Plant and machinery

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Plant and machinery

All farms need to manage the risks of injury that come with using agricultural plant and machinery. By thinking about what you do on a daily basis and what equipment you use, you will better manage the risks which are part of your everyday farming activities.

Start by making a complete list of plant and equipment that you use and all the hazards you can see. With each item, including those specific farming activities that pose a risk to health and safety (e.g. fencing with a post hole digger). Consult with workers who use them regularly, as they often have the best idea about those hazards.

Think about:

- cultivating, seeding and harvesting plant
- sprayers
- silos, field bins
- farm vehicles (e.g. tractors, trucks, motorcycles, quad bikes)
- workshop tools and equipment (e.g. portable electric tools, generators, drill presses, welding equipment)
- general farm implements.

Determine the level of risk created by these activities and prioritise them in order of danger. Then work out how best to limit or reduce these risks. Note what you have considered and why, then monitor and review what you've done and what you can do in the future.

Safety solutions

The best way to deal with hazards is:

1. **Elimination** – Can you get rid of dangerous, unsuitable or obsolete plant and prevent it from being used?
2. **Substitution** – Is there an alternative, safer plant or method (e.g. fit 'slam shut' catches to stockyard gates instead of chains)?
3. **Engineering controls** – Ensure guards are in place on all accessible and dangerous parts of machinery or plant.
4. **Administrative controls** – Develop and implement safe operating procedures for working at height, handling stock, moving augers and field bins, and safe operation of mobile plant.
5. **Personal Protective Equipment (PPE)** – Ensure all operators wear appropriate PPE (e.g. hearing/eye protection, gloves).

This is referred to as the hierarchy of control. It's best to implement risk controls that are as high in the order as possible.

Maintenance

- Arrange regular inspections of all machines and powered equipment by someone who knows about the hazards and work practices needed to work with rural plant.
- Service, maintain and repair your equipment in accordance with the manufacturer's specifications or, without such specifications, according to accepted practice.
- Keep a record of all servicing and/or maintenance – a daily diary is fine.
- Maintain safety devices such as cut-outs, guards, reverse and warning beepers and flashing beacons.
- Always isolate machine power before adjusting, unclogging or servicing.
- Adequately label equipment with safety decals and caution notices.

Modifications

If you need to modify agricultural plant, you could:

- freight it to the manufacturer/supplier for modification
- have the engineering workshop perform the modifications onsite
- do the modifications yourself.

You should only do your own modifications if you:

- are competent and trained to do so
- have the correct equipment for the task
- can do so without affecting the equipment's integrity
- follow the manufacturer's recommendations.

Top tip

Safety equipment is best left as it is, because it was designed that way for a reason.

For example, by welding brackets onto or drilling holes in a rollover protective structure, you may affect its structural integrity, and in the process dramatically reduce its protective ability. It will also make it non compliant with legislation.

Farm vehicles

- When transporting agricultural plant on a road/track, operate at a safe speed and securely hitch equipment.
- When travelling on public roads, comply with the appropriate Codes of Practice for moving agricultural machinery on-road. Visit **sa.gov.au** and search for 'agricultural vehicles'.
- Consider the terrain of the roads you will travel on, as well as the presence of overhead power and telephone lines along the route.
- Ensure that farm vehicles are fitted with seat belts in good working order and that they are used at all times.
- Have clear rules prohibiting passengers riding on the back of utes, trucks and trailers while in motion.
- Check that drivers of farm vehicles have the correct licences and competency to operate them.
- Make sure keys are removed from vehicles when not in use.
- Put in place clear speed limits, 'no go' zones, designated parking areas, visibility aids and warning signs as needed.
- Check that exhaust systems are functioning properly.

Guarding

One of the many problems of working with agricultural plant is the chance of coming into contact with or getting trapped between moving parts or materials, or being hit by material thrown from the machine.

Provide guards where rural plant parts are within reach and could become hazardous during operation, routine maintenance or adjustment. This includes when you carry out servicing, maintenance or adjustment of rural plant while:

- it is operating
- it is mobile
- power-driven parts are functioning or in motion.

Further information

Code of Practice – Managing the Risks of Plant in the Workplace
safework.sa.gov.au/cop

Guide for managing the risks of machinery in rural workplaces
safeworkaustralia.gov.au

Guarding

A guard (e.g. shield, cover, casing, physical or electronic barrier) is intended to prevent contact between a hazardous machine part and any part of a person or their clothing.

There may be times when an operator needs to reach over, under, around or into a machine while it is running. If so, any moving parts or other hazards must be appropriately guarded from human contact.

Guards are needed for:

- any moving part or rotating shaft, gear, cable, sprocket, chain, clutch, coupling, cam or fan blade
- any crushing or shearing points (e.g. augers and slide blocks, roller feeds, conveyor feeds)
- ground wheels and track gear
- any machine component which cuts, grinds, pulps, crushes, breaks or pulverises farm produce
- hot parts where the surface temperature exceeds 120°C in normal operation.

Safety solutions

To prevent injury:

- always use the manufacturer's guards and shields
- replace unguarded machinery with safer machinery
- check that older machinery is adequately guarded and retrofit where necessary
- have guards designed and fitted for improvised machinery – guards must comply with the relevant Australian Standards and manufacturer's specifications
- check that everyone can use machinery safely and are fully instructed about safe procedures for guarding, isolation devices, locks and danger tags
- only use augers when all guards are in place (with flighting, belt and shaft drives covered)
- never carry out repairs or maintenance when a machine is running
- use lock-out procedure and tag devices to prevent machinery being accidentally started during maintenance
- have a checklist procedure for maintenance jobs, which includes safely replacing guarding
- regularly check that all machinery complies with safety standards
- routinely inspect and maintain all plant and equipment, and have a comprehensive inspection conducted at least once a year
- keep all service, maintenance and inspection records
- keep children away from machinery and teach them that machinery is not play equipment.

