



What to expect when an inspector calls

A guide for persons conducting a business or undertaking
This brochure will help you understand the reasons for an inspector visit and what to expect when an inspector comes to your workplace.





What to expect when an inspector calls

Introduction

Workplace duties

Work health and safety, electrical safety and safety in recreational water activities laws are administered by Workplace Health and Safety Queensland (WHSQ) and the Electrical Safety Office (ESO). They are responsible for ensuring workplaces and individuals comply with these laws through effective compliance monitoring and enforcement.

WHSQ and ESO inspectors seek to ensure workplaces and individuals comply with the following core principles:

- Workers should be protected from exposure to the risks of illness and injury at work.
- People should not have their health and safety put at risk because of work being carried out.
- The people in control of the work that creates the risk are in the best position to eliminate or minimise exposure to those risks.
- Persons conducting a business or undertaking (PCBUs), officers, workers and others need to be proactive in ensuring health and safety in the workplace.
- Owners, managers and people in control of the business must communicate and collaborate with workers and their representatives to manage work health and safety risks.
- Where there are multiple duty holders, they need to work together to exchange ideas and information about eliminating or minimising risks in their workplace.

Compliance and Monitoring Enforcement Policy (CMEP)

The Compliance Monitoring and Enforcement Policy (CMEP) was developed to inform workplaces of WHSQ and ESO's approach to compliance monitoring and enforcement and to guide inspectors and their managers in their decision-making and use of enforcement measures.

WHSQ and ESO will give priority to compliance activities that focus on the industries and mechanisms which pose the greatest risk to the health and safety of workers and others. Inspectors will use their legal powers to monitor and enforce compliance which includes directing compliance, imposing a penalty and providing information and advice about compliance.

Inspectors will not give prior notice of entry to a workplace except in specific circumstances (e.g. remote sites where it is necessary to ensure someone is on site or where it is necessary to ensure a particular person is available) and where advance notice will not compromise the intention of the visit.

Workplace conduct

You must provide reasonable help to assist the inspector in his or her work, if they request it. It is an offence to hinder, obstruct, impersonate, assault, threaten or intimidate an inspector or a person assisting an inspector.

WHSQ and ESO are committed to providing a safe and healthy work environment for inspectors and will not tolerate verbal abuse, violence or aggressive behaviour towards inspectors carrying out their duties.

Why inspectors visit workplaces

In Queensland there are around 40 fatalities each year due to traumatic workplace incidents and more than 24,000 serious work-related injuries. These deaths and injuries carry with them a devastating and personal impact on workers and their families, with a significant financial cost to the Queensland community. Overall, workplace incidents are estimated to cost the Queensland economy over \$5.8 billion each year.

WHSQ and ESO inspectors will visit a workplace in response to a health and safety incident and to monitor and enforce compliance. Inspectors may:

- investigate breaches of work health and safety and electrical safety laws
- assist with resolving work health and safety issues
- assist with resolving right of entry and workplace access disputes
- review disputed provisional improvement notices
- conduct inspections and national, state-wide and regional audit campaigns
- provide information and advice on the laws.

Compliance monitoring and enforcement is designed to ensure:

- obvious risks to the health and safety of workers and others are managed
- breaches of the laws are addressed quickly
- work is conducted in a way that is electrically safe
- PCBUs are fulfilling their duties to ensure the health and safety of workers and others
- officers of a PCBU are exercising due diligence to ensure the PCBU is complying with any relevant duties.





Residential premises

WHSQ and ESO inspectors have the power to enter residential premises when:

- the inspector suspects a residential premise is used as a workplace
- entry is authorised by a search warrant
- entry is at a reasonable time (i.e. the times the inspector believes the work is being done)
- it is used for storing or handling dangerous goods
- it involves the use or storage of high risk plant that affects public safety.

An ESO inspector may also enter a place if the entry is urgently required to investigate the circumstances of a serious electrical incident or dangerous electrical event.

The inspector must leave a residential premise if it does not meet any of the above criteria.

Inspector powers

WHSQ and ESO inspectors have legal powers under the law which allow them to enter any workplace. An inspector can enter with or without the consent of the person with management or control of the business and without prior notice.

WHSQ and ESO inspectors carry out their role with minimal disruption to any workplace where possible however, when an incident occurs or dangerous work practices exist, they will intervene to ensure everyone is safe.

The laws provide inspectors with a range of powers that help them do their job. This includes the power to:

- enter a workplace or suspected workplace
- inspect, examine and make inquiries
- seize things (including documents)
- bring and use any equipment or materials they need
- take measurements, conduct tests and make sketches or recordings (e.g. photographs, films, audio and video)
- take and remove samples for analysis without paying for it
- copy documents (e.g. training records, employee records, manufacturer's instructions)
- require a person to provide a document
- require a person to answer questions
- require a person to provide his or her name and residential address
- issue a non-disturbance notice to preserve or prevent the disturbance of a site
- take affidavits
- issue improvement, prohibition and infringement notices
- exercise any compliance power or other power that is necessary.

What inspectors do during a visit

Inspectors will carry photo identification and identify themselves once they have entered the workplace. They will take all reasonable steps to notify the relevant person conducting the business or undertaking, the person with management or control of the workplace, any health and safety representative for workers and any work health and safety officer of their arrival and the reason for their visit. The person with management or control of the workplace, health and safety representative or a work health and safety officer will be invited to accompany the inspector during the visit.

Inspectors may visit a workplace as a team because they specialise in a particular aspect of safety management (e.g. ergonomics, hazardous chemicals). They may bring other individuals who are not inspectors, including technical experts, interpreters or police officers. An inspector can also require a person at the workplace to help during the visit.

The inspector will explain the focus of the visit and the inspection process. They may review documented procedures, observe work practices, speak with workers and supervisors and look at tools and equipment.

During workplace visits, inspectors may identify breaches that can be rectified immediately to achieve compliance. These will be recorded by the inspector and noted on the PCBU/ workplace's record. Breaches that cannot be rectified immediately will result in a notice to remedy.

At the end of the inspection, the inspector will summarise the key findings and explain any actions that need to be taken. When the inspector identifies a contravention or serious risk, they will use their powers to address the matter, which includes issuing notices. If notices are issued, the inspector will explain these as well as your right of review if you disagree with the decision.

When an inspector visits a workplace to ensure you are complying with the law, they will observe the workplace, talk to PCBUs and workers and review safety documents.

An inspector will use this information to determine the level and suitability of control measures being used to manage risks. This assessment will produce one of five residual risk ratings:

1. Controls are in place. The controls are working and are effective (i.e. the hazard or risk has been eliminated or residual risk is minimised).
2. Controls are in place, so far as is reasonably practicable. There is some remaining risk because better controls do not appear to be available or a better alternative would require an investment grossly disproportionate to the risk. Ongoing monitoring of this risk is needed.
3. Controls are low level with no evidence of investigation into higher order controls. Low level control measures may still be considered a contravention if higher level control measures are reasonable and available.
4. Controls are inadequate. There are known problems or limitations with existing controls and further action is needed to eliminate or minimise exposure to the risk.

5. The risk is uncontrolled. Controls either have not been implemented, or are grossly inadequate. Urgent action is required.

A residual risk rating of three or higher would indicate a breach has occurred and enforcement action is required to prevent workers and others being exposed to the likelihood of serious injury or illness.

Visits to investigate workplace incidents

WHSQ and ESO exercise discretion in deciding the extent that workplace incidents will be investigated. They are guided by the principles set out in the National Compliance and Enforcement Policy.

During an investigation into an incident, an inspector may:

- take action to secure the scene to prevent evidence from becoming lost or misplaced (e.g. prevent access to part of the workplace)
- seize evidence such as an item of plant, part of a workplace or an entire workplace
- take photographs, make sketches and take notes
- speak with employers, managers and workers, especially those who witnessed the incident
- take formal statements and/or affidavits from witnesses
- examine records and documents (and take copies)
- take another person to the workplace to assist in the investigation (e.g. a technical expert)
- take proportionate and responsive enforcement action
- require persons to answer questions and produce documents.

If evidence is seized an inspector will issue a receipt for the seized item. The inspector will explain the process for seizure, storage and return of the seized item. The owner of the item may apply for it to be returned after a six-month period. The inspector will also advise who to contact for updates about when the item is likely to be returned.

Notifiable incidents

A serious workplace incident investigation will usually begin immediately after WHSQ or ESO are notified. There is a requirement that certain types of workplace and electrical safety incidents must be notified to WHSQ and ESO. For workplace incidents this includes the death, serious injury or serious illness of a person or involves a dangerous incident. For electrical safety, this includes a serious electrical incident or dangerous electrical event. More information regarding notifiable incidents is available at worksafe.qld.gov.au.

An inspector could visit the workplace several times to complete the investigation. The time it takes to complete the investigation will vary depending on the circumstances. More complex incidents can take many months to complete.

In the event of a workplace death, WHSQ or ESO will contact the deceased's next of kin. During this contact, the next of kin will be consulted about their preferences for ongoing contact and how they can access further information about the investigation.

What to expect from enforcement measures

Inspectors have several enforcement measures available to direct compliance or penalise non-compliance. These work as an effective incentive for compliant behaviour and as a deterrent to non-compliance. If an inspector detects a breach they can:

- provide an opportunity for the PCBU to immediately rectify a breach
- issue one or more of the following:
 - A prohibition notice, requiring an immediate action if the inspector reasonably believes an activity is occurring, or may occur, at a workplace that involves or will involve a serious risk to the health or safety of a person from an immediate or imminent exposure to a hazard.
 - An electrical safety protection notice (ESPN) if there is an immediate electrical risk to people or property.
 - An improvement notice for a contravention of the law that does not result in the issue of a prohibition notice or ESPN.
 - A non-disturbance notice requiring immediate action for a business or person to preserve a site.
 - An unsafe equipment notice for defective or hazardous electrical equipment that is likely to cause a serious electrical incident.
 - An infringement notice (on the spot fine) if the inspector believes, on reasonable grounds, that a person is committing or has committed an infringeable offence. For example, failing to provide first aid equipment. Infringement notices may be issued to an organisation, individual or both. There are many contraventions where issuing an infringement notice is mandatory. For example, failing to stop high risk construction work that is not carried out in accordance with a safe work method statement. The list of infringeable offences that are priority areas for enforcement, are available at worksafe.qld.gov.au and will change periodically to reflect current and emerging risks.
- seize items (e.g. plant, equipment or substances)
- institute court proceedings for an offence.

Enforcement measures are specific and proportionate to the situation, and consider:

- the level of risk
- the level of actual or potential harm
- the availability, clarity and status of standards or guidance
- any relevant history of non-compliance
- whether the contravention has been identified as a priority area for enforcement.

When taking enforcement action, inspectors will explain:

- the reasons for taking the action
- the evidence on which they have based their decision
- the actions required in order to comply
- the date by which compliance is required
- where to get guidance on how to comply.

If you are unsure about what is required you should ask the inspector to clarify.



