increases risk of anxiety and depression. More frequent exposure can also increase severity of harm. Increased time pressure can lead to rushing and fatigue, causing burns, cuts, slips and trips within the restaurant.
What is the likelihood of this happening?	Very likely. This conflict could happen multiple times a day because online orders are taken every day from 7.30am to 9.30pm. Orders are more likely to be delayed during very busy periods where time pressure is increased, between 11.30am and 2.00pm, 6.00 and 9.00pm.
Who is at risk?	• All of our staff who prepare or serve meals. • External delivery personnel.

	Example 3 Busy Restaurant Pty Ltd—WHS Risk Assessment as at 18 February 2018
What existing control measures are being applied?	Staff are effectively applying their training and the Workplace Behaviour Policy to address the conflicts. Staff have appropriately reported the repeated tense exchanges. The next step under the policy is for management to contact and work cooperatively with the online delivery service and with individual deliverers to resolve issues. Existing controls are not adequately addressing the increased time pressures. These controls include preparing as much as possible in advance, such as sauces and par-cooked vegetables, and reducing repetitive actions by using suitable kitchen equipment such as food processors. Further controls are needed to address time pressures associated with the online orders.
What are the consequences?	Serious psychological and physical harm to our staff and delivery personnel.
Initial assessment	High risk—immediate action is required to reduce the risk.
Control measures	
What additional controls could be implemented to eliminate or minimise the risk?	**Elimination**—Stop offering online order and delivery services. This would eliminate the hazards but also remove an income stream. **Substitution**—Use only in-house delivery person. Would require managing delivery process and additional delivery staff. Other controls would still be required, as this would only substitute the line of control, not the inherent risks. This may also increase the time pressure on staff dealing with the online orders. **Substitution**—Reduce the menu items available for delivery. At the moment the whole menu is available online. Records show that less than half of all food items have been ordered online. Staff could focus their preparation better if there were fewer items available for delivery. Substituting the menu would not significantly affect delivery sales. **Engineering**—Improve ordering system so that it automatically rearranges orders so the kitchen staff prepare online orders in time for pick-up, ahead of less urgent orders. One day of accepting online orders will be lost with this option while the changes are engineered. The modifications are estimated to cost approximately $200. All kitchen staff will need to be trained in the new order preparation procedure. **Administrative**—Increase expected delivery timeframes from 20 to 30 minutes on the ordering website so staff have more time to prepare orders for delivery. This administrative change may cause a minor reduction to order numbers but will better manage customer expectations.
Preferred controls	The benefits of reducing risks associated with the conflict and time pressure are far greater than the cost of implementing the following preferred controls: • Immediately consult with online delivery service to improve understanding of our respective needs and to identify solutions for the restaurant and for the delivery personnel. • At the same time, reduce the online menu and increase the expected delivery timeframes on ordering website to 30 minutes.

	Example 3 Busy Restaurant Pty Ltd—WHS Risk Assessment as at 18 February 2018
	• Implement changes to the order system within one month. • To support these changes, the manager and staff will be provided with information and training on the new menu and delivery timeframes, the changes to the order system, and the outcomes of consulting with the online delivery service and individual deliverers.
Maintenance	Use existing weekly meeting to plan and communicate when agreed changes will happen, and to get staff feedback on new safety measures.

Appendix C—Assessing how things can go wrong

It may be helpful to think through work processes or situations to identify what could go wrong. Note any hazards, risks and control measures identified as you go.

Once completed, you should consider the hazards and risks you identified and implement control measures in line with the hierarchy of control measures in order to eliminate or minimise the risks, so far as is reasonably practicable.

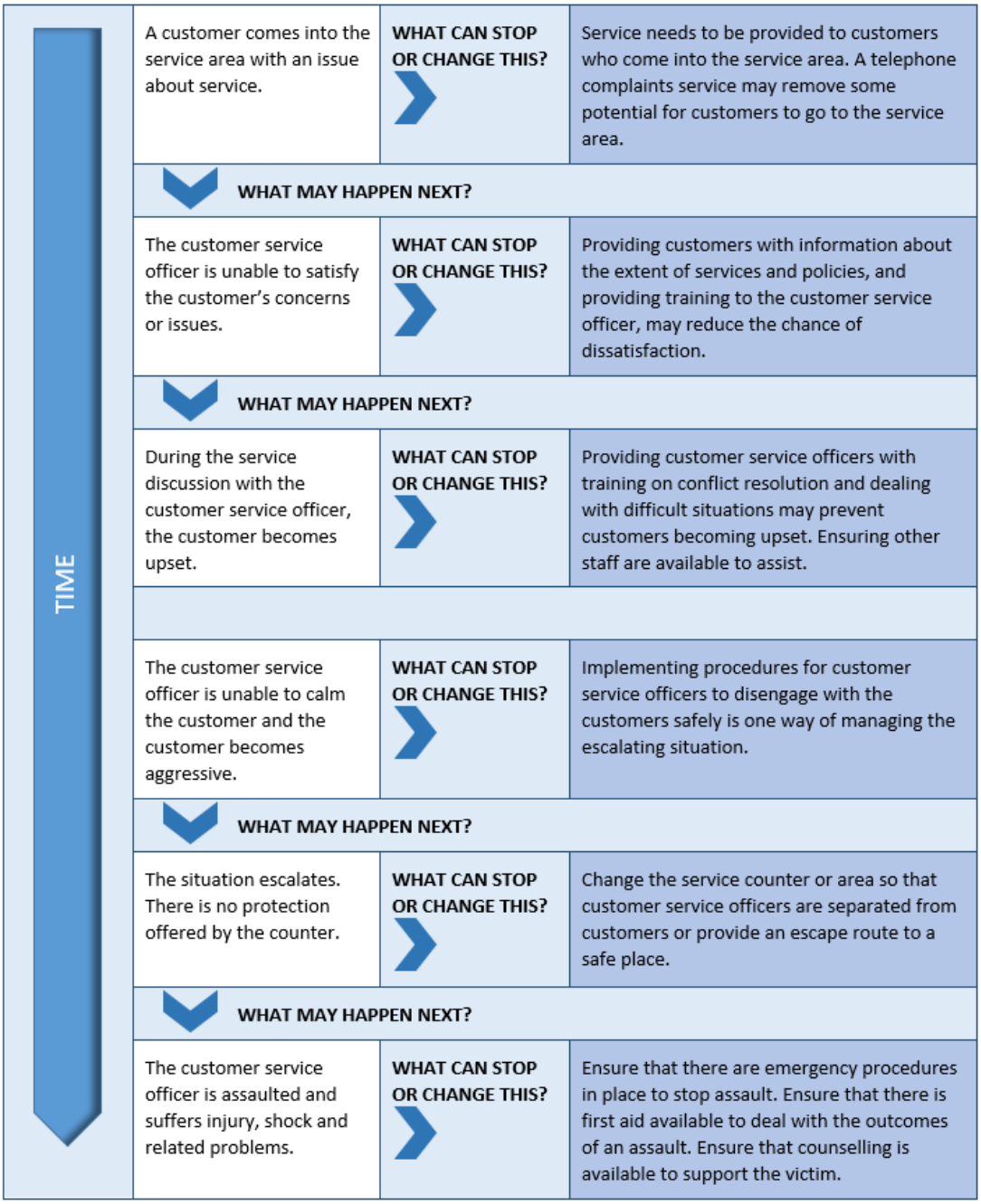

Figure 3 Assessing how things can go wrong

Appendix D—Risk register

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Date: Click here to enter text.

Hazard	What is the harm that the hazard could cause?	What is the likelihood that the harm would occur?	What is the level of risk?	How effective are the current controls?	What further controls are required?	Actioned by	Date due	Date complete	Maintenance and review
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Managing the risk of falls at workplaces

Code of Practice

2021

Workplace Health and Safety Queensland
worksafe.qld.gov.au

Queensland Government

PN12648

Contents

Foreword

This Code of Practice on how to manage the risk of falls at workplaces is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the Work Health and Safety Regulation 2011 (the WHS Regulation).

Under section 26A of the WHS Act duty holders must comply with an approved code of practice or follow another method, such as a technical or industry standard, if it provides an equivalent or higher standard of work health and safety than the standard required in this code.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and WHS Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice. This may include issuing an improvement notice for failure to comply with a code of practice where equivalent or higher standards of work health and safety have not been demonstrated.

Scope and application

This code is intended to be read by a person conducting a business or undertaking (PCBU). It provides practical guidance for PCBUs, including those persons who design, construct, import, supply or install plant or structures, on how to eliminate, or if that is not possible, minimise the risk of falls from height in workplaces.

This code applies to all types of work and all workplaces covered by the WHS Act and the WHS Regulation where there is a risk of a fall by a person from one level to another that is reasonably likely to cause injury.

This code may be a useful reference for other persons interested in the duties under the WHS Act and the WHS Regulation.

How to use this Code of Practice

This code includes references to the legal requirements under the WHS Act and the WHS Regulation. These are included for convenience only and should not be relied on in place of the full text of the WHS Act or the WHS Regulation. The words ‘must’, ‘requires’ or ‘mandatory’ indicate a legal requirement exists that must be complied with.

The word ‘should’ is used in this code to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

1. Introduction

Falls are a major cause of death and serious injury in Australian workplaces. Fall hazards are found in many workplaces where work is carried out at height, for example stacking shelves in warehouses and retail outlets, working on a roof, unloading a large truck or accessing silos. Falls can also occur at ground level into holes, for example trenches or service pits.

1.1. Who has health and safety duties in relation to falls?

There are a number of duty holders who have a role in managing the risk of falls in the workplace. These include:

- persons conducting a business or undertaking (PCBUs)
- designers, manufacturers, importers, suppliers and installers of plant, substances or structures
- officers.

Workers and other persons at the workplace also have duties under the WHS Act, such as the duty to take reasonable care for their own health and safety at the workplace.

A person can have more than one duty and more than one person can have the same duty at the same time.

Early consultation and identification of risks can allow for more options to eliminate risks and reduce the associated costs.

Person conducting a business or undertaking

WHS Act section 19

Primary duty of care

A PCBU must eliminate the risk of falls in the workplace, or if that is not reasonably practicable, minimise those risks so far as is reasonably practicable.

A PCBU has more specific obligations under the WHS Regulation to manage the risk of a fall by a person from one level to another, including requirements to:

- ensure, so far as is reasonably practicable, that any work involving the risk of a fall by a person from one level to another is carried out on the ground or on a solid construction
- provide safe means of access to and exit from the workplace and an area from which a person could fall, such as a platform or scaffolding
- if it is not reasonably practicable to eliminate the risk of a fall, minimise the risk of falls so far as is reasonably practicable by providing adequate protection against the risk, including by providing a fall prevention device if it reasonably practicable to do so, or if not, a work positioning system if it is reasonably practicable to do so, or if not, a fall arrest system.

A combination of the controls that are reasonably practicable to provide adequate protection against the risk may be used if a single control is not sufficient for the purpose.

The WHS Regulation classifies a number of activities as ‘high risk construction work’ for which a Safe Work Method Statement (SWMS) must be prepared before the work starts. High risk construction work includes work that involves a risk of a person falling more than 2 metres.

PCBUs have a duty to consult workers about work health and safety and may also have duties to consult, cooperate and coordinate with other duty holders.

Designers, manufacturers, importers and suppliers of plant, substances or structures

WHS Act Part 2 Division 3

Further duties of persons conducting businesses or undertakings

Designers, manufacturers, importers, suppliers and installers of plant, substances or structures that are to be used or could reasonably be expected to be used for work must ensure, so far as is reasonably practicable, that the plant or structure is without risks to health and safety.

This duty includes carrying out testing and analysis as well as providing specific information about the plant or structure.

To assist in meeting these duties, the WHS Regulation requires:

- manufacturers to consult with designers of plant
- importers to consult with designers and manufacturers of plant, and the person who commissions construction work to consult with the designer of the structure.

Designers of plant or structures have an important role in eliminating and minimising the risk of falls in the design stage—see Chapter 2.

Officers

WHS Act section 27

Duty of officers

Officers, such as company directors, have a duty to exercise due diligence to ensure that the PCBU complies with the WHS Act and the WHS Regulation. This includes taking reasonable steps to:

- gain an understanding of the hazards and risks associated with the operations of the business or undertaking
- ensure the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks of falls from one level to another that are likely to cause injury.

Workers

WHS Act section 28

Duties of workers

Workers have a duty to take reasonable care for their own health and safety and to not adversely affect the health and safety of other persons. Workers must comply with reasonable instructions, as far as they are reasonably able, and cooperate with reasonable health and safety policies or procedures that have been notified to workers. If personal protective equipment (PPE) is provided by the business or undertaking, the worker must so far as they are reasonably able, use or wear it in accordance with the information and instruction and training provided.

Other persons at the workplace

WHS Act section 29

Duties of other persons at the workplace

Other persons at the workplace, like visitors, must take reasonable care for their own health and safety and must take care not to adversely affect other people's health and safety. They must comply, so far as they are reasonably able, with reasonable instructions given by the PCBU to allow that person to comply with the WHS Act.

1.2. What is involved in managing the risk of falls?

WHS Regulation section 34

Duty to identify hazards

WHS Regulation section 35

Managing risks to health and safety

WHS Regulation section 36

Hierarchy of control measures

WHS Regulation section 37

Maintenance of control measures

WHS Regulation section 38

Review of control measures

This code provides guidance on how to manage the risks of falls in the workplace using the following systematic process:

- identify hazards—find out what could cause harm
- assess risks, if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. This step may not be necessary if you are dealing with a known risk with known controls
- eliminate risks so far as is reasonable practicable
- control risks—if it is not reasonably practicable to eliminate the risk, implement the most effective control measures that are reasonably practicable in the circumstances in accordance with the hierarchy of control measures, and ensure they remain effective over time
- review control measures to ensure they are working as planned

Further guidance on the risk management process is available in the How to manage work health and safety risks Code of Practice.

Guidance on the preparation of a SWMS is available in the Safe work method statement for high risk construction work – Information sheet.

Consulting workers

Consultation involves sharing information, giving workers a reasonable opportunity to express views and taking those views into account before making decisions on health and safety matters.

WHS Act section 47

Duty to consult workers

A PCBU must consult, so far as is reasonably practicable, with workers who carry out work for the business or undertaking and who are (or are likely to be) directly affected by a health and safety matter.

This duty to consult is based on the recognition that worker input and participation improves decision-making about health and safety matters and assists in reducing work-related injuries and disease.

The broad definition of a ‘worker’ under the WHS Act means a PCBU must consult, so far as is reasonably practicable, with employees, contractors and subcontractors and their employees, on-hire workers, outworkers, apprentices, trainees, work experience students, volunteers and other people who are working for the PCBU and who are, or are likely to be, directly affected by a health and safety matter.

Workers are entitled to take part in consultations and to be represented in consultations by a health and safety representative who has been elected to represent their work group.

By drawing on the experience, knowledge and ideas of workers, fall hazards are more likely to be identified and effective control measures implemented.

Consulting, cooperating and coordinating activities with other duty holders

WHS Act section 46

Duty to consult with other duty holders

The WHS Act requires a PCBU to consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

There is often more than one business or undertaking at a workplace, which may each have responsibility for the same health and safety matters, either because they are involved in the same activities or share the same workplace.

In these situations, each duty holder should exchange information to find out who is doing what and work together in a cooperative and coordinated way so risks are eliminated or minimised so far as is reasonably practicable.

For example, the owner of a transport company with large trucks should consult the goods suppliers as well as the businesses having the goods delivered about how the risk of falls will be controlled during loading and unloading. This may include checking whether equipment is available at each site so that workers do not have to climb on top of loads on the truck and be at risk of falling.

Further information is available in the Work health and safety consultation, cooperation and coordination Code of Practice.

1.3. Information, training, instruction and supervision

WHS Act section 19

Primary duty of care

WHS Regulation section 39

Provision of information, training and instruction

The WHS Act requires PCBUs to ensure, so far as is reasonably practicable, the provision of any information, instruction, training or supervision necessary to protect all persons from risks to their health and safety arising from work carried out as part of the conduct of that business or undertaking.

The PCBU must ensure that information, training or instruction provided to a worker is suitable and adequate having regard to:

- the nature of the work carried out by the worker
- the nature of the risks associated with the work at the time of the information, training and instruction
- the control measures implemented.

The PCBU must also ensure, so far as is reasonably practicable, that the information, training and instruction are provided in a way that is readily understandable for the person to whom it is provided.

Workers must be trained and have the appropriate skills to carry out a particular task safely. Training should be provided to workers by a competent person.

Information, training, instruction provided to workers exposed to potential falls from working at any height should include:

- the proper use, wearing, storage and maintenance of PPE
- the hazards and risks associated with work performed at these heights
- how to follow health and safety procedures associated with this work, including the contents of any SWMS
- the reasons fall protection measures have been put in place and how to use them properly.

Those supervising the work should also receive training. The amount and type of information, training and instruction required will depend on the nature of the work and the risk involved, as well as the type of fall protection measures used.

The information, training and instruction provided to workers should also include:

- procedures for emergency and rescue
- procedures for reporting fall hazards and incidents
- the correct selection, fitting, use, care, inspection, maintenance and storage of fall arrest and restraint equipment, if this equipment is to be used
- the correct use of tools and equipment used in the work, for example using a tool belt instead of carrying tools
- control measures for other potential hazards, for example electrical hazards and crushing or entanglement from the use of plant like elevating work platforms (EWPs).

Workers exposed to a risk of a fall should also be adequately supervised by a competent person, especially if they are undergoing training or are unfamiliar with the working environment. As a PCBU, you should check that:

- only workers who have received training and instruction in relation to the system of work are authorised to carry out the work
- workers use fall control measures in the correct manner.

WHS Regulation section 317

Duty to ensure worker has been trained

You must not direct or allow a worker to carry out construction work unless the worker has successfully completed general construction induction training. You must also ensure the worker holds a general construction induction training card or a general construction induction training certification.

2. The role of designers of plant and structures

2.1. Eliminating or minimising the risk of falls at the design stage

The design, manufacture or modification of any plant or structure can significantly affect the risk of falls. Thoughtful design and the early consideration of the potential risk of falls can result in the elimination of such risks. The design stage should consider the whole life cycle of the plant or structure, from manufacture and use through to demolition and disposal.

Safety considerations that may eliminate or minimise risks at the design stage should include:

- safer building design including:
  - low-level mounting of roof vents
  - locating air conditioning and similar plant at ground level
  - locating air conditioning units and other roof-mounted plant like satellite dishes away from edges
  - specifying non-fragile material for the roof
  - using permanent safety mesh
  - having safer gutters, for example by installing large volume gutters and downpipes to minimise the need to access the roof for cleaning; locating the gutters at ground level or away from edges; or the removal of gutters altogether, with a smooth transition from the roof to the walls with the gutters at ground level
  - safe entry to and exit from work areas, including scaffolding
  - designing permanent guardrails or other forms of edge protection, like parapet walls for permanent fall prevention on roofs
  - future maintenance requirements, for example in relation to air-conditioning units, sloping building exteriors and windows, to ensure maintenance can be carried out safely
  - specifying the strength of roof members and other points to which guardrails or anchor points for work positioning systems will be fixed
  - designing the prefabrication of structures on the ground before they are lifted into position
  - specific safety requirements for particular workers doing subsequent installation, maintenance or repair work. These groups include:
    - people installing and maintaining antennae and satellite dishes
    - contractors servicing air-conditioning equipment on the roof
    - window and gutter cleaners and repairers.

2.2. Plant

Safety considerations that may eliminate or minimise risks at the plant design stage could include:

- providing steps and handrails on vehicles (see Figure 1)
- incorporating one or more systems designed to prevent falls in silos and overhead conveyors
- ensuring workers who will be maintaining, repairing or cleaning the plant are able to do so safely, including safe access to and exit from the plant
- considering the safety of passengers.

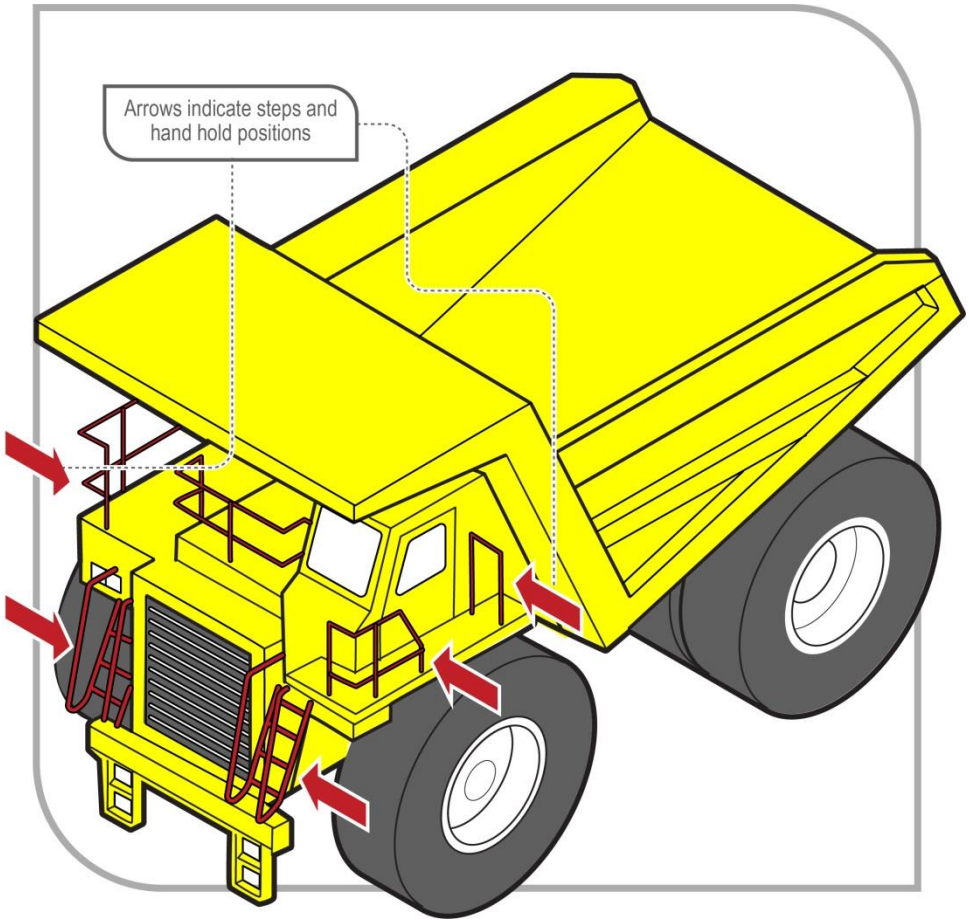

Figure 1 Steps and handrails on dump trucks

2.3. Buildings and structures

Designers or constructors of buildings or structures must ensure, so far as is reasonably practicable, that workers involved with the construction, use or subsequent maintenance are not exposed to the risks associated with work at height. Therefore, at the design and planning stage, it is important to consider providing one or more systems designed to prevent falls as part of the building or structure.

As it is unlikely that all design work on larger projects will be carried out by one designer, consultation, cooperation and coordination should occur between the builder and other designers to ensure the safe interaction of the different design aspects.

When risks remain in the design work, information must be included with the design to alert others to the risks. Providing information about safety issues is a key component to ensure proper, adequate and suitable design and installation.

Safety considerations that may eliminate or minimise risks at the construction stage should include:

- reducing the risk for those working at heights, for example installing guardrails
- to perimeter structural members before erection
- reducing the time spent working at heights by pre-fabricating modules on the ground, before lifting them into position
- sequencing of the work to be carried out at heights
- locating access roads to enable a crane to place building materials in the most accessible location rather than the materials being moved manually
- preparing the ground or floor below the work area—it should be compacted and level to support plant or equipment like cranes and elevating work platforms (EWPs)
- identifying underground services including drainage, for example for the safe setting up of cranes
- providing permanent safety mesh.

Planning for building maintenance

During the planning stage, consideration should also be given to the methods by which maintenance, repairs or cleaning will be carried out on a building or structure, for example:

- designing window cleaning bays or gangways integrated into the structural frame
- designing permanent anchorage and hoisting points into structures where maintenance needs to be carried out at height.

Planning the site layout

Factors to be considered when planning the site layout include:

- preparing firm, level surfaces below work areas for the support of plant and equipment like EWPs or mobile scaffolds
- the site and condition of access roads to enable plant to place material in and pick it up from the most favourable positions, reducing the need for manual handling at height
- the safe access to and exit from work areas and amenities including the provision and placement of stairways, ladders, catwalks, guardrails and barriers
- the need for a direct and unobstructed means of escape and rescue in the event of an emergency.

3. The risk management process

3.1. The risk management process

A risk assessment is not mandatory under the WHS Regulation. However, in many circumstances it will be the best way to determine the measures that should be implemented to control risks. It will help to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing that risk
- identify if and what kind of control measures should be implemented
- check the effectiveness of existing control measures.

Risk management is a systematic process to eliminate or minimise the potential for harm to people.

3.2. Identifying the hazards

The first step in the risk management process is to identify all fall hazards in the workplace. This involves finding things and situations which could potentially cause harm to people. Hazards generally arise from the following aspects of work and their interaction:

- physical work environment
- equipment, materials and substances used
- work tasks and how they are performed
- work design and management.

As a person conducting a business or undertaking (PCBU), you must identify all locations and work tasks that are reasonably likely to cause injury due to a fall. This includes access to and exit from the areas where work is to be carried out.

Inspect the workplace

Hazards may be identified by looking at the workplace and how work is carried out.

Walk around the workplace and talk to your workers to find out where work is carried out that could result in falls. A checklist may be useful in this process. Key things to look for include:

- edges — requiring protection for open edges of floors, working platforms, walkways, walls or roofs
- holes, openings or excavations—requiring guarding
- surfaces, including:
  - their stability, fragility or brittleness
  - their strength or capability to support loads
  - the potential to slip, for example where surfaces are wet, polished or glazed
  - the safe movement of workers where surfaces change
  - the slope of work surfaces.
- levels—where levels change and workers may be exposed to a fall from one level to another
- structures—the stability of temporary or permanent structures
- the ground—the evenness and stability of the ground for safe support of a scaffold or work platform
- the working area—whether it is crowded or cluttered
- safe means of access to and exit from the workplace and working area
- hand grip—places where hand grip may be lost.

Particular attention should also be given to work tasks that are carried out:

- near an unprotected open edge, for example near incomplete stairwells or leading formwork edges
- using equipment to work at the elevated level, for example when using elevating work platforms (EWPs) or portable ladders

- on any structure or plant being constructed or installed, demolished or dismantled, inspected, tested, repaired or cleaned
- on or alongside a fragile surface, for example cement sheeting roofs, rusty metal roofs, fibreglass sheeting roofs and skylights
- on a potentially unstable surface, for example areas where there is potential for ground collapse
- on a sloping or slippery surface where it is difficult for people to maintain their balance, such as on glazed tiles or wet surfaces
- near a hole, shaft or pit into which a worker could fall such as trenches, lift shafts, service pits or floor and column penetrations.

You may also need to talk to manufacturers, suppliers and health and safety specialists. In some situations, you may need to seek advice from technical specialists like structural engineers to check the stability or load-bearing capacity of structures.

Review available information including incident records

Records of previous workplace incidents (injuries and near misses) and worker complaints related to falls should be checked.

Information and advice about fall hazards and risks relevant to particular industries and work activities are also available from regulators, industry associations, unions, technical specialists and safety consultants.

Manufacturers and suppliers can also provide information about hazards and safety precautions for specific plant or processes (information manuals).

3.3. Assessing the risks

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of it happening. A risk assessment can help you determine:

- how severe a risk is
- whether any existing control measures are effective
- what action you should take to control the risk
- how urgently the action needs to be taken.

Hazards have the potential to cause different types and severities of harm, ranging from minor discomfort to a serious injury or death.

Many hazards and their associated risks are well known and have well established and accepted effective control measures. In these situations, the second step in the process outlined in section 1.2 of this code (to formally assess the risk) is not required. If after identifying a hazard you already know the risk and how to control it effectively, you may simply implement the controls.

In some circumstances, a risk assessment will assist to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing the risk
- identify if and what kind of control measures should be implemented
- check the effectiveness of existing control measures.

When assessing the risks of each fall hazard the following should be considered:

- what could happen if a fall did occur and how likely it is to happen
- the design and layout of elevated work areas including the distance of a potential fall
- the number and movement of people at the workplace
- the proximity of workers to unsafe areas where loads are placed on elevated working areas, for example loading docks, and where work is to be carried out above people and there is a risk of falling objects
- the adequacy of inspection and maintenance of plant and equipment, for example scaffolds
- the adequacy of lighting for clear vision

- weather conditions including the presence of rain, wind, extreme heat or cold which can cause slippery or unstable conditions
- the suitability of footwear and clothing for the conditions
- the suitability and condition of ladders including where and how they are being used
- the adequacy of current knowledge and training to carry out work safely, for example young, new or inexperienced workers may be unfamiliar with the work
- the adequacy of procedures for potential emergency situations—including effective procedures for response and evacuation, the provision of medical treatment and assistance (for example ensuring appropriate first aid is provided immediately and ambulances are called for when necessary), and effective communication
- the adequacy of current testing and training of the emergency procedures.

Generic risk assessment

If you are responsible for a number of different work areas or workplaces and the fall hazards are the same, you may complete a single—or generic—risk assessment. However, a generic risk assessment must be reviewed if there is any likelihood a person may be exposed to greater, additional or different risks at the specific work area or workplace.

3.4. Controlling the risks

Hierarchy of control measures

The WHS Regulation requires duty holders to work through the hierarchy of control measures when managing certain risks; however, the hierarchy can be applied to any risk. The hierarchy ranks control measures from the highest level of protection and reliability to the lowest.

Further guidance on the risk management process and the hierarchy of control measures is available in the How to manage work health and safety risks Code of Practice.

Managing the risk of falls

WHS Regulation section 78

Management of risk of fall

In managing the risk of falls, the WHS Regulation requires specific control measures to be implemented, where it is reasonably practicable to do so.

As a PCBU, you must manage risks to health and safety associated with a fall by a person from one level to another that is reasonably likely to cause injury to the person or any other person.

You must ensure, so far as is reasonably practicable, that any work involving a risk of a fall is carried out on the ground or on a solid construction (see Chapter 4).

You must also provide safe means of access to and exit from the workplace or any area within the workplace from or through which a person could fall, such as a platform or scaffolding.

Carrying out work on the ground or on a solid construction and providing a safe means of access to and exit from a workplace are intended to, as far as is reasonably practicable, eliminate the fall hazard and associated risk of a fall.

WHS Regulation section 79

Specific requirements to minimise risk of fall

If it is not reasonably practicable for you to eliminate the risk of a fall by working on the ground or on a solid construction, you must minimise the risk of a fall by providing adequate protection against the risk.

Adequate protection against the risk is provided if you provide and maintain a safe system of work, including by:

- providing a fall prevention device if it is reasonably practicable to do so (see Chapter 5), or
- if it is not reasonably practicable to provide a fall prevention device, providing a work positioning system (see Chapter 6), or
- if it not reasonably practicable to provide a fall prevention device or work positioning system, providing a fall arrest system, so far as is reasonably practicable (see Chapter 7).

- If a risk remains after considering all of the control measures mentioned above, you must minimise the remaining risk, so far as is reasonably practicable, by implementing administrative controls (see Chapter 8).

Administrative controls may also be used to support other control measures. However, the exclusive use of administrative controls to minimise the risk of falls is only appropriate when it is not reasonably practicable to use a higher order control.

Combining control measures

A combination of control measures may be used to minimise risks, so far as is reasonably practicable, if a single control is not sufficient for the purpose. In most cases, a combination of the control measures will provide the best solution to minimise the risk to the lowest level reasonably practicable.

You should also ensure that the control measures you select do not create new hazards, for example electrical risks from contact with overhead powerlines or crushing and entanglement from plant like EWPs. If any new hazards are created they must also be controlled.

Maintaining and reviewing control measures

WHS Regulation section 37

Maintenance of control measures

Control measures must be maintained so they remain fit for purpose, suitable for the nature and duration of the work and installed, set up and used correctly.

To allow the chosen control measures to operate effectively, you should develop work procedures on how to correctly install, use and maintain the control measures. The procedures should include a planned program of inspections and maintenance for the control measures. The inspection regime should include details of:

- the equipment to be inspected including its unique identification
- the frequency and type of inspection, for example pre-use checks, detailed inspections
- action to be taken on finding defective equipment
- means of recording the inspections
- training of users
- the system of monitoring the inspection regime to verify inspections are carried out appropriately.

The manufacturer or supplier of the equipment should be consulted for product specific requirements. If signs of excessive wear or other defects are found during the inspection the defective equipment must be withdrawn from use.

WHS Regulation section 38

Review of control measures

You must review and as necessary revise fall control measures in the following circumstances:

- when the control measure does not control the risk so far as is reasonably practicable
- before a change at the workplace that is likely to give rise to a new or different risk to health and safety that the control measure may not effectively control
- a new relevant hazard or risk is identified
- the results of consultation indicate that a review is necessary, or
- a health and safety representative requests a review if that person reasonably believes that:
    - a circumstance in any of the above points affects or may affect the health and safety of a member of the work group represented by the health and safety representative
    - the control measure has not been adequately reviewed in response to the circumstance.

4. Work on the ground or on a solid construction

The most effective control measure is to eliminate the risk of a fall, so far as is reasonably practicable. This can be achieved by working on the ground or from a solid construction. A person conducting a business or undertaking (PCBU) can only take steps to minimise the risk of a fall if it is not reasonably practicable to eliminate that risk.

4.1. Work on the ground

Eliminating the need to work at height is the most effective way of protecting workers from the risk of falls. Examples of tasks that may be carried out on the ground to eliminate the risk of falls are:

- prefabricating roofs at ground level
- prefabricating wall frames horizontally then standing them up
- installing air-conditioning units at ground level
- using mechanical tarp spreaders to cover loads on trucks from the ground
- reducing shelving heights so workers can access items from ground level
- using tools with extendable handles, for example paint rollers—however, the risk of musculoskeletal disorders will need to be considered when deciding whether to use such tools
- lowering a concert hall chandelier to repair it
- fitting outlets, inlets and controls of large tanks and silos near the ground—see Figure 2.

