

HAND AND POWER TOOLS AND OTHER CONSTRUCTION PLANT

LEARNING OUTCOME

Describe the requirements of the Work Health and Safety legislation and standards relating to hand and power tools and other construction plant.

ASSESSMENT CRITERIA

- Describe the statutory requirements relating to hand and power tools.
- Understand some of the hazards and the risks associated with hand and power tools and other construction plant.
- Understand the need for documented training for personnel required to use and/or maintain hand and power tools and other construction plant.
- Describe the selection process of effective and appropriate personal protective equipment for personnel required to use and/or maintain hand and power tools and other construction plant.

REFERENCES

- Work Health and Safety Act 2011;
 - Part 2 - Duties
- Work Health and Safety Regulation 2011:
 - Subdivision 3 – Ladders and platforms supported by ladders
- Managing risks of Plant in the Workplace Code of Practice 2013
- AS/NZS 1873 Powder Actuated (PA) Hand Held Fastening Tools
- Hazardous Manual Tasks Code of Practice 2011
- Concrete cutting and drilling industry guide 2001
- WA Code of practice Concrete and masonry cutting and drilling 2010
- AS/NZS 1657 – Fixed Platforms, Walkways, Stairways and Ladders
- AS/NZS 1892.1 – Metal Ladders
- AS/NZS 1892.2 – Timber Ladders
- AS/NZS 1892.3 – Reinforce Plastic Ladders
- AS/NZS 1892.5 – Portable Ladders – Selection, Safe Use and Care

ATTACHMENTS

- [Information Guide: Identifying and Managing Crystalline Silica](#)

HAND AND POWER TOOLS

Workers who use hand and power tools and are exposed to hazards such as falling, flying, abrasive and splashing objects, or harmful dusts, fumes, mists, vapours or gases must be provided with the appropriate personal protective equipment (PPE).

All electrical connections for these tools must be suitable for the type of tool and the working conditions (wet, dusty, flammable, vapours). When a temporary power source is used, a portable Residual Current Device should be used.

Workers and others should be competent in the proper use of all tools. Workers should be able to recognise the hazards and the risks associated with the different types of tools and the safety precautions necessary.

There are five basic principles that can help minimise the risk associated with the use of hand and power tools. They are:

- Keep all tools in good condition with regular maintenance;
- Use the right tool for the job;
- Examine each tool for damage before use and do not use damaged tools;
- Operate tools according to the manufacturer's specifications; and
- Provide and use properly, the right personal protective equipment.

Persons conducting a business or undertaking (PCBU) and workers should work together to establish safe working procedures. If a hazardous situation is identified, it must be reported immediately to the appropriate person.

The following sections identify various types of hand tools and power tools and their potential risk. They also identify ways to prevent worker injury through proper use of the tools and personal protective equipment.

HAND TOOLS

Hand tools are tools that are powered manually. They include anything from an axe to a wrench. The greatest risks associated with hand tools result from misuse and improper maintenance.

The PCBU is responsible for the safe condition of tools and equipment used by workers. A PCBU shall not issue or permit the use of unsafe hand tools. Workers should be trained in the proper use and safe handling of all tools and equipment.

POWER TOOLS

Types of power tools are determined by their power source: electric, pneumatic, liquid fuel, hydraulic and powder actuated.

The various plant types are found in nearly every work place. Depending on the particular type of power tool, various hazards may be present and therefore, associated risk.

Well-designed workplace layout and good housekeeping practices are paramount in areas where there is a lot of power tool activity. Workplace floors should be kept clean and dry to prevent accidental slips with or around dangerous power tools.

An adequate and effective maintenance program is an integral part of the provision of safe equipment. Power tools must be fitted with guards and safety switches in accordance with manufacture's specifications.

Appropriate personal protective equipment must be worn to protect against hazards such as flying debris, noise and dust etc.

