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BOC Gas Equipment

Operating and Safety Instructions

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TECHNICAL DATA CHARTS CAN BE FOUND ON PAGE 23

WARNING!

**READ THESE INSTRUCTIONS CAREFULLY
FAILURE TO READ THESE INSTRUCTIONS CAN RESULT IN SEVERE PERSONAL
INJURY.**

Oxy-fuel welding, cutting and heating equipment should not be used without proper training in safety precautions and procedures by a qualified instructor.

SECTION 1

GENERAL SAFETY INFORMATION

EYE PROTECTION

Oxy-fuel welding, brazing, cutting and heating processes produce both visible and infrared radiation. In order to protect the welding or cutting operator, goggles fitted with an approved filter lens suitable for the application are required.

Typical applications for the various shades of gas welding filter lenses are shown below, this table is for general guidance only and is NOT a recommendation.

Filter shade	Typical applications
4	Small nozzles and low gas-flow rates. Gas welding sheet aluminium, copper, or steel. Flame descaling.
5	Medium nozzles and moderate gas-flow rates. Gas welding steel, copper and its alloys, and nickel alloys. Repairing castings. Oxygen cutting. Hardfacing.
6	Moderate to high gas-flow rates. Welding heavy section steel and preheated components. Welding castings. Oxygen cutting. Rebuilding heavy section or large areas.
7	Large nozzles and high gas-flow rates. As for shade 6/GW but where a darker shade is required or preferred.

Appropriate safety glasses and filter lenses are available from your local BOC store.

PROPER CLOTHING

Infrared radiation, molten metal or sparks can cause severe burns to unprotected parts of the body. Appropriate protective clothing such as gloves, aprons, safety shoes etc are required when using oxy-fuel welding, brazing, cutting, and heating and are available from your local BOC store.

Keep all clothing and protective equipment free from oil and grease as these substances can ignite and burn. NEVER use pure oxygen to blow down or clean clothing or protective equipment as oxygen enrichment will increase the rate of burning.

VENTILATION

Oxy-fuel welding, cutting and heating operations must be performed, whenever possible in an open, well-ventilated area. Tests should be carried out to ensure that particulate and fume levels are below those recommended within the appropriate

codes of practice. Fume extraction should be used when required. Extra care should be taken when cutting or welding materials containing certain metals such as zinc, chrome, nickel or manganese, or those with painted and coated surfaces.

Care should be taken not to enrich the normal atmosphere with oxygen, as small increases in the oxygen content of air will dramatically increase the burning rate of all combustible materials. This is particularly important to remember when working in confined spaces. When using oxy-fuel equipment in a confined space it is recommended that it is first tested for explosive and toxic gases prior to the commencement of work. If possible light the equipment prior to entering the confined space.

HOUSEKEEPING AND FIRE PROTECTION

Safety of any work area can be improved by following good housekeeping practices. All combustible materials should be removed from the area in which welding, cutting, brazing or heating is taking place prior to commencing work.

Never perform welding or cutting operations in an area containing combustible vapours, flammable liquids or explosive dust.

Tanks and other closed containers, which have held such materials, must not be cut or welded. Failure to do this can result in property damage, severe personal injury or death.

An approved and regularly serviced fire extinguisher should be kept and maintained close to where work is being carried out. Fire extinguishers are available from your local BOC store, Part numbers 6kg: 5089; 2kg: 5090.

WORKPLACE RISK ASSESSMENT

Employers and self-employed people have duties under health and safety laws to assess risks in the workplace. Before commencing to use this product in the workplace a suitable and sufficient risk assessment must be carried out. Reference should be made to general safety information enclosed, relevant safety data sheets and other safety literature provided.

SECTION 2

OXY-FUEL CUTTING, HEATING AND WELDING EQUIPMENT

Read and follow these instructions before installing or operating any oxy-fuel welding, cutting or heating equipment. Failure to do so could result in fire, explosion, damage to equipment, personal injury or property damage.

Never use regulators, hoses, cylinders, torches or any other oxy-fuel equipment if oil, grease or similar contaminants are present.

Never use regulators, hoses, cylinders, torches or any other oxy-fuel equipment showing signs of damage.

Never alter or attempt to repair any oxy-fuel equipment.

Serious accidents can occur from improper use and handling of compressed gas cylinders and associated equipment. Always follow the instruction and safety procedures provided by your gas and equipment supplier.

For more information BOC has produced a publication called 'Safe Under Pressure' giving guidance on the safe maintenance and handling of cylinders and fuel gas equipment. 'Safe Under Pressure' is available in paper, VHS and CD formats through your local BOC outlet or by calling BOC on 0800 111 333.

COMPRESSED GAS CYLINDERS

Cylinders are large and heavy and their design is relatively unstable due to their small base. It is important that it is understood they are potentially very dangerous and should be treated with care. Cylinders should never be dropped, and when moving and using cylinders, they should always be treated with respect.

All personnel responsible for handling cylinders should have been trained in methods used. Some general pointers are listed below. In addition to reading this chapter, operators should also be familiar with the BCGA Guidance note GN3.

1. You should never handle or transport a gas cylinder if it's contents have not been positively identified. Always check the cylinder label.
2. Always keep the material safety data sheets at hand and make sure you are aware of the information it contains.
3. Always wear the correct protective clothing- eye, hand and foot protection must always be worn when handling and using gas cylinders.
4. Check that the cylinder valve is closed and all equipment including regulators are disconnected. Security caps should also be fitted if available.
5. Before handling or using gas cylinders, you must understand the properties of the gas, the hazards that these properties may cause and actions to take in the event of an emergency.

