

~ FABRICATION ~



METALWORK

OPERATING INSTRUCTIONS



METALWORK

INTRODUCING

the



OXI-ACETYLENE WELDING



Oxygen and Acetylene Gas Welding System

Access Level 2 (see Metal Workshop induction Guide on Access Levels)

A mixture of Oxygen and Acetylene gases to make a hot flame burning at 3500°C.

Used in welding, brazing, cutting and heating up of metal to bend and form

PPE Basic

- Suitable work coat (provided)
- Suitable Eye protection for the hot work being undertaken – generally BS/EN166 or BS/EN 175 for Oxy/acetylene welding – Grade 3 or 4 green filtering lenses for Oxy-Acetylene (provided)
- Leather gauntlets (provided)
- Stout leather footwear

What to do before use

- **INFORM** a member of staff **BEFORE** using the system – they will prime the system with both Oxygen and Acetylene
- **ASK** for the gas **CONTROL** valves to be **UNLOCKED**
- **CHECK** that the **VALVES** on the torch are **CLOSED**
- **SLOWLY** crack open the gas control valves
- **ENSURE** the work is prepared **BEFORE** working – free of **RUST**
- **ENSURE** the work **AREA** is prepared **BEFORE** working
- Gather your PPE in preparation for starting work and **ENSURE** it is in **GOOD WORKING ORDER**
- **MAKE SURE** that you know where the fire blanket is
- **VISUALLY CHECK** the hoses of the welding touches are in good condition
- **VISUALLY CHECK** all joint couplings on the torch are **TIGHT** and **SECURE**
- Use a **FLINT** spark to ignite the pilot flame. **DO NOT** use (or **KEEP ON YOU**) a cigarette lighter or other flammable liquid lighting system
- **BEFORE** admitting gas to the torches, check the nozzle you will be using – if it has **EXCESSIVE** soot, it may need **CLEANING** or require the **CAREFUL** use of a **REAMING** tool to ensure a **SMOOTH, STABLE** flame

- **ENSURE** the gas **MIXING CHAMBER**, just above the torch body, is loosely connected to the **TORCH BODY**. This allows the nozzle head to be fitted **AND** then aligned to the torch body later
- Once cleaned, **CAREFULLY** screw on the required nozzle head to the **MIXING CHAMBER**
- Screw **DOWN** the **MIXING CHAMBER** and **NOZZLE** to the torch body once it has all been aligned
- Turn **ON** fume extraction by tracing the ducting and pressing the **GREEN** button to start the motor
- It is considered **GOOD PRACTICE** to bend the end of the welding/brazing rod over, thus **REDUCING** the risk of serious burns since the curled end will always be the **COLD** end of the rod. It also reduces the risk of a **SERIOUS, PENETRATING EYE INJURY**
- If you are **BRAZING**, you need to pre-mix your flux powder. Sometimes a **DROP** of washing detergent helps break-down the **IMMISCIBILITY** of the water/powder mix – ensuring a good, well-flowing flux, which has a consistency of thick paint. **DO THIS JUST BEFORE** your work has been set for brazing as the mixture will start to **HARDEN** within 15 minutes of preparation

How to Light the Gas Torches

- **LIGHT** the Acetylene (via the pilot light) by **SLOWLY** cracking open the red valve on the gas torch body – pointing the body away from you
- Once lit, **OPEN** the **RED** valve a little more, increasing the Acetylene rate to the point where it just **STOPS** smoking and leaving particulates in the air
- **OPEN** the Oxygen valve **SLOWLY**. This brightens the flame, makes it slightly shorter and more **BLUE**
- Continue to open the **BLUE** Oxygen valve until the flame **SHORTENS** and the very **CENTRE** of the mixed flame forms a sharply-defined **DIAMOND** by the nozzle tip
- If you continue to add Oxygen, you reduce the **FLAMMABILITY** of the mixture and a **LOUD CRACK** may be heard – this is called flashback and can be serious if it persists.
- Once you have established a **NEUTRAL** flame, you are ready to **Weld, Cut or Braze** your metal

How to Gas Weld (Basic Introduction)

- **WELDING** is the **FUSION** of two **SIMILAR** metals, such as **STEEL**, though the application of **HEAT** only
- Set up your work how you need it joined - most welding jobs have the work **BUTT-JOINED** together at the edges/corners - that is the surfaces to be **JOINED** are placed **VERY CLOSELY** together
- Make sure your **PPE** is on and the gas welding goggles or faceshield (fitted with the **GRADE 3** or **4** filter screen) are in place
- Start to heat up **BOTH** metals at the same time in the location you are going to weld with the bright, diamond inner cone of the flame
- Take **CARE** when heating thin metal stock - the **Oxy-Acetylene** mix will only take a **FEW SECONDS** to reach **1500°C** - the point at which your steel becomes **MOLTEN**
- Wait until you have both parts of the metal molten and flowing together **BEFORE** you use your **Steel filler rod** to keep the weld topped up
- **STEADILY** move the molten pool of metal along the **SEAM** of your butt-jointed work pieces, topping it up with the filler rod as you go
- When you have finished your weld **BEAD**, wait for work to cool - at least **2 hours** - place a **DANGER - HOT WORK** sign by the weld bay and tidy the bay up
- **DO NOT** leave the hot work just in the bay without some notice to **OTHERS** that there is the potential for serious burns if touched

How to Braze (Basic Introduction)

- **BRAZING** is the **JOINING** of two **SIMILAR** or **DISSIMILAR** metals through the application of **HEAT** and a **FILLER** metal
- Set up your work how you need it to be joined - most brazed joints require a very close gap between the metal being joined
- Make sure your **PPE** is on and the gas welding goggles or faceshield (fitted with the **GRADE 3** or **4** filter screen) are in place
- You should **PREPARE** your flux now - you can make a **PASTE** (see **What To Do Before Use** above) which flows into the join cleaning it more thoroughly or use the **DIPPING** method, in which the heated **BRONZE-COLOURED** brazing rod tip is dipped directly into the flux powder and applied directly to the join
- Start to heat up **BOTH** metals at the same time in the location you are going to **BRAZE** until the metals become a **BRIGHT, CHERRY RED** approximately **1000°C** (Steels only) - **TAKE CARE**, for most **Steel** materials, this may only take a few seconds and you risk **BURNING THROUGH** your material
- Wait until you have both parts of the metal at the same temperature - if you have a **THIN SHEET** to be brazed to a **LARGE DIAMETER STEEL ROD** (or vice-versa), then you will need to **CONCENTRATE** the heat on the **THICKEST WORKPIECE** first as this requires more heat to reach temperature. Some of this heat will be **TRANSFERRED** to the thinner sheet through **CONDUCTION**

- **CAREFULLY** put your bronze-coloured brazing rod into the heat and apply directly to the join, **STEADILY** working along your join as you go
- If the rod balls or beads when you apply it, you have too **LITTLE HEAT** in your base metal you are brazing – or your **FLUX** has **BOILED OFF**
- If white smoke appears you have too **MUCH HEAT** or **TOO MUCH** flux
- When you have finished your **BRAZING**, wait for work to cool – at least 30 minutes - place a **DANGER - HOT WORK** sign by the brazing bay and tidy the bay up
- **DO NOT** leave the hot work just in the bay without some notice to **OTHERS** that there is the potential for serious burns if touched

Date

I verify that I have read and understood the information detailed within this document

Name

Signature