



CUT 25 Plasma

OPERATING MANUAL



Welcome to a better way

Congratulations on purchasing a MagMate™ Cut25 Plasma.

The products in BOC's plasma cutting machine range perform with reliability and have the backing of the South Pacific's leading industrial supplier.

This operating manual provides the basic knowledge required for plasma cutting, as well as highlighting important areas of how to operate the MagMate Cut25 Plasma machine.

BOC equipment and technical support is available through our national BOC Customer Service Centre or contact your local Gas & Gear outlet.

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1.0 Recommended Safety Precautions

1.1 Health Hazard Information

The actual process of plasma cutting is one that can cause a variety of hazards. All appropriate safety equipment should be worn at all times, i.e. headwear, hand and body protection. Electrical equipment should be used in accordance with the manufacturer's recommendations.

Eyes:

The process produces ultra violet rays that can injure and cause permanent damage. Fumes can cause irritation.

Skin:

Arc rays are dangerous to uncovered skin.

Inhalation:

Cutting fumes and gases are dangerous to the health of the operator and to those in close proximity. The aggravation of pre-existing respiratory or allergic conditions may occur in some workers. Excessive exposure may cause conditions such as nausea, dizziness, dryness and irritation of eyes, nose and throat.

1.2 Personal Protection

Respiratory

Confined space cutting should be carried out with the aid of a fume respirator or air supplied respirator as per AS/NZS 1715 and AS/NZS 1716 Standards.

- You must always have enough ventilation in confined spaces. Be alert to this at all times.
- Wear a respirator when natural or forced ventilation is not good enough.

Eye protection

Protective eyewear should be worn when plasma cutting. The minimum lens requirements are as follows:

Recommended filter shades for plasma cutting

Arc Current (Amperes)	Minimum Protective Shade	Suggested Shade*
<20	4	4
20-40	5	5
40-60	6	6
60-80	8	8
80-300	8	9

* One shade darker lens should be used for Aluminium cutting.

Clothing

Suitable clothing must be worn to prevent excessive exposure to UV radiation and sparks. An adjustable helmet, flameproof loose fitting cotton clothing buttoned to the neck, protective leather gloves, spats, apron and steel capped safety boots are highly recommended.

1.3 Electrical Shock

- Never touch 'live' electrical parts.
- Always repair or replace worn or damaged parts.
- Disconnect power source before performing any maintenance or service.
- Earth all work materials.
- Never work in moist or damp areas.

Avoid electric shock by:

- Wearing dry insulated boots.
- Wearing dry leather gloves.
- Working on a dry insulated floor where possible.

1.4 User Responsibility

- Read the Operating Manual prior to installation of this machine.
- Unauthorised repairs to this equipment may endanger the technician and operator and will void your Warranty. Only qualified personnel approved by BOC should perform repairs.
- Always disconnect mains power before investigating equipment malfunctions.
- Parts that are broken, damaged, missing or worn should be replaced immediately.
- Equipment should be cleaned periodically.

BOC stock a huge range of personal protective equipment. This combined with BOC's extensive Gas and Gear network ensures fast, reliable service throughout the South Pacific.

STOP

PLEASE NOTE that under no circumstances should any equipment or parts be altered or changed in any way from the standard specification without written permission given by BOC. To do so, will void the Equipment Warranty.

Further safety information can be obtained from Welding Institute of Australia (WTIA) Technical Note No.7 'Health and Safety Welding' Published by WTIA, PO Box 6165 Silverwater NSW 2128 Phone (02) 9748 4443.