6. Cylinders should be kept in a vertical position and secured from falling.
7. A suitable trolley should always be used for transporting and moving cylinders where possible. If cylinders have to be chucked this should be for as short a distance as possible. The correct procedure for this practice is illustrated in the 'Safe under Pressure' video and CD.
8. Locate cylinders away from sparks and hot slag and flames. Do not allow any electrical contact with cylinders.

Never tamper with or attempt to repair compressed gas cylinders or valves. Leaking cylinders or cylinders with leaking valves should be placed outdoors, identified and returned to the supplier. BOC should be contacted, either via your local representative, or by calling 0800 111 333.

If cylinders must be handled manually, reduce the risks involved by carrying out a risk assessment, in accordance with requirements of the Manual Handling Operations Regulations 1992 (SI 2793.)

Never roll a cylinder. Rolling cylinders along the ground may damage or even open a cylinder valve and will also damage the identifying marks and symbols.

EQUIPMENT SET-UP

Before assembling regulators and fittings make sure there are no particles of dirt in the cylinder outlet. If a supply of clean compressed air or nitrogen is available use this to blow out any loose particles of dirt from the valve sockets: N.B. eye protection must be worn during this operation. Where clean compressed air or nitrogen is not available, particles of dirt and residual moisture can be removed by "cracking" open and immediately closing the cylinder valve (otherwise known as "sniffting"). Sniffting should be carried out outside where possible.

Before doing this, the user must ensure that there is no possible source of ignition in the vicinity and must stand clear of the gas stream.

Sniffting should never be carried out on a hydrogen cylinder because vented hydrogen can ignite spontaneously.

When "sniffting" you must take the following safety precautions:

- Wear eye protection.
- Be sure there are no possible sources of ignition in the vicinity; stand clear of the gas stream and on no account deflect the gas stream with the hand or the face.
- It is also recommended that, in the case of high purity gases such as argon, you dry the outlet of the cylinder valve with a clean cloth before "sniffting".

DO NOT "SNIFF" HYDROGEN OR TOXIC GASES

Never "sniff" hydrogen as it may ignite spontaneously and never "sniff" toxic gases. Instead, carefully inspect the outlet and if there are any signs of dirt, blow it out with a jet of clean compressed air or nitrogen.

ATTACHING REGULATORS

1. Regulators must be used only with the gas or gases and pressure for which they are designed.
2. For new regulators remove the plastic bullnose cap by pulling the nut down towards the body of the regulator.
3. Check the regulator for any damage. Threads must be in good condition and the seating connection must be free of contamination. If there is an inlet filter, is it in place? Check that the gauges are in a good condition.
4. Fit the regulator to the cylinder valve ensuring that the front of the regulator is facing forwards.
5. Using the correct spanner, tighten down the regulator nut. Do not use excessive force. The bullnose on the regulator is a precision made component designed to fit the cylinder valve

NOTE: Fuel gases have a left-hand thread (tighten anti-clockwise), while oxygen, nitrogen, carbon dioxide, air and inert gases and some mixtures have right-hand threads (tighten clockwise).

REGULATOR MAINTENANCE

- Always keep the regulator clean and in a safe working condition.
- Should gauges become faulty or damaged the product needs replacing immediately as the gauges contain pressurized components which, if damaged, can be potentially dangerous.
- Regularly check the regulator visually for any signs of damage.
- Never attempt to alter or repair any gas equipment, cylinders or valves.
- Repairs and refurbishment of gas equipment must only be performed by competent repair agents.

Regulators should be inspected by a competent person on an annual basis and, in line with the British Compressed Gases Association Code of Practice CP7 requirements, replaced or refurbished after five years.

BOC supports this recommendation as certain components in these items deteriorate with age, which can lead to a potentially dangerous discharge of high-pressure gas.

Both regulators and flashback arrestors have date codes on them that show the date of manufacture.

For a small fee, BOC can visit your site and perform safety checks on all your gas f can

equipment in accordance with the British Compressed Gases Association Code of Practice CP7 requirements. Alternatively, please bring your equipment to your local store where our fully qualified staff can perform safety checks. For details of your nearest store please contact your local BOC representative or contact the BOC Customer Service Centre on 0800 111 333 (phone) or 0800 111 555 (fax).

FLASHBACK ARRESTORS

A flashback arrestor is a device designed to prevent a flashback from passing from the hose into the cylinder. A flashback arrestor has a sintered flame-arresting element, which acts to extinguish any flame coming into contact with it. Flashback arrestors can also have pressure and thermal cut off devices, as well as a non-return valve to stop the gas travelling through it in the wrong direction. Hose check valves are designed to prevent the gases from flowing back into the system. They are not designed to stop a receding flame and must not be used in place of flashback arrestors.

In line with BCGA recommendations and for ultimate safety, when working with acetylene, propane or hydrogen, fit BOC flashback arrestors. (BOC Part Numbers: Resettable oxygen: 41541; Resettable fuel gas: 41540; Standard oxygen: 41543; Standard fuel gas: 41542)

ATTACHING THE FLASHBACK ARRESTOR

1. Flashback arrestors must be used only with the gas or gases for which they are designed.
2. Check the flashback arrestor for any damage or indication that the equipment has undergone a flashback. This can be identified by carbon deposits in the outlet.
3. Fit the flashback arrestor to the regulator and tighten down using the correct spanner.

HOSES

Use only hoses to British Standard BS5120 or the new European Standard EN559. These hoses are designed for low-pressure gases. Industrial welding hoses are colour-coded blue for oxygen and red for acetylene and hydrogen or orange for propane.

It is important that each hose is long enough to allow the cylinders to be safely positioned away from flying sparks and hot metal. It is bad practice to use lengths of hose longer than necessary, especially when it involves coupling two or more standard lengths together.

ATTACHING THE HOSES

1. Check each hose to ensure there is no damage
2. Attach the blue hose to the oxygen flashback arrestor (right hand thread) and tighten securely using the correct spanner.
3. Attach the red or orange hose to the fuel gas flashback arrestor (left hand thread) and tighten securely.