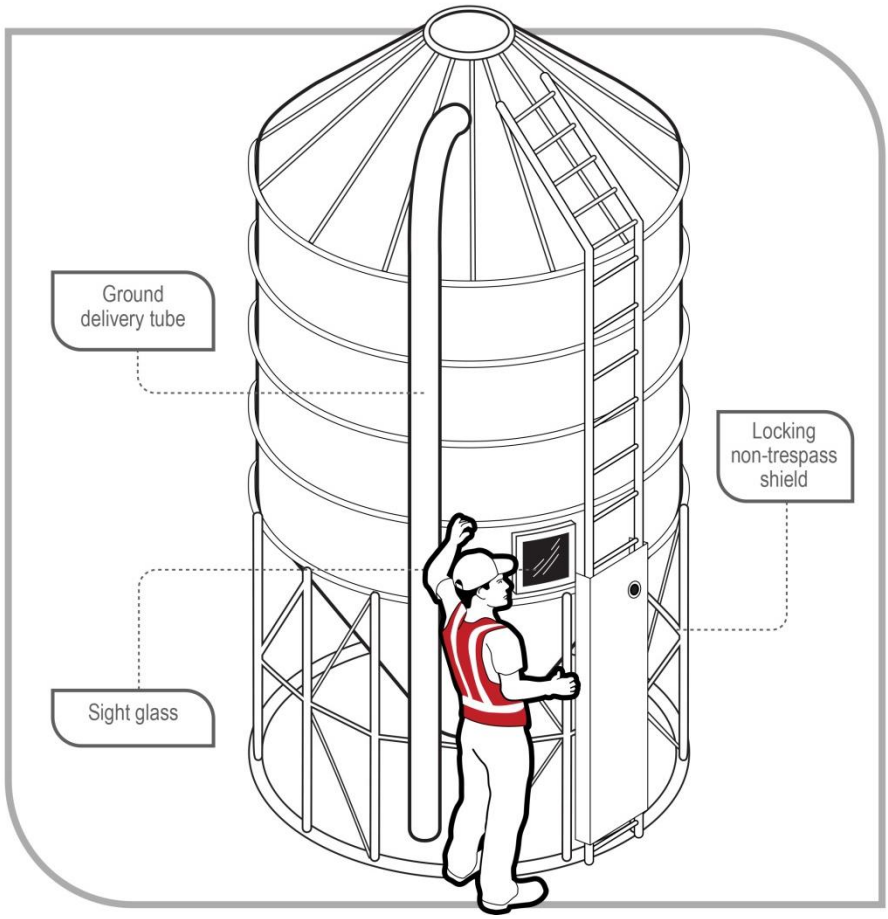

Figure 2 Silo with sight glass and ground delivery tube

4.2. Work on a solid construction

Working on a solid construction provides an environment where the likelihood of a fall may be eliminated. ‘Solid construction’ means an area:

- with a surface that is structurally capable of supporting workers, materials and any other loads applied to it
- provided with barriers around its perimeter and around any openings from or through which a person could fall
- with an even and readily negotiable surface and gradient
- with a safe means of entry and exit.

Structural strength

Different types of work involve different loads on the supporting surface. The surface and its supports must be able to safely carry the expected loads, including workers, materials, tools and equipment. When in doubt, have a structural engineer determine the safe load capacity before use.

Barriers

Barriers to prevent a person falling over edges and into holes must be provided on relevant parts of a solid construction. These include:

- the perimeters of buildings or other structures
- floors, including mezzanine floors—see Figure 3
- openings in floors
- the open edge of a stair, landing, platform or shaft opening—see Figure 4.

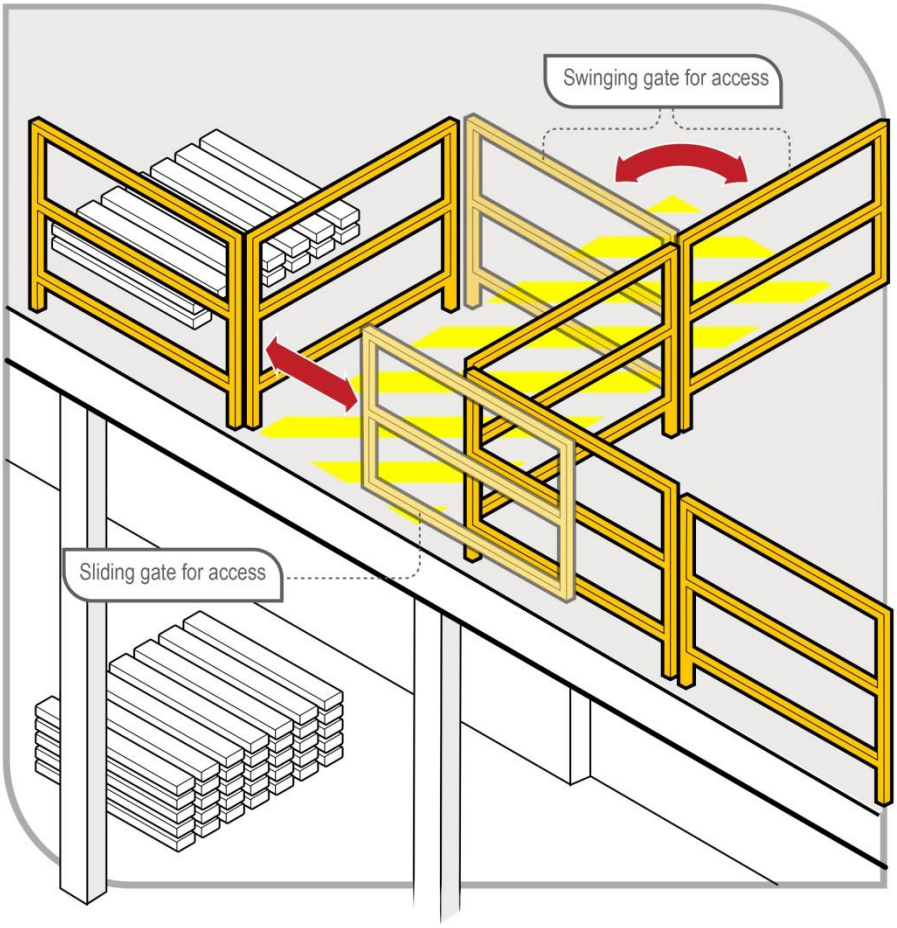

Figure 3 Mezzanine floor barrier

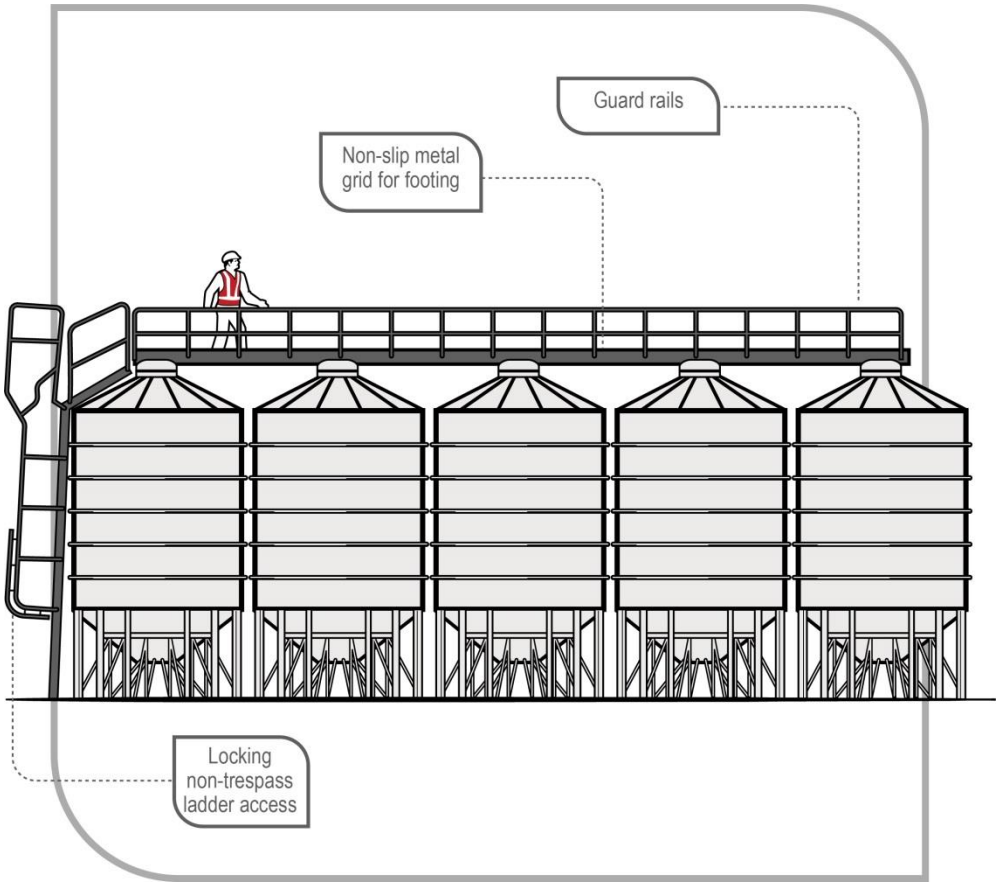

Figure 4 Silos with platform and guard rails

The barrier must be designed and constructed to withstand the force of someone falling against it.

Barriers should consist of guardrails, solid balustrades or other structural components, for example wire mesh supported by posts and provided with a reinforced top edge. The top of the guardrail or component should be between 900 mm and 1100 mm above the working surface. If a guardrail system is used, it should also have mid-rails and toe-boards or wire mesh infill panels.

If access is required to equipment, for example a hoist, it should be protected with gates or other means to prevent a person falling.

Protection around holes, penetrations and openings

A fall prevention device (for example a secure fence, edge protection, work platform or cover) must be used to provide and maintain a safe system of work where persons are working near and around holes, penetrations and openings through which a person could fall, if it is reasonably practicable to do so.

Holes, penetrations and openings must be made safe immediately after being formed, for example with covers, barricading or by embedded mesh—see Figure 5. When mesh is used, an additional cover should be used to prevent things falling through the mesh.

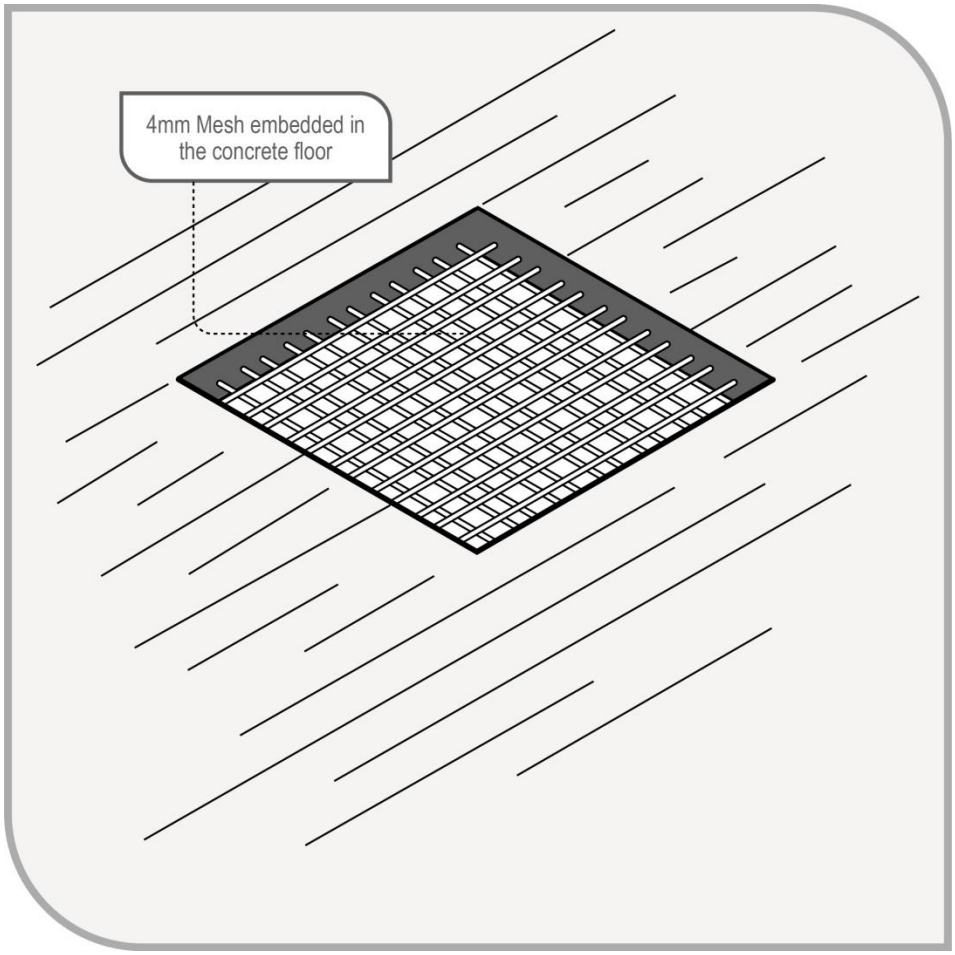

Figure 5 Mesh embedded in a concrete floor

If a cover is used as a control measure it must be made of a material strong enough to prevent people or objects falling through the hole, penetration or opening and should be securely fixed to prevent dislodgement or accidental removal.

Covers over penetrations should be designed to safely withstand a point load of at least 2 kilonewtons—that is, 200 kilograms.

Plywood covers on their own are not preferred because:

- the cover may be indistinguishable from other pieces of plywood
- it may be difficult to determine if the plywood is properly secured
- secured plywood covers can be unsecured to gain access and not be re-secured.

The cover should also include signage indicating its purpose as a cover, for example ‘DANGER HOLE BENEATH’—see Figure 6.

Figure 6 Cover danger sign

Surface and gradient

Surfaces of a solid construction must be non-slip, free from trip hazards and should generally not exceed 7 degrees—1 in 8 gradient. Cleated surfaces, which provide greater slip-resistance, should not be steeper than 20 degrees—1 in 3 gradient.

If grid mesh or checker plate flooring is used for walkways and working platforms you should, ensure:

- flooring panels are securely fixed and assembled in accordance with the manufacturer's specifications
- where possible, the flooring is fitted to the structure before being lifted into permanent position
- each panel is fixed securely before the next panel is placed in position
- during installation, this type of flooring is secured by tack welding, panel grips or other means to prevent movement before being fixed permanently
- if panels of grid mesh or checker plate flooring are removed, edge protection is provided and the gaps left due to removed panels are protected.

Entry and exit

The solid construction must have a safe means for people to enter and exit and to move around the work area, for example permanently installed platforms, ramps, stairways or fixed ladders.

Further information on fixed walkways, stairways and ladders is in AS 1657: *Fixed platforms, walkways, stairways and ladders – Design, construction and installation*. Other safety considerations for entrances and exits in a solid construction include:

- exposure of access systems to the weather, for example rain can make surfaces slippery and strong winds can cause loss of hand grip
- providing natural or artificial lighting to access ways
- clearing obstructions so people are able to move easily to and from the workplace.

Portable stepladders and trestle ladders should not be used for entries or exits and single or extension ladders should only be used where the use of safer systems is not reasonably practicable.

5. Fall prevention devices

When work cannot be performed on the ground or from a solid construction, you, as a person conducting a business or undertaking (PCBU), must minimise the risk of a fall by providing a fall prevention device, if it is reasonably practicable to do so.

A 'fall prevention device' is material or equipment—or a combination of both—designed to prevent a fall for temporary work at heights, that once in place after initial installation does not require any ongoing adjustment, alteration or operation by any person to ensure its integrity. Fall prevention devices include secure fencing, edge protection, working platforms and covers.

5.1. Temporary work platforms

A 'temporary work platform' is a working platform, other than a permanently installed fixed platform, used to provide a working area for the duration of the work. The design of the platform prevents workers from falling. Temporary work platforms include scaffolds, elevating work platforms (EWPs), mast climbers, workboxes, building maintenance units, portable or mobile fabricated platforms or any other platform that provides a working area designed to prevent a fall.

Scaffolds

Scaffolds can be very effective protection in preventing falls. Specific requirements apply to some types of scaffold under the WHS Regulation.

WHS Regulation section 225

Scaffolds

A person with management or control of a scaffold must not allow the use of a scaffold from which a person or object could fall more than 4 metres unless a competent person, who has inspected the scaffold, provides written confirmation that the scaffold has been completed.

The person with management or control of a scaffold must also ensure that:

- the scaffold and its supporting structure are inspected by a competent person:
  - before use of the scaffold is resumed after an incident occurs that may reasonably be expected to affect the stability of the scaffold (such as a severe storm or impact by mobile plant)
  - before use of the scaffold is resumed after any repairs
  - at least every 30 days.
- if an inspection indicates that a scaffold or its supporting structure creates a risk to health or safety, that any repairs, alterations and additions are made or carried out and the scaffold and its supporting structure are inspected again by a competent person before use is resumed, and
- unauthorised access is prevented on scaffolding that is incomplete and left unattended, for example by attaching danger tags and warning signs at appropriate locations.

The WHS Regulation also requires that the design of certain types of plant, such as prefabricated scaffolding, must be registered before the plant is used in the workplace. Further information on design registration is available in the Managing risks of plant in the workplace Code of Practice.

The WHS Regulation sets out requirements for erecting and dismantling scaffolding in construction work.

Scaffolding work platforms are generally rated as light, medium or heavy duty:

- **Light duty**—up to 225 kg per bay. Examples include painting, electrical work, many carpentry tasks and other light tasks. Platforms should be at least two planks wide (approximately 450 mm)
- **Medium duty**—up to 450 kg per bay. This is suitable for general trades work. Platforms should be at least four planks wide (approximately 900 mm)

- **Heavy duty**—up to 675 kg per bay. This is what is needed for bricklaying, concreting, demolition work and most other work tasks involving heavy loads or heavy impact forces. Platforms should be at least five planks wide (approximately 1000 mm)
- **Special duty**—has a designated allowable load as designed.

These safe load limits include the weight of people plus the weight of any materials, tools and debris on the working platform. For example, a properly constructed mobile scaffold with a light duty platform holding up to 225 kg per bay can safely support one 80 kg worker and 145 kg of tools and material, or two 80 kg workers and 65 kg of tools and materials.

Safety considerations when using scaffolds should include:

- scaffolding conforms to AS/NZS 4576: Guidelines for scaffolding and the AS/NZS 1576 Scaffolding (set)[1]
- scaffolding is erected, altered and dismantled by competent people. Scaffolds from which a person or object could fall more than 4 metres must be erected, altered and dismantled by a person who holds a scaffolding high risk work licence, or is enrolled in a training course to obtain a scaffolding high risk work licence and is under the direct supervision of a licensed scaffolder
- prefabricated scaffolds are of the same type and not mixed components, unless the mixing of components has been approved by the manufacturer
- safe access to and exit from the scaffold is provided
- edge protection like handrails, mid-rails and toe-boards is provided at every open edge of a work platform—see Figure 7.

Where work is carried out from a scaffold, workers must be provided with information, training and instruction on the nature of the scaffolding work, the risks associated with scaffolding and the control measures implemented to reduce that risk. This may include information, training and instruction on:

- emergency response procedures
- what loads the scaffold can safely take (Safe Working Load (SWL))
- not to make unauthorised alterations to the scaffold, such as removing guardrails, planks, ties, toe-boards and braces
- keeping working platforms clear of debris and obstructions along their length
- never accessing incomplete or defective scaffolds
- immediately reporting defects, if they occur
- isolating electrical leads from the metal frame of the scaffold with plastic lead hooks or an insulated rubber material where reasonably practicable (to prevent damage to the leads or electrifying the scaffold)
- the requirement for a written safe work method statement (SWMS) to be developed for any work carried out at or above 2 metres
- complying with any electrical ‘permit to work’ requirements issued by the electricity supply authority for work conducted from a scaffold that has been erected within the powerline ‘no go’ zone.

Where mobile scaffolds are used, workers should be trained in their use, including on how to ensure the scaffold:

- remains level and plumb
- is kept well clear of powerlines, open floor edges and penetrations
- is not accessed until the castors are locked to prevent movement
- is not moved while anyone is on it
- is accessed using an internal ladder (see Figure 8), except for low height platforms where this is not reasonably practicable.

[1] *AS/NZS 1576 (set):* Scaffolding *includes AS/NZS 1576.1:* Scaffolding – General requirements*; AS/NZS 1576.2:* Scaffolding – Couplers and accessories*; AS 1576.3:* Prefabricated and tube-and-coupler scaffolding*; AS 1576.4:* Scaffolding – Suspended scaffolding*; AS/NZS 1576.5:* Scaffolding – Prefabricated splitheads and trestles*; AS/NZS 1576.6:* Scaffolding – Metal tube-and-coupler scaffolding – Deemed to comply with AS/NZS 1576.3.

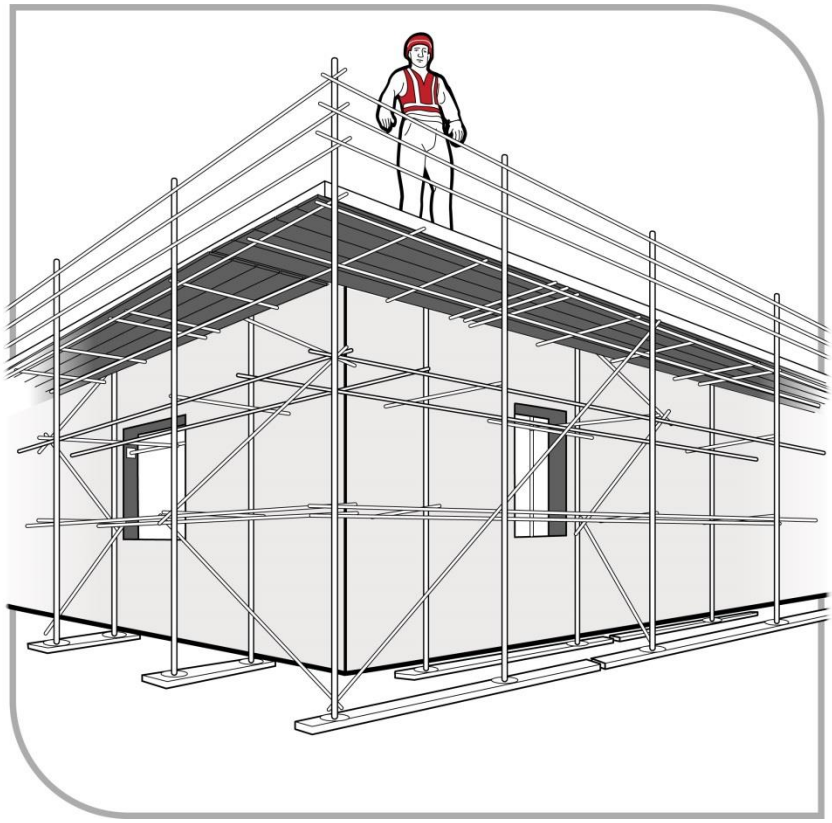

Figure 7 Perimeter scaffold with fully decked working platform, guardrails, mid-rails and toe-boards

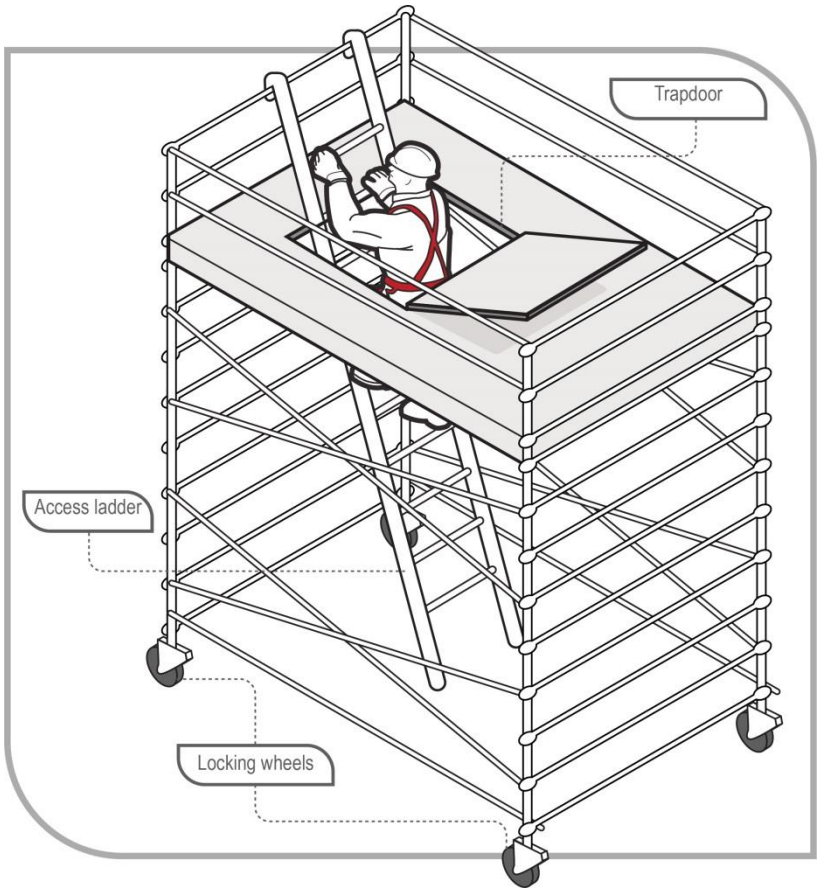

Figure 8 Mobile scaffold with access ladder and trapdoor

Suspended (swing stage) scaffold

A suspended scaffold incorporates a suspended platform capable of being raised or lowered when in use. Other terms often used are ‘suspended cradle’ and ‘swing stage’ scaffold. They are typically prefabricated modular units (see Figure 9) or permanently fabricated units, although they can be assembled from scaffolding.

Common types of suspended scaffold include:

- swing stages with cradles supported by a single row of suspension ropes
- double rope scaffolds with cradles supported by two rows of suspension ropes
- work cages which are small cradles supported by one suspension rope only
- false cars which are specialised forms of suspended scaffold and are often used in the construction of lifts before lift cars are installed.

In managing the risks of using swing stage scaffolds, you should ensure that:

- the working load and specifications are in accordance with AS 1576.4: Scaffolding – Part 4: Suspended scaffolding
- workers operating suspended scaffolds are trained in their safe operation
- workers installing or servicing a suspended scaffold must either:
    - hold an advanced rigging or advanced scaffolding high risk work licence, or
    - be enrolled in a training course to obtain an advanced rigging or advanced scaffolding high risk work licence and be supervised by the holder of an advanced rigging or advanced scaffolding high risk work licence.
- all occupants of the swing stage should wear a fall arrest harness attached to a suitable anchorage point in the swing stage
- the platform remains horizontal when it moves up or down.

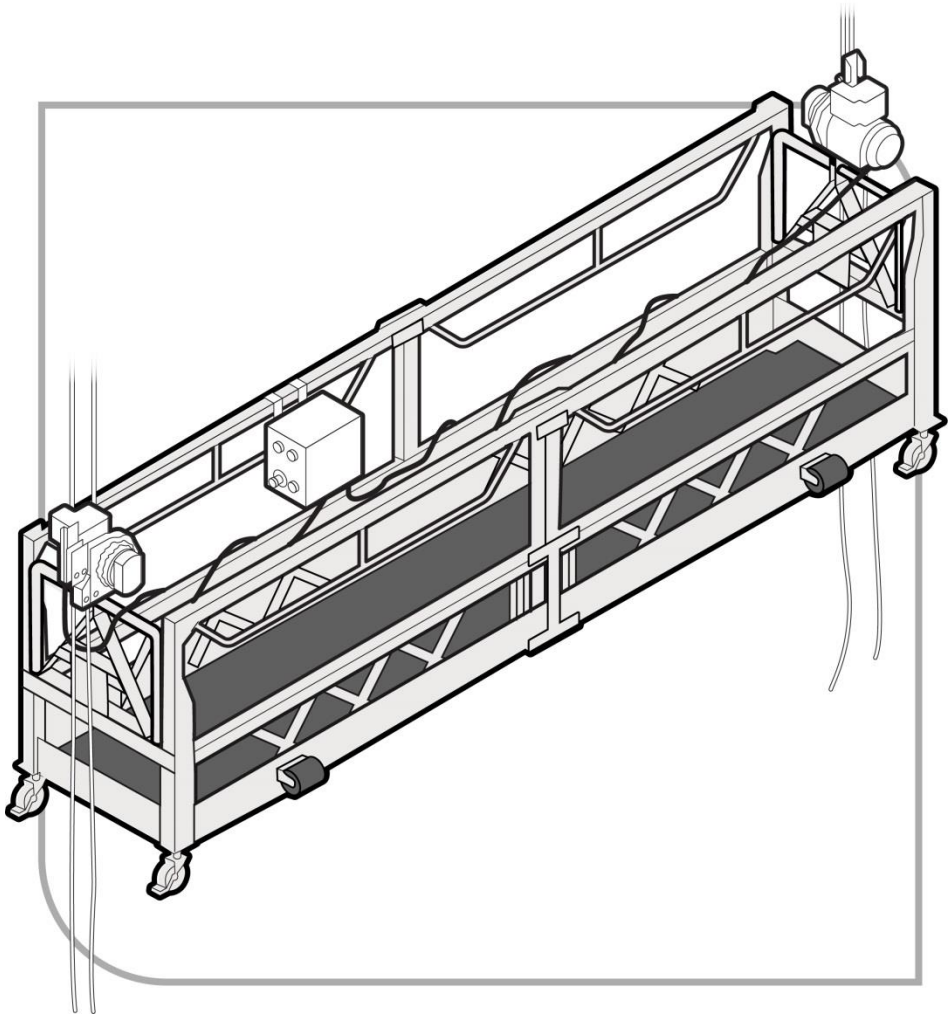

Figure 9 Suspended (swing-stage) scaffold – cradle (suspended) end

Elevating work platforms (EWPs)

EWPs include boom-type EWPs (see Figure 10) and scissor lifts (see Figure 11). Some are designed for hard flat surfaces only while others are designed to be operated on rough terrain. Some types are designed for indoor use and are not suitable for windy conditions outdoors.

If using an EWP at the workplace, you must identify the hazards associated with the use of the EWP and implement control measures to eliminate or minimise those risks so far as is reasonably practicable. The main hazards related to the use of EWPs are contact with electric lines, overturning the machine, falling from the work platform, and potential crushing hazards when elevating the platform or moving laterally.

Relevant risk control measures when using EWPs should include:

- training and instructing workers in the safe operating procedures for the particular brand and type of EWP, as well as safe work procedures to avoid crushing and electrical hazards
- training and instructing workers in the safe use of fall arrest equipment and emergency rescue procedures
- ensuring the EWP is only used as a working platform and not as a means of entering and exiting a work area unless the conditions set out in AS 2550.10: Cranes, hoists and winches – Safe use –Part 10: Mobile elevating work platforms are met
- ensuring the EWP is only used on a solid level surface, unless it is designed for use on rough terrain
- checking the surface area to make sure there are no penetrations or obstructions that could cause uncontrolled movement or overturning of the EWP.

In addition to the above, you must ensure:

- where it is not reasonably practicable to use a fall prevention device or a work positioning system to adequately protect against the risk of a fall, workers working in travel towers, boom lifts or cherry pickers wear a properly anchored fall arrest harness. The lanyard should be as short as possible and should be attached directly to the designated anchor point on the EWP, not to the handrail (unless the handrail is the manufacturer's specified anchor point)
- workers operating boom-type EWPs with a boom length of 11 metres or more either:
  - hold a boom-type EWP high risk work licence, or
  - are enrolled in a training course to obtain a boom-type EWP high risk work licence and are supervised by the holder of a boom-type EWP high risk work licence.

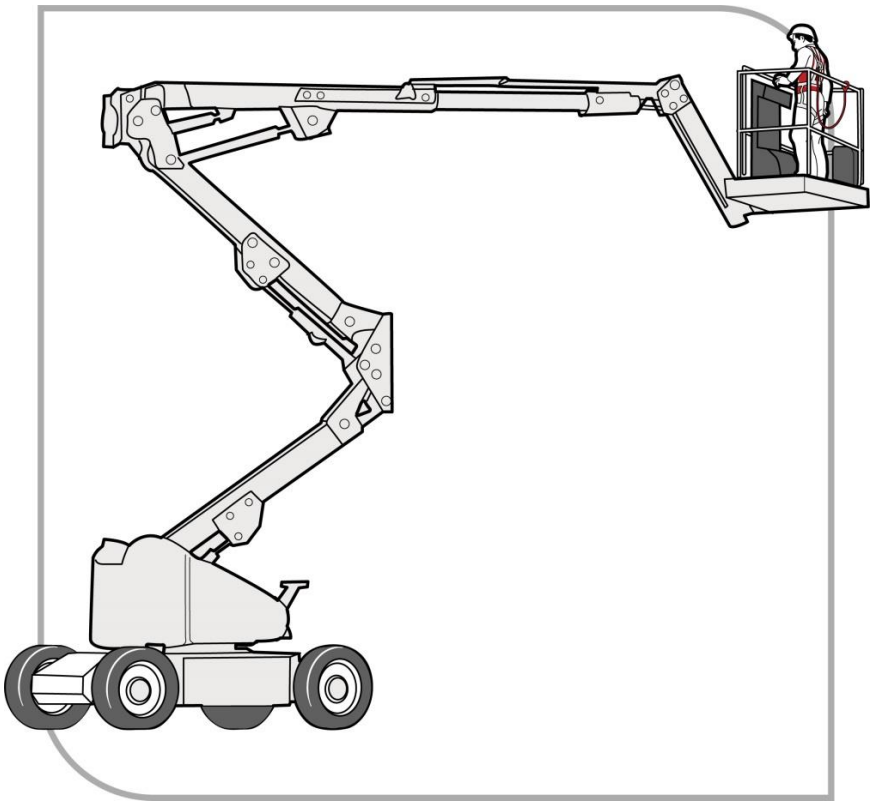

Figure 10 Boom-type elevating work platform

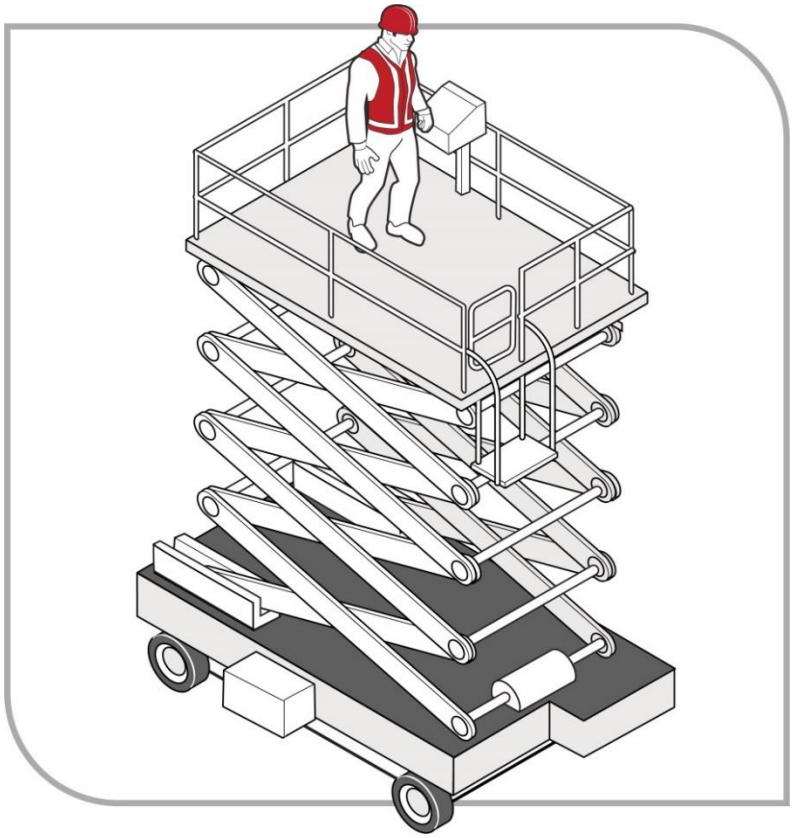

Figure 11 Scissor-lift elevating work platform

Mast climbing work platforms

Mast climbing work platforms are hoists with a working platform that is used to raise workers and material to a temporary working position (see Figure 12). They use a drive system mounted on an extendable mast which may need to be tied to a building under circumstances prescribed by the manufacturer.

Mast climbing work platforms can be set up in either single-mast or multi-mast configurations. They are generally not suitable for use if the profile of a structure changes at different elevations, for example if the upper floors of a building step back or balconies protrude from the building.