What review rights exist

An application can be made to review some inspectors' decisions, such as the issuing of an improvement or prohibition notice. However, the decision to issue an infringement notice cannot be reviewed.

Internal reviews of decisions

You may apply for an internal review of an inspector's decision. An application for internal review must be made within 14 calendar days of the decision. For an improvement notice, an application must be made in the time stated on the notice or 14 calendar days, whichever is shorter. The outcome of the review may be:

- confirm the original decision
- vary the original decision
- substitute the original decision for another decision.

If the review relates to a prohibition or non-disturbance notice, you may apply for a stay (i.e. suspension) of the original decision while the internal review process is underway.

If the review relates to an improvement notice, a stay is automatically granted once the application for internal review is lodged. You will receive written notice about the outcome of the internal review.

If applicant is dissatisfied with the internal review decision or the regulator's decision, they may apply for an external review.

External reviews of decisions

The external review will be conducted by the Queensland Civil and Administrative Tribunal (QCAT) or the Queensland Industrial Relations Commission (QIRC) depending on the type of decision.

If the decision is reviewable by QCAT you must submit your written notice of appeal to QCAT within 28 days of receiving the notice of decision.

If the decision is reviewable by QIRC, you must file a written application for a review with the industrial registrar. The application must be filed within 30 days of the applicant receiving the notice.

QCAT and QIRC may:

- confirm or vary the original decision
- set aside the original decision and substitute another decision
- set aside the original decision and return the matter to the decision-maker with appropriate directions.

The list of reviewable decisions can be found on worksafe.qld.gov.au and outlines who is eligible for a review and who would undertake the external review.

Infringement notices

Neither the decision to issue nor the content of an infringement notice is reviewable. The recipient of an infringement notice may choose to:

- pay the fine in full
- apply to the state penalties enforcement registry for a payment plan
- elect to have the matter heard in a magistrates court.

Inspector conduct

Inspectors come from diverse backgrounds. Some have trade experience and some have tertiary qualifications in occupational health and safety disciplines.

Inspectors undergo an induction as well as on the job coaching, mentoring and training on work health and safety and electrical safety issues.

Inspectors are expected to deliver professional services where they:

- treat all people in the business and at the workplace with respect, dignity and sensitivity
- interact with duty holders and other individuals in a timely and efficient manner
- remain professional and consistent
- ensure confidential information or documents are not used or disclosed inadvertently
- undertake activities without favouritism or discrimination
- explain all decisions
- conduct all activities in accordance with the values outlined in the Code of Conduct for the Queensland Public Service and Global Code of Integrity for Labour Inspection.

If you feel that an inspector has not operated within these principles, you can make a complaint to the regional office in your area.

Who to talk to about workers' compensation

All employers in Queensland are required to have a workers' compensation policy that covers their employees.

Workers' compensation insurance in Queensland is handled by WorkCover Queensland, except where the employer has been granted a licence to self-insure. Contact WorkCover Queensland on 1300 362 128 or visit www.worksafe.qld.gov.au.

Further information

Visit worksafe.qld.gov.au to:

- find more information about the Compliance Monitoring and Enforcement Policy
- download information and tools to help you manage health and safety in your business
- subscribe to eSAFE and follow WHSQ and ESO on social media sites
- keep up to date with changes to work health and safety and electrical safety laws
- find out about audit campaigns, industry events and information sessions
- arrange a free safety advisory visit
- access work health and safety and electrical safety laws and codes of practice.

Visit worksafe.qld.gov.au or call 1300 362 128.



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How to manage work health and safety risks

Code of Practice 2011

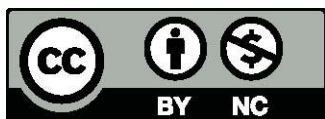
This code is based on a national model code of practice developed by Safe Work Australia and approved by the Workplace Relations Ministers' Council on 10 August 2011 as part of the harmonisation of work health and safety laws.

This Queensland code of practice was made by the Minister for Education and Industrial Relations on 27 November 2011 and published in the Queensland Government Gazette on 2 December 2011.

This code commenced on 1 January 2012.

This code was varied on 1 July 2018 by the Minister for Education and Minister for Industrial Relations.

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Foreword

The *How to manage work health and safety risks Code of Practice* 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 2013* (the WHS Regulation).

From 1 July 2018, duty holders are required to comply either with an approved code of practice under the WHS Act or follow another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety to the standard required in the 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.

Compliance with the WHS Act and WHS Regulation may be achieved by following another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety than the code.

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.

This code of practice has been developed by Safe Work Australia as a model code of practice under the Council of Australian Governments' *Inter-Governmental Agreement for Regulatory and Operational Reform in Occupational Health and Safety* for adoption by the Commonwealth, state and territory governments.

Scope and application

This code provides practical guidance for persons who have duties under the WHS Act and WHS Regulation to manage risks to health and safety. The duty is placed on persons conducting a business or undertaking, including employers, self-employed people, principal contractors, persons with management or control of a workplace, designers, manufacturers, importers and suppliers of plant, substances or structures that are used for work.

This code applies to all types of work and all workplaces covered by the WHS Act. Other approved codes of practice should be referenced for guidance on managing the risk of specific hazards.

How to use this code of practice

In providing guidance, 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.

This code also includes various references to sections of the WHS Act and to WHS Regulation which set out the legal requirements. These references are not exhaustive. The words 'must', 'requires' or 'mandatory' indicate that a legal requirement exists and must be complied with.

OIR Disclosure Log

1. Introduction

1.1 Who has responsibility for managing work health and safety risks?

The WHS Act and WHS Regulation require persons who have a duty to ensure health and safety to 'manage risks' by eliminating health and safety risks so far as is reasonably practicable, and if it is not reasonably practicable to do so, to minimise those risks so far as is reasonably practicable.

Persons conducting a business or undertaking (PCBU) will have health and safety duties to manage risks if they:

- engage workers to undertake work for them, or if they direct or influence work carried out by workers
- may put other people at risk from the conduct of their business or undertaking
- manage or control the workplace or fixtures, fittings or plant at the workplace
- design, manufacture, import or supply plant, substances or structures for use at a workplace
- install, construct or commission plant or structures at a workplace.

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.

Officers (for example company directors) must exercise due diligence to ensure that the business or undertaking complies with the WHS Act and 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 that the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks to health and safety.

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

1.2 The meaning of key terms

Hazard means 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.

Risk is the possibility that harm (death, injury or illness) might occur when exposed to a hazard.

Risk control means 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.

1.3 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, and if you show your workers that you are serious about health and safety they are more likely to follow your lead.

To demonstrate your commitment, you should:

- get involved in health and safety issues
- invest time and money in health and safety
- ensure health and safety responsibilities are clearly understood.

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.
- **Control risks** – implement the most effective control measure that is reasonably practicable in the circumstances.
- **Review control measures** to ensure they are working as planned.

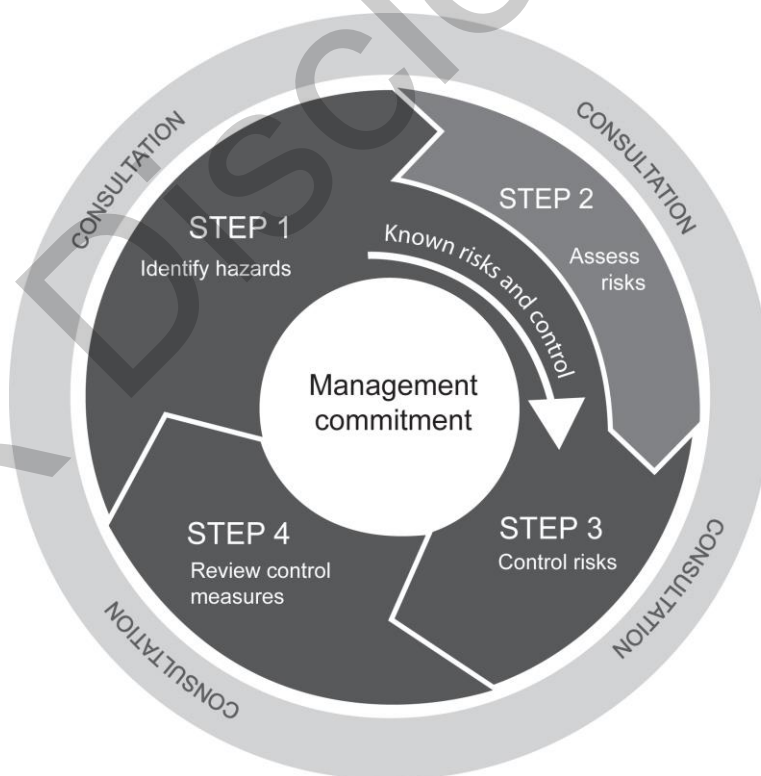


Figure 1: The risk management process

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 may simply implement the controls.

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 your workers

WHS Act section 47: The WHS Act requires that you consult, so far as is reasonably practicable, with workers who carry out work for you who are (or are likely to be) directly affected by a work health and safety matter.

WHS Act section 48: If the workers are represented by a health and safety representative, the consultation must involve that representative.

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

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, co-operating and co-ordinating activities with other duty holders

WHS Act section 46: The WHS Act requires that you consult, co-operate and co-ordinate 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.

Sometimes you may share responsibility for a health and safety matter with other business operators who are involved in the same activities or who share the same workplace. For example, if you engage on-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 on-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 co-operative and co-ordinated way so that all 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 consultation is available in the *Work health and safety consultation, co-operation and co-ordination Code of Practice*.

1.4 When should a risk management approach be used?

Managing work health and safety risks is an ongoing process that is triggered when any changes affect your work activities. You should work through the steps in this code when:

- starting a new business or purchasing a business
- changing work practices, procedures or the work environment
- purchasing new or used equipment or using new substances
- 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
- 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.

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.

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 psychological hazards due to the pace of work.

Table 1: Examples of common hazards

Hazard	Potential harm
Manual tasks	Overexertion or repetitive movement can cause muscular strain
Gravity	Falling objects, falls, slips and trips of people can cause fractures, bruises, lacerations, dislocations, concussion, permanent injuries or death
Electricity	Potential ignition source. Exposure to live electrical wires can cause shock, burns or death from electrocution
Machinery and equipment	Being hit by moving vehicles, or being caught by moving parts of machinery can cause fractures, bruises, lacerations, dislocations, permanent injuries or death
Hazardous chemicals	Chemicals (such as acids, hydrocarbons, heavy metals) and dusts (such as asbestos and silica) can cause respiratory illnesses, cancers or dermatitis
Extreme temperatures	Heat can cause burns, heat stroke or fatigue Cold can cause hypothermia or frost bite
Noise	Exposure to loud noise can cause permanent hearing damage
Radiation	Ultra violet, welding arc flashes, micro waves and lasers can cause burns, cancer or blindness
Biological	Micro-organisms can cause hepatitis, legionnaires' disease, Q fever, HIV/AIDS or allergies
Psychosocial hazards	Effects of work-related stress, bullying, violence and work-related fatigue

2.1 How to find hazards

Inspect the workplace

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 is 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 suitable are the tools and equipment for the task and how well are they maintained?
- 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 as 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.