TORCHES

Choose the torch required for the process and the fuel gas being used.

ATTACHING THE TORCH

1. Check the torch to ensure there is no damage. Look for signs of damage and carbon caused by backfires or mistreatment.
2. Attach and securely tighten the oxygen hose to the oxygen connection on the torch handle (right hand thread).
3. Attach and securely fasten the fuel gas hose to the fuel gas connection on the torch handle (left hand thread).
4. For gas welding torches attach the appropriate gas mixer to the torch.
5. For combination cutting torches attach the appropriate cutting attachment.

NOZZLES

Select the appropriate nozzle for the process and the thickness of the material being welded, brazed, heated or cut. Use the charts at the back of the manual to choose the correct nozzle size.

ATTACHING THE NOZZLE

1. Check the nozzle and the torch or mixer seat for damage.
2. Insert the welding nozzle into the appropriate mixer or cutting head.
3. Position the welding nozzle and hand tighten it into the mixer.

SECTION 3

LEAK TESTING AND PURGING THE SYSTEM

SAFETY

Before carrying out the leak test or purging procedure ensure that the operator is using all the correct safety equipment, overalls, safety glasses and safety shoes as a minimum.

GENERAL

Before lighting, a newly assembled oxy-fuel system should be tested to ensure there are no leaks present.

LEAK TEST PROCEDURE

1. Ensure that all equipment connections are tightened in accordance with the manufacturer's instructions.
 2. Ensure that the pressure-adjusting knobs on both regulators are fully open. (Turn anti-clockwise)
 3. Close both the fuel gas and oxygen torch valves.
 4. Open the oxygen cylinder valve about half a turn
 5. Turn the oxygen regulator pressure-adjusting knob clockwise until a small amount of pressure registers on the outlet pressure gauge.
 6. Close the oxygen cylinder valve.
 7. Follow the same procedure for the fuel gas.
 8. Using a proprietary leak testing solution such as the BOC CFC Free Leak Detector Spray (BOC Part Number: 3731) or a mixture of 1% Teepol in de-ionised water.
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WARNING!

NEVER USE A SOLUTION OF SOAPY WATER OR A NAKED FLAME TO TEST EQUIPMENT FOR LEAKS

1. Leaks must be corrected immediately by tightening connections. Do not over tighten. If the connection requires excessive force then it is likely that there is a more serious fault with it.
2. If leaks persist, the connections must be replaced. Do not use the equipment if a persistent leak is detected.
3. Open the equipment valves to release pressure, adjust the regulators to zero outlet pressure and close the equipment valves.
4. After leak testing all testing solution should be cleaned off using a clean, oil and grease free cloth.

NOTE: Any leakage from the regulator bonnet holes means that the regulator safety bursting disc has burst. The regulator must be replaced. Contact your local BOC

representative or contact the BOC Customer Service Centre on 0800 111 333

PURGING THE SYSTEM

Before lighting the torch, always purge the system to reduce the possibility of a mixed gas condition in the system. Mixed gases can result in an explosion or flashback in the system. Purging must be done in a well-ventilated area that is free from open flames or other sources of ignition.

1. Ensure that the pressure-adjusting knobs on both regulators are fully open.
2. Close both the fuel gas and oxygen torch valves.
3. Open the oxygen cylinder valve slowly to ensure the regulator isn't damaged by the surge of high-pressure gas.
4. Open the oxygen torch valve one full turn.
5. Turn the oxygen regulator pressure-adjusting knob clockwise until a small amount of pressure registers on the outlet pressure gauge.
6. Allow the oxygen to pass through the torch for 3 seconds for every 5 meters of hose.
7. Close the oxygen torch valve.
8. Repeat the same procedure with the fuel gas.

SECTION 4

LIGHTING AND SHUT DOWN PROCEDURES FOR WELDING OR BRAZING

SAFETY

Before lighting the torch always follow all personal and equipment safety regulations. Wear safety glasses and filtered protective eyewear to protect the eyes from heat, sparks and hazardous rays of light produced by the flame. Overalls, safety shoes, leather aprons and gloves may also be required.

LIGHTING PROCEDURE

1. Follow the instructions in this manual pertaining to set up, leak testing and purging practices prior to lighting the torch.
2. Using the nozzle chart, identify the working oxygen and fuel gas pressure for the nozzle size being used.
3. Ensure that the pressure-adjusting knobs on both regulators are fully open.
4. Close both the fuel gas and oxygen torch valves.
5. Open the oxygen cylinder valve slowly to ensure the regulator isn't damaged by the surge of high-pressure gas.
6. Open the oxygen torch valve one full turn.
7. Using the oxygen regulator pressure-adjusting knob set the pressure identified from the nozzle chart.
8. Close the oxygen torch valve.
9. Repeat the procedure on the fuel gas.
10. Open the fuel gas torch valve about one turn, using an approved friction or cup spark lighter to ignite the fuel gas.
11. Increase the fuel gas flow until the flame is about to leave the end of the nozzle.
12. Slowly open the oxygen torch valve. Continue to open the oxygen valve until the flame of your choice is achieved.

NOTE: Friction spark lighters are normally used for acetylene (gases lighter than air), cup lighters are normally used for propane and other fuel gases heavier than air.

EXTINGUISHING THE TORCH FLAME

1. Turn the fuel gas torch valve to the closed position.
2. Turn the oxygen torch valve to the closed position.

SHUT DOWN THE SYSTEM FOR A SHORT TIME

Having closed the fuel and oxygen torch valves, the equipment is safe to leave if the operator remains in the vicinity.

