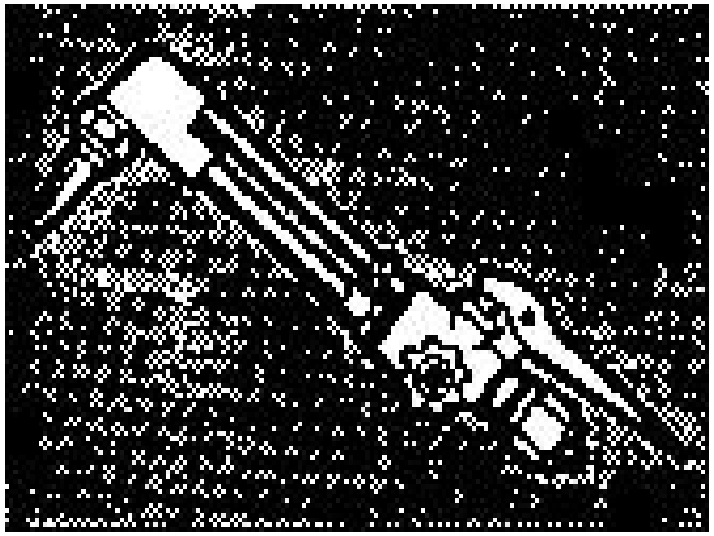
Oxy-Acetylene Safety



⌘Presented by

⌘Bureau of Deep Mine Safety

⌘ Special thanks to Victor Equipment Co. and Valley National Gas, Inc.

Oxygen

- Oxygen is natural in the atmosphere
- It is produced industrially by distilling air below it's freezing point
- Oxygen does not burn or explode
- Oxygen is an accelerante, it causes every thing it comes in contact with to burn hotter and faster
- Oxygen is heavier than air (1.105)

Never use oxygen…….

- in pneumatic tools
- in oil pre-heating burners
- to start internal combustion engines
- to blow out pipelines
- to dust off clothing or work area
- to create pressure
- for ventilation
- Remember, oxygen is not air

Acetylene

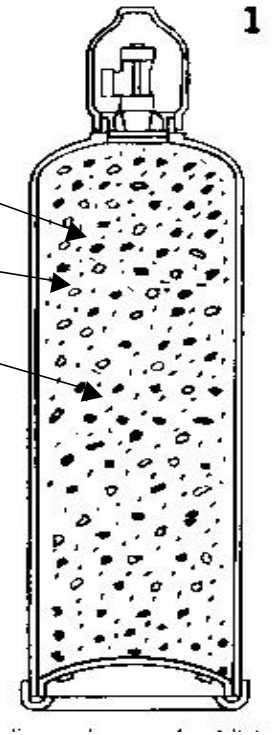
- Acetylene is a compound of Hydrogen and Carbon (C_2H_2)
- Explosive range is 3.0 to 93%
- Needs only 10% oxygen to ignite
- Produced when calcium carbide is mixed with water
- Unstable gas, will violently decompose when in a pure state above 15 psi
- Has a burning temperature of 4,600º F, 5,700º F when burned with oxygen
- Auto-ignition temperature is 763º - 824º F

Oxygen Cylinders

- Usually steel construction
- 244 cu. ft is standard size
- 2000 to 2600 psi
- Hollow in construction
- An electric arc can cause an oxygen bottle to explode
- The orifice at the top of the bottle is the diameter of the lead in a pencil
- Never allow a tank to go empty
- Keep free from oil and grease