Make a list of all the hazards you can find, including the ones you know are already being dealt with, to ensure that nothing is missed. You may use a checklist designed to suit your workplace to help you find and make a note of hazards.

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.

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 hurt 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 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.

A risk assessment can be undertaken with varying degrees of detail depending on the type of hazards 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 recommended by safety professionals.

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
- changes at the workplace occur that may impact on the effectiveness of control measures.

A risk assessment is mandatory under the WHS Regulation for high risk activities such as 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 necessary in the following situations:

- Legislation requires some hazards or risks to be controlled in a specific way – these requirements must be complied with.
- A code of practice or other guidance sets out a way of controlling a hazard or risk that is applicable to your situation and you choose to use the recommended controls. In these instances, the guidance can be followed.
- There are well-known and effective controls that are in use in the particular industry, that are suited to the circumstances in your workplace. These controls can simply be implemented.

3.2 How to do a risk assessment

All 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 store room 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.

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, fatigue, 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 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).
- 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 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 case study in Appendix A.

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 maintenance and cleaning as well as breakdowns of equipment and failures of health and safety controls.

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.

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

Table 2	
Questions to ask in determining likelihood	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. <i>For example:</i> <ul style="list-style-type: none"> 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. <i>For example:</i> 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. <i>For example:</i> 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. <i>For example:</i> 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: <ul style="list-style-type: none"> Environmental conditions change. For example, work performed in high temperatures in a confined 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?	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 possible, minimising the risks so far as is reasonably practicable.

In deciding how to control risks 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 risk control

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 risk control. The WHS Regulation require duty holders to work through this hierarchy when managing risk under the WHS Regulation.

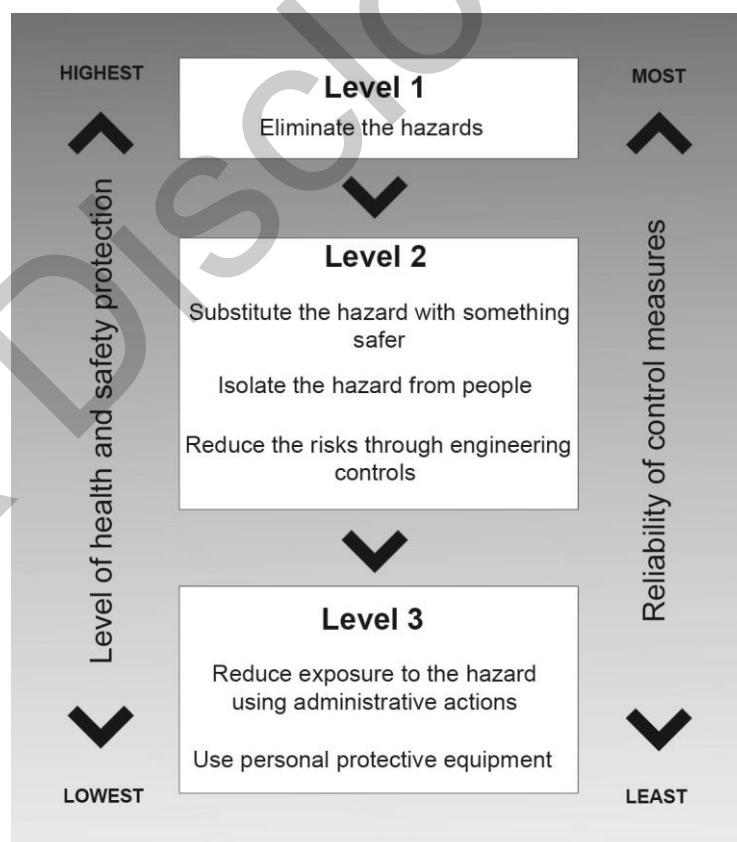


Figure 2: The hierarchy of risk control

You must always aim to eliminate a hazard, 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.

Level 1 control measures

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, a noisy machine could be designed and built to produce as little noise as possible, which is more effective than providing workers with personal hearing protectors.

You can also eliminate risks by removing the hazard completely, for example, by removing trip hazards on the floor or disposing of unwanted chemicals.

It may not be possible 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 eliminate as many of the risks associated with the hazard as possible.

Level 2 control measures

If it is not reasonably practicable to eliminate the hazards and associated risks, you should minimise the risks using one or more of the following approaches:

- **Substitute the hazard with something safer.** For instance, replace solvent-based paints with water-based ones.
- **Isolate the hazard from people.** This involves physically separating the source of harm from people by distance or using barriers. For instance, install guard rails around exposed edges and holes in floors; use remote control systems to operate machinery; store chemicals in a fume cabinet.
- **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.

Level 3 control measures

These control measures do not control the hazard at the source. They rely on human behaviour and supervision, and used on their own, tend to be least effective in minimising risks. Two approaches to reduce risk in this way are:

- **Use administrative controls.** Administrative controls are work methods or procedures that are designed to minimise exposure to a hazard. For instance, develop procedures on how to operate machinery safely, limit exposure time to a hazardous task, use signs to warn people of a hazard.
- **Use personal protective equipment (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. Administrative controls and PPE should only be used:
 - when there are no other practical control measures available (as a last resort)
 - as an interim measure until a more effective way of controlling the risk can be used
 - to supplement higher level control measures (as a back-up).

WHS Regulation sections 44-47: The WHS Regulation includes specific requirements if PPE is to be used at the workplace, including that the equipment is:

- selected to minimise risk to health and safety
- suitable for the nature of the work and any hazard associated with the work
- a suitable size and fit and reasonably comfortable for the person wearing it
- maintained, repaired or replaced so it continues to minimise the risk
- used or worn by the worker, so far as is reasonably practicable.

A worker must, so far as reasonably able, wear the PPE in accordance with any information, training or reasonable instruction.

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
- 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 A.

Working through the events in the sequence will give you ideas about all 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 that provides 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.

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 a 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 a hazard occurring and/or the greater the harm that would result if the hazard or risk did occur, the less weight should be given to the cost of controlling the hazard or risk.

If two control measures provide the same levels of protection and are equally reliable, you can adopt the least 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 that you put into operation will usually require changes to the way work is carried out due to new or modified equipment or processes, new or different chemicals or new personal protective equipment. In these situations, it is usually necessary to support the control measures with:

- **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 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.

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 B.

4.3 How to ensure that controls remain effective

The following actions may help you monitor the control measures you have implemented and ensure that they remain effective:

- **Accountability for health and safety.** Accountability should be clearly allocated to ensure procedures are followed and maintained. Managers and supervisors should be provided with the authority and resources to implement and maintain control measures effectively.
- **Maintenance of plant and equipment.** This will involve 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.
- **Up-to-date training and competency.** Control measures, particularly lower level controls, depend on all workers and supervisors having the appropriate competencies to do the job safely. Training should 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.

5. Step 4 – How to review controls

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

There are certain situations where you must review your control measures under the WHS Regulation and, if necessary, revise 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
- if a health and safety representative requests a review.

You may use the same methods as in the initial hazard identification step 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?
- Has 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?
- Is 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, review your information and make further decisions about risk control. Priority for review should be based on the seriousness of the risk. Control measures for serious risks should be reviewed more frequently.

Quality assurance processes may be used if you design, manufacture or supply products used for work to check that 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.

Case studies demonstrating how to manage work health and safety risks in consultation with workers are at Appendix C.

6. Keeping records

Keeping records of the risk management process demonstrates potential compliance with the WHS Act and WHS Regulation. It also helps when undertaking subsequent risk assessments.

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. 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 – Assessing how things go wrong

TIME	A customer comes into the service area with an issue about service	WHAT CAN STOP OR CHANGE THIS?	Service needs to be provided to customers who come into the service area. A telephone complaints service may remove some potential for customers to go to the service area.
	 WHAT MAY HAPPEN NEXT?		
	The customer service officer is unable to satisfy the customer's concerns or issues.	WHAT CAN STOP OR CHANGE THIS?	Providing customers with information about the extent of services and policies, and providing training to the customer service officer, may reduce the chance of dissatisfaction.
	 WHAT MAY HAPPEN NEXT?		
	During the service discussion with the customer service officer, the customer becomes upset.	WHAT CAN STOP OR CHANGE THIS?	Providing customer service officers with training on conflict resolution and dealing with difficult situations may prevent customers becoming upset. Ensuring other staff are available to assist.
	 WHAT MAY HAPPEN NEXT?		
	The customer service officer's unable to calm the customer and the customer becomes aggressive.	WHAT CAN STOP OR CHANGE THIS?	Implementing procedures for customer service officers to disengage with the customers safely is one way of managing the escalating situation.
	 WHAT MAY HAPPEN NEXT?		
	The situation escalates. There is no protection offered by the counter.	WHAT CAN STOP OR CHANGE THIS?	Change the service counter or area so that customer service officers are separated from customers or provide an escape route to a safe place.
	 WHAT MAY HAPPEN NEXT?		
The customer service officer is assaulted and suffers injury, shock and related problems.	WHAT CAN STOP OR CHANGE THIS?	Ensure that there are emergency procedures in place to stop assault. Ensure that there is first aid available to deal with the outcomes of an assault. Ensure that counselling is available to support the victim.	

Appendix B – Risk register

Location:					Date:			
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?	How will the controls be implemented?		
						Action by	Due Date	When Completed

Appendix C – Case studies

Case study 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 (SM) 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 co-operation.

To do this, the SM 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 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 SM'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 SM 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.

Safety workshop – 20 August 2018	
Team	Parks and Gardens Branch
Task being reviewed	Cleaning of the toilets in the council's parks
Description of task	Undertaken by two workers each Monday morning in a Council truck who would clean the eight toilet blocks across the municipality
What does the task involve?	<p>At the depot:</p> <ul style="list-style-type: none"> • Load the truck with the compressor and pressure hose along with cleaning chemicals and materials <p>At the park:</p> <ul style="list-style-type: none"> • 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 SM asked the following questions and shared the responses by writing them on a whiteboard or butchers paper:

	<i>What hazards are encountered when doing the task?</i>	<i>What risks do these pose to the health and safety?</i>	<i>How are these hazards and risks controlled?</i>
Plant	<ul style="list-style-type: none"> Truck Compressor and pressure hose 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Truck and compressor have maintenance schedule Checklist for visual inspection for all plant before it leaves depot Reporting and tagging system for all defective plant
Manual Handling	<ul style="list-style-type: none"> Loading and unloading the compressor Carrying the compressor to and from the toilet block 	<ul style="list-style-type: none"> Heavy load can cause sprains, strains, back injuries or fractures and cuts if dropped on foot 	<ul style="list-style-type: none"> 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
Chemical	<ul style="list-style-type: none"> Cleaning agents used to clean toilets and basins 	<ul style="list-style-type: none"> Skin irritation, rashes and illness caused by exposure to chemicals and their vapours in confined space 	<ul style="list-style-type: none"> Only non-toxic cleaning agents used Gloves provided to avoid skin contact
Noise	<ul style="list-style-type: none"> Operating the compressor in a closed space with hard surfaces 	<ul style="list-style-type: none"> Hearing loss from prolonged exposure to the noise levels generated by the compressor 	<ul style="list-style-type: none"> Hearing protection provided for wearing when hosing out the toilet block
Slips, trips and falls	<ul style="list-style-type: none"> Wet floor when hosing out the toilet block. 	<ul style="list-style-type: none"> Cuts and bruises caused by slipping on wet surface 	<ul style="list-style-type: none"> Safety boots were provided that had 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 SM 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 SM 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 he 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 SM 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 SM 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.

