



# **Demonstrate knowledge of tools and equipment used for carpentry**

Unit Standard – 32443

Level 3, Credit 9



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**Published by: Building and Construction Industry Training Organisation**

Level 5, 234 Wakefield Street  
PO Box 2615  
Wellington

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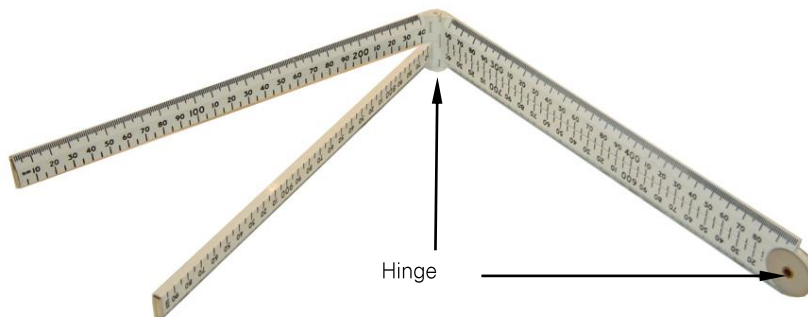
# Introduction

There is a large range of carpentry tools and equipment available on the market. Trainees will need to become thoroughly familiar with the selection, maintenance and operation of these items as they progress through their training. Expert advice should be obtained when planning and purchasing a basic tool kit. This basic tool kit will be added to as your training progresses and the need for new tools arises.

The skilled carpenter must have a thorough understanding of the tools and equipment they are using and the mechanical principles underlying their design and construction. They will also need to know how to care for, maintain and use them properly.

## Setting-out hand tools

### Folding Rule



#### Description

Folding rules are made from wood, metal or plastic and are designed with a hinge for folding. The standard length is 1m long and measurements are graduated in millimetres.

#### Use

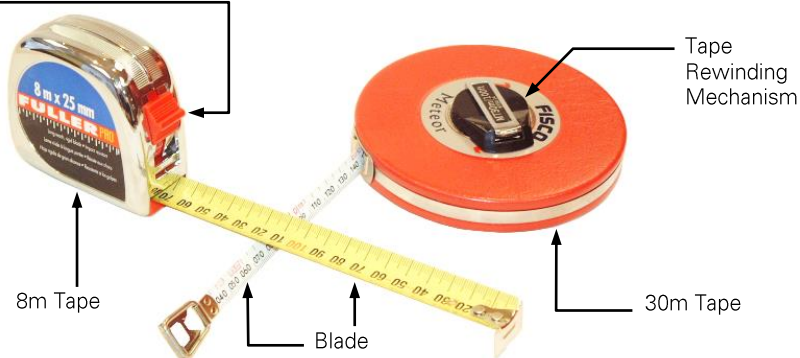
Used flat on the surface for an average reading and used on its edge for accuracy so the measurements can be marked exactly with a sharp pencil.

#### Care and Maintenance

Lubricate hinges and keep ruler clean.  
Always fold up when not in use.

### Measuring Tape

Tape Lock and Retracting Mechanism



#### Description

A measuring tape is a flexible strip of steel divided into millimetres, centimetres and metres. Common lengths used by carpenters are 5m, 8m and 30m. Tapes are equipped with a power return spring that automatically returns the tape to the housing. The lock attached to the tape can hold the blade in an open position.

#### Use

Used for accurately measuring long lengths.  
When measuring, hold the tape taut and support it to prevent sagging.  
Rewind after use.

#### Care and Maintenance

Avoid loops in the tape as they may cause the tape to snap when pulled taut.  
Keep the tape dry and lightly oiled, free from grit, which may scratch the enamel surface and make reading and rewinding difficult.

### Carpenter's Pencil



#### Description

The carpenter's pencil has a rectangular-shaped lead and comes in hard, medium or soft grades.

They are colour coded for ease of lead identification.

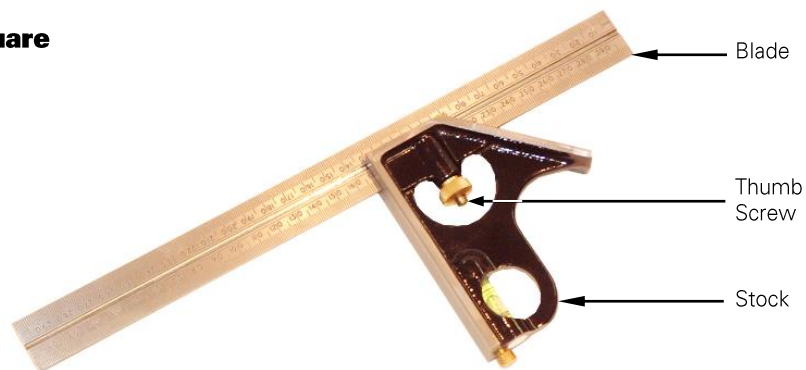
#### Use

Used for marking measurements on timber.

#### Care and Maintenance

Keep the lead sharp and to a chisel-shaped point. A fine accurate line can only be produced by using the correct grade of pencil for the material being marked.

### Combination Square



#### Description

The combination square consists of two components – stock and blade. The stock fixes the blade in position and is held firmly by tightening the thumb screw.

#### Use

Used for marking angles of 45°, 90° and 135°. Can be set and used as a gauge for awkward places and for measuring the depths of rebates.

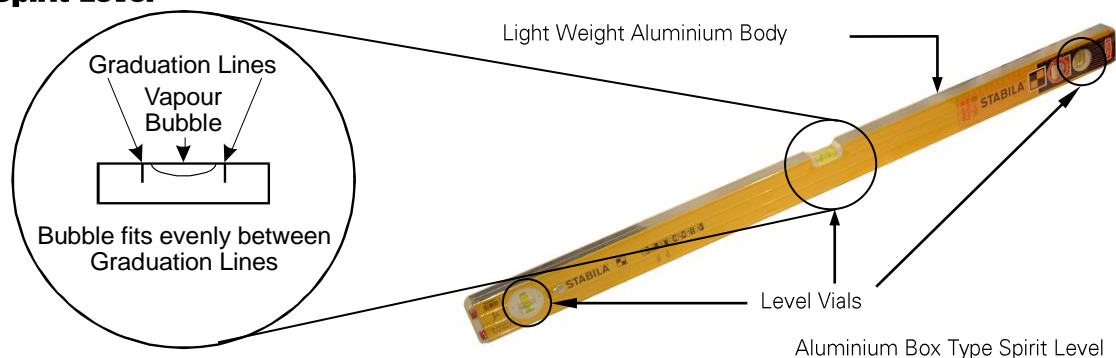
To check if a square is accurate, complete the following:

- Place the stock firmly against the edge of a dressed piece of timber and mark a pencil line across the face of the timber.
- Rotate the stock of the square 180° and check that the blade corresponds with the original marked line.
- If it does, the square is accurate.

#### Care and Maintenance

Keep clean and free of rust. For easy movement of the stock on the blade, lightly oil the thread screw.

## Spirit Level



### Description

Spirit levels are made of either wood or metal and some have as many as six level tubes or vials contained within them. These levels are available in varying lengths. The most convenient length for carpentry use is between 900mm and 1200mm.

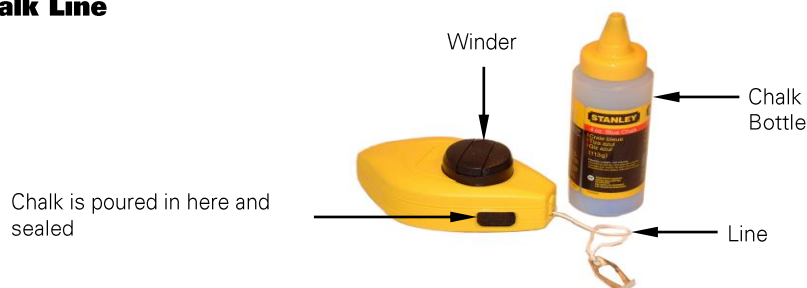
### Use

Levels are used for testing horizontal and vertical surfaces for level and plumb. Levels are also available which digitally display degrees, to within  $1/10^{\text{th}}$  degree accuracy.

### Care and Maintenance

Treat carefully.  
Do not drop or jar level.  
Regularly check the level's accuracy by placing on fixed points at each end and reading the level tube or vial. Turn level end for end. If the reading in the vial is the same on both occasions the level is accurate. If not, the level requires adjustment.

## Chalk Line



### Description

This is a line wound onto an enclosed spool containing coloured chalk powder. Replacement line and chalk powders are available.

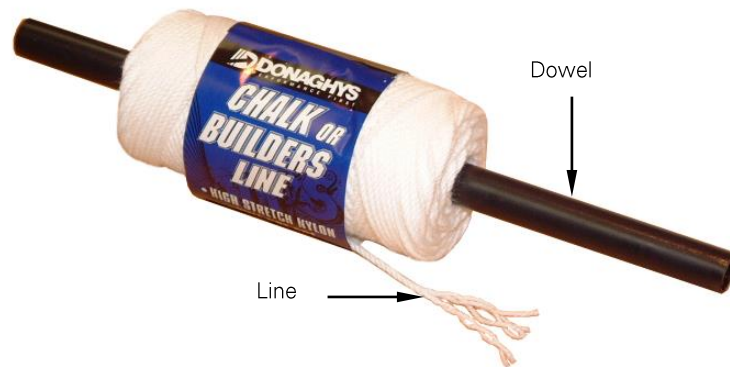
### Use

When a straight line is required on a surface, the line is stretched taut between two points. At the midpoint, the line is raised and allowed to snap back, leaving a straight chalk marked line on the surface.  
The line is retrieved using a winder which folds away when not in use.

### Care and Maintenance

Keep dry.  
Keep the container filled with chalk.

## String Line



### Description

This is a nylon line, wound on a timber or plastic dowel. String lines are available in various lengths and colours from 50m to 100m.

### Use

Must be pulled taut to give accurate alignment.  
Used for setting out and checking straightness on such things as formwork, wall frames, fascia lines, etc.

### Care and Maintenance

When not in use, the string line should be rewound onto the dowel.  
Continual use may cause deterioration of the first section of the line. (Remove the damaged section of line as required.)

## Straight Edge



### Description

A straight edge can be made from either timber or metal and has one or both edges perfectly straight.  
If the straight edge has two edges straight then the edges must also be parallel.

### Use

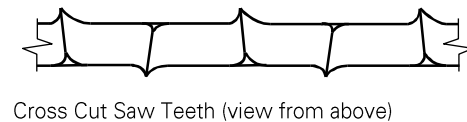
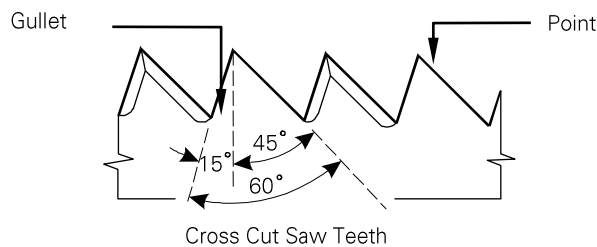
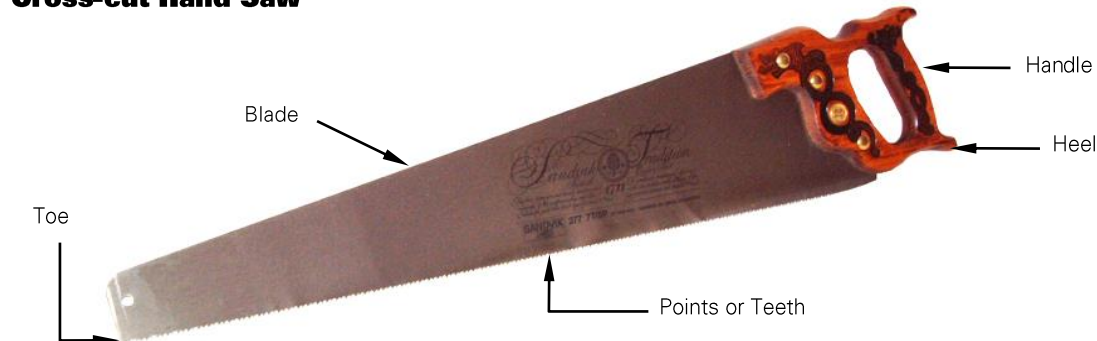
Transferring level points from site datums together with a spirit level.  
Testing a surface for level by identifying high or low areas.

### Care and Maintenance

Care must be taken not to damage the edges of the straight edge.

# Cutting Hand Tools

## Cross-cut Hand Saw



### Description

Crosscut saws are normally 500 – 700mm long with 6 – 9 points per 25mm of blade.

### Use

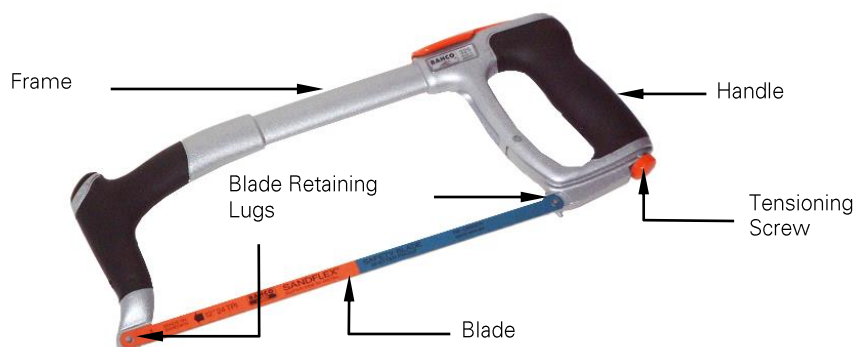
Used for general purpose cutting across the grain of timber (known as cross cutting).

A six-point saw is the most suitable for general sitework.

### Care and Maintenance

Keep clean and free of rust. Send the saw to the saw doctor for sharpening and setting when required. Keep a blade guard over the teeth when not in use or place saw in saw bag.

## Hack Saw



### Description

Hack saws have a heavy duty metal frame, which allows for the blade to be tensioned, to prevent it twisting and bending.

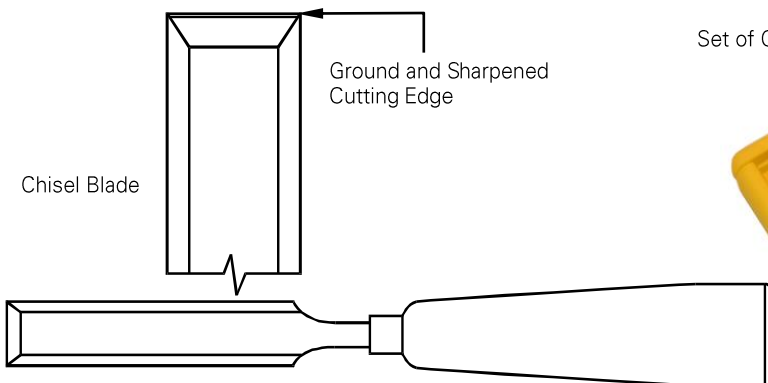
### Use

Used for cutting metal or plastic.

### Care and Maintenance

Keep clean and free of rust. Change blade as required.