Further information

Code of Practice – Managing the Risks of Plant in the Workplace

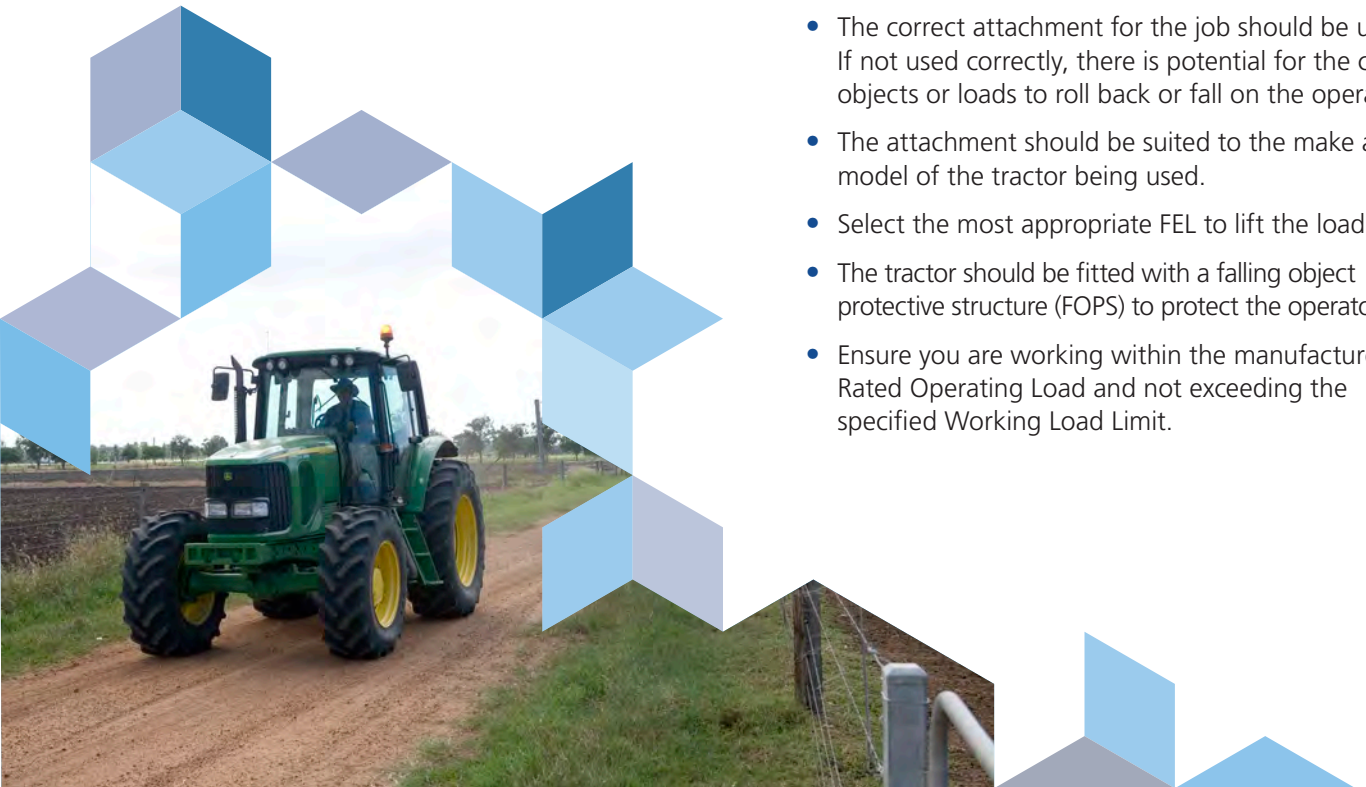
safework.sa.gov.au/cop

Tractors

No matter how long you have been working with tractors, it's important to remember that they are immense and powerful machines that can cause serious injury and death in the blink of an eye.

Safety solutions

- Always start a tractor from the driver's seat, not from the ground.
- Never dismount from a moving tractor or adjust or work on implements while they are in motion.
- If provided, safety mechanisms must not be tampered with.
- Always use three points of contact when getting on and off a tractor.
- Do not use or attach power take off (PTO) driven implements unless the power take-off shaft is guarded.
- Look up for clearances of power lines overhead and look down for signs for underground power lines.
- Do not park a tractor on a steep slope.
- Remove the key when the tractor is not in use.
- Make sure all operators are trained and competent to safely use tractors.
- Always wear a seat belt where fitted.



Guarding

Components which should be guarded for your safety include:

- any rotating shaft, gear, cable, sprocket, chain, clutch, coupling, cam or fan blade
- any crushing or shearing points (e.g. augers, slide blocks, roller feeds, conveyor feeds)
- ground wheels and track gear
- any machine component which cuts, grinds, pulps, crushes, breaks or pulverises farm produce
- hot parts where the surface temperature exceeds 120°C in normal operation.

Front end loader attachments

Front end loader (FEL) attachments mounted to tractors that are widely used include:

- single or multi-purpose buckets
- pallet forks
- bale and silage spikes/clamps and grapples
- blades and scrapers
- lifting jibs.

While you may have used a tractor fitted with an FEL on many occasions, it is good practice to refresh your knowledge. You should consider the following:

- The operator should possess the appropriate level of skill and knowledge, including having read and understood the manufacturer's operating instructions.
- The correct attachment for the job should be used. If not used correctly, there is potential for the carried objects or loads to roll back or fall on the operator.
- The attachment should be suited to the make and model of the tractor being used.
- Select the most appropriate FEL to lift the load.
- The tractor should be fitted with a falling object protective structure (FOPS) to protect the operator.
- Ensure you are working within the manufacturer's Rated Operating Load and not exceeding the specified Working Load Limit.

- The axle, wheels and tyres of the tractor should accommodate the weight of the FEL when fully loaded.
- Ensure you do not breach the lift capacity of the tractor's hydraulic system.
- The pressure should be equal, including all pressure released out of the system before coupling or uncoupling hydraulic fittings.
- Ensure attachments are stable or fixed so they will not move when being connected or disconnected.
- There should be adequate clearance between tractor front tyres and the FEL frame to eliminate contact during turns.
- The tractor should be stable when operating a fully loaded FEL.
- Fully assess the operating conditions related to the density of material, dimensions of the load, speed of travel, load height during travel and terrain surface.

Prior to operating a Telehandler (telescopic handler) all operators should undertake a competency training course. Telehandlers are often much lighter in mass than a straight FEL, so it is critical to consider options when determining the weight ratios with the different attachments and loads.

Rollover protective structures

In South Australia, as of 1 January 2016, a rollover protective structure (ROPS) is required to be fitted to all rural mobile plant with a weight of 560kg to 15 tonne.

Previously this only applied to post-1981 vehicles with a weight of 560kg to 3.86 tonne.

The design of the ROPS must be sufficient to provide protection for the operator against roll-over.

It may not be reasonably practicable to operate a tractor under trees or within an enclosed space with an approved ROPS fitted. There is a case for lowering or removing the ROPS in these situations, provided the tractor is operated with due care, and that the ROPS is returned to its normal state immediately afterwards.

Falling object protective structures

You must fit a falling object protective structure (FOPS) to any rural mobile plant if any activity is undertaken which involves a risk to the operator of being struck and injured by a falling object.

Tips from an SA farmer

- Keep well documented maintenance records.
- Keep machinery and tyres in good working order.
- If you need to crawl into the header to replace an agitator bar, make sure the responsibility of working in confined spaces is understood and do not, under any circumstances, work alone.
- Ensure you have the correct licence to operate the machinery.
- Contact SA Power Networks, Telstra and the Office of the Technical Regulator to check whether the height of your machinery meets the recommended safe clearance for overhead powerlines.

Quad bikes

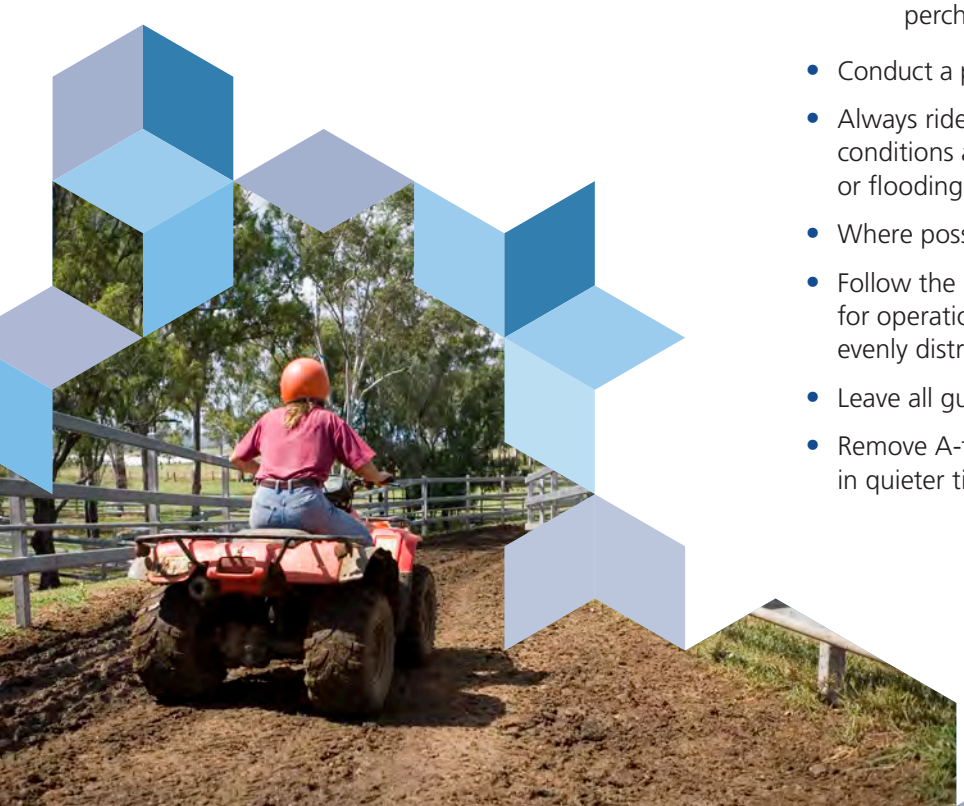
While quad bikes have certainly become a popular vehicle on farm, they are also the leading cause of fatalities on Australian farming properties.