The following general precautions will assist in the risk minimization to users of power tools and other persons within close proximity:

- Never carry a tool by the cord or hose;
- Never yank the cord or the hose to disconnect it from the receptacle;
- Keep all cords and hoses away from heat, oil and sharp objects;
- Disconnect tools when not in use, before servicing and cleaning and when changing accessories such as blades, bits and cutters;
- Keep all people who are not involved with the work at a safe distance from the work area;
- Secure work with clamps or a vise, freeing both hands to operate the tool;
- Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool;
- Maintain tools with care. Keep them sharp and clean for best performance;
- Follow instructions in the user's manual for lubricating and changing accessories;
- Be sure to keep good footing and maintain good balance when operating power tools;
- Wear appropriate clothing for the task. Loose clothing, ties, jewellery and long hair that is unrestrained can become caught in moving parts;
- Remove all damaged portable equipment from use and tag them "Do Not Use". Place lockout devices on all stationary equipment that requires replacement, repair or servicing.

GUARDS

The exposed moving parts of power tools need to be safeguarded in accordance with manufacture's specifications. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains or other reciprocating, rotating or moving parts of equipment must be guarded.

Machine guards, as appropriate, must be provided to protect the operators and other from the following:

- Point of operation;
- In-running nip points;
- Rotating parts; and
- Flying chips and sparks.

Safety guards must never be removed when a tool is being used. Portable circular saws having a blade greater than 5.08 cm in diameter must be equipped at all times with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work material.

OPERATING CONTROLS AND SWITCHES

The following hand-held power tools must be equipped with a constant-pressure switch or control:

- Drills;
- Tappers;
- Fastener drivers;
- Horizontal, vertical and angle grinders with wheels more than 5.08cm in diameter;
- Disc sanders with discs greater than 5.08cm;
- Belt sanders;
- Reciprocating saws;
- Saber saws;
- Scroll saws;
- Jigsaws with blade shanks greater than 0.63cm wide; and
- Other similar tools.

These tools may be equipped with a “lock-on” control, if it allows the worker to also shut off the control in a single motion using the same finger or fingers.

The following hand-held power tools must be equipped with either a positive “on-off” control switch, a constant-pressure switch or a “lock-on” control:

- Disc sanders with discs 5.08cm or less in diameter;
- Grinders with wheels 5.08cm or less in diameter;
- Platen sanders;
- Routers;
- Planers;
- Laminate trimmers;
- Nibblers;
- Shears;
- Scroll saws;
- Jigsaws; and
- Saber and scroll saws with blade shanks a nominal 6.35mm or less in diameter.

It is recommended that the constant-pressure control switch be regarded as the preferred device. Other hand-held power tools, such as circular saws, chain saws and percussion tools

with no means of holding accessories securely must be equipped with a constant-pressure switch that will shut off the power immediately the pressure is released.

ELECTRIC TOOLS

Employees using electric tools must be aware of several dangers. Among the most serious hazards are electric burns and shock.

Shocks, which can lead to injuries or even heart failure and burns, are among the major hazards associated with electric power tools. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death. An electric shock can also cause the user to fall off a ladder or other elevated work platform and be injured due to the fall.

Electrical Safety Regulation 2013:

Section 104 of the ES Regulation provides requirements for construction wiring and electrical equipment.

Section 105 - 110 of the ES Regulation provides requirements for electrical equipment in manufacturing work.

Double-insulated tools are available that provide protection against electric shock without third-wire grounding. On double-insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool.

The following general practices should be followed when using electric tools:

- Operate electric tools within their design limitations;
- Use gloves and appropriate safety footwear when using electric tools;
- Store electric tools in a dry place when not in use;
- Do not use electric tools in damp or wet locations unless they are approved for that purpose;
- Keep work areas well lit when operating electric tools; and
- Ensure that cords from electric tools do not present themselves as a tripping hazard.
- Ensure that all specified electrical equipment is tested and tagged in accordance with legislative requirements.