2.0 MagMate™ Cut25 Plasma

2.1 Fundamentals of Plasma Cutting

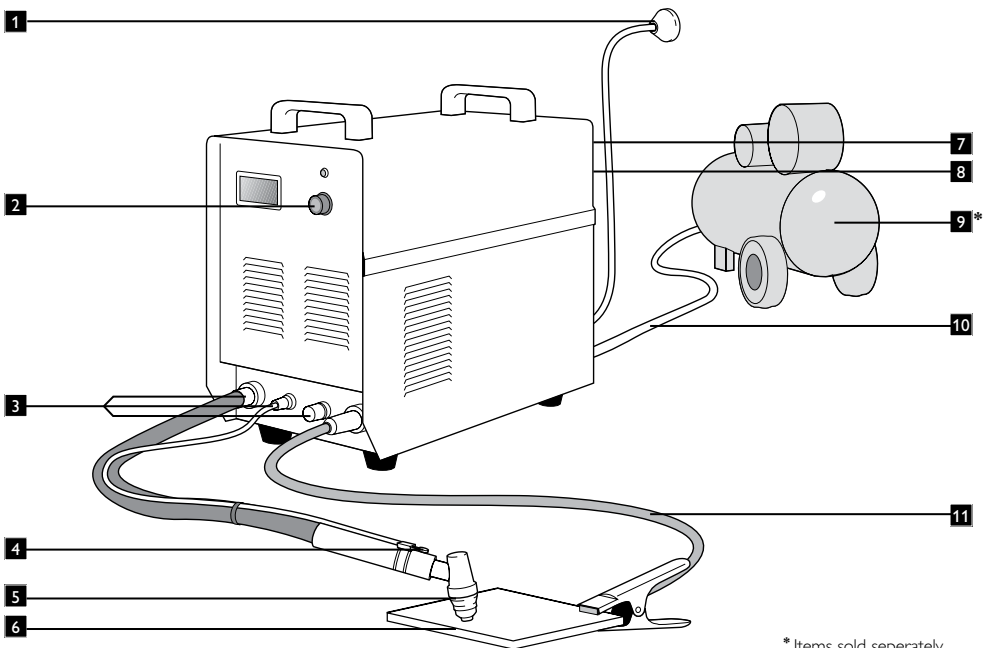
A plasma can be created by adding energy to an electrically neutral gas. In the case of air plasma cutting the air is dry, clean compressed air delivered from an air compressor or an air line. By adding electricity through an electrode (Hafnium), the gas becomes imbalanced and conducts electricity. The greater the level of electricity the higher the temperature of the plasma.

Plasma cutting torches control energy by constricting the arc and forcing it through a constricting nozzle fitted to the torch. By increasing air pressure and intensifying the arc with higher voltages, the arc becomes hotter and more capable of blasting through thicker metals and blowing away the cuttings, leaving minimal cleanup.

For plasma cutting, the air supply can be delivered via an external air compressor or, in some cases, plasma cutting units (such as the MagMate Cut25 Plasma) will have inbuilt air compressors.

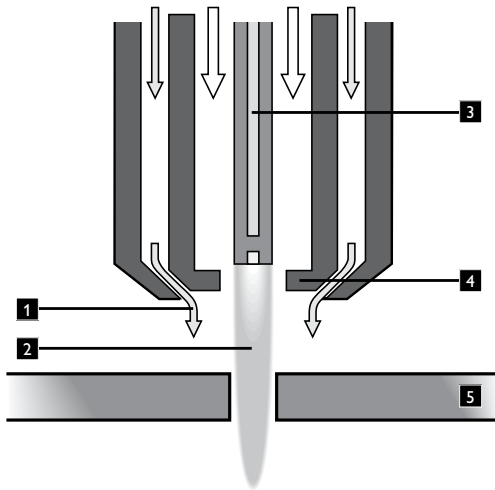
Typical Plasma cutting set-up

1	Main power supply	7	Power On/Off switch (on back)
2	Amperage control knob	8	Air pressure regulator
3	Air/Electricity outlet connector	9	Air compressor (sold separately)
4	Airflow switch	10	Air supply hose
5	Plasma Torch	11	Earth lead and connector
6	Workpiece		



* Items sold separately

2.2 Process operation for transferred arc applications



1	Airflow
2	Constricted Plasma Stream
3	Electrode
4	Constricting nozzle
5	Workpiece

- Compressed air flows through the torch.
- A pilot arc is established inside the head of the plasma torch.
- The high voltage of the pilot arc changes the air stream into a plasma stream.
- The plasma stream is constricted and forced through a tip with a small orifice.
- The constricted plasma stream exiting from the tip is termed a plasma jet.
- The plasma jet is allowed to touch the work.
- An arc is initiated between the hafnium electrode and the work.
- The arc passes through the orifice of the tip.
- The constricted arc so formed is a stiff, columnated and narrow arc.
- The intense heat of arc melts the plate.
- The plasma jet blows away the metal to produce a cut.