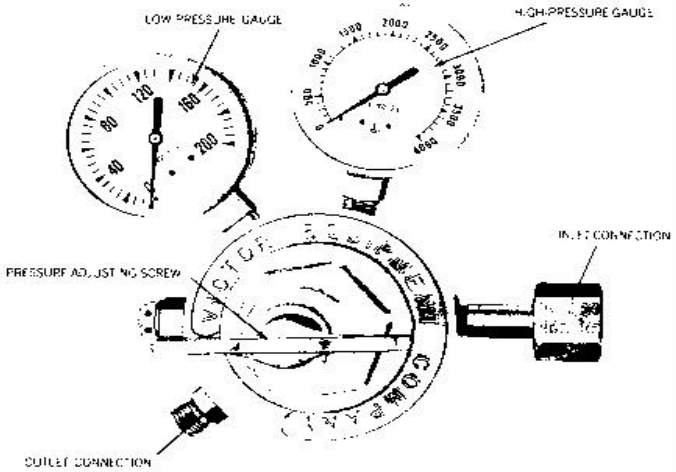
Acetylene Cylinders

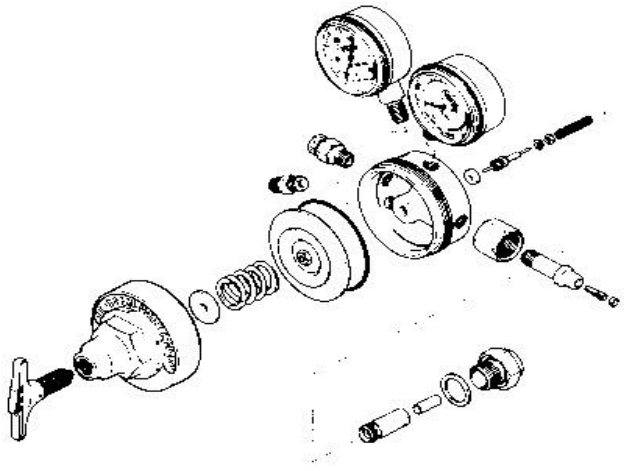
- Usually are steel construction
- Filled with a porous material to allow the acetone to dissolve the acetylene, which makes it stable
- Porous filler(8-10%), Acetone(42%)
- Acetylene gas(36%),
- Reserve volume-70^{o} F(10-12%)
- Comes in various sizes
- Must always be stored upright
- Should not be stored below freezing
- Never allow a tank to go empty



Regulators

- 1. Inlet Connection
  - Oxygen-right hand thread
  - Acetylene-left hand thread
  - Oil, grease, & dirt free
- 2. Pressure adjusting screw
  - Clockwise-gas is allowed to flow
  - Counterclockwise-gas flow stops
- 3. High pressure gauge
  - Indicates pressure from tank
- 4. Low pressure gauge
  - Indicates delivery pressure to hose
- 5. Outlet connections
  - Hose connections
  - Right or left thread





Hose

- Usually color coded - Oxygen (green) Acetylene (red)
- Neoprene over braided inner section
- Flame retardant, but will burn
- Hoses are graded

Torch handle

- Torch handle
- Control valve & body”Y”
- Barrel
- Torch head
- Check valves
  - prevents reverse gas flow
- Flashback arrestors
  - prevents flame from reaching the hose

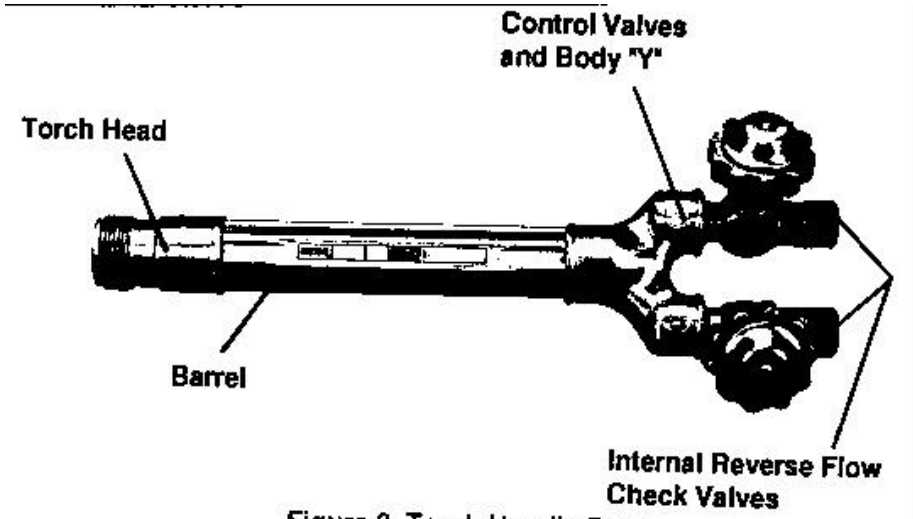
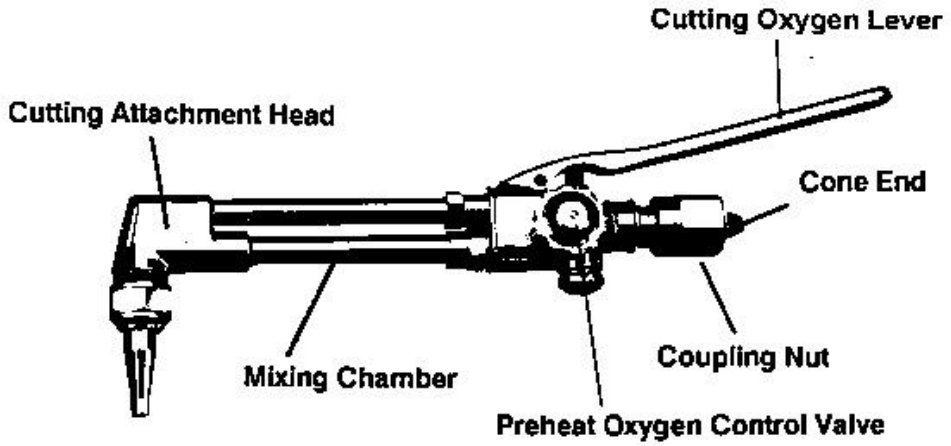