## Chisels



Set of Chisels



### Description

A chisel consists of a blade of tempered steel and a shaped plastic or wooden handle. One end of the blade is ground and sharpened to produce the cutting edge and the other has a sharpened tang to which the handle is fitted. Chisel blades are heat treated, bevelled and polished and available individually or as a set. The width identification is scribed on its shatter-resistant handle for quick selection. The width of the blade can vary from 6mm to 50mm whilst the overall length might be from 188mm to 228mm.

### Use

Chisels have a wide range of applications in building including checking out (hinges etc.), forming and levelling joints.

### Care and Maintenance

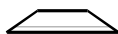
Keep clean and free from rust. Grind and hone to produce sharp edge. Store chisels in roll-up pouch or carrying case to shield cutting edge when not in use. Keep both hands back from the cutting edge at all times when using chisels. Never place a wood chisel in your pocket. Grinding angle to sharpen a chisel blade should be 20° to 25° and the honing angle 25° to 30°.



**Note:** There is a wide range of chisels, designed for different purposes. A set of the standard bevel-edged type is suitable for most carpentry work.

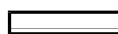
## Common Types of Chisels

### Bevel Edged



The edges of the blade are ground away so that it can be used to cut into corners.

### Firmer Chisel



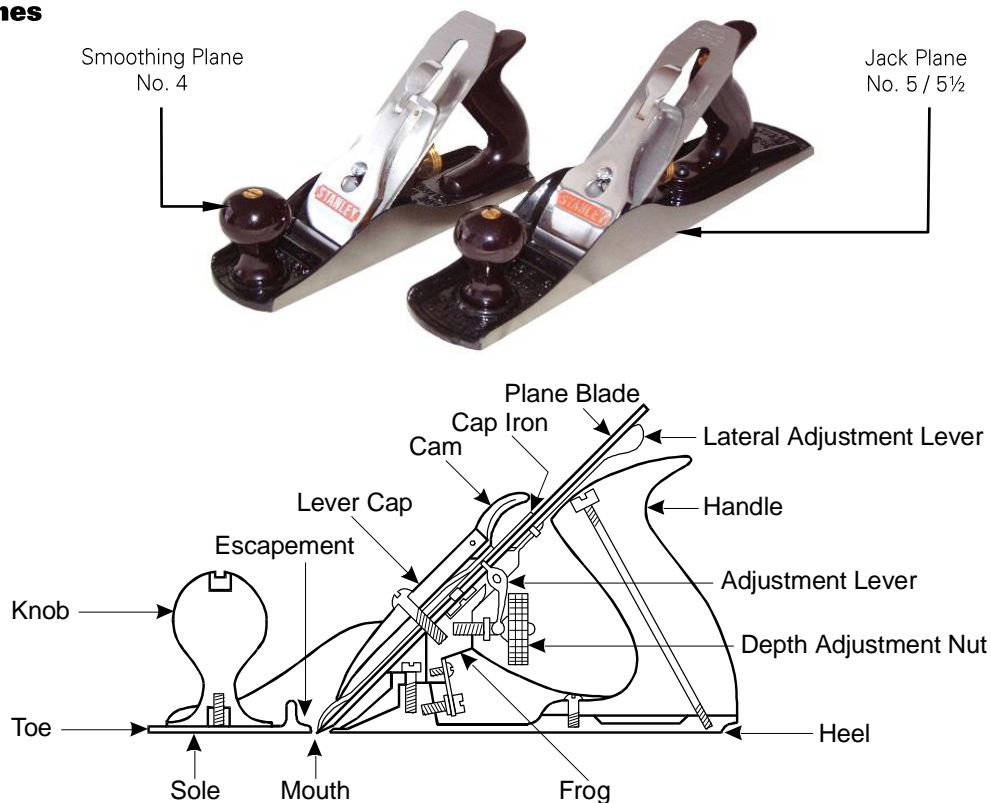
A general purpose chisel with a square edge strong enough to withstand the force of being hit with a hammer.

### Mortise Chisel



Mortise chisels are designed to remove waste wood from narrow trenches.

## Planes



### Description

Planes have a cast steel body and an adjustable cutting blade or iron held at 45°.

There is a range of planes available which include:

- Smoothing plane - Number 4.
- Jack or bench plane - Number 5 or 5½.
- Rebate plane - Number 10.
- Block plane.

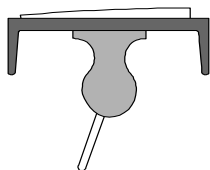
Adjustment can be made in depth using a thumb screw and laterally using the adjustment lever.

### Use

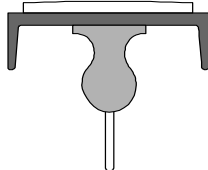
Planes are used to produce planed or flat surfaces, smooth timber surfaces, straighten timber and reduce timber to a required width.

### Care and Maintenance

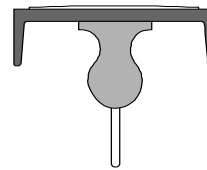
Keep clean and free from rust by applying a light oil. Do not drop. When not in use rest the plane on its side or retract the blade. Grinding angle to sharpen the plane's blade should be 20° to 25° and the honing angle 25° to 30°.



Too much of the blade is exposed. (The blade requires lateral adjustment.)



Correct lateral adjustment, but there is too much of the blade showing.



Correct adjustment of the plane blade.



### Drill Bits (Standard)



Twist Bits



Flat Bits

#### Description

Standard drill bits are available in a range of types and sizes for use in portable power tools, including:

- twist; and
- flat.

The chuck size will determine the maximum diameter drill that can be used.

The bit sizes used by carpenters generally range from 1mm to 13mm. Drill bits go up in size in 1mm increments.

Range includes:

- masonry;
- metal; and
- timber.

#### Use

Used for drilling holes in a range of materials including timber, metal and concrete.

#### Care and Maintenance

Keep in drill set case when not in use.

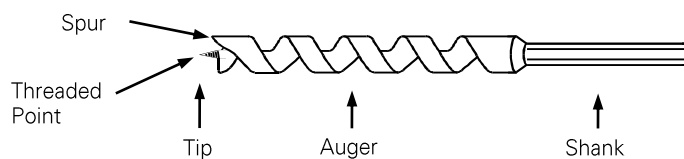
Sharpen when required.

Grinding angle from centre point is:

- Wood drill bits 40°.
- Metal drill bits 59°.

Use the correct drill cutting speed to suit the drill bit and the material being drilled.

### Drill Bits (Auger)



#### Description

Auger bits have a threaded point to draw the bit into the timber and a twisted shank that ejects the waste wood and keeps the hole aligned.

The bit for soft textured woods has spurs or scribes at the outer ends of the cutting edges. The size range varies from 6mm to 30mm.

#### Use

Auger bits are used for boring clean-cut holes in timber and wood-based sheet materials.

#### Care and Maintenance

Keep bit clean and free from rust. For easy, clean cutting keep the spurs and cutting edges sharp.

When not in use store bits in a roll-up pouch or specially designed container.

### Drill Bits (Countersink)



Countersink Bit



Counterborer Bit

#### Description

Countersink bits are available in two types:

- countersink for wood and metal; and
- counterborers for when the screw head is to be seated flush or below the surface of the timber.

#### Use

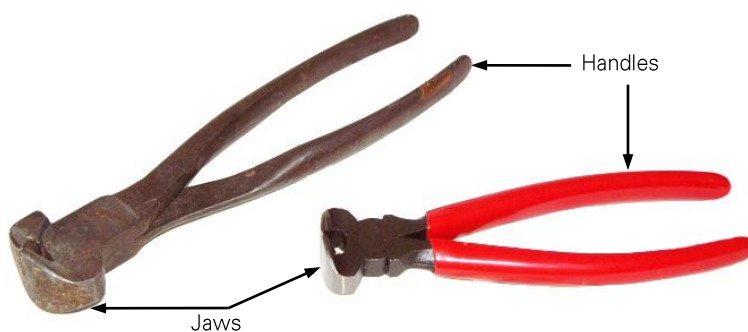
Countersinks are used to enlarge the top of the screw hole so that the head of a wood screw can be recessed.

Counterborers are used to drill the hole and countersink the screw hole so that the screw head can be recessed.

#### Care and Maintenance

Keep clean and free from rust.

### End Cutting Nippers



#### Description

End cutting nippers are available in varying sizes for different applications:

- nail pulling;
- cutting and tying; and
- reinforcing tie wires (102mm to 245mm).

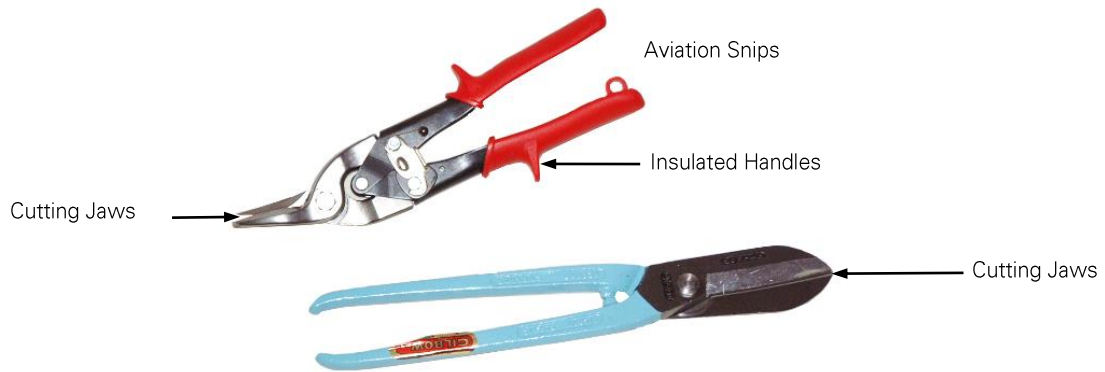
#### Use

Used for tying and cutting reinforcing ties, cutting wire and cutting and withdrawing nails. The bevelled cutting edges are machined smooth to protect surface when extracting nails. (Use a wooden block to increase leverage and protect the timber surface when extracting nails.)

#### Care and Maintenance

Keep clean and free of rust, lightly oil scissor joint.

## Tinsnips



### Description

Tinsnips are available in varying styles such as:

- straight cutting;
- curved cutting;
- offset handles;
- spring open action;
- straight cuts;
- left and straight cuts;
- right and straight cuts;
- left curve; and
- right curve.

### Use

Used for cutting thin sheet metal such as:

- roofing iron; and
- flashings.

For ease of work and quality of finish always select and use the appropriate pair of snips for the job.

### Care and Maintenance

Keep clean and free of rust.  
Lightly oil scissor joint.

## Cutting Knife



### Description

Cutting knives are available in many:

- sizes;
- colours;
- handle and blade shapes; and
- fixed or retractable blades.

Accessories available:

- knife holster; and
- insulation cutting shield.

Replacement blades are stored in the handle and are easily replaced.

### Use

Used for cutting building papers, surface paper on plaster board and insulation.

Always pull the knife towards the body when making a cut on a flat surface. A pulling motion is stronger and more positive than pushing the knife away from you, and the knife is less likely to slip. When using a straight edge to guide a cut, either clamp it down or keep your free hand well away from the cutting path of the knife. Be sure the straight edge is thick enough to prevent the knife from “riding up” over the edge.

Don't bend or apply side loads to blades by using them to open cans or pry loose objects. Blades are brittle and can snap easily.

When using a knife to cut through thick material, make several passes – cutting a little deeper into the material each time.

Retract the blade back into the handle when it is not in use.

### Care and Maintenance

Ensure that blades are properly seated in position and that knives are properly closed when not in use.

Never leave the knife with the blade exposed.

Always use sharp blades. A dull blade requires more force and is more likely to slip.

Change the blade when it starts to tear the material.

**Caution:** The cutting blades used in these knives are extremely sharp. They should always be handled with care. They have the potential to cause serious injury if not handled and used correctly.

# Impelling Hand Tools

## Claw Hammer



### Description

A hammer is a driving tool that consists of a steel head which is fitted to either a wooden, steel or fibreglass shaft. A rubber grip handle is fitted to the shaft.

One end of the head has a striking face and the other a claw to withdraw nails.

Available in various:

- head styles; and
- claw shapes.

Features also include:

- the weights varying from 200gms to 937gms or from 7ozs to 33ozs. Most commonly used is a 20oz hammer (560 gm); and
- handles of different design and length (varying from 290mm to 460mm).

### Use

Used for driving and withdrawing nails, driving chisels and set punches. Always strike securely and avoid glancing blows.

Select the appropriate hammer considering:

- head design;
- claw design;
- weight;
- handle length; and
- the job being undertaken.

### Care and Maintenance

Always discard hammer when face shows excessive wear, mushrooming, chipping or dents.

Never strike with the side of the hammer.

Never strike one hammer head with another hammer head.

Never use a hammer with a loose or damaged handle.

Do not use for driving masonry nails, cold chisels and other hardened metal tools.

### Nail Punch Set



#### Description

A nail punch is a hardened piece of steel with a knurled body for grip, designed to drive nail heads below the surface of the timber.

Nail punches have the following features:

- the tip sizes are between 0.08mm and 3.2mm;
- an overall length of 100mm or 127mm;
- the size is stamped on the head and / or colour coded for easy selection; and
- the tips are cupped and chamfered for ease of alignment. (The tip shape is designed to reduce slipping on nail head.)

#### Use

Used with a hammer to drive the heads of nails below the surface of the timber.

Ensure the correct size punch is used.

The nail punch point should be slightly smaller than the nail head being punched.

Keep the nail punch in line with the direction of the nail.

#### Care and Maintenance

Remove burrs.

Discard if the point becomes chipped or when the cupped point wears.

### Pinch Bar or Wrecking Bar



#### Description

Wrecking bars are made in many sizes and shapes with a slotted claw at one end and a sharpened bevel chisel at the other.

Lengths vary from 180mm to 915mm.

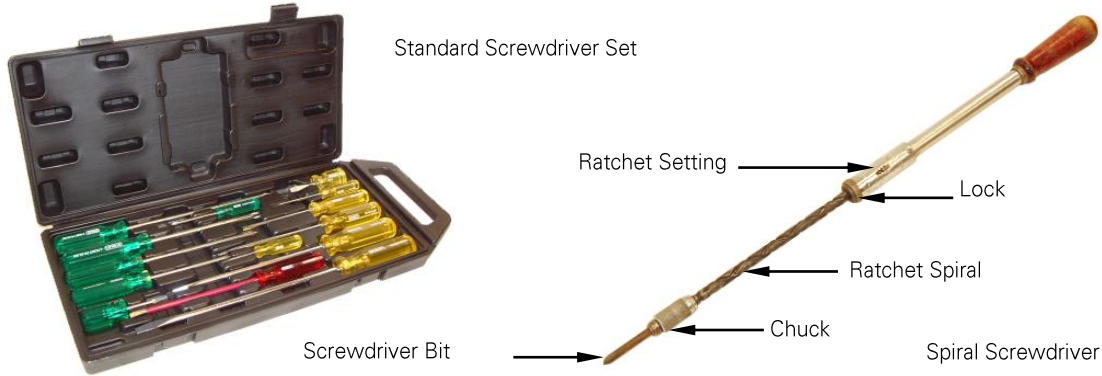
#### Use

Used for withdrawing nails from timber, levering and moving heavy objects.