3.0 Plasma cutting components

3.1 Plasma cutting power sources

The plasma arc cutting power source changes the relatively high voltage, low amperage primary power into low voltage, high amperage secondary power suitable for plasma cutting.

The size of the power source depends on the cutting amperage it is expected to deliver. Cutting thicker materials requires more amperage than does cutting of thinner materials.

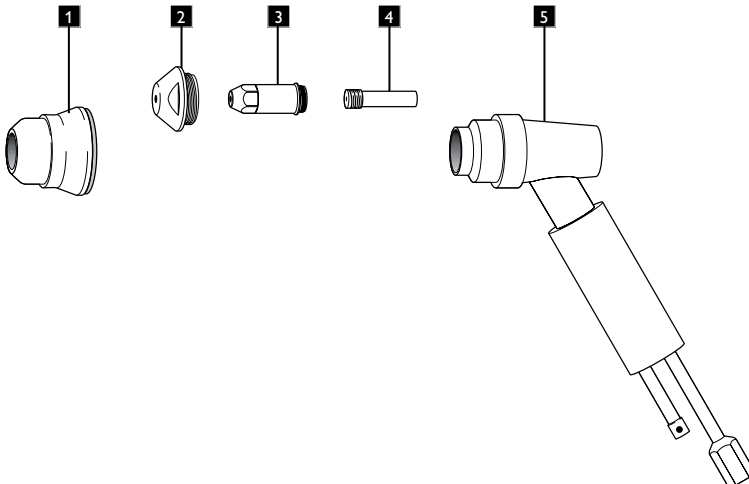
3.2 Plasma cutting capacity

Rated Output (A)	Cutting thickness (mm)		
	Steel	Stainless Steel	Aluminium
25A Single phase	7	5	3
40A Single phase	9	8	4
60A Three phase	20	18	6
80A Three phase	25	22	8
100A Three phase	32	25	12
160A Three phase	50	35	20

3.3 Plasma cutting torches (general)

Plasma torches are rated in accordance to the maximum current that the consumable tips will handle. The diagram below shows a typical plasma torch with its consumable items.

- 1 Shield cup
- 2 Tip
- 3 Air electrode
- 4 Standard air plunger
- 5 Plasma torch body



BOC stocks a range of plasma torches and consumables to suit any need.

3.4 Air supply

The supply of air to the cutting process plays an important role. The force of the air is used to blow the molten material (created by the plasma arc) away from the cut area thereby creating separation. Air pressure and amperage are two variables that are changed when increasing the cut thickness.

Compressed air from compressed air lines may be contaminated with moisture and oil residue. Contaminants such as these shorten the life

of the consumable torch parts, it is therefore recommended that an inline filter drying system is fitted to all air delivery lines.

When air is supplied from a portable air compressor it is important to ensure that the compressor has adequate pressure and airflow rate capacity.

Typical air supply requirements	
Pressure	4.5–6 bar
Draw-off rate	150–200 L/min

3.5 Process comparisons

Characteristic	Air plasma cutting	Oxy-fuel cutting
Metals	Any conductive material. Cutting thickness depends on power source capacity. Typically very thin to 50 mm	Restricted to steel. The formation of an oxide during cutting of aluminium and stainless steel prevents the process being used
Industries	All forms of metal fabrication, art sculptures, hobby and DIY	All forms of metal fabrication, art sculptures, hobby and DIY
Pre-heating	Not required	Required on most steel to prevent cracking
Productivity	<ul style="list-style-type: none"> • Due to the fact that no pre-heating is required the overall cutting process time is reduced. • High speed cutting of thin materials. • Produces a small, thin kerf width and minimal post cut cleaning is required 	Highly portable and relatively low cost to set up
Versatility	Highly versatile, stack cutting of material and combinations of different materials can be cut. No additional gas cylinders required	The process can be adopted to welding, brazing and heating of materials
Safety concerns	Electrical process, therefore a risk of electrocution exists. Appropriate safety clothing must be worn	Gas process therefore a risk of flashbacks occurring leading to explosion of cylinders. Appropriate safety clothing must be worn

3.6 Work return cable assembly

The work return cable and clamp forms an integral part of the Plasma cutting process and if it does not make proper contact the efficiency of the process is greatly reduced.