Case Study 2

Jane Smith has 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 with 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, whilst 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 following:

- 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 following risk register:

XYZ Grocery Store Pty Ltd Work area: Bakery department Form completed by: Jane Smith (Bakery supervisor) Date form completed: 05/11/2018			
Hazard identification <i>Hazard:</i> Doughnut mixer not guarded and mixing bowl can be accessed when machine is operating.			
Risk Assessment <i>What is the harm the hazard could cause:</i> The person operating the mixer could be injured by the moving parts if their hand slipped in while the machine was operating. Hand could be cut or could even lose a finger. <i>What is the likelihood of this happening:</i> 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. <i>Persons at risk:</i> All four bakers who operate the machine. <i>Existing control measure:</i> 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. <i>Consequence:</i> Serious injuries <i>Likelihood:</i> Very likely <i>Outcome:</i> High risk - the mixer must not be used again until the risk has been controlled.			
Control measures <i>Possible control options:</i> <ul style="list-style-type: none"> • <i>Elimination</i> – 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. • <i>Substitution</i> – Use of the mixer could be substituted by hand mixing the dough. One day's production will be lost in the change over. 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. • <i>Engineering</i> – 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. • <i>Administrative or PPE</i> – All 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. <i>Preferred control option:</i> Purchase a new mixer, which would not cost much more than having the old one modified. Mixing to be done 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			
Associated activities	Resources required	Person(s) responsible	Sign off and date
New mixer to be purchased. Mixing to be done by hand while waiting for new mixer. May require staff working more hours	Less than \$6000	Jane Smith – Bakery supervisor	J Smith 9/11/10
Develop new work procedures Provide training to bakers on using the new machine	3 hours	Jane Smith – Bakery supervisor	J Smith 20/12/10

Review Scheduled review date: 31 January 2011
Are the control measures in place? <ul style="list-style-type: none"> • 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? <ul style="list-style-type: none"> • Yes – the interlocking guard prevents people from putting their hand in the mixing bowl.
Are there any new problems with the risk? <ul style="list-style-type: none"> • No.

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.

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Hazardous chemical register

A Hazardous chemical register is a list of all hazardous chemicals used, handled or stored at your workplace. You must keep the current safety data sheet (SDS) with this register and make sure it is accessible to workers. The SDS will tell you how to use and manage hazardous chemicals safely. The supplier of your chemicals should provide a SDS on request. **Note:** Chemicals not classified as hazardous chemicals do not require SDSs and do not need be included in this register.

How can you tell if a chemical is classed as hazardous?

Section 2 of the SDS will tell you if, and how the chemical is hazardous. Other indications are:

- The manufacturer or supplier provided a copy of the SDS with the chemical
- The label of the product includes:
 - diamond-shaped warning pictograms (see right)
 - signal words *Danger* or *Warning*
 - hazard or precautionary statements such as *Toxic if swallowed* and *Wear eye protection*
 - risk or safety phrases such as *Harmful if swallowed* and *Keep out of the reach of children*.

Contact the manufacturer or supplier for more details or for a copy of the SDS. Many companies also provide SDSs online.



Chemical name	Manufacturer <i>including Australian contact details</i>	SDS issue date <i>(must be <5 years)</i>	Maximum quantity held on site *	Comments

* If quantities stored at the workplace are equal to or exceed the amounts specified in the Work Health and Safety Regulation 2011 Schedule 11, placarding and/or manifests may be required. See worksafe.qld.gov.au for details.

Chemical name	Manufacturer <i>including Australian contact details</i>	SDS issue date <i>(must be <5 years)</i>	Maximum quantity held on site *	Comments

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Managing risks of plant in the workplace

Code of Practice 2013

OIR Disclosure Log

This Queensland Code of Practice has been approved by the Attorney-General and Minister for Justice and commences on 1 December 2013.

This code is based on a national model Code of Practice developed by Safe Work Australia and approved by the Select Council on Workplace Relations on 13 July 2012 as part of the harmonisation of work health and safety laws.

This code was varied on 1 July 2018 by the Minister for Education and Minister for Industrial Relations.

PN11579



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Foreword

The *Managing risks of plant in the workplace Code of Practice* 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). From 1 July 2018, duty holders are required to comply either with an approved Code of Practice under the WHS Act or follow another method, such as a technical or an industry standard, if it provides an equivalent or higher standard of work health and safety to the standard required in the 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 which 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.

This Code of Practice has been developed by Safe Work Australia as a model Code of Practice under the Council of Australian Governments' *Inter-Governmental Agreement for Regulatory and Operational Reform in Occupational Health and Safety* for adoption by the Commonwealth, state and territory governments.

Scope and application

This code provides practical guidance on how to manage health and safety risks of plant once it is in the workplace, from plant installation, commissioning and use through to decommissioning and dismantling.

This code provides practical guidance to persons who conduct a business or undertaking and have management or control of plant in the workplace, as well as to persons who install and commission plant. It includes information about specific control measures required under the WHS Regulation for plant generally. Other approved Code of Practice on various types of plant may also be referenced.

How to use this Code of Practice

In providing guidance, 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.

This code also includes various references to provisions of the WHS Act and WHS Regulation which set out the legal requirements. These references are not exhaustive. The words 'must', 'requires' or 'mandatory' indicate that a legal requirement exists and must be complied with.

1. Introduction

Plant is a major cause of workplace 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
- 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 plant that is poorly designed.

1.1 The meaning of key terms

Plant includes any machinery, equipment, appliance, container, implement and tool, and includes any component or anything fitted or connected to any of those things. Plant includes items as diverse as lifts, cranes, computers, machinery, conveyors, forklifts, vehicles, power tools and amusement devices.

Plant that relies exclusively on manual power for its operation and is designed to be primarily supported by hand (e.g. a screw driver) 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, such as 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.

Competent person means 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 inspection of 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 inspection of 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 WHS regulator to be a competent person.

Fail safe means a state or condition where, if any component or function of the plant fails, a system exists to prevent any 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 that the fail safe capability is re-established.

1.2 Who has health and safety duties in relation to plant at the workplace?

A person conducting a business or undertaking (PCBU) has the primary duty under the WHS Act to ensure, so far as is reasonably practicable, that workers and other persons are not exposed to health and safety risks arising from the business or undertaking. 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.

Persons who conduct a business or undertaking involving the management or control of fixtures, fittings or plant at a workplace also have a duty to ensure, so far as is reasonably practicable, that the fixtures, fittings and plant are without risks to the health and safety of any person.

The WHS Regulation includes specific duties for persons who conduct a business or undertaking involving the management or control of plant (persons with 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
- use plant only for the purpose for which it was designed unless the proposed use does not increase the risk to health or safety.

As there are generally a number of people involved with plant during its lifecycle (e.g. from its design through to its use and eventual disposal), 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.

If you own the plant, you will be the person with management or control of that plant. If you hire or lease an item of plant, you have management or control of that plant for the period that you have hired it for and will have responsibility for ensuring health and safety together with the person you have hired or leased it from.

If you conduct a business or undertaking that installs, commissions, maintains, operates, tests, repairs or carries out any other activity associated with plant in workplaces, even if you do not own the plant, you will be a person with management or control of the plant. This is because you have a degree of control over the plant during the period of the activity. In these situations you will have responsibility for managing risks associated with the plant together with other duty holders, such as the owner of the plant.

Officers, for example company directors, have a duty to exercise due diligence to ensure that the business or undertaking complies with the WHS Act and WHS Regulation. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate resources and processes to eliminate or minimise risks that arise from plant used in the workplace.

Workers have a duty to take reasonable care for their own health and safety and must not adversely affect the health and safety of other persons. Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to health and safety at the workplace.

1.3 Other persons with duties related to plant

Designers, manufacturers, suppliers, importers and installers of plant must also ensure, so far as is reasonably practicable, that the plant is without risks to health and safety.

Designers

The safe design of plant plays a critical role in eliminating hazards and risks before plant is introduced in the workplace.

A designer is a person who conducts a business or undertaking that designs, redesigns or alters the design of plant or any part of the plant that is to be used or could reasonably be expected to be used at a workplace.

Designers have a duty to ensure, so far as is reasonably practicable, that the plant is without risks to health and safety to workers throughout the life of the plant. Among other things, designers must also provide specific information to the manufacturer. If the manufacturer advises the designer that there are safety issues with the design, the designer must revise the information to take account of these concerns, or tell the manufacturer in writing the reasons why such revision is not necessary. Designers must also carry out, or arrange the carrying out of, any calculations, analysis, testing or examination that may be necessary to ensure the plant is safe and without risks to health and safety.

Manufacturers

Manufacturers have a duty to ensure, so far as is reasonably practicable, that the plant is manufactured to be without risks to workers throughout the lifecycle of the plant. Manufacturers must advise the designer of any hazards they identify during manufacture and ensure that hazards are not incorporated into the manufacture of the plant.

Manufacturers must also arrange for any calculations, analysis, testing or examination that may be necessary to ensure that the plant is without risks to health and safety. If design registration is required, the manufacturer must give the design registration number to the person with management or control of the plant, who must ensure the number is kept readily accessible.

A reliable way to achieve this is for the manufacturer to permanently mark the design registration number on the plant.

Importers and suppliers

Importers of plant from outside Australia must take all reasonable steps to obtain information from the manufacturer and then pass this information on when supplying the plant. If this is not available importers must carry out, or arrange the carrying out of, any calculations, analysis, testing or examination that may be necessary to ensure, so far as is reasonably practicable, that the plant is without risks to the health and safety of any person. If design registration is required, the importer will also have duties to ensure that the design of plant is registered.

Any imported plant must be inspected, having regard to information provided by the manufacturer. If this information requires the plant to be tested then the importer must undertake this testing.

If an importer identifies any hazards, the importer must not supply the plant until the risks have been eliminated, or minimised, so far as is reasonably practicable, or if that is not possible, advise the person receiving the plant of those risks.

If the item of plant requires any alteration as a result of testing or hazard identification, then the importer must take all reasonable steps to advise the designer and manufacturer of this.

Suppliers of second-hand plant must ensure, so far as is reasonably practicable, that any faults in the plant are identified. A written notice outlining the condition of the plant, any faults

identified and, if appropriate, that the plant should not be used until the fault is rectified must be provided to the person to whom the plant is supplied.