Figure 3, Torch Handle Parts

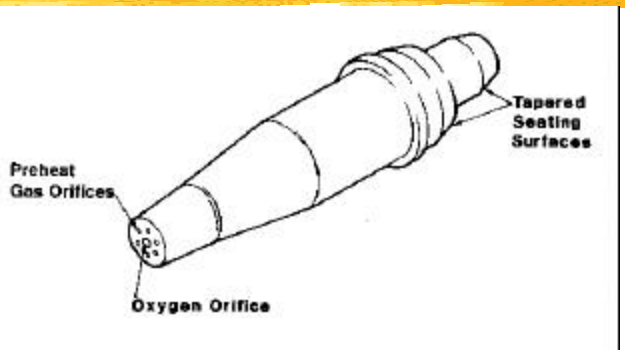
Torch cutting attachment

- Cone end and coupling nut
- Preheat oxygen control valve
- Mixing chamber tube
- Cutting oxygen lever
- Cutting attachment head

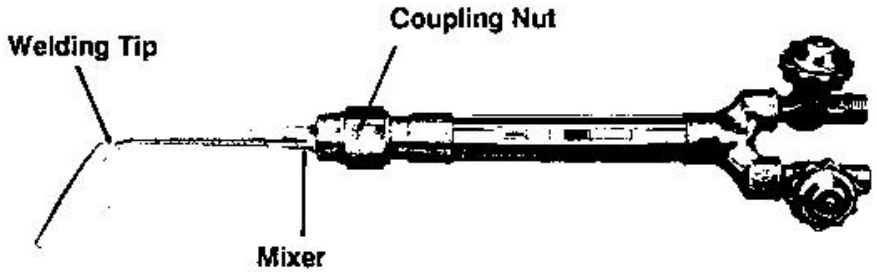


Cutting tips and nozzles

- **Cutting tip**



- **Welding nozzle**



Cutting Charts

TYPES 1-101, 3-1-1 & 5-101 (Oxy-Acetylene)

Metal Thickness	Tip Size	Cutting Oxygen		Pre-heat Oxygen*	Acetylene		Speed IPM	Kerf Width
		Pressure*** PSIG	Flow *** SCFH	PSIG	Pressure PSIG	Flow SCFH		
1/8"	000	20-25	20-25	3-5	3-5	6-11	20-30	.04
1/4"	00	20-25	30-35	3-5	3-5	6-11	20-28	.05
3/8"	0	25-30	55-60	3-5	3-5	6-11	18-26	.06
1/2"	0	30-35	60-65	3-6	3-5	9-16	16-22	.06
3/4"	1	30-35	80-85	4-7	3-5	8-13	15-20	.07
1"	2	35-40	140-160	4-8	3-6	10-18	13-18	.09
2"	3	40-45	210-240	5-10	4-8	14-24	10-12	.11
3"	4	40-50	280-320	5-10	5-11	18-28	10-12	.12
4"	5	45-55	390-450	6-12	6-13	22-30	6-9	.15
6"	6**	45-55	500-600	6-15	8-14	25-35	4-7	.15
10"	7**	45-55	700-850	6-20	10-15	25-35	3-5	.34
12"	8**	45-55	900-1050	7-25	10-15	25-35	3-4	.41

*Applicable for 3-hose machine cutting torches only. With a two hose cutting torch, preheat pressure is set by the cutting oxygen.

