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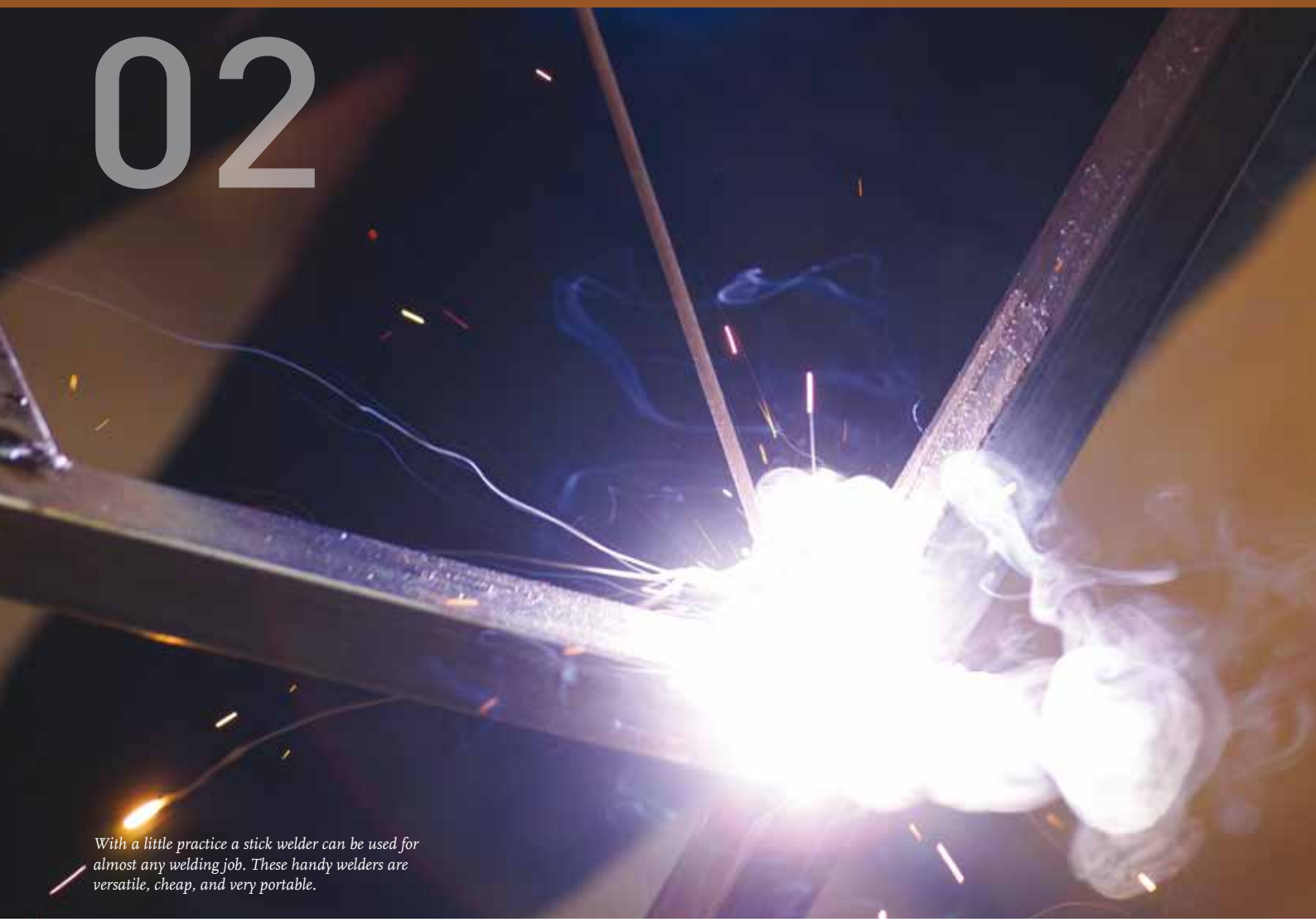


With a little practice a stick welder can be used for almost any welding job. These handy welders are versatile, cheap, and very portable.

Stick welders a versatile choice

At a glance:

- Stick welders are popular with all types of users as they can weld a range of metals by simply changing electrodes and current settings.
- Stick welders are less expensive than other types of welders and good second-hand units are easy to find.
- Electricity supply, duty cycle and output current need to be considered when buying a stick welder.

Due to its versatility, stick welding, or manual metal arc (MMA) welding is possibly the most common welding method used in workshops, farms and on site.

Stick welders are used in many situations, such as a 240-volt welder in a workshop, a three-phase welder in an industrial fabrication shop and an on-site generator welder.