SHUT DOWN THE SYSTEM

1. Fully close the oxygen cylinder valve.
2. Open the oxygen torch valve.
3. When the oxygen regulator low pressure gauge indicates "0" close the oxygen torch valve.
4. Fully wind out (anticlockwise) the pressure-adjusting knob on the oxygen regulator
5. Repeat the process for the fuel gas.

SECTION 5

LIGHTING AND SHUT DOWN PROCEDURES FOR COMBINATION CUTTING TORCHES

SAFETY

Before lighting the torch always follow all personal and equipment safety regulations. Wear safety glasses and filtered protective eyewear to protect the eyes from heat, sparks and hazardous rays of light produced by the flame. Overalls, safety shoes, leather aprons and gloves may also be required.

GENERAL

The following instructions are adjustment procedures for the BOC Combi and Combi-Lite combination welding/cutting torches.

There are three adjustments two located on the torch shank and one located on the cutting attachment.

LIGHTING PROCEDURE

1. Insert the cutting assembly into the torch body. Tighten the connection fitting.
2. Select a cutting nozzle to match the thickness of metal that will be cut. Refer to the charts in the back of this manual.
3. Insert the nozzle into the cutting assembly and tighten to seat the nozzle.
4. Follow the instructions in this manual pertaining to set up, leak testing and purging practices prior to lighting the torch.
5. Using the nozzle chart, identify the working oxygen and fuel gas pressures for the nozzle size being used.
6. Ensure that the pressure-adjusting knobs on both regulators are fully open.
7. Close both the fuel gas and oxygen torch valves.
8. Open the oxygen cylinder valve slowly to ensure the regulator isn't damaged by the surge of high-pressure gas.
9. Open the oxygen torch valve one full turn.
10. Using the oxygen regulator pressure-adjusting knob set the pressure identified from the nozzle chart.
11. Close the oxygen torch valve.
12. Repeat the procedure on the fuel gas.
13. Open the fuel gas torch valve about one turn, using an approved friction or cup spark lighter to ignite the fuel gas.
14. Continue to open the acetylene torch body valve until the flame is about to leave the end of the nozzle.
15. Open the oxygen torch body valve completely on the cutting assembly.
16. Slowly open the oxygen preheat valve on the cutting assembly until a neutral flame is achieved.

17. Depress cutting oxygen lever and inspect jet stream for straightness and uniformity. If necessary, re-adjust preheats by further opening preheat oxygen valve.

NOTE: Friction spark lighters are normally used for acetylene (gases lighter than air), cup lighters are normally used for propane and other fuel gases heavier than air.

EXTINGUISHING THE FLAME

1. Turn the fuel gas torch valve to the closed position.
2. Turn the oxygen preheat valve to the closed position.
3. Turn the oxygen torch valve to the closed position.

SHUT DOWN THE SYSTEM FOR A SHORT TIME

Having closed the fuel and oxygen torch valves the equipment is safe to leave if the operator remains in the vicinity.

SHUT DOWN THE SYSTEM

1. Fully close the oxygen cylinder valve.
2. Open the oxygen torch and preheat valves.
3. When the oxygen regulator low pressure gauge indicates "0" close the oxygen torch valves.
4. Fully wind out the pressure-adjusting knob on the oxygen regulator
5. Repeat the process for the fuel gas.

SECTION 6

LIGHTING AND SHUT DOWN PROCEDURES FOR STRAIGHT CUTTING TORCH

SAFETY

Before lighting the torch always follow all personal and equipment safety regulations. Wear safety glasses and filtered protective eyewear to protect the eyes from heat, sparks and hazardous rays of light produced by the flame. Overalls, safety shoes, leather aprons and gloves may also be required.

GENERAL

The following instructions are adjustment procedures for the BOC cutting torch.

There are two adjustments located on the torch inlet body.

LIGHTING PROCEDURE

1. Select a cutting nozzle to match the thickness of metal that will be cut. Refer to the charts in the back of this manual.
2. Insert the nozzle into the torch and tighten to seat the nozzle.
3. Follow the instructions in this manual pertaining to set up, leak testing and purging practices prior to lighting the torch.
4. Using the nozzle chart, identify the working oxygen and fuel gas pressures for the nozzle size being used.
5. Ensure that the pressure-adjusting knobs on both regulators are fully open.
6. Close both the fuel gas and oxygen torch valves.
7. Open the oxygen cylinder valve slowly to ensure the regulator isn't damaged by the surge of high-pressure gas.
8. Open the oxygen torch valve one full turn.
9. Turn the oxygen regulator pressure-adjusting knob clockwise to set the pressure identified from the nozzle chart.
10. Close the oxygen torch valve.
11. Repeat the procedure on the fuel gas.
12. Open the fuel gas torch valve about one turn, using an approved friction or cup spark lighter to ignite the fuel gas.
13. Continue to open the fuel gas torch valve until the flame is about to leave the end of the nozzle.
14. Slowly open the oxygen torch valve on the cutting assembly until a neutral flame is achieved.
15. Depress cutting oxygen lever and inspect jet stream for straightness and uniformity.

NOTE: Friction spark lighters are normally used for acetylene (those lighter than air), cup lighters are normally used for propane and other fuel gases heavier than air.

EXTINGUISHING THE FLAME

1. Turn the fuel gas torch valve to the closed position.
2. Turn the oxygen torch valve to the closed position.

SHUT DOWN THE SYSTEM FOR A SHORT TIME

Having closed the fuel and oxygen torch valves the equipment is safe to leave if the operator remains in the vicinity.

SHUT DOWN THE SYSTEM

1. Fully close the oxygen cylinder valve.
2. Open the oxygen torch valve.
3. When the oxygen regulator low pressure gauge indicates "0" close the oxygen torch valve.
4. Fully wind out the pressure-adjusting knob on the oxygen regulator
5. Repeat the process for the fuel gas.