It is therefore essential to ensure that the correct size cable and clamp is fitted to the machine and its earth clamp is properly connected to the workpiece to be cut.

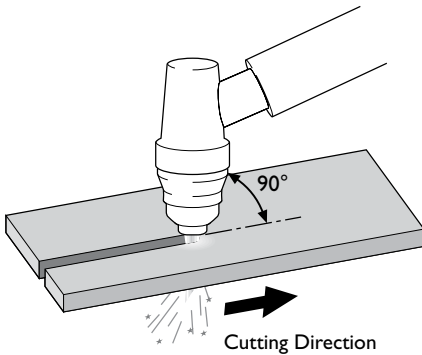
4.0 Cutting Technique

4.1 Cutting

As a general rule for cutting amperages below 40A the cutting tip can be dragged on the cutting surface. Higher amperages require a stand-off distance and torch manufacturers normally supply a stand-off guide or 'drag shield'. Some operators prefer to use an extended electrode to improve visibility when cutting.

For straight edge cutting the torch should be held at a 90° angle to the plate and dragged along the plate. The cutting speed will depend on the material thickness, amperage and airflow rate.

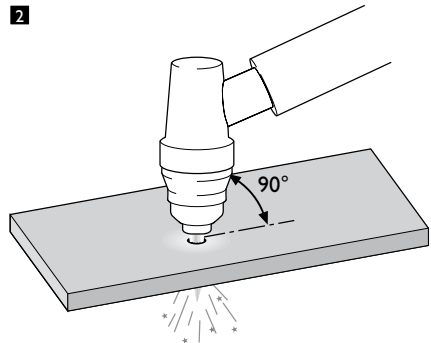
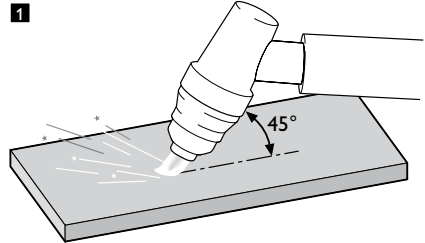
For bevel cutting the torch should be angled on the plate to the required bevel angle and dragged on the plate surface. (Note that the bevel angle will influence the material thickness).



4.2 Piercing and Gouging*

To pierce material the cutting torch should be held at an angle of 45° to the pierce surface (Refer to Diagram 1). Once the arc is established the torch is turned to 90° (Refer to Diagram 2) and cutting is carried out in a normal manner. Piercing thickness is dependent on the output of the machine and is generally 50% of the rated cutting thickness of the power source.

It is important to direct the arc away from the operator when establishing the arc as sparks and molten material will be ejected from the point of contact. Care must also be taken to protect the surrounds from these sparks.



* Gouging is dependant on the availability of the correct gouging tip and the size of the power source.

5.0 Technical Specifications

Model No.	MagMate™ Cut25 Plasma		
		Internal Air Source	External Air Source
Part No.	MAGCUT25		
Input voltage (V)	Single Phase 220V ± 15%		
Plug	15A		
Input power rating (A)	26		
No-load voltage (V)	260		
Current range (A)	15–25	20–40	
Output voltage (V)	96		
Duty Cycle	40% @ 25A	40% @ 40A	
Efficiency (%)	80		
Insulation class	F		
Housing protection class	IP21S		
Arc initiation	Contact		
Air pressure requirement (bar)	4 (Min)		
Cutting thickness (mm)			
Mild Steel	7	9	
Stainless Steel	5	8	
Aluminium	3	4	
Weight (kg)	27		
Dimensions (mm)	546 × 272 × 268		

6.0 Operating Controls

6.1 MagMate™ Cut25 Plasma



- 1 Thermal overload indicator
- 2 On/Off switch
- 3 Internal/external air supply selector
- 4 Air/electricity connector
- 5 Contactor
- 6 Amperage control knob
- 7 Earth return lead (cable) connector