In the construction industry, employees who use electric tools must be provided with residual current devices.

PORTABLE ABRASIVE WHEEL TOOLS

Portable abrasive grinding, cutting, polishing and wire buffing wheels create special safety problems because they may throw off flying fragments. Abrasive wheel tools must be equipped with guards that:

- Cover the spindle end, nut and flange projections;
- Maintain proper alignment with the wheel; and
- Do not exceed the strength of the fastenings.

Before an abrasive wheel is mounted, it must be inspected closely for damage and should be sound or ring-tested to ensure that it is free from cracks or defects. If the wheels sound cracked or dead, they must not be used because they could fly apart during operation. A stable and undamaged wheel when tapped will give a clear metallic tone or 'ring'.

To prevent an abrasive wheel from cracking, it must fit freely on the spindle. The spindle nut must be tightened enough to hold the wheel in place without distorting the flange. **Always follow the manufacturer's recommendations.** Take care to ensure that the spindle speed of the machine will not exceed the maximum operating speed marked on the wheel.

An abrasive wheel may disintegrate or explode during start-up. Allow the tool to come up to operating speed prior to grinding or cutting. The employee should never stand directly in front of the wheel as it accelerates to full operating speed. Portable grinding tools need to be equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of wheel breakage.

When using a powered grinder:

- Always use eye and/or face protection;
- Turn off the power when not in use; and
- Never clamp a hand-held grinder in a vise.

PNEUMATIC TOOLS

Pneumatic tools are powered by compressed air and include chippers, drills, hammers and sanders.

There are several dangers associated with the use of pneumatic tools. First and foremost, is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool.

Pneumatic tools must be checked to see that the tools are fastened securely to the air hose to prevent them from becoming disconnected. A short wire or positive locking device (Deadman Switch) attaching the air hose to the tool must also be used and will serve as an added safeguard.

If an air hose is more than 12.7mm in diameter, a safety access flow valve must be installed at the source of the air supply to reduce pressure, in case of hose failure.

In general, the same precautions should be taken with an air hose that are recommended for electric cords, because the hose is subject to the same kind of damage or accidental striking and because it also presents tripping hazards.

When using pneumatic tools, a safety clip or retainer must be installed to prevent attachments, such as chisels on a chipping hammer, from being ejected during tool operation.

Pneumatic tools that shoot nails, rivets, staples or similar fasteners and operate at pressures more than 100 pounds per square inch (6,890 kPa), must be equipped with a special device to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.

Airless spray guns that atomise paints and fluids at pressures of 1,000 pounds or more per square inch (6,890 kPa), must be equipped with automatic or visible manual safety devices

that will prevent pulling the trigger, until the safety device is manually released.

Eye, head and face protection is recommended, for all employees working with pneumatic tools.

Screens must also be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers or air drills. A chip guard must be used when compressed air is used for cleaning.

Compressed air guns should never be pointed towards anyone. Workers should never 'dead-end' them against themselves or anyone else.

Use of heavy jackhammers can cause fatigue and strains, from both manual handling and vibration. Heavy rubber gloves reduce these effects by providing a secure handhold. Workers operating a jackhammer must wear safety glasses and safety shoes that protect them against injury if the jackhammer slips or falls. A face shield should also be used.

Noise is another hazard associated with all pneumatic tools. Working with noisy equipment, such as jackhammers, requires the provision and use of effective hearing protection.

LIQUID FUEL TOOLS

Fuel-powered tools are usually operated on ULP. The most serious hazard associated with the use of fuel-powered tools comes from fuel vapours that can burn or explode and also give off dangerous exhaust fumes. The worker must be careful to handle, transport and store gas and fuel only in approved flammable liquid containers, according to the specifications for Dangerous Goods / flammable liquids.