The erection and dismantling of mast climbing work platforms must be carried out by workers who:

- hold a basic rigging or intermediate scaffolding high risk work licence, or
- are enrolled in a training course to obtain a basic rigging or intermediate scaffolding high risk work licence and are being supervised by the holder of a basic rigging or intermediate scaffolding high risk work licence.

Further information on mast climbing work platforms is in AS 2550.16: Cranes – Safe Use – Part 16: Mast climbing work platforms.

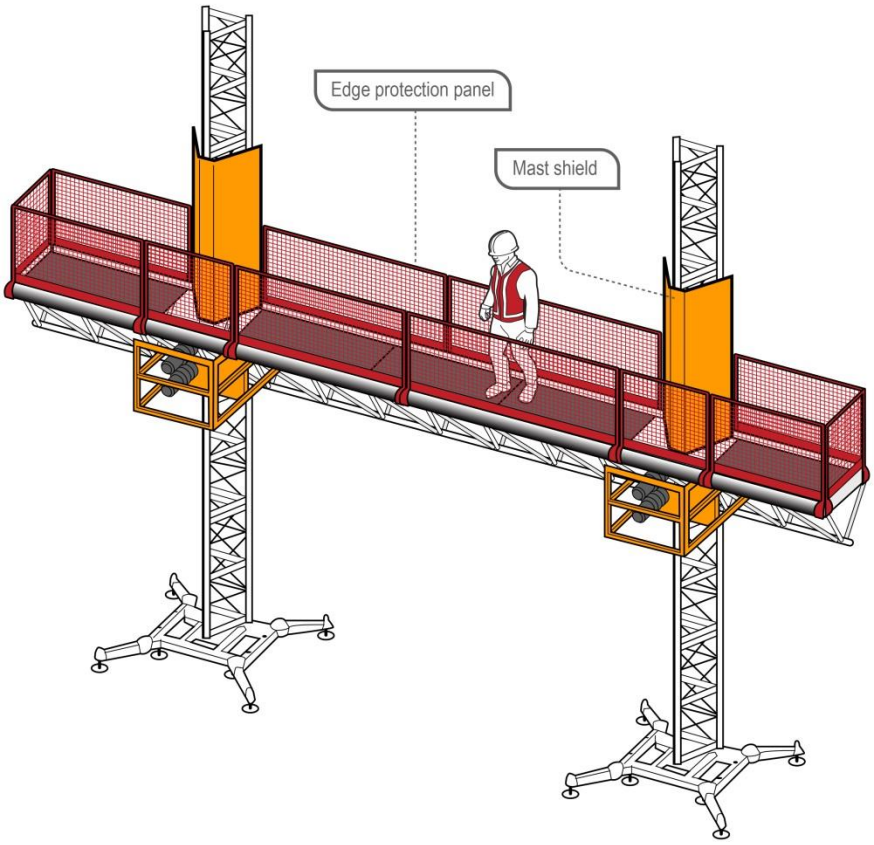

Figure 12 An example of a typical mast climbing work platform

Workboxes and Work platforms

Workboxes and work platforms consist of a platform surrounded by edge protection, designed to provide an elevated work area for people working from the box. Workboxes are designed to be supported from above by a crane, hoist, or other mechanical device whereas work platforms are designed to be supported from underneath or the side by forklifts or other mechanical devices.

Where reasonably practicable, other working platforms like EWPs or scaffolds should be used as an alternative to a workbox or work platform.

Certain safety precautions should be observed when using a workbox or work platform to provide an elevated work area. These include ensuring the workbox or work platform:

- is designed for the task and securely attached to the crane, hoist, forklift truck or other mechanical device
- is not suspended over people.

You should also ensure:

- there is an effective means of communication between any person in the workbox or work platform and the operator
- the operator remains at the controls of the crane, hoist, forklift truck or other mechanical device at all times
- lifting attachments and records are checked by a competent person before use.

Workboxes designed to be suspended from cranes

The WHS Regulation requires workboxes designed to be suspended from cranes to be ‘design registered’ before they are used in the workplace.

When using crane workboxes as an elevated work area, you should ensure that:

- the workbox is designed in accordance with AS 1418.17: *Cranes* (including hoists and winches) – Part 17: Design and construction of workboxes

- the workbox is fitted with an anchorage capable of withstanding the fall forces specified in AS/NZS 1891.4: Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance
- where there is a risk of a person falling from height, the person must be attached to the anchorage by a lanyard and harness unless the workbox is fully enclosed
- workers remain within the workbox while they are being lifted or suspended
- except in an emergency, workers do not enter or leave the workbox when it is elevated unless the conditions set out in section 6.19.3 of AS 2550.1: Cranes, hoists and winches – Safe use – Part 1: General requirements are met
- directions to the crane operator should be provided from the workbox by a person holding a dogging or rigging licence.

A crane used to elevate a workbox should:

- be fitted with the means to safely lower the workbox in an emergency or a power supply failure
- be suitably stabilised while the workbox is used
- have ‘drive up’ and ‘drive down’ controls on both the hoisting and luffing motions and those controls should be used. No declutching allowing free fall is to be used while a workbox is in use.

Further specifications for cranes used to lift workboxes and requirements relating to the use of crane workboxes is in AS 2550.1: Cranes, hoists and winches – Safe use – Part 1: General requirements.

Work platforms supported by forklifts

Work platforms used on forklifts to elevate people to work at height should be engineer-designed and constructed in accordance with AS 2359.1–2015: Powered Industrial Trucks – Part 1: General requirements (see Figure 13)**.**

The work platform should be securely attached to the forklift carriage to prevent it from sliding off the forks.

In managing the risks of using a work platform to provide an elevated work area you should ensure that:

- workers are only raised by a forklift when in a compliant work platform
- workers remain within the work platform when it is elevated or being raised or lowered
- no other device such as a ladder or pallet is used to gain additional height (see Figure 14 and Figure 15)
- the safety gate is self-closing and kept shut when in the elevated position.

Further information on the use of work platforms with forklifts is in AS 2359.2: Powered industrial trucks –Part 2: Operations.

Forklifts used to elevate people in a work platform should comply with the requirements of AS 2359.1–2015: Powered industrial trucks – Part 1: General requirements.

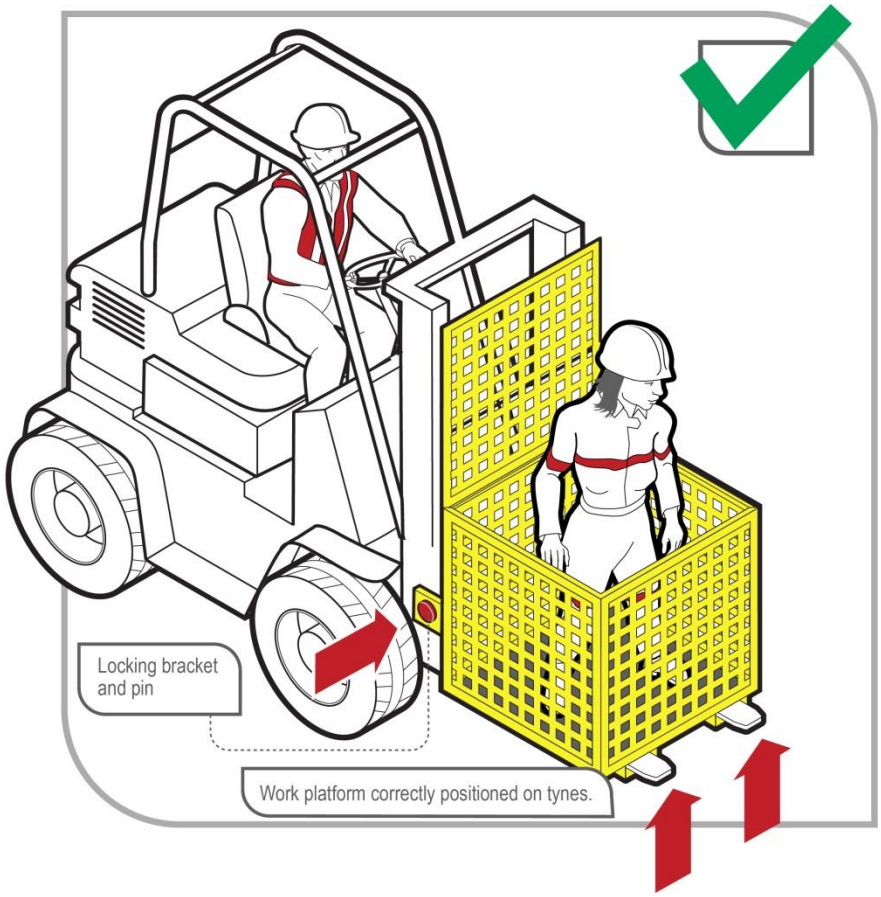

Figure 13 An engineer-designed work platform correctly positioned on tynes

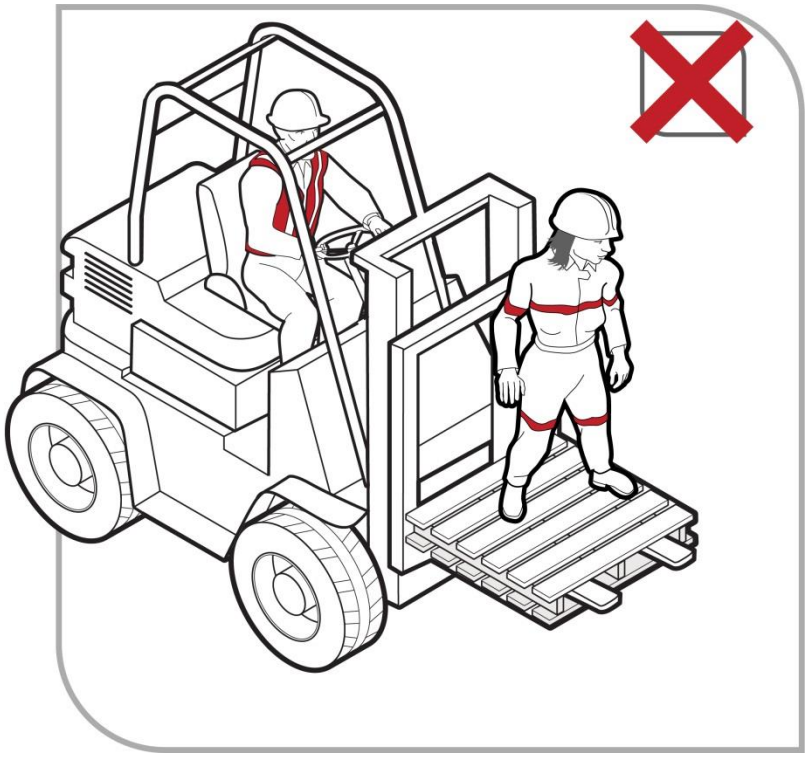

Figure 14 Using a forklift as a working platform or to gain extra height by standing on the tynes or a pallet is an unacceptable practice

Figure 15 Unacceptable practice with ladder on forklift

Building maintenance units

A building maintenance unit is a power-operated suspended working platform that is fixed permanently to a building or structure. It is used for access for building maintenance or window cleaning (see Figure 16).

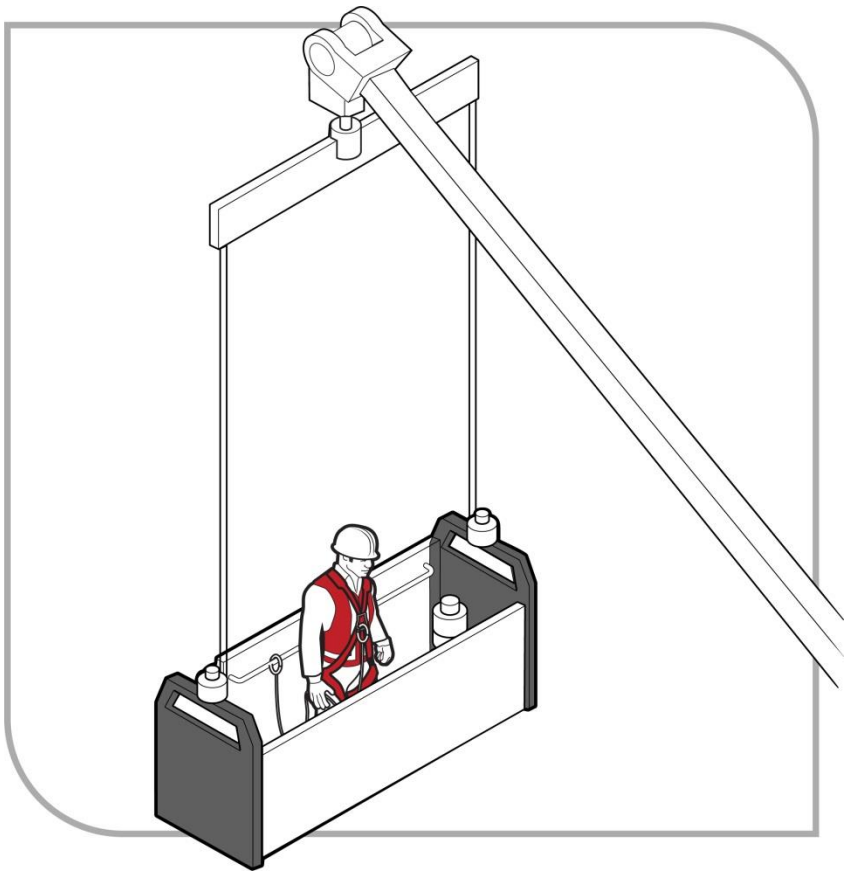

Figure 16 Building maintenance unit with harness and anchor rail

When using a building maintenance unit you should ensure that:

- the unit is designed in accordance with AS 1418.13: Cranes (including hoists and winches) –Part 13: Building maintenance units
- the unit has clearly designated fall arrest harness anchorage points designed to withstand the forces caused by a fall of a person located anywhere on the platform
- the unit is operated by competent people in accordance with AS 2550.13: Cranes – Safe Use – Building maintenance units
- operators possess a suitable attitude for working at height, including a responsible attitude to safety.

Platforms supported by trestle ladders

Trestle scaffolds are generally not suitable for working at heights of 2 metres or above. If they are used at heights greater than 2 metres, guardrailing and toe-boards should be used to prevent people and material from falling off the open side or end of the work platform.

Working platforms on trestle scaffolds should have a width of at least 450 mm (two planks) with exception to instances described in section 306O(3)a of the *Work Health and Safety Regulation 2011*. The use of plank locking devices will extend plank spans and reduce plank whip when walking along the platform. The system (including planks) should be assembled according to the manufacturer's specifications using only compatible components.

Except where the working platform is at or below 2 metres in height, if there is no guardrail or mid-rail provided adjacent to the working face of the structure, the distance between the platform edge and the working face of the structure should not be greater than one plank width (225 mm).

When adjusting the height of a brick layer's trestle scaffold, make sure that only the purpose-designed pins are used. Do not use nails or pieces of reinforcing bar. Pins should be attached to the trestle by a chain to prevent loss.

Some trestle ladder scaffolds include outriggers to increase stability (see Figure 17).

Most trestle ladder scaffolds are only suited to light duty work like painting and rendering.

Work should only be carried out between the trestles.

As a person conducting a business or undertaking (PCBU) you must always consider what is reasonably practicable to maintain a safe system of work in the circumstances. It may be that a trestle scaffold is not the most appropriate means of minimising the risk of a fall in the circumstances. Therefore, alternative types of temporary work platforms should be considered, for example EWPs like small scissor lifts and other types of fall prevention devices like light duty aluminium mobile scaffolds and modular scaffolding.

The WHS Regulation sets out requirements on the use of platforms supported by trestle ladders in construction work.

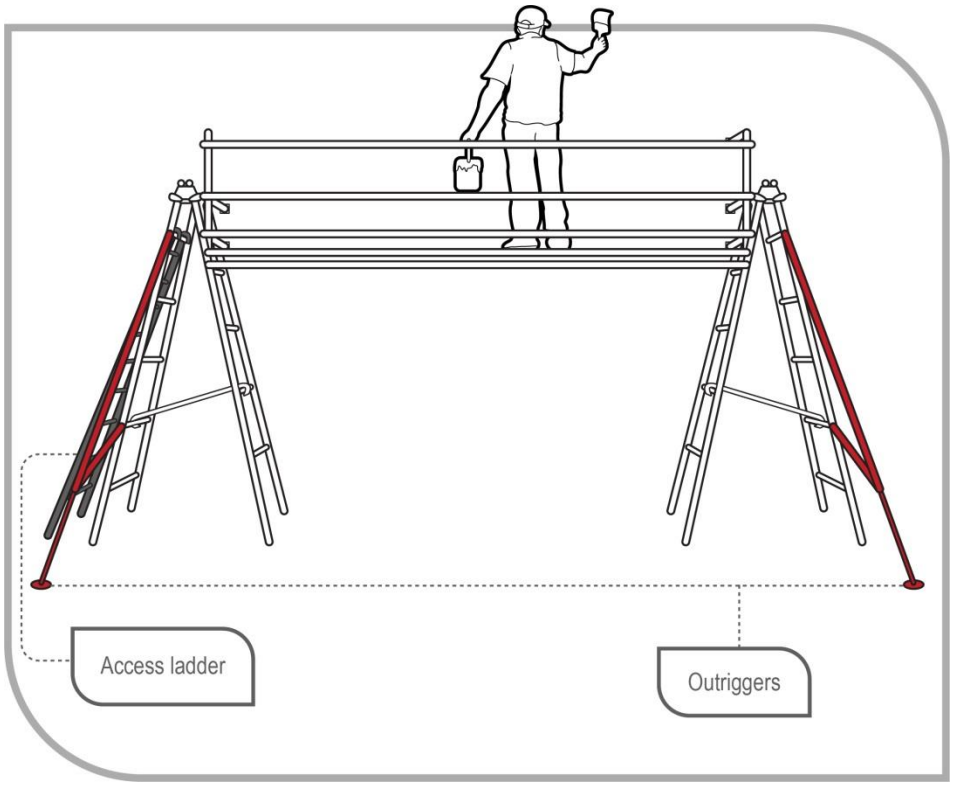

Figure 17 Trestle ladder scaffold with guard rails and outriggers for stability

5.2. Perimeter guardrails

Guardrails may be used to provide effective fall prevention:

- at the edges of roofs
- at the edges of mezzanine floors, walkways, stairways, ramps and landings
- on top of plant and structures where access is required (see Figure 18)
- around openings in floor and roof structures
- at the edges of shafts, pits and other excavations.

Guardrails should incorporate a top rail 900 mm to 1100 mm above the working surface, a mid-rail and a toe-board.

The guardrail system, method of attachment and the supporting structure should be capable of withstanding the loads that will be applied.

The required load resistance will depend on the momentum of a falling person. For example, the momentum of a person falling from a pitched roof will increase as the pitch, that is, the angle, of the roof increases.

Further information is contained in AS/NZS 4994 (set)[2]: Temporary edge protection.

The WHS Regulation sets out requirements on the use of edge protection in construction work.

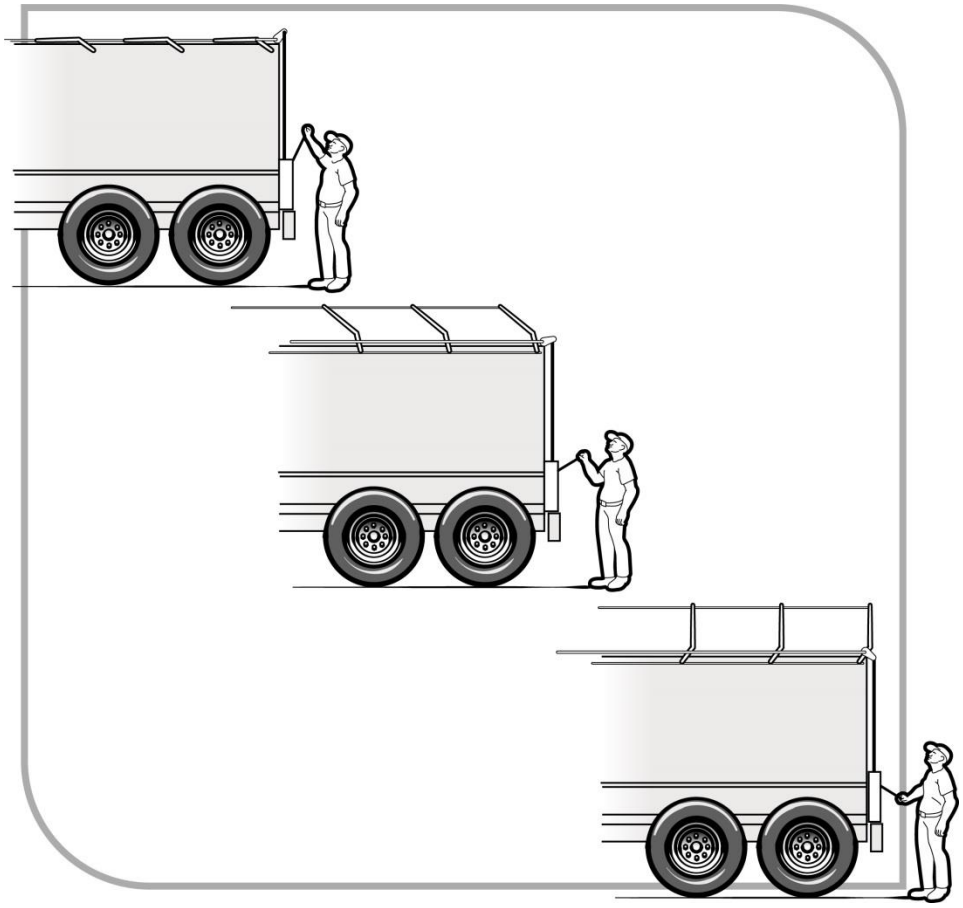

Figure 18 Guardrails installed on top of a tanker to enable safe access to tank hatches

Guardrails for trenching work

Where trenching works present a risk of a person falling into the trench, any such risk should be controlled by the provision of:

- guardrailing, including guardrails fitted to the top edges of trench shields, or
- a barrier approximately 1.5 metres back from the excavation, to prevent persons approaching the trench.

[2] *AS/NZS 4994 (set):* Temporary edge protection *includes AS/NZS 4994.1::* Temporary edge protection – General requirements*; AS/NZS 4994.2:* Temporary edge protection – Roof edge protection – Installation and dismantling*; AS/NZS 4994.3:* Temporary edge protection – Installation and dismantling for edges other than roof edges*; AS/NZS 4994.4:* Temporary edge protection – Perimeter protection screens.

5.3. Safety mesh

Safety mesh is designed to prevent internal falls through a roof. If securely fixed, safety mesh provides fall protection for roof installers and offers long-term protection against falling for maintenance and repair workers.

Safety mesh does not prevent falls from the edge of a roof or through holes in a roof so it should always be used in conjunction with other types of fall prevention devices such as edge protection (e.g. guardrails), or other control measures such as fall arrest systems.

Safety mesh should comply with AS/NZS 4389: Roof safety mesh, which specifies the minimum requirements for the design, construction, testing and installation of safety mesh for use in domestic, commercial and industrial building applications.

The mesh should be formed from 2 mm diameter wire, welded into a mesh with the longitudinal wires not more than 150 mm apart and the cross wires not more than 300 mm apart. Transverse wires should have a 450 MPa minimum tensile strength and longitudinal wires a 500 MPa minimum tensile strength.

Safety mesh should be installed by competent people in accordance with the manufacturer's instructions. Workers installing roof safety mesh must be protected against the risk of falling by using control measures like scaffolding, EWPs or fall arrest systems. The appropriate control measure will depend on what is reasonably practicable in the circumstances.

Particular care is required to ensure that the mesh is securely connected to the structure and the overlap between adjacent sections of mesh is sufficient to generate the necessary strength to resist the force of a person falling onto it. The safety mesh should be covered by the roof cladding as soon as is reasonably practicable after it has been installed.

6. Work positioning systems

A ‘work positioning system’ includes any plant or structure, other than a temporary work platform, that enables a person to be positioned and safely supported at a location in such a way that a fall is prevented.

The use of work positioning systems must only be considered if it is not reasonably practicable to carry out work on the ground or on a solid construction, or by providing a fall prevention device as detailed in Chapter 5, for example an elevating work platform (EWP).

Work positioning systems require a high level of competency on the part of the user and supervisors to ensure safe use. Users, including supervisors, should undertake a relevant competency based course of training before using a work positioning system.

Users should be competent in the technique and possess a suitable attitude for working at height, including a responsible attitude to safety.

Operators should be fit to perform the work and not be affected by alcohol or drugs including prescribed medication which may affect or impair their ability to work at height.

6.1. Restraint technique

A restraint technique controls a person’s movement by physically preventing the person from reaching a position at which there is a risk of a fall. It consists of a harness that is connected by a lanyard to an anchorage or horizontal lifeline. It must be set up to prevent the wearer from reaching an unprotected edge—see Figure 19.

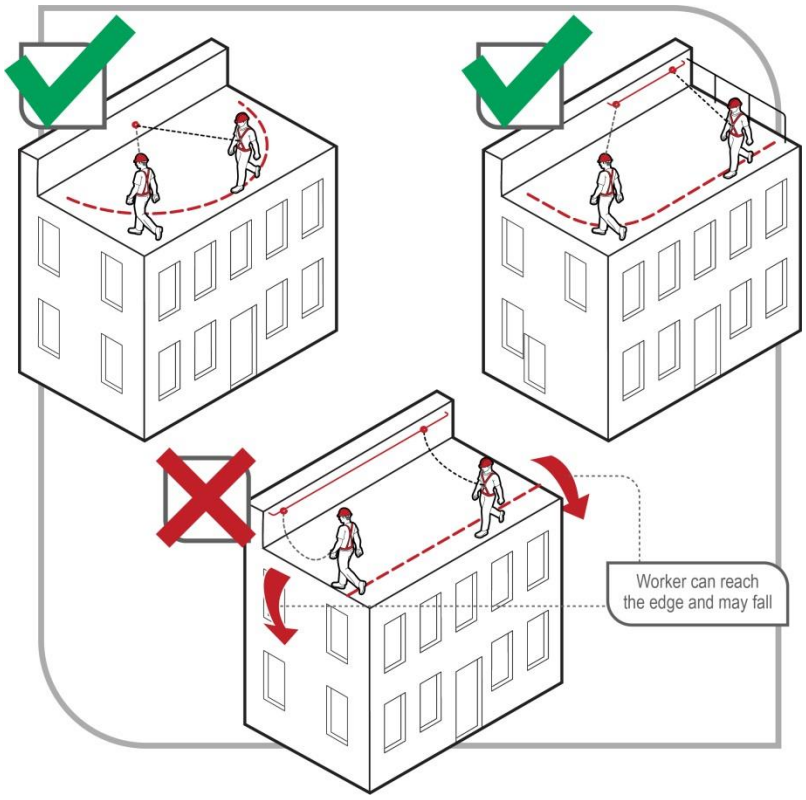

Figure 19 Restraint technique options

A restraint technique is suitable for use where:

- the user can maintain secure footing without having to tension the restraint line and without the aid of another handhold or lateral support. When deciding whether secure footing can be maintained, consider:
- the slope of the surface
- the supporting material type
- the texture of the surface and whether it is likely to be wet, oily or otherwise slippery.

Restraint techniques must only be used if it is not reasonably practicable to prevent falls by carrying out work on the ground or on a solid construction, or by minimising the risk using a fall prevention device, such as providing a physical barrier, for example a guardrail.

A restraint system should be installed by a competent person in accordance with the manufacturer's instructions. Restraint anchorage should be designed for fall arrest loading.

A purpose-designed roof anchor, when used in accordance with the designer's or manufacturer's/supplier's instructions, may be used as part of the restraint technique on metal deck or tiled roofs.

Where it is not reasonably practicable to provide a work positioning system such as a restraint technique, as a person conducting a business or undertaking (PCBU), you must provide a fall arrest system, so far as is reasonably practicable. Situations where it may not be reasonably practicable to use a restraint technique include when:

- the user can reach a position where a fall is possible
- the user has a restraint line that can be adjusted in length so that a free fall position can be reached
- there is a danger the user may fall through the surface, for example fragile roofing material
- the slope is over 15 degrees
- there is any other reasonably likely use or misuse of the system that could lead to a free fall.

In these circumstances it may be more appropriate to use an individual fall arrest system.

6.2. Industrial rope access systems

Industrial rope access systems are used for gaining access to and working at a workface, usually by means of vertically suspended ropes. Although fall arrest components are used in the industrial rope access system, the main purpose of the system is to gain access to a work area rather than to provide backup fall protection (see Figure 20).

Other methods of accessing a workface, for example EWPs or building maintenance units, must be considered before industrial rope access systems.

Before using an industrial rope access system, a risk assessment should be carried out that, amongst other things, considers the location of the work and any associated special features of the structure, anchor points, emergency access and weather conditions.

The use of industrial rope access systems is considered high risk construction work if it involves construction work where there is a risk of a person falling more than 2 metres. The WHS Regulation requires that high risk construction work must not be carried out unless a safe work method statement (SWMS) is prepared for the work. Some of the information contained within the risk assessment can be used in the SWMS.

Where it is necessary for industrial rope access systems to be used, you should ensure:

- rope access work is properly supervised—supervisors of rope access work should have the necessary experience and competence to supervise the rope access work and any potential rescue for each rope access project under their supervision
- operators are competent in the technique and possess a suitable attitude for working at height, including a responsible attitude to safety

- operators should be fit to perform the work and not affected by alcohol or drugs including prescribed medication which may affect or impair their ability to work at height
- operators do not work alone in case they require assistance in an emergency
- when using an industrial rope access system, personal protective equipment (PPE) appropriate for the tasks being undertaken is used, for example helmets, gloves, hearing protection, goggles or masks.

Where industrial rope access systems are used, you should also ensure:

- industrial rope access systems are installed in a location where it is possible to provide prompt assistance or rescue if required (see Chapter 10)
- equipment is checked regularly by a competent person
- fixed anchorage points are checked by a competent person before attaching the rope access lines
- a back-up system is used to protect the operator, for example use two independently anchored ropes for each person
- a person within 3 metres of an unguarded edge is adequately secured
- operators wear a full body or work positioning sit harness with shoulder straps
- supervisors can communicate with workers
- exclusion zones that exclude and alert the public that industrial rope access systems are in use are established and enforced on access areas below the working area and anchorage locations.

Further information on industrial rope access systems is available in AS/NZS 4488: (set)[3]: Industrial rope access systems.

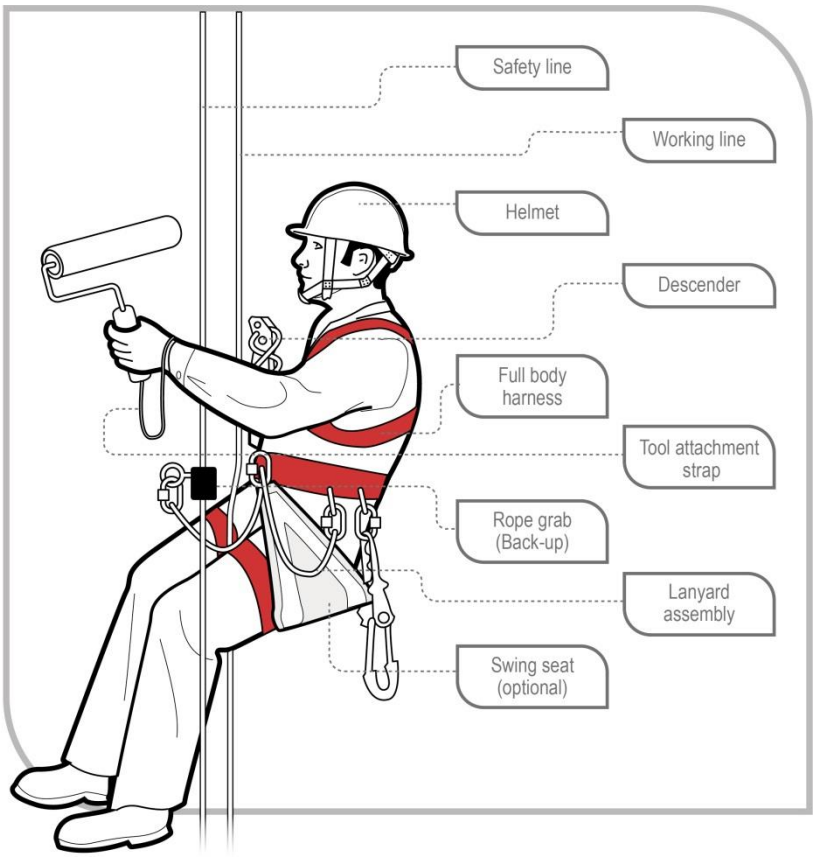

Figure 20 Operator using a descender in an industrial rope access system

[3] *AS/NZS 4488 (set):* Industrial rope access systems *includes AS/NZS 4488.1:* Industrial rope access systems – Specifications*; AS/NZS 4488.1/Amdt 1* Industrial rope access systems – Specifications*; AS/NZS 4488.2:* Industrial rope access systems – Selection, use and maintenance.

7. Fall arrest systems

Fall arrest systems, such as catch platforms, safety nets and individual fall arrest systems (including anchorage lines or rails), are intended to safely stop a worker falling an uncontrolled distance and reduce the impact of the fall. These systems must only be used if it is not reasonably practicable to use a fall prevention device or work positioning system or if these higher level controls might not be fully effective in preventing a fall on their own.

Equipment used for individual fall arrest systems should be designed, manufactured, selected and used in compliance with AS/NZS 1891(set)[4]: Industrial fall-arrest systems and devices.

When using fall arrest systems, the following key safety measures should be observed:

- fall arrest equipment is selected, installed and used correctly. Workers should be trained in the use of fall arrest equipment
- the equipment and anchorages are designed, manufactured and installed to be capable of withstanding the force applied to them as a result of a person's fall
- the system is designed and installed so that the person travels the shortest possible distance before having the fall stopped
- the WHS Regulation sets out requirements on the use of fall arrest harness systems in construction work.

7.1. Catch platforms

A catch platform is a temporary platform located below a work area to catch a worker in a fall. The platform should be of robust construction and designed to withstand the maximum potential impact load. Scaffolding components may be used to construct fixed and mobile catch platforms.

Catch platforms that include the use of a cantilevered, spur or tube and coupler scaffolding system must be installed by people who:

- hold a high risk work licence for intermediate or advanced scaffolding, or
- are enrolled in a training course to obtain an intermediate or advanced scaffolding high risk work licence and are being supervised by the holder of an intermediate or advanced scaffolding high risk work licence.

Catch platforms installed on prefabricated scaffolding systems from which a person or object could fall more than 4 metres must be installed by people who:

- hold a high risk work licence for basic scaffolding, or
- are enrolled in a training course to obtain a basic scaffolding high risk work licence and are being supervised by the holder of a basic scaffolding high risk work licence.

Catch platforms should:

- incorporate a fully planked-out deck
- be positioned so the deck extends at least 2 metres beyond unprotected edges of the work area, except where extended guardrailing is fitted to the catch platform
- be positioned as close as possible to the underside of the work area—the distance a person could fall before landing on the catch platform should be no more than 1 metre
- always be used with edge protection.

The WHS Regulation sets out requirements on the use of catch platforms in construction work.