6.2 Package Contents

- Plasma power source
- Air pressure regulator
- Air hose (3m) and connectors
- Plasma torch
- Work return lead and clamp
- Operating manual

7.0 Air pressure regulator installation

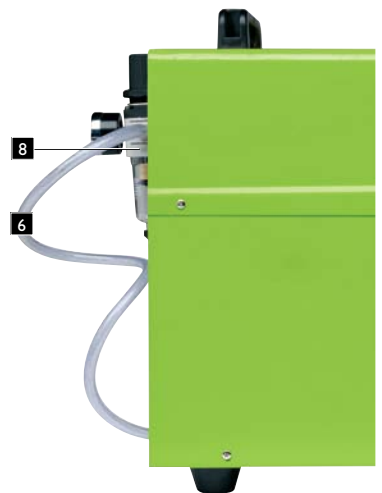
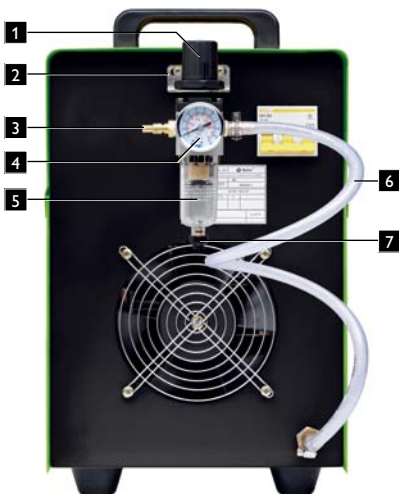
NB: This is only required if an external air compressor is used.

An air pressure regulator assembly is included with the MagMate Cut25 Plasma.

To install follow the steps listed below:

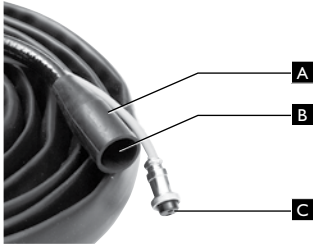
- 1 Fix the mounting bracket with the screws as supplied to the back of the machine.
- 2 Fix the outlet air hose to the air pressure regulator and the inlet to the machine. Ensure that all connections are tight.
- 3 Fit the pressure indicating dial to the main body of the regulator and ensure that it is screwed in tight.
- 4 Fit the air pressure regulator to the mounting bracket.
- 5 Fit the air hose (supplied) to the air pressure regulator inlet and couple to the air supply.
- 6 Adjust pressure adjusting screw till correct air pressure is achieved.

1	Pressure adjusting knob
2	Mounting bracket
3	Air inlet connector
4	Pressure indicating dial
5	Vapour collection container
6	Air hose
7	Vapour drain plug
8	Outlet marked on regulator



8.0 Setting up your MagMate™ Cut25 Plasma

8.1 Fitting the torch to the power source



Rubber boot fitted to the end of the MagMate Cut25 Plasma torch to cover the Air/Electrical outlet. Air/electrical connection nut **B** (inside rubber boot).

CAUTION

This is a safety device and must be fitted over the air/electrical connection prior to use

Contactor/trigger switch cable connector



Front end MagMate Cut25 Plasma

- 1 Connect the air/electrical connection **B** by fixing the hexagon nut to the terminal indicated as . Tighten the nut firmly but do not overtighten.
- 2 **IMPORTANT SAFETY NOTICE**
Push the rubber boot **A** over the terminal and ensure that it is completely covered.
- 3 Connect the contactor/trigger **C** switch cable connector by fitting the plug to the terminal indicated as .
- 4 Fit the work return lead and clamp to the terminal indicated as .



Incorrect



Correct

Torch fitted to the MagMate Cut25 Plasma power source

WARNING

Care must be taken that the Rubber boot is pushed over the air/electrical outlet and that all electrical contact wires are properly insulated as illustrated.

8.2 Setting up the power source

- 1 Connect primary cable to the power supply (15Amps).
- 2 Select the air supply mode (internal/external).
NB: If using an external air supply ensure that the air pressure regulator is properly installed as per section 7 of this manual.
- 3 Connect the work return lead and clamp.
- 4 Select the appropriate amperage.
- 5 Ensure that you are wearing the correct PPE.
- 6 Begin cutting.
- 7 The torch is fitted with a trigger safety latch which needs to be lifted in order to depress the torch trigger.
- 8 The cutting process works on the principle of a contact start i.e. the cutting tip needs to touch the work piece before cutting will commence.