Every year quad bikes are responsible for the deaths of 15 to 20 farm workers and a further 1,400 serious injuries, with young people aged between 10 and 24 years having a much higher risk of injury. These statistics do not include hobby farmers.

The majority of injuries result from sideways, backward and forward rollovers, trapping or crushing the driver underneath. The most common cause of death is due to entrapment and inability to breathe under the weight of an overturned bike (up to 400kg).

Other contributing factors include a lack of training and experience, excessive speed, steep, uneven or unfamiliar ground, carrying a passenger or an unbalanced load, attachments, unsuitable protective clothing and unsafe driving.

Because of the unique design characteristics of quad bikes, installing a roll cage is not possible. You can retrofit an existing bike by installing a crush prevention device. These devices change the trajectory of the bike if it rolls over; however, they are not failsafe and should be viewed as just one of many solutions to help minimise the risk of injury and death.



Safety solutions

Quad bike owners should be aware of the inherent risks associated with quad bikes and know what safety solutions to consider:

- Choose a new bike carefully and buy from a reputable manufacturer. Select an agricultural quad bike (not a sports recreational model) that is designed for power, traction and stability, and for its intended use (e.g. size of property, age of operator), if possible with a factory-fitted crush prevention device.
- Purchase and install a crush protection device for an existing bike. They retail for under $700 and you can install it yourself.
- Ensure all riders are trained and competent in safe bike use. There are courses available through TAFE where they will come to your area to facilitate. This is also a good idea for community training events, especially for the younger generation of farmers who have less experience.
- Ensure traffic control procedures are in place, including speed restrictions and ‘no-go’ zone signs posted.
- Be familiar with the capabilities, stability and handling of the bike:
  - on different terrains (e.g. undulating ground and steep inclines)
  - at different speeds on differing terrains
  - on differing ground cover such as wet, slippery clays and rocky stone reefs
  - when attachments are added (e.g. trailers and rack mounted spray tanks) or dogs are on their perch, noting how they change weight ratios.
- Conduct a pre-operational check before any ride.
- Always ride appropriately for the weather, terrain conditions and level of visibility, especially after rain or flooding.
- Where possible, use familiar tracks.
- Follow the manufacturer’s recommendations for operation and loading, securely restraining and evenly distributing the weight of items being carried.
- Leave all guards in place, particularly foot plates.
- Remove A-frames when they are not being used in quieter times.

- Wear a helmet. There are approved open faced helmets on the market and others that provide better air flow for hot riding conditions.
- Wear appropriate clothing and equipment for the environment (e.g. long pants, boots, gloves, eye protection, face shield/goggles).
- Stay visible (e.g. with flags, aerials, hi-visibility shirts, colourful helmets).
- Unless the bike is designed for two people, you must not transport another person due to weight shifting and control risks.
- Never allow children under the age of 16 to operate an adult bike – their body weight, strength and skill are not sufficient to control it safely.
- Never attempt jumps, wheelies or other stunts.
- Keep bikes well maintained. Make sure all parts used for repairs are designed for use on the particular brand of bike.
- Have a reliable means of communication and let someone know where you will be working and what time you expect to return. You may also fit a suitable Personal Locator Beacon which activates automatically should the bike roll over.
- Public road movement should be kept to a minimum between farm blocks. Quad bikes are not intended for use on smooth paved or bitumen surfaces where they could be difficult to control.

Tips from an SA farmer

From my experience, the biggest complaint from farmers about helmets is that they can be hot and uncomfortable when you are moving livestock, for instance on a hot day.

Look to source a helmet with good airflow to ensure you keep it on all day.

Case Study

Stock Journal, Tom McKenny, 1 June 2016

Quad bike rollover highlights safety issues

When north eastern Victorian cattle farmer Scott McKay came a cropper from his quad bike, it was a combination of good luck and good management that saw him miss becoming a statistic on what is one of farming's most dangerous tools.

The accident happened on a flat section of road when a calf blocked his path, causing him to grab the brake but roll the bike. He believes a crush protection device prevented the quad bike from rolling onto him and potentially causing serious damage. That risk was evident when two men couldn't right the rolled bike.

"The accident was slow motion and I didn't hurt myself and there was no damage to the bike, but it was 20 minutes before someone came along. If you had that lying on your chest I don't know whether you'd still be breathing," he said.

He is confident the crush protection device stopped the bike rolling further.

"When I landed and saw the bike coming toward me I had the feeling it was coming and it just rolled back the other way. After the event two of us couldn't roll the bike back onto its wheels. There was just a slight camber on the road and there was no way we could get it back over – we had to pull it over with another bike."

The (crush protection devices) were fitted to the farm's two 500cc quads 12 months before the accident.

"It's about looking after your people and looking after yourself," Mr McKay said.

He says the argument about fitting crush protection to quads is analogous to the tractor Roll Over Protection Systems (ROPS) argument decades ago.

"It's the same sort of argument with people saying the same sorts of things. Now you wouldn't hop on a tractor if it didn't have an ROPS."

He recognises the resistance some farmers have to the systems.

"This is a non-argument," he said. "We had the bikes for a year before we put them on and now the guys that work for us just feel so much more comfortable and secure. I don't know what the percentage chance of getting hurt on them is now compared to before is, but it would be multiples in our favour."

Elevating work platforms

Elevating work platforms (EWPs) are powered mobile plant designed to lift or lower people and equipment by means of a telescoping, hinged or articulated device, or any combination of these, from a base support.

Consideration must be given to each task and any potential associated hazards to ensure that an EWP is suitable to use and appropriate for the task (e.g. indoors or outdoors, presence of overhead hazards, condition of supporting surfaces). It may be appropriate to use an alternative means of reaching the area (e.g. scaffolding) to carry out the work.

A thorough task, site and equipment-specific hazard and risk assessment must be undertaken before operating an EWP. This may include the height, reach, crush or trapping hazards, safe working load, ground conditions and terrain, any electrical hazards or restricted working space.

Safety solutions

Secondary guarding devices

Various secondary guarding devices are available which may help prevent crush or trap injuries on mobile EWPs. These include:

- protective structure – attached or fixed to the existing guardrails that provides a protective barrier around the operator
- presence sensing device – activated by force or pressure, acting to stop the movement of the EWP and minimise harm.

Where secondary guarding devices are intended to be retrofitted to an existing EWP, a specific risk assessment should be undertaken before installation to ensure that the changes do not introduce new hazards or negatively impact the EWP's operation.

Operator training

Training of operators in the use of an EWP and its functions, including safe work methods and emergency procedures, must be provided before work starts.

Note: For a boom-type EWP, where the boom length is 11 metres or more, the operator must hold a *Licence to Perform High Risk Work*. The boom length is the greater of either:

- the vertical distance from the surface supporting the EWP to the floor of the platform, with the platform extended to its maximum height, or
- the horizontal distance from the centre point of the boom's rotation to the outer edge of the platform, with the platform extended to its maximum distance.

Pre-operational checks

Before use and at the start of each work shift, an EWP must be checked and tested by the operator in accordance with the manufacturer's pre-operational checklist. Checks should include the safety devices and interlock controls. If faults are identified, the EWP must be placed out of action (tagged out) and faults rectified before the EWP is used again.

Siting

The stability of an EWP must be carefully assessed, in particular if there's soft ground, sloping surfaces, overhead power lines, underground services, ground cavities and windy conditions.

Wheel-mounted EWP

All tyres should be foam filled and free from defects so they cannot deflate or cause roll-over in the event of a failure or major puncture.

Base controls

Base controls should not be used when anyone is on the platform, except in an emergency or for maintenance purposes. All EWPs should be fitted with an emergency retrieval system or be provided with auxiliary retrieval equipment to allow the safe evacuation of anyone from the platform.

Safe working load

The total weight of people, tools and material being loaded on a platform should not exceed the rated load capacity of an EWP.