#### Care and Maintenance

Always choose the correct size for the job to be completed.

Screwdrivers



Description

Screwdrivers are available in various sizes to suit screw head configurations.

Ratchet screwdrivers work in the forward, reverse and fixed blade positions. The spirals are spring loaded to keep the blade in the screw slot and automatically return the handle into the driving position after each stroke.

Use

Used for driving or withdrawing screws.

Select the appropriate size screwdriver to suit screw head width and configuration.

Care and Maintenance

Lightly oil ratchet mechanism.

Screwdriver safety tips:

- Never use a screwdriver as a cold chisel, or for prying, punching, chiselling, scoring or scraping.
- Make sure the tip fits the slot of the screw; not too loose or tight.
- Never expose a screwdriver to excessive heat or cold.
- Always discard a screwdriver with a worn or broken handle.
- Never use a screwdriver on a work piece held in your hand. A slip could cause serious injury.
- Never depend on a screwdriver's handle or covered blade to insulate from electricity. Vinyl covered blades are intended only as a protective measure against shorting out.

Common Types of Screw Head



Slotted



Pozidriv



Square



Phillips



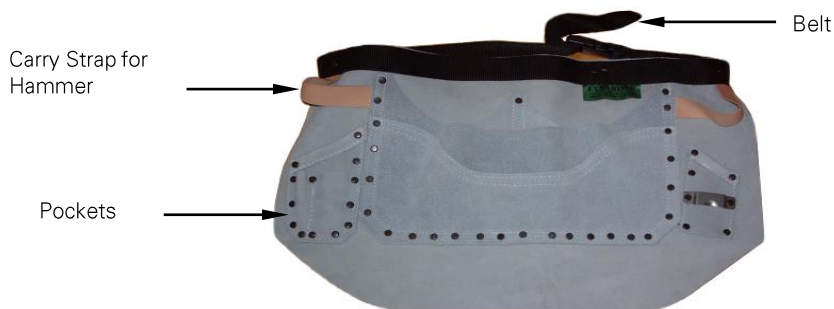
Clutch head



Torx

## Holding Hand Tools

### Apron



#### Description

Aprons are made from leather or nylon with a varying number of stitched and riveted pockets, including nail set and tool carrying pockets. Accessories can be added to the belt such as:

- cordless drill holder;
- hammer holster; and
- cutting knife holster.

#### Use

Used for:

- protection when carrying items;
- carrying nails; and
- carrying tools.

Only carry items needed for the task being undertaken.

#### Care and Maintenance

Keep the apron clean on the exterior and in the pockets. Have any repairs that may be required carried out as early as possible.

### Adjustable Spanner



#### Description

Adjustable spanners are made from strong tempered steel and have a precision machined screw for jaw adjustment.

These are available in varying sizes from 100mm to 300mm.

#### Use

Used for fastening or holding nuts and bolts.

Use the correct size spanner for the job so that the right amount of torque can be applied.

Always locate an adjustable spanner with the solid section taking the majority of force being applied.

#### Care and Maintenance

Keep the spanner clean and free of rust.

Lightly oil the screw mechanism.



**Pliers****Description**

Pliers are manufactured from tempered alloy steel with a serrated jaw providing grip and leverage.

Pliers also have a finely honed cutting edge used to cut most types of wire.

Usually pliers are fitted with a bonded vinyl grip attached to the handles.

**Use**

Used for holding, cutting wire and bending metal.

**Care and Maintenance**

Keep pliers clean and free from rust. Lightly oil the scissor joint.

Do not depend on the vinyl grip handle to insulate from electricity. These coverings are intended to improve grip only.

## Hand Tool Hazards and Controls

The use of any hand tool has its own hazards, and every hazard has a control. As users of hand tools we need to be aware of the hazards and use the appropriate controls. This example may help to make the process clearer.

Before I use the table saw, I think about the hazards and make sure I control each. The process is:

15. I think about what might happen.
16. I take action to ensure that it doesn't happen (or if it does happen, I make sure no one will get hurt).

What might happen?	What do I need to do?
Hazards	Controls
Damage to hearing from noise	Wear ear muffs
Electric shock from water, cutting the cord, faulty saw, etc.	Use an isolating transformer or cut-out switch
Damage to eyes from flying chips and dust	Wear goggles, check that guard is in place and operating properly
Cutting hands/fingers	Keep hands clear of blade, use a push stick
Timber kicking back, flying off	Do not cut shorts, see that wood is placed firmly against the back plate

Every tool has hazards. You could probably come up with a dozen hazards for the hammer alone! This manual cannot hope to list every possible hazard associated with every possible hand tool, and if it did, it would make for some pretty boring reading.

Common sense tells you what might go wrong, and common sense also tells you what to do to protect yourself and others. If in doubt, ask a more experienced workmate.

# Care, Maintenance and Safety of Carpentry Hand Tools

Good-quality work is impossible to achieve with blunt or badly sharpened tools. Tools with broken handles also impede the quality of work and are dangerous. Careless use of sharp tools can result in serious accidents. Methods that promote safety should be adopted at all times.

It is important to keep tools sharpened and in good condition at all times as this allows for good-quality work as well as easy and safe use of the tool. Any timber that has soil, sand or concrete adhering to it should be thoroughly cleaned before any tools are used on it.

Cutting tools can lose their edge when they are in contact with metal, so care must be taken when handling, packing or transporting tools. When tools are being packed away, plane irons should be withdrawn from the cutting position. The cutting edges of chisels and saws should be kept away from other metal tools; bits should be kept in a roll or container and not left loose. At all times, tools should be kept free of moisture and from time to time rubbed over with light machine oil to prevent rust. When transporting tools store them carefully in a kit bag or tool box.

Apprentices should regularly inspect their tool kit and check that all tools are accounted for and any maintenance required is carried out promptly.

## The Dos and Don'ts of Carpentry Hand Tools

Hand tools should always be kept in good working order. Use them correctly, carry them carefully and store them safely.

Always:

- select the right tool for the job;
- use a hammer for driving punches and similar tools;
- start hand saws on the back stroke, guiding the saw with the thumb of the other hand slightly raised;
- carry sharp-edged or pointed tools carefully, hold firmly, close to the body and point downward;
- pass sharp or pointed tools handle first;
- store dangerous tools carefully and considerately;
- follow manufacturers' instructions carefully; and
- select and use the appropriate Personal Protective Equipment (PPE) for the job.

Never:

- use hammers with loose heads or damaged or chipped faces;
- use tools with damaged handles;
- use cold chisels or punches with mushroom ferruls or ends;
- check the depth of cut of a plane with the hand; or
- use a tool for a job that it is not designed for.

## Carrying and Storing Hand Tools

You must carry and store these hand tools in the correct manner.

- Don't carry too many tools at once.
- Don't carry sharp-edged or pointed tools in a nail pouch or apron pockets unless the pockets are specifically designed for that purpose.
- When carrying sharp-edged or pointed tools such as chisels and bits, hold them firmly and close to the body. Point them down to the floor and keep them pointed downward.
- When passing sharp-edged or pointed tools to a fellow worker, pass them handle first.

## Manufacturers' Instructions

Whenever you purchase a hand tool, read the manufacturer's literature to get a clear understanding of the tool's:

- intended use;
- limitations;
- safe use; and maintenance requirements.

**Now would be a good time to go and complete Worksheet 1 – Hand Tools**

# Portable Power Tools – Health and safety

## Operator Training

It is important that apprentices/trainees fully understand the operation of any portable power tool that they are required to use. Apprentice/trainee operators must receive adequate supervision until they are competent at using the complete range of portable power tools required to achieve Unit Standard 13039 (Use and maintain portable power tools for construction work on site).

An effective and ongoing training programme will need to be developed for each individual trainee. Evidence of training should be documented (for example, employer records).

It will also be necessary for trainees to document in their Record of Work the details of the training undertaken.

## General Health and Safety

When using portable power tools, basic safety precautions should always be followed to reduce the risk of:

- personal injury to the operator or other workers;
- electric shock;
- fire;
- material damage; or
- damage to the power tool.

## Preventing Personal Injury

Always use the appropriate Personal Protective Equipment (PPE):

- safety glasses, goggles or face shield;
- hearing protection with a suitable rating for the level of exposure to noise;
- respirator and/or dust masks; and
- rubber-soled safety shoes or boots.

Always follow these guidelines:

- Wear firm-fitting clothing. (Loose clothing can be easily caught in rotating tools.)
- Tie back long hair or retain it under a close-fitting cap.
- Keep work areas clean and free from off-cuts and other debris.
- Exclude all visitors from the immediate work area. On no account should casual site visitors have access to power tools or other machinery.
- When not required for use, power tools should be stored away securely.

## **Preventing Electric Shock**

When using any electrical machinery, there are some basic safety precautions that must always be observed in order to reduce the risk of electric shock:

- Always use the appropriate electrical safety device, ie. isolating transformer or a Residual Current Device (RCD).
- Use only the appropriate three core extension leads designed specifically for outdoor industrial use, complete with weatherproof plugs and sockets.
- Do not use power tools in wet or damp conditions. Do not expose power tools to rain.
- Disconnect leads from the power source before changing blades and accessories or performing any maintenance operations.
- Before connecting any tool to the power source, check that the tool is compatible with the voltage supply. (Any power source with a greater voltage than that specified for the tool can result in serious injury or death to the operator.)
- Do not carry or lift a power tool by the cord. Always disconnect the cord from the power source using the plug. Do not pull on the cord.
- Keep the cord away from heat, oil and sharp objects.
- When operating a portable power tool, avoid body contact with earthed or grounded objects such as pipes, radiators, appliances etc.

## **Extension Leads, Plugs and Sockets**

Most portable electrical tools will require an extension lead to deliver the power from the source to the tool. Extension leads are easily damaged, so it is important that the following precautions are observed in order to get the best performance from the tool:

- Use only properly made up three core extension leads. (Never use two core flex.)
- If the outer casing or the wires of a lead are damaged in any way, the lead should not be used and sent for repair.
- Weatherproof and shatterproof plug and socket connections are designed to keep moisture out of the join and lock the leads together, preventing potentially dangerous separation of the contacts.
- Keep operating extension leads as short as possible. Leads will lose a small amount of voltage for every metre of length.
- Provide protection for leads which cross traffic access by laying timber on either side of the lead.
- Do not overload electrical power outlets or use damaged outlets.
- Faulty equipment must never be used. Faulty equipment is to be identified and reported to your employer so it can be repaired.
- Completely unwind leads off reels or coils.

# Portable Power Tool Hazards and Controls

The use of any portable power tool has its own hazards, and every hazard has a control. As users of portable power tools we need to be aware of the hazards and use the appropriate controls. This example may help to make the process clearer.

Before I use the circular saw, I think about the hazards and make sure I control each. The process is:

1. I think about what might happen.
2. I take action to ensure that it doesn't happen (or if it does happen, I make sure no one will get hurt).

What might happen?	What do I need to do?
Hazards	Controls
Damage to hearing from noise	Wear ear muffs
Damage to eyes from flying chips and dust	Wear goggles, check that guard is in place and operating properly
Machine kicking back, flicking backwards	Only cut a straight line (no curves), use firm forward pressure
Electric shock	Do not use power tools in wet or damp conditions Use RCD when using power tool

Common sense tells you what might go wrong, and common sense also tells you what to do to protect yourself and others. If in doubt, ask a more experienced workmate.



# Maintenance of Portable Power Tools

Regular basic maintenance of power tools and equipment is necessary to ensure:

- best performance;
- safe operation; and
- long, trouble-free service.



**Note:** Isolate all portable power tools from the power source before carrying out any maintenance work.

Basic maintenance tasks that can be carried out by the operator include:

- keeping the outside of the power tool clean to stop the build-up of dust and timber resins;
- checking that ventilation slots do not become clogged. (This can cause the tool to overheat and could even burn out the motor.);
- checking the carbon brushes frequently;
- lubricating the power tool if this is required by the manufacturer. (Most modern power tools are lubricated for their working life when manufactured.);
- always following the manufacturer's instructions when changing blades or knives;
- inspecting the power tool regularly and, if it is damaged, having it repaired by an authorised agent or electrician; and
- reading the manufacturer's instructions before carrying out any maintenance.



**Note:** Signs that blades or cutting edges are blunt and need changing or sharpening are smoke being produced while used, blackened finish to cuts and lines on the finished face.

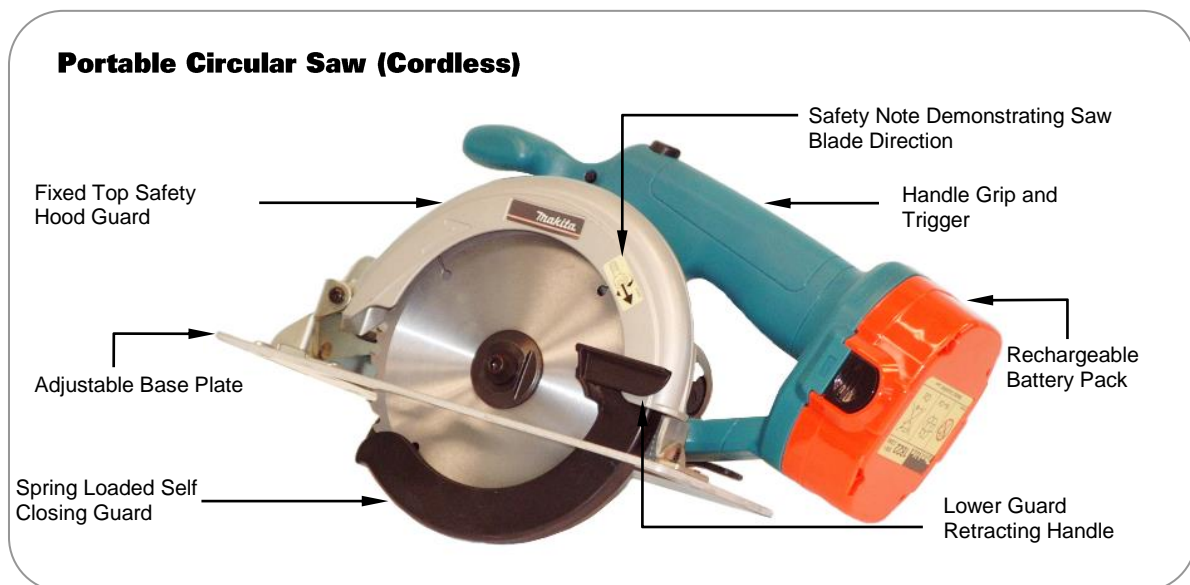
## Portable Circular Saws

Portable circular saws are used extensively throughout the construction industry. They are available in a range of sizes and can be used to cut a wide variety of materials including:

- timber;
- plywood;
- manufactured boards (eg. particle board and customwood);
- fibre cement products;
- mild steel;
- aluminium; and
- plastic.

They are particularly useful for cutting materials that have already been fixed into position.