If second-hand plant is to be used for scrap or spare parts, the supplier must inform the person they are supplying the second-hand plant to that the plant is being supplied as scrap or spare parts and that 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.

Installers

An installer is a person who conducts a business or undertaking who sets up, assembles, places in position and connects or otherwise makes plant ready for use. Installers have certain duties under the regulation (see section 3.2 of this code).

1.4 What is required to manage the risks associated with plant?

WHS Regulation section 203: A person with management or control of plant at a workplace must manage risks to health and safety associated with the plant.

WHS Regulation sections 34-38: In order to manage risk under the WHS Regulation, a duty holder must:

- identify reasonably foreseeable hazards that could give rise to the risk
- eliminate the risk so far as is reasonably practicable
- if it is not reasonably practicable to eliminate the risk, minimise the risk so far as is reasonably practicable by implementing control measures in accordance with the hierarchy of control
- maintain the implemented control measure so that it remains effective
- review, and if necessary revise, risk control measures so as to maintain, so far as is reasonably practicable, a work environment that is without risks to health and safety.

This code provides guidance on how to manage the risks associated with plant in the workplace by following a systematic process that involves:

- identifying hazards
- if necessary, assessing the risks associated with these hazards
- implementing and maintaining risk control measures
- reviewing risk control measures.

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

Providing and obtaining information

Designers, manufacturers, importers and suppliers all 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 any calculations, analysis, testing or examination
- any conditions necessary for the safe use of the plant.

Consulting workers

Consultation involves sharing of 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: The WHS Act requires that you consult, so far as is reasonably practicable, with workers who carry out work for you who are (or are likely to be) directly affected by a work health and safety matter.

WHS Act section 48: If the workers are represented by a health and safety representative, the consultation must involve that representative.

Consultation with workers and their health and safety representatives is required at each step of the risk management process.

Your workers usually know the hazards and risk associated with the plant they use. By drawing on the experience, knowledge and ideas of your workers you are more likely to identify all hazards and develop effective risk controls.

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

Consulting, co-operating and co-ordinating activities with other duty holders

There may be other businesses involved with plant at your workplace (e.g. who carry out installation or repair, or who share the workplace with you).

WHS Act section 46: The WHS Act requires that you consult, co-operate and co-ordinate 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.

For example, if you own or manage an on-hire business and your workers undertake work at other workplaces then you should exchange information with the host business to determine:

- if your workers could be exposed to hazardous plant
- what each of you will do to control any associated risks.

If you use plant (e.g. mobile plant such as a forklift) at a workplace that is shared with other businesses you should talk to those businesses about the risks your plant could cause them and work together in a co-operative and co-ordinated way to manage the risks.

Further guidance on consultation requirements is available in the *Work health and safety consultation, co-operation and co-ordination Code of Practice*.

1.5 Registering plant

Certain items of plant and types of plant designs must be registered. A list of registrable plant is provided at Appendix A.

Registrable plant must be:

- design registered before it is supplied
- item registered before it is used.

Design registration

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

Item registration

Plant item registration applies to a specific item of plant and each item requires registration. The purpose of registering an item of plant is to ensure that it is inspected by a competent person and is safe to operate. It is the responsibility of the person with management or control of plant to ensure that all registrable plant items are registered.

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

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2. The risk management process

2.1 Identifying hazards

Identifying hazards involves finding all of the things and situations that could potentially cause harm to people. Hazards associated with plant generally arise from:

- the plant itself, for example hazards associated with a forklift would include hazards relating to its mobility, its electrical, hydraulic and mechanical power sources, moving parts, load-carrying capacity and operator protection
- how and where the plant is used. The forklift, for example may have hazards arising from the kind of loads it is used to lift, the size of the area in which it is used and the slope or evenness of the ground.

Inspect the plant

Inspect each item of plant in your 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.

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 that 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, such as: 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
- cause injury due to poor ergonomic design, for example 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, its 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?
- 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 B.

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 such as engineers
- your workers
- WHS regulators, unions and other organisations
- businesses or undertakings similar to your own
- 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 any investigations to collect information about plant hazards.

2.2 Assessing the risks

A risk assessment involves considering what could happen if someone is exposed to a hazard combined with 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.

A risk assessment is unnecessary if you already know the risk and how to control it.

To assess the risk associated with plant hazards you have identified, you should consider:

What is the potential impact of the hazard?

- How severe could an injury or illness be? For example, lacerations, amputation, serious or fatal crushing injury, burns or loss of hearing.
- What is the worst possible harm the plant hazard could cause?

How likely is the hazard to cause harm?

- Is it highly likely or unlikely to happen?
- How frequently are workers exposed to the hazard? For example, if plant is used constantly with five operators per shift and three 8-hour shifts and there is a lack of high level control measures, the risk will increase compared to the occasional use by a single operator.

Other factors to consider when undertaking a risk assessment include:

- In what type of conditions is the plant used in (e.g. 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 in relation to plant safety (for example, isolation to carry out maintenance, emergency shut-down)?
- What kind of training, information, instruction and supervision is 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:
 - the speed of the process line
 - pedestrian and vehicular traffic around the plant
 - time spent on repetitive tasks
 - shift work arrangements
 - any production incentives that may affect health and safety.

2.3 Controlling risks

The ways of controlling risks associated with plant are ranked from the highest level of protection and reliability to the lowest. This ranking is known as the *hierarchy of risk control*. The WHS Regulation requires duty holders to work through this hierarchy to choose the control that most effectively eliminates or, where that is not reasonably practicable, minimises the risk in the circumstances. Specific controls are required under the WHS Regulation for certain types of plant, such as:

- powered mobile plant
- plant that lifts or suspends loads
- industrial robots
- lasers
- pressure equipment
- scaffolds.

The hierarchy of control measures

Elimination – The most effective control measure is to remove the hazard or hazardous work practice associated with the plant (e.g. buy pre-sawn timber instead of using a power saw). Many hazards can be addressed before introducing plant into your workplace, that is, in the planning and purchasing stages. For example, purchasing machinery that is designed and built to produce low noise levels is more effective than providing workers with personal hearing protectors. This also avoids costly modifications to plant after it is purchased. If elimination is not reasonably practicable, you must minimise the risk by:

Substitution – Substitute the plant (or hazardous parts of it) with plant that is safer. For example:

- using a cordless drill instead of an electric drill if the power cord is in danger of being cut
- isolation – separate the hazardous plant from people, either by distance or physical barrier. For example:
 - constructing a booth from which the plant can be operated remotely
 - using concrete barriers to separate mobile plant from workers.

Engineering controls – Include modifications to tools or equipment (e.g. installing guards to prevent contact with moving parts of machinery or installing a roll over protective structure on a tractor).

Administrative controls – If risk remains, it must be minimised by implementing administrative controls, so far as is reasonably practicable, for example installing a tag-out system to ensure that workers are aware that the plant is isolated from its power source and must not be operated while maintenance or cleaning work is being done. Providing training and supervision, using warning signs or arranging work to minimise the time spent near noisy machinery are all examples of administrative controls.

Personal protective equipment (PPE) – Any remaining risk must be minimised with suitable PPE, such as providing workers with breathing protection, hard hats, gloves, aprons and protective eyewear.

Administrative control measures and PPE rely on human behaviour and supervision, and used on their own, tend to be least effective in minimising risks.

Combining control measures

In many cases, a combination of control measures will provide the best solution. 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.

2.4 Maintaining and reviewing risk control measures

WHS Regulation section 37: Control measures must be maintained so that they continue to protect workers and other people from the hazards associated with plant. The control measures must be:

- fit for purpose
- suitable for the nature and duration of the work
- installed, set up and used correctly.

WHS Regulation section 38: A person conducting a business or undertaking must review and as necessary revise control measures:

- 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
- if a health and safety representative requests a review.

The control measures that are implemented must be reviewed and, if necessary, revised to make sure they work as planned and that no new hazards have been introduced by the control measures.

You should consult your workers to obtain feedback on the plant and work processes being used and consider the following questions:

- Are the relevant workers aware of the control measures and do they understand them?
- Are the control measures, for example guards, working effectively in both their design and operation?
- Have all hazards associated with the plant been identified?
- Has the purchase of a new item of plant made the job safer?
- Are safety procedures being followed?
- Has an incident occurred in relation to the plant?
- If new legislation or new information becomes available, does it indicate current controls may no longer be the most effective?

When deciding how frequently to carry out a review, you should consider the level of risk (high risk plant may need more frequent review) and the type of plant involved (there may be particular stages in the life of the plant where a more frequent review is needed).

3. Controlling risks: From purchase to disposal

3.1 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 that 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 any calculations, analysis, testing or examination
- any conditions necessary for the safe use of the plant
- any 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 in relation to the frequency and type of inspection and maintenance needed
- any special skills required for people who operate the plant or carry out inspection and maintenance
- any special conditions or equipment required to protect the health and safety of people carrying out activities such as installation, operation and maintenance
- any alterations or modifications to be made to the plant.

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

- 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).

Purchasing second-hand plant

WHS Regulation section 198: A supplier of plant must:

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

WHS Regulation section 199: 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 conditions of the plant
- any faults identified
- if appropriate, that the plant should not be used until the faults are rectified.

WHS Regulation section 8: 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 whether the plant is new, second-hand or hired out.

Some examples of suppliers include a person conducting a business or undertaking 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).

Suppliers' duties apply to suppliers that know, or should know, the plant is to be used in a workplace.

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

Duty to supply safe plant

Suppliers of second-hand plant must ensure, so far as is reasonably practicable, that the plant it without risks to the health and safety of persons who use it or may be exposed to it.

This includes, so far as is reasonably practicable, identifying any faults in the plant.

Suppliers of second hand plant, other than scrap or spare parts, must give written notice to a prospective buyer of:

- the condition of the plant, including identified faults, if any
- 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 that were kept by the previous owner.

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

Outdated or non-existent safety features of second-hand plant

Second-hand plant is more likely to have out-dated or missing safety features.

In these circumstances suppliers of second-hand plant must do what is reasonably practicable to supply equipment that is 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
- if not reasonably practicable—whether information needs to be given to the buyer about any relevant matters including the purpose for which the plant was designed or manufactured and any conditions necessary to ensure the plant is without risks to health and safety when properly used.

Buyers also have a 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 any conditions necessary to ensure its safe use.

Apart from the manufacturer or original supplier—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 agricultural 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 agricultural plant at clearing sales do not take possession of the plant, have little or no control of 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 are 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 any other purpose.

This should 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, that the plant is safe to use. During the time that 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 that the plant has been inspected and maintained by the supplier according to the manufacturer's specifications. This may involve checking the log book or maintenance manual. You should also ensure that the supplier provides you with the manufacturer's information about the purpose of the plant and its proper use.

Any 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 that they must ensure, so far as is reasonably practicable, that 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 that the plant is adequately 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.