SECTION 7

LIGHTING AND SHUT DOWN PROCEDURES FOR HEATING NOZZLES

SAFETY

Before lighting the torch always follow all personal and equipment safety regulations. Wear safety glasses and filtered protective eyewear to protect the eyes from heat, sparks and hazardous rays of light produced by the flame. Overalls, safety shoes, leather aprons and gloves may also be required.

GENERAL

Fuel and oxygen starvation are responsible for the majority of problems occurring with heating nozzles. If insufficient amounts of gas are allowed to flow through the heating nozzle during operation this will cause backfires to occur. Withdrawal rates for fuel gases are dependent on the size of the cylinder, the contents in the cylinder and the temperature of the cylinder. Never exceed the gas supplier's recommended withdrawal rates.

LIGHTING PROCEDURE

1. Select a heating nozzle using the charts in the back of this manual.
2. Fit the heating nozzle onto the heating neck and tighten into the mixer.
3. Follow the instructions in this manual pertaining to set up, leak testing and purging practices prior to lighting the torch.
4. Using the nozzle chart, identify the working oxygen and fuel gas pressures for the nozzle size being used.
5. Ensure that the pressure-adjusting knobs on both regulators are fully open. (Turn anti-clockwise)
6. Close both the fuel gas and oxygen torch valves.
7. Open the oxygen cylinder valve slowly to ensure the regulator isn't damaged by the surge of high-pressure gas.
8. Open the oxygen torch valve one full turn.
9. Using the oxygen regulator pressure-adjusting knob set the pressure identified from the nozzle chart.
10. Close the oxygen torch valve.
11. Repeat the procedure on the fuel gas.
12. Open the fuel gas torch valve about one turn, using an approved friction or cup spark lighter to ignite the fuel gas.
13. Continue to open the fuel gas torch body valve until the flame is about to leave the end of the nozzle.
14. Open the oxygen valve until a neutral flame is achieved.

EXTINGUISHING THE FLAME

1. Turn the fuel gas torch valve to the closed position.
2. Turn the oxygen torch valve to the closed position.

SHUT DOWN THE SYSTEM FOR A SHORT TIME

Having closed the fuel and oxygen torch valves the equipment is safe to leave if the operator remains in the vicinity.

SHUT DOWN THE SYSTEM

1. Fully close the oxygen cylinder valve.
2. Open the oxygen torch valve.
3. When the oxygen regulator low pressure gauge indicates "0" close the oxygen torch valve.
4. Fully wind out the pressure-adjusting knob on the oxygen regulator
5. Repeat the process for the fuel gas.

SECTION 8

ARGON / CO2 SHIELDING GAS FLOWMETERS

Read and follow these instructions before installing or operating shielding gas equipment. Failure to do so could result in explosion, damage to equipment, severe personal injury or substantial property damage.

Serious accidents can occur from improper use and handling of compressed gas cylinders. Always follow the instruction and safety procedures provided by your gas supplier. For more information BOC has produced a publication called 'Safe Under Pressure' giving guidance on this subject. 'Safe Under Pressure' is available in paper, VHS and CD formats through your local BOC outlet or by calling BOC on 0800 111 333.

COMPRESSED GAS CYLINDERS

Cylinders are large and heavy and their design is relatively unstable due to their small base. It is important that it is understood they are potentially very dangerous and should be treated with care. Cylinders should never be dropped, and when moving and using cylinders, they should always be treated with respect.

All personnel responsible for handling cylinders should have been trained in methods used some general pointers are listed below. In addition to reading this document, operators should also be familiar with the BCGA Guidance note GN3.

1. You should never handle or transport a gas if its contents have not been positively identified, always check the cylinder label.
2. Always keep the material safety data sheets to hand and make sure you are aware of the information it contains.
3. Always wear the correct protective clothing when handling and using gas cylinders - eye, hand, and foot protection must always be worn.
4. Check the cylinder valve is closed and all equipment including regulators are disconnected. Security caps should also be fitted if available.
5. Before handling or using gas cylinders, you must understand the properties of the gas, the hazards that these properties may cause and actions to take in the event of an emergency.
6. Always keep the material safety data sheets to hand and make sure you are aware of the information it contains.
7. Cylinders should be kept in a vertical position and secured from falling.
8. A suitable trolley should always be used for transporting and moving cylinders where possible. If cylinder have to be churned this should be for as short a distance as possible. The correct procedure for this practice is illustrated in the 'Safe under Pressure' video and CD.

Locate cylinders away from sparks and hot slag and flames. Do not allow any electrical contact with cylinders.

Never tamper with or attempt to repair compressed gas cylinders or valves. Leaking cylinders or cylinders with leaking valves should be placed outdoors, identified and

returned to the supplier. BOC should be contacted, either via your local representative, or by calling 0800 111 333.

If cylinders must be handled manually, reduce the risks involved by carrying out a risk assessment, in accordance with requirements of the Manual Handling Operations Regulations 1992 (SI 2793).

Never roll a cylinder. Rolling cylinders along the ground may damage or even open a cylinder valve and will also damage the identifying marks and symbols.

EQUIPMENT SET-UP

Before assembling regulators and fittings make sure there are no particles of dirt in the cylinder outlet. If a supply of clean compressed air or nitrogen is available use this to blow out any loose particles of dirt from the valve sockets: N.B. eye protection must be worn during this operation. Where clean compressed air or nitrogen is not available, particles of dirt and residual moisture can be removed by "cracking" open and immediately closing the valve (otherwise known as "sniffting"). Sniffting should be carried out outside where possible.

Before doing this, the user must ensure that there is no possible source of ignition in the vicinity and must stand clear of the gas stream.

Sniffting should never be carried out on a hydrogen cylinder because vented hydrogen can ignite spontaneously.

When "sniffting" you must take the following safety precautions:

- Wear eye protection.
- Be sure there is no possible source of ignition in the vicinity; stand clear of the gas stream and on no account deflect the gas stream with the hand or the face.
- It is also recommended that in the case of high purity gases such as argon, you dry the outlet of the cylinder valve with a clean cloth before "sniffting".

DO NOT "SNIFF" HYDROGEN OR TOXIC GASES

Never "sniff" hydrogen as it may ignite spontaneously and never "sniff" toxic gases. Instead, carefully inspect the outlet and if there are any signs of dirt, blow it out with a jet of clean compressed air or nitrogen.

ATTACHING REGULATORS

1. Regulators must be used only with the gas or gases and pressure for which they are designed.
2. For new regulators remove the plastic bullnose cap by pulling the nut down towards the body of the regulator.
3. Check the regulator for any damage. Threads must be in good condition, the seating connection must be free of contamination. If there is an inlet filter, it is in place. Check the gauges are in a good condition.

4. Fit the regulator to the cylinder valve ensuring that the front of the regulator is facing forwards.
5. Using the correct spanner, tighten down the regulator nut. Do not use excessive force. The bullnose on the regulator is a precision made component designed to fit the cylinder valve

FLOWMETER OPERATING INSTRUCTIONS

1. Attach the flowmeter inlet to regulator outlet and tighten RH thread.
2. Connect hose to the flowmeter outlet and tighten RH thread
3. Close flow control-valve - clockwise
4. Slowly open the cylinder valve.
5. Set the required flow by opening the flow-valve anti clockwise
6. Check for leaks using the BOC CFC Free Leak Detector Spray.

NOTE: For the most accurate results BOC flowmeters should be used with BOC pre-set regulators.

BOC Argon 2bar/29 psi pre-set regulator.

BOC CO₂ 2bar/29psi pre-set regulator.

Warning.

- Do not fit the flowmeter directly to the cylinder valve. Doing so will cause the flow-tubes to rupture, possibly injuring the operator.
- The flowmeter is designed to operate at an inlet pressure of 2bar/29psi.

REGULATOR MAINTENANCE

- Always keep the regulator clean and in a safe working condition.
- Should the gauge become faulty or damaged the product needs replacing immediately as the gauges contain pressurised components which if damaged can be potentially dangerous.
- Regularly check the regulator visually for any signs of damage.
- Never attempt to alter or repair any gas equipment, cylinders or valves.
- Repairs and refurbishment of gas equipment must only be performed by competent repair agents.

Regulators should be inspected by a competent person on an annual basis, and in line with the British Compressed Gases Association Code of Practice GN7 requirements, replaced or refurbished after five years.

BOC supports this recommendation as certain components in these items deteriorate with age, which can lead to potentially dangerous discharge of high-pressure gas.

Regulators have date codes on them that show the date of manufacture.

For a small fee, BOC can visit your site and perform safety checks on all your gas equipment in accordance with the British Compressed Gases Association Code of Practice GN7 requirements. Alternatively, please bring your equipment to your local store where our fully qualified staff can perform safety checks. For details of your nearest store please contact your local BOC representative or contact the BOC Customer Service Centre on 0800 111 333 (phone) or 0800 111 555 (fax).

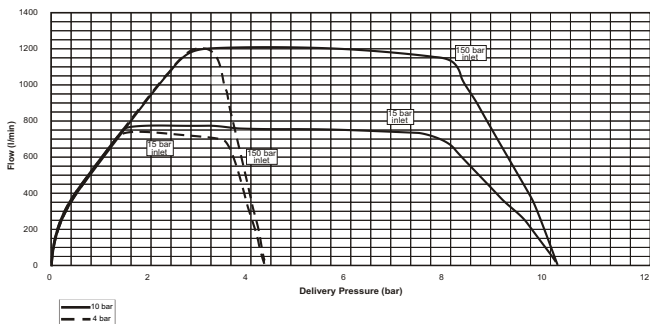
TECHNICAL DATA CHARTS

1. Pressure Regulators

Series 9500

Part Number	Gas Used	Delivery Pressure	Inlet Connection	Outlet Connection	Max Inlet Pressure
41570	Oxygen	0-4 bar 0-60 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41571	Oxygen	0-10 bar 0-150 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41572	Carbon Dioxide	0-10 bar 0-150 psi	BS341 no 8 0.860" Whit	3/8" RH	300 bar 4500 psi
41573	Acetylene	0-1.5 bar 0-22 psi	BS341 no 2 5/8" LH	3/8" LH	25 bar 400 psi
41574	Nitrogen Argon	0-4 bar 0-60 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41575	Nitrogen Argon	0-10 bar 0-150 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41576	Hydrogen	0-10 bar 0-150 psi	BS341 no 2 5/8" LH	3/8" LH	300 bar 04500 psi
41577	Air	0-10 bar 0-150 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41578	Helium	0-10 bar 0-150 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi

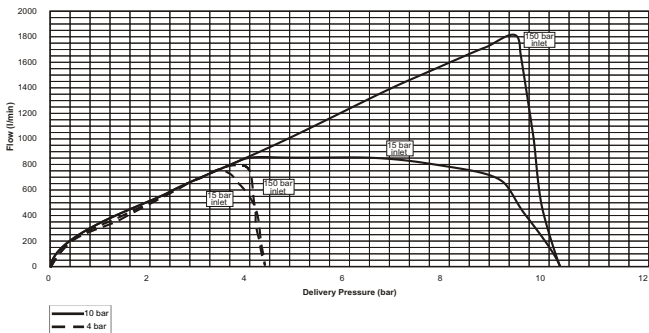
Series 8500 Flow Capacities



Series 8000

Part Number	Gas Used	Delivery Pressure	Inlet Connection	Outlet Connection	Max Inlet Pressure
41552	Oxygen	0-4 bar 0-60 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41553	Oxygen	0-10 bar 0-150 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41554	Acetylene	0-1.5 bar 0-22 psi	BS341 no 2 5/8" LH	3/8" LH	25 bar 400 psi
41555	Nitrogen	0-10 bar 0-150 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi

Series 8000 Flow Capacities



Series 6000 High Pressure Regulators

Part Number	Gas Used	Delivery Pressure	Inlet Connection	Outlet Connection	Max Inlet Pressure
41559	Nitrogen	0-26 bar 0-390 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41560	Nitrogen	0-42 bar 0-600 psi	BS341 no 3 5/8" RH	7/16" JIC Refrigeration fitting	300 bar 4500 psi

Series 6000 Pressure Regulators

Part Number	Gas Used	Delivery Pressure	Inlet Connection	Outlet Connection	Max Inlet Pressure
41891	Propane	0-4 bar 0-60 psi	BS341 no 2 5/8" LH	3/8" LH	25 bar 360 psi

Series 6000 Flow Gauge

Part Number	Gas Used	Flow	Inlet Connection	Outlet Connection	Max Inlet Pressure
41892	Argon Carbon Dioxide	0-40 l/min	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi

Series 6000 Shielding Gas

Part Number	Gas Used	Delivery Pressure	Inlet Connection	Outlet Connection	Max Inlet Pressure
41558	Argon Carbon Dioxide	2 bar 30 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi

Series 5000

Part Number	Gas Used	Delivery Pressure	Inlet Connection	Outlet Connection	Max Inlet Pressure
41549	Oxygen	2 bar 30 psi	BS341 no 3 5/8" RH	3/8" RH	300 bar 4500 psi
41551	Acetylene	1 bar 15 psi	BS341 no 2 5/8" LH	3/8" LH	25 bar 400 psi

2. Cutting Nozzles

Acetylene Nozzle Mix Cutting Nozzles (ANM)

Material Thickness	Part Number	Nozzle Size	Pressure		Cutting speed (mm/min)	Gas Consumption		
			Oxygen (bar)	Acetylene (bar)		Oxygen Cutting (l/min)	Oxygen Heating (l/min)	Acetylene Heating (l/min)
3-6 mm 1/8"-1/4"	41590	0.8 1/32"	1.5	0.15	500-850	14.16	5.14- 8.65	4.74- 7.95
6-12 mm 1/4"-1/2"	41591	1.2 3/64"	2	0.15	440-700	30.70	6.14- 10.27	5.65- 9.47
12-75 mm 1/2"-3"	41592	1.6 1/16"	2.5-3.5	0.15-0.3	300-610	67.29- 88.09	7.02- 13.28	6.72- 11.61
75-100 mm 3"-4"	41593	2.0 5/64"	3	0.3	180-250	119.66	9.52- 14.66	8.56- 13.29
100-150 mm 4"-6"	41594	2.4 3/32"	3	0.3	150-180	174.42	14.66- 20.30	13.29- 18.34
150-300 mm 6"-12"	41595	3.2 1/8"	4.5	0.35	100-125	373.90	20.61- 30.32	18.79- 30.56

Acetylene Nozzle Mix Sheet Metal (ASNM)

Material Thickness	Part Number	Nozzle Size	Pressure		Cutting speed (mm/min)	Gas Consumption		
			Oxygen (bar)	Acetylene (bar)		Oxygen Cutting (l/min)	Oxygen Heating (l/min)	Acetylene Heating (l/min)
0-3 mm 0"-1/8"	41596	-	1.5	0.15	460-560	14.03	1.38	1.38

Acetylene Nozzle Mix Gouging (AGNM)

Groove Width	Part Number	Nozzle Size	Pressure		Gas Consumption		
			Oxygen (bar)	Acetylene (bar)	Oxygen Cutting (l/min)	Oxygen Heating (l/min)	Acetylene Heating (l/min)
8	41628	13	4	0.5	61.40	16.29	13.75
11	41629	19	5	0.5	155.37	30.07	27.5

Propane Nozzle Mix Cutting Nozzles (PNM)

Material Thickness	Part Number	Nozzle Size	Pressure		Cutting speed (mm/min)	Gas Consumption		
			Oxygen (bar)	Propane (bar)		Oxygen Cutting (l/min)	Oxygen Heating (l/min)	Propane Heating (l/min)
3-6mm 1/8"-1/4"	41597	0.8 1/32"	1.5	0.1	460	14.16	22.55	6.10
6-12mm 1/4"-1/2"	41598	1.2 3/64"	2.5	0.15	400	32.83	25.06	8.29
12-75mm 1/2"-3"	41599	1.6 1/16"	3-3.5	0.2-0.35	160-300	66.41- 76.43	25.06- 31.33	8.29- 9.11
75-100mm 3"-4"	41600	2.0 5/64"	3.5	0.4	155	130.31	38.84	11.84
100-150mm 4"-6"	41601	2.4 3/32"	4	0.4	140	205.49	43.86	12.75
150-300 mm 6"-12"	41602	3.2 1/8"	5.6	0.50-0.6	90-100	446.07	56.39	16.40

AFN Cutting Nozzles

Material Thickness	Part Number	Nozzle Size (bar)	Pressure		Gas Consumption		
			Oxygen (bar)	Acetylene	Oxygen Cutting (l/min)	Oxygen Heating (l/min)	Acetylene Heating (l/min)
3-6 mm 1/8"-1/4"	41603	0.8 1/32"	2	0.15	11.78	4.26	3.84
6-20 mm 1/4"-3/4"	41604	1.2 3/64"	2	0.15	23.06	4.26	3.82
20-50 mm 3/4"-2"	41605	1.6 1/16"	2-5	0.15-0.2	56.26- 74.93	4.26- 5.14	3.82- 4.74