They all share the same basic operating techniques regardless of the machine used. An arc is formed between a consumable welding electrode and the work piece to create intense heat capable of melting metal. The filler metal from the electrode and the molten parent metal mix and solidify, forming a bond or weld. Flux coating on the electrode produces a shielding gas and forms slag, which is chipped off the finished weld.

A stick welder can be applied easily to different tasks and to different metals simply by changing the electrode type and adjusting the current.

Choosing the right welder

Stick welders have the advantage of being inexpensive compared with other welding units.

Basic welders cost as little as $200, although they are only suited to light welding tasks. A new $500 unit will carry out most tasks with ease.

A second-hand welder will also perform most jobs required. Because stick welders do not have wearing parts a good second-hand unit should be easy to find.

When choosing a stick welder the most important factors to consider are the electricity supply, duty cycle and output current.

Electricity supply

Choose a welder that suits the electricity supply available. There is no point buying a three-phase or 240V AC welder if a considerable amount of welding will be carried out on site, away from a power source. Generator welders have the advantage of supplying 240V power for other tools such as grinders or drills.

A 240V AC welder needs to have a current range sufficient to weld a wide variety of metals and thicknesses. Although

the current range is obvious from the welder's case, its duty cycle will need to be taken into account when selecting a suitable unit.

Smaller units will operate off a standard 10-amperes household power outlet, while larger units suited to workshops will need a 15amp outlet. A qualified electrician can easily install a 15A outlet in a workshop.

Duty cycle

Duty cycle is a direct rating of how well an electric welder will perform during use. It is the percentage of time in 10 minutes that a welder can operate at a set current.

The duty cycle is related to the heat generated in the welder's transformer and how quickly this heat dissipates. The higher the current setting the more heat produced and the lower the duty cycle.

Welding units are commonly air-cooled with a fan but smaller, less expensive 'handyman' style welders often do not have a fan. Because these lower quality units have a reduced cooling capacity and build quality they have a low duty cycle.

More expensive welders are oil-cooled, with the entire transformer immersed in oil, which increases their duty cycle.

Information about a welder's duty cycle is included on its case under 'output ratings'. The duty cycle is quoted for maximum current output and rated current output for both high and low current settings.

For example, the welder shown below can operate at its maximum output of 230A on the high setting or 195A on the low setting for two out of 10 minutes (20 per cent). Its rated output at 30% duty cycle (three minutes out of every 10) is 190A on high and 125A on low. At a 100% duty cycle the welder can continuously deliver 98A on high and 65A on low. The corresponding voltages for all current ratings are listed below the amps in brackets.

If the duty cycle is exceeded for a particular current setting during welding, the unit will either shut off automatically or the current output will drop. The machine will need to be allowed to cool before welding can continue.

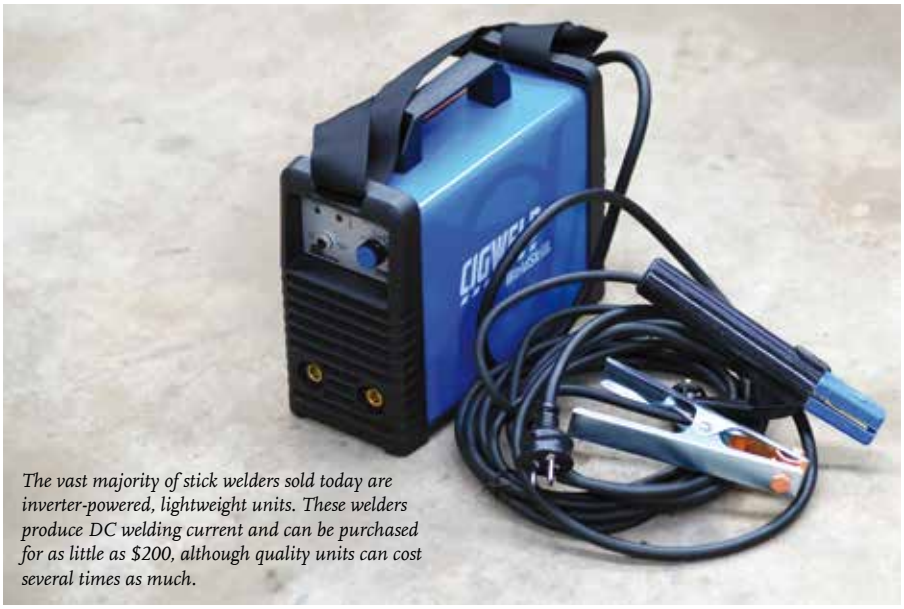
The periodic replacement of electrodes allows machines to cool regularly.

Open circuit voltage

Open circuit voltage refers to the voltage measured across the welding electrode and earth before an arc is struck.

By Australian design standards it cannot exceed 80V in an AC welder or 110V in a DC welder to ensure safety.