8.3 Selecting the correct air pressure and flow rate (when using an external air compressor)

Compressed air from compressed air lines may be contaminated with moisture and oil residue. Contaminants such as these shorten the life of the consumable torch parts. It is therefore recommended that an inline filter drying system be fitted to all air delivery lines.

When air is supplied from a portable air compressor, it is important to ensure that the compressor has adequate pressure and

airflow rate capacity such as the BOC 14 (and upwards) air compressors.

External air supply requirements for MagMate Cut25 Plasma torch

Pressure	70 psi / 480 kPa
Draw-off rate	90–100 L/min

9.0 Periodic Maintenance

The working environment and amount of use the machine receives should be taken into consideration when planning maintenance frequency of your MagMate Cut25 Plasma.

Preventative maintenance will ensure trouble free cutting and increase the life of the machine and its torch consumables.

9.1 Power Source

- Check electrical connections of unit at least twice a year.
- Clean oxidised connections and tighten.
- Inner parts of machine should be cleaned with a vacuum cleaner and soft brush.
- Do not use any pressure-washing devices.
- Do not use compressed air as pressure may pack dirt even more tightly into components.
- Only authorised electricians should carry out repairs.

10.0 Warranty Information

10.1 Terms of Warranty

BOC provides a warranty for the MagMate Cut25 Plasma sold by it against defects in manufacture and materials.

- Powersource: Valid for 18 months from date of purchase.
- Torch: Valid for 12 months from date of purchase.
- Leads and work return lead: Valid for one month from date of purchase.
- An authorised BOC Service Agent must carry out warranty repairs.
- Freight, packaging and insurance costs are to be paid for by the claimant.
- No additional express warranty is given unless in writing signed by an authorised manager of BOC.
- This warranty is in addition to any other legal rights you may have.

10.2 Limitations on Warranty

The following conditions are not covered:

- Non compliance with operating and maintenance instructions such as connection to incorrect faulty voltage supply including voltage surges outside equipment specs, and incorrect overloading.
- Natural wear and tear, and accidental damage
- Transport or storage damage.

The warranty may be voided if:

- Changes are made to the product without the approval of the manufacturer.
- Repairs are carried out using non-approved spare parts.
- A non-authorised agent carries out repairs.

10.3 Warranty Repairs

BOC or their Authorised Service Agent must be informed of the warranty defects, and the product returned within the warranty period.