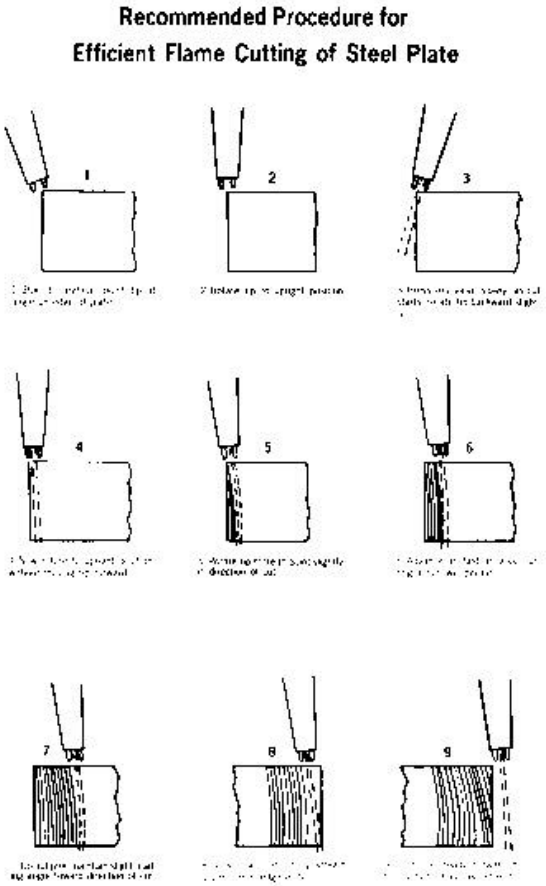
**For best results use ST 1600C-ST 1900C series torches and 3/8" hose using tip size 6 and larger

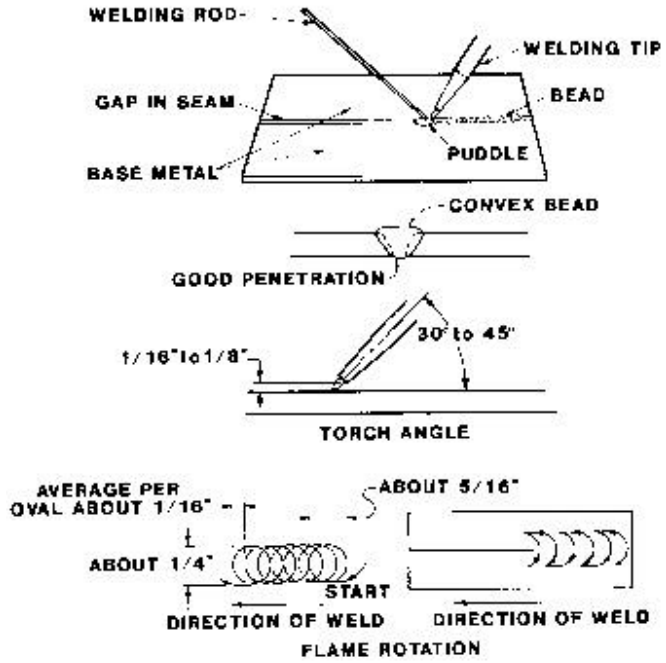
***All pressures are measured at the regulator using 25' x 1/4" hose through tip size 5, and 25' x 3/8" hose for tip size 6 and larger.

⚠WARNING **At no time should the withdrawal rate of an individual acetylene cylinder exceed 1/7 of the cylinder contents per hour. If additional flow capacity is required, use an acetylene manifold system of sufficient size to supply the necessary volume.**

Recommended Cutting Procedure

Welding Procedure





Federal Regulations - Title 30 CFR

- **Surface Metal & Nonmetal Mines**
  - **Part 56.4600 thru 56.4604**
- **Underground Metal & Nonmetal Mines**
  - **Part 57.4600 thru 56.4660**
- **Surface Coal Mines**
  - **Part 77.201-1, 77.1111, 77.1112, 77.1916**
- **Underground Coal Mines**
  - **75.321, 75.322, 75.1106, 75.1106-2 thru 75.1106-6**

State Requirements

- **Underground Bituminous Coal Mines**
  - **Part M- Section 274 thru 278**
- **Surface Coal Mines**
  - **Title 25- Chapter 209.71 & 209.72, 209.186**

General Safety Tips

- Never allow oxygen to contact oil, grease or other flammable substances
- Use the proper regulator for each specific gas
- Only qualified technicians should repair a regulator
- Keep regulators free of oil, grease and other flammable substances
- Check valves stop reverse gas flow, they do not act as a fire stop
- Never starve a tip, this can cause a flashback
- Always keep cylinders in an upright position
- Never stand in front or behind a regulator when opening the cylinder valve
- Do not open acetylene valve more than 1 $^{1}/_{2}$ turns
- Always make sure area is safe and flammable free

General Safety Tips

- Never mix brands
- Purge the lines before and after usage
- Always wear protective clothing
- Use proper eye protection
- If flashback occurs, immediately turn off the O_2, then the acