

OXYACETYLENE

WELDING

UNIT

Oxyacetylene Welding

Introduction

Cylinders:

There are three ways to legally own cylinders - Rental, Lease and Purchase. A rental agreement is generally for a short term of time - a matter of a few weeks. It is an agreement between that single store of the company (the vendor) and the person renting. A rental agreement requires the payment of a refundable deposit on the cylinders, a demurrage charge (container use fee) which is generally a flat rate per month, and a charge for the gas in the cylinder. A lease agreement is for a longer period of time - a year or so. A lease requires the down payment, which is generally equal to the vendor's investment in the cylinders, and a charge for the gas in the cylinder. The major advantage of a lease is the vendor maintains the upkeep on the cylinder; however, the agreement is taken out with just that single store. Purchase agreements are usually the best investment. The purchaser owns them for life, can transfer ownership, and pays no future charges except for the gas.

Filling Cylinders:

Cylinders are filled at regional plants. They are transported by the vendors to two or three locations in all of Northern California, filled and returned to the local vendors. Acetylene cylinders are filled to different amounts because of the atmospheric conditions of the day they are filled. (Temperature, barometric pressure, etc.)

Hydrostatic Testing:

All high pressure (oxygen) cylinders are hydrostatic tested every ten years. This is mandated by the D.O.T (Department of Transportation.) Hydrostatic testing involves a water pressure test that exceeds triple the normal filling pressure. Acetylene cylinders are only inspected for visual physical damage as they are not classified as a high pressure cylinder. Testing is done at a filling plant.

Apparatus:

There are three sizes of torches generally produced by each manufacturer. The miniature, often referred to as the aircraft series, the medium, referred to by Victor as the Super Range and the large industrial referred to by Victor as the Journeyman. All three sizes have the ability to support the same sizes of heating and cutting nozzles.

Gases:

Oxygen: Hose is color code green - Fittings are all right hand.

Acetylene: Hose is color code red - Fittings are all left hand. (Left hand fittings can be identified by the "V" notch on the corners of the hex nut.)

Lighting:

Use only a striker.

Pressures:

Marks on the gauge will be equal to the tip size number stamped on the elbow of the torch nozzle. This rule is for minimum pressures. It is safe to go above the settings, but never below because of overheating the torch handle and low pressures may cause the torch to backfire (pop). Special Note: Pressures for a #0, #00, or #000 nozzle will all be the same -treat them as if they are a #1 when setting pressures.

Flames:

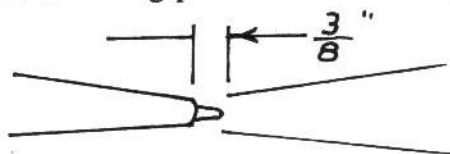
There are three different flames available from an oxyacetylene torch.

1. **Carburizing Flame:** Its purpose is for brazing and silver brazing. It is the quietest of the three flames. The oxygen is not enough to have a neutralizing effect on the acetylene (more acetylene). The heating potential of this flame is 5700 degrees F. at a point 1/8" in front of the inner cone.



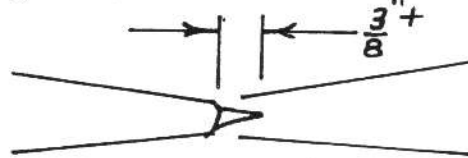
Carburizing Flame

2. **Neutral Flame:** Its purpose is for welding. It is the medium loudest of the three flames, with enough oxygen to have an equalizing effect on the acetylene, and a heating potential of 5800 degrees F. at a point 1/8" in front of the cone.



Neutral Flame

3. **Oxidizing Flame:** As a beginner, you will use this flame for absolutely nothing. (Know it to avoid it.) It is the loudest of the three flames, using more oxygen than acetylene, and is the hottest of the three flames at 6200 degrees F. at a point 1/8" in front of the cone.



Oxidizing Flame (Note sharp point)

Filler Rods:

Copper Coated Welding Rod: This is a mild steel rod that has the appearance of the red copper. It is copper plated to prevent oxidation (rust). No flux is added when using this filler rod. Value approximately .80 to .90 per pound.