A-SFN Cutting Nozzle Sheet Metal

Material Thickness	Part Number	Pressure		Gas Consumption		
		Oxygen (bar)	Acetylene (bar)	Oxygen Cutting (l/min)	Oxygen Heating (l/min)	Acetylene Heating (l/min)
0-3 mm 0-1/8"	41633	2	0.15	14.03	0.13	1.83

3. Welding Nozzles

Welding Nozzles Medium Duty

Material Thickness	BOC Part Number	Nozzle Size	Oxygen Pressure (bar)	Acetylene Pressure (bar)	Gas Consumption (l/min)	
					Oxygen	Acetylene
0.9 mm 1/32"	41606	1	0.15	0.15	0.5-0.75	0.46-0.76
1.2 mm 3/64"	41607	2	0.15	0.15	0.88-1.88	0.92-1.68
2.0 mm 5/64"	41608	3	0.15	0.15	1.38-2.63	1.38-2.44
2.6 mm 1/10"	41609	5	0.15	0.15	2.63-3.13	2.44-2.90
3.2 mm 1/8"	41610	7	0.15	0.15	3.51-4.76	3.36-4.28
4.0 mm 5/32"	41611	10	0.2	0.2	5.14-5.89	4.74-5.35
5.0 mm 3/16"	41612	13	0.3	0.3	6.77-8.27	6.11-7.64
6.5 mm 1/4"	41613	18	0.4	0.4	7.77-10.40	8.56-9.47
8.2 mm 5/16"	41614	25	0.4	0.4	7.64-15.04	11.77-13.60
10 mm 3/8"	41615	35	0.6	0.6	18.17-18.67	16.50-16.96

Welding Nozzles Light Duty

Material Thickness	BOC Part Number	Nozzle Size	Oxygen Pressure (bar)	Acetylene Pressure (bar)	Gas Consumption (l/min)	
					Oxygen	Acetylene
0.9 mm 1/32"	41616	1	0.15	0.15	0.5-0.75	0.46-0.76
1.2 mm 3/64"	41617	2	0.15	0.15	0.88-1.88	0.92-1.68
2.0 mm 5/64"	41618	3	0.15	0.15	1.38-2.63	1.38-2.44
2.6 mm 1/10"	41619	5	0.15	0.15	2.63-3.13	2.44-2.90
3.2 mm 1/8"	41620	7	0.15	0.15	3.51-4.76	3.36-4.28
4.0 mm 5/32"	41621	10	0.2	0.2	5.14-5.89	4.74-5.35
5.0 mm 3/16"	41622	13	0.3	0.3	6.77-8.27	6.11-7.64
6.5 mm 1/4"	41623	18	0.4	0.4	7.77-10.40	8.56-9.47
8.2 mm 5/16"	41624	25	0.4	0.4	7.64-15.04	11.77-13.60

4. Heating Nozzles

Acetylene Heating Nozzles

Nozzle Type	BOC Part Number	Oxygen Pressure (bar)	Acetylene Pressure (bar)	Gas Consumption (l/min)		Heat Output (BTU)
				Oxygen	Acetylene	
A-HT 25	41630	0.3	0.3	18.29	18.34	52200
A-HT 50	41567	0.4	0.4	33.20	29.95	9100
A-HT 100	41568	0.7	0.5	49.87	49.97	138500

Propane Super Heating Nozzles

Nozzle Type	BOC Part Number	Oxygen Pressure (bar)	Propane Pressure (bar)	Gas Consumption (l/min)		Heat Output (BTU)
				Oxygen	Propane	
1H	41894	0.7-2	0.15-0.5	58.14-121.29	4.94-34.07	72 100-163 100
3H	41632	1.8-5	0.3-1.1	137.96-274.16	37.72-73.61	183 100-360 500
5H	41895	3.5-8.7	0.85-2	211.01-465.24	57.48-125.63	251 400-618 500

5. Torches

BOC Part Number	Description	Inlet Connection	Length
41581	BOC light duty combination torch attachment	-	190 mm
41582	BOC light duty combination torch shank	1/4"	190 mm
41584	BOC medium duty combination torch shank	3/8"	245 mm
41585	BOC medium duty combination torch cutting attachment	-	250 mm
41589	BOC straight cutter 90 deg head	3/8"	500mm
41588	BOC straight cutter 75 deg head	3/8"	700mm

6. Kits

Description	BOC Part Number	Fuel Gas	Torch Shank	Cutting Attachment	Cutting Nozzles	Welding Nozzles	Oxygen Regulator	Fuel Gas Regulator	Accessories
Promaster	41547	Acetylene	Combi	Medium duty	ANM 1/32" 1/16" 3/32"	Medium duty 2 5 7 10 13	Series 8000 10 bar	Series 8000 1.5 bar	Welding mixer Fitted hose Flashback arrestors Heating tube and nozzle Cup lighter Spanner, goggles Nozzle cleaner kit Circle cutting guide
Masterstart	41546	Acetylene	Combi	Medium duty	ANM 1/16"	Medium duty 5	Series 8000 10 bar	Series 8000 1.5 bar	Welding mixer Fitted hose Flashback arrestors Cup lighter Spanner, Goggles Nozzle cleaner kit
PortaPak	41545	Acetylene	Combi-Lite	Light duty	AFN 3/64"	Light duty 2 5 10	Series 5000 2 bar	Series 5000 1 bar	Welding mixer Fitted hose Flashback arrestors Cup lighter Spanner, Goggles Nozzle cleaner kit
WeldingPak	41544	Acetylene	Combi-Lite	-	-	Light duty 2 3 5	Series 5000 2 bar	Series 5000 1 bar	Welding mixer Fitted hose Flashback arrestors Heating tube and nozzle Cup lighter Spanner, Goggles Nozzle cleaner



BOC Industrial

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