Portable circular saws are used primarily for cross cutting and ripping timber and are available in both 240 volt mains power and rechargeable battery power (cordless).



### Safety Features

All portable circular saws must have these in-built safety features:

- a fixed top safety hood guard, deep enough to cover both sides of the blade, to below the depth of the roots of the saw teeth, down to the base plate when the plate is set at right angles to the blade and in its highest cutting position; and
- a spring loaded, self-closing lower guard covering the lower portion of the blade, on both sides to below the roots of the teeth.

## Portable Circular Saw Operation

The following basic principles apply to all operations with a portable circular saw:

- Check that the portable circular saw is suitable for the task to be done. Portable circular saws have two classifications – light and heavy duty. Heavy duty portable circular saws are more appropriate for the building site.
- Check that the base plate is always in firm contact with the material to be cut before starting the saw. As the blade cuts upwards, the cutting action will pull the material hard up against the bottom of the base plate.
- Do not attempt curved cuts. Twisting the blade in the saw kerf may result in a "kick back" (tool unexpectedly flicking backwards).
- Use firm forward pressure, without forcing the saw.
- The material to be cut must be held firmly in position, and the timber should be supported so that the waste is free to drop.
- Where chipping needs to be minimised, set the depth of the cut so that the teeth only protrude 5mm through the material.
- Allow blade to gain full speed before starting the cut.

## Saw Blades for a Portable Circular Saw

- **Combination Saw Blades** – Most portable circular saws are supplied with a combination saw blade, which is suitable for most carpentry work. Other blades suitable for cutting timber include:
  - **Cross Cut Blade** – Gives smoother cutting across the grain.
  - **Ripping Blade** – Allows faster cutting along the grain.
  - **Tungsten Carbide Tipped Blade** – Can be used for longer periods before resharpening is required.

Other specialist saw blades available include:

- metal cutting blade for soft metals;
- wave saw blade for thin plastics;
- mitre saw blade for fine cuts in wood;
- diamond tipped blades; and
- fibre reinforced cut-off wheels:
  - for cutting masonry, ceramic tiles; and
  - for cutting light gauge ferrous and non-ferrous metals.

## Changing Saw Blades on a Portable Circular Saw



**Note:** While different makes and models may have different retaining methods, the procedures for changing saw blades on a portable circular saw are basically the same.

- Isolate the portable circular saw from the power supply.
- Engage the arbor locking mechanism to hold the saw blade.
- Remove the blade retaining nut and washer. (Turn the spanner in an anticlockwise direction.)
- Retract the lower safety guard and remove the blade.
- Check that the retaining washers are clean.
- Replace the blade and firmly tighten the retaining nut.



**Note:** Blunt blades or blades with chipped teeth should be reset, gulleted and sharpened by a saw doctor. Do not attempt to sharpen tungsten carbide tip saw blades. Send them to a saw doctor for specialised grinding.

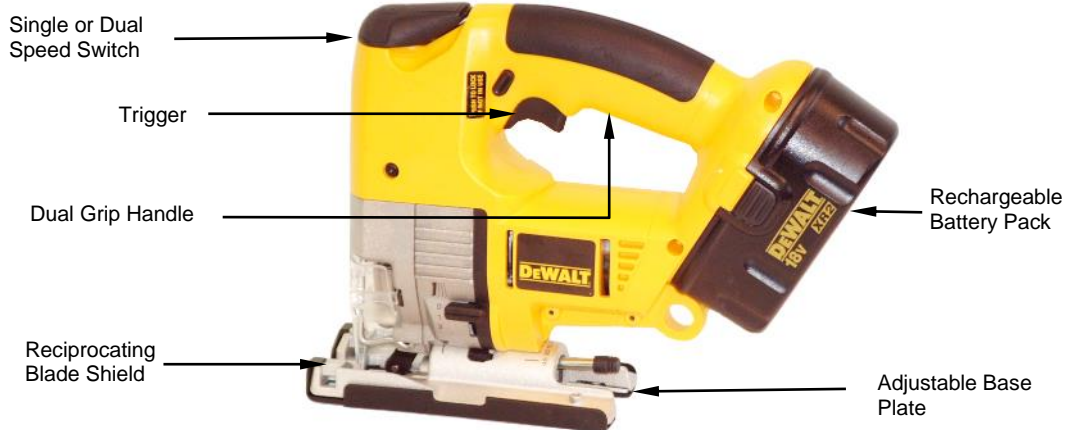
## Portable Jig Saws

The portable jig saw is used mainly for internal cut-outs and for on-site curved work. Portable jig saws are available in a variety of sizes and models for cutting a range of materials varying from cardboard to steel plate.

The most suitable portable jig saw for construction is a heavy duty model with dual or variable speeds that is able to cut a wide range of construction materials.

Portable jig saws are available in both 240 volt mains power, and rechargeable battery power (cordless).

### Portable Jig Saw (Cordless)



### Common Blades



Suitable for mild steel



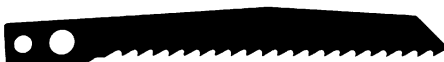
Suitable for wood curving



Suitable for plastics, laminates  
and aluminium



Suitable for cutting timber and veneer,  
hollow ground



Suitable for timber



Suitable for stainless steel

## **Portable Jig Saw Cutting Action**

Most portable jig saws have a reciprocating action (up and down) with the cutting being done on the up stroke. Some models may have an adjustable support, which reduces the unsupported length of the blade.

The thickness of material able to be cut by a portable jig saw will depend on the material being cut and the selection of the portable jig saw blade. It is important that the correct blade is used for the material to be cut. This will ensure that the cut will be to the required standard and that the portable jig saw and blade are not subject to any excessive loading.

## **Portable Jig Saw Operation**

The following are the suggested operating procedures when operating the portable jig saw:

- Select the appropriate saw blade for the material to be cut. (A range of different blades is available for various materials.)
- Discard any worn or damaged blades.
- Place the base plate firmly on the work before switching on.
- Allow the blade to gain full speed before starting the cut.
- Do not force the blade while cutting. Use an even, firm pressure keeping the base plate in contact with the work.
- Allow the blade to come to a complete stop before removing it from the work.
- Drill holes to provide blade access for internal cuts.
- Do not exceed the capacity of the portable jig saw or its blade.
- For straight cutting, clamp a piece of timber to the work to act as a guide.
- Ensure the area below the line of cut is clear of any obstacles.

## Portable Reciprocating (Sabre) Saws

Portable reciprocating (sabre) saws are heavy duty hand-held saws, which can be used to cut a wide range of materials such as:

- metal (steel, aluminium and copper);
- timber;
- brick; and
- plastic.

Portable reciprocating saws are available in both 240 volt mains power and rechargeable battery power (cordless).

### Portable Reciprocating Saw (240 volt Mains Power)



### Portable Reciprocating Saw (Cordless)



Reciprocating saw blades are commonly available in sizes from 100 to 300mm, for cutting both wood and metal.

### Portable Reciprocating Saw Operation

The operating and safety procedures for the portable reciprocating saw are identical to those for the jig saw.

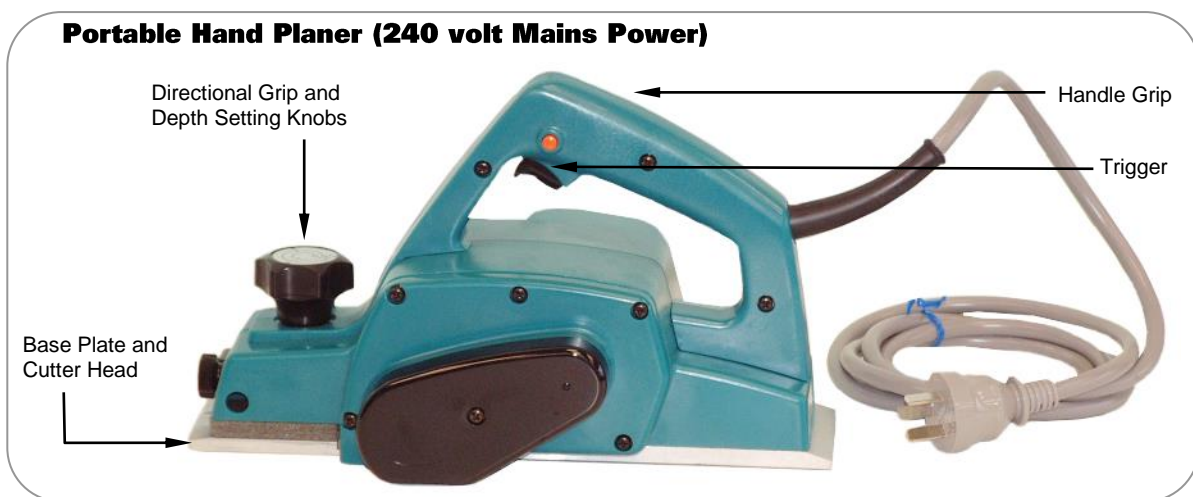
## Portable Electric Hand Planer

The portable hand planer is a lightweight planing machine, which can be used on a construction site for planing operations that would otherwise be done with a hand plane.

Some common uses of the portable hand planer include:

- planing rough sawn timber;
- small rebating and chamfering work; and
- reducing/straightening door edges to fit door jamb or frame.

Portable electric hand planers are available in both 240 volt mains power and rechargeable battery power (cordless).



### Parts of a Portable Electric Hand Planer

- A fixed rear base. The cutting head is flush with this base.
- An adjustable front base which can be raised or lowered with the adjusting screw, providing the depth of the cut.
- A high-speed rotating cutter head usually with two blades.

### Safety Precautions When Using a Portable Electric Hand Planer

Extreme care must be taken when using the portable electric hand planer, as the cutter head is continually exposed on the underside of the base plate.

- Always use with both hands on the handles provided.
- Switch on only when the front of the base plate rests firmly on the material.
- Wait until the cutter head stops revolving before placing the planer on the work bench. Place the machine on its side with the cutters clear of the bench and facing away from the operator.



## Portable Electric Hand Planer Operation

For normal planing operations, the following procedures should be followed:

- Hold the material to be machined securely, as the material will be inclined to be pushed forward by the cutting action of the machine.
- Adjust the portable electric hand planer to the required depth. The rate of feed will depend on the depth of the cut. (A series of fine cuts is preferable to one coarse cut.)
- Place the front of the base plate on the work and apply pressure on the front handle.
- Switch the portable electric hand planer on and complete the cut. (Allow the cutting head to reach full speed before starting the cut.)
- Towards the end of the cut reduce the pressure on the front knob while maintaining the pressure on the rear.
- Switch off the machine and when the cutter head has stopped rotating, lay the planer on its side.

## Cutter Replacement

You can tell when the blades need replacing or sharpening because smoke will be produced, and there will be a blackened finish to cuts and lines on the finished face.

Because of the wide range of portable electric hand planers available, it will be necessary to refer to the manufacturer's instructions when installing replacement blades. Blades are available as both standard or tungsten carbide tipped.

Isolate power at source before changing blades.

## Portable Electric Drills

The portable electric drill is the most versatile of all power tools and is available in a wide range of sizes, power ratings and accessories. Types of power drills available include:

- **Pistol Grip Drill** – Designed for one-handed operation. (Mainly used for small diameter drilling in wood and metal.)
- **Heavy Duty Drill** – Used mainly for larger holes. (Usually supplied with single or double side handles and breastplate.)
- **Impact Drill** – Used for drilling masonry. (Impact drills are more efficient at this task than other drills.) For drilling other materials, impact drills can be switched to a straight rotary action.
- **Hammer Drill** – In addition to the action of the impact drill, the hammer drill has a spring or a pneumatically driven floating hammer which adds a percussion force to the drill bit, independent of the force provided by the operator.
- **Specialised Drill** – Produced specifically for a sole purpose such as screw fixing proprietary products including roofing materials and exterior and interior wall claddings. (These tools do not have a drilling capacity. However, some are designed with an automatic screw feed which can speed up the fixing of a particular product.)

### Portable Electric Drill (Cordless)



### Special Features and Accessories for Portable Electric Drills

Portable power drills may be:

- **Single Speed** – Mainly high speed for small diameter drilling.
- **Dual Speed** – Able to drill a variety of materials and drill sizes.
- **Variable Speeds** – These drills provide the operator with the ability to select the most appropriate speed to suit the material and drill size. Variable speed drills rely on the pressure the operator applies to the trigger.
- **Angled Head Drill** – Which can be used for drilling in confined spaces.
- **Reversible** – To enable the drill to be used to drive and remove screws etc.

- **Keyless Chuck** – To speed up bit changing and avoid key loss problems.
- **Variable Torque** – Many portable drills now feature variable torque settings which enable the drill to be used to drive screws and adjust nuts to a pre-set torque.

### **Safety Precautions When Using Portable Electric Drills**

- The basic safety precautions outlined earlier in this module should be observed.
- Use side handles when the drill diameter is larger than 8mm.
- Avoid using a drill when working from a ladder as back torque from the drill may result in a fall.

### **Portable Electric Drill Operation**

To operate the drill, use the following procedure:

- Select the appropriate drill bit.
  - Carbon steel twist bits for wood and soft steel.
  - High-speed steel twist bits for harder metals.
  - Wood auger bits for general carpentry work.
  - Flat bits can be used for soft timber and plastics.
  - Tungsten carbide tipped bits can be used for concrete, masonry, ceramic tiles and fibre cement products.
- Fit the drill bit.
  - Most drills are fitted with a three jaw self-centring key operated chuck. Fit the drill bit in place and hand tighten. Use the key to hold the drill firmly in place.
  - For drilling requiring a number of drill bit changes, a keyless chuck may be used. The knurled surfaces are gripped and tightened by hand.
- Select the correct speed.
  - For general carpentry work, the smaller the drill bit being used, the higher the speed required.
- Centre punch the starting point for hard materials.
- Secure the work piece. (Use a vice if possible.)
- Start the power tool and drill the hole.

## Impact and Hammer Drills

The operating procedures for the impact and hammer drills are the same as for smaller rotary drills with the following additions:

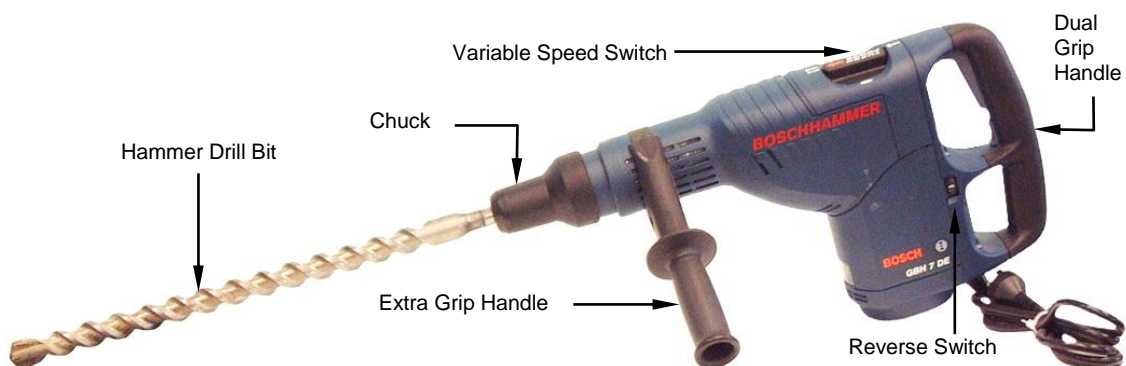
- After selecting the speed, set the impact mechanism. (Some drills may have a variable impact control knob while others may have a number of settings.)
- Set the depth gauge if fitted.
- Apply continuous heavy feed pressure.
- Disconnect the impact function when drilling ceramic tiles.
- Do not exceed the manufacturer's recommendations.