Operating instructions

Operating instructions must be clearly and permanently displayed on an EWP.

Safety harnesses

Full safety harnesses must be worn by everyone on the platform of a boom-type EWP and be secured to the EWP anchor point.

Where there is a risk of a free fall, a fall-arrest harness designed for attachment to a lanyard assembly, including a personal energy absorber, must be worn by each person on an EWP.

Work in a public place

When an EWP is used in a public place or on a roadway, suitable barricades need to be in place so that pedestrians or vehicles are kept at a safe distance. Warning signs should be displayed and the appropriate approvals obtained from local authorities.

Maintenance

All maintenance, inspection and repair should be undertaken at regular intervals in accordance with the manufacturer's recommendations. An EWP owner may engage a competent person to ensure that maintenance is properly undertaken.

All EWPs 'in-service' should be regularly inspected and must be subject to a major inspection by the end of the tenth year by a competent qualified person.

Further information

Code of Practice – Managing the Risks of Plant in the Workplace

Code of Practice – Excavation Work

Code of Practice – Managing Electrical Risks in the Workplace

safework.sa.gov.au/cop

Australian Standard *AS 2550.10: Cranes, hoists and winches – Safe use. Part 10: Mobile elevating work platforms*

Elevating Work Platform Association of Australia
ewpa.com.au

Forklifts

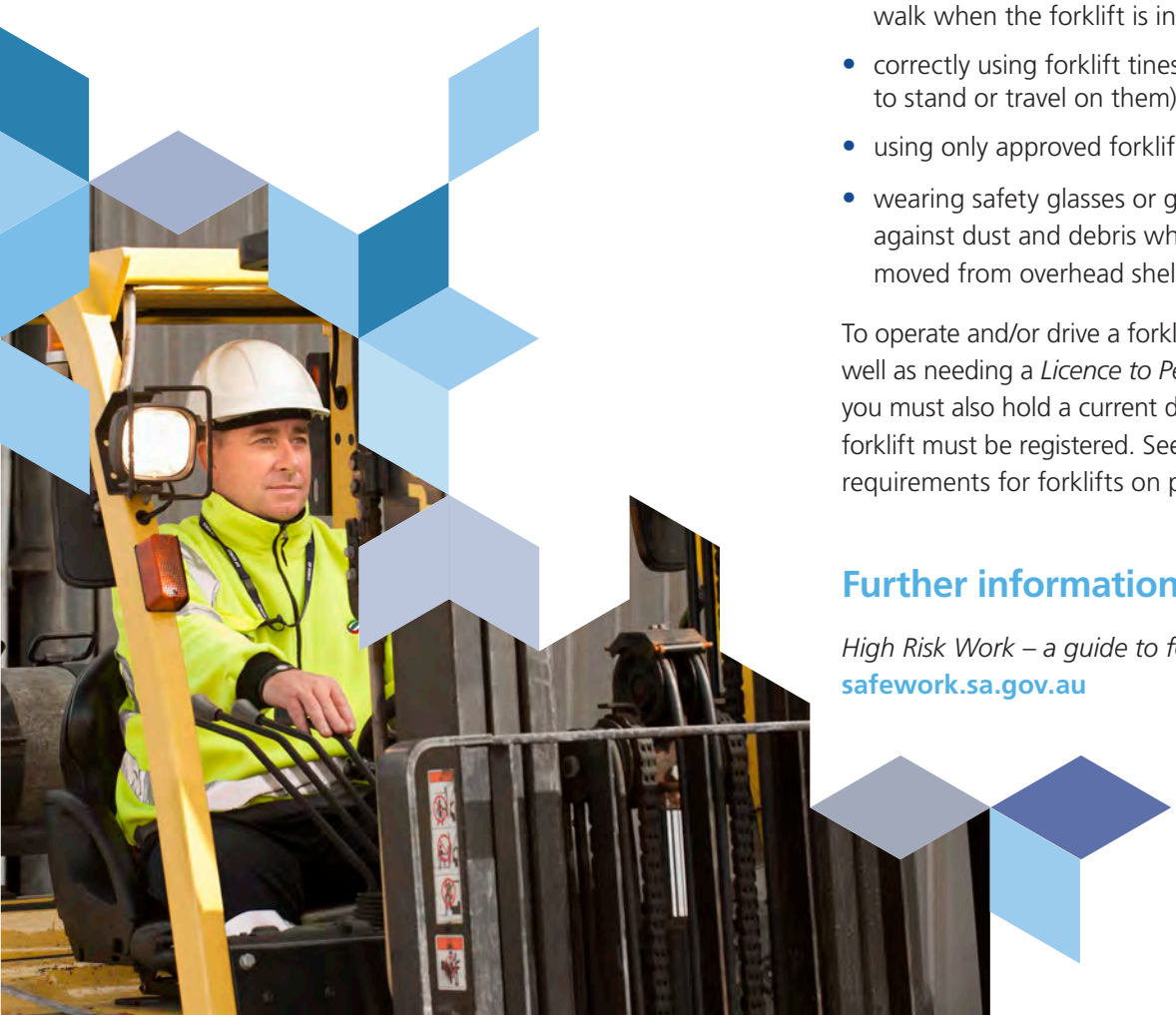
Forklifts are maneuverable and designed to be compact. However, when carrying loads they can become unstable.

Fully laden, a standard two-tonne forklift can weigh approximately five tonnes. In addition, a laden forklift cannot use its maximum braking capacity, because the load may slide or fall from the forklift tines, or the forklift will tip forwards.

Even at low speeds, forklifts can cause serious injuries and fatalities. It's not just the forklift operator who can be injured – others nearby can be struck by a forklift or its load.

Tipping is the biggest danger for a forklift operator. If an operator jumps from a tipping forklift, the chances of serious injury are high as the forklift will tip quicker than the operator can jump out.

With lower stability and greater maneuverability, combined with uncontrolled traffic areas on the farm, you'll understand why forklifts are involved in so many incidents.



Safety solutions

Safety can be greatly improved by the adoption of simple, safe practices such as:

- wearing correctly fitted seat belts and high-visibility vests (both operators and pedestrians)
- slowing down (e.g. to walking pace)
- making sure the reverse beeper, flashing light and warning sound are in good working order
- sounding the horn when others are around.

Reduce the risk of forklift-related injuries by:

- keeping to even terrain as much as possible
- ensuring visibility is clear for those working on and around forklifts
- fitting the weight carrying capacity
- fitting falling object protection
- making sure every forklift user has a current *Licence to Perform High Risk Work* (must be 18 years of age) and is trained in all forklift attachments used, and providing site-specific and refresher training
- regularly maintaining and servicing the equipment, and keeping a record of this
- implementing a traffic management plan – mark out areas in the shed where other workers/visitors must walk when the forklift is in use
- correctly using forklift tines (e.g. not used for others to stand or travel on them)
- using only approved forklift attachments
- wearing safety glasses or goggles for eye protection against dust and debris when stored products are moved from overhead shelving.

To operate and/or drive a forklift on a public road, as well as needing a *Licence to Perform High Risk Work* you must also hold a current driver's licence, and the forklift must be registered. See more about licensing requirements for forklifts on page 118.

Further information

High Risk Work – a guide to forklift safety
safework.sa.gov.au

Angle grinders

The main risk with the use of angle grinders is kickbacks, which can result in severe cuts. Discs can also shatter or disintegrate, producing fragments which may become lodged in the operator's eyes or other parts of the body.

The 9-inch angle grinder has a poor record for injuries and deaths, to the point where some farmers have banned their use outright. If a 7-inch angle grinder can do the job, that lighter power tool is a better option.