[4] *AS/NZS 1891 (set):* Industrial fall-arrest systems and devices *includes AS/NZS 1891.1:* Industrial fall-arrest systems and devices – Harnesses and ancillary equipment*; AS/NZS 1891.1:/Amdt 1*: Industrial fall-arrest systems and devices – Harnesses and ancillary equipment*; AS/NZS 1891.1:/Amdt 2*: Industrial fall-arrest systems and devices – Harnesses and ancillary equipment*; AS/NZS 1891.2*:: Industrial fall-arrest systems and devices – Horizontal lifeline and rail systems*; AS/NZS 1891.2 Supp 1*:: Industrial fall-arrest systems and devices – Horizontal lifeline and rail systems – Prescribed configurations for horizontal lifelines*; AS/NZS 1891.3*:: Industrial fall-arrest systems and devices – Fall-arrest devices*; AS/NZS 1891.4*:: Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance.

7.2. Safety nets

Safety nets can provide a satisfactory means of protection while allowing workers maximum freedom of movement. They should not be used to enter or exit a work area or as a working platform.

Safety nets used in conjunction with basic rigging or scaffolding work must be erected and serviced by people who:

- hold a high risk work licence for Basic Rigging or Basic Scaffolding, or
- are enrolled in a training course to obtain a Basic Rigging or Basic Scaffolding high risk work licence and are supervised by the holder of a Basic Rigging or Basic Scaffolding high risk work licence.

When safety nets are used they should be:

- constructed of material strong enough to catch a falling person or thing
- securely anchored before work starts
- hung as close as is practicable to the underside of the working area, but no more than 2 metres below the working area
- sufficiently tensioned and have clearance to prevent a falling person contacting any surface or structure below the net
- inspected, particularly after installation, relocation or repair
- stored correctly in dry, shaded areas with good air circulation.

Other precautions when using safety nets include:

- no hot work like welding, oxy cutting, or any other work that may damage the safety net, should be performed above safety nets
- material and other refuse should not be allowed to accumulate in safety nets.

7.3. Individual fall arrest systems

Individual fall arrest systems consist of some or all of the following components:

- anchorages including rail system
- lifelines, lanyard, shock absorber and inertia reel
- rope and wire grabs
- harness
- snap hooks and karabiners—double or triple action to prevent rollout
- rescue equipment.

Individual fall arrest systems rely on workers wearing and using them correctly, therefore workers who will use such a system must be trained in its safe use. Users of individual fall arrest systems should possess a suitable attitude for working at height, including a responsible attitude to safety.

Workers using a fall arrest system should wear appropriate head protection to protect them in a fall.

- If the equipment has been used to arrest a fall, it should not be used again until it has been inspected and certified by a competent person as safe to use.
- Individual fall arrest systems must only be used where it is not reasonably practicable to use higher level control measures.

Individual fall arrest equipment should be permanently marked or labelled with relevant information aimed at reducing misuse of the equipment.

Fall arrest lines can fail if they come into contact with an edge. Fall arrest lines that can come into contact with edges such as concrete or steel beam edges should be of a type that has been shown to not fail during such use.

Anchorage points

Each anchorage point should comply with the anchor strength specified in AS/NZS 1891:4:2009: Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance.

Insert-type anchors, that is anchors installed in partial depth holes in concrete or other masonry, including friction, chemical and screw type anchors, should not be used for fall arrest anchors where the potential loading is a direct pull-out load.

Anchorages should be tested and approved by a competent person before use. For insert-type anchors this should include pull-out testing as the grip on the concrete below the surface cannot be assessed by a visual inspection.

Each anchorage point should be located so that a lanyard of the system can be attached to it before the person using the system moves into a position where they could fall.

Inspecting the system components

Each component of the individual fall arrest system should be inspected by a competent person:

- after it is installed but before it is used
- at regular intervals
- immediately after it has been used to arrest a fall.

Inspection of components should be conducted in accordance with the manufacturer's specifications and the relevant standards. If signs of excessive wear or other defects are found during the inspection those components should be withdrawn from use.

Limiting free fall distance

Harness-based fall arrest systems should be installed so that the maximum distance a person would free fall before the fall arrest system takes effect is 2 metres, although a lesser free fall distance is preferable. There should be sufficient distance between the work surface and any surface below to enable the system, including the action of any shock absorber, to fully deploy (see Figure 21). To work out whether there is enough distance available you should take into account:

- the worker's height
- the height and position of the anchorage point
- the length of the lanyard
- any slack in the horizontal lifeline
- any stretching of the lanyard or horizontal lifeline when extended by a fall
- the length of the energy absorber when extended by a fall.

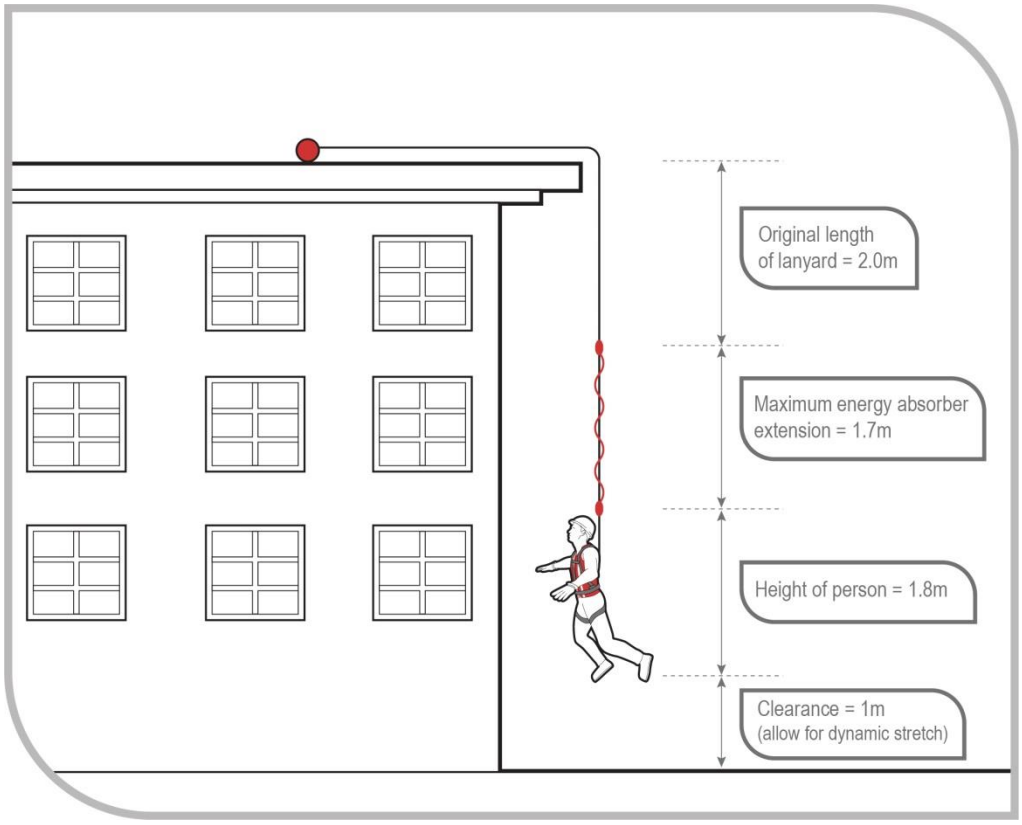

Figure 21 Total fall distance before this particular configuration would be effective in arresting a fall is 6.5 m

Do not use lanyards in conjunction with inertia reels as this can result in an excessive amount of free fall before the fall is arrested.

Harnesses

Full body harness should be worn and must be correctly fitted. Workers should connect the fall arrest line to the attachment point on their harness—dorsal attachment point or the chest connection—that will provide the best protection for the situation. Consideration should be given to the potential fall distance, potential impact with the structure, body position after a fall and the need to interact with equipment like rope-grabs.

Maintaining a minimum of slack in fall arrest lanyard

There should be a minimum of slack in the fall arrest lanyard between the user and the attachment. The anchorage point should be as high as the equipment permits. Work should be avoided above the anchor point, as this will increase the free fall distance in a fall, resulting in higher forces on the body and greater likelihood of the lanyard snagging on obstructions.

Use inertia reels correctly

The use of inertia reels may not be effective in certain situations. For example, if a worker falls down the inclined surface of a steeply pitched roof, the inertia reel line may keep extending from the reel as it may not lock.

Inertia reels should not be used as working supports (by locking the system and allowing it to support the user) during normal work as they are not designed for continuous support.

Inertia reels can be used as a control measure in connection with work carried out from bosun's chairs and ladders. Where such lines are used, only one person may be attached to one line.

Using compatible components

The use of non-compatible components may lead to 'roll-out' with some hook and karabiner configurations, resulting in injury or death to the user. The hazard cannot always be avoided by using components produced by the same manufacturer under the one brand name. If you are unsure

whether components of a fall arrest system are compatible you should contact the manufacturer for further information.

Snap hooks should be the double action type that requires at least two consecutive deliberate actions to open. Snap hooks should not be connected to each other as this could prevent the safe operation of the snap hook, for example roll-out may occur. Some double action hooks are susceptible to roll-out. Hex nut connectors may be appropriate for semi-permanent connections.

Further information is in AS/NZS 1891 (set): Industrial fall-arrest systems and devices series (details above).

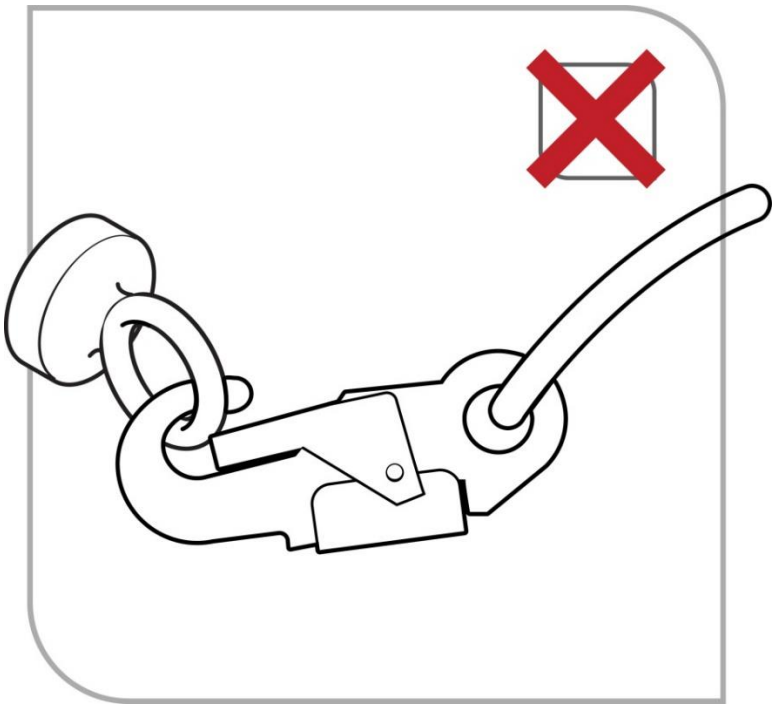

Figure 22 Roll-out on a small diameter eyebolt

Ensuring prompt rescue in event of fall

A PCBU who implements a fall arrest system as a control measure must establish emergency and rescue procedures. The emergency and rescue procedures must be tested to ensure that they are effective, and workers must be provided with suitable and adequate information, training and instruction in relation to the emergency procedures.

The rescue of a worker who is suspended in a full body harness should occur promptly to prevent suspension intolerance and to treat any injuries sustained during the fall and fall arrest.

A worker should not use a fall arrest system unless there is at least one other person on the site who can rescue them if they fall.

Individual fall arrest system: hazards

If a person using an individual fall arrest system falls, the system may act as a pendulum, and in some situations the user may hit the ground, which is called ‘swing down’ (see Figure 23), or swing back into the building or structure, which is called ‘swing back’ (see Figure 24).

‘Swing down’ can occur if the lanyard slides back along the perimeter edge of the roof until it is vertical. When this happens, the person may hit the ground or the lanyard may break as a result of its contact with the edge of the roof. Measures to address the risk of ‘swing down’ include:

- the installation of guardrails
- placing the anchorage point at a right angle to the position of the lanyard at the perimeter edge, for example by using a mobile anchorage
- the installation of a second anchorage point and belay devices—intermediate anchorages.

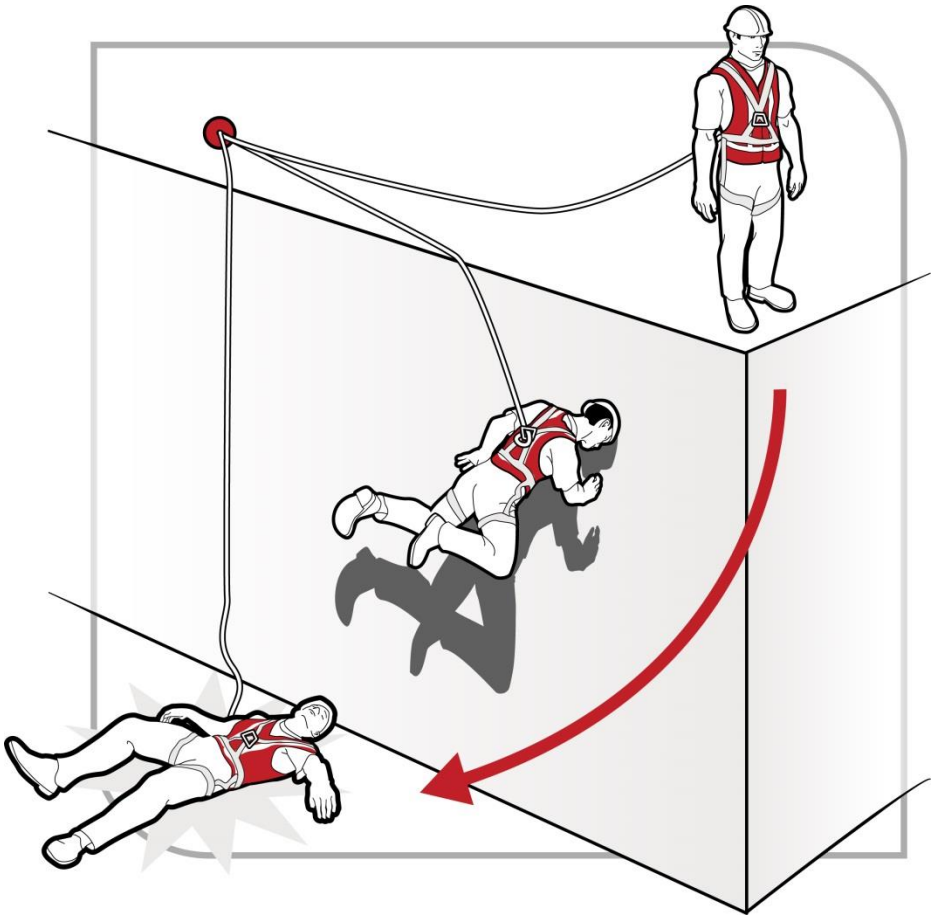

Figure 23 ‘Swing down’: the length of the lanyard and positioning of the anchor allow contact with the ground

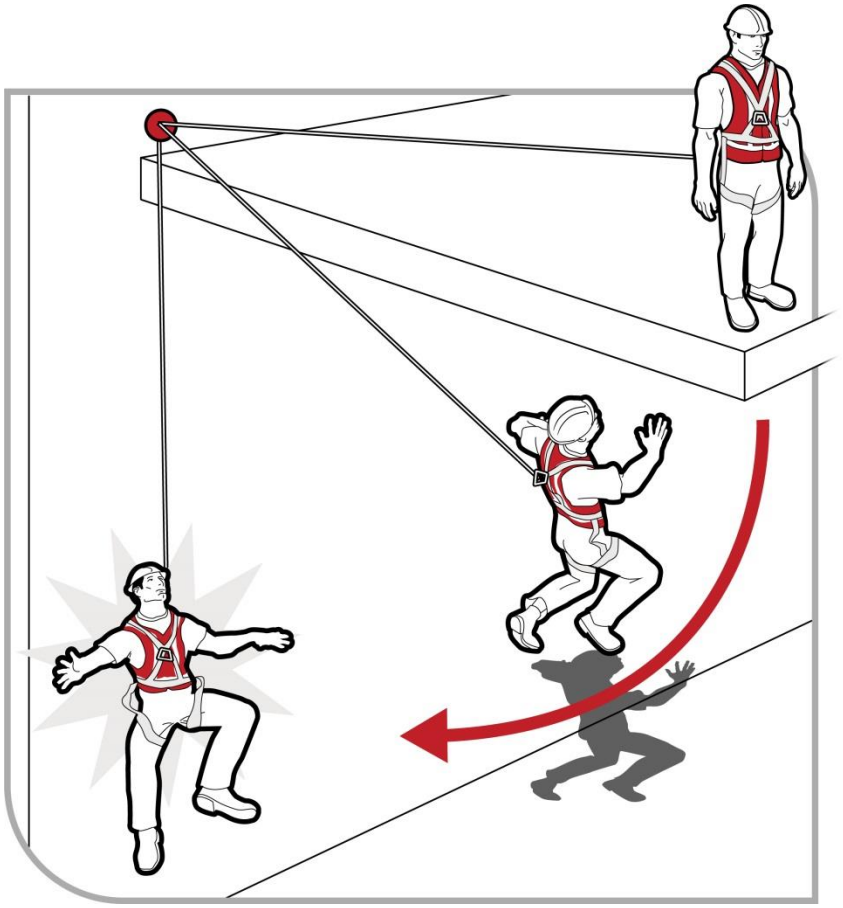

Figure 24 During ‘swing back’ the length of the lanyard and positioning of the anchor may allow the worker to hit the structure

7.4. Vertical anchorage lines or rails

Vertical anchorage lines or rails are temporary or permanent fall arrest systems which can be installed to provide continuous fall protection for workers using ladders or climbing towers. These can be used on plant like tower cranes as well as on buildings and structures.

With an anchorage line system, the person climbing has continuous fall protection by being attached to the anchorage line and harness.

Safety precautions when using vertical anchorage lines or rails include ensuring:

- systems comply with AS/NZS 1891 (set): Industrial fall-arrest systems and devices, including a suitable harness for the task and checking that the use by date has not passed
- the locking device is attached to the frontal attachment point of the harness and the lanyard assembly is a maximum of 300 mm length
- the point of connection onto the anchorage system is near the base of the ladder to allow the connection to be made before beginning to ascend and also to provide continuous connection to the disconnecting point when at a safe higher level
- free fall is limited to a maximum of 600 mm
- permanent systems are of wire or rail construction and are installed according to the manufacturer’s instructions.

After a fall, you should remove the system from service and have it inspected by a competent person before it is used again.

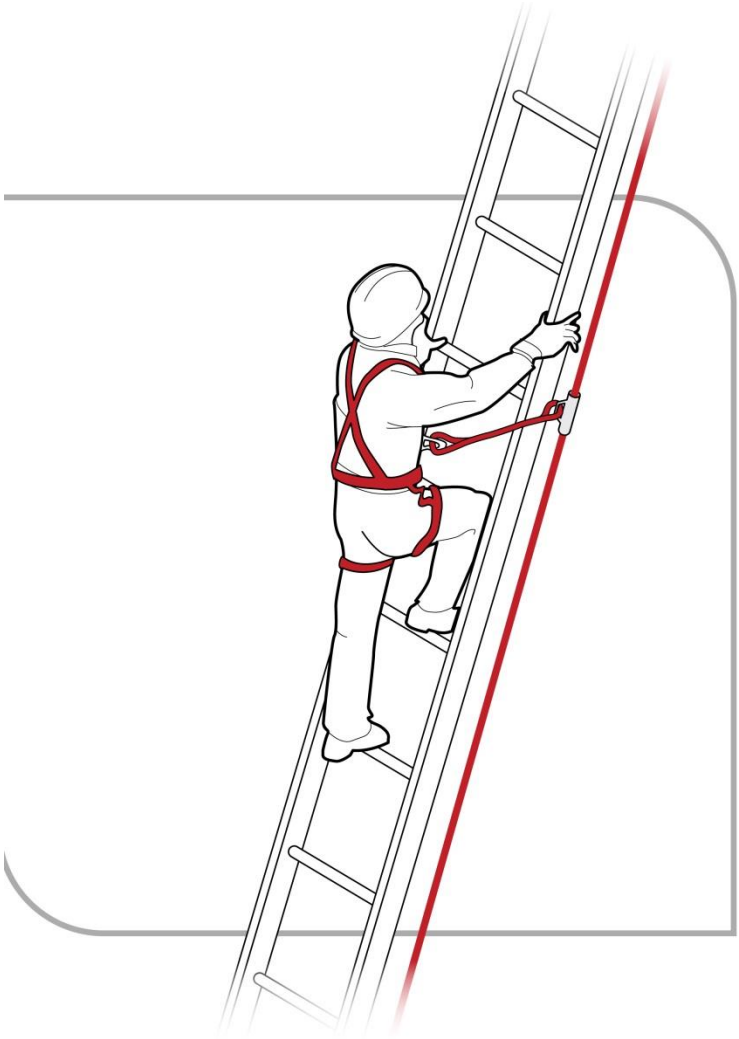

Figure 25 Anchorage line system

7.5. Double lanyards

An alternative to anchorage lines or rails is the use of a double lanyard—also known as a twin tail or ‘Y’ lanyard. Double lanyards should include double action connectors to prevent unintentional opening during use. Figure 26 shows how the use of a double lanyard means that the person climbing can always be connected to the ladder or structure.

However, double lanyards are easy to misuse—there should be no back hooking; they should not be wrapped around the body or passed between the legs; the chest connection should never be higher than the highest attachment point; they are not suitable for frequent use because of possible misuse or muscle injury; and the ladder or structure points must be capable of arresting forces generated by a fall with the double lanyard. Training should also be provided on their use.

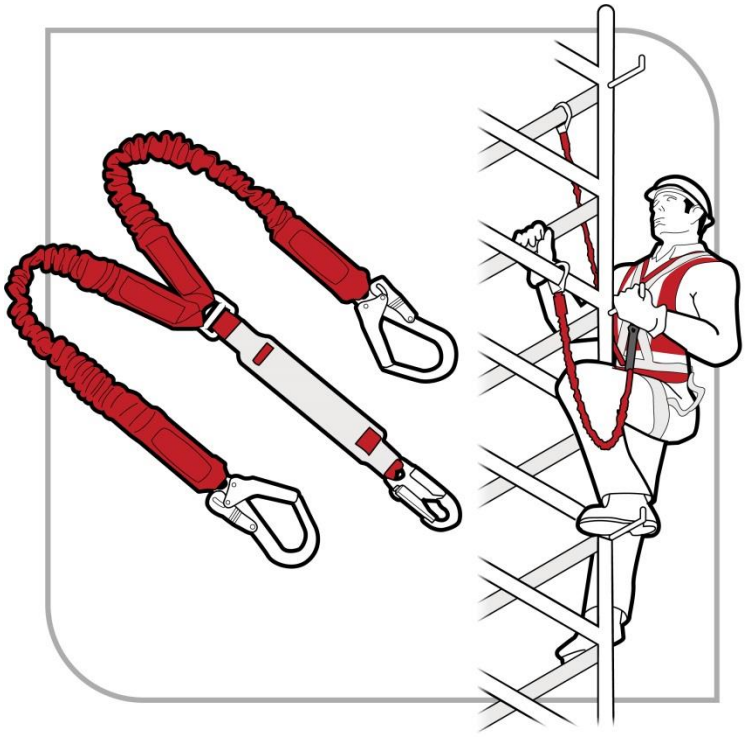

Figure 26 An example of a double lanyard

It is noted that in the application shown in Figure 26 the connectors will slide down to the lowest point on the rail and likely be subject to side loading. Side loading can be controlled by using soft connections like slings or the use of hooks rated to withstand side loading.

8. Administrative controls

Administrative controls may be used to support other control measures and may include ‘no go’ areas, permit systems and the sequencing of work. You must not use administrative controls exclusively to minimise the risk of falls unless it is not reasonably practicable to use a higher order control.

If relying on administrative controls, it may be necessary to provide a high level of supervision to ensure that they are being adhered to.

8.1. No go areas

No go areas can be an effective method of making sure people are not exposed to hazards like falls or being hit by a falling object. They require clear signs warning people not to access the hazardous area. They can be used to highlight the risks of entry to an area where there is an unguarded hazard, or to areas where work is being carried out overhead and there is a risk of falling objects.

Information and instruction should be provided about no go areas, with supervision to ensure that no unauthorised worker enters the no go area.

Barriers should be used in conjunction with signs to cordon off areas where there is a risk of falling or being hit by falling objects. They should be highly visible and securely fixed to prevent displacement.

Figure 27 No go area sign

8.2. Permit systems

Permit systems allow only competent people trained in the use of relevant control measures to work in an area where there is a hazard. Examples include:

- tagging access points to a scaffold with ‘only licensed scaffolders permitted on an incomplete scaffold’ to restrict unauthorised access during erection and dismantling
- requiring permits for access to areas where restraint systems or fall arrest systems are to be used.

8.3. Organising and sequencing of work

Work should be organised so that people do not interfere with other workers or increase the risk to themselves or others. For example, you can sequence jobs so that different trades are not working above or below each other at the same time. Plan so the work is not carried out for extended periods from a ladder, or so that work at height is minimised in extremely hot or cold weather.

9. Ladders

Falls from ladders have resulted in a significant number of serious and fatal injuries, even when working at relatively low heights. While ladders are often considered to be the first option when working at heights, they should only be considered after safer alternatives, for example elevating work platforms (EWPs) or scaffolding, have been considered first and found to be not reasonably practicable.

The WHS Regulation sets out requirements on the use of ladders in construction work.

9.1. Portable ladders

Extension or single ladders should only be used as a means of access to or exit from a work area or for short duration light work that can be carried out safely from the ladder.

Selecting ladders

Ladders should be selected to suit the work to be carried out. In doing this, you should consider the duration of the work, the physical surroundings of where the work is to be carried out and the prevailing weather conditions.

Depending on the specific task and how it is carried out, step platforms (see Figure 28) should provide an improved level of fall protection over traditional step or single ladders as they include a small working platform and a partial handrail.

Ladders should have a load rating of at least 120 kg and be manufactured for industrial use. Domestic or ‘homemade’ ladders should not be selected for industrial use or for use on construction sites.

Figure 28 A step platform can provide a stable work surface

Using ladders safely

Workers must be provided with information and training on how to use ladders safely. You should only use a ladder if you have been trained in how to inspect, set up and use ladders correctly.

Positioning and setting up ladders

Before setting up a ladder, it should be inspected for visible damage or faults, for example broken rungs, stiles and footings. Faulty or damaged ladders must be removed from service.

When setting up a ladder you should check that:

- the ladder is the correct height for the work to avoid over-reaching or stretching
- locking devices on the ladder are secure
- the ladder is not placed so that the weight of the ladder and any person using the ladder is supported by the rungs.

Ladders used at a workplace should be set up on a solid and stable surface, and to prevent the ladder from slipping. Single and extension ladders can be prevented from slipping by:

- ensuring the ladder has non-slip feet
- placing ladders at a slope of 4:1 (the distance between the ladder base and the supporting structure should be about 1 metre for every 4 metres of working ladder height)
- securing ladders at the top or bottom, or if necessary, at both ends (see Figure 29).

Stepladders should be set up in the fully opened position and may require a second person to ‘foot’ the ladder for added stability.

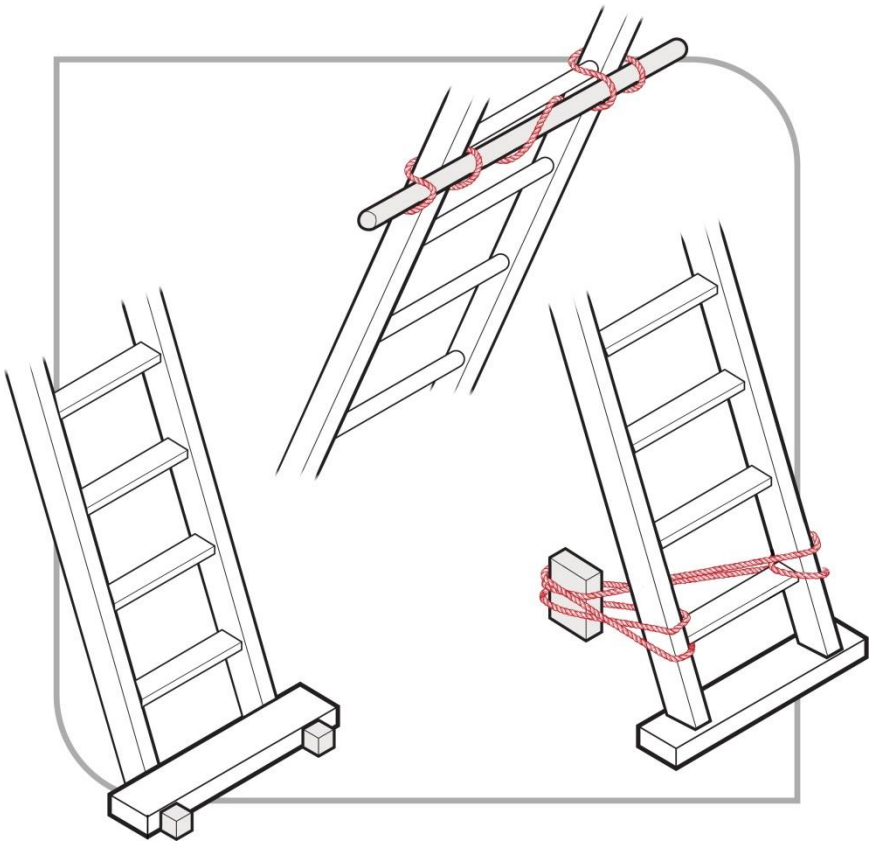

Figure 29 Examples effectively securing a ladder

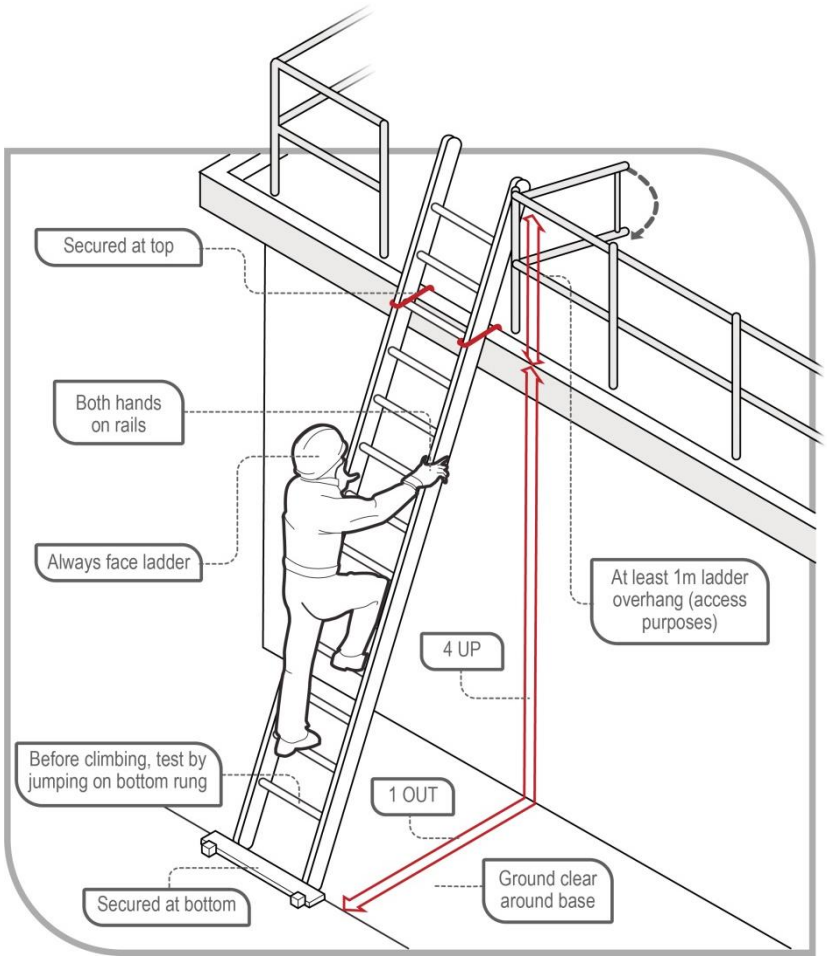

Figure 30 Example of acceptable ladder use

Safe use of ladders

When using a ladder:

- always maintain ‘three points of contact’ as follows:
  - when going up or down a ladder, always have two feet and one hand, or one foot and two hands, on the ladder
  - when working from a ladder, have two feet and one other point of contact with the ladder, such as a hand or thighs leaning against the ladder
  - use a tool belt or side pouch so that materials or tools are not carried in the hands while climbing the ladder
  - ensure only light duty work is carried out while on the ladder, where tools can be operated safely with one hand
  - make sure that no-one works underneath the ladder
  - do not allow anyone else on the ladder at the same time
  - do not straddle the ladder
  - wear slip-resistant footwear.

When using ladders it is not safe to:

- use metal or metal reinforced ladders when working on live electrical installations, or
- carry out ‘hot’ work like arc welding or oxy cutting.

Except where additional fall protection equipment is used in conjunction with the ladder, it is not safe to:

- use a stepladder near the edge of an open floor, penetration or beside a railing
- over-reach—the centre of the torso should be within the ladder stiles throughout the work

- use power or hand tools requiring two hands to operate, for example concrete cutting saws and circular saws
- use tools that require a high degree of leverage force which, if released, may cause the user to over-balance or fall from the ladder, for example stillsons or pinch bars
- face away from the ladder when going up or down, or when working from it
- stand on a rung closer than 900 mm to the top of a single or extension ladder, or
- stand higher than the second tread below the top plate of a stepladder with the exception of three-rung stepladders, unless working through an overhead opening of the building or structure that provides appropriate additional support above the ladder.

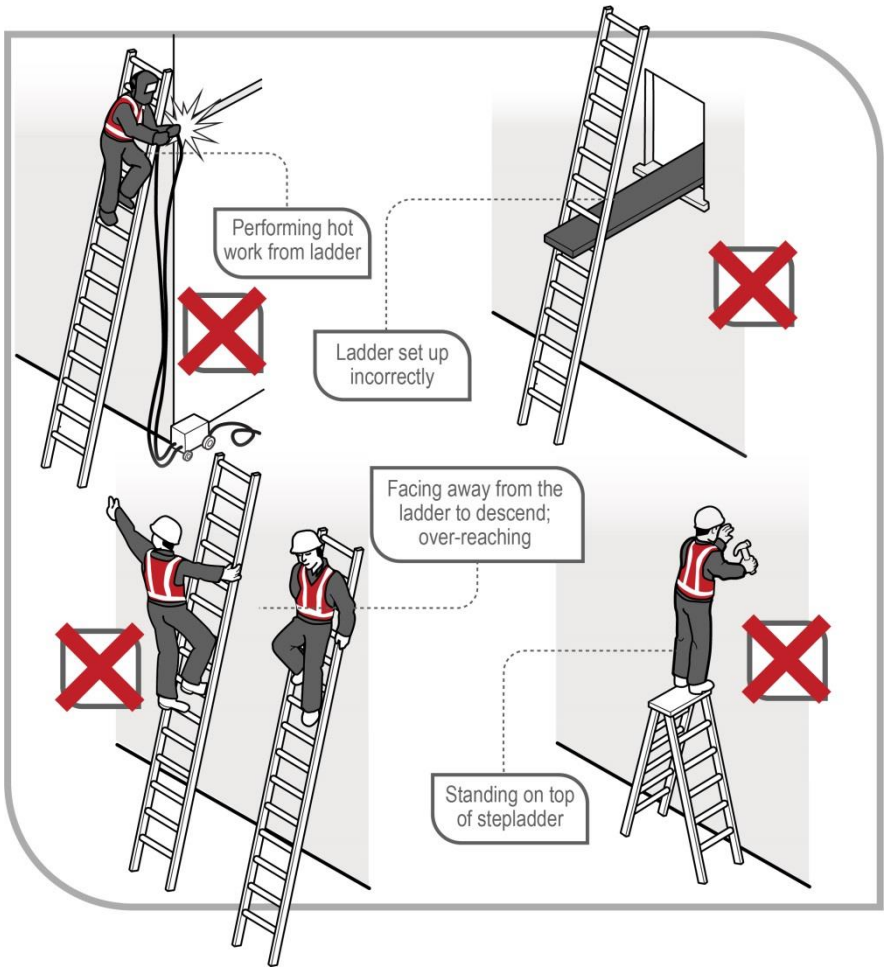

Figure 31 Examples of unsafe ladder use

Ladder use in the following situations should only be carried out with additional safety precautions in place:

- in access areas or doorways—if necessary, erect a barrier or lock the door shut
- next to powerlines, unless the worker is trained and authorised and the correct ladder for the work is being used
- in very wet or windy conditions
- next to traffic areas, unless the working area is barricaded.