Before refilling a fuel-powered tool tank, the user must shut down the engine and allow it to cool to prevent accidental ignition of hazardous vapours. When a fuel-powered tool is used inside a closed area, effective ventilation and/or proper respirators must be utilised to avoid breathing carbon monoxide. Fire extinguishers must also be available in the area.

HYDRAULIC POWER TOOLS

The fluid used in hydraulic power tools must be an approved fire resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The exception to fire resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts and hydraulic tools that are used on or around energised lines. This hydraulic fluid shall be of the insulating type.

The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters and other fittings must not be exceeded.

All jacks – including lever and ratchet jacks, screw jacks and hydraulic jacks – must have a stop indicator and the stop limit must not be exceeded. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack and the load limit must not be exceeded.

A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up. Put a block under the base of the jack when the foundation is not firm and place a block between the jack cap and load if the cap might slip.

To set up a jack, make certain of the following:

- The base of the jack rests on a firm and level surface;
- The jack is correctly centered;
- The jack head bears against a level surface; and
- The lift force is applied evenly.

Proper maintenance of jacks is essential for safety. All jacks must be lubricated regularly as per manufacture's specifications. In addition, each jack must be inspected according to the following schedule:

- For jacks used continuously or intermittently at one site – inspected at least once every 6 months;
- For jacks sent out of the shop for special work – inspected when sent out and inspected when returned; and
- For jacks subjected to abnormal loads or shock – inspected before use and immediately thereafter.

POWDER-ACTUATED TOOLS (EXPLOSIVE POWERED TOOLS)

Powder Actuated Tools (PATs) are used to fasten construction materials to concrete, steel or brick and consist of the tool, a fastener and an explosive charge; they are commonly referred to as explosive power tools.

PATs look like and operate in a similarly fashion to a firearm and should be subjected to the same care and safety precautions. These tools use varying strength explosive charges; so that the operator can select the appropriate charge strong enough to drive the fastener. If the charge selected applies excessive force on the fastener it can cause it to ricochet or the work surface material to chip or splatter.

Current generation PAT models are low-velocity types and incorporate a captive piston that contains most of the excess energy within the tool, reducing the risk of serious injury.

The older type high-velocity PATs are becoming obsolete and some manufacturers no longer sell them new in Australia; however they are still readily available, particularly in the second-hand market. Care should be taken when purchasing a second-hand PAT and prior to use the tool should be thoroughly checked.

Both high-velocity and low-velocity type PATs can be safely operated when basic safety procedures, outlined below, are observed and the manufacturers' operational guidelines are followed.

SAFETY PRECAUTIONS

- **The manufacturer's specifications and operating instructions** for the model of PAT being used (as well as the fasteners and charges) should be read, understood and complied with;

- The PAT should not be used unless the operator is trained and deemed competent in the tool's safe use;
- A Job Safety Analysis (JSA) should be developed for the task and followed;
- Hearing and eye protection should be worn by the operator and others in the vicinity;
- The PAT should be kept in a locked container when not in use;
- Before using the tool, the operator should do a (daily) function check to ensure that it's clean, operating correctly and the barrel is free from obstructions;
- The PAT should not be loaded unless it is to be used immediately and never be left unattended;
- The weakest compatible charge is used for the first (test) firing and the strength of charges are selected to do the work without applying excessive force to the fastener;
- Unless specified in the tool's operating manual, fasteners should be at least 75mm from an edge, corner, or predrilled hole of concrete or brickwork (For steel, at least 12mm from an edge or hole);
- Fasteners should not be driven into material through which they can pass or into very hard or brittle materials (e.g. high-tensile or hardened steel, cast iron, hard tile, terracotta, glazed brick, marble granite etc.);
- If the PAT misfires, the operator should continue to hold the tool against the work surface for at least 10 seconds before trying to fire again. If the second attempt doesn't fire, wait at least another 10 seconds so that the faulty charge is less likely to explode, and then carefully remove the charge and place it in water;
- If the PAT jams in the firing position, it should be left alone and locked away where it can not harm anyone if it accidentally discharged (then contact the manufacturer for directions);
- PATs should not be used if flammable vapours or materials may be present.

USING THE FASTENING TOOL ON A POWER-ACTUATED TOOL

When using the fastening tool, operators should:

- Ensure the barrel of a loaded or unloaded tool is always pointed in a safe direction away from the operator's body and not pointed towards any other person. This is especially important where a misfired charge is being removed.
- During firing, persons in the area should be restricted to only those persons necessary in the immediate vicinity.
- Operators should ensure they are in a safe and well-balanced position before firing.
- Always use the weakest charge when firing for the first time into previously untried material.
- Where there is a possibility of a fastener passing completely through the material, the area on the opposite side to the operating location should be kept clear of persons for

a suitable distance and in all directions. It may be necessary to cordon off the area with appropriate signs.

Fasteners and charges

Operators should ensure that only fasteners and charges complying with AS/NZS1873.3 and AS/NZS1873 are used in the tool.

Fasteners and any attachments should not be modified to achieve interchangeability.

COLOUR IDENTIFICATION OF CHARGE

Relative strength	Identification colour	AS 2700 reference colour No. and name	
Minimum	Grey	N53	Blue grey
Very weak	Brown	X54	Brown
Weak	Green	G13	Emerald
Medium	Yellow	Y13	Vivid yellow
Medium strong	Blue	B41	Bluebell
Strong	Red	R15	Crimson
Very strong	Purple	P13	Violet
Especially strong	White		—
Maximum	Black		—

FIRING THROUGH EXISTING HOLES

Direct-acting tools should not be used to drive fasteners through fixtures which have existing holes, unless the tool is specially equipped by the manufacturer to do so. Indirect-acting tools (piston driven) may be used in this way provided the point of the fastener can be firmly located in the hole in the fixture prior to firing.

WORKING ENVIRONMENT

Operators should ensure that the following do not present a hazard:

- Particles on work surfaces which may fly off during fastening. Surfaces should be clear of such material.
- Concealed pipes or electrical wiring. Check the location of pipes and wiring.
- The presence of explosive or flammable gas, dust or vapour, or compressed atmosphere. Do not use the tool if these situations occur.
- Do not use the tool in conditions of excessive heat.

MISFIRING

In the event of a tool misfire the operator should observe the manufacturer's misfire precautions and procedures. If there are no specific instructions, comply with the following:

- Wait 10 seconds, then release the tool from its depressed condition.
- Release the tool from the work surface without changing the direction it is pointing.
- Remove the charge and store in a safe place for later disposal.

Misfired charges should be returned to the supplier. If numerous misfires occur from one batch, the batch should be returned to the supplier.

UNSUITABLE MATERIALS

Some materials are considered to be unsuitable to be fixed together using a powder-actuated fastening tool. Some of these may be:

- The base material, eg. concrete and steel; and
- The material to be fixed to that base material, e.g. timber or steel.
- Spalled areas caused by previous unsatisfactory fastening.

When firing into particular materials, the operator should comply with the following:

Do not drive fasteners into brittle materials which are liable to shatter and materials which are too hard. Unsuitable brittle materials include: cast-iron; marble; glazed tiles; slate; natural stones; and fired clay bricks. Concrete and cement products with a compressive strength greater than 60 mpa are also unsuitable as they are too hard.

- Do not drive fasteners into areas of steel that have been affected by welding, flame cutting or similar processes.
- Do not drive fasteners into joints in masonry, i.e. brickwork or stonework joints.
- Do not drive fasteners into timber where timber is the base material. A timber member is unsuitable for the purpose of securing another timber member to it. Manufactured products such as plywood, hardboard or particle board are considered to be timber where those products have similar physical characteristics to timber.
- Do not drive fasteners into soft materials with a low compressive strength, i.e. concrete of less than 10 mpa, as they are unsuitable for use as a base material. Other unsuitable materials include plasterboard and lightweight aerated or weak concrete.

Note: As a general rule, do not fire into any material which dulls the point of a fastener if used as a centre punch as this material is too hard for the fastener to penetrate.

INSPECTION

Powder-actuated tools should be inspected as per the manufacturer's instructions and be overhauled every six months by an armourer or manufacturer's agent.

COMPRESSED AIR NAILING TOOLS

The most popular nailing device used in light and heavy construction is the pneumatic nail gun. It uses the force from compressed air to drive nails through hard surfaces. Recent injury accidents involving the use of pneumatic nail guns have raised concerns about safe operating procedures. These injury accidents could have been easily prevented by adhering to the following simple safety procedures for the use of these tools:

- Review the owner's manual carefully with all operators.
- Always wear safety glasses.
- Do not hold the trigger down unless you're purposefully firing the tool. This is especially important when descending ladders.
- Keep people out of range of fire. Exercise extreme caution when using an air tool around another worker.
- Never point the tool at anyone. Treat the tool like a firearm. Never assume the tool is empty.
- Disconnect the air hose before clearing a jam or making adjustments.
- Do not fire the tool unless the nose is firmly pressed against a work piece.

Use only compressed air to power the tool, not bottled gas. Do not exceed the manufacturer's specified air pressure for the tool.

- Keep your free hand safely out of the way of the tool.
- Do not operate the tool around flammables.
- Nail top to bottom when nailing wall sheathing in a vertical position.
- Nail from the eaves to the ridge when nailing roof sheathing, this way you will not back off the edge of the roof.
- Move forward, not backward, when nailing horizontal areas.
- Secure the hose when working on scaffolding, to prevent the weight of the hose from dragging the tool off the scaffold if you set the tool down.

Other risks to guard against while using a nail gun include being hit by one of the nail gun's attachment or a fastener used with the tool and being hit by flying concrete, wood chips and nails.

MASONRY AND CONCRETE CUTTING

This session sets out guidelines for the use of saws and drills and associated equipment used in the cutting and drilling of concrete and other building structural materials during construction work. Reference should be made to the '*Plant Code of Practice*' and the '*Concrete Cutting and Drilling Industry Guide*' for guidance on how to identify and control hazards associated with this activity.

BACKGROUND

The use of cutting saws for concrete and masonry work can be hazardous work. Hand-held concrete cutting equipment has particular dangers that must be taken into account when decisions are made about the use of this type of equipment.

Operators of the equipment and others may be exposed to health and safety risks due to factors such as manual handling, noise, vibration, exhaust fume, contact with electrical conductors, cutting blade and airborne dust, part of the equipment breaking up and ejection of material.

PLANNING THE JOB

When planning concrete cutting work, make sure all the hazards that might endanger the operator or people in the vicinity are identified and appropriate measures are considered. A formal risk assessment, job safety analysis or similar techniques are the way to determine potential safety problems and to find solutions.

Particular attention must be given:

- The type of equipment to be used.
- Which is the safest equipment to use for the job?
- Hand-held cutting saws should only be used where the use of larger self-supporting saws is impractical.
- The operator's work area.
- Can the cutting work be carried out safely from the ground or floor level, or will a scaffold be needed?
- Hand-held cutting saws should be used with the operator's hands at waist height when cutting horizontally and between shoulder to knee height when cutting vertically.

Operation outside these limits will create dangers of injury to the operator. It may be necessary for scaffolding or supports to be provided to ensure safe use of the saw.

It may be necessary to use another technique to do the job because a saw cannot be used safely.

The type and condition of the concrete

Does it contain reinforcing steel, electrical cable conduits, gas pipes or other services?

- Services plans should be checked to ensure that live services will not be cut by the saw.

The operator's posture

If the cutting work is on a vertical or near-vertical surface, how can the machine be supported to minimise strain on the operator?