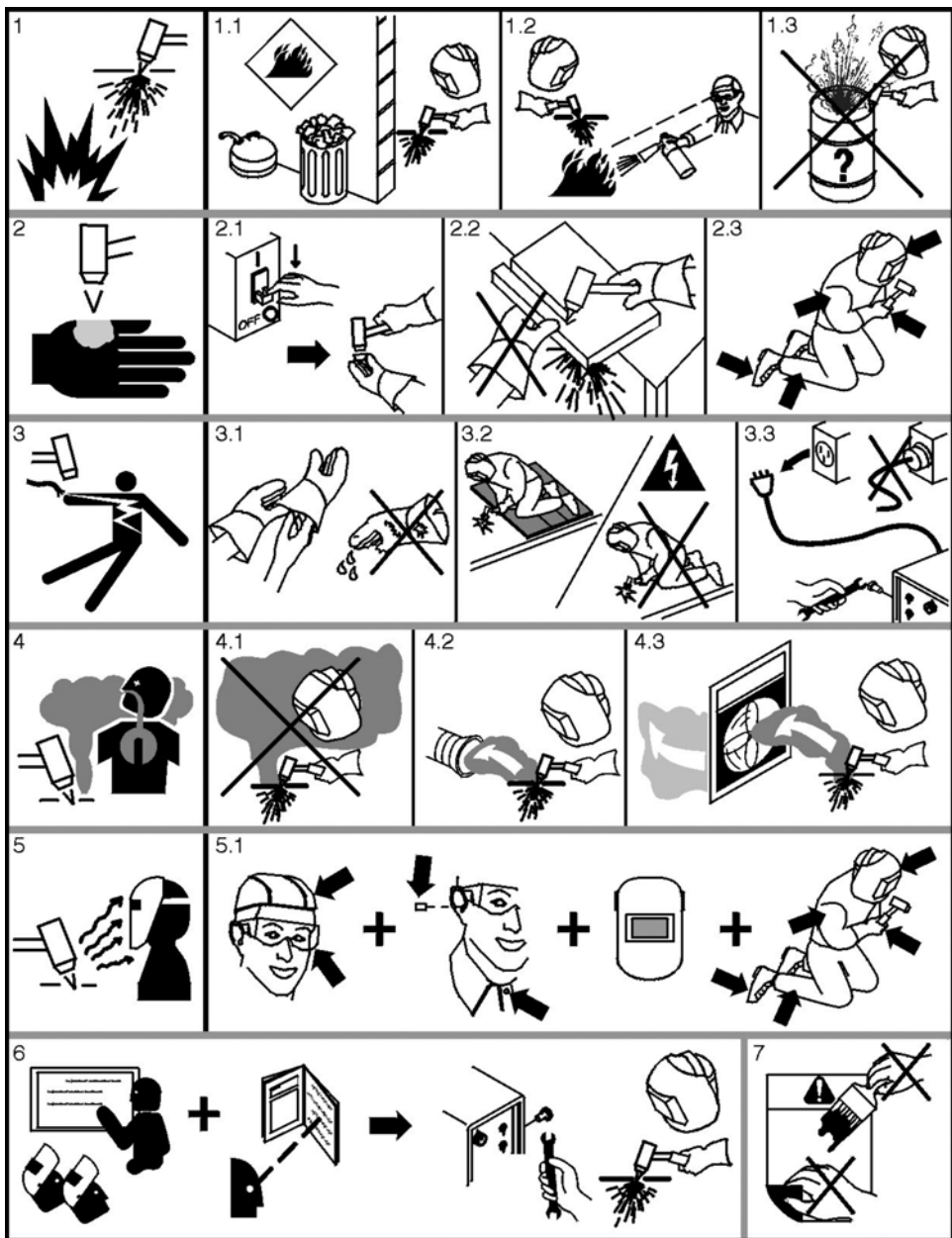
- Before any warranty work is undertaken, the customer must provide proof of purchase and serial number of the equipment in order to validate the warranty.
- The parts replaced under the terms of the warranty remain the property of BOC.

11.0 Recommended Safety Guidelines

Some safety precautions BOC recommends are as follows:

- Repair or replace defective cables immediately.
- Never watch the plasma arc except through lenses of the correct shade.
- In confined spaces, adequate ventilation and constant observation are essential.
- Leads and cables should be kept clear of passageways.
- Keep fire extinguishing equipment at a handy location in the shop.
- Keep primary terminals and live parts effectively covered.
- Never strike an electrode on any gas cylinder.
- Never use oxygen for venting containers.

Key	
1	Cutting sparks can cause explosion or fire.
1.1	Keep flammable materials away from cutting. Do not cut near flammable materials.
1.2	Cutting sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.
1.3	Do not cut on drums or any closed container.
2	The plasma arc can cause injury and burns.
2.1	Turn off power before disassembling torch.
2.2	Do not grip material near cutting path.
2.3	Wear complete body protection.
3	Electric shock from torch or wiring can kill.
3.1	Wear dry insulating gloves. Do not wear wet or damaged gloves.
3.2	Protect yourself from electric shock by insulating yourself from work and ground.
3.3	Disconnect input plug or power before working on machine.
4	Breathing cutting fumes can be hazardous to your health.
4.1	Keep your head out of fumes.
4.2	Use forced ventilation or local exhaust to remove fumes.
4.3	Use ventilating fan to remove fumes.
5	Arc rays can burn eyes and injure skin.
5.1	Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.
6	Become trained and read the instructions before working on the machine or cutting.
7	Do not remove or paint over (cover) the label.



For more information on MagMate products or service,
call the **BOC Customer Service Centre** on:

AUSTRALIA

131 262

Website: www.boc.com.au

NEW ZEALAND

0800 111 333

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