The advantages of a hammer drill compared with an impact drill are:

- faster drilling rate;
- less tiring on the operator; and
- easy to operate in a confined space.

The same basic operating procedure should be followed as for normal drilling operations, except that less feed pressure is required.

### Portable Hammer Drill (Dual Handed)



### Portable Hammer Drill (Pistol Grip)



## Portable Electric Screwdrivers

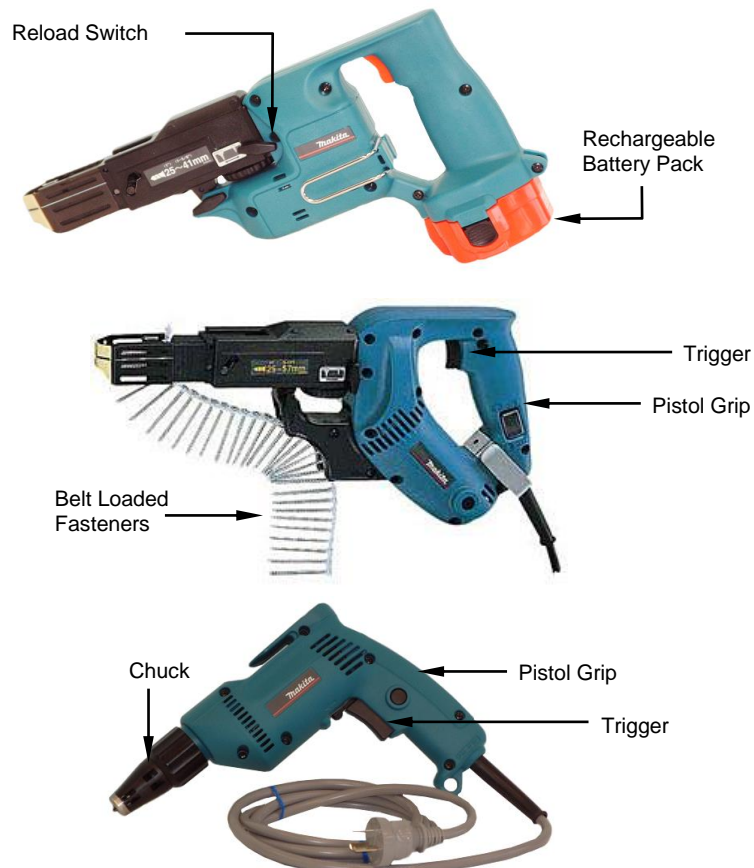
There are number of specialised tools developed to save time, effort and produce consistent results for driving screws. Screw fixings can be collated in strips and fed into the machine which automatically advances the strip after each screw is driven. By adjusting the settings, the depth of the screw head below the surface can be altered. These automatic screwdrivers are commonly used for fixing wallboards and sheet flooring.

### Portable Electric Screwdriver Operation

Portable electric screwdrivers have similar controls to portable electric drills, except that all portable electric screwdrivers have a reverse switch – which most of the larger portable electric drills do not. Some makes of portable electric screwdrivers are single speed, while others have variable speed controls. When using a portable screwdriver:

- Select the correct speed for the job. (High speeds for self tapping operation, low speeds for normal operation.)
- Select the correct bit for the screws to be used. (Screw bits are available in a wide variety of sizes and shapes.) On most portable electric screwdrivers, the spindle assembly is magnetised, holding the bit, sleeve and screw in position.
- Hold the portable electric screwdriver at right angles to the screw head.

#### Portable Electric Screwdrivers



## Portable Electric Sanders

There are two types of portable electric sanders. They are:

- portable belt sanders; and
- portable orbital and reciprocating sanders.

### Precautions and Good Working Practices

The sanding of some building materials can produce contaminated dust – which can have long-term health effects. These include the following materials:

- lead-based paint;
- treated timber;
- fibre cement products; and
- medium density fibre boards (MDF).

When working with these materials, care must be taken and all the following safe working practices must be observed:

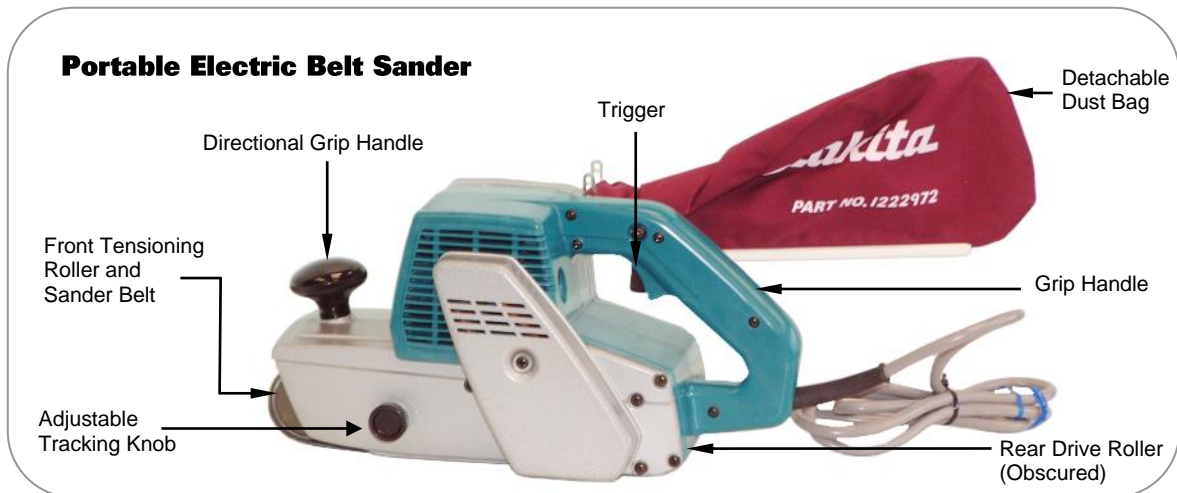
- Wear the appropriate protective equipment including overalls, respirator and safety goggles for the task being performed.
- No eating, drinking or smoking should be done in the work area.
- Food, drink, etc. must not be left in the work area where the dust could settle on it.
- Keep all visitors and other workers away from the area.

### Portable Electric Belt Sanders

Belt sanders produce a smooth finish on timber surfaces by removing machine marks in preparation for finishing.

A portable electric belt sander is made up of the following parts:

- an abrasive belt or loop which runs continuously underneath the machine;
- two rollers:
  - a rear roller which drives the belt; and
  - a spring loaded front roller which allows the belt to be tensioned and also tracking adjustment; and
- a base plate providing a surface for the belt to pass over.



## Portable Electric Belt Sander Operation

- Check the tracking of the belt by holding the portable electric belt sander upside down on a firm surface.
- Check the position of the belt across the base plate.
- Run the portable electric belt sander in short bursts and adjust the tracking knob if necessary.
- The belt will be tracking correctly when it runs evenly and flush with the outside edge of the base plate.
- Place the rear of the timber to be sanded firmly against a fixed stop or hold it firmly with a clamp.
- Grip the portable electric belt sander firmly with both hands.
- Switch the portable electric belt sander on before making contact with the timber.
- Lower the portable electric belt sander onto the timber so that the base plate sits flat on the surface. Be ready to absorb the forward pull from the machine.
- Use sander in same direction as grain of timber; not across the grain.
- Guide the portable electric belt sander evenly over the surface of the timber. The weight of the machine is sufficient to provide efficient sanding. It is not necessary to apply additional weight.
- Lift the tool clear of the work before switching it off. Ensure that the belt has completely stopped before placing the tool down.



## Portable Electric Belt Sander Maintenance

- Clean the belts regularly to allow them to work effectively.
- To change belts:
  - Isolate the power tool from the power source.
  - Release the tension on the belt. (Check manufacturer's instructions.)
  - Remove the old belt and fit the new belt. (Care must be taken to ensure that the directional arrows point in the same direction as the arrows marked on the tool.)
  - Align the belt with the sides of the base plate.
  - Tighten the belt using the tension mechanism, and adjust the tracking of the belt.

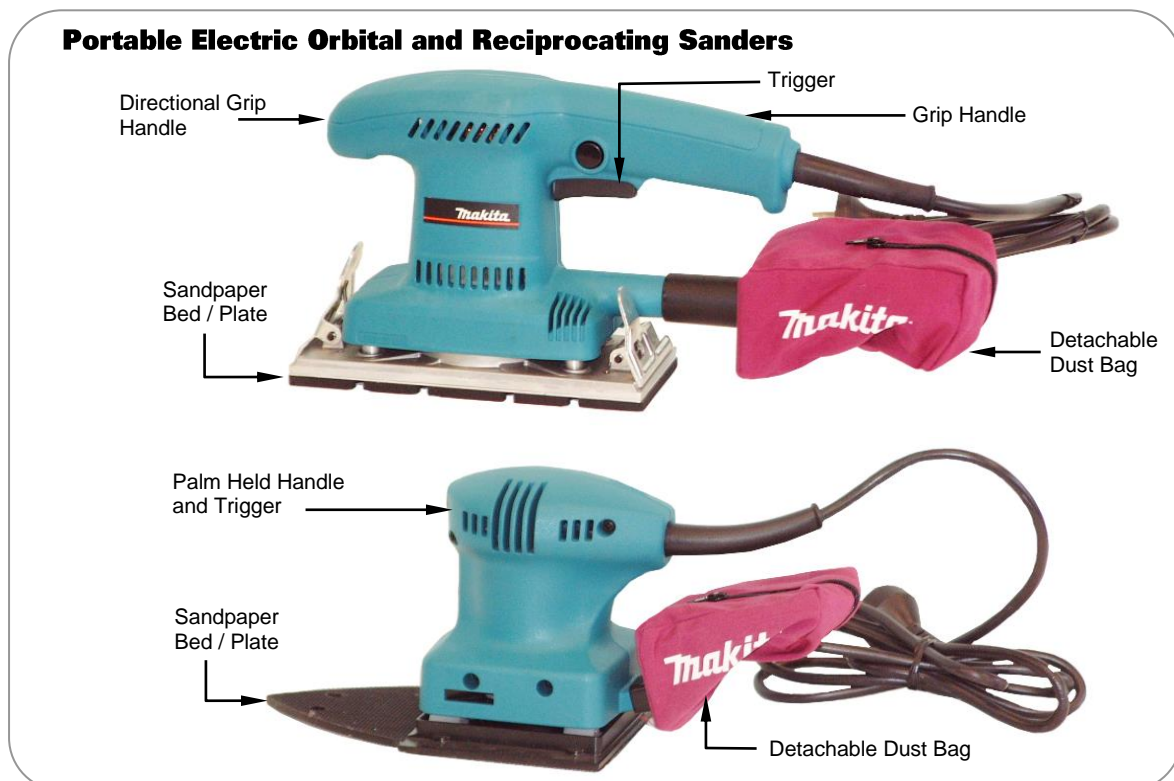
## Portable Orbital and Reciprocating Sanders

Orbital and reciprocating sanders are similar in appearance, but have different sanding actions:

- The orbital sander rotates an abrasive disc in a circular motion at between 5,000 to 25,000 orbits per minute.
- The reciprocating sander moves the abrasive backwards and forwards in a straight line.

Both types are simple to use and provide little danger to the operator as the sanding stroke is reduced to approximately 3mm to 5mm in any direction.

Care must be taken to select the correct grade of abrasive, as the appropriate grade must be fitted to suit the standard of finish required.





## Portable Disc Grinder

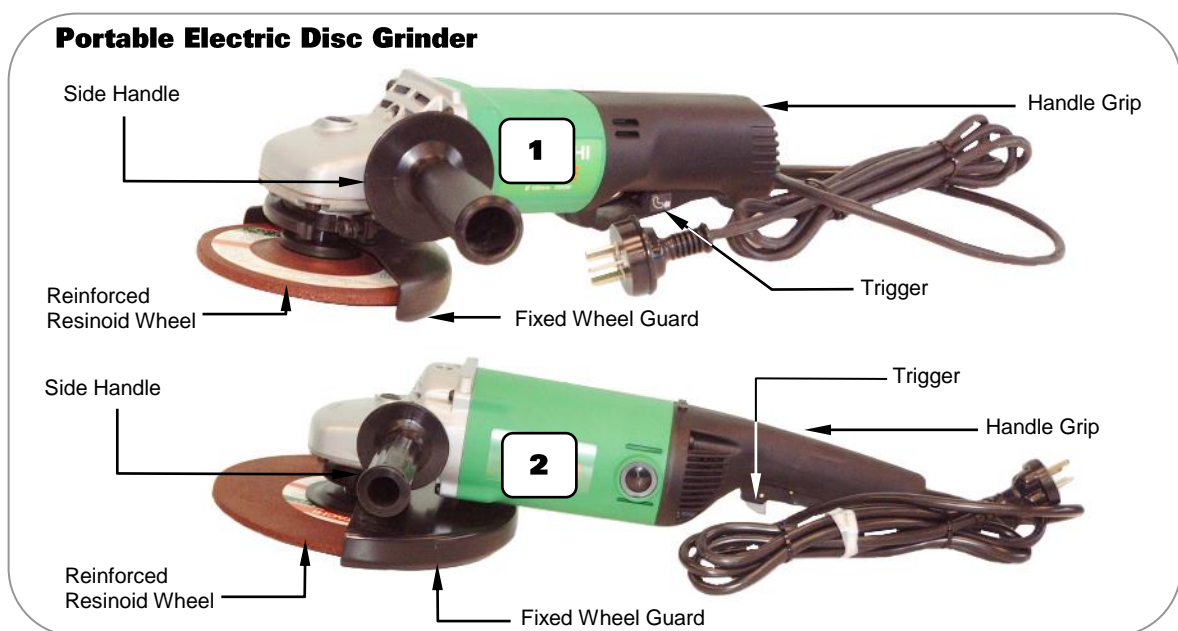
A portable disc grinder (or angle grinder) is a machine fitted with a reinforced vitrified or resinoid grinding wheel mounted on a drive shaft.

The basic function of the portable disc grinder is to "grind" material. They may be used to:

- cut steel pipe and metal sheet;
- grind metal joints and welds;
- cut masonry; or
- sand and polish.

Portable disc grinders come in two different sizes:

- 1.** 100 to 125mm diameter grinder (shown below). (This small, all round angle grinder is the one most likely to be found on building sites.)
- 2.** 190 to 230mm diameter grinder (shown below). (This is a larger version of the one above. It is designed for heavy duty grinding operations. These models may produce a gyroscopic effect and can be difficult to control.)



Speed in revolutions per minute (rpm) can vary with each machine. Before use, check that the machine speed is not greater than maximum rpm of the disc. It is important that the correct disc is fitted to avoid injury or damage.