The form of power used to operate the equipment

Which is safest for the particular work area - petrol driven, electric powered or hydraulically powered?

- Petrol driven equipment should not be used in confined spaces because of the potential for carbon monoxide poisoning.
- If electrical equipment is used in wet conditions, the potential for electrocution needs to be considered and be guarded against.

The protection of other workers and the public

- Barricades and signs may be needed to warn people who may be at risk from the cutting operation.
- Operators should wear a respirator with at least P1 filtration that has been fit-tested (for respirators that are tight-fitting with half or full-face mask).

Selecting the equipment

- Do not use hand-held concrete cutting saws unless the larger self-supporting types are impractical for the work.
- Do not use petrol driven equipment in poorly ventilated areas.
- Where there is a choice of appropriate types of machines, use the one which creates less noise. Make sure operators are supplied with, and use, appropriate hearing protection.
- Minimise the amount of dust released into the air by choosing tools that have on-tool dust extraction (M or H class dust extraction unit) or on-tool water suppression.

Where it is necessary to use a hand held machine, select one which:

- is as light weight as is practical for the type of work, so as to reduce manual handling risks
- is well balanced and has hand grips that are comfortable to use (poorly balanced machines may require operators to place their hands in dangerous positions near the cutting blades to support the machine)
- has the least vibration when in use, so as to reduce the risk of damage to the operator's blood circulation

- has the best type of guarding around the blade
- can be used both left-handed and right-handed
- for horizontal cutting, can be used left-to-right and right-to-left without having to reposition the blade or guard, and
- has handholds for the operator's non-trigger hand.

Make sure the supplier's manual or safe use information is available. Check this information to make sure the machine can be used safely for the sort of cutting work that is to be done.

TRAINING / ASSESSING THE OPERATOR

- Make sure the operator is familiar with the supplier's safe use manual and is competent to operate the equipment to the supplier's recommendations.
- Make sure the operator understands what the hazards associated with the cutting operation are, why the risks need to be controlled and how the risks are to be controlled.
- Make sure the operator understands what protective equipment is needed, why it is needed, and how it is to be fitted and used.

SETTING UP

When setting up a cutting operation, make sure that:

- the exact location of the cut or penetration is clearly marked on the work area
- a trolley is used to support the cutting machine for horizontal work at low level, so that operators do not have to work on their knees.
- the cutting blade is the right size and right type for the machine
- the blade is in good working condition and is free from cracks and deterioration
- electrically powered machines are protected at the power outlet with a residual current device (earth leakage circuit breaker).
- appropriate barricading and warning signs are erected to prevent people entering the cutting area
- adequate lighting (natural or artificial) is provided at the work area
- a method of collecting residue from the cutting operation is put in place in order to prevent surfaces becoming slippery

Before cutting operation, check that:

- the cutting speed matches the drive speed, as per the manufacturer's specification
- the shaft and flanges are clean and not damaged
- the blade fits securely over the shaft
- the shaft nut is securely tightened against the outside flange
- a blade guard is fitted and is in good working order
- the drive belt is tensioned correctly

- adequate coolant or water is readily available for wet cutting

During cutting operation, make sure that:

- the blade guard is in the lowered position
- when starting the machine the operator and other people stand outside the path of the blade
- if the machine stalls during cutting operation, the blade is raised and the outside flange and nut are checked for tightness
- whenever blade is raised, when resuming cutting, the blade is in alignment with the previous cut
- wall cuts are performed with the operator's back close to vertical and the hands not move above shoulder height
- where possible, cut from a standing posture with the feet braced and the body balanced. (In some circumstances it may be necessary to kneel on one knee to enable cuts to be made close to the floor. In this situation, protection for the knee will be necessary)
- when cutting horizontally across a wall, the operator's hands are at waist height
- the length of time the operator spends in fixed postures is minimised.
- plenty of water or coolant is used to suppress dust at the point of generation. Failure to use coolant/water could create high levels of airborne dust that contains crystalline silica in concentrations to be a significant health hazard
- the throttle lock is only be used when starting the equipment. If the throttle lock used during normal operation then the ability to cut power will be reduced increasing the potential for injury
- the equipment is stopped when changing grip to move between horizontal and vertical cuts
- the handles provided are used to support the equipment. Supporting the equipment by the belt guard is poor work practice and should be avoided
- when using electrical equipment the electrical leads will not be cut during operation. It is also possible that the presence of water (either coolant or rainwater etc) could lead to electrocution
- any person, who is providing assistance to the operator, is located where they will not be exposed to danger from sudden saw movement, ejection of material, a dropped machine or falling off-cuts
- the saw is only used with blade rotating in the opposite direction to the cut and not used for inverted cutting

After cutting operation, clean up in a way that minimises airborne dust:

- housekeeping – avoid dry sweeping dust and debris as it can generate high levels of airborne RCS and other respirable dust. Suitable respiratory protection must be used when dry sweeping. Alternative methods include:
 - wet sweeping
 - hosing down/wiping/mopping of surfaces
 - vacuuming up dust and debris containing silica using an M or H class vacuum cleaner

- using ride-on floor cleaners (HEPA filtered or water scrubbing)
- waste disposal – reduce dust associated with waste by:
- bagging waste material such as debris and empty cement bags before putting them into the bin or skip
- locating bins and skips outdoors where possible
- using water misting systems to keep waste materials damp where possible

MAINTENANCE

The general condition of the equipment should be checked by the person doing the cutting before commencing each job to ensure that the cutting tool, guards, leads and hydraulic hoses are in good order.

The equipment should be inspected and maintained regularly by a competent person.

Make sure that equipment with defects which would endanger people is not to be used.

PREVENTATIVE MEASURES:

- Care should be taken when selecting the saw and cutting wheel.
- Hold the concrete saw firmly in two hands.
- Maintain good balance and footing at all times. Never cut while standing on a ladder.
- Do not cut any material with a blade that is not suitable.
- Do not overreach.
- Do not cut above shoulder height.
- Be especially alert for reactive forces exerted by the saw.
- Be alert to shifting of the work piece or anything that could cause the cut to close and pinch the wheel.
- Release the pressure on the concrete saw as you reach the end of the cut. Too much pressure may cause the operator to lose control of the saw when the blade completes the cut.

Use extreme caution when re-entering a cut and do not turn the wheel at an angle or push the wheel into the cut as this may result in a pinching of the wheel.

SPECIFIC HAZARDS

- Inverted cutting
- Dust and gases
- Noise
- Manual handling
- Vibration
- Working at height

- Electricity
- Damage to structures
- Damage to services
- Loss of vacuum pressure
- Working alone

HEALTH MONITORING

Sections 49 and 50 of the WHS Regulation 2011 details health monitoring requirements. Concrete and masonry cutting exposes workers to dust that contains respirable crystalline silica (RCS), a hazardous chemical. Inhaling RCS can lead to silicosis, an incurable lung disease that can lead to disability and death. RCS can also contribute to lung cancer, renal cancer and chronic obstructive pulmonary disease (COPD). These diseases usually follow exposure to RCS over many years, but extremely high exposures across the short-term can cause it to develop rapidly.

Health monitoring of a person means monitoring the person to identify changes in the person's health status because of exposure to certain substances. Health monitoring is carried out by or under the supervision a register medical practitioner.

Health monitoring must be provided to workers who are carrying out ongoing work using, handling, generating or storing RCS and there is a significant risk to the worker's health because of exposure. Further guidance on determining significant risk can be found in **Safe Work Australia's Health Monitoring for Exposure to Hazardous Chemicals - Guide for persons conducting a business or undertaking**.

Version	Date	Author
1	30/06/2018	WHSQ