Brazing Rod: This is a brass rod (alloy of copper and zinc) used for brazing. Its appearance is the yellow color associated with brass. A flux is used with brazing rod. It is a granular powder like salt that comes in various colors (pink, white, blue, yellow) depending on the manufacturer. Value approximately \$3.00 per pound. Brazing rod comes pre-flux coated for approximately .50 per pound additional charge.

Silver Brazing (Silver Solder): This is brazing alloy of copper and silver. (Some special alloys in this family have phosphorous, gold, or other metals in them.) Their purpose is for silver brazing. They have the appearance of tarnished (oxidized) silver like mom's silverware. They do use a flux which is applied to the parts to be joined. The flux is generally a white paste.

Cast Iron Welding Rod: This is a filler rod that has actually been cast from iron. It is used for welding of cast iron. It is about 1/8" square and grey and uses a powdered high heat flux that is a brick red color.

Purposes of a flux:

A flux **must** be used if any one of the following factors become necessary:

- Promotes cleaning of the base metal.
- Promotes flow of the filler metal or the base metal.
- Promotes adhesion (sticking ability) of the filler to the base metal.
- Prevents surface oxidation on precious metals.

Definition:

Base metal/Parent metal: The project metal.

Filler metal: The rod being added.

Effective Fluxing Ranges:

Each filler rod has its own **effective fluxing range**. This is usually determined by the melting and flow point of the filler metal.

Silver brazing alloys: 1200 - 1700 degrees F.

Brazing: 1800 - 2100

Cast Iron - high heat: 2300 - 2700

Appearance of a Good Weld:

The four major factors that contribute the appearance of a good weld are that:

- It is **smooth**
- It is **even**
- It has a **gloss** (sheen) on the surface
- It shows signs of good **penetration**

Important Operation Notes:

Select the proper nozzle size - #1 is used for 1/16" material, #2 for 2/16" (1/8"), #3 for 3/16", etc. What about the #0 nozzles? Use a #0 for 1/32" - 1/16", #00 for 1/32", and #000 for material under 1/32" and small wires. (Keep in mind there is a Mini torch not out in the lab for super small detailed work - you would have to ask instructor for this item when needed.)

Angle of the torch - 45 degrees is best. Different angles can be tried for slight change of heat into the metal. A steeper angle (toward 90 degrees) will give more heat into the metal and a flatter angle (toward 0 degrees) will give less.

Distance of the tip of the flame cone to the metal - 1/8"

Speed of travel - Determined by the metal thickness and size of torch nozzle.

Motion - Try one of the two below. Make it exact. Size is about 1/8" across the motion of your choice.

Definitions:

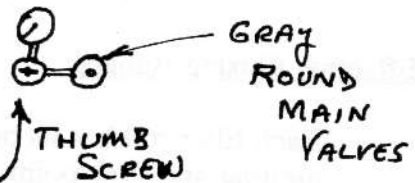
Forehand: Pushing torch away from predominant hand **Backhand:** Pulling toward the predominant hand

Capillary Action: The ability of a metal to flow toward heat.

MANUFACTURING I
OXYACETYLENE WELDING

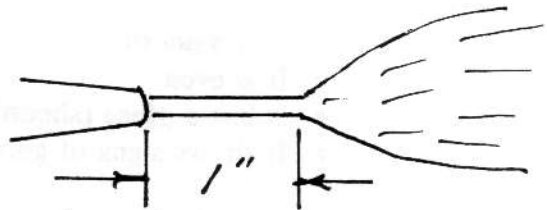
TORCH SET-UP

1. Open gray round main valves.
2. Open valve on torch (only one at a time).
3. Turn thumb screw on regulator so that pressure (in marks on red portion of gauge) is equal to tip size while valve on torch is open - the close torch valve.
4. Repeat steps 2 & 3 for the other gas.



5. **** Check Point **** GRADE
6. Open torch acetylene valve approximately 1/8" turn.
7. Ignite torch with striker.

8. Adjust acetylene flame - no air is added here yet.



9. Adjust oxygen valve to produce:
 - a. Carburizing
 - b. Neutral
 - c. Oxidizing**(Adjust above flames as requested by instructor.)**

10. **** Check Point **** GRADE
11. Shut Down Procedure as follows:
 12. Turn off gray main valves.
 13. Open - drain lines - close torch valves (one at a time).
 14. Open thumb screws on regulators until there is no pressure against them.
15. **** Check Point **** GRADE

EXERCISE COMPLETE