Where single or extension ladders are used for entry and exit, you should check that:

- there is a firm, stable work platform, free from obstructions, to step onto from the ladder
- the ladder is securely fixed
- the ladder extends at least 1 metre above the stepping-off point on the working platform
- fall protection is provided at the stepping-off point where people access the working platform.

As an alternative to using ladders as a means of access in stairwells, you should consider having the staircase installed as soon as possible.

Further information on the selection, safe use and care of portable ladders is set out in AS/NZS 1892 (set)[5]: Portable ladders.

The ladder manufacturer's recommendations on safe use should also be followed.

9.2. Fixed ladders

Fixed ladders should be installed in accordance with AS 1657: Fixed platforms, walkways, stairways and ladders – Design, construction and installation.

Ladder cages on vertical fixed ladders, that is, over 75 degrees to the horizontal, do not stop a fall but simply funnel a fall and, in some cases, more injuries can occur from striking the protective backguards on the way down. The cages may also hinder rescues. Therefore, fixed ladders with angles exceeding 75 degrees to the horizontal should be fitted with a permanent or temporary fall arrest system using anchorage lines or rails.

The ladder's angle of slope should not be less than 70 degrees to the horizontal and not greater than 75 degrees to the horizontal. In no case should the ladder overhang the person climbing the ladder. If the angle is more than 75 degrees, a safe system of work to prevent falls should be provided, for example a permanent fall arrest system or a full body harness with double lanyard.

A specifically designed rescue procedure should be developed for use in ladder cage situations. Training in rescue procedures should occur before using the fixed ladder.

[5] *AS/NZS 1892 (set):* Portable ladders *includes AS/NZS 1892.1:* Portable ladders – Metal*; AS 1892.2–*: Portable ladders – Timber*; AS/NZS 1892.3:* Portable ladders – Reinforced plastic*; AS/NZS 1892.5:* Portable ladders – Selection, safe use and care.

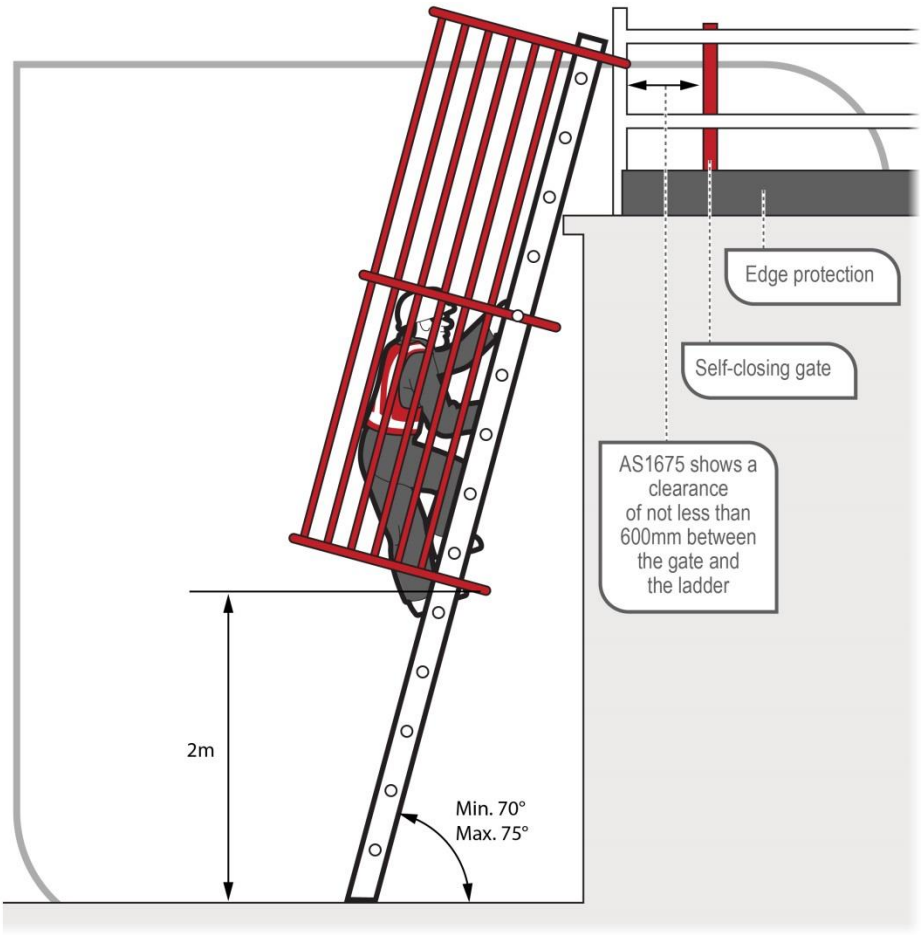

Figure 32 Fixed ladder with ladder cage

9.3. Ladder maintenance

Ladders should be regularly inspected by a competent person in accordance with the manufacturer's recommendations. Ladders with any of the following faults should be replaced or repaired:

- fibreglass stiles cracked, chipped or severely faded with fibres exposed
- timber stiles warped, splintered, cracked or bruised
- metal stiles twisted, bent, kinked, crushed or with cracked welds
- rungs, steps, treads or top plates that are missing, worn, damaged or loose
- tie rods missing, broken or loose
- ropes, braces or brackets that are missing, broken or worn
- timber members that are covered with opaque paint or other treatment that could disguise faults in the timber
- missing, loose, bent or worn fasteners, that is rivets, bolts and pins, and/or
- worn or damaged feet including non-slip material.

10. Emergency procedures for falls

Whenever there are risks from working at height, emergency procedures must be established and first aid equipment provided. Typical injuries from falls can include unconsciousness, blocked airway, impalement, serious head or abdominal injuries and fractures. A person using a fall arrest system could also suffer suspension intolerance as a result of being suspended in a harness after a fall.

WHS Regulation section 80

Emergency and rescue procedures

A person conducting a business or undertaking (PCBU) who provides a fall arrest system as a measure to control risk must establish emergency and rescue procedures.

The procedures must be tested so that they are effective. Workers must be provided with suitable and adequate information, instruction and training in relation to the emergency procedures.

When developing emergency procedures, the different types of emergency and rescue scenarios that might arise should be considered. Information from the risk assessment will help in this task.

WHS Regulation section 42

Duty to provide first aid

You must ensure that workers have access to first aid equipment and facilities for the administration of first aid. You must also ensure that workers are trained to administer first aid or that workers have access to people who are trained in first aid.

Further information is contained in the First aid in the workplace Code of Practice.

The emergency procedures for falls should be incorporated into the emergency plan required for the workplace under the WHS Regulation.

Table 1 lists a number of considerations when establishing emergency procedures for falls.

Table 1 Considerations when establishing emergency procedures for falls

Relevant consideration	Questions
Location of the work area	Is the work at height being carried out in a remote or isolated place? How accessible is it in an emergency and how far away is it from medical facilities? Can the rescue of a person after an arrested fall be provided immediately, without relying on emergency services?
Communications	How can workers working at height communicate in an emergency?
Rescue equipment	What kinds of emergencies may arise? The provision of suitable rescue equipment will depend on the nature of the work and the control measures used, for example an emergency rapid response kit with man-made fibre rope, according to AS/NZS 4142.3: Fibre ropes— Part 3: Man-made fibre rope for static life rescue lines. Selected rescue equipment should be kept in close proximity to the work area so that it can be used immediately.

Relevant consideration	Questions
Capabilities of rescuers	Are rescuers properly trained, sufficiently fit to carry out their task and capable of using equipment provided for rescue, for example breathing apparatus, lifelines and firefighting equipment? Have emergency procedures been tested to demonstrate that they are effective?
First aid	Is first aid available for injuries associated with falls? Are trained first aid officers available to make proper use of necessary first aid equipment?
Local emergency services—if they are to be relied on for rescue	How will the local emergency services, like ambulance, be notified of an incident? What is the likely response time?

10.1. Suspension intolerance

Suspension intolerance can occur with a fall arrest system when a person has an arrested fall and is suspended in an upright, vertical position. The capacity of the lower legs to store large amounts of blood reduces the return of blood to the heart, slowing the heart rate, which can cause the person to faint. This may lead to renal failure and eventually death, depending on a person's susceptibility. This condition may be worsened by heat and dehydration.

The quick rescue of a person suspended in a harness, as soon as possible, is vital. For this reason, workers should be capable of conducting a rescue of a fallen worker and be familiar with on-site rescue equipment and procedures.

Relevant workers must be trained in the rescue procedures. It is important for workers to be able to recognise the risks of suspension intolerance and act quickly in the rescue of a person.

Preventing suspension intolerance

To prevent suspension intolerance occurring as a result of an arrested fall, you should ensure that:

- workers never work alone when using a harness as fall protection
- workers use a harness, which allows legs to be kept horizontal
- where the rescue is likely to take more than five minutes the harness and connection point used should allow the suspended worker to raise their legs to near horizontal, or the worker should carry straps to provide footholds
- workers are trained to do the following when they are hanging in their harness after a fall:
    - move their legs in the harness and push against any footholds, where these movements are possible. In some instances, the harness design and any injuries received may prevent this movement
    - move their legs or legs and body to a near horizontal position, where these movements are possible.

10.2. Training for rescues

The training for rescuing workers who have fallen should address the following factors:

- the rescue process should start immediately
- training frequency should take into account the worker's competence and their ability to retain competence through regular exposure to the equipment and skills needed to perform a rescue
- workers should not put themselves at risk during a rescue.

Appendix A—Glossary

Term	Description
Anchorage	A secure point for attaching a lanyard, lifeline or other component of a travel restraint system technique or fall arrest system. Anchorages require specific load and impact capacities for their intended use.
Competent person	A person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.
Double or triple action device	A self-closing hook or karabiner with a keeper latch which will automatically close and remain closed until manually opened. These units have a minimum of at least two distinct and deliberate consecutive actions to manually open them.
Duty holder	Any person who owes a work health and safety duty under the WHS Act including a person conducting a business or undertaking, a designer, manufacturer, importer, supplier, installer of products or plant used at work (upstream duty holder), officer or a worker.
Energy absorber	A device that reduces the deceleration force imposed when a fall is suddenly arrested, and correspondingly reduces the loadings on the anchorage and the person's body. The energy absorber may either be a separate item or manufactured as part of the lanyard.
Fall	A fall by a person from one level to another.
Fall arrest system	Plant or material designed to arrest a fall.
Free fall	Any fall or part of a fall where the person falling is under the unrestrained influence of gravity over any fall distance, either vertically or on a slope on which it is not possible to walk without the assistance of a handrail or hand line.
Hazard	A situation or thing that has the potential to harm a person. Hazards at work may include: noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace.
Health and safety committee	• A consultative body established under the WHS Act. The committee's functions include facilitating cooperation between workers and the person conducting a business or undertaking to ensure workers' health and safety at work, and assisting to develop work health and safety standards, rules and procedures for the workplace.
Health and safety representative	• A worker who has been elected by their work group under the WHS Act to represent them on health and safety matters.

Term	Description
Inertia reel	A type 2 or 3 fall arrest device, as classified in AS/NZS 1891.3, that arrests a fall by stopping the payout of the anchor line. Also known as a self-retracting lanyard or fall arrest block.
Karabiners	Usually a 'D'-shaped or oblong metal ring, with a spring-hinged opening on one side, used as a connector between components of a fall arrest system. They come in a variety of sizes, shapes and locking mechanisms to suit various applications. They should be self-closing and self- or manual-locking and capable of being opened only by at least two consecutive deliberate manual actions.
Lanyard	An assembly consisting of a line and components which will enable connection between a harness and an anchorage point and will absorb energy in the event of a fall.
May	• 'May' indicates an optional course of action.
Must	• 'Must' indicates a legal requirement exists that must be complied with.
Officer	An officer under the WHS Act includes: • an officer under section 9 of the *Corporations Act 2001* (Cth) • an officer of the Crown within the meaning of section 247 of the WHS Act, and • an officer of a public authority within the meaning of section 252 of the WHS Act. A partner in a partnership or an elected member of a local authority is not an officer while acting in that capacity.
Person conducting a business or undertaking (PCBU)	PCBU is an umbrella concept which intends to capture all types of working arrangements or relationships. A PCBU includes a: • company • unincorporated body or association, and • sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A volunteer association (defined under the WHS Act, see below) or elected members of a local authority will not be a PCBU.
Restraint line	The line securing workers to a point of anchorage which is used to prevent a person from reaching a point from which he or she could fall.
Risk	• The possibility harm (death, injury or illness) might occur when exposed to a hazard.
Risk control	Taking action to eliminate health and safety risks so far as is reasonably practicable, and if that is not possible, minimising the risks so far as is reasonably practicable. Eliminating a hazard will also eliminate any risks associated with that hazard.

Term	Description
Risk of a fall	A circumstance that exposes a worker while at work, or other person while at or in the vicinity of a workplace, to a risk of a fall that is reasonably likely to cause injury to the worker or other person. This includes circumstances in which the worker or other person is: • in or on plant or a structure that is at an elevated level • in or on plant that is being used to gain access to an elevated level • in the vicinity of an opening through which a person could fall • in the vicinity of an edge over which a person could fall • on or in the vicinity of a surface through which a person could fall • on or near the vicinity of a slippery, sloping or unstable surface.
Scaffold	A temporary structure specifically erected to support access or working platforms.
Scaffolding	The individual components, for example tubes, couplers or frames and materials, that when assembled form a scaffold.
Scaffolding work	Erecting, altering or dismantling a temporary structure that is or has been erected to support a platform and from which a person or object could fall more than 4 metres from the platform or the structure.
Should	'Should' indicates a recommended course of action.
Solid construction	An area that has: • a surface that is structurally capable of supporting all people and things that may be located or placed on it • barriers around its perimeter and any openings to prevent a fall • an even and readily negotiable surface and gradient, and • a safe means of entry and exit.
Static line	A horizontal or substantially horizontal line to which a lanyard may be attached and which is designed to arrest a free fall.
Total fall distance	The total distance a person is likely to fall during both the free and restrained parts of a fall and includes the maximum dynamic extension of all supporting components.
Volunteer association	A group of volunteers working together for one or more community purposes where none of the volunteers, whether alone or jointly with any other volunteers, employs any person to carry out work for the volunteer association.
Work group	A group of workers established to facilitate the representation of workers by one or more health and safety representatives. A work group may be all workers at a workplace but it may also be appropriate to split a workplace into multiple work groups where workers share similar work conditions or are exposed to similar risks and hazards. For example all workers on night shift.

Term	Description
Worker	Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer.
Workplace	Any place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water.
Work positioning system	Any plant or structure, other than a temporary work platform, that enables a person to be positioned and safely supported at a location for the duration of the relevant work being carried out.

Appendix B—References and other information sources

Australian Standards and Australian/New Zealand Standards

AS 1418.13: Cranes (including hoists and winches) –Part 13: Building maintenance units

AS 1418.17: Cranes (including hoists and winches) – Part 17: Design and construction of workboxes

AS/NZS 1576 (set): Scaffolding including:

- AS/NZS 1576.1: Scaffolding – Part 1: General requirements
- AS/NZS 1576.2: Scaffolding – Part 2: Couplers and accessories
- AS/NZS 1576.3: Prefabricated and tube-and-coupler scaffolding
- AS/NZS 1576.4: Scaffolding – Suspended scaffolding
- AS/NZS 1576.5: Scaffolding – Part 5: Prefabricated splitheads and trestles
- AS/NZS 1576.6: Scaffolding – Metal tube-and-coupler scaffolding – Deemed to comply with AS/NZS 1576.1

AS/NZS 1657: Fixed platforms, walkways, stairways and ladders – Design, construction and installation
AS/NZS 1891.1: Industrial fall-arrest systems and devices – Harnesses and ancillary equipment
AS/NZS 1891.2 Supp 1: Industrial fall-arrest systems and devices – Horizontal lifeline and rail systems – Prescribed configurations for horizontal lifelines
AS/NZS 1891.3: Industrial fall-arrest systems and devices – Fall-arrest devices
AS/NZS 1891.4: Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance

AS/NZS 1892 (set): Portable ladders including:

- AS/NZS 1892.1: Portable ladders – Metal
- AS 1892.2: Portable ladders – Timber
- AS/NZS 1892.3: Portable ladders – Reinforced plastic
- AS/NZS 1892.5: Portable ladders – Selection, safe use and care

AS/NZS 4488 (set): Industrial rope access systems including:

- AS/NZS 4488.1: Industrial rope access systems – Specifications
- AS/NZS 4488.1: Industrial rope access systems – Specifications
- AS/NZS 4488.2: Industrial rope access systems – Selection, use and maintenance

AS/NZS 4576: Guidelines for scaffolding

AS/NZS 4994 (set): Temporary edge protection including:

- AS/NZS 4994.1: Temporary edge protection – General requirements
- AS/NZS 4994.2: Temporary edge protection – Roof edge protection – Installation and dismantling
- AS/NZS 4994.3: Temporary edge protection – Installation and dismantling for edges other than roof edges
- AS/NZS 4994.4: Temporary edge protection – Perimeter protection screens

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Managing the risks of plant in the workplace

Code of Practice

2021

Workplace Health and Safety Queensland
worksafe.qld.gov.au
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PN12678

Contents

1. Foreword

This Code of Practice on how to manage risks of plant in the workplace is an approved code of practice under section 274 of the *Work Health and Safety Act 2011* (the WHS Act).

An approved code of practice is a practical guide to achieving the standards of health, safety and welfare required under the WHS Act and the Work Health and Safety Regulation 2011 (the WHS Regulation).

Under section 26A of the WHS Act duty holders must comply with an approved code of practice or follow another method, such as a technical or industry standard, if it provides an equivalent or higher standard of work health and safety than the standard required in this code.

A code of practice applies to anyone who has a duty of care in the circumstances described in the code. In most cases, following an approved code of practice would achieve compliance with the health and safety duties in the WHS Act, in relation to the subject matter of the code. Like regulations, codes of practice deal with particular issues and do not cover all hazards or risks that may arise. The health and safety duties require duty holders to consider all risks associated with work, not only those for which regulations and codes of practice exist.

Codes of practice are admissible in court proceedings under the WHS Act and WHS Regulation. Courts may regard a code of practice as evidence of what is known about a hazard, risk or control and may rely on the code in determining what is reasonably practicable in the circumstances to which the code relates.

An inspector may refer to an approved code of practice when issuing an improvement or prohibition notice. This may include issuing an improvement notice for failure to comply with a code of practice where equivalent or higher standards of work health and safety have not been demonstrated.

Scope and application

This Code is intended to be read by a person conducting a business or undertaking (PCBU). It provides practical guidance to PCBUs on how to manage health and safety risks associated with managing risks of plant in the workplace.

This Code may be a useful reference for other persons interested in the duties under the WHS Act and the WHS Regulation.

This Code applies to all workplaces covered by the WHS Act and the WHS Regulation where plant is operated and where plant equipment is used or stored.

How to use this Code of Practice

This Code includes references to the legal requirements under the WHS Act and the WHS Regulation. These are included for convenience only and should not be relied on in place of the full text of the WHS Act or the WHS Regulation. The words ‘must’, ‘requires’ or ‘mandatory’ indicate a legal requirement exists that must be complied with.

The word ‘should’ is used in this Code to indicate a recommended course of action, while ‘may’ is used to indicate an optional course of action.

2. Introduction

2.1. What is ‘plant’?

Plant includes machinery, equipment, appliances, containers, implements and tools and any components or anything fitted or connected to those things. Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools, quad bikes, mobile plant and amusement devices.

The general duty of care under the WHS Act applies to this type of plant. Plant that relies exclusively on manual power for its operation and is designed to be primarily supported by hand, for example a screwdriver, is not covered by the WHS Regulation.

Plant is a major cause of work-related death and injury in Australian workplaces. There are significant risks associated with using plant and severe injuries can result from the unsafe use of plant including:

- limbs amputated by unguarded moving parts of machines
- being crushed by mobile plant
- sustaining fractures from falls while accessing, operating or maintaining plant
- being crushed by a quad bike rollover
- electric shock from plant that is not adequately protected or isolated
- burns or scalds due to contact with hot surfaces, or exposure to flames or hot fluids.

Other risks include hearing loss due to noisy plant and musculoskeletal disorders caused by manually handling or operating poorly designed plant.

2.2. Who has health and safety duties for plant at the workplace?

There are a number of duty holders who have a role in managing the risks of plant in the workplace. These include:

- persons conducting a business or undertaking (PCBUs)
- PCBU involving the management or control of fixtures, fittings or plant
- designers, manufacturers, importers and suppliers of plant, substances or structures
- installers
- officers.

Workers and other persons at the workplace also have duties under the WHS Act, such as the duty to take reasonable care for their own health and safety at the workplace.

A person can have more than one duty and more than one person can have the same duty at the same time.

Early consultation and identification of risks can allow for more options to eliminate or minimise risks and reduce the associated costs.

Person conducting a business or undertaking

WHS Act section 19

Primary duty of care

A PCBU must eliminate risks arising from plant in the workplace, or if that is not reasonably practicable, minimise the risks so far as is reasonably practicable.

The WHS Regulation includes more specific requirements for PCBUs to manage the risks of hazardous chemicals, airborne contaminants and plant, as well as other hazards associated with the workplace.

This duty includes ensuring, so far as is reasonably practicable:

- the provision and maintenance of safe plant
- the safe use, handling, storage and transport of plant.

PCBUs have a duty to consult workers about work health and safety and may also have duties to consult, cooperate and coordinate with other duty holders.

Persons who conduct a business or undertaking involving the management or control of fixtures, fittings or plant

WHS Regulation section 203

Management of risks to health and safety

WHS Regulation section 204

Control of risks arising from installation or commissioning

WHS Regulation section 205

Preventing unauthorised alterations to or interference with plant

WHS Regulation section 206

Proper use of plant and controls

WHS Regulation section 207

Plant not in use

WHS Regulation section 208

Guarding

WHS Regulation section 209

Guarding and insulation from heat and cold

WHS Regulation section 210

Operational controls

WHS Regulation section 211

Emergency stops

WHS Regulation section 212

Warning devices

WHS Regulation section 213

Maintenance and inspection of plant

Multiple duties

The WHS Regulation includes specific duties for PCBUs involving the management or control of plant including requirements to:

- manage the health and safety risks associated with plant
- prevent unauthorised alterations to or interference with plant, and
- use plant only for the purpose for which it was designed unless the proposed use does not increase the risk to health or safety.

There are generally a number of people involved with plant during its lifecycle. For example, different people will be involved from its design through to its use and eventual disposal, and throughout this process a person can have more than one duty and more than one person can have the same duty at the same time.

For example, if you own and operate plant in your workplace and you decide to modify it yourself, you will have the duties of a designer and manufacturer as well as a person with management or control of plant at the workplace.

Further information is available in SWA's Guidance material for the safe design, manufacture, import and supply of plant.

Designers, manufacturers, importers and suppliers of plant, substances or structures

WHS Act section 22

Duties of persons conducting businesses or undertakings that design plant, substances or structures

WHS Act section 23

Duties of persons conducting business or undertakings that manufacture plant, substances or structures

WHS Act section 24

Duties of persons conducting businesses or undertakings that import plant, substances or structures

WHS Act section 25

Duties of persons conducting businesses or undertakings that supply plant, substances or structures

WHS Act section 26

Duties of persons conducting businesses or undertakings that install, construct or commission plant or structures

Designers, manufacturers, importers and suppliers of plant, substances or structures must ensure, so far as is reasonably practicable, the plant, substances or structure they design, manufacture, import or supply is without risks to health and safety. This duty includes carrying out testing and analysis as well as providing specific information about the plant or substance.

To assist in meeting these duties, the WHS Regulation requires:

- manufacturers to consult with designers of the plant
- importers to consult with designers and manufacturers of plant
- the person who commissions construction work to consult with the designer of the structure.

Officers

WHS Act section 27

Duty of officers

Officers, for example company directors, have a duty to exercise due diligence to ensure the PCBU complies with the WHS Act and the WHS Regulation. This includes taking reasonable steps to ensure the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks to health and safety.

Workers

WHS Act section 28

Duties of workers

Workers have a duty to take reasonable care for their own health and safety and to not adversely affect the health and safety of other persons. Workers must comply with reasonable instructions, as far as they are reasonably able, and cooperate with reasonable health and safety policies or procedures that have been notified to workers. If personal protective equipment (PPE) is provided by the business or undertaking, the worker must so far as they are reasonably able, use or wear it in accordance with the information and instruction and training provided.

Other persons at the workplace

WHS Act section 29

Duties of other persons at the workplace

Other persons at the workplace, like visitors, must take reasonable care for their own health and safety and must take care not to adversely affect other people's health and safety. They must comply, so far as they are reasonably able, with reasonable instructions given by the PCBU to allow that person to comply with the WHS Act.

2.3. What is involved in managing risks associated with plant?

WHS Regulation Part 3.1 Regulation 32–38

Managing risks to health and safety

WHS Regulation section 203

Management of risks to health and safety

This Code provides guidance on how to manage the risks associated with plant in the workplace using the following systematic process:

- Identify hazards—find out what could cause harm.
- Assess risks, if necessary—understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening. This step may not be necessary if you are dealing with a known risk with known controls.
- Eliminate risks so far as is reasonably practicable
- Control risks—if it is not reasonably practicable to eliminate the risk, implement the most effective control measures that are reasonably practicable in the circumstances in accordance with the hierarchy of control measures, and ensure they remain effective over time.
- Review control measures to ensure they are working as planned.

Chapter 3 of this Code provides guidance on how to manage the risks associated with managing plant in the workplace by following the hierarchy of control.

Further guidance on the risk management process is in the How to manage work health and safety risks Code of Practice.

Providing and obtaining information

Designers, manufacturers, importers and suppliers have duties to provide information about the plant to enable other duty holders to fulfil the responsibilities they have in managing the risks associated with it. This information must be given to each person to whom the plant or its design is provided. Information must be passed on from the designer through to the manufacturer and supplier to the end user. This information includes:

- the purpose for which plant was designed or manufactured
- the results of calculations, analysis, testing or examination
- conditions necessary for the safe use of the plant.

Consulting workers

WHS Act section 47

Duty to consult workers

WHS Act section 48

Nature of consultation

A PCBU must consult, so far as is reasonably practicable, with workers who carry out work for the business or undertaking and who are (or are likely to be) directly affected by a health and safety matter.

This duty to consult is based on the recognition that worker input and participation improves decision-making about health and safety matters and assists in reducing work-related injuries and disease.

The broad definition of a 'worker' under the WHS Act means a PCBU must consult, so far as is reasonably practicable, with contractors and subcontractors and their employees, on-hire workers, outworkers, apprentices, trainees, work experience students, volunteers and other people who are working for the PCBU and who are, or are likely to be, directly affected by a health and safety matter.

Workers are entitled to take part in consultations and to be represented in consultations by a health and safety representative who has been elected to represent their work group.

Workers usually know the hazards and risks associated with the plant they use. By drawing on the experience, knowledge and ideas of workers it is more likely hazards will be identified so that effective control measures can be implemented.

Workers should be encouraged to report hazards and health and safety problems immediately so the risks can be managed before an incident occurs.

It is important to consult workers as early as possible when planning to introduce new plant or change the way plant is used.

Consultation requires that:

- relevant work health and safety information is shared with workers
- workers are given a reasonable opportunity to express their views and to raise health or safety issues
- workers are given a reasonable opportunity to contribute to the decision-making process relating to the health and safety matter
- the views of workers are taken into account
- workers are advised of the outcome of any consultation in a timely manner
- if the workers are represented by a health and safety representative, consultation must include that representative.

Management commitment and open communication between managers and workers is important in achieving effective consultation. Workers are more likely to engage in consultation when their knowledge and ideas are actively sought and concerns about health and safety are taken seriously.

Consultation does not mean telling workers about a health and safety decision or action after it has been taken. Workers should be encouraged to:

- ask questions about health and safety
- raise concerns and report problems
- make safety recommendations
- be part of the problem-solving process.

While consultation may not always result in agreement, agreement should be the objective as it will make it more likely the decisions are effective and actively supported.

Consulting, cooperating and coordinating activities with other duty holders

WHS Act section 46

Duty to consult with other duty holders

The WHS Act requires a PCBU to consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

There is often more than one business or undertaking involved in managing risks of plant in the workplace, that may each have responsibility for the same health and safety matters, either because they are involved in the same activities or share the same workplace.

In these situations, each duty holder should exchange information to find out who is doing what and work together in a cooperative and coordinated way, so risks are eliminated or minimised so far as is reasonably practicable.

Examples of where a PCBU will have a health and safety duty include where:

- the PCBU engages workers to carry out work
- the PCBU directs or influences workers in carrying out work
- other persons may be put at risk from work carried out in their business or undertaking
- the PCBU manages or controls a workplace or the fixtures, fittings or plant at a workplace
- the PBCU's business or undertaking involves designing, manufacturing, importing or supplying plant, substances or structures for use at a workplace
- the PBCU's business or undertaking involves installing, constructing or commissioning plant or structures at a workplace.

For example, if the owner or manager of an on-hire business has workers carry out work at other workplaces then the owner or manager should exchange information with the host business to determine:

- if workers could be exposed to hazardous plant
- what each party will do to control associated risks.

If using plant, for example a crane, at a workplace shared with other businesses the plant owner or manager should talk to those businesses about the risks the plant could cause

them and work together in a cooperative and coordinated way to manage the risks.

Further guidance on consultation requirements is available in the *Work health and safety consultation, cooperation and coordination Code of Practice*.

2.4. Information, training, instruction and supervision

WHS Act section 19

Primary duty of care

WHS Regulation section 39

Provision of information, training and instruction

The WHS Act requires that a PCBU ensure, so far as reasonably practicable, the provision of any information, training, instruction or supervision that is necessary to protect all persons from risks to their health and safety arising from work carried out as part of the conduct of the business or undertaking.

The PCBU must ensure that information, training or instruction provided to a worker are suitable and adequate having regard to:

- the nature of the work carried out by the worker
- the nature of the risks associated with the work at the time of the information, training and instruction
- the control measures implemented.

The PCBU must also ensure, so far as is reasonably practicable, that the information, training and instruction are provided in a way that is readily understandable for the person to whom it is provided.

Workers must be trained and have the appropriate skills to carry out a particular task safely. Training should be provided to workers by a competent person.

Before a PCBU's workers or other persons use the plant in a workplace, a PCBU must, as far as is reasonably practicable, provide them with information, training, instruction and organise ongoing supervision as necessary to protect them from risks arising from the use of the plant.

As a PCBU you must also provide the necessary safety information to persons who are involved in installing, commissioning, testing, maintaining or repairing plant, as well as decommissioning, dismantling or disposing of plant. This should include information on the types of hazards and risks the plant may pose to the person when they are carrying out these activities.

This information may be supported with safe work procedures including instructions on:

- the correct use of guarding and other control measures
- how to safely access and operate the plant
- who may use an item of plant, for example, only authorised or licensed operators
- how to carry out inspections, shut-down, cleaning, repair and maintenance
- traffic rules, rights of way, clearances and no-go areas for mobile plant
- procedures when plant malfunctions
- emergency procedures

- the proper use, wearing, storage and maintenance of personal protective equipment (PPE).

Emergency instructions relating to an item of plant should be clearly displayed on or near it. Training programs should be practical and 'hands on' and take into account the particular needs of workers. For example, literacy levels, work experience and specific skills required for safe use of the plant should all be taken into account.

Supervisors should take action to correct unsafe work practices associated with plant as soon as possible. Otherwise workers may think unsafe work practices are acceptable.

2.5. Registering plant

Certain items of plant and types of plant designs must be registered. A list of registrable plant designs and registrable items of plant is provided at Appendix B. Registrable plant designs must be design registered prior to being supplied.

Registrable items of plant must be item registered prior to being commissioned for use by a PCBU.

Design registration

Design registration is the registering of a completed design, from which any number of individual items can be manufactured. The original designer or a person with management or control of the item of plant may apply for design registration.

Item registration

Plant item registration applies to a specific item of plant. Each item requires registration. The purpose of registering an item of plant is to ensure it is inspected by a competent person and is safe to operate. A person with management or control of plant should obtain a copy of the design registration from the supplier of the plant to ensure all registrable plant items are registered.

Further information on registering plant is provided in Chapter 5 of this Code.

3. The risk management process

WHS Regulation section 34

Duty to identify hazards

WHS Regulation section 35

Managing risks to health and safety

WHS Regulation section 36

Hierarchy of control measures

WHS Regulation section 37

Maintenance of control measures

WHS Regulation section 38

Review of control measures

WHS Regulation section 297

Management of risks to health and safety

WHS Regulation section 299

Safe work method statement required for high risk construction work.

3.1. Identifying the hazards

The first step in the risk management process is to identify all hazards associated with plant in the workplace. This involves finding things and situations that could potentially cause harm to people. Hazards generally arise from the following aspects of work and their interaction:

- physical work environment
- equipment, materials and substances used
- work tasks and how they are performed
- work design and management.

Hazards may be identified by looking at the workplace and how work is carried out. It is also useful to talk to workers, manufacturers, suppliers and health and safety specialists and review relevant information, records and incident reports.

Typical hazards found in managing risks of plant in the workplace can include:

- The plant itself. For example, hazards associated with a bridge and gantry crane include hazards relating to worn or damaged mechanical components; background noise causing problems with communication; lighting; and multiple cranes on the same runway
- Traffic movements in the workplace. For example, vehicles including powered mobile plant moving in and around a workplace, reversing, loading and unloading are frequently linked with death and injuries to workers and members of the public
- The environment in which the plant is used. For example, there may be hazards associated with using a tower crane as a result of structural failure, collapse or contact or collision with other plant and structures.

Further information on identifying these types of hazards is in SWA's Workplace traffic management guidance material.

When plant is being used to lift or suspend persons or things, the person with management or control of plant at a workplace must ensure, so far as is reasonably practicable, that the plant used is specifically designed to lift or suspend the load.