Safety solutions

- Decide if an angle grinder is the best tool to perform the task at hand – another tool may be more effective.
- When purchasing a grinder select one with:
  - adjustable handles that can be moved to suit both left and right-handed operators
  - an automatic cut-off or dead-man switch as part of the handgrip, if available and appropriate for the task.
- It's much easier to control a lighter tool, so try to match the power and size of the grinder with the size of the job.
- Don't use grinders on fire ban days or close to flammable/combustible materials (e.g. chemicals, dry grass, hay bales, firewood stacks).
- Never remove guards, which should cover half of the disc and be positioned between the disc and the operator.
- Ensure that the correct type of disc is used for the task being performed. The wrong disc could shatter or 'grab' the work piece causing kickback.
- Never use a cutting disc for grinding or a grinding disc for cutting.
- Provide workers with training and instruction on how to use angle grinders safely, explaining the following:
  - emergency stop function
  - correct flange and locking nut for the type of disc being used
  - checking disc condition
  - kickbacks
  - allowing run-up to operating speed before use
  - firmly securing the work piece (either as part of a larger item, or in a bench vice)
  - securing guards and handles
  - using two hands to operate – one hand should grip the handle and dead-man switch (if provided), while the other hand supports the weight of the tool
  - suggested angle to be held
  - adopting a comfortable, well-balanced body position with good visibility
  - instructions on depth of cut
  - rotating disc safety when a task is finished.
- Ensure other workers stand well back when someone is grinding.
- If you have one, use a welding screen to stop sparks and flying particles impacting on others in the vicinity.
- To prevent muscle fatigue, take regular short breaks to rest your hands and arms if grinding for extended periods, and where possible keep the work at waist height.
- Remove the plug from the power point before changing discs.
- When not in use, disconnect the power and place the grinder on a bench with the disc facing upwards.
- Ensure all grinders are regularly checked for electrical safety and that all defects are repaired by a competent person.

Personal protective equipment

It is recommended that you use appropriate personal protective equipment (PPE), including:

- wide vision goggles, safety glasses or a face shield
- ear muffs or ear plugs
- steel-capped safety boots
- overalls or other fitted cotton clothing (not polyester or other flammable fabrics)
- fitted gloves that allow a good grip of the tool.

Chainsaws

The chainsaw is an indispensable, labour-saving power tool used widely by farmers, viticulturists, orchardists and foresters. While it makes light work of felling and cutting up trees, when not handled skilfully and with care by trained operators, a chainsaw has the potential to inflict very serious injuries and/or create hazardous situations.

Chainsaws should only be used by trained operators. Cross-cut and felling training should be undertaken by competent operators.

Safety solutions

Chainsaw selection

Purchase chainsaws that are designed and manufactured for safe operation, and are properly guarded. All modern chainsaws have certain safety devices designed to help you safely use and keep control of the saw.

Select a task-appropriate chainsaw that is light and well-balanced, with a low noise rating, and equipped with:

- a chain brake (preferably automatic) and low-kick chain (safety chain) to prevent injury in the event of kickback
- a chain catcher and rear hand protector to protect the saw and the operator in the event of chain breakage
- an interlock throttle system to prevent uncontrolled activation of the throttle
- an anti-vibration system to reduce exposure to vibration
- an on-off switch.

Checks and maintenance

Carry out pre-operational checks as outlined in the operator's manual, in particular checking that the chain brake is working effectively.

Conduct regular chainsaw maintenance – sharpen and tension the chain, check the sprocket for wear, check the guide bar for burring and wearing.

Operators

- Ensure operators are well trained, instructed and supervised – send workers to a chainsaw operator training course if necessary.
- Provide chainsaw operators and anyone helping them with appropriate personal protective equipment (PPE) which must be worn at all times while a saw is being operated.
- PPE should include:
  - eye and face protection (goggles, safety glasses, mesh and perspex face shields); the chain on the saw rotates at more than 40 km/h, so chips and material can be flung at an operator's eyes at a very high speed
  - head protection (hard hat), to protect from falling material and kickback
  - hearing protection; chainsaws operate in the region of 100-110dB(A) at the operator's ear, therefore careful consideration must be given to the attenuation of the ear protector for the operator and anyone else working in the vicinity
  - foot protection (e.g. safety boots with steel toe caps, non-slip/deep tread soles or metal sprigs/cleats)
  - leg protection (e.g. cut-resistant safety chaps)
  - hand protection (e.g. gloves or mittens to protect against cuts and abrasions when handling offcuts, keep hands warm and help prevent vibration induced problems).
- Do not tackle jobs beyond your capabilities – use professionals for felling trees that overhang powerlines or buildings, large shelterbelt trees, trees with a heavy lean or on steep slopes/unstable ground.
- Never work alone – always have someone within calling distance.

Chainsaw use

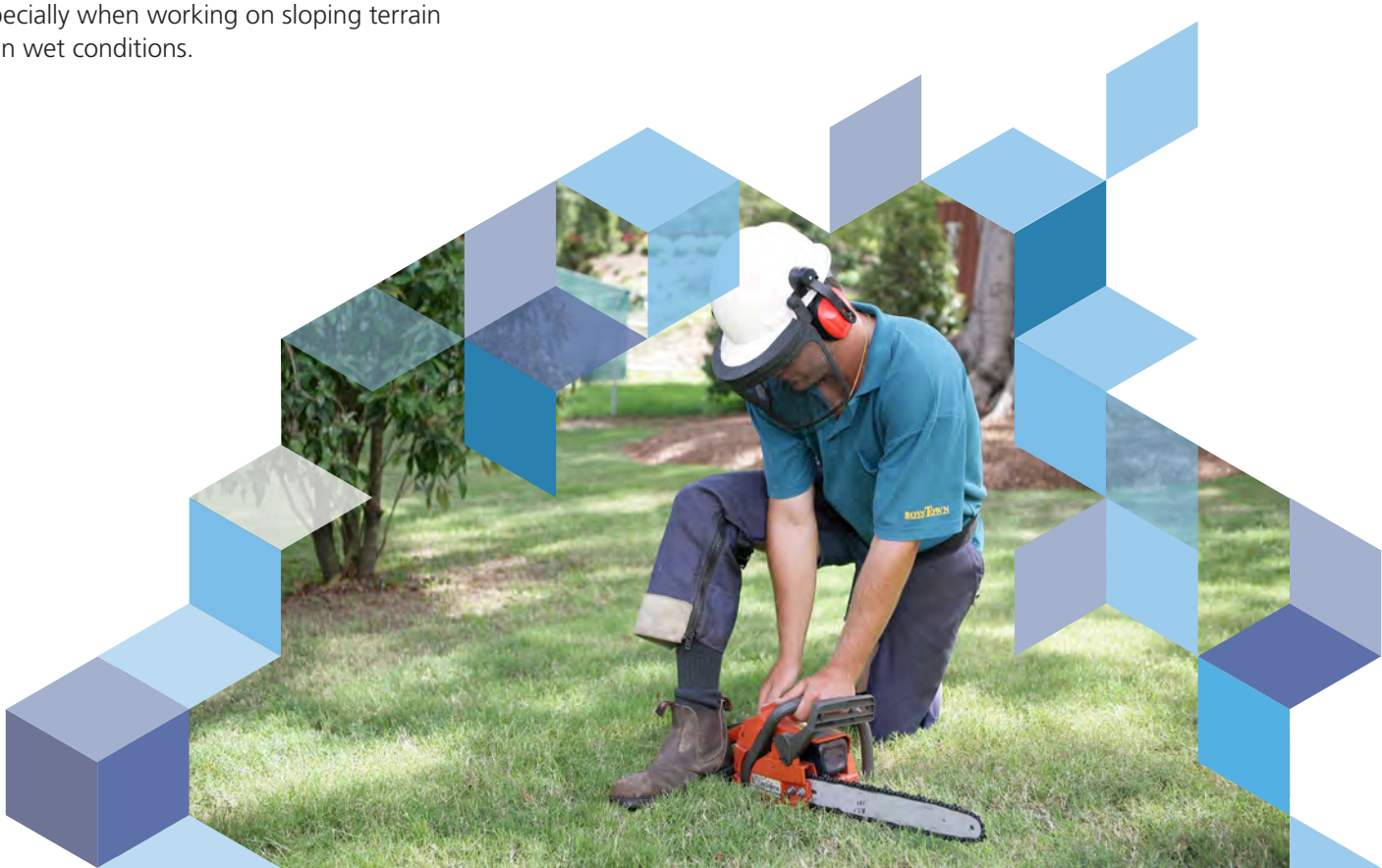
- Other than the obvious risk of contact with a moving chain, the single most dangerous aspect of the saw is kickback when the bar nose makes contact with an object, resulting in instantaneous kick reaction. Severe injuries and sometimes death can occur. To prevent kickback:
  - avoid using the bar nose and be alert to anything coming into contact with it
  - ensure the safety chain is used, and that it is correctly sharpened and tensioned
  - always hold a running saw firmly with both hands on the handles, with the thumb of the left hand placed under the front handle
  - avoid using the saw above shoulder height
  - always keep the saw in front of the body.
- Start the chainsaw on firm ground with the chain brake applied and the blades facing away from the operator.
- Match the size of your saw and bar to the size of the material being cut. Don't try to use a small saw and bar to fell a large tree.
- Chainsaws are only designed for cutting wood. Never use them to cut any other material or use the saw guide bar for levering or digging.
- Do not use chainsaws when working from a ladder. Chainsaws require both hands to be operated safely, and working from a ladder requires one hand to hold the ladder to maintain a steady position.
- Ensure you have a firm and stable footing, especially when working on sloping terrain or in wet conditions.