3.2 Installation and commissioning of plant

WHS Regulation section 204: A person with management or control of plant at a workplace must ensure that:

- plant is not commissioned unless the person has established that the plant is, so far as reasonably practicable, without risks to the health and safety of any person
- the person installing or commissioning the plant is a competent person, and is provided with all the information necessary to minimise risks to health and safety
- the processes for the installation, construction and commissioning of plant include inspections that ensure, so far as is reasonably practicable, the risks are monitored.

Installing plant

An installer should ensure:

- plant is erected or installed in having regard to the manufacturer's instructions including ensuring that specialised tools, jigs and appliances necessary to minimise any risk of injury during installation are used
- access to and egress 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 (e.g. wet conditions) are considered
- all electrical installations associated with plant comply with AS 3000 (also known as the Australian/New Zealand Wiring Rules) as far as it is relevant.

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

Positioning plant in the workplace

Plant should be positioned so that:

- risks from hot plant (such as 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 the operation of the plant or work processes
- the plant rests on a suitable foundation where required (e.g. on a floor or other support that ensures the plant is stable and secure)
- ventilation is adequate to deal with the nature and volume of any 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.

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 that:

- the commissioning sequence is in accordance with the design specifications
- tests, such as dummy runs, are carried out to check that the plant will perform within the design specifications.

3.3 Instruction, training and supervision

Before plant is used in your workplace, you must provide your workers and other persons who are to use the plant with information, training, instruction or supervision that is necessary to protect them from risks arising from the use of the plant.

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 that include 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
- emergency procedures.

Any 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.

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

3.4 Using plant in the workplace

WHS Regulation sections 205-206: A person with management or control of plant at a workplace must:

- so far as is reasonably practicable, prevent unauthorised alterations to or interference with the plant
- take all reasonable steps to ensure the plant is only used for the purpose for which it is designed, unless a competent person has assessed that the proposed use does not increase the risk to health and safety
- ensure all safety features, warning devices, guarding, operational controls, emergency stops are used in accordance with instructions and information provided.

Workers who operate plant should be competent, or suitably supervised during training, so that 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. You should also consider and address the risks that may arise from:

- operator fitness for work, for example fatigue
- carrying out routine or repetitive tasks
- local conditions and working procedures.

High risk work licences

Certain types of plant, such as industrial lift trucks and some types of cranes, require the operator to have a high risk work licence before they can operate the plant. Schedule 3 of the WHS Regulation sets out the classes of high risk work licences and the types of plant involved.

3.5 Making changes

If you intend to alter the design of the plant, change the way the plant is used or change a system of work associated with the plant, you should carry out the risk management process again.

If you intend to use plant in a different way or for a purpose that it was not designed for, you must ensure that the risks associated with the new use are assessed by a competent person. For example, if an item of plant that is designed to cut wood is intended to be used to cut metal, all hazards associated with that use must be identified and the appropriate controls implemented. This may mean the provision of a lubricating and/or cooling fluid system to ensure that the cutting process does not generate excess friction or heat.

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, such as the impracticability of using it or additional risks that using purpose-designed plant would generate
- 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 measures used to control the risks that such plant is designed to control
- amend any relevant documentation, for example, operator and maintenance manuals and signage.

If a competent person decides that the plant is not suitable for the proposed task, it must not be used for that task.

Making alterations to plant

Prior to making any alterations to plant you should consult with the designer and manufacturer to ensure all relevant safety issues have been considered. Any alterations you make to the plant will result in you assuming the obligations of a designer or manufacturer.

If the original designer or manufacturer cannot be contacted (for older plant or imported plant) the alterations should be carried out by a competent person in accordance with the relevant technical standards. See Appendix C for examples of published technical standards.

In the case of plant that requires design registration, the altered design must be registered if the alteration to the design 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 any 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.

3.6 Inspecting plant

WHS Regulation section 213: A 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 in accordance with manufacturer's recommendations, or if those aren't available, in accordance with recommendations of a competent person. If it is not reasonably practicable to comply with the manufacturer's recommendations or the recommendations of a competent person, the inspection and testing must occur annually.

The inspection of plant should be conducted in accordance with a regular maintenance system to identify any:

- potential problems that were not anticipated during plant design or task analysis
- deficiencies in plant or the equipment associated with use of plant (e.g. 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.

Inspection of associated work processes should be conducted regularly to identify any:

- 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 them when necessary, and replace damaged or worn parts (such as grinding wheels).

Any control measures implemented, such as 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
- any variations from normal operation or dangerous occurrences and any 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 by ensuring that plant is switched off or isolated from the energy source to avoid accidental re-energising of dangerous parts.

Any guards that are removed must be replaced correctly to prevent access to the hazardous part of the plant when it is returned to use.

3.7 Maintenance, repair and cleaning of plant

Plant must be maintained and repaired according to the manufacturer's specifications or, in the absence of such specifications, 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 be isolated before maintenance or cleaning commences. Where plant is isolated and plant shutdown will result, any total or partial shutdown should not allow a hazardous situation to be created.

Isolated or disengaged plant should:

- not hinder or interfere with the operation of any other plant
- 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 the operation of the plant which has been shut down due to inspection, maintenance or cleaning.

Where plant cannot be isolated, methods to prevent accidental operation must 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: If there is a need to operate plant during maintenance or cleaning, the person with management or control of the plant must ensure that the operators' controls allow the safe operation of the plant while a person is undertaking the maintenance or cleaning.

If the plant is operated by a person other than the person who is carrying out the maintenance or cleaning, the person operating the plant must be authorised to do so by the person with management or control of the plant.

Following maintenance all guarding must be replaced prior to start-up of plant. Damaged plant should be withdrawn from service until any risks to health and safety have been controlled.

3.8 Storing plant

WHS Regulation section 207: A person with management or control of plant at a workplace must ensure that plant not in use is left in a state that does not create a risk to the health or safety of any person.

Plant that is not in use must be stored so that 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 risks of damage to plant during storage, for example from corrosion as a result of exposure to residues of hazardous substances and deterioration of 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 when it was first commissioned.

Plant that has been taken off-line constitutes 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 not

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 work station from the power supply, employing lock-out and tag-out systems, and providing physical stops to prevent movement in the event of accidental powering of the plant. Further information on isolating energy sources is provided at Section 4.5 of this code.

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 unattended for short periods of time. The person with management or control should ensure that the operator of the truck understands the required safety procedures when leaving the truck unattended. This would include ensuring that the 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.

3.9 Decommissioning, dismantling and disposing of plant

WHS Regulation section 204: A person with management or control of plant at a workplace must ensure that:

- plant is not decommissioned or dismantled unless it can be carried out without risks to health and safety so far as is reasonably practicable
- the person who decommissions or dismantles the plant is a competent person and is provided with all available information necessary to eliminate, or where this is not reasonably practicable, minimise risks to health and safety
- the processes associated with the decommissioning and dismantling include inspections to ensure, so far as is reasonably practicable, that risks associated with these activities are monitored.

You should 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) or scrapping (waste disposal and/or recycling). If the plant is to be resold, the seller will take on the duties of a person that supplies plant. The seller should ensure that the plant is safe to load, transport, unload and store. Any information relating to the plant design, registration, installation, operation and/or maintenance must be provided with the plant to the reseller or buyer.

If the plant is to be scrapped, you should consult with local waste disposal authorities or organisations so that the plant is 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 that 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.

4. Specific control measures

4.1 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 such as radiation
- minimising noise through the application of sound-absorbing materials
- preventing ejected parts or off-cuts from striking people.

WHS Regulation section 208: If guarding is used, the person with management and control must ensure that:

- if access to the area of plant requiring guarding is not necessary during operation, maintenance or cleaning, the guarding is a permanently fixed barrier
- if access to the areas requiring guarding is necessary during operation, maintenance or cleaning, the guarding is an interlocked physical barrier
- if it is not reasonably practicable to use a permanently fixed barrier or an interlocked physical barrier, the guarding is a physical barrier that can only be altered or removed using a tool
- if it is not reasonably practicable to use a permanently fixed barrier, an interlocked physical barrier or a physical barrier fixed in position, the guarding includes a presence-sensing safeguarding system.

Guarding must:

- be of solid construction and securely mounted so as to resist impact or shock
- prevent by-passing or disabling of the guard
- 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)
- be properly maintained
- control any risk from potential broken or ejected parts and workpieces
- allow for servicing, maintenance and repair to be undertaken with relative ease, and
- if guarding is removed the plant cannot be restarted unless the guarding is replaced.

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.

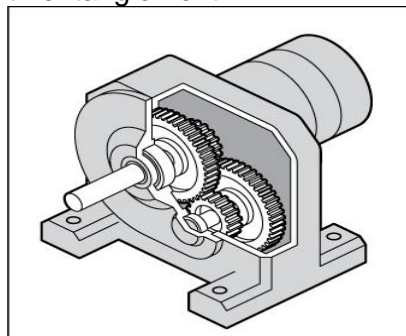


Figure 1 Cut-away view of a fixed physical barrier encasing the gear assembly and electric motor

Interlocked physical barriers

An interlock guard is connected to the plant's operational controls so that the plant is prevented from operating until the guard is closed. The guard cannot be opened or removed until the dangerous parts of the machine have fully come to rest. 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.

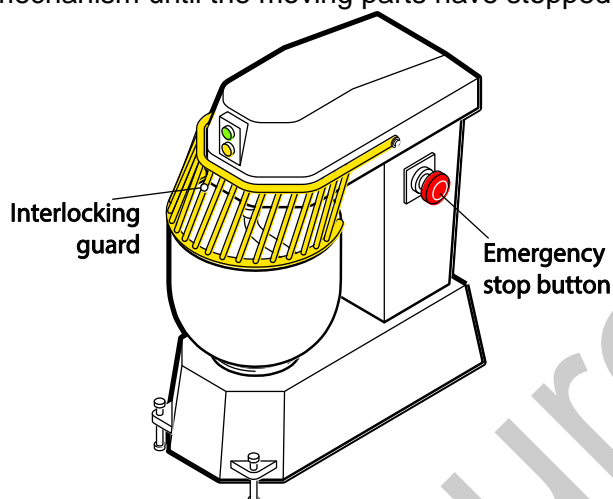


Figure 2 Food mixer with interlocking guard

Physical barriers fixed in position

Physical barriers that are securely fixed in position should be easy to remove and replace but only with the aid of a special tool, such as a spanner, Allen key or similar tool, and only when the machine is not in operation (see Figure 3). Devices such as wing nuts or wedge inserts, which can be operated using fingers or become stuck, should not be used.

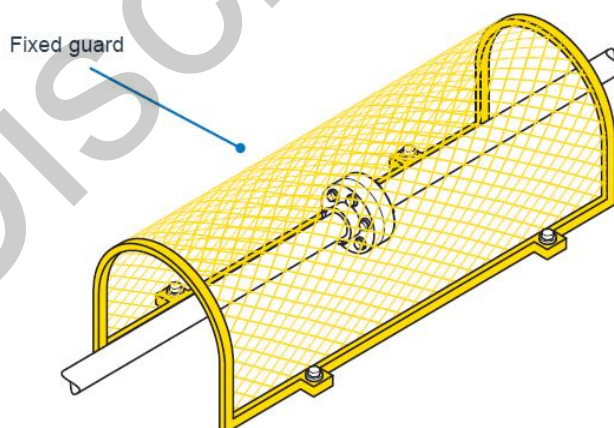


Figure 3 Fixed guard on rotating shaft or coupling

Physical barriers such as 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.