If it is not reasonably practicable to use plant that is specifically designed to lift or suspend the load, the person must ensure that:

- the plant does not cause a greater risk to health and safety than if specifically, designed plant were used
- if the plant is lifting or suspending persons, the use of the plant complies with WHS Regulation 220: Exception—Plant not specifically designed to lift or suspend a person.

The person must ensure that the lifting and suspending is carried out:

- with lifting attachments that are suitable for the load being lifted or suspended
- within the safe working limits of the plant.

The person must ensure, so far as reasonably practicable, that:

- no loads are suspended or travel over a person unless the plant is specifically designed for that purpose
- loads are lifted or suspended in a way that ensures that the load remains under control during the activity
- no load is lifted simultaneously by more than one item of plant unless the method of lifting ensures that the load placed on each item of plant does not exceed the design capacity of the plant.

Inspect the plant

A person with management or control of plant at a workplace must review safety information and inspect each item of plant in the workplace and observe how it is used. Talk to your workers and their health and safety representatives to find out what their experience is with the plant they operate, inspect or maintain. You should also review the manufacturer's and the supplier's instruction for safe set-up and use of the plant.

If you have hired or leased plant, you should also consult the person who owns the plant about potential hazards, because you both have responsibility for ensuring, so far as is reasonably practicable, the plant is safe and without risk to health and safety.

When identifying hazards, you should think about all the activities that may be carried out during the life of the plant at your workplace, for example installation, commissioning, operation, inspection, maintenance, repair, transport, storage and dismantling. For each of these activities, you should consider whether the plant could:

- cause injury due to entanglement, falling, crushing, trapping, cutting, puncturing, shearing, abrasion or tearing
- create hazardous conditions due to harmful emissions, fluids or gas under pressure, electricity, noise, radiation, friction, vibration, fire, explosion, moisture, dust, ice, hot or cold parts, cleaning, and undisclosed asbestos-containing materials
- cause injury when an operator responds to common failure modes. For example, machine jams cause injury due to poor ergonomic design; if operator controls are difficult to reach or require high force to operate.

Other factors to consider include:

- the **condition** of the plant, for example its age, maintenance history and how frequently the plant is used
- the **suitability** of the plant, for example is it actually being used for its intended purpose? Has it been modified from its intended use?
- the **location** of the plant, for example what is its impact on the design and layout of the workplace and are workers able to access the plant without risk of slips, trips or falls?
- **Abnormal situations, for example** what abnormal situations, misuse or fluctuation in operating conditions can you foresee?

A checklist to assist in identifying hazards associated with plant is at Appendix C.

Review safety information

Information about hazards, risks and control measures relating to plant in your workplace can be obtained from:

- manufacturers, importers or suppliers of the plant
- maintenance technicians or specialists, for example engineers
- your workers
- regulators, unions and other organisations
- businesses or undertakings similar to your own
- Australian, International or other technical standards.

Review incident records and data

Check your records of workplace injuries and illness, dangerous incidents, plant inspection reports and maintenance logs, workers compensation records and the results of investigations to collect information about plant hazards.

3.2. Assessing the risks

A risk assessment involves considering what could happen if someone is exposed to a hazard and the likelihood of it happening. A risk assessment can help you determine:

- how severe a risk is
- whether existing control measures are effective
- what action you should take to control the risk
- how urgently the action needs to be taken.

Hazards have the potential to cause different types and severities of harm, ranging from minor discomfort to a serious injury or death.

Many hazards and their associated risks are well known and have well established and accepted control measures. In these situations, the second step to formally assess the risk is not required. If after identifying a hazard you already know the risk and how to control it effectively, you may simply implement the controls.

In some circumstances, a risk assessment will assist to:

- identify which workers are at risk of exposure
- determine what sources and processes are causing the risk
- identify if and what kind of control measures should be implemented
- check the effectiveness of existing control measures.

The nature and severity of risks will depend on various factors. To assess the risk associated with plant hazards you have identified, you should consider the following.

What is the potential impact of the hazard?

- How severe could an injury or illness be? For example, lacerations, amputation, serious or fatal crush injury, burns or loss of hearing.
- What is the worst possible harm the plant hazard could cause? For example, a crane could overturn or collapse causing harm to the operator, workers and others below.

How likely is the hazard to cause harm?

- How frequently are workers exposed to the hazard?
- What condition is the plant used in? For example, in a confined space, muddy or dusty environment
- What is the condition of the plant? For example, is it old and missing safety features found on new plant? Is it reliable or often needing emergency maintenance?
- If there are other people or items of plant in the vicinity, what effect do they have on the likelihood or consequence?
- Where and when is access required during the installation, operation or maintenance of plant and in an emergency?
- What work practices and procedures exist for plant safety? For example, is isolation required to carry out maintenance?
- What kinds of information, training, instruction and supervision are provided to workers and other persons who may be exposed to plant?
- Does the plant's safety depend on the competency of its operators?
- How is work organised? For example, consider:
  - the speed of the process line
  - pedestrian and vehicular traffic around the plant
  - time spent on repetitive tasks
  - shiftwork arrangements
  - production incentives that may affect health and safety.

3.3. Controlling the risks

The WHS Regulation requires duty holders to work through a hierarchy of control measures when managing risks to health and safety associated with plant.

Specific controls are required under the WHS Regulation for certain types of plant, including:

- powered mobile plant
- plant that lifts or suspends loads
- plant used in connection with tree lopping
- industrial robots
- lasers
- pressure equipment
- scaffolds
- plant with presence-sensing safeguarding systems.

Hierarchy of control measures

The WHS Regulation requires duty holders to work through the hierarchy of control measures when managing certain risks; however, it can be applied to any risk. The hierarchy

ranks control measures from the highest level of protection and reliability to the lowest. Further guidance on the risk management process and the hierarchy of control measures is in the *How to manage work health and safety risks Code of Practice*.

Eliminating the risk

You must always aim to **eliminate the risk**. For example, you may design items of a size, shape and weight so they can be delivered, handled or assembled at the location where they will be used without the need for a crane.

If eliminating the hazards and associated risks is not reasonably practicable, you must minimise the risk by one or more of the following:

- **Substitution**—minimise the risk by substituting or replacing a hazard or hazardous work practice with something that gives rise to a lesser risk. For example, installing a conveyor system to replace forklifts will eliminate the risks associated with moving plant but will introduce other risks associated with conveyors. The new system should reduce the overall risks of transporting material.
- **Isolation**—minimise the risk by isolating or separating the hazard or hazardous work practice from any person exposed to it. For example, use concrete barriers to separate mobile plant from workers
- **Engineering controls**—engineering controls are physical control measures to minimise risk. For example:
  - emergency brakes in a lift that are applied automatically when the lift exceeds its maximum speed
  - an automatically applied control system that prevents tower cranes from colliding while sharing the same air space
  - interlocked guards on machinery.

If risk remains, it must be minimised by implementing **administrative controls**, so far as is reasonably practicable. For example, a tag-out system could be used to ensure the plant is isolated from its power source and is not operated while maintenance or cleaning work is being done.

Any remaining risk must be minimised with suitable **personal protective equipment (PPE)**. For example, providing workers with breathing protection, hard hats, gloves, aprons and protective eyewear.

Administrative control measures and PPE do not control the hazard at the source. They rely on human behaviour and supervision and used on their own tend to be the least effective in minimising risks.

The control measures you apply may change the way work is carried out. In these situations, you must consult your workers and develop safe work procedures, and provide your workers with training, instruction, information and supervision on the changes.

Combining control measures

In most cases, a combination of the control measures will provide the best solution to minimise the risk to the lowest level reasonably practicable. For example, protecting workers from flying debris when using a concrete cutting saw may involve guarding the blade, isolating the work area and using PPE such as a face shield.

You should check whether your chosen control measures introduce new hazards. For example, hiring a forklift to control hazardous manual tasks introduces risks involving moving plant that also need to be controlled.

Working near overhead and underground electric lines

Electrical Safety Regulation Part 5

Overhead and underground electric lines

As a person conducting a business or undertaking (PCBU) at a workplace, you must ensure, so far as is reasonably practicable, that no person, plant or thing at the workplace comes within an unsafe distance of an overhead or underground electric line.

If it is not reasonably practicable to ensure the safe distance, you must ensure that a risk assessment is conducted for the proposed work and control measures implemented are consistent with the risk assessment and the requirements of an electricity supply entity where it is responsible for the electric line.

Electric lines pose significant risks, including electrocution, arcing, explosion, fire causing burns, unpredictable cable whiplash and electrifying other objects including signs, poles, trees or branches. Whether energised overhead or underground electric lines are carrying voltage of 400,000V or 230V, contact with these lines can be fatal. It is not necessary to touch an overhead electric line to be electrocuted. A ‘flashover’ or ‘arc’ can electrocute a person close to a line conductor.

The following should be considered:

- Are workers or plant likely to go near electric lines? If so, how high are the electric lines and the plant?
- Are overhead electric lines hard to see in the sky or are they hidden by trees?
- Have underground electric lines been accurately located?
- Is a safety observer in place to watch plant when it is operating close to electric lines?
- Has the relevant state or territory electricity supply authority been contacted for information about specific requirements when working near electric lines, including the qualifications required for those people working near electric lines?
- Have emergency rescue procedures been established, including calling the electricity supply authority to isolate the electricity supply before trying to rescue a person receiving an electric shock?

Most risks can be addressed by observing safe working distances for people and plant near electric lines. Safe working distances will depend on the type of work being carried out and the voltage of the electric lines. You should contact the relevant electricity supply authority to determine unsafe distances and the type of control measures needed. This may include isolating the line.

Further information about electrical safety can be obtained from your Electricity Regulator.

3.4. Maintaining and reviewing control measures

WHS Regulation section 37

Maintenance of control measures

WHS Regulation section 38

Review of control measures

Control measures must be maintained so they remain fit for purpose, suitable for the nature and duration of work and are installed, set up and used correctly.

The control measures put in place to protect health and safety should be regularly reviewed to make sure they are effective. If the control measure is not working effectively it must be revised to ensure it is effective in controlling the risk.

You must review and as necessary revise control measures so as to maintain, so far as is reasonably practicable, a work environment that is without risks to health or safety. For example:

- when the control measure does not control the risk so far as is reasonably practicable
- before a change at the workplace that is likely to give rise to a new or different health and safety risk that the measure may not effectively control
- a new or relevant hazard or risk is identified
- the results of consultation indicate that a review is necessary, or
- a health and safety representative requests a review if that person reasonably believes that:
  - a circumstance in any of the above points affects or may affect the health and safety of a member of the work group represented by the health and safety representative
  - the control measure has not been adequately reviewed in response to the circumstance.

Common review methods include workplace inspection, consultation, testing and analyzing records and data.

You can use the same methods as in the initial hazard identification step to check control measures. You must also consult your workers and their health and safety representatives. If problems are found, go back through the risk management steps, review your information and make further decisions about control measures.

4. Controlling risks: from purchase to disposal

4.1. Purchasing and hiring plant

Many injuries and illnesses associated with plant occur due to a failure to select the right equipment for the job. Before you purchase plant, check it is suitable for the intended use including the environment it will be used in and the workers using it. Discuss your needs with the plant supplier, who must provide you with information about:

- the purpose for which the plant was designed or manufactured
- the results of calculations, analysis, testing or examination carried out to determine that the plant, so far as is reasonably practicable, is without risk to health and safety
- conditions necessary for the safe use of the plant
- alterations or modifications made to the plant.

Before purchasing, hiring or leasing plant you should also determine:

- the hazards and risks associated with installation, commissioning, operation, inspection, maintenance, repair, transport, storage and dismantling of the plant
- control measures needed to minimise these hazards and risks
- the manufacturer's recommendations for the frequency and type of inspection and maintenance needed
- special skills required for people who operate the plant or carry out inspection and maintenance, including preventative maintenance
- special conditions or equipment required to protect the health and safety of people carrying out activities. For example, installation, operation and maintenance, and
- alterations or modifications to be made to the plant.

You should check whether the plant includes some or all of the following controls:

- contact with or access to dangerous parts is prevented. For example, by using guards and protective structures
- it is of sturdy construction and has tamper-proof design
- there are no obstructions to the plant operator
- it has fail-safe operation
- it is easy to inspect and maintain
- it does not introduce other hazards, for example manual handling problems or excessive noise, into your workplace
- it incorporates measures to minimise risks during use, for example low noise.

Duties of suppliers and purchasers of second-hand plant

Second-hand plant

WHS Act section 25

Duties of persons conducting businesses or undertakings that supply plant, substances or structures

WHS Regulation section 198

Information to be obtained and provided by supplier

WHS Regulation section 199

Supply of second-hand plant—duties of supplier

WHS Regulation section 200

Second-hand plant to be used for scrap or spare parts

Suppliers' duties apply whether the plant is new, second-hand or hired out. There are also some additional duties that apply when the plant is second-hand. Some examples of suppliers of second-hand plant include a person conducting a business or undertaking (PCBU) who:

- sells second-hand plant at a retail outlet or directly sells their own second-hand plant
- imports second-hand plant for on-sale
- auctions second-hand plant, excepting certain clearing sales (see below).

A supplier of plant must:

- take all reasonable steps to obtain the information required to be provided by the manufacturer under sections 23(4)(a), (b) and (c) of the WHS Act, and
- when the plant is supplied, ensure the person to whom the plant is supplied is given the information obtained by the supplier.

A supplier of second-hand plant must ensure, so far as is reasonably practicable, that any faults in the plant are identified.

Before plant is supplied, the supplier of second-hand plant must ensure that the person to whom the plant is supplied is given written notice:

- of the condition of the plant
- of any faults identified
- if appropriate, that the plant should not be used until the faults are rectified.

A supply of a thing does not include the supply of a thing by a person who does not control the supply and has no authority to make decisions about the supply, for example an auctioneer without possession of the thing or a real estate agent acting in their capacity as a real estate agent.

Suppliers' duties apply to a PCBU whether the sale is a one-off sale or forms part of the business's day-to-day operations.

Duty to supply safe plant

Suppliers of second-hand plant must ensure, so far as is reasonably practicable, the plant is without risks to the health and safety of persons who are at or in the vicinity of a workplace. This includes, so far as is reasonably practicable, identifying faults in the plant.

Suppliers of second-hand plant, other than scrap or spare parts, must give written notice to a person to whom the plant is supplied stating:

- the condition of the plant, including identified faults
- if appropriate, that the plant should not be used until the faults are rectified.

Suppliers of second-hand plant must also take all reasonable steps to obtain information about how to use the plant correctly and safely from the manufacturer or original supplier.

Suppliers of second-hand plant must give the buyer:

- this information
- all available records of the plant kept by the previous owner.

The information may include data sheets, test certificates, operations and service manuals, reports and a safety manual.

Out-dated or non-existent safety features of second-hand plant

Second-hand plant is more likely to have outdated or missing safety features. In these circumstances suppliers of second-hand plant must do what is reasonably practicable to supply equipment safe for use at work.

The degree of risk posed by the plant must be weighed up against the cost of implementing measures to minimise it. Suppliers of second-hand plant should consider:

- if it is reasonably practicable to retrofit or modify the plant to improve its safety having regard to improvements to that type of plant since its manufacture
- what information needs to be given to the buyer about relevant matters including the purpose for which the plant was designed or manufactured and conditions necessary to ensure the plant is without risks to health and safety when properly used
- their duty to ensure the plant is safe and has all the required safety features before bringing it into service.

Adequate information to be provided about the condition of second-hand plant

Adequate information must be given to the buyer about the purpose for which the plant was designed or manufactured and conditions necessary to ensure its safe use.
Information about using second-hand plant safely, including its condition, may be obtained from:

- the previous owner of the plant
- a ‘competent person’ engaged to assess the plant and develop this information.

Without this kind of information, suppliers of second-hand plant have no way of knowing whether they have met their suppliers’ duties under the WHS Act.

Suppliers’ duties and agents or auctioneers selling used plant at clearing sales

Suppliers’ duties apply to sellers’ agents like auctioneers, **unless** the agent does not take control of the supply and has no authority to make decisions about the supply.

Agents selling used plant at clearing sales usually do not take possession of the plant and have no authority to make decisions about the supply and are not considered to be suppliers.

In these limited circumstances the suppliers' duties will only apply to the seller—not their agent.

Supplying scrap and spare parts

Plant sold for scrap or spare parts is usually not intended to be used at a workplace so does not need to be made safe or supplied with instructions for use.

However, the supplier must tell prospective buyers that the plant is being supplied for scrap or spare parts only and that it cannot be used safely in its current form for other purposes. This must be done in writing or by marking the item of plant.

Hiring plant

When you hire plant, both you and the person you have hired it from must ensure, so far as is reasonably practicable, the plant is safe to use. During the time the plant is in your possession you will have control over the way the plant is used in the workplace.

Before you hire the plant, you should assess whether the plant is suitable for its intended use. You should also check the plant has been inspected and maintained by the supplier according to the manufacturer's specifications. This may involve checking the logbook or maintenance manual. You should also ensure the supplier provides you with the manufacturer's information about the purpose of the plant and its proper use.

A person who hires or leases plant to others will have duties as a supplier of plant and as a person with management or control of plant. This means they must ensure, so far as is reasonably practicable, the plant is safe to use and properly maintained. They must also provide specific information with the plant about how to operate it safely.

In most cases the supplier will be responsible for inspecting and maintaining the plant. However, if the plant is to be hired for an extended period of time, you and the supplier may develop arrangements to ensure the plant is properly inspected and maintained throughout the lease. This may involve the supplier coming to your workplace to maintain the plant, or you maintaining the plant while it is at your workplace.

The arrangements you make will depend on your ability to inspect and maintain the plant in accordance with the manufacturer's specifications. If you choose to maintain the plant yourself during the lease, you should provide all information and records about the maintenance to the hirer at the end of the lease.

4.2. Installation and commissioning of plant

WHS Regulation section 204

Control of risks arising from installation or commissioning

A person with management or control of plant at a workplace must:

- not commission the plant unless the person has established that the plant is, so far as reasonably practicable, without risks to the health and safety of any person
- not decommission or dismantle the plant unless the decommissioning and dismantling can be carried out, so far as is reasonably practicable, without risks to the health and safety of any person
- ensure that a person who installs, assembles, constructs, commissions, decommissions or dismantles the plant is a competent person, and is provided with all the information necessary to minimise risks to health and safety
- ensure that the processes for the installation, construction, commissioning, decommissioning and dismantling of plant include inspections that ensure, so far as is reasonably practicable, the risks associated with these activities are monitored.

Installing plant

An installer should ensure:

- plant is erected or installed having regard to the manufacturer's instructions including ensuring specialised tools, jigs and appliances necessary to minimise risk of injury during installation are used
- entry to and exit from plant complies with relevant standards
- plant is stable during installation
- the interaction of plant with people, work processes and other plant is considered
- environmental factors affecting installation and use, for example wet conditions, are considered
- electrical installations associated with plant comply with AS/NZS 3000, also known as the Australian/New Zealand Wiring Rules, as far as is relevant.

The installer should notify the designer, manufacturer, supplier and person with management or control of plant of new risks identified during the plant installation.

Positioning plant in the workplace

Plant should be positioned so:

- risks from hot plant, for example, friction, molten material, hot gases, are controlled through restricted access, guarding or insulation
- there is sufficient space (suggested 600 mm, the minimum width of a walkway) for safe access to the plant for operation, cleaning, maintenance, inspection and emergency evacuation
- the plant does not obstruct doorways and emergency exits
- the proximity to other plant does not have a negative effect on operation of the plant or work processes
- the plant rests on a suitable foundation where required, for example on a floor or other support that ensures the plant is stable and secure
- ventilation can deal with the nature and volume of emissions from the plant
  workers and others are not exposed to noise levels greater than those stated in the exposure standard for noise under the WHS Regulation. Consideration could also be given to placing plant in areas with sound insulation or mounting to decrease reverberations which will decrease noise levels.

Commissioning plant

Commissioning plant involves performing the necessary adjustments, tests and inspections to ensure plant is in full working order to specified requirements before the plant is used. Commissioning includes recommissioning.

The person who commissions plant should ensure:

- the commissioning sequence is in accordance with the design specifications
- tests are carried out to check the plant will perform within the design specifications.

4.3. Using plant in the workplace

WHS Regulation section 205

Preventing unauthorised alterations to or interference with plant

WHS Regulation section 206

Proper use of plant and controls

A person with management or control of plant at a workplace must:

- so far as is reasonably practicable, prevent alterations to or interference with the plant that they have not authorised
- take all reasonable steps to ensure the plant is only used for the purpose for which it is designed, unless they have assessed that the proposed use does not increase the risk to health and safety
- in determining whether or not the proposed use of plant increases the risk to health and safety, ensure that the risk associated with the proposed use is assessed by a competent person
- take all reasonable steps to ensure that all safety features, warning devices, guarding, operational controls, emergency stops are used in accordance with instructions and information that they have provided.

Workers who operate plant should be competent or suitably supervised during training, so they do not put themselves or others at risk. It is important to retain all operating manuals and instructional material provided by the manufacturer in order to correctly operate and maintain the plant once it is in the workplace. The person with management or control of plant should also consider and address the risks that may arise from:

- operator fitness for work, such as fatigue
- carrying out routine or repetitive tasks
  local conditions and working procedures.

Work platforms and boxes

WHS Regulation section 219

Plant that lifts or suspends loads

WHS Regulation section 220

Exception—Plant not specifically designed to lift or suspend a person

If plant is being used to lift or suspend persons and it is not reasonably practicable to use plant that is specifically designed to lift or suspend them, the person with management or control of the plant must ensure:

- the plant does not cause a greater risk to health and safety than if specifically, designed plant were used
- the persons are lifted or suspended in a work box that is securely attached to the plant
- the persons in the work box remain substantially within the workbox while they are being lifted or suspended
- a safety harness is worn if there is a risk of a worker falling from a height, and
- means are provided by which the persons being lifted or suspended can safely exit from the plant in the event of a failure in its normal operation.

High risk work licences

WHS Regulation section 85

Evidence of licence—duty of person conducting business or undertaking

As a PCBU, you must not direct or allow a worker to carry out high risk work for which a high risk work licence is required unless you see written evidence provided by the worker that the worker has the relevant high risk work licence for that work.

Certain types of work, for example operating industrial trucks and some cranes or scaffold and rigging work, require the worker to have a high-risk work licence before they can operate the plant or undertake the work. Schedule 3 of the WHS Regulation sets out the classes of high-risk work licences and the types of plant involved, and Schedule 4 sets out the competency requirements for a high-risk work licence.

4.4. Making changes

If the person with management or control of the plant intends to alter the design of the plant, change the way the plant is used or change a system of work associated with the plant, the person should carry out the risk management process again.

If the person with management or control of the plant intends to use the plant in a different way or for a purpose it was not designed for, the person must ensure the risks associated with the new use are assessed by a competent person. For example, if an item of plant designed to cut wood is to be used to cut metal, all hazards associated with that use should be identified and controls implemented.

The competent person's assessment should:

- include all aspects of the proposed task
- outline the reasons a purpose-designed item of plant cannot be used for the proposed task. For example, the impracticability of using it
- take into account the recommendations of the designer, manufacturer or supplier of the plant and ensure the proposed use is not outside its capabilities
- identify differences between the item of plant and one that is purpose-designed for the task, and describe the measures that will be used to control the risks the purpose-designed plant was designed to control
- amend relevant documentation. For example, operator and maintenance manuals and signage.

If a competent person decides the plant is not suitable for the proposed task, it must not be used for that task.

Making alterations to plant

Before making alterations to plant, the person with management or control of the plant should consult with the designer and manufacturer to ensure all relevant safety issues have been considered. If the original designer and manufacturer of the plant design implement alterations, then relevant obligations imposed by the WHS Regulations still apply. If the person with management or control of the plant makes alterations to the plant then the person will also be a designer or manufacturer, and those obligations will apply to that person.

If the original designer or manufacturer cannot be contacted about older plant or imported plant, the alterations should be carried out by a competent person in accordance with the relevant technical standards. See Appendix D for examples of published technical standards.

If the plant is subject to design registration requirements, the altered design must be registered if the alteration may affect health and safety.

Plant should be isolated from power sources and be unable to be switched on or activated accidentally before alterations begin or while alterations are being carried out.
Before returning altered plant to service you should:

- have control measures in place to eliminate or, where that is not reasonably practicable, minimise risks created by the alteration including providing information and training for users and supervisors about the changes
- inspect and test the plant, having regard to the altered design specifications and relevant technical standards.

4.5. Inspecting plant

WHS Regulation section 213

Maintenance and inspection of plant

The person with management or control of plant at a workplace must ensure that maintenance, inspection and, if necessary, testing of plant is carried out by a competent person.

The maintenance, inspection and testing must be carried out:

- in accordance with the manufacturer's recommendations, if any
- if there are no manufacturer's recommendations, in accordance with the recommendations of a competent person
- in relation to inspection, if it is not reasonably practicable to comply with the above, annually.

Plant inspection should be conducted in accordance with a regular maintenance system to identify:

- potential problems not anticipated during plant design or task analysis
- deficiencies in plant or the equipment associated with use of the plant, for example wear and tear, corrosion and damaged plant parts
- adverse effects of changes in processes or materials associated with plant
- inadequacies in control measures that have been previously implemented.

Inspecting associated work processes should be conducted regularly to identify:

- unsafe work practices associated with the use of plant
- negative effects of changes in processes or materials associated with plant
- inadequacies in control measures that have been previously implemented.

Regularly inspect hand-held powered plant and repair or replace when necessary, and replace damaged or worn parts, for example grinding wheels.

Control measures implemented, for example guards and warning devices, must be regularly inspected and tested to ensure they remain effective.

You should keep an up-to-date register of the items of plant requiring regular inspection and maintenance. It should include information on:

- allocated responsibilities for people dealing with inspections
- standards against which plant should be inspected
- the frequency of inspections
- critical safety instructions to be followed during inspection. For example, the isolation procedure
- the procedures for particular types of inspections including:
  - periodic inspections
  - specific tests
  - repaired or modified plant
- variations from normal operation or dangerous occurrences and trends that may be occurring.

Reasonably practicable control measures must be implemented to ensure the health and safety of the person conducting the inspection. For example, you may need to ensure the plant is switched off and isolated from the energy source to avoid accidental re-energising of dangerous parts.

Guards that are removed must be replaced correctly to prevent access to the hazardous part of the plant when it is returned to use.

4.6. Maintenance, repair and cleaning of plant

Plant must be maintained and repaired according to the manufacturer's specifications. If you identify deficiencies in the specifications, you should contact the manufacturer. In the absence of a manufacturer's specifications, plant energy sources should be maintained in accordance with a competent person's recommendations. For example, ensure fluid levels and pressures are correct and ensure brakes are functioning properly.

Plant should usually be isolated before maintenance or cleaning starts.
Isolated or disengaged plant should:

- not hinder or interfere with other plant operation
- have guards in place where a risk of injury is identified
- not obstruct access.

A process should be put in place to enable effective communication and consultation with affected workers and other persons conducting a business or undertaking to prevent any risk to health and safety arising from restarting plant operation when plant has been shut down due to inspection, maintenance or cleaning.

Where plant cannot be isolated, methods to prevent accidental operation should be implemented. The work should be carried out under controlled procedures to allow for maintenance and cleaning without risk to the health and safety of the person performing the work.

WHS Regulation section 210

Operational controls

If plant needs to be operated while being maintained or cleaned, the person with management or control of the plant must ensure that the operator's controls:

- permit operation of the plant while a person is undertaking maintenance or cleaning of the plant
- while the plant is being maintained or cleaned, either:
  - cannot be operated by a person other than the person carrying out the maintenance or cleaning of the plant, or
  - if the plant must be operated by a person other than the person carrying out maintenance or cleaning, cannot be operated except by a person authorised by the person with management or control of the plant for that purpose
- allow the plant to be operated in such a way that eliminates risks or, if that is not reasonably practicable, minimises the risks so far as reasonably practicable.

Following maintenance or cleaning, all guarding must be replaced before plant is used. Plant with damage that poses a risk to health and safety should be withdrawn from service until those risks have been controlled.

4.7. Storing plant

WHS Regulation section 207

Plant not in use

The person with management or control of plant at a workplace must ensure, so far as is reasonably practicable, that plant that is not in use is left in a state that does not create a risk to the health or safety of any person.

Plant not in use should be stored so it does not create a risk to workers or other people in the workplace. Where plant is to be placed in storage, you should:

- ensure relevant health and safety information supplied by the designer or manufacturer is provided to the person who is to dismantle or store the plant
- implement control measures to eliminate, or if that is not reasonably practicable, minimise the risk to health and safety to people during storage. For example, release stored energy, lower moving parts that lower under gravity and provide support to prevent toppling
- implement control measures to eliminate or, if that is not reasonably practicable, minimise the risks of damage to plant during storage. For example, risks may arise from corrosion as a result of exposure to residues of hazardous substances and deteriorating consumables.

Before plant is used after an extended period of storage, the plant should be re-commissioned by carrying out the same level of testing and inspection as when it was first commissioned.

Plant that has been taken off-line is plant not in use. For example, an automatic robot on a welding line may be taken off-line due to a product design modification no longer requiring the use of the robot for the particular product. The robot is therefore still fully functional but is no longer in use. The robot must not be left in a state that presents a risk to health or safety.

This may be done by isolating the workstation from the power supply, employing lock-out and tag-out systems, and providing physical stops to prevent movement if the plant is accidently powered. Further information on isolating energy sources is provided at section 5.5 of this Code.

Powered mobile plant

WHS Regulation section 214

Powered mobile plant—general control of risk

WHS Regulation section 215(2)

Powered mobile plant—specific control measures

The person with management or control of powered mobile plant must manage risks to health and safety associated with the following:

- the plant overturning
- things falling on the operator of the plant
- the operator being ejected from the plant
- the plant colliding with any person or thing
- mechanical failure of pressurised elements of plant that may release fluids that pose a risk to health and safety.

A person with management or control of powered mobile plant at a workplace must ensure, so far as is reasonably practicable, that a suitable combination of operator protective devices for the plant is provided, maintained and used.

Powered mobile plant may present a risk to health or safety if measures are not taken to prevent the plant moving of its own accord, for example rolling down a sloping surface, or to prevent unauthorised operation. For example, an industrial lift truck at the end of or during a shift is plant that is frequently not in use and is unattended for short periods of time. The person with management or control should ensure the operator of the industrial lift truck understands the required safety procedures when leaving the industrial lift truck unattended.

This would include ensuring the industrial lift truck has been parked on a firm, level surface with the handbrake applied, the motor switched off and rendered inoperable, for example by removing the key.

4.8. Decommissioning, dismantling and disposing of plant

WHS Regulation section 204

Control of risks arising from installation or commissioning

Section 4.2 of this Code provides an outline of obligations imposed on persons with management or control of plant in relation to controlling risks arising from installing and commissioning plant.

A person with management or control of plant at a workplace should follow the same procedures to identify any hazards inherent in the process of decommissioning and dismantling the plant, for example exposure to hazardous substances. The plant should be dismantled in accordance with the designer's and manufacturer's instructions.

Disposing of plant may include reselling, in full or part, scrapping, waste disposal or recycling. If the plant is to be resold, the seller will take on the duties of a person supplying the plant. The seller should ensure the plant is safe to load, transport, unload and store. Information relating to the plant design, registration, installation, operation and maintenance must be provided with the plant to the reseller or buyer.

The supplier must ensure, so far as reasonably practicable, the plant they import, or supply is without risks to health and safety to people at or in the vicinity of a workplace.

If the plant is to be scrapped, you should consult with local recycling or local waste disposal authorities or organisations so the plant can be made safe to load, transport, unload and dispose of.

If the plant is to be used for scrap or spare parts, you must inform the person you are supplying the plant to that the plant is being supplied as scrap or spare parts and the plant in its current form is not to be used as plant. This must be done in writing or by marking the item of plant.

5. Specific control measures

5.1. Guarding plant

A guard is a physical or other barrier that can perform several functions including:

- preventing contact with moving parts or controlling access to dangerous areas of plant
- screening harmful emissions, for example radiation
- minimising noise through applying sound-absorbing materials
- preventing ejected parts or off-cuts from striking people.

More than one type of guarding system may be required to ensure the safe operation of machinery or plant (see Figure 1).

WHS Regulation section 208

Guarding

If guarding is used, the person with management or control of the plant must ensure that one of the following is complied with:

- if access to the area of plant requiring guarding is not necessary during operation, maintenance or cleaning of the plant, the guarding is a permanently fixed barrier
- if access to guarded areas is necessary during operation, maintenance or cleaning, the guarding is an interlocked physical barrier that allows access to the area being guarded at times when that area does not present a risk and prevents access to that area at any other time.

If it is not reasonably practicable to use a permanently fixed barrier or an interlocked physical barrier in accordance with the above dot points:

- the guarding is a physical barrier that can only be altered or removed using a tool
- if it is also not reasonably practicable to use a physical barrier fixed in position, the guarding includes a presence-sensing safeguarding system that eliminates risk arising from the area of the plant requiring guarding when a person or any part of a person is in the area being guarded.

A person with management or control of the plant must ensure that the guarding:

- is of solid construction and securely mounted so as to resist impact or shock
- makes by-passing or disabling the guarding, whether deliberate or accidental, as difficult as is reasonably practicable
- does not create a risk in itself. For example, it must not obstruct operator visibility, weaken the plant, cause discomfort to operators or introduce new hazards, such as pinch points, rough or sharp edges
- is properly maintained
- controls, so far as is reasonably practicable, any risk from potential broken or ejected parts and work pieces, and
- is able to be removed when the plant is not in normal operation to allow for maintenance and cleaning and, when the guarding is removed, that, so far as is reasonably practicable, the plant cannot be restarted unless the guard is replaced.

Removal of guarding

If the guarding required by the WHS Act or the WHS Regulation is removed for the purposes of maintenance or cleaning, it must be replaced before the plant is put back into normal operation. Where reasonably practicable, the plant should not be able to restart unless the guarding is in place. When removing guarding, eliminate the energy source by disconnecting the power supply or by locking out motive power sources.

Permanently fixed physical barriers

Permanently fixed physical barriers are designed to be welded or incorporated into the body of the machine. In Figure 1, the plant's power transmission is not required to be accessed during normal operation, maintenance or cleaning. It is therefore practicable to have the gear arrangements enclosed in gearbox housing to prevent access to moving gears. This has eliminated the risk associated with entanglement.