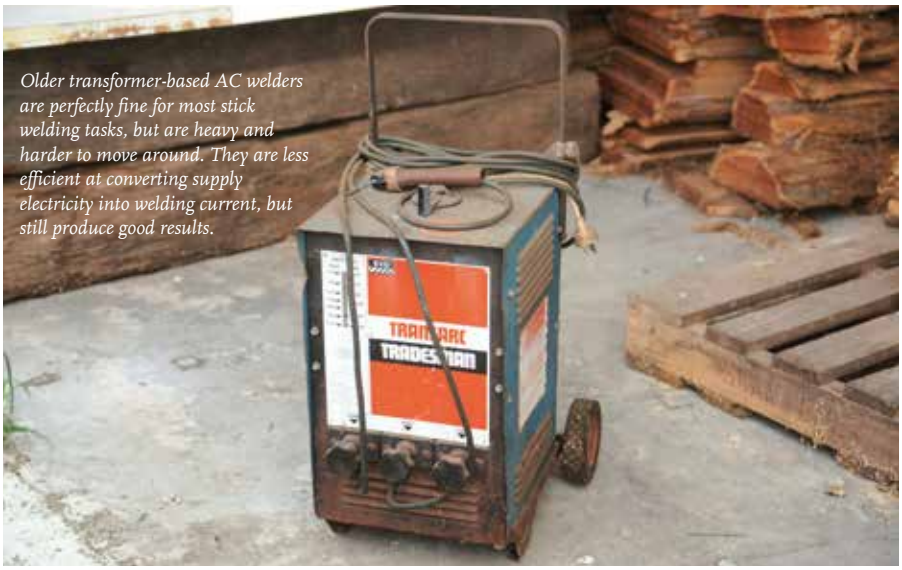
Once an arc is struck, the voltage ▶



The vast majority of stick welders sold today are inverter-powered, lightweight units. These welders produce DC welding current and can be purchased for as little as $200, although quality units can cost several times as much.

The first guide to the performance of a welder is the current adjustment knob, which displays the maximum welding current available. But be aware that the duty cycle is far more important, as it will govern how well the unit can sustain high welding currents.

When buying any welder it is essential to compare the duty cycle rating between units. The duty cycle specifies the level of output current that can be maintained continuously, as well as how long it can maintain its maximum current.



Older transformer-based AC welders are perfectly fine for most stick welding tasks, but are heavy and harder to move around. They are less efficient at converting supply electricity into welding current, but still produce good results.

drops to about 20–30V, which is called the arc voltage.

A high open circuit voltage is needed to strike an arc because air does not conduct electricity well.

Once an arc is struck, it is carried by the molten weld metal and only a lower voltage is needed.

Cables, handpieces and clamps

A welder has two cables: the electrode cable and the earth cable. Both are thick multi-stranded copper cable.

The cables have a large diameter to carry the maximum amount of current that the welder can produce.

Thin cables may still carry a high current for a short period but they will heat up and possibly melt the insulation. Long cables may be convenient but they will also increase resistance to current flow.

If a cable becomes warm it is a sign that welding current is being lost due to excessive resistance. Any frayed connections on the cables will lead to a loss of current and poor performance.

The electrode cable is connected to the welding handpiece which holds the electrode. Many types of handpieces are available but they all perform the same task.

Long or underrated 240V extension cords will also lower the available current to the welder. Never use a 10A extension cord with a 15A welder and never use more than 30 metres of extension cord. A hot power cord is a sure sign that the wrong extension cord is being used.

The earth cable connects to the earth clamp which is attached to the work piece.

Pincer clamps, G-clamps and magnetic earth clamps are some of the common earth clamp styles available.

Accessories

Apart from safety equipment, some welding accessories will make life much easier.

The most important tool is a chipping hammer, which is used to remove slag from stick welds.

A section of G-clamps and magnetic welders' squares will help clamp work together before welding starts.

A good quality wire brush is useful for cleaning metal before welding and between passes.

Last of all, an angle grinder is invaluable for cleaning and preparing metal and grinding out defective welds.

Consider upgrading earth clamps to heavy duty units, especially if your welder has a lightweight clamp fitted. This screw-down clamp is ideal for the job, but there are also magnetic clamps which make quick work of attachment.

Frayed connections on welding cables increase the resistance to current flow, reducing the available welding current.

You don't need a huge range of accessories to complement your welder. A grinder with a range of grinding or flap discs is invaluable for cleaning metal and preparing joints for welding. A sturdy wire brush is handy for giving your work a quick scrub, and a quality chipping hammer is a must for removing slag post welding, and between runs.

A range of G- and F-clamps will help you clamp your work during welding. Magnetic squares can also be pretty handy.