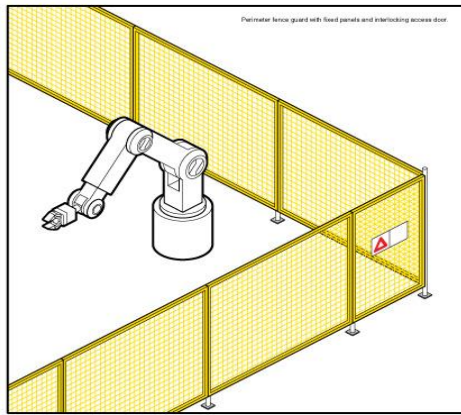


Figure 4 Perimeter fence guard with fixed panels and interlocking access door

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).

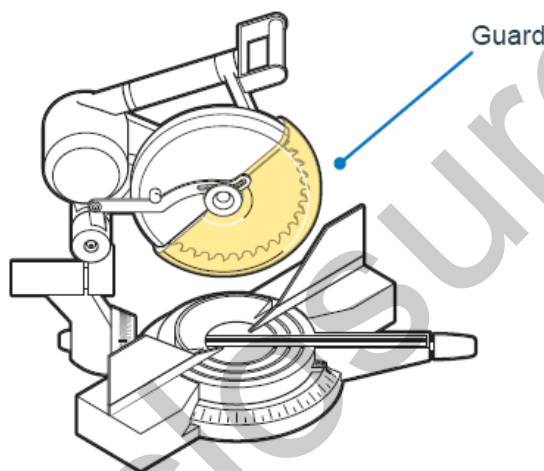


Figure 5 Self-adjusting guard for a drop saw

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

If physical guards are not reasonably practicable, then a presence sensing system can be used to control the risk. These systems detect when a person (or part of a person's body) enters the danger zone and stops the machine. Photoelectric light beams, laser scanners and foot pressure mats are examples of these type of guards. 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 the selection of 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.

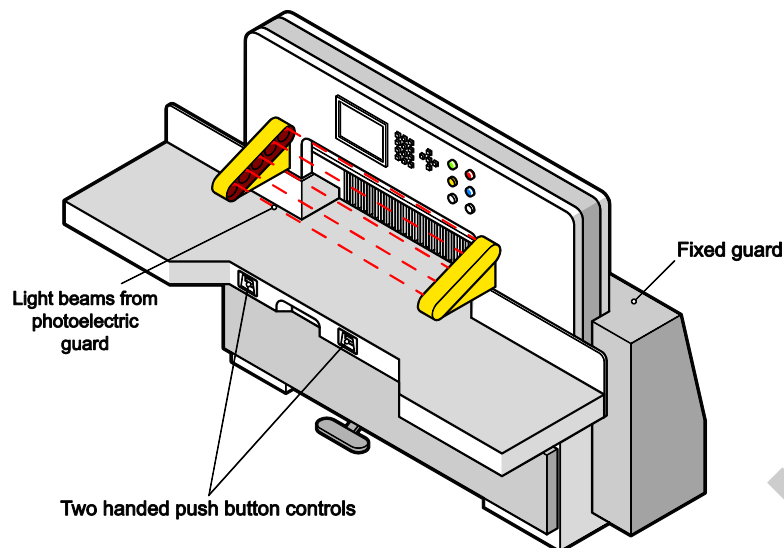


Figure 6 Paper cutting guillotine with a combination of guards including a photoelectric light curtain.

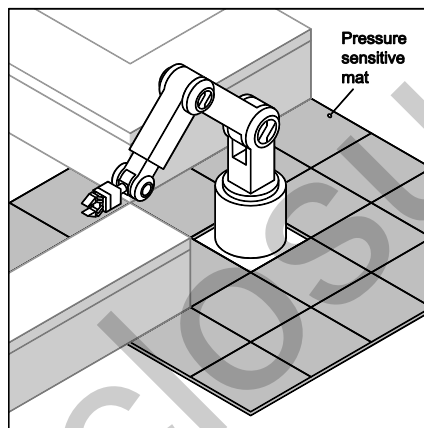


Figure 7 Pressure sensitive mat

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, you 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, provided it is different to the plant's colour, so that 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 workpieces, where these need to be visible through the guarding.

Removal of guarding

If any type of guarding is removed for the purposes of maintenance or cleaning, it must be replaced before the plant is put back into normal operation. 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.

4.2 Operator controls

WHS Regulation section 210: A person with management or control of plant at a workplace must ensure that any operator controls are:

- identified so as to indicate their nature, function and direction of operation
- located so they can be readily and conveniently operated
- located or guarded to prevent unintentional activation
- able to be locked into the 'off' position to enable disconnection from energy sources.

Badly designed operator controls can lead to unintentional and unsafe operation of plant. 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.

Operator 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 operation of a control, for example provision of 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.

4.3 Emergency stops

WHS Regulation section 211: 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 are coloured red
- the stop control cannot be adversely affected by electrical or electronic circuit malfunction.

Where plant is designed to be operated or attended by more than one person and more than one control is fitted, the multiple controls must be of the 'stop and lock-off' type so that the plant cannot be restarted after a 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 be capable of stopping the plant itself as well as all the equipment interrelated to its operation, where continued operation of this related equipment may be dangerous.



Figure 8 Emergency stop button

4.4 Warning devices

WHS Regulation section 212: A person with management or control of plant at a workplace must ensure that an emergency warning device is positioned on the plant to ensure that the warning device will work to best effect.

WHS Regulation section 215: 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.

Warning devices should be used where there is a likelihood of moving plant colliding with other plant or workers in the vicinity 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.

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, such as flashing lights.

Motion sensors

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, such as 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 the lights appropriate to your workplace to ensure that 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 that are usually mounted in a prominent place, such as the top of a vehicle cabin. They can be wired to operate continuously or activated by a switch. They are suitable to be used on any items of plant that moves in the workplace, such as 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, such as trucks travelling on defined site roads.

Percussion alarms

Percussion alarms are mechanical devices that are fitted to an axle or gear shift. 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 sounds 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 breaking distances, such as trucks. Some large workplace or sites may require a truck to “stop and sound horn before continuing”.

4.5 Isolation of energy sources

An isolation procedure is a set of predetermined steps that should be followed when workers are required to perform tasks such as maintenance, repair, installation and cleaning of plant.

Isolation procedures involve the isolation of all forms of potentially hazardous energy so that the plant does not move or start up accidentally. Isolation of plant also ensures that 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 means that the isolation procedure is effective and that all stored energies have dissipated. This may require further measures to safely release these energies, for example hydraulic or pneumatic pressure, suspended weight or compressed springs.

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 (water, air, steam or hydraulic oil)
- stored energy (e.g. compressed springs)
- gravity, and
- 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 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 that 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 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 at isolating the energy source.

5. 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 A.

You must not allow the use of any registrable plant in the workplace if it has not been registered.

5.1 Design and altered design registration

You must register a plant design if:

- it has not already been design registered
- you alter the plant design by modifying the plant and the alterations to the design may affect health and safety.

In order to register a plant design, the design must be verified by a design verifier who must provide a statement that 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 C.

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 that the design was produced in accordance with the published technical standards and engineering principles used in the design
- is certified by a body that is 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 that 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. This number must then be given to the manufacturer, importer or supplier of plant. These duty holders must ensure that the design registration number is provided to the person with management or control of plant at the workplace.

The person with management or control of plant at the workplace must then ensure that 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.

Changes to design registration

If a registered plant design is altered so as to require any new risk control measures, the altered design must be registered.

5.2 Item registration

A person with management or control of an item of plant specified in Part 2 of Schedule 5 of the WHS Regulation must apply to the regulator to register that item 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 that 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. This document must be kept and made available for any inspection required under the WHS Act.

If it is lost, stolen or destroyed, you will need to apply to the regulator that registered the plant for a replacement document as soon as possible, outlining the reasons for needing a replacement.

The regulator may impose any conditions it considers appropriate on the registration of the plant including conditions in relation to the use and maintenance of the plant, record keeping or provision of information to the regulator.

You must ensure that the item registration number is permanently marked on the item of plant in a location that is readily accessible. 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, such as a tower crane that may comprise 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 that are readily accessible and able to be seen when the crane is fully assembled.

Registration renewal

The WHS Regulation requires renewal of registration for items of plant. To renew the registration for the item of plant you must apply to the regulator before the registration expires.

Changes to item registration

If there is any change to any information provided at the time of item registration, or in relation to the registration itself, you have 14 days to advise the regulator of the change. This must be done in writing. In particular, you must provide written notice to the regulator if:

- the item of plant is altered to the extent that it requires new risk control measures
- the item of plant is usually fixed but has been moved
- the registration holder no longer has management or control of the item of plant.

6. Keeping records

WHS Regulation section 237: A person with management and control of plant must keep a record for plant that requires design or item registration including records of all tests, inspections, maintenance, commissioning, decommissioning, dismantling and alterations of the plant.

These records must be kept for the period the plant is used or until the person relinquishes control of the plant.

The records must be available for inspection under the WHS Act and be made available to any person to whom the person relinquishes control of the plant, for example if you sell the plant, those records should be transferred to the person who purchased the plant.

If there is a presence sensing safeguarding system at a workplace the person with management or control of the plant must keep a record of safety integrity tests, inspections, maintenance, commissioning, decommissioning, dismantling or alterations for the life of the plant or until control is relinquished or in any other case for five years.

While you must keep records associated with plant requiring design or item registration, it is good practice to keep records for other types of plant in your workplace. Keeping records of the risk management process demonstrates potential compliance with the WHS Act and WHS Regulation. It also helps when undertaking subsequent risk assessments.

Records on items of plant that may be kept could 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 major modifications
- information on use that deviates 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 – Registrable plant

List of plant requiring registration of design as outlined 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: *Pressure equipment – hazard levels*.
- Gas cylinders covered by Part 1.1 of AS 2030.1-2009: *Gas cylinders - General requirements*.
- Tower cranes including self-erecting tower cranes.
- Lifts including 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 covered 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.

Note: The plant listed as requiring design registration does not include:

- a heritage boiler
- any pressure equipment – other than a gas cylinder – excluded from the scope of AS 1200:2000: *Pressure equipment* – see section A1 of Appendix A to AS/NZS 1200:2000
- 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
- certain amusement devices including:
 - 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
 - inflatable devices, other than inflatable devices (continuously blown) with a platform height of three metres or more.

List of plant items requiring registration as outlined 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 4343-2005: *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 covered by AS 3533 (series): *Amusement Rides and Devices*, except for certain devices noted below
- Concrete placing booms.