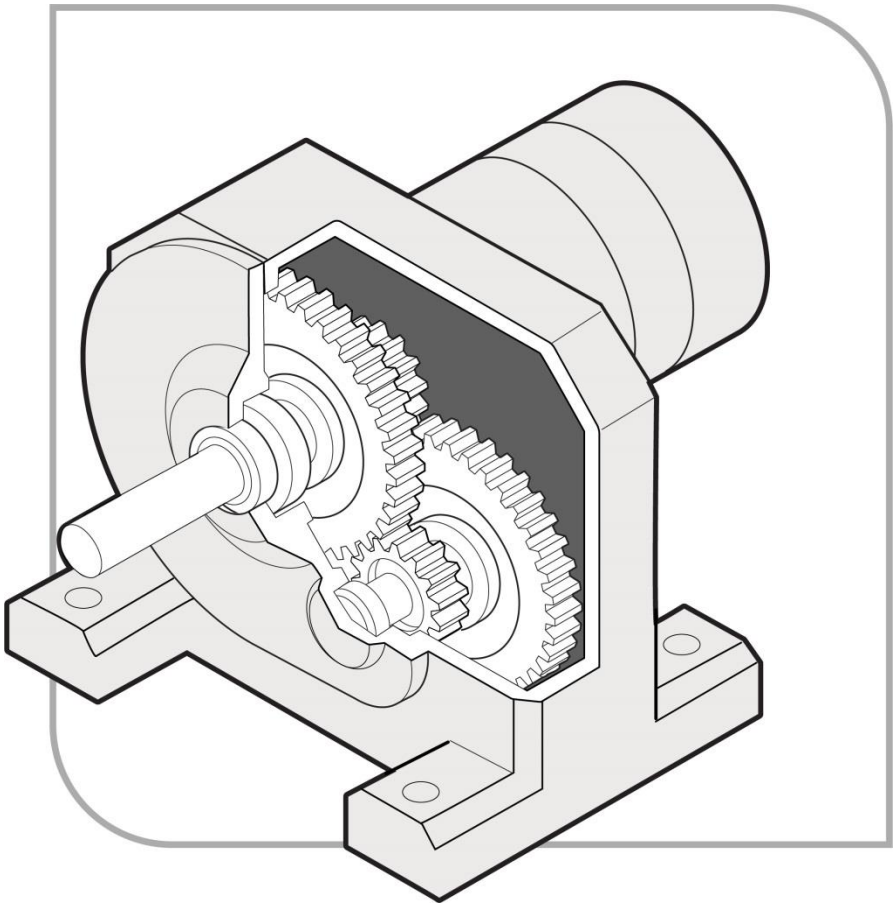

Figure 1 Cut-away view of a fixed physical barrier encasing the gear assembly and electric motor

Interlocked physical barriers

An interlock guard is connected to the plant's operational controls, so the plant is prevented from operating until the guard is closed. The guard can either:

- remain locked while the plant is in operation and, where it takes time for the dangerous parts to come to rest, incorporate a delay before it can be opened
- not be locked but stop the operation of the machine when opened.

In Figure 2, the hinged top guard on the food mixer has a positively operating insertion key which automatically cuts off the plant's power when the lid is opened or removed. This allows the blades to come to rest. If the moving parts do not stop immediately once the power is cut off, then a guard should be designed to delay release of the locking mechanism until the moving parts have stopped.

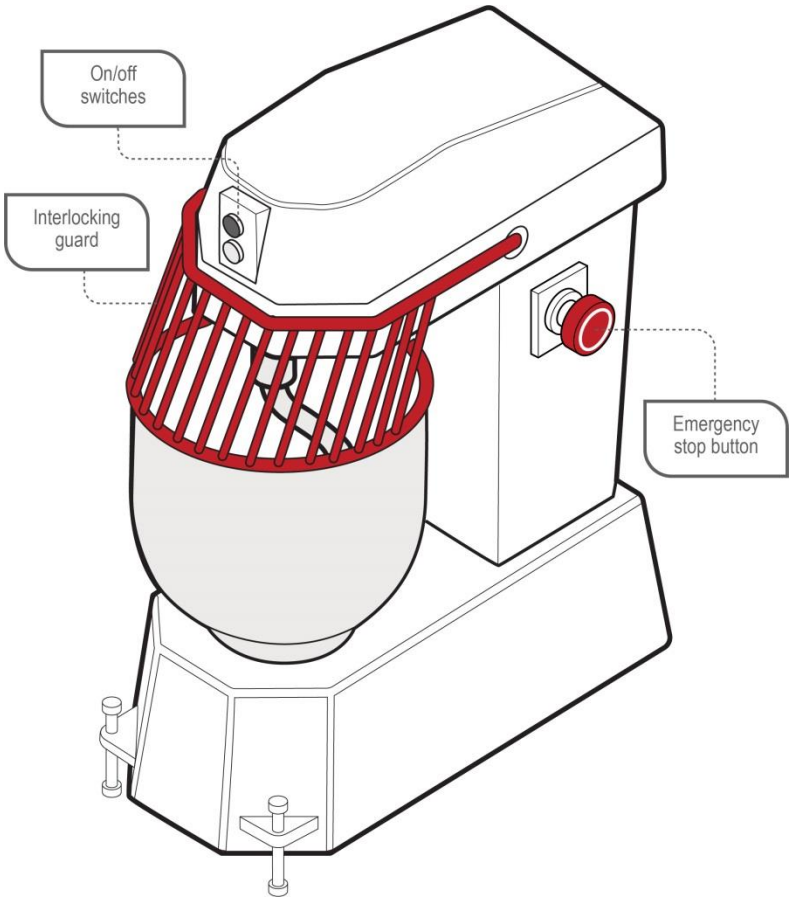

Figure 2 Food mixer with interlocking guard.

Physical barriers fixed in position

Physical barriers securely fixed in position should be easy to remove and replace but only with the aid of a special tool, for example a spanner, Allen key or similar tool. They should only be opened when the machine is not in operation (see Figure 3). The special tool should not be the same as any tool issued to and used by the operator of the plant when the operator is performing their normal work. Devices that can be operated using fingers, for example wing nuts or wedge inserts, should not be used.

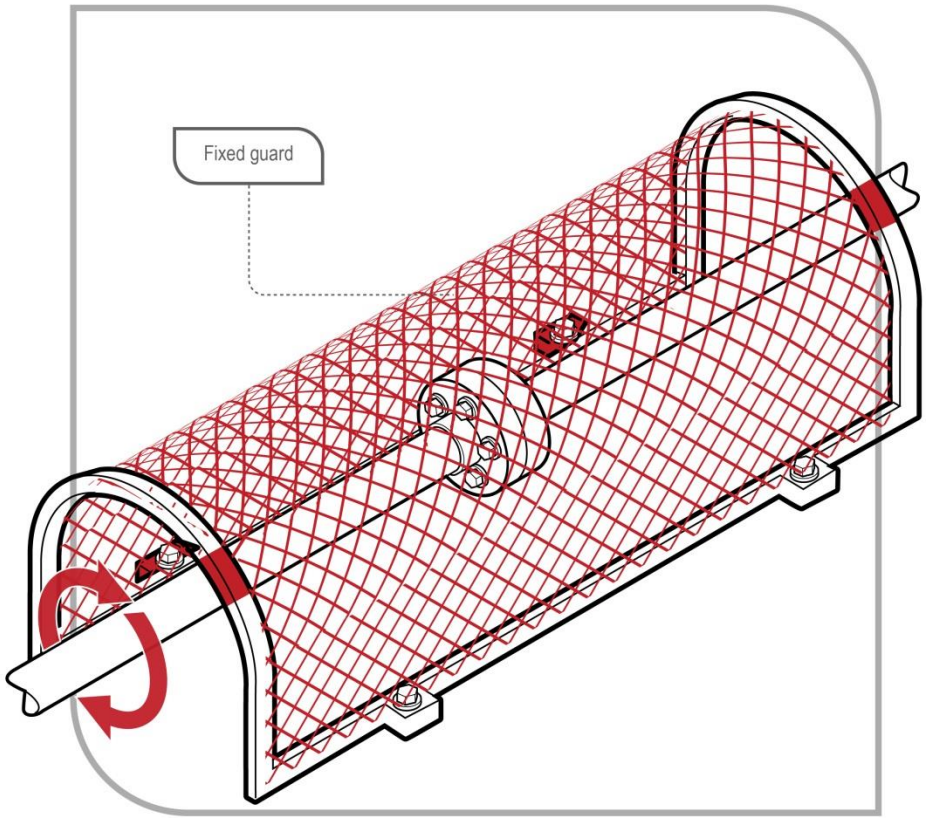

Figure 3 Fixed guard on rotating shaft or coupling

Physical barriers, for example perimeter fences securely fixed in position, may prevent access to dangerous areas. Any access points, for example gates and doors, should be secured with a lock and key or an interlocking system (see Figure 4). Isolation procedures may be necessary where there is a danger of machines activating while a person is inside the barrier. For example, when an interlocked door is accidentally closed the machine should not automatically restart.

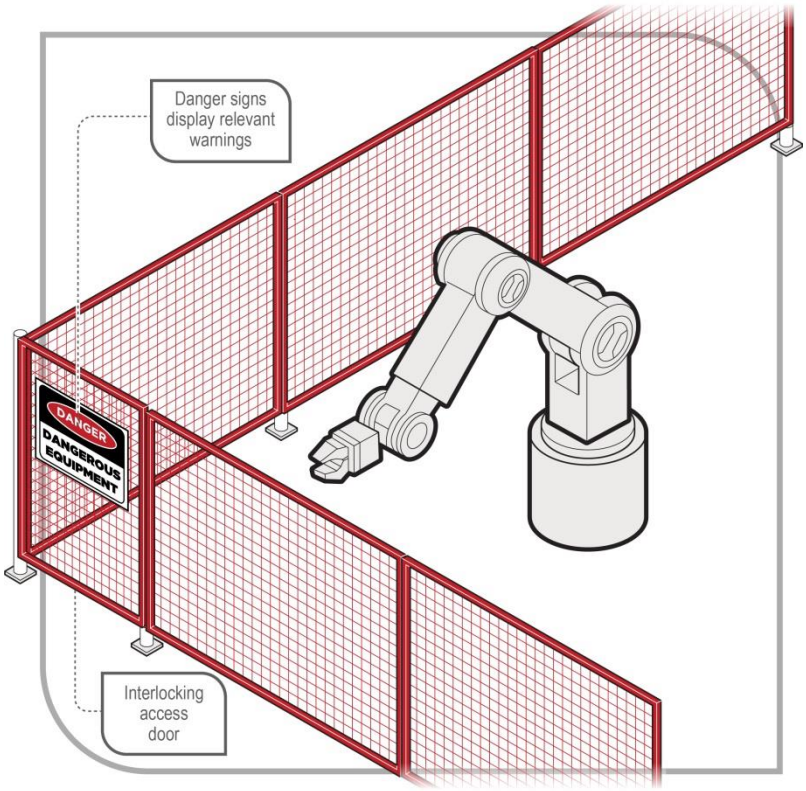

Figure 4 Perimeter fence guard with fixed panels and interlocking access door

Adjustable guarding incorporates movable sections or panels of the guard to allow materials to be fed into the guarded area while still preventing physical contact (see Figure 5).

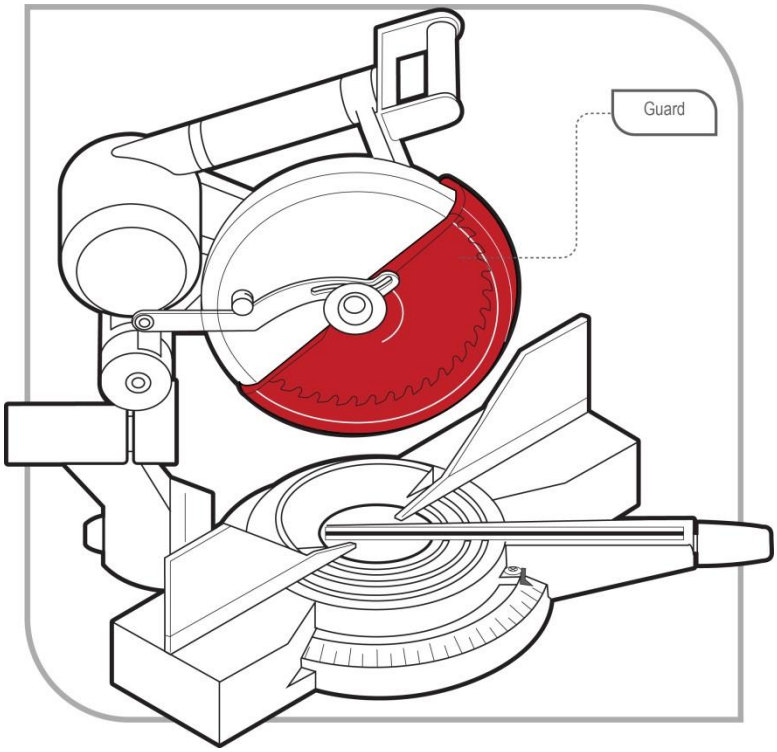

Figure 5 Self-adjusting guard for a drop saw

Physical barrier guarding should be strong enough to resist normal wear and shock that may arise from failure of the parts or processes being guarded, and to withstand prolonged use with a minimum of maintenance.

Presence-sensing systems

WHS Regulation section 226

Plant with presence-sensing safeguarding system—records

The person with management or control of plant with a presence-sensing safeguarding system at a workplace must keep a record of safety integrity tests, inspections, maintenance, commissioning, decommissioning, dismantling and alterations of the plant.

If physical guards are not reasonably practicable, then a presence-sensing system can be used to control the risks. These systems detect when a person or part of a person's body enters a defined area and stop the machine before the person or part reaches the danger zone. Photoelectric light beams, laser scanners and foot pressure mats are examples of this type of guarding. They rely on sensitive trip mechanisms and the machine being able to stop quickly, which may be assisted by a brake (see Figures 6 and 7).

Effective presence-sensing safeguard systems require selecting a trip device appropriate for the work being done, and the correct location of beams with light-activated devices, taking into account speed of entry and machine stopping time.

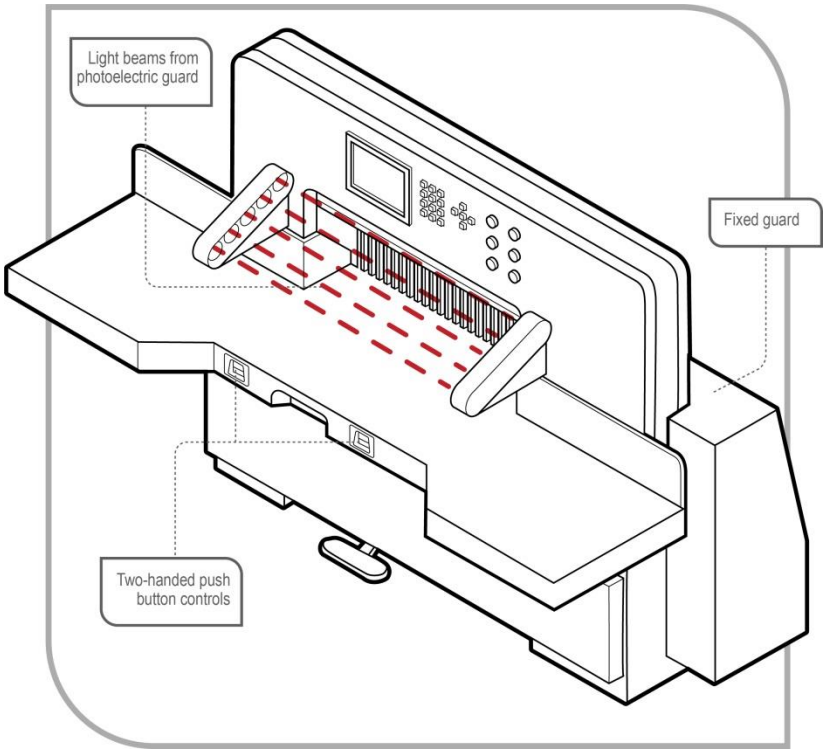

Figure 6 Paper cutting guillotine with a combination of guards including a photoelectric light curtain

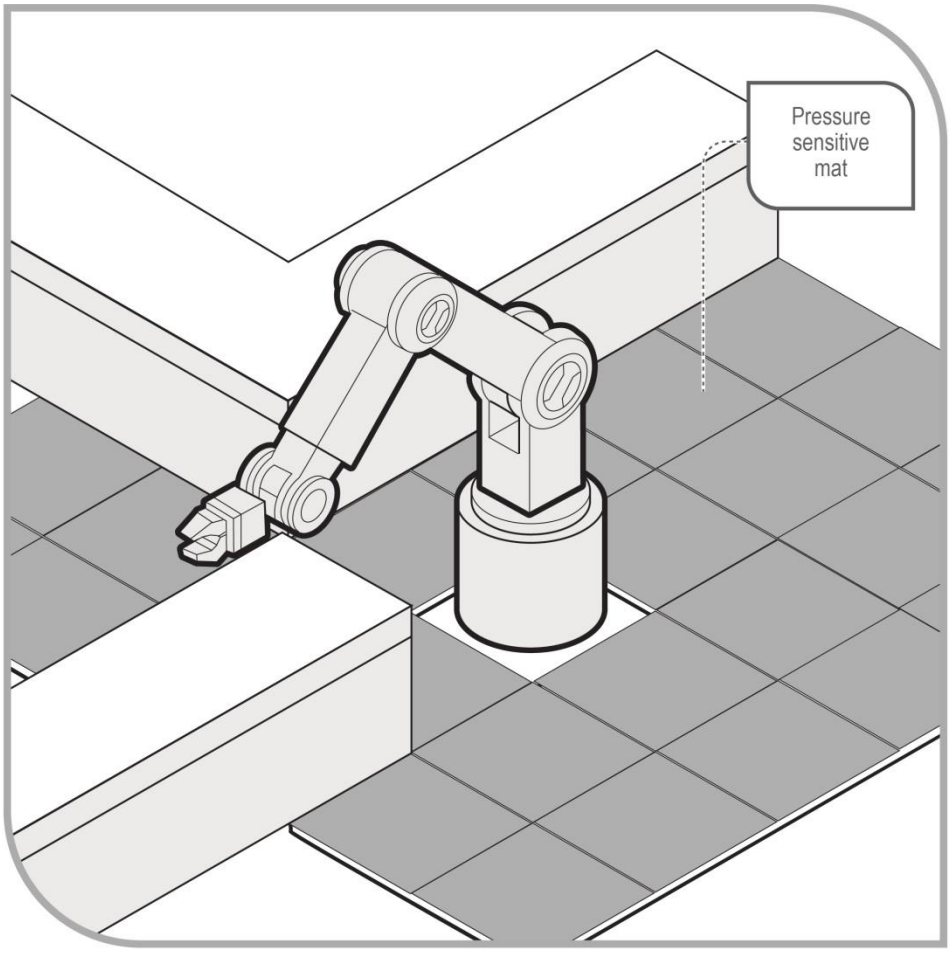

Figure 7 Pressure sensitive unit

Environmental factors

When using a guard, you should consider the environment in which it may be used. Some examples of poor guard selection include guards on high frequency welders that become electrically charged; heating of guards in hot processes; and wire mesh guards on machines emitting splashes.

If a guard is likely to be exposed to corrosion, the person with management or control of the plant should consider corrosion-resistant materials or surface coatings.

Colour coding

It is good practice for all guards to be painted the same colour. For example:

- use high visibility yellow or red, provided it is different to the plant's colour, so it can be clearly seen when a guard has been removed or when it is not in its proper place
- paint the surfaces behind the guard a contrasting or bright colour so that when the guard is removed the exposed colour is clearly visible and it is easy to identify that the guard has been removed, alerting workers to possible danger.

For some types of plant, it may be necessary to choose colours that contrast with work pieces, where these are visible through the guarding.

5.2. Operational controls

WHS Regulation section 210

Operational controls

A person with management or control of plant at a workplace must ensure that any operator controls are:

- identified on the plant to indicate their nature and function and direction of operation
- located so they can be readily and conveniently operated by each person using the plant
- located or guarded to prevent unintentional activation
- able to be locked into the 'off' position to enable disconnection from energy sources.

Poorly designed operator controls can lead to plant moving unexpectedly or not being able to be operated safely. For example, a control for setting the speed on a saw should not be a simple slider or rotary control that may be accidentally adjusted during operation. It should be graduated in fixed lockable steps.

Operational control devices should be designed:

- to enable the plant to be 'fail safe', for example when hand pressure is released on a lever controlling up and down movement, the lever will return to the neutral position and movement will stop
- to be within easy access of the operator
- so the intended function can be easily read and understood, especially in the case of dials and gauges
- so the movement of the control is consistent with established convention, for example anticlockwise to open, clockwise to close
- so the desired effect can only occur by intentional control operation, for example providing a starting control
- to withstand the rigours of normal use, undue forces and environmental conditions
- so they are located outside danger zones
- so they are readily accessible for maintenance
- so they are positioned to maximise visibility of the whole plant.

5.3. Emergency stops

WHS Regulation section 211

Emergency stops

If the design of plant at a workplace includes an emergency stop control, the person with management or control of the plant must ensure that:

- the stop control is prominent, clearly and durably marked and immediately accessible to each operator of the plant
- any handle, bar or push button associated with the stop control is coloured red
- the stop control cannot be adversely affected by electrical or electronic circuit malfunction.

Where the plant is designed to be operated or attended by more than one person and more than one emergency stop control is fitted, the person with management or control of the plant must ensure that the multiple controls are of the 'stop and lock-off' type so that the plant cannot be restarted after an emergency stop control has been used unless each activated stop control is reset.

Emergency stop devices should not be the only method of controlling risks. They should be designed as a back-up to other control measures.

Once engaged, the emergency stop controls should remain that way. It should only be possible to disengage the emergency stop controls by a deliberate action. Disengaging the emergency stop control should not restart the plant. It should only allow the normal starting sequence to be activated.

In the case of plant or parts of plant designed to work together, stop controls, including the emergency stop control, should also stop all the equipment related to the plant's operation, where continuing to operate this related equipment may be dangerous.

Figure 8 Emergency stop button

5.4. Warning devices

WHS Regulation section 212

Warning devices

WHS Regulation section 215

Powered mobile plant—specific control measures

If the design of plant includes an emergency warning device or it is necessary to include one to minimise risk, the person with management or control of the plant must ensure that the device is positioned on the plant to ensure that the device will work to best effect.

If there is a possibility of the plant colliding with pedestrians or other powered mobile plant, the person with management or control of the plant must ensure that the plant has a warning device that will warn persons who may be at risk from the movement of the plant. There are a number of warning devices that can be fitted to moving plant to alert the operator and others in the workplace.

Warning devices should be fitted to fixed plant to warn workers of an impending risk. For example, these may warn of start-up movement or release of steam or overpressure.

Automatic audible alarms

Automatic audible alarms are usually fitted to warn of forward or reversing movement. These alarms emit an intermittent sound which is activated when the gear or drive lever is engaged.

If automatic audible alarms are used, the sound should be distinct and clearly audible only in the hazard area. If several items of plant are using the same warning device, it may be difficult for workers to be aware of which item of plant is moving or is about to move. It is also possible that workers will become desensitised to the sound. For this reason, it may be more effective to combine audible alarms with other warning devices, for example flashing lights.

Motion sensors

Motion sensors are used to activate an integrated or separately located alarm. Motion sensors also warn with sound. They are sensitive to movement and are activated by motion in the required direction. These devices are suitable for plant that moves suddenly in any direction, for example rollers, bulldozers, excavators, boom lifts or scissor lifts.

Motion sensor alarms usually deactivate after a short time. They should not be deactivated if the operator has restricted vision when reversing.

Lights

Lights are usually used to warn of forward and reversing movement. These lights are wired to operate continuously or in hazard mode by flashing, usually when reversing. They generally work when the gear or drive lever is engaged.

It is important to choose the intensity and colour of lights appropriate to your workplace to ensure the moving plant can be seen. For example, an orange warning light may be suitable inside a warehouse but may not be seen in sunlight.

Flashing lights

Rotary flashing lights are coloured revolving lights and are usually mounted in a prominent place, for example the top of a vehicle cabin. They can be wired to operate continuously or can be activated by a switch. They are suitable to be used on any items of plant that move in the workplace, for example forklifts or skid steer loaders.

Flashing lights may not be suitable for plant that:

- is stationary for long periods of time
- operates in restricted areas, for example trucks travelling on defined site roads.

Percussion alarms

Percussion alarms are mechanical devices fitted to an axle or gearshift. When plant moves, a cam raises a hammer that drops repeatedly onto a bell or sounding plate. These alarms are relatively cheap to install. However, they require regular maintenance to ensure they continue functioning effectively.

Radio sensing devices

Radio sensing devices activate when the operator selects reverse. A light and alarm sound inside the cabin to alert the operator if a pedestrian is within a predetermined distance from the rear of the plant.

Air horns

Horns are suitable for powered mobile plant with long braking distances, for example trucks. Some large workplace or sites may require a truck to ‘stop and sound horn before continuing’.

5.5. Isolating energy sources

An isolation procedure is a set of predetermined steps that should be followed when workers are required to perform tasks, for example maintenance, repair, installation and cleaning of plant.

Isolation procedures involve isolating potentially hazardous energy, so the plant does not move or start up accidentally. Isolating plant also ensures entry to a restricted area is controlled while the specific task is being carried out.

The lock-out process is the most effective isolation procedure. The process is as follows:

- shut down the machinery and equipment
- identify all energy sources and other hazards
- identify all isolation points
- isolate all energy sources
- control or de-energise all stored energy
- lock out all isolation points
- tag machinery controls, energy sources and other hazards
- test by ‘trying’ to reactivate the plant without exposing the tester or others to risk.

Failure to reactivate the plant may mean the main power has been isolated. However, it does not guarantee all stored energies have dissipated. Further measures to safely release

these energies, for example hydraulic or pneumatic pressure, suspended weight or compressed springs, may be required.

In order for the isolation procedure to be effective, you should identify all energy sources likely to activate the plant or part of it and isolate or de-energise these to avoid the plant being inadvertently powered. Energy sources include:

- electricity (mains)
- battery or capacitor banks
- solar panels
- fuels
- heat
- steam
- fluids or gases under pressure. For example, water, air, steam or hydraulic oil
- stored energy. For example, compressed springs
- gravity
- radiation.

In order to isolate plant, you should use a device that effectively locks out the isolation points. These devices include switches with built-in locks and lock-out circuit breakers, fuses and valves. Other devices include chains, safety lock-out jaws (also known as hasps) and safety padlocks.

When isolating an energy source, you should, where possible, use a lock that allows one or more padlocks to be fitted. If more than one person is working on the plant at the same time, you should ensure each worker is able to attach a padlock to the device (see Figure 9). This will prevent access to the energy sources while the work is being carried out.

Figure 9 Example of lock-out with a tag and the padlocks of two workers

Another way to allow multiple locks to be used is to have one padlock on the isolation point, with the keys locked in a box that has been locked separately by each worker.

Each worker involved in the maintenance, cleaning or repair of the plant should have a lock, tag and key for each isolation point. There should be no duplicate key for any lock, except a master key that is kept in a secure location and which should only be used in an emergency. If more than one energy source needs to be isolated to enable safe shut-down of the plant, the single key to each lock-out device should be held by the same person.

Tags should only be used as a means of providing information to others at the workplace. A tag should not be used on its own as an isolation device; only a lock is effective in isolating the energy source.

Tags and locks should only be removed by the person who applied them or by the supervisor after consultation with the signatory of the tag.

In the event that the person who applied the tag is unavailable, their tag or lock may only be removed in accordance with a management approved procedure.

6. Plant registration

Schedule 5 of the WHS Regulation requires certain plant designs and items of plant to be registered (registrable plant). Schedule 5 is reproduced at Appendix B.

A person with management or control of plant in the workplace must not direct or allow a worker to use registrable plant in the workplace if it has not been registered.

6.1. Design and altered design registration

You must register the plant design if:

- it has not already been design registered
- the person conducting the business or undertaking (PCBU) alters the plant design by modifying the plant and the alterations to the design may affect health and safety.

Design registration

In order to register a plant design, the design must be verified by a design verifier who must provide a statement stating the design has been produced in accordance with published technical standards or engineering principles specified by the designer. Examples of published technical standards are provided at Appendix D.

A design can only be verified by a person who is eligible to be a design verifier under the WHS Regulation. The types of people who would be competent to verify the design of plant may include someone who:

- has educational or vocational qualifications in an engineering discipline relevant to the design to be verified
- has knowledge of the technical standards relevant to the design to be verified
- has the skills necessary to independently verify the design was produced in accordance with the published technical standards and engineering principles used in the design
- is certified by a body accredited or approved by the Joint Accreditation System—Australia and New Zealand or an equivalent overseas body to undertake conformity assessments of the design against the relevant technical standards.

For example, this could include someone who is registered on the National Professional Engineers Register administered by the Institution of Engineers Australia and is determined by the Institution to be competent to design or inspect the relevant type of plant, or is a member of the Institution of Engineers Australia with the status of Chartered Professional Engineer.

When registering a plant design, the regulator will issue a plant design registration number. The person to whom this number is issued must give this number to the manufacturer, importer or supplier of plant manufactured to that design. These duty holders must ensure the design registration number is provided to the person with management or control of that plant at the workplace.

The person with management or control of plant at the workplace must then ensure the design registration number is kept readily accessible in the vicinity of the plant at all times. A reliable way to achieve this is to permanently mark the design registration number on the plant.

Altered design registration

WHS Regulation section 244

Altered plant designs to be registered

WHS Regulation section 282

Changes to information

If a registered plant design is altered and the altered design may affect health and safety, the altered design must be registered. This is because altering a plant design may require the introduction of new risk control measures. The application for registration of the altered design must be made in the jurisdiction that registered the original design. If the original design was not registered before the specified date, the altered design must be registered as a new design.

6.2. Item registration

A person must not use a registrable item of plant in the workplace if it has not been registered.

A PCBU must not direct or allow a worker to use a registrable item of plant in the workplace if it has not been registered. Part 2 of Schedule 5 of the WHS Regulation lists registrable items of plant.

In order to have an item of plant registered, the item must be inspected, and a statement provided by a competent person stating the plant is safe to operate. A person is competent to inspect an item of plant if the person has educational or vocational qualifications in an engineering discipline relevant to the plant, or knowledge of the technical standards relevant to the plant to be inspected.

If the design of the plant was also required to be registered, the design registration number must be included with the application.

Once the item of plant is registered

When the item of plant is registered, the regulator will issue a registration document. This document will list the name of the registration holder, any associated business name, the registration number and the date of effect of the registration. The registration holder must keep this document and make it available for any inspection required under the Act.

If it is lost, stolen or destroyed, the registration holder will need to apply to the WHS regulator that registered the plant for a replacement document as soon as possible, outlining the reasons for needing a replacement.

The regulator may impose conditions on registering items of plant including conditions about the use and maintenance of the plant, record keeping or providing information to the regulator.

The registration holder must ensure the item registration number is marked on the item of plant. It will generally be a simple task to mark large items of plant with the item registration number by either etching the number in place or by fixing the number in place on a plate in a position that will not lead to damage or removal over time.

On some items, for example a tower crane comprising many parts assembled in a variable configuration to suit a particular site, it may not be feasible to mark each component of the plant. In such cases the item registration number should be marked on those components readily accessible and able to be seen when the crane is fully assembled.

Registration renewal

The WHS Regulation requires annual renewal of registration for items of plant. To renew the registration for the item of plant the registration holder must apply to the regulator before the registration expires.

Changes to item registration

If there is a change to the information provided at the time of item registration, or about the registration itself, the registration holder has 14 days to advise the regulator of the change. This must be done in writing. Without limiting this requirement, the registration holder must provide written notice to the regulator if:

- the item of plant is altered to the extent it requires new risk control measures
- the item of plant is usually fixed and is relocated
- the registration holder no longer has management or control of the item of plant.

7. Keeping records

7.1. Record keeping—plant

WHS Regulation section 237

Records of plant

WHS Regulation section 226

Plant with presence-sensing safeguarding system—records

The person with management or control of plant that is required to be registered at a workplace must keep a record of all tests, inspections, maintenance, commissioning, decommissioning, dismantling and alterations of the registered plant for the period that the plant is used or until the person relinquishes control of the plant.

The person with management or control of plant with a presence-sensing safeguarding system must keep a record of safety integrity tests, inspections, maintenance, commissioning, decommissioning, dismantling or alterations of the plant. The record must be kept for:

- five years
- the life of the plant or until the person relinquishes control of the plant if the plant is registered plant or has been altered.

It is also good practice to keep records for other types of plant in your workplace. Keeping records of the risk management process helps demonstrate compliance activities with the WHS Act and the WHS Regulation. It also helps when undertaking subsequent risk assessments.

Records on items of plant that may be kept include:

- the unique plant identification number
- plant design registration information
- relevant data from commissioning
- compliance statements and/or test certificates
- manufacturer's specifications and user manuals
- results of inspections
- results of tests on the plant including safety devices, for example protective earth continuity tests, testing of mechanical guarding, stop time measurement
- information on maintenance and major repairs carried out
- information on alterations
- information on use deviating from intended operating or design conditions
- results of risk assessments carried out on plant
- information, instruction and training provided to workers
- competencies of operators.

Appendix A—Glossary

1. **Table 1** List of key terms used in this Code of Practice

Term	Description

Competent person	A person who has acquired through training, qualification or experience the knowledge and skills to carry out the task.
	A competent person has a more specific meaning in the following circumstances:
	• For design verification, the person must have the skills, qualifications, competence and experience to design the plant or verify the design.
	• For inspecting plant for registration purposes, the person must have:
	  - educational or vocational qualifications in an engineering discipline relevant to the plant being inspected
	  - knowledge of the technical standards relevant to the plant being inspected.
	For inspecting mobile cranes, tower cranes and amusement devices the person must:
	• have the skills, qualifications, competence and experience to inspect the plant, and be registered under a law that provides for the registration of professional engineers in jurisdictions where such a law exists
	• be determined by the regulator to be a competent person.

Duty holder	Any person who owes a work health and safety duty under the WHS Act including a person conducting a business or undertaking, a designer, manufacturer, importer, supplier, installer of products or plant used at work (upstream duty holder), officer or a worker.
Fail safe	A state or condition where, if a component or function of the plant fails, a system exists to prevent an increase in the risks. For example, if the primary hoist brake fails on a crane lifting a person in a workbox, the secondary hoist brake will prevent uncontrolled dropping of the workbox. However, once the secondary brake is engaged, a lower level of safety has been reached. The situation must be made safe and the fault rectified so the fail-safe capability is re-established.
Health and safety committee	A consultative body established under the WHS Act. The committee's functions include facilitating cooperation between workers and the person conducting a business or undertaking to ensure workers' health and safety at work, and assisting to develop work health and safety standards, rules and procedures for the workplace.
Health and safety representative	A worker who has been elected by their work group under the WHS Act to represent them on health and safety matters.
May	'May' indicates an optional course of action.

Term	Description
Must	'Must' indicates a legal requirement exists that must be complied with.
Officer	An officer under the WHS Act includes: • an officer under section 9 of the Corporations Act 2001 (Cth) • an officer of the Crown within the meaning of section 247 of the WHS Act • an officer of a public authority within the meaning of section 252 of the WHS Act. A partner in a partnership or an elected member of a local authority is not an officer while acting in that capacity
Person conducting a business or undertaking (PCBU)	A PCBU is an umbrella concept which intends to capture all types of working arrangements or relationships. A PCBU includes a: • company • unincorporated body or association • sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU. A volunteer association (defined under the WHS Act, see below) or elected members of a local authority will not be a PCBU.
Plant	Plant includes machinery, equipment, appliance, container, implement and tool components or anything fitted or connected to those things. Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools, quad bikes, mobile plant and amusement devices. Plant that relies exclusively on manual power for its operation and is designed to be primarily supported by hand, for example a screwdriver, is not covered by the WHS Regulation. The general duty of care under the WHS Act applies to this type of plant. Certain kinds of plant, for example forklifts, cranes and some pressure equipment, require a licence from the regulator to operate and some high-risk plant must also be registered with the regulator.
Should	'Should' indicates a recommended course of action.
Volunteer association	A group of volunteers working together for one or more community purposes where none of the volunteers, whether alone or jointly with any other volunteers, employs any person to carry out work for the volunteer association.
Work group	A group of workers established to facilitate the representation of workers by one or more health and safety representatives. A work group may be all workers at a workplace, but it may also be appropriate to split a workplace into multiple work groups where workers share similar work conditions or are exposed to similar risks and hazards. For example, all workers on night shift.
Worker	Any person who carries out work for a person conducting a business or undertaking, including work as an employee, contractor or

Term	Description
	subcontractor (or their employee), self-employed person, outworker, apprentice or trainee, work experience student, employee of a labour hire company placed with a 'host employer' or a volunteer.
Workplace	Any place where work is carried out for a business or undertaking and includes any place where a worker goes, or is likely to be, while at work. This may include offices, factories, shops, construction sites, vehicles, ships, aircraft or other mobile structures on land or water.