When cross-cutting or pruning

- Clear the area as much as possible to ensure you have a firm and stable footing.
- Do not use the chainsaw above shoulder height or above ground level (e.g. in a tree or off a ladder).
- Consider using a pole saw if working overhead.
- Check for dead limbs that may fall and injure the operator.

When felling large trees

- Assess the tree for the desired direction of fall.
- Identify a planned clear path for escape.
- Ensure you have a firm and stable footing.
- Ensure no people or vehicles are in, or can enter, the danger zone (2.5 x tree length).
- Check the tree for dead limbs.



Hand tools

With the range of handyman jobs that need to be done on farms, you probably have many hand tools in the shed. Using hand tools incorrectly – or tools that are not fit for purpose or not suited to the user – can lead to joint and tissue injury.

Check before you start work that you have the right tool for the job and that you are working comfortably and not in a restricted or awkward position. The design and condition of tools can accentuate any discomfort and lead to more serious symptoms or other injuries.

Safety solutions

- Select tools that are designed for the task.
- Select tools that are comfortable to hold and use, and don't put localised pressure on muscles and joints in the palm and fingers.
- Read the tool owner's manual prior to use.
- Plan how you will do the work safely before you start.
- Inspect before use and regularly maintain tools to keep them in good working order.
- Inform, instruct and train workers in the selection, use and maintenance of hand tools.
- Store tools safely.
- Regularly inspect power tool cords and get them tested by a qualified person if they appear faulty.
- Wear close-fitting work clothing to avoid entanglement and sturdy work boots with a non-slip sole .
- Use personal protective equipment (e.g. goggles/ face shields to protect your eyes from flying particles and dust, ear muffs to protect your ears from noise damage, gloves).
- Use guards where needed and do not remove them.
- Ensure the work area is well lit.
- Minimise the time you spend using tools that vibrate (e.g. chainsaws).
- Manage the effects of muscle fatigue by reducing the need to work in positions where the arms are above shoulder height or tools are held for extended periods without proper rest breaks or task rotation between workers.
- Replace hand tools with power tools to reduce the level of force required to do the task.

Power tools are extremely hazardous when not used correctly and must be fitted with guards and safety switches. Hand-held power tools must have a:

- constant pressure switch which shuts off power upon release (e.g. circular saw, chainsaw, grinder, hand-held power drill), or
- on-off switch (e.g. routers, planers, laminate trimmers, shears, jig saws, nibblers, scroll saws).

Top tip

Be aware of all powerlines, electrical circuits, water pipes and other mechanical hazards in your work area, particularly those below the work surface or hidden from view.

Remember, look up and live and Dial Before You Dig.

1100.com.au

Firewood saws

Unguarded bench-type firewood saws pose extreme safety risks and should never be used.

Fixed guards or safe feeding arrangements must be used to prevent hands or other parts of the body from inadvertently coming into contact with dangerous parts of saws or benches.

Safety solutions

- Provide operators with appropriate personal protective equipment including:
  - close-fitting work clothing to avoid entanglement
  - eye and face protection (e.g. goggles, safety glasses, face shields) to guard against wood chips and sawdust
  - hearing protection
  - foot protection (e.g. sturdy work boots with non-slip soles)
  - hand protection (e.g. gloves or mittens to protect against cuts and abrasions when handling offcuts, and to keep hands warm in cold weather).
- Disconnect the saw from the power source before making any adjustments.
- Ensure power cords/cables are protected with a residual current device (RCD) that is regularly tested.
- Keep saw benches and the surrounding area clear of debris and sawdust build-up.
- Use sheet metal or mesh guards to fully enclose belts and pulleys.
- Guard power take-off (PTO) drive shafts and belt-driven saws mechanisms to eliminate entanglement and trapping points.
- A guard should extend at least 50mm beyond the front edge of the saw teeth in the non-cutting position.
- The opening in the guard for the passage of the saw blade should not exceed 50mm (it becomes exposed as a tilting type table is tilted).
- Only the upper quadrant of the saw blade (forward of the vertical centre line) should be exposed during the cutting operation.
- The table and guard should be spring-loaded or fitted with counterweights to automatically return and enclose the saw blade on completion of the cut.
- For sliding-type tables, a guard enclosing the upper half of the saw blade should form part of the sliding table.

Electrical hazards

Electrical hazards associated with all electrical power cords, fittings, machinery, tools and equipment need to be identified. Assess each hazard for the likelihood and severity of possible injury or harm, and develop safe work procedures to control them. Any suspect items should be immediately put out of use and either isolated or kept in a safe place until repaired or discarded.

The most common causes of injury or death are:

- electric shock, which may result from direct or indirect contact, tracking through or across a medium, or by arcing (e.g. from indirect contact where a conductive part that is not normally energised, such as a metal fence, becomes energised due to a fault)
- electric shock from 'step-and-touch' potentials
- arcing, explosion or fire causing burns – injuries are often suffered because arcing or explosion or both occur when high fault currents are present
- toxic gases causing illness or death – burning and arcing associated with electrical equipment may release various gases and contaminants
- fire resulting from an electrical fault.

Safety solutions

- Regularly inspect wiring, cords, plugs, tools and equipment for obvious external damage and look out for shorting or sparking fittings.
- Always get an electrical contractor to install, alter or repair electrical wires, plugs, switches, fuses or electrical machinery and equipment.
- Avoid using electrical equipment outdoors in wet conditions, or use weatherproof outlets and fittings in areas exposed to wind and rain.
- Do not overload circuits by plugging in too many electrical appliances at once.
- Never remove guards or covers from electrical switch gear.
- Light fittings that could get broken by moving equipment should be fitted with wire guards.
- Ensure extension cords are positioned in work areas so they do not create a slip or trip hazard and are not exposed to physical damage.
- Wear suitable footwear and clothing when using electrical equipment.

Residual current devices

Residual current devices (RCDs), which switch off immediately when electricity 'leaks' to earth at a level harmful to a human, offer a high level of personal protection from electric shock. For best protection ensure that:

- RCDs are only installed by licensed electrical contractors
- a fixed RCD is installed in the switchboard of the homestead, sheds and workshops
- portable RCDs are used with individual power tools
- electrical equipment is checked for obvious faults if an RCD operates (trips) – if it keeps tripping out, call an electrical contractor.

Fuses

Australian Standard *AS/NZS3000: Electrical installations* (known as the Australian/New Zealand Wiring Rules) prohibits the installation of semi-enclosed rewireable fuses.

If a fuse operates (blows), switch off and check the electrical equipment being used before replacing the fuse wire. If the fuse operates again, call an electrical contractor, as there is a fault with the wiring, the appliance or the tool.

When replacing fuse wire, make sure its rating is correct for the circuit. An oversize fuse wire could cause a fire or damage the electrical installation wiring.