## **Safety Precautions When Using a Portable Disc Grinder**

Portable disc grinders create a large amount of dust, debris and noise. Eye, hearing and breathing protection are essential. Select PPE suitable for the task being done.

A large number of industrial accidents occur with these machines. Always ensure the guard is fitted. Grinding discs without guards can cut legs, arms and fingers. Grinding discs can also disintegrate if they are run at a speed greater than the rating on the disc.

## **Portable Disc Grinder Operation**

- Always check that the machine is switched off before connecting it to the power supply.
- Check that the grinding disc is properly secured to the machine.
- Before starting the grinding operation, check that the material to be ground is firmly secured in a vice or to a bench.
- The operator must have a clear view of the material. They should also be standing in a comfortable, well-balanced position.
- Point the portable disc grinder down when starting. (Hold firmly to compensate for kickback.)
- Use a backward and forward motion across the surface of the material.
- When the grinding operation has been completed, switch the machine off. Wait until the wheel has stopped running and then place it down, with the grinding disc facing up.
- Never operate the machine above shoulder height.

## Concrete Drill

Concrete drills provide fast wet or dry drilling of reinforced concrete, brick, block and stone, and are used for drilling holes in concrete floors, walls and ceilings.

These are available in a range of sizes, from portable drilling machines through to large rig-mounted machines equipped with large drill bits with the capacity to drill holes up to 300mm in diameter.

### Concrete Drill



### General Safety Precautions

- Ensure ear, eye and foot protective equipment is worn at all times.
- All electric concrete drilling equipment should only be operated through earth leakage protection (RCD).
- Keep the area free of rubbish.
- Avoid operating equipment overhead.
- Never refuel a petrol-operated machine while in operation.

## Compressed Air and Gas-powered Nail Guns

The use of mechanically powered nailers and staplers is now one of the most common labour saving devices on a construction site.

The range of fasteners fixed by these devices can vary from staples to 100mm nails. Compressed air nail guns are used for:

- sub-floor framing;
- flooring;
- wall and roof framing;
- claddings;
- finishing trim; and
- joinery assembly.

Compressed air and gas-powered nail guns are available in a variety of models and sizes, and features including nail depth adjustment, single or sequential firing options and automatic firing stop are available.

### Portable Compressed Air Nail Guns



### Portable Gas-powered Nail Guns



## Safety Precautions When Using a Compressed Air or Gas-powered Nail Gun

The following safety rules should be followed when operating nail guns:

- Always assume that the tool is loaded with fasteners.
- Always check that safety mechanisms are working before use.
- Do not aim the tool at anyone. Always consider the firing zone.
- Always operate the tool with consideration for others.
- Take care when nailing near the edge of any material. Keep a lookout for any defects in timber, which may deflect the fasteners.
- Disconnect the compressed air nail gun when adjusting, cleaning or if leaving it unattended.
- Use only the power source (gas or compressed air) designed for that tool. (Never use bottled oxygen with compressed air tools as it can explode.)
- Use the appropriate safety equipment including eye and hearing protection sufficient to meet minimum NZ Standards when operating a compressed air nail gun.



**Note:** *Compressed air (like any power source) must be used with care.*

Every operator of compressed air equipment should be aware of the potential dangers which are present, in order to avoid accidents and injury.

## Compressed Air and Gas-powered Nail Gun Operation

- Compressed air and gas-powered nail guns must be checked regularly before they are used. This check should include the energy supply and connections including compressors, air lines and hoses. Any defect in the machine should be repaired before its next use.
- For nail guns with gas cartridges as a power source, checks should be made for gas leaks.

## Compressors

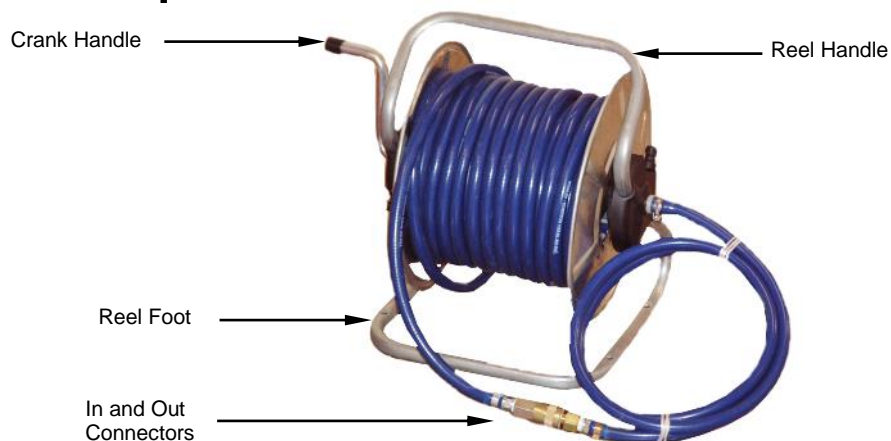
When a compressor provides the power source, it is important to achieve the best performance for the tools by:

- locating the compressor in an area free from dust and dirt;
- keeping the air line as short as possible;
- operating the compressor out of direct sunlight to assist in cooling;
- keeping electrical extension leads as short as possible. (The appropriate electrical safety devices must also be used.);
- working within the capacity of the unit and not overloading it; and
- servicing regularly.

### Portable Electric Compressor



### Portable Compressor Hose and Reel



## Filtering and Regulating Compressed Air

Air supplied by a compressor will contain water vapour and also dirt and dust. This can cause serious damage to tools and significantly reduce their operating life. The compressed air supplied is also at a much higher pressure than what is needed for the operation of the tool.

It is essential that both the impurities are removed and the pressure is controlled if air tools are to operate efficiently. This is done by installing an air filter between the compressor and the tool being operated.

Pressure regulators reduce the pressure from the compressor and maintain that pressure in the air line for the particular tool being used.



**Note:** In all cases, the manufacturer's recommendations must be followed for the maintenance and servicing of the compressor and its accessories.

## Fasteners

Fasteners can be supplied in either strips or coils to fit the appropriate magazine in the nail gun. They are joined with a variety of materials, most of which are discharged into the timber with the fastener.

## Compressed Air and Gas-powered Nail Gun Operator Training

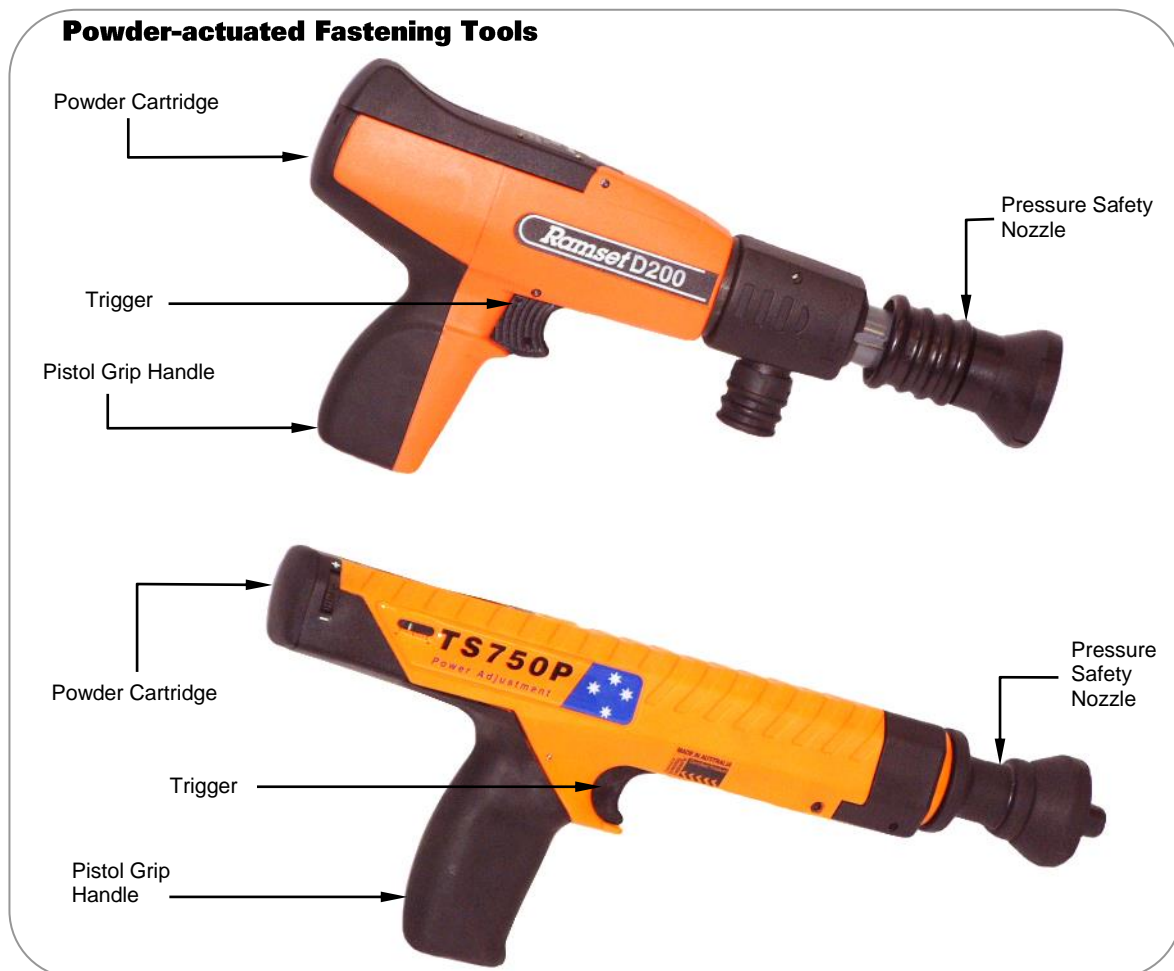
It is important that operators of compressed air and gas-powered nail guns are competent in the safe operation of this tool. Apprentices/trainees should receive adequate supervision until such time as they are deemed competent and evidence of such training should be recorded in the Record of Work.

## Powder-actuated Fastening Tools

Powder-actuated fastening tools are widely used throughout the construction industry. This is a hand-held tool capable of driving a pin, stud, bolt or similar fastening into or through building materials such as concrete, brickwork and structural steel using an explosive cartridge.

Typical applications include:

- fixing timber and metal wall plates to concrete floors;
- fixing battens to concrete block walls;
- fixing suspended ceiling fittings to concrete structures;
- fixing partition tracking to floors and ceilings; and
- fixing conduits to steel and concrete.







### **Powder-actuated Fastening Tools Certified Operators and Operator Training**

A powder-actuated fastening tool is in the same category as an ordinary firearm and consequently must not be loaded or fired except by a person who is the holder of a certificate of competency issued by the manufacturer or their agent.

Any person training for such a certificate may operate the powder-actuated fastening tool, provided that it is under the direct personal supervision of the holder of the appropriate certificate.

### **Powder-actuated Fastening Tools Inbuilt Safety Features**

Explosive powered tools have a number of safety features including:

- The tool will not operate unless the operator applies a minimum pressure.
- The breach cannot be opened when the tool is in the cocked position.
- They are equipped with a protective shield that extends in all directions at the end of the barrel. This shield may be adjusted if the surrounding material can arrest the projectile.
- They must not be capable of accidental discharge when the barrel deviates more than 6° from the perpendicular, from the surface of the work.
- Each tool has the following notice in a prominent position on the tool:  
*"Do not remove the fastening tool from the work surface for at least 10 seconds if the charge fails to fire."*

The above safety features are mandatory.

### **Powder-actuated Fastening Tools Explosive Charges**

Explosive charges must be marked on the top or bottom, to indicate the relative strength:

- Charges must be kept in a secure, lockable metal container clearly marked "EXPLOSIVE CHARGES".
- Charges must be compatible with the type of tool being used.

## Powder-actuated Fastening Tools Operation

Loading, cleaning and general maintenance procedures will vary from brand to brand. Therefore it will be necessary to follow the manufacturer's instructions provided with the tool being used.

The following are same general rules which must be observed for the safe operation of the tool:

- Never fasten too close to the edge of any material.
- Check that the barrel is clear of any obstruction before loading.
- Do not use the tool where there is the possibility of inflammable gases.
- Use the weakest charge for the task.
- Do not fire into a structure or material of unknown construction. The pin could pass right through any weak section – such as a mortar joint. Place an observer well clear on the other side of the wall. Keep the area clear of other construction workers for a safe distance in all directions. The area on the opposite side to the firing location should be cordoned off to restrict entry while firing operations are taking place. Appropriate “Caution” signs must be displayed so as to be clearly visible to all people in the immediate area.
- Use the appropriate safety equipment including eye and hearing protection sufficient to meet minimum NZ Standards when operating a powder-actuated fastening tool.

## Powder-actuated Fastening Tools Misfires

In the event of a misfire, the operator must comply with the following requirements:

- Observe the manufacturer's misfire precautions and procedures. Where the manufacturer has not provided specific instructions, the following steps should be taken:
  - Wait at least ten (10) seconds and carefully release the downward pressure.
  - Release the tool from the surface of the work maintaining the direction in which the tool was pointing.
  - Remove the charge and store safely for later disposal.



**Note:** Any charges that have misfired should not be used again. Return them to the supplier. If a number of misfires occur from one batch of charges, return the whole batch to the supplier for destruction.

## Powder-actuated Fastening Tools Maintenance

The operating and maintenance procedures will vary from brand to brand. It is essential that the manufacturer's instructions for maintenance and servicing procedures are observed. This will ensure that the tool is not only safe to use but will also significantly extend its economic life. The following points should be followed:

- Inspect the tool carefully before use, Regularly clean the tool. Have the tool certified by manufacturer's representative every six months.

**Now would be a good time to go and complete Worksheet 2 – Power Tools**

# Mitre Saws - General Health and Safety

As with all other types of construction work, the human factor is the principal cause of accidents when using machinery. Accidents don't "just happen", they are caused – usually by unsafe practices, unsafe conditions or a combination of both.

Below is a list of general safety precautions, which covers all machinery. (Specific safety precautions for each individual machine will be listed in that section.)

## Personal Health and Safety Requirements for Machinery

When using any machinery, the following personal safety rules must be observed:

- Wear dust masks when required.
- Wear safety glasses, goggles or a face shield.
- Wear hearing protection that is suitable for the level and frequency of the noise exposure.
- Do not wear loose fitting clothing.
- Tie long hair back behind the head or wear a cap or net.
- Wear safety shoes or boots.

## Safe Machine Operation

High-speed machinery can cause serious injury if incorrectly used. The following safety rules must be observed for safe machine operation:

- Always operate machines in well lit, clean areas.
- Use only machines which you have been trained and authorised to use.
- Read and follow the manufacturer's instructions before use.
- Check the position and secure all safety guards before starting work. They are there to reduce the possibility of injury to you, the operator.
- Before starting the machine, turn the blade or cutting head by hand to check for smooth operation.
- Check the electricity supply. (Use an isolating transformer or Residual Current Device (RCD). Check electrical leads have current inspection tags.)
- Stand to one side of the machine when starting it.
- The stop button must operate efficiently and be within easy reach of the operator. (The stop button must be a raised mushroom shape and coloured red, to allow quick recognition and access in the case of an emergency.)
- Switch off machine to make any adjustments or to remove waste. Machines should also be isolated from power when maintenance is carried out.
- Do not leave any machine running while unattended.
- Follow the manufacturer's instructions when changing blades or cutting knives.
- Keep the surrounding work area clear of scraps and off-cuts.
- Give the machine your undivided attention at all times.