Appendix B—Registrable plant designs and items of plant

Plant requiring registration of design in Schedule 5 (Part 1) of the WHS Regulation

- Pressure equipment, other than pressure piping, and categorised as hazard level A, B, C or D according to the criteria in section 2.1 of AS 4343–2005: *Pressure equipment—hazard levels*
- Gas cylinders covered by section 1 of AS 2030.1–2009: *Gas cylinders—General requirements*
- Tower cranes including self-erecting tower cranes
- Lifts, escalators and moving walkways
- Building maintenance units
- Hoists with a platform movement exceeding 2.4 metres, designed to lift people
- Work boxes designed to be suspended from cranes
- Amusement devices classified by section 2.1 of AS 3533.1–2009: *Amusement rides and devices—Design and construction* except amusement devices noted below
- Concrete placing booms
- Prefabricated scaffolding
- Boom-type elevating work platforms
- Gantry cranes with a safe working load greater than five tonnes or bridge cranes with a safe working load of greater than 10 tonnes, and any gantry crane or bridge crane which is designed to handle molten metal or Schedule 11 hazardous chemicals
- Vehicle hoists
- Mast climbing work platforms
- Mobile cranes with a rated capacity of greater than 10 tonnes.

Plant not requiring registration of design in Schedule 5 (Part 1) of the WHS Regulation

- A heritage boiler
- Any pressure equipment (other than a gas cylinder) excluded from the scope of AS/NZS 1200: Pressure equipment. See section A1 of Appendix A to AS/NZS 1200
- A crane or hoist that is manually powered
- A reach stacker
- An elevating work platform that is a scissor lift or a vertically moving platform
- A tow truck
- Amusement devices classified by section 2.1 of AS 3533.1 (Amusement rides and devices—Design and construction) that are:
  - class 1 devices
  - playground structures
  - water slides where water facilitates patrons to slide easily, predominantly under gravity, along a static structure
  - wave generators where patrons do not come into contact with the parts of machinery used for generating water waves, and
  - inflatable devices, other than inflatable devices—continuously blown—with a platform height of three metres or more.

Items of plant requiring registration in Schedule 5 (Part 2) of the WHS Regulation

- Boilers categorised as hazard level A, B or C according to criteria in section 2.1 of AS 4343: Pressure equipment—hazard levels.
- Pressure vessels categorised as hazard level A, B or C according to the criteria in section 2.1 of AS 4343: Pressure equipment—hazard levels, except for gas cylinders; LP Gas fuel vessels for automotive use, and serially produced vessels
- Tower cranes including self-erecting tower cranes.
- Lifts, escalators and moving walkways
- Building maintenance units
- Amusement devices classified by section 2.1 of AS 3533.1: Amusement rides and devices—Design and construction except amusement devices noted below
- Concrete placing booms
- Mobile cranes with a rated capacity of greater than 10 tonnes.

Items of plant not requiring registration in Schedule 5 (Part 2) of the WHS Regulation

- Any pressure equipment (other than a gas cylinder) excluded from the scope of AS/NZS 1200: Pressure equipment. See section A1 of Appendix A to AS/NZS 1200
- A manually powered crane or hoist
- A reach stacker
- Lifts installed in a private residence within the meaning of AS 1735.1 (Lifts escalators and moving walks- General requirements)
- Amusement devices classified by section 2.1 of AS 3533.1: Amusement rides and devices—Design and construction that are:
  - class 1 devices
  - playground devices
  - water slides where water facilitates patrons to slide easily, predominantly under gravity, along a static structure
  - wave generators where patrons do not come into contact with the parts of machinery used for generating water waves, and
  - inflatable devices, other than inflatable devices—continuously blown—with a platform height of three metres or more.

Appendix C—Hazard checklist

Plant description: Click here to enter text.

Activities for example use, cleaning and maintenance: Click here to enter text.

Assessed by: Click here to enter text.

Date: Click here to enter a date.

'Yes' to any of the following indicates the need to implement control measures		
Entanglement	**Yes**	**No**
Can a person's hair, clothing, gloves, necktie, jewellery, cleaning brush or rag become entangled with moving parts of the plant?	☐	☐
Crushing	**Yes**	**No**
Can anyone be crushed due to: • material falling off the plant? • uncontrolled or unexpected movement of the plant? • lack of capacity for the plant to be slowed, stopped or immobilised? • the plant tipping or rolling over? • parts of the plant collapsing? • coming into contact with moving parts of the plant during testing, inspection, operation, maintenance, cleaning or repair? • being thrown off or under plant? • being trapped between the plant and materials or fixed structures? • other factors not mentioned?	☐	☐
Cutting, Stabbing or Puncturing	**Yes**	**No**
Can anyone be stabbed or punctured due to: • coming in contact with sharp or flying objects? • coming in contact with moving parts during testing, inspection, operation, maintenance, cleaning or repair? • the plant, parts of the plant or work pieces disintegrating? • work pieces being ejected? • the mobility of the plant? • uncontrolled or unexpected movement of the plant? • other factors not mentioned?	☐	☐
Shearing	**Yes**	**No**
Can anyone's body parts be sheared between two parts of the plant, or between a part of the plant and a work piece or structure?	☐	☐
Striking	**Yes**	**No**

'Yes' to any of the following indicates the need to implement control measures		
Can anyone be struck by moving objects due to: • uncontrolled or unexpected movement of the plant or material handled by the plant? • the plant, parts of the plant or work pieces disintegrating? • work pieces being ejected? • mobility of the plant? • other factors not mentioned?	☐	☐
High Pressure Fluid	**Yes**	**No**
Can anyone come into contact with fluids under high pressure, due to plant failure or misuse of the plant?	☐	☐
Electrical	**Yes**	**No**
Can anyone be injured by electrical shock or burnt due to: • the plant contacting live electrical conductors? • the plant working in close proximity to electrical conductors? • overload of electrical circuits? • damaged or poorly maintained electrical leads and cables? • damaged electrical switches? • water near electrical equipment? • lack of isolation procedures? • other factors not mentioned?	☐	☐
Explosion	**Yes**	**No**
Can anyone be injured by explosion of gases, vapours, liquids, dusts or other substances, triggered by the operation of the plant or by material handled by the plant?	☐	☐
Slipping, Tripping and Falling	**Yes**	**No**
Can anyone using the plant, or in the vicinity of the plant, slip, trip or fall due to: • uneven or slippery work surfaces? • poor housekeeping, for example offcuts, cables, hoses obstructing walkways, spills not cleaned up? • obstacles being placed in the vicinity of the plant? • other factors not mentioned?	☐	☐

'Yes' to any of the following indicates the need to implement control measures		
Can anyone fall from a height due to: • lack of a proper work platform? • lack of proper stairs or ladders? • lack of guardrails or other suitable edge protection? • unprotected holes, penetrations or gaps? • poor floor or walking surfaces, for example the lack of a slip-resistant surface? • steep walking surfaces? • collapse of the supporting structure? • other factors not mentioned?	☐	☐
Ergonomic	**Yes**	**No**
Can anyone be injured due to: • poorly designed seating? • poorly designed operator controls? • high forces? • repetitive movements? • awkward body posture or the need for excessive effort? • vibration? • other factors not mentioned?	☐	☐
Hazard combination	**Yes**	**No**
Can anyone be injured due to unexpected start-up, unexpected over-run/over-speed or similar malfunction from: • failure/disorder of the control system, for example a hydraulic system? • restoring energy supply after an interruption? • external influences on electrical equipment? • other environmental factors, for example gravity and wind? • errors in the software? • errors made by the operator?	☐	☐
Other hazards	**Yes**	**No**
Can anyone be injured due to: • noise? • inadequate or poorly placed lighting? • entry into any confined spaces of the plant? • failure to select plant suitable for its intended use? • contact with hot or cold parts of plant? • exposure to hazardous chemicals, radiation or other emissions released by the plant? • lack of operator competency? • other factors not mentioned?	☐	☐

Appendix D—Examples of technical standards

The following table is a list of published technical standards providing guidance on the design, manufacture and use of certain types of plant. These technical standards provide guidance only and compliance with them does not guarantee compliance with the WHS Act and the WHS Regulation in all instances. This list is not exhaustive.

2. **Table 2** List of published technical standards

Plant description	Reference number	Standard title	Design	Make	Use
Amusement structures	AS 3533 (series)	*Amusement rides and devices*	•	•	•
Cranes including hoists and winches	AS 1418 (series)	*Cranes, hoists and winches*	•	•	
	AS 4991	*Lifting devices*	•	•	•
	AS 2550 (series)	*Cranes, hoists and winches—Safe use*			•
Conveyers	AS/NZS 4024 (series)	*Safety of machinery conveyors*	•	•	•
Earthmoving machinery	AS 2294.1	*Earth-moving machinery—Protective structures—General*	•	•	
	AS 2958.1	*Earth-moving Machinery—Safety—Wheeled machines—Brakes*	•	•	•
	ISO 6165	*Earth-moving machinery—Basic types—Identification and terms and definitions*	•		
	ISO 6746–1	*Earth-moving machinery—Definitions of dimensions and codes—Part 1: Base machine*	•		
	ISO 6746–2	*Earth-moving machinery—Definitions of dimensions and codes—Part 2: Equipment and attachments*	•		

Plant description	Reference number	Standard title	Design	Make	Use
	ISO 7133	*Earth-moving machinery—Scrapers—Terminology and commercial specifications*	•		
Electrical installation	AS/NZS 3000	*Electrical installations (known as the Aust/NZ Wiring Rules)*			•
Electrical installation within an industrial plant	AS 60204.1 (IEC 60204.1)	*Safety of machinery: Electrical equipment of machines—General requirements*	•	•	
Hand-held electric tools	AS/NZS 60745 (series)	*Hand-held motor-operated electric tools—Safety*	•	•	•
Fall arrest	AS/NZS 1891 (series)	*Industrial fall-arrest systems and devices*	•	•	•
	BS EN 1263–1	*Temporary works equipment—Safety nets—Part 1: Safety requirements, test methods*	•		
Gas cylinders	AS 2030.1	*Gas cylinders—General requirements*	•	•	
	AS 2030.5	*Gas cylinders—Filling, inspection and testing of refillable cylinders*			
	AS 2337.2	*Gas cylinder test stations—LP Gas fuel vessels for automotive use*			•
	AS/NZS 3509	*LP Gas fuel vessels for automotive use*	•	•	
Industrial (forklift) trucks	AS 2359 (series)	*Powered industrial trucks*	•	•	•
Industrial rope access systems	AS 4488.2	*Industrial rope access systems—Selection, use and maintenance*	•	•	•
Ladders	AS/NZS 1892 (series)	*Portable ladders*	•	•	

Plant description	Reference number	Standard title	Design	Make	Use
Lasers	AS/NZS IEC 60825.1	*Safety of laser products—Equipment classification and requirements*	•	•	•
	AS/NZS IEC 60825.14	*Safety of laser products—A user's guide*			
	AS 2397	*Safe use of lasers in the building and construction industry*			•
Lifts	AS 1735 (series)	*Lifts, escalators and moving walks (known as the SAA Lift Code)*	•	•	•
Machinery	AS 4024 (series)	*Safety of machinery*	•	•	•
	AS 1657	*Fixed platforms, walkways, stairways and ladders—Design, construction and installation*	•	•	
	AS 1788.2	*Abrasive wheels—Selection, care and use*	•	•	•
	AS/NZS IEC 60947.3	*Low-voltage switchgear and control gear—Switches, disconnectors, switch-disconnectors and fuse-combination units*	•		•
	AS 61508(series)	*Functional safety of electrical / electronic / programmable electronic safety-related systems*	•	•	•
	AS/IEC 61511 (series)	*Functional safety—Safety instrumented systems for the process industry sector*	•	•	•
	AS 62061	*Safety of machinery: Functional safety of safety-related electrical, electronic and programmable electronic control systems*	•	•	•
	ISO 13849.1	*Safety of machinery: Safety-related parts of control systems—Part 1 General principles for design*	•	•	•

Plant description	Reference number	Standard title	Design	Make	Use
	BS EN 61496–1:2013	*Safety of machinery—Electro-sensitive protective equipment—Part 1: General requirements and tests*	•		•
	AS 1121.1–2007	*Agricultural tractor power take-offs—Rear-mounted power take-off types 1, 2 and 3—General specifications, safety requirements, dimensions for master shield and clearance zone*	•	•	
	AS 1636 (series)	*Tractors—Roll-over protective structures—Criteria and tests*	•	•	
	AS/NZS 2153.1	*Tractors and machinery for agriculture and forestry—Technical means for ensuring safety—General*	•	•	
	SAE J 167	*Overhead protection for agricultural tractors—Test procedures and performance requirements*	•	•	
	ILO Code of Practice	*Safety and Health in the Use of Machinery*			
Machinery guarding	AS 4024 (series)	*Safety of machinery*	•	•	•
	ISO 12100:2010	*Safety of machinery—General principles for design—Risk assessment and risk reduction*	•	•	•
Miniature boilers	AMBSC Code—Part 1	*Copper Boilers—Issue 7–2001*	•	•	
	AMBSC Code—Part 2	*Steel Boilers—Issue 5–12012*	•	•	
	AMBSC Code—Part 3	*Sub-Miniature Boilers—Issue 1–2006*	•	•	
	AMBSC Code—Part 4	*Duplex Boilers—Issue 1–2010*	•	•	

Plant description	Reference number	Standard title	Design	Make	Use
Passenger ropeways	AS 4722	*Passenger ropeways and passenger conveyors*			
Pressure equipment	AS/NZS 1200	*Pressure equipment*	•	•	•
	AS 2593	*Boilers—Safety management and supervision systems*	•		•
	AS 2971	*Serially produced pressure vessels*	•	•	
	AS/NZS 3788	*Pressure equipment—In-service inspection*			•
	AS 3873	*Pressure equipment—Operation and maintenance*			•
	AS 3920	*Pressure equipment—Conformity assessment*	•	•	
	AS 4343	*Pressure equipment—Hazard levels*			
	ASME IPV Code 1	*Boiler and pressure vessel code- Rules for construction of power boilers*	•	•	
	ASME IPV Code 2	*Boiler and pressure vessel code- Materials*	•	•	
	ASME IPV Code 5	*Boiler and pressure vessel code- Non-destructive examination*	•	•	
	ASME PV Code 8 Div 1	*Boiler and pressure vessel code- Rules for construction of pressure vessels*	•	•	
	ASME PV Code 8 Div 2	*Boiler and pressure vessel code- Rules for construction of pressure vessels—Alternative rules*	•	•	
	ASME PV Code 8 Div 3	*Boiler and pressure vessel code- Alternative rules for construction of high-pressure vessels*	•	•	

Plant description	Reference number	Standard title	Design	Make	Use
	ASME PV Code 9	*Boiler and pressure vessel code- Welding and brazing qualifications*	•	•	
	ANSI NGV2	*compressed natural gas vehicle fuel containers*	•	•	
			•	•	
	ISO 11439	*Gas cylinders—High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles*	•	•	
	ISO 21009–2 (series)	*Cryogenic vessels—Static vacuum insulated vessels—Part 2: Operational requirements*	•	•	•
Pressure piping	AS 4041	*Pressure piping*	•	•	
Scaffolding	AS/NZS 1576.1	*Scaffolding—general requirements*	•	•	
	AS 1577	*Scaffold decking components*	•	•	
	AS/NZS 4576	*Guidelines for scaffolding*			•
Spray painting	AS/NZS 4114.1	*Spray painting booths—Design, construction and testing*	•	•	•
	AS/NZS 4114.2	*Spray painting booths—Installation and maintenance*			•
Steam turbines	BIS IS 1498.2	*Rules for steam turbine thermal acceptance tests*	•		
	API 612	*Petroleum, petrochemical and natural gas industries—Steam turbines—Special purpose applications*	•		
Ventilation	AS 1668.2	*The use of ventilation and air conditioning in buildings—Mechanical ventilation in buildings*	•	•	•

Plant description	Reference number	Standard title	Design	Make	Use
Work boxes—crane lifted	AS 1418.17	*Cranes (including hoists and winches)—Design and construction of workboxes*	•	•	
	AS 2550.1	*Cranes, hoists and winches—Safe use—General requirements*			•
	ISO 2374	*Lifting appliances—Range of maximum capacities for basic models*	•	•	

3. **Table 3** Key to abbreviations

Key	Abbreviations name
AMBSC	Australian Miniature Boiler Safety Committee
ANSI	American National Standards Institute
API	American Petroleum Institute
AS	Australian Standard
ASME	American Society of Mechanical Engineers
AS/NZS	Australian Standard / New Zealand Standard
BS	British Standard
CSA	Canadian Standards Association
EN	Europaische Norm (European Standard)
IEC	International Electrochemical Commission
ISO	International Standards Organisation
NZS	New Zealand Standards
SAE	Society of Automotive Engineers


TOYOTA
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EQUIPPED
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service
07 4634 3431


NO SMOKING
WARNING
FORKLIFTS IN USE
GENERAL WASTE


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service
1300 558 299
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NO SMOKING
NO ENTRY
AUTHORISED PERSONS ONLY
SECURITY NOTICE
SURVEILLANCE CAMERAS IN USE
FORKLIFTS OPERATING IN THIS AREA


LHEP


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LEMRCH


JUMBO
LERCH
Nally MegaBin
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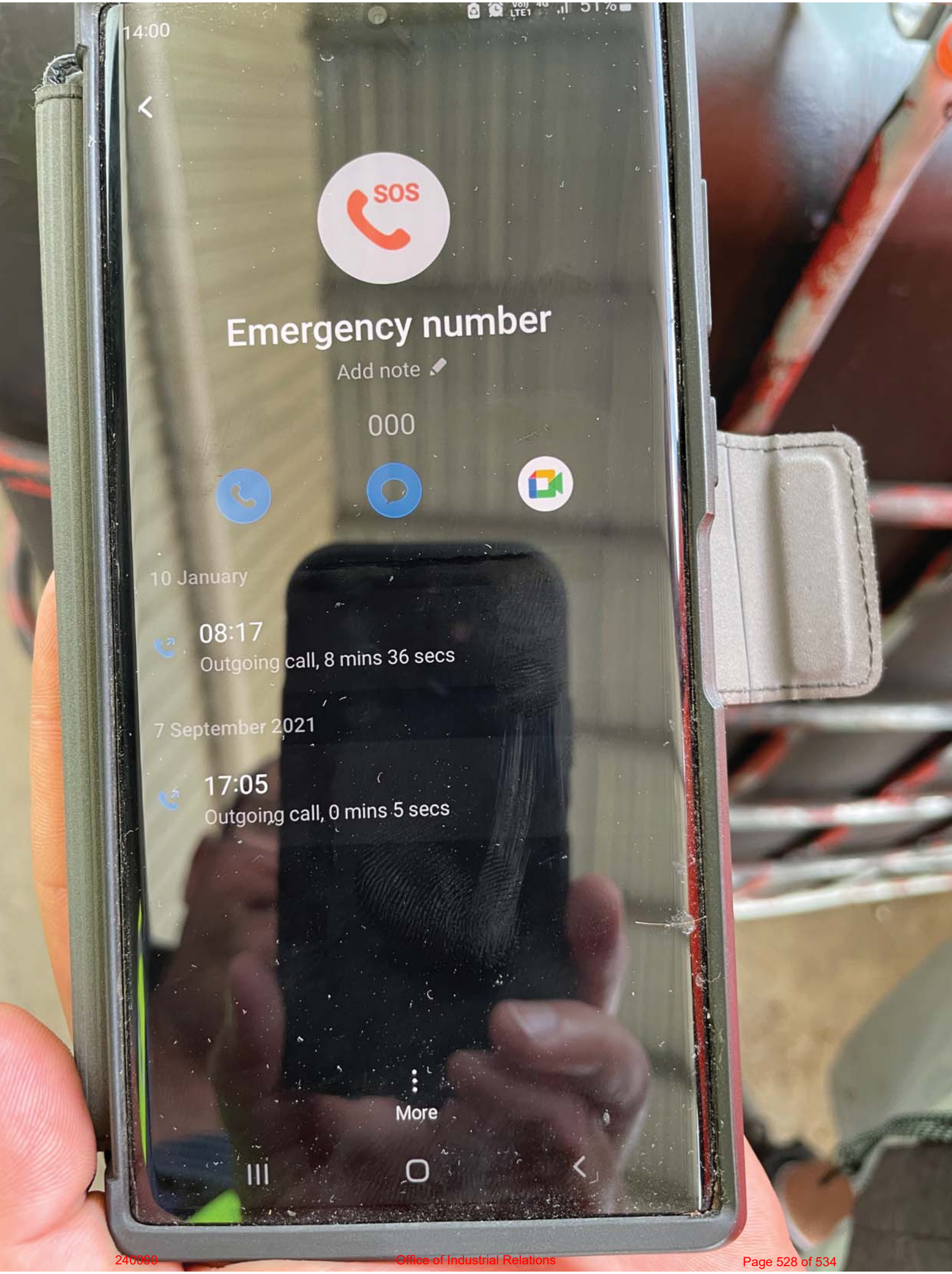
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7 September 2021
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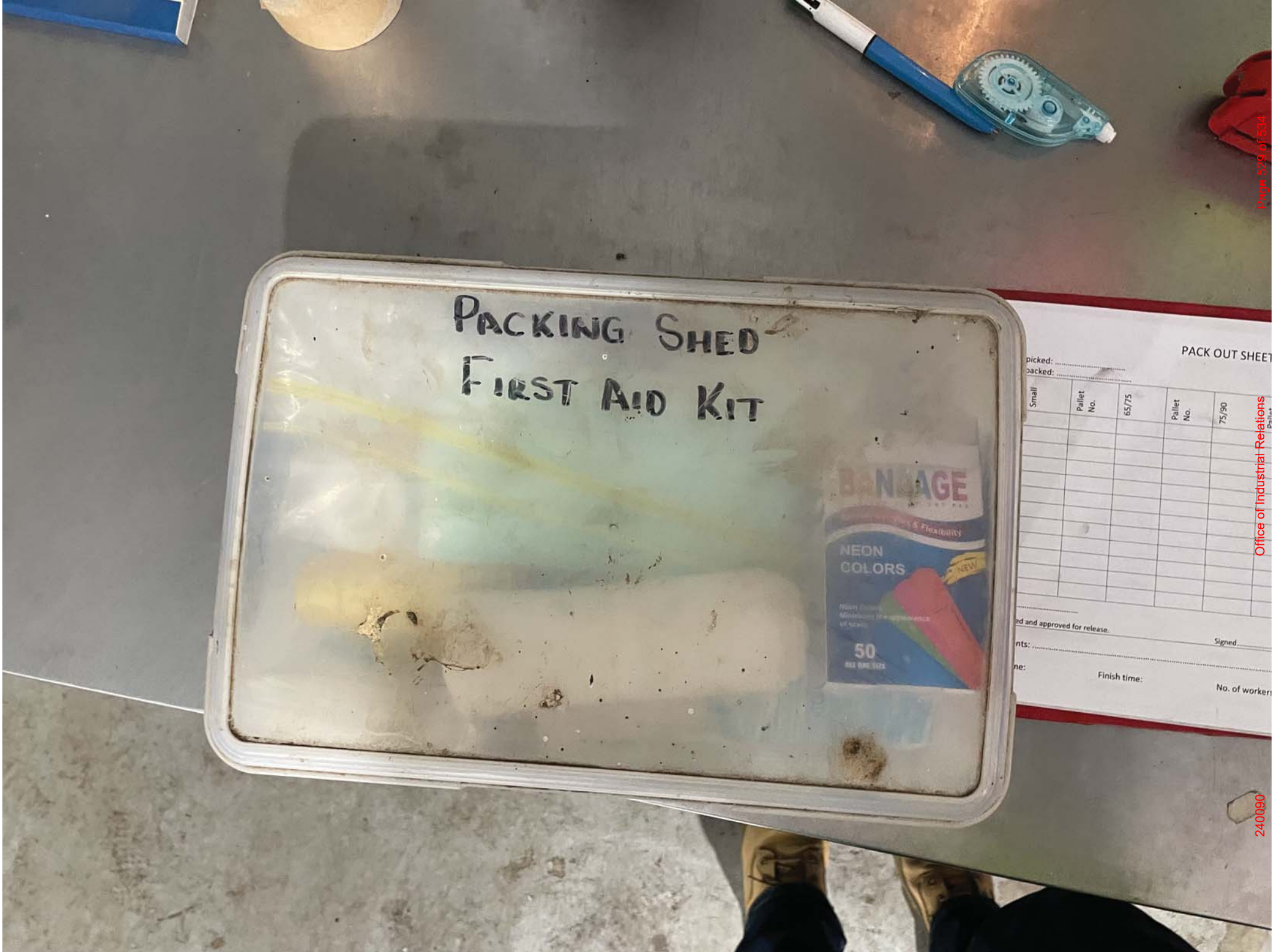

Dettol

For use as a gentle antiseptic on the skin.
Also suitable as a household disinfectant

Directions

ANTISEPTIC:

Prepare a 1:20 dilution using 20 mL (approximately 1 capful) of Dettol Liquid in 400 mL of water. Liberally cleanse the affected area with diluted Dettol Liquid until the area is wiped clean. **Discard any unused mixture.**

SURFACE DISINFECTION

For household grade disinfection, prepare a 1:20 dilution using 20 mL of Dettol Liquid in 400 mL of water. Wipe down hard surfaces around the home. No need to rinse. Discard diluted solutions after use.

Toll Free Contact Line
AUST: 1800 226 766
NZ: 0508 731 234
Reckitt Benckiser
44 Wharf Rd, West Ryde
NSW 2114, AUSTRALIA
Auckland, NEW ZEALAND.
Made in the UK from imported and local components

WARNING: FOR EXTERNAL USE ONLY. DO NOT USE UNDILUTED LIQUID. AVOID CONTACT WITH EYES. KEEP OUT OF REACH OF CHILDREN. IF SWALLOWED SEEK MEDICAL ADVICE. DO NOT MIX WITH DETERGENTS OR OTHER CHEMICALS. DO NOT USE ON HIGH GLOSS ACRYLIC SURFACES.
STORE BELOW 30°C

9363 1037

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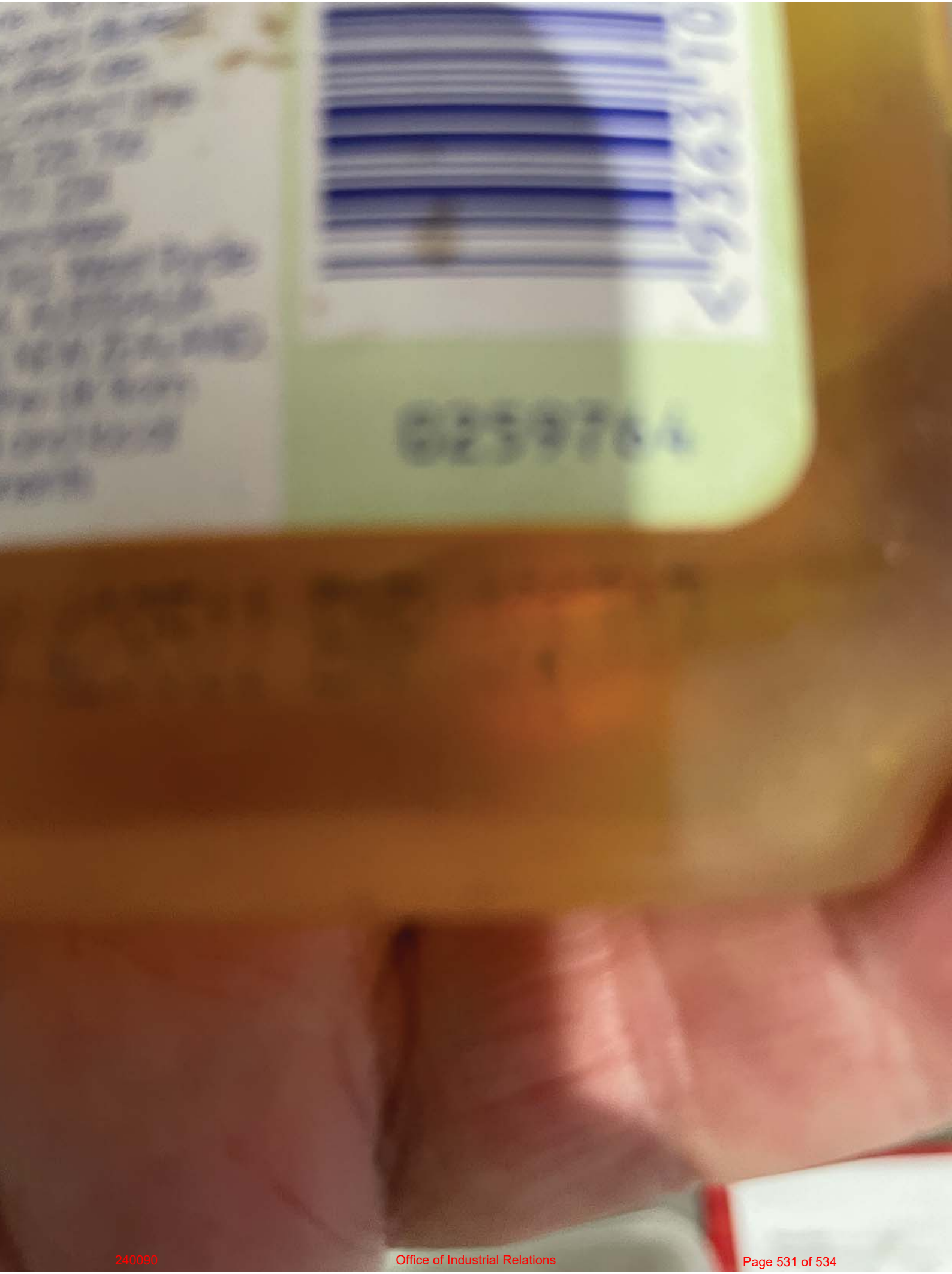


LERCH FARMS
PALLET No.
G.D. & L.J. LERCH
THIS IS A REMOVABLE LABEL PLEASE REMOVE CAREFULLY
T SHEET – BEETROOT
Block picked from:
Pallet No.
Large
Pallet No.
End of day
of workers:


LERCH
G.D. & L.J. LERCH
No. 09911
LERCH FARMS
PACK OUT SHEET – BEETROOT
Block picked from:
Pallet No.
75/90
Pallet No.
Large
Pallet No.
BINS
Scale 5-point check =
Packaging tare weight :
TIME
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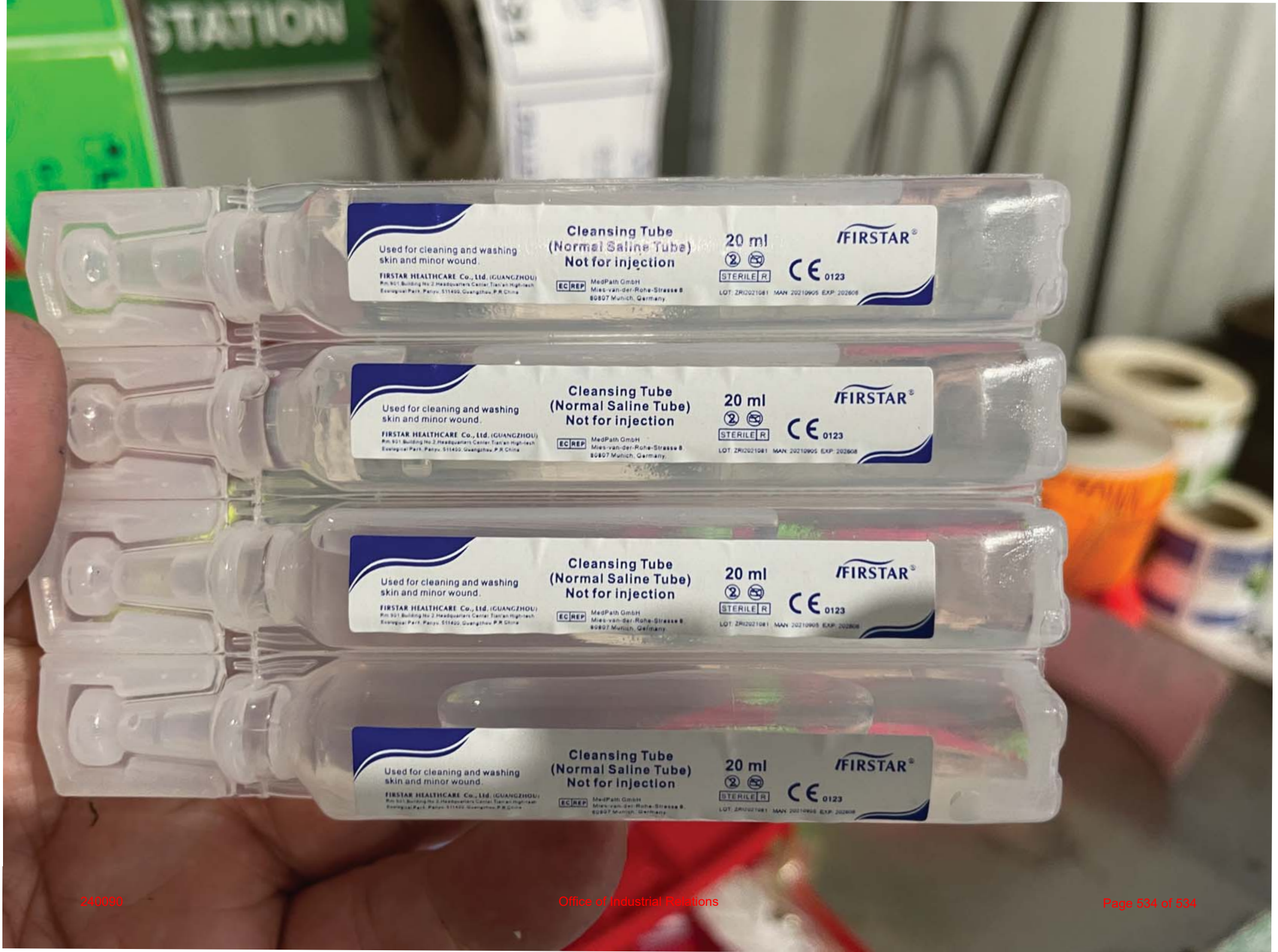
Start
Midday
End of day
workers:
3489
PALLET No
THIS IS A REMOVABLE LABEL
PLEASE REMOVE CAREFULLY


Used for cleaning and washing skin and minor wound.
FIRSTAR HEALTHCARE Co., Ltd. (GUANGZHOU)
Cleansing Tube
(Normal Saline Tube)
Not for injection
EC REP MedPath GmbH
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