- Mobile cranes with a rated capacity of greater than 10 tonnes.

Note: The plant listed as requiring item registration does not include:

- 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
- lifts installed in a private residence within the meaning of AS 1735.1 (Lifts, escalators and moving walks – General requirements)
- certain amusement devices including:
 - 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 B – Hazard checklist

Description of plant: _____ Activities (e.g. use, cleaning and maintenance): _____ Assessed by: _____ Date: _____ 'Yes' to any of the following indicates the need to implement appropriate 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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
Can anyone be struck by moving objects due to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • uneven or slippery work surfaces? • poor housekeeping e.g. offcuts, cables, hoses obstructing walkways, spills not cleaned up? • obstacles being placed in the vicinity of the plant? • other factors not mentioned? 		
Can anyone fall from a height due to: <ul style="list-style-type: none"> • 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, such as 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: <ul style="list-style-type: none"> • 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? 		
Combination of hazards	Yes	No
Can anyone be injured due to unexpected start-up, unexpected over-run/over-speed (or similar malfunction) from: <ul style="list-style-type: none"> • failure/disorder of the control system(e.g. a hydraulic system)? • restoration of energy supply after an interruption? • external influences on electrical equipment? • other environmental factors (gravity, wind, etc.)? • errors in the software? • errors made by the operator? 		
Other hazards	Yes	No
Can anyone be injured due to: <ul style="list-style-type: none"> • noise? • inadequate or poorly placed lighting? • entry into any confined spaces of the plant? • failure to select plant that is 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 C – Examples of technical standards

The following table is a list of published technical standards that provide 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 WHS Regulation in all instances. This list is not exhaustive.

Amusement Structures	AS 3533 (Series)	<i>Amusement Rides and Devices</i>	•	•	•
Cranes including hoists and winches	AS 1418 (Series)	<i>Cranes, Hoists and Winches</i>	•	•	•
	AS 4991	<i>Lifting devices</i>	•	•	•
	AS 2550 (Series)	<i>Cranes – Safe use</i>			•
Conveyers	AS/NZS 4024.3610	<i>Safety of Machinery - Part 3610: Conveyors – General Requirements</i>	•	•	•
Electrical installation	AS/NZS 3000	<i>Electrical installations (known as the A/NZ wiring rules)</i>			•
Electrical installation within an industrial plant	AS 60204.1	<i>Safety of machinery - Electrical equipment of machines – Part 1: General requirements</i>	•	•	
Earthmoving machinery	AS 2294.1	<i>Earthmoving machinery – Protective structures – Part 1: General</i>	•	•	
	AS 2958.1	<i>Earthmoving Machinery – Safety – Part 1: Wheeled machines-Brakes</i>	•	•	•
	ISO 6165	<i>Earthmoving machinery – Basic types – Identification and terms and definitions</i>	•		
	ISO 6746-1	<i>Earth-moving machinery - Definitions of dimensions and codes - Part 1: Base machine</i>	•		
	ISO 6746-2	<i>Earth-moving machinery - Definitions of dimensions and codes - Part 2: Equipment and attachments</i>	•		
	BIS IS/ISO 7133	<i>Earth-moving machinery - Tractor-scrapers – Terminology and commercial specifications</i>	•		
Hand-held electric tools	AS/NZS 60745.1	<i>Hand-held motor operated electric tools – Safety – Part 1: General requirements</i>	•	•	•
Fall arrest	AS/NZS 1891.1	<i>Industrial fall-arrest systems and devices – Part 1: Harnesses and ancillary equipment</i>	•	•	
	AS/NZS 1891.4	<i>Industrial fall-arrest systems and devices – Part 4: Selection, use and maintenance</i>			•
	BS EN 1263-1:2014	<i>Temporary works equipment. Safety nets. Safety requirements, test methods</i>	•		
Gas cylinders	AS 2030.1	<i>Gas cylinders- Part 1: General requirements</i>	•	•	
	AS 2337.2	<i>Gas cylinder test stations – Part 2 – Gas Fuel Vessels for Automotive use</i>			•
	AS/NZS 3509	<i>LP Gas Fuel Vessels for Automotive Use.</i>	•	•	
Industrial (Forklift) trucks	AS 2359 (Series)	<i>Powered industrial trucks</i>	•	•	•
Industrial rope access systems	AS/NZS 4488.2	<i>Industrial rope access systems – Part 2 Selection, use and maintenance</i>	•	•	•
Lasers	AS/NZS IEC 60825.1:2011 (in part)	<i>Safety of laser products – Equipment classification and requirements</i>	•	•	•
	AS 2397	<i>Safe use of lasers in the building and construction industry</i>			•
	AS/NZS IEC 60825.1	<i>Safety of laser products – Part 1: Equipment classification and requirements</i>	•	•	•
Lifts	AS 1735 (Series)	<i>Lifts, escalators and moving walks (known as the SAA Lift Code)</i>	•	•	•
Machinery	AS 4024 (Series)	<i>Safety of machinery</i>	•	•	•
	AS 1657	<i>Fixed platforms, walkways, stairways</i>	•	•	

		<i>and ladders-Design, construction and installation</i>			
	AS 1788.2	<i>Abrasive wheels – Part 2: Selection, care, and use</i>	•	•	•
	AS/NZS 3947.3	<i>Low-voltage switchgear and control gear - Part 3: switches, disconnectors, switch-disconnectors and fuse-combination units</i>	•		•
	AS 61508 (Series)	<i>Functional safety of electrical/electronic/programmable electronic safety-related systems</i>	•	•	•
	AS IEC 61511 (Series)	<i>Functional safety – Safety instrumented system for the process industry sector</i>	•	•	•
	AS 62061	<i>Safety of machinery: Functional safety of safety-related electrical, electronic and programmable electronic control systems</i>	•	•	•
	BS EN ISO 13849-1	<i>Safety of machinery: Safety-related parts of control systems – Part 1: General principles for design</i>	•	•	•
	BS PD IEC TR 61496 (Series)	<i>Safety of machinery - Electro - sensitive protective equipment</i>	•		•
	AS 1121.1	<i>Agricultural tractor power take-offs – Part 1: rear-mounted power take-off types 1, 2 and 3 - General specifications, safety requirements, dimensions for master shield and clearance zone</i>	•	•	
	AS 1636 (Series)	<i>Tractors - Roll-over protective structures criteria and tests</i>	•	•	
	AS/NZS 2153.1	<i>Tractors and machinery for agriculture and forestry - Technical means for ensuring safety – Part 1: General</i>	•	•	
	SAE J 167	<i>Overhead protection for agricultural tractors - Test procedures and performance requirements</i>	•	•	
Miniature boilers	AMBSC Code –Part 1	<i>Copper Boilers - Issue 7-2001</i>	•	•	
	AMBSC Code –Part 2	<i>Steel Boilers – Issue 4-1995</i>	•	•	
	AMBSC Code - Part 3	<i>Sub-Miniature Boilers – Issue 1-2008</i>	•	•	
	AMBSC Code – Part 4	<i>Duplex Boilers – Issue 1-2010</i>	•	•	
Pressure equipment	AS/NZS 1200	<i>Pressure Equipment</i>	•	•	•
	AS 2593	<i>Boilers – Safety management and supervision systems</i>	•		•
	AS 2971	<i>Serially produced pressure vessels</i>	•	•	
	AS/NZS 3788	<i>Pressure equipment – In-service inspection</i>			•
	AS 3873	<i>Pressure equipment – Operation and maintenance</i>			•
	AS 3920	<i>Pressure equipment – Conformity assessment</i>	•	•	
	ASME PV Code 1	<i>Boiler and pressure vessel code – Rules for construction of power boilers</i>	•	•	
	ASME PV Code 2 SET	<i>ASME Boiler and pressure vessel code – Materials (SET)</i>	•	•	
	ASME PV Code 5	<i>Boiler and pressure vessel code - Nondestructive examination</i>	•	•	
	ASME PV Code 8 Div 1	<i>Boiler and pressure vessel code – Rules for construction of Pressure vessels</i>	•	•	
	ASME PV Code 8 Div 2	<i>Boiler and pressure vessel code – Rules for construction of Pressure vessels – alternative rules</i>	•	•	
	ASME PV Code 8 Div 3	<i>Boiler and pressure vessel code – Rules for construction of Pressure vessels – Alternative rules for construction of high pressure vessels</i>	•	•	

	ASME PV Code 9	<i>Boiler and pressure vessel code – Welding, brazing and fusing qualifications</i>	•	•	
	ANSI NGV2	<i>Compressed natural gas vehicle fuel containers</i>	•	•	
	ISO 11439	<i>Gas cylinders - High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles</i>	•	•	
	BS EN 13458 (Series)	<i>Cryogenic vessels – Static vacuum insulated vessels</i>	•	•	•
Pressure piping	AS 4041	<i>Pressure piping</i>	•	•	
Machinery guarding	AS/NZS 4024 (Series)	<i>Safety of machinery</i>	•	•	•
	ISO 12100	<i>Safety of machinery – General principles for design – Risk assessment and risk reduction</i>	•	•	•
Scaffolding	AS/NZS 1576.1	<i>Scaffolding – Part 1: General requirements</i>	•	•	
	AS/NZS 1577	<i>Scaffold decking components</i>	•	•	
	AS/NZS 4576	<i>Guidelines for scaffolding</i>			•
Ladders	AS/NZS 1892.1/1892.2/1892.3	<i>Portable ladders</i>	•	•	
Spray painting	AS/NZS 4114.1	<i>Spray painting booths, designated spray painting areas and paint mixing rooms - Part 1: Design, construction and testing</i>	•	•	•
	AS/NZS 4114.2	<i>Spray painting booths, designated spray painting areas and paint mixing rooms - Part 2: Installation and maintenance</i>			•
Turbines	BIS IS 1498.2	<i>Rules for steam turbines thermal acceptance tests</i>	•		
	API 612	<i>Special purpose steam turbines for refinery services</i>	•		
Ventilation	AS 1668.2	<i>The use of ventilation and air conditioning in buildings – Part 2: Mechanical ventilation in buildings</i>	•	•	•
Work boxes- crane lifted	AS 1418.17	<i>Cranes (including hoists and winches) – Part 17: Design and construction of workboxes</i>	•	•	
	AS 2550 (Series)	<i>Cranes – Safe use</i>			•
	AS 3860	<i>Fixed guideway people movers</i>	•	•	•
	ISO 2374	<i>Lifting appliances – Range of maximum capacities for basic models</i>	•	•	

Key

Abbreviations name

ANSI	American National Standards Institute
API	American Petroleum Institute
AMBSC	Australian Miniature Boiler Safety Committee
AS	Australian Standard
ASME	American Society of Mechanical Engineers
AS/NZS	Australian Standard / New Zealand Standard
BS	British Standard
CSA	Canadian Standards Association
EN	Europäische Norm (European Standard)
IEC	International Electrotechnical Commission
ISO	International Standards Organisation
NZS	New Zealand Standards
SAE	Society of Automotive Engineers





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