Earth wires

Earth wires should never be removed or disconnected. They are an essential safety feature. The purpose of earth wires is to divert any current leakage to the ground and cause a fuse to blow or an RCD to trip should a fault develop. The earth wire is usually a bare or green and yellow insulated copper wire connected to a water pipe or stake driven into the ground.

Power tools

To work safely with power tools:

- make sure all hand-held tools and appliances are protected by an RCD
- when purchasing, look for double insulated tools as they are safer
- regularly check tools, leads and plugs for external damage or makeshift repairs
- ensure a competent person such as an electrician inspects and tests tools, leads and plugs on a regular basis
- don't use if the casings, cords or plugs are broken or damaged
- don't adjust tools without first switching off and removing the plug from the outlet.

Overhead and underground powerlines

There are many hazards associated with working near powerlines. To work safely:

- always check the location before you start work
- know the operation and maximum height of your machinery – powerline heights are deceptive
- have an observer check your position when working close to overhead powerlines
- when using or moving tall machinery like augers, balers and headers, or when moving long or tall loads such as irrigation pipes, make sure they are kept well clear of overhead powerlines
- never stack irrigation pipes or park machinery under powerlines
- carry pipes horizontally, and never up-end a pipe before looking up
- water is a conductor of electricity, so be careful when using water irrigation or jets near powerlines
- if you're using GPS-guided equipment, make sure the location of electricity infrastructure on your property is programmed into the system
- never ride on top of loads
- if you're crop dusting, make sure you (or your contracted pilot) know the location and height of powerlines in the area before commencing the job
- plan farm roads to avoid passing under powerlines and have new powerlines installed so they do not cross over roads
- if possible locate sheds, haystacks and silos, and access to them, away from powerlines
- check plans and records of underground powerlines before any digging or earthworks
- ensure that powerlines on your property are secure after storms, wind or heavy rain
- keep clear and notify the power supply authority if a powerline has been damaged or has fallen down.

Further information

Code of Practice – Managing Electrical Risks in the Workplace
safework.sa.gov.au/cop

Read more in the 'Working safely near overhead powerlines' section of **sa.gov.au**

Farmers, excavators, electricians, plumbers, planners, land surveyors, contractors, home owners and landscapers can take advantage of the free *Dial Before You Dig* referral service for information on locating underground utilities anywhere in Australia.
Call 1100 during business hours or visit **1100.com.au**.

In case of emergency

If an object or vehicle comes into contact with powerlines, there is a high risk of electric shock.

If this happens **immediately contact SA Power Networks on 13 13 66 – do not move until the power is switched off.**

If it becomes necessary **to evacuate the vehicle, jump out and clear of it**, ensuring that you don't touch the vehicle and the ground at the same time.

Tips from an SA farmer

Powerline heights can change, with high temperatures causing sagging during the summer months.

Welding

Welding is a great way to fix broken items on the farm, saving time and money. While the list of possible hazards is very long, welding is a safe occupation when proper precautions are taken.

You need to be aware of:

- electrocution and electric shock
- fire and explosion
- burns
- vision damage
- inhalation of poisonous gases and fumes
- exposure to intense ultraviolet radiation.

Safety solutions

Protect yourself and always wear head-to-toe personal protective equipment (PPE) including:

- helmet
- filter shade for goggles
- face shield to protect the eyes from radiation
- gloves and other protective clothing to cover exposed skin
- steel-capped boots.

Protect others by:

- installing non-flammable screens and partitions
- using signs to warn that welding is taking place – entry into the work area is not allowed unless safeguards are used
- reducing exposure to fumes and gases by making sure there is proper ventilation
- checking that all equipment is tested and tagged
- having leads kept away from potential sources of damage (e.g. water, heat, being run over).

Safe welding starts with using your welding equipment according to the manufacturer's recommendations. Take the time to read the operator's manual thoroughly and follow all of the safety, operation and maintenance instructions.

Ideally you and your workers should be formally trained in welding.

Regularly inspect and maintain your equipment.

Do not use temporary extension leads, multiple double adaptors or power boards in series.

Before you or your workers start welding:

- check that it is safe, especially if welding outside or near combustible/flammable materials
- know what equipment is needed for the job and check that it is in good condition
- have the right instructions on hand, including safe storage of chemicals
- protect yourself and others with the right PPE and signage
- make sure your welding equipment is protected by an RCD and that main isolation switches are clearly labelled/accessible
- store cylinders upright and prevent them from falling
- light up gas cylinders using a flint or piezo electric lighter, not matches or cigarette lighters
- make sure that flashback arrestors are fitted at the blow pipe and to the oxygen and fuel gas regulators
- do not use electrical equipment in wet areas.

Sparks

Arc welding produces sparks and spatter, and emits intense visible and invisible rays that pose several hazards to unprotected skin and eyes.

Shorts, short sleeves and open collars leave you vulnerable to burns from both flying sparks and the arc rays. Wear only flame-resistant clothing, and button your cuffs and pockets to prevent them from catching sparks. Cuffs on pants can also catch sparks and should be avoided.

Radiation

Radiation hazards emitted from electric arc and laser welding have the potential to cause eye disorders and skin burns such as 'arc eye' or 'welder's flash'.

Radiation from laser welding is less obvious than from electric welding arcs, but both are serious hazards. Workers directly involved in welding processes are at the greatest risk but other workers could also be exposed to harmful radiation.

Cylinders

Cylinders of compressed and liquefied gases contain large volumes under high pressure. Precautions need to be taken when storing, handling and using cylinders.

The hazards associated with compressed and liquefied gases include fire, explosion, toxicity, asphyxiation, oxidisation and uncontrolled release of pressure. Leaking gas is usually recognised by odour. However, oxygen is odourless and potentially more hazardous.

Further information

Code of Practice – Welding Processes
safework.sa.gov.au/cop

While there are many providers of such courses, TAFE offers welding courses for farmers. Contact your TAFE SA Regional Manager to organise a course on-farm or within your local area. Visit **tafesa.edu.au**.

Quick safety scans

Use these quick safety scans to look at key work health and safety issues on your property. Those items where you tick 'Sometimes' or 'Never' will need action to fix or do better. Use the safety solutions suggested earlier in the guide to help you improve.

Plant and machinery	Always	Sometimes	Never
Regular inspections are performed by someone who knows about the hazards and work practices.	☐	☐	☐
Equipment is serviced, maintained and repaired in accordance with the manufacturer's specifications.	☐	☐	☐
Records are kept of all servicing and maintenance.	☐	☐	☐
Modifying rural plant is done to the manufacturer's recommendation or with expert advice.	☐	☐	☐
Machine power is isolated before adjusting, unclogging or servicing equipment.	☐	☐	☐
All machines and powered equipment have been adequately labelled with safety decals and caution notices.	☐	☐	☐
Operator manuals and safety instructions are readily accessible for all powered machines.	☐	☐	☐
Transporting rural plant on a road/track is done at a safe speed and equipment is securely hitched.	☐	☐	☐
Operators have been taught safe hitching procedures.	☐	☐	☐
Workers are aware of the risk of plant contacting overhead powerlines.	☐	☐	☐
Farm vehicles are fitted with seat belts which are in working order and used at all times.	☐	☐	☐
Drivers of farm vehicles have the correct licences and competency to operate them.	☐	☐	☐
There are clear speed limits, 'no go' zones, designated parking areas, visibility aids and warning signs as needed.	☐	☐	☐
Keys are removed from vehicles when not in use.	☐	☐	☐

Guarding	Always	Sometimes	Never
Guards are fitted to all required equipment and not removed.	☐	☐	☐
Plant is disabled if guards are either deliberately or inadvertently removed.	☐	☐	☐
Workers are fully instructed about safe procedures for guarding, isolation devices, locks and danger tags.	☐	☐	☐
Lock-out procedures and tag devices are fitted where required.	☐	☐	☐

Guarding	Always	Sometimes	Never
No repairs or maintenance are done when a machine is running.	☐	☐	☐
Guards are designed and fitted according to the relevant Australian Standards and manufacturer's specifications.	☐	☐	☐
Augers are only used when all guards are in place.	☐	☐	☐