## Machining Equipment Hazards and Controls

The use of any machining equipment has its own hazards, and every hazard has a control. As users of machining equipment we need to be aware of the hazards and use the appropriate controls. This example may help to make the process clearer.

Before I use a mitre saw, I think about the hazards and make sure I control each. The process is:

1. I think about what might happen; and
2. I take action to ensure that it doesn't happen (or if it does happen, I make sure no one will get hurt).

What might happen?	What do I need to do?
Hazards	Controls
Damage to hearing from noise	Wear ear muffs
Electric shock from water, cutting the cord, faulty saw, etc.	Use an isolating transformer or cut-out switch
Damage to eyes from flying chips and dust	Wear goggles, check that guard is in place and operating properly
Long piece of timber gets caught on the other side of the table saw	Have an assistant or workmate tail out
Injury to others when you have finished using the saw	Turn off the power to the machine when finished and do not leave until the blades have stopped spinning

Every machine has hazards. Common sense tells you what might go wrong, and common sense also tells you what to do to protect yourself and others. You, the operator, are responsible for the safe operation of the machine. If in doubt, ask a more experienced workmate.

## Mitre/Drop Saw

The mitre saw is a general purpose power saw which has largely replaced other saws on construction sites. It can be used as a "drop saw" for general cross cutting but also has the ability to cut angles in two planes making it ideal for on-site precision cutting of rafters, weatherboarding and internal trim such as skirting and architraves.



### Description

There is a wide range of brands and types of mitre and compound mitre saws available on the market. However, the basic construction principles are:

- The saw assembly (including the motor) is mounted on a pivoting and tilting arm, which allows the saw to be lowered onto the timber to be cut.
- The saw is mounted above an adjustable table with a fence, and can rotate in a horizontal arc to a position 45° either side of 90°.
- A compound mitre saw enables an angle in the vertical plane to be cut as well as in the horizontal plane.
- The saw has pre-determined locking positions at 90° and at 15° steps each way to 45°, and can be clamped at any of these positions.
- The direction of the blade rotation is always down and away from the operator, which pulls the timber hard up against the fence.

### **Safe Positioning of the Mitre/Drop Saw**

Mitre saws can be used without fixing them in a semi-permanent position. However, for safe use and prolonged cutting, the saw should be mounted using one of the following methods:

- clamping or bolting it to a standard workbench;
- mounting it on a proprietary transportable bench; or
- permanently building it into a fixed bench, for workshop applications.

### **Safe Operation of the Mitre/Drop Saw**

To operate the mitre saw, the following procedures should be followed:

- Check the power supply and make sure an isolating transformer or Residual Current Device (RCD) is in place.
- Adjust and lock the saw at the required angle. (Rotate the handle clockwise to clamp the saw, anticlockwise to release.)
- Place the timber to be cut on the table, tight up against the fence. The material can be fed from the left or the right side of the operator.
- Switch the saw on and slowly lower the saw onto the timber. Use firm pressure without forcing the blade into the timber.

### **Safety Procedures When Using Mitre/Drop Saws**

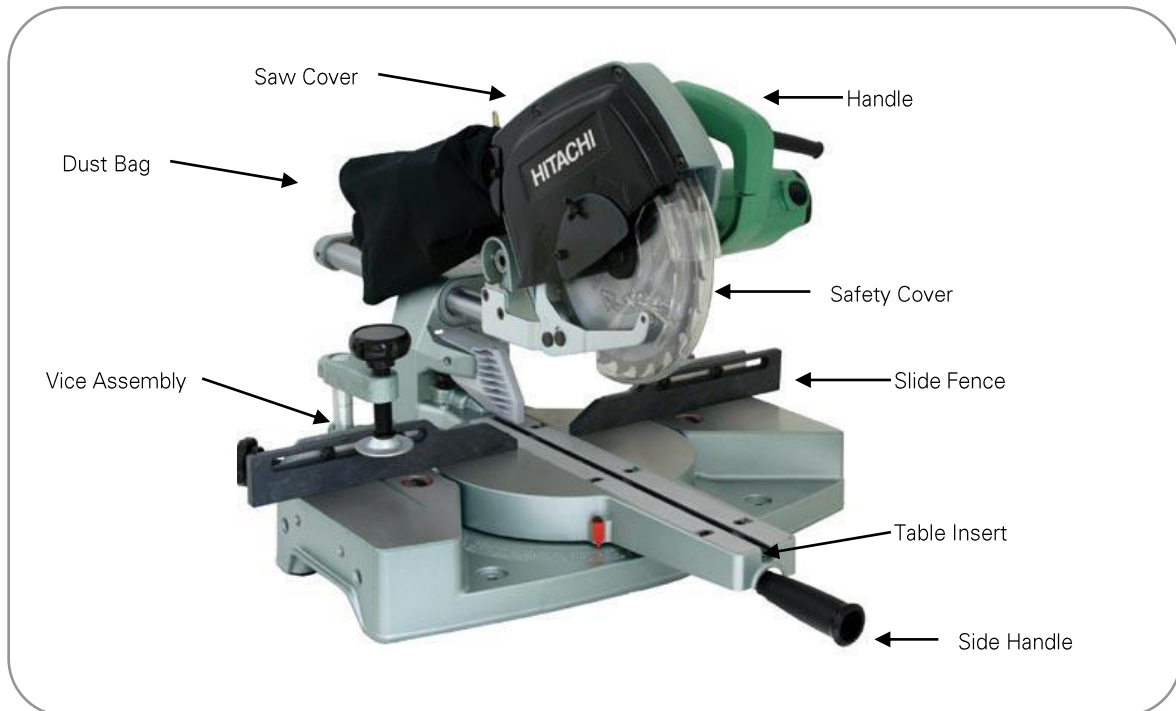
- Wear appropriate Personal Protection Equipment (PPE) (ie. hearing and eye protection, and dust masks or respirators if necessary).
- Check that the saw is firmly mounted on a bench or rigid frame. Operate the saw at waist height.
- Check that all guards are in place and inspect regularly for faults.
- Check that the blade is suitable for the task to be undertaken, and that it rotates in the correct direction. Keep blades clean, sharp and properly seated.
- Follow the manufacturer's maintenance instructions for lubricating and changing the blades and accessories. (Always isolate the machine from its power source when carrying out machine maintenance and repairs.)
- Keep blades and arbour collars clean. (Recessed faces of the arbours must be hard against the blade.)
- Keep the work area clean and well lit.
- Check that the power switch on the saw is in the OFF position before connecting it to the power source. This will prevent the unintentional starting of the saw.
- Regularly check the saw for damage. Report any damage for repair or replacement. Keep the motor ventilation slots clean and free from dust and debris. (Always isolate the machine from its power source when carrying out machine maintenance and repairs.)
- Only use the accessories that are designed for the specific saw and operation.

## **Operating Precautions When Using a Mitre/Drop Saw**

- Always use on firm, stable and level surfaces. Keep a well-balanced position and a firm footing.
- Make sure that the timber is in position on the table and held firmly against the fence.
- Do not reach around or behind the saw blade. Never "cross hands" in front of the blade when operating the saw.
- Do not release the handle until the retractable cover guard has fully covered the blade.
- Do not operate the saw in damp or wet conditions.
- Regularly check the leads and plugs for damage and always use an isolating transformer or RCD at the power source. Check that electrical inspection tags on any extension leads are current.

## Sliding Compound Mitre Saw

Sliding compound mitre saws are very useful for cutting pre-sized timber to length. They can be used to cut framing-sized timber or finishing mouldings. They can cut at right angles and perform single and double mitre cuts. They are similar to the compound mitre saw we have looked at earlier; however, the sliding mechanism means they are able to cut wider pieces of timber than a mitre saw.



### Safety Procedures When Using a Sliding Compound Mitre Saw

- Use the appropriate PPE (ie. safety glasses or goggles, suitable hearing protection, safety shoes, and a dust mask or respirator).
- Check that the saw is firmly mounted on a bench or rigid frame. Operate the saw at waist height.
- Check that all guards are in place and inspect regularly for faults.
- Check that the blade is suitable for the task to be undertaken, and that it rotates in the correct direction. Keep blades clean, sharp and properly seated.
- Follow the manufacturer's maintenance instructions for lubricating and changing the blades and accessories. (Always isolate the machine from its power source when carrying out machine maintenance and repairs.)
- Keep the work area clean and well lit.
- Check that the power switch on the saw is in the OFF position before connecting it to the power source. This will prevent the unintentional starting of the saw.



- Regularly check the saw for damage. Report any damage for repair or replacement.
- Keep the motor ventilation slots clean and free from dust and debris. (Always isolate the machine from its power source when carrying out machine maintenance and repairs.)
- Only use the accessories that are designed for the specific saw and operation.
- Never leave the saw blade running while unattended – turn the power off.

### **Operating Precautions When Using a Sliding Compound Mitre Saw**

- Always use on firm, stable and level surfaces. Keep a well-balanced position and a firm footing.
- Make sure that the timber is in position on the table and held firmly against the fence, or slide fence (if it is too small to be fixed to the fence).
- During slide cutting always push the saw blade away from yourself in a single smooth motion.
- Do not reach around or behind the saw blade. Never "cross hands" in front of the blade when operating the saw.
- Always make sure that the safety cover is in the proper place before using the saw. Make sure that the safety cover does not obstruct the sliding motion of the saw before attempting slide cutting.
- Do not release the handle until the retractable cover guard has fully covered the blade.
- Do not operate the saw in damp or wet conditions.
- Always turn the power off and wait for the saw blade to stop moving before moving the saw or changing settings.
- Regularly check the leads and plugs for damage and always use an isolating transformer or RCD at the power source. Check that electrical inspection tags on any extension leads are current.

**Now would be a good time to go and complete Worksheet 3 – Mitre Saws**

# Non-mechanical construction equipment

## Manual construction equipment

### Spade



#### Description

A spade has a rectangular blade attached to either a wooden or a metal handle. The lower end of the blade is sharpened for ease of operation.

#### Use

A spade is used for excavating and trimming trenches for footings.

#### Care and Maintenance

Keep sharp by grinding the rear edge of the blade only, which increases its efficiency. Oil handle, if wood, and the blade. Clean regularly.

### Wheelbarrow



#### Description

A wheelbarrow is made up of a metal frame, with a steel wheel and pneumatic tire at one end and handles with supports attached at the other. The frame supports a metal or polypropylene tray.

#### Use

A wheelbarrow is used to transport soil, sand, gravel, concrete and so on to the required location on site.

#### Care and Maintenance

Always clean the wheelbarrow at the completion of the operation. For ease of use, make sure the tyre is inflated to the correct pressure. Do not leave tyre uncovered in sun for long periods.

## Panel Lifter

A panel lifter is a mechanically operated hoist that is used for lifting sheet linings to the ceiling level to be fixed. The sheet is placed onto the flat framing of the panel lifter and then hoisted to be level to the ceiling, ready to be fixed to the substrate.

The area of the panel lifter the sheet lays on is called the bed



### Panel lifter use

In most cases,

- Tilt the bed vertically for the sheet to be placed.
- Then tilt the bed to a horizontal position and locked in place for lifting.

The length of the bed can be adjusted to suit the length of the sheet being installed.

The installation of ceiling linings is the most common use of a panel lifter.

Panel lifters can be mechanically operated (see picture – above) or they may be operated by compressed air, hydraulic fluid or electricity.

Using a piece of equipment such as a panel lifter not only reduces the risk of injury due to lifting and twisting but (depending on the length of the sheet) lifters can substitute the labour of two people.

## Scaffolding

Scaffolding that is lower than 5m high does not need to be erected by someone who is certified but it is important that anyone who does erect this scaffold knows exactly what they are doing and it should still be checked thoroughly and tagged.

It is now common for portable and mobile scaffold sets to be an everyday part of many building an sites. These sets are usually of a size and design that does not require a certificate to erect, amend or dismantle them. This means such scaffolds are lower than 5m in height but are generally lightweight and often mobile.



Once the scaffold is erected, a pre-job safety check should be carried out on the scaffold with particular attention paid to the following:

Item to check	Check for:
<b>Foundations</b>	<ul style="list-style-type: none"> <li>• firm, rigid and not subject to settling</li> <li>• metal base plates in place – even if the scaffold is on concrete</li> <li>• metal base plates 150x150mm x 6mm thick</li> <li>• base plates should be nailed to the sole boards when on soft ground</li> <li>• sole boards made from timber at least 500mm long, 200mm wide and 38mm thick</li> <li>• at least 150mm or half the maximum extension of the screw (whichever is greater) must be in the tube at the base of the scaffold</li> </ul>
<b>Access</b>	<ul style="list-style-type: none"> <li>• access must be provided – whether through access stairs or ladders</li> <li>• ladders should be secured and at a 4:1 pitch</li> <li>• climbing the scaffold structure is not an appropriate way to gain access to the working platforms and should never be done</li> </ul>
<b>Platforms</b>	<ul style="list-style-type: none"> <li>• minimum width = three planks (total 675mm) wide for non-proprietary scaffolds always maintaining a 450mm wide clear pathway.</li> <li>• Ideally brick and blocklayers would lay four planks which gives room for bricks, mortar buckets etc</li> <li>• platforms should be as close as possible to the working face but no more than 300mm without the use of internal guardrails</li> <li>• plank ends should overhang by 80-220mm</li> <li>• planks should be secured against uplift and horizontal displacement</li> </ul>

Item to check	Check for:
<b>Guardrails</b>	<ul style="list-style-type: none"> <li>• top guardrail (handrail) must be between 900 and 1100mm above the working platform</li> <li>• midrails should be positioned mid-way between the top guardrail and the working platform</li> </ul>
<b>Stability</b>	<ul style="list-style-type: none"> <li>• if the scaffold is free-standing, a height-to-base ratio of 3:1 must not be exceeded</li> <li>• if the scaffold is mobile, casters must have brakes applied before accessing the scaffold</li> <li>• scaffolds should be tied back to the structure and/or have outriggers in place</li> <li>• scaffolds should be braced to resist horizontal loads</li> </ul>
<b>Material fall prevention</b>	<ul style="list-style-type: none"> <li>• toe boards must be a minimum of 225mm above the work platform or at least 150mm above any materials being stored on the platform</li> <li>• netting around the exterior of the scaffold assists in preventing falling material or debris and also deters workers from climbing the outside of the scaffold structure</li> </ul>

# Mechanical construction equipment

## Excavator

Excavators are used for the preparation of building sites, drainage and foundation trenches.

There are various sizes of excavators, with various operating limitations:

- reach;
- capacity;
- mobility; and
- operations area required.

Therefore it is important that the appropriate excavator is selected and used for the intended operations.