Tractors	Always	Sometimes	Never
Key safety precautions are considered when starting, driving, dismounting and parking a tractor.	☐	☐	☐
All associated risks are considered when fitting a front end loader attachment.	☐	☐	☐
A risk assessment has been carried out to check if there is a risk of rollover.	☐	☐	☐
All tractors are fitted with an approved rollover protection structure (ROPS).	☐	☐	☐
Tractors at risk of being struck by a falling object have been fitted with a falling object protective structure (FOPS).	☐	☐	☐
Passengers on tractors have appropriate seats, foot holds and hand holds.	☐	☐	☐
Children are prevented from riding on tractors under any circumstances.	☐	☐	☐

Elevating work platforms	Always	Sometimes	Never
Worksites are checked prior to use, to assess site specific risks and ground conditions.	☐	☐	☐
All workers operating an EWP with a boom length of 11 metres or more hold a *Licence to Perform High Risk Work*.	☐	☐	☐
All EWP operators are trained in the use of the equipment.	☐	☐	☐
Operating instructions are clearly and permanently displayed on an EWP.	☐	☐	☐
The operational weight of people, tools and materials has been checked to ensure that the rated load capacity is not exceeded.	☐	☐	☐
Base controls are not used when people are on the platform, except in an emergency or for maintenance purposes.	☐	☐	☐
Secondary guarding devices are fitted (e.g. protective structures, presence sensing devices, proximity systems).	☐	☐	☐
An emergency personnel retrieval system is fitted or auxiliary retrieval equipment provided.	☐	☐	☐
An appropriate fall arrest harness with lanyard type energy absorber is provided for each person working on an EWP.	☐	☐	☐
Suitable barricades are positioned, warning signs displayed and approvals obtained from local authorities when an EWP is used in a public place or on a roadway.	☐	☐	☐
Maintenance is carried out in accordance with the manufacturer's recommendations and recorded in a logbook.	☐	☐	☐

Forklifts	Always	Sometimes	Never
All operators have a current *Licence to Perform High Risk Work*.	☐	☐	☐
Forklifts are regularly serviced.	☐	☐	☐
Maintenance and service records are kept.	☐	☐	☐
Weight carrying capacity is fitted.	☐	☐	☐
Reverse beeper, flashing light and warning sound are in good working order.	☐	☐	☐
Falling object protection is fitted.	☐	☐	☐
Walking pace is observed by operators.	☐	☐	☐
Only approved forklift attachments are used.	☐	☐	☐
Forklift tines are not used for any other purpose.	☐	☐	☐
Operators and pedestrians wear high-visibility vests.	☐	☐	☐
Forklift 'roadways' are clearly defined, and separated from pedestrian walkways.	☐	☐	☐

Angle grinders	Always	Sometimes	Never
Workers are trained and instructed on how to use angle grinders safely.	☐	☐	☐
Handgrips have an automatic cut-off or dead-man switch.	☐	☐	☐
Grinders have adjustable handles to suit both left and right-handed operators.	☐	☐	☐
Guards are kept in place (covering half the disc and positioned between the disc and the operator).	☐	☐	☐
Grinders are not used on fire ban days or close to flammable materials.	☐	☐	☐
Correct types of disc are used for tasks performed.	☐	☐	☐
PPE is provided, worn and maintained.	☐	☐	☐
Overalls or other fitted cotton clothing is worn (not polyester or other flammable fabrics).	☐	☐	☐
Other workers stand well back or are protected by a welding screen when someone is grinding.	☐	☐	☐
Regular short breaks are taken to prevent muscle fatigue when grinding for extended periods.	☐	☐	☐
The plug is removed from the power point before changing discs.	☐	☐	☐

Chainsaws	Always	Sometimes	Never
Saw operators are well trained, instructed and supervised.	☐	☐	☐
Safety chains are used, and are correctly sharpened and tensioned.	☐	☐	☐
Saws are started on firm ground with the chain brake applied and blades facing away from the operator.	☐	☐	☐
Saw operators and anyone assisting them are provided with appropriate PPE.	☐	☐	☐
Saw operators never work alone.	☐	☐	☐
Chainsaws are always used in front of the body and not above shoulder height.	☐	☐	☐
Pole saws are used if working overhead.	☐	☐	☐
Chainsaws are not used without a firm and stable footing.	☐	☐	☐
Saws are not used to cut anything other than wood.	☐	☐	☐
When felling trees, ensure no people or vehicles are in the danger zone (2.5 x tree length).	☐	☐	☐

Hand tools	Always	Sometimes	Never
Tools are designed for the task and are comfortable to hold and use.	☐	☐	☐
Tools are fitted with appropriate safety guards.	☐	☐	☐
Tools are maintained in accordance with the manufacturer's specifications.	☐	☐	☐
PPE is worn and maintained.	☐	☐	☐
Power tool cords and leads are in good condition, regularly inspected, tested and tagged by a qualified person.	☐	☐	☐
Time spent using tools that vibrate (e.g. chainsaws) is minimised.	☐	☐	☐
Muscle fatigue effects are minimised by reducing the need to work in positions where the arms are above shoulder height or tools are held for extended periods without proper rest breaks or task rotation between workers.	☐	☐	☐

Firewood saws	Always	Sometimes	Never
Belts and pulleys are fully enclosed with sheet metal or mesh guards.	☐	☐	☐
PTO drive shafts and belt-driven saw mechanisms are guarded to prevent entanglement.	☐	☐	☐
Guards extend at least 5cm beyond the front edge of the saw teeth in the non-cutting position.	☐	☐	☐
Only the upper section of the saw blade is exposed during cutting.	☐	☐	☐
The table and guard are spring loaded or fitted with counterweights to automatically return and enclose the saw blade on completion of the cut.	☐	☐	☐
Saws are disconnected from the power source before any adjustments are made.	☐	☐	☐
Saw benches and surrounding areas are clear of debris and sawdust build-up.	☐	☐	☐
Operators are provided with and wear appropriate PPE.	☐	☐	☐

Electrical hazards	Always	Sometimes	Never
All electrical equipment is maintained in good condition.	☐	☐	☐
Testing and tagging is current for all electrical and portable electrical equipment.	☐	☐	☐
Maintenance records are kept and available.	☐	☐	☐
Outlets, plugs, sockets, leads and power points are in good condition.	☐	☐	☐
Temporary extension leads, multiple double adaptors and power boards in series are not used.	☐	☐	☐
Power circuits are protected with appropriately rated fuses or circuit breakers.	☐	☐	☐
Electrical power tools and electrical equipment are adequately earthed.	☐	☐	☐
Unsafe equipment is disconnected/isolated/labelled.	☐	☐	☐
All moveable electrical equipment and power boards are protected by an RCD.	☐	☐	☐
Main and isolation switches are clearly labelled/accessible.	☐	☐	☐
Electrical leads, power boards and equipment is kept away from potential sources of damage (e.g. water, heat, being run over).	☐	☐	☐
Flammable chemicals are located more than one metre away from an electrical power point.	☐	☐	☐

Welding	Always	Sometimes	Never
Welding equipment is used according to the manufacturer's recommendations.	☐	☐	☐
Non-flammable welding screens and partitions are available and used.	☐	☐	☐
Signs are used to warn that welding is taking place, and entry into the work area is not allowed unless safeguards are used.	☐	☐	☐
PPE is provided and used (e.g. helmet, filter shade for goggles, face shield, gloves, steel-capped boots and protective clothing).	☐	☐	☐
Ensure there is adequate ventilation.	☐	☐	☐
Oxy/gas cylinders are secured in trolleys or prevented from falling (e.g. chained).	☐	☐	☐
Flashback arrestors are fitted at the blow pipe and to the oxygen and fuel gas regulators.	☐	☐	☐
Oil is not used on threads when changing gas cylinders.	☐	☐	☐
Gauges are suitable for the cylinder pressure.	☐	☐	☐