### Excavators



## General Safety Precautions

- Overhead and underground services have been located, marked and precautions taken to avoid them.
- The excavation does not affect the stability of the adjoining properties or buildings.
- Ground conditions are sufficiently stable to carry the weight of the machine.
- Temporary traffic control measures are implemented if required.
- Roll-over protection and seat belts are fitted to the machines.
- Excavated material is positioned at least 0.600m away from the excavation.

## Excavator Operation

The operator of the excavator must be fully trained and competent in the use of the machine and made aware of the hazards as identified in the site-specific safety plan.

## Compactor

Compactors are used to compact hard core fill, sand etc. and are usually hired on a daily basis.

They are available in many forms:

- ride-on vibrating roller;
- hand control vibrating roller;
- plate compactor; and
- tamper.

Most types of compactors are available in a range of sizes allowing the appropriate one to be selected to meet the requirements of the project.

### Compactors



### General Safety Precautions

- The right compactor has been selected for the work to be done.
- Exposed parts are adequately guarded, eg. exposed gears, chain drives, projecting engine shafts.
- The compactor is maintained in good repair and all safety devices are in place.
- The operator has been trained in the safe operation of the compactor.
- Always wear ear protection and safety footwear.
- Ensure area to be compacted is free of any obstructions that may affect the safe operation of the compactor.

## Crane

Cranes are appliances used on building sites for raising and lowering plant, equipment and other materials.

They are available in many styles, with varying lifting and reach capacities. The most common cranes used on building sites are:

- tower cranes;
- mobile (track or wheel mounted); and
- truck mounted.

When selecting a crane, ensure that the proposed lift and reach capacities are adequate.

### Cranes



## General Safety Precautions

- Identify who will be responsible for directing the crane operations and the signals to be used.
- Cranes must be operated within their safe working-load rating.
- Mobile cranes must be set up on solid foundations with outriggers fully extended and suitably packed.
- There must be enough space for the safe operation of the crane including overhead services.



## Concrete Mixer

Concrete mixers are used to mix the ingredients for concrete, mortar and plaster on a building site.

They are available in range of bowl capacities, and powered by an electric motor or a petrol engine.

### Concrete Mixer



### General Safety Precautions

- Ensure belt drives and pulleys are guarded correctly.
- Clean the bowl and frame of mixer at the completion of each concreting operation.
- Where the power source is electricity, a suitable electrical safeguard (such as a residual current device) must be used.
- Regular 3-month inspections should be carried out on electric-powered machines by a registered electrician.

## Power Float

Power floats are used to finish surfaces of concrete floor slabs.

They are available in various sizes and designs:

- solid disc;
- three or four floating trowels;
- ride-on twin floats;
- electric power-driven; and
- petrol-driven.

### Power Float



## General Safety Precautions

- When using petrol-driven floats, ensure the float is turned off prior to refuelling.
- Ensure all guards are in place.
- Ensure all power leads are kept clear of the ground and away from float blades.
- Where the power source is electricity, a portable electrical safeguard (such as a residual current device) must be used.
- Replace worn floats when required.
- Ensure the floats and frame are cleaned at the end of each concreting operation.

## Mechanical Screed

Mechanical screeds are used to vibrate level and compact concrete slabs after the concrete has been placed, prior to bull floating.

They are available in a range of lengths, widths and configurations. The larger screeds require screed guides at each end for support and also to maintain the correct level of concrete. Smaller screeds can operate on levelled, freshly-laid concrete strips.

### Mechanical Screed

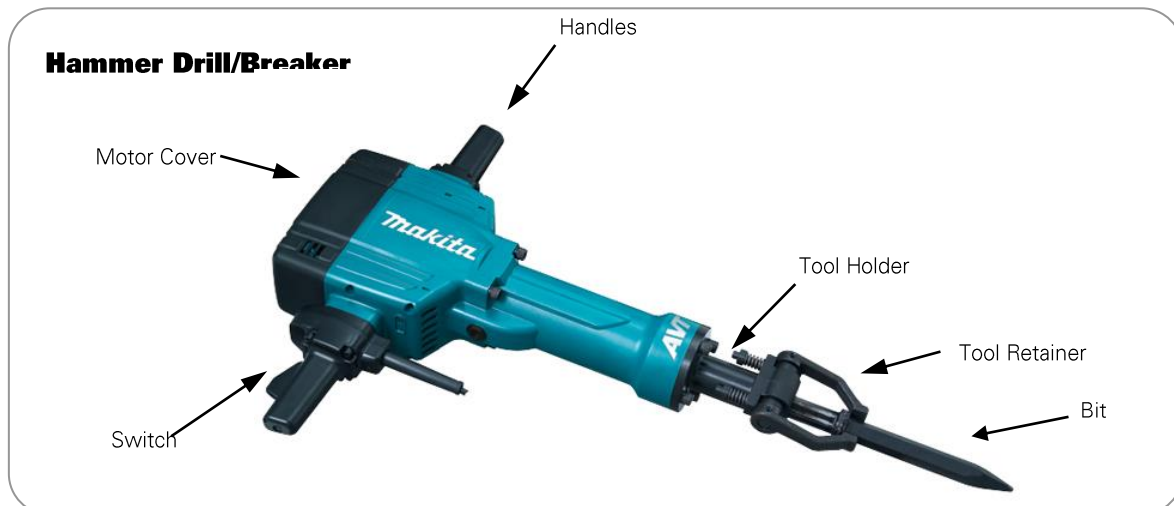


### General Safety Precautions

- Ensure safety footwear is worn.
- Keep power leads away from water.
- A suitable electrical safeguard (such as a residual current device) must be used.

## Hammer Drill/Breaker

This tool is used for breaking concrete and asphalt as well as rubble-laden ground, for demolishing concrete, masonry and similar building material, for ripping up roads and concrete, asphalt, tar as well as wood-block and stone paving, for cutting off clay, for breaking compacted ground and for ramming in posts and earth rods.



### Safety Precautions When Using a Hammer Drill/Breaker

- When working with drilling and breaking hammers make sure that you have a firm stand, especially when working on ladders or scaffolding.
- Make sure the bit is securely in place before use.
- The operation of this machine may cause broken-off pieces to be flung away so no-one but the operator should come near the machine while it is in use. Wear PPE.
- Vibration can cause the screws to come loose during operation. Check the tightness of screws before use.

### Hammer Drill/Breaker Operation

The following are the suggested operating procedures when operating the portable hammer drill / breaker:

- Hold the tool firmly with both hands.
- Place the breaker on the material in question and switch on by pressing the switch lever. After a few seconds the electric breaker reaches its full percussion rate.
- Exploit the weight of the electric breaker when working. Applying great force against the surface being worked does not improve the performance of the tool.
- In order to avoid no-load strokes and to ensure easy handling, it is necessary to apply a certain amount of pressure on the handles.
- Position the chisel in such a way that the material to be worked can be split. This prevents the tool from jamming and the demolition performance is increased.

**Now would be a good time to go and complete Worksheet 4**

# Worksheet 1 – Hand tools

**Name:** \_\_\_\_\_

1. What steps should be taken to check a combination square for accuracy?

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2. List the care and maintenance requirements for a hand saw.

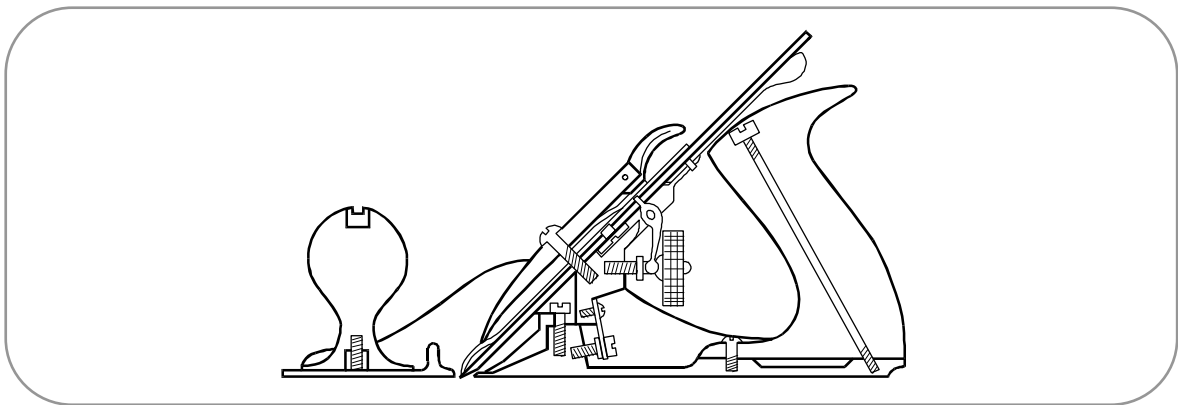
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3. On the drawing below identify and label the following parts of a smoothing plane:

- Toe.
- Lever cap.
- Cap iron.
- Depth adjustment nut.



4. List three (3) safety precautions to be observed when using a cutting knife.

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5. List three (3) types of chisels.

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6. Why is the tip of a nail punch cupped?

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7. Give two (2) uses for a pinch bar or wrecking bar.

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8. In the space below, draw the screw heads to match the named screwdrivers.

			
Slotted	Phillips	Pozidriv	Square

9. List three (3) safety precautions which should be observed when using a hammer.

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10. List three (3) things that the manufacturer's instructions will clarify about a tool.

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- 11.** Why is it important that the cutting edges of tools are maintained in a sharp condition?

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- 12.** What are the recommended grinding angles and honing for plane blades and chisels?

- a)** Grinding angle.

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- b)** Honing angle.

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- 13.** List the steps required to check the accuracy of a spirit level.

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- 14.** Different tools are used for different tasks. Complete the table below to match a task (work operation) to the correct tool. In some cases the tool name is missing, in other cases it is the task that is missing.

Tool	Task	Tool	Task
Folding rule			Driving in and pulling out nails
	Measuring lengths over one metre	Pliers	
Carpenter's pencil		Adjustable spanner	<i>Tighten nuts and bolts</i>
Combination square			Worn around the waist to hold hand tools and fixings
	Marking angles and testing bevel cuts		Cutting reinforcing ties, wire, nails
Spirit level		Screwdriver	
Pinch bar		Nail punch	
Chalk line		<i>Oilstone</i>	Sharpening chisels
String line		Tinsnips	
Drill bits		Straight edge	
Chisel		Cutting knife	
Hack saw		Plane	S
Cross cut saw			

<b>WORKSHEET 1</b>	<b>Evaluator Initials:</b>	<b>Date:</b>
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## Worksheet 2 – Portable power tools

**Name:** \_\_\_\_\_

- 1.** List four (4) precautions which could be taken to prevent electric shock on a building site.

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- 2.** Where would evidence of operator training be recorded?

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- 3.** List four (4) safety requirements when using extension leads.

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- 4.** What is the first step to be taken before carrying out any maintenance on a power tool?

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- 5.** What are the two (2) guards that are required on a portable circular saw?

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6. List three (3) types of saw blades that are commonly used on a portable circular saw.

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7. List three (3) items of Personal Protective Equipment (PPE) that would be necessary when using a portable circular saw to cut manufactured board.

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8. List three (3) safety precautions (**not** items of PPE) that should be observed when using a portable electric hand planer.

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9. What signs would indicate blades were blunt and needed changing/sharpening?

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10. What type of sander would be selected to sand timber which is to be smooth finished?

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- 11.** Outline the steps involved in changing a portable circular saw blade.

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- 12.** What are three (3) common uses of a portable hand planer?

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- 13.** How is the depth of cut of a planer adjusted?

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- 14.** What four (4) power sources are used to drive portable woodworking and fixing tools?

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- 15.** Which portable fastening tools require the operator to be certificated to use them?

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16. Identify six (6) safe practices which should be carried out by the operator of a portable power tool.

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17. List eight (8) operating procedures required when using a jig or reciprocating saw.

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18. List five (5) safety precautions that should be followed while using a compressed air or gas-powered nail gun.

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19. List three (3) items which need to be checked prior to using a compressed air or gas-powered nail gun.

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WORKSHEET 2	Evaluator Initials:	Date:
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## Worksheet 3 – Mitre saws

**Name:** \_\_\_\_\_

- 1.** Describe one (1) method for fixing a mitre saw for safe use.

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- 2.** List two (2) precautions to be taken with the power supply for any timber machining equipment used on construction sites.

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- 3.** Where would information on the safe operation, use and maintenance of a woodworking machine be obtained?

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- 4.** Who is responsible for the correct positioning of guards before a woodworking machine is started?

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- 5.** List two (2) housekeeping rules when operating a woodworking machine.

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6. What is the purpose of properly positioned guards?

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7. What are two (2) different tasks that can safely be carried out with the following timber machining equipment?







Equipment	Task 1	Task 2
Mitre saw		
Sliding compound saw		

<b>WORKSHEET 3</b>	<b>Evaluator Initials:</b>	<b>Date:</b>
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## Worksheet 4 – Construction Equipment

**Name:** \_\_\_\_\_

1. Complete the table below to name and describe each of the following items of construction equipment.

Item	Name	Purpose	Safe use
			
			
			
			
			
			

2. What would a common item of non-mechanical equipment to use when installing ceiling linings?

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3. What are two advantages of using the piece of equipment identified in the question above?

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4. To what height is a scaffold permitted to be built without using a certified scaffolder?

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5. If a scaffold has a top platform of 3.9 metres (ie less than 5metres high), what height must the be guardrails be?

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6. What is the minimum width of a working platform on a scaffold?

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<b>WORKSHEET 4</b>	<b>Evaluator Initials:</b>	<b>Date:</b>
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## Assessment Record Sheet Tools and equipment

Unit Standard 32443, Level 3, Credit 9

### Sign off check

The learner has successfully completed all the worksheets and answered all the questions correctly.

#### Checklist:

☐ Worksheet 1      ☐ Worksheet 2      ☐ Worksheet 3      ☐ Worksheet 4

Where reassessment of certain questions has occurred, the correct answers were:

- ☐ Re-written by the learner
- ☐ Confirmed through oral questioning and noted next to the answer

In signing off this unit standard, the learner can:

- ☐ Describe how to use hand tools for carpentry
- ☐ Identify and explain the manufacturer recommendations for maintaining and caring for carpentry hand tools
- ☐ Identify and describe the health and safety requirements for working with carpentry hand tools
- ☐ Describe how to use portable power tools
- ☐ Describe how to set up portable power tools
- ☐ Identify and explain the manufacturer recommendations for maintaining and caring for portable power tools
- ☐ Identify and describe the health and safety requirements for working with power tools
- ☐ Describe how to use a mitre saw according to manufacturer instructions
- ☐ Identify and explain the manufacturer recommendations for maintaining and caring for mitre saws
- ☐ Identify and describe the health and safety requirements for working with mitre saws
- ☐ Identify and describe mechanical construction equipment
- ☐ Describe how to use mechanical construction equipment
- ☐ Identify and describe non-mechanical construction equipment
- ☐ Describe how to use non-mechanical construction equipment
- ☐ Identify and describe the health and safety requirements for working with mechanical and non-mechanical equipment used for carpentry

#### Comments:

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<b>UNIT STANDARD 32443 COMPLETED</b>	<b>Evaluator Signature:</b>	<b>Date:</b>
	<b>Assessor Signature:</b>	<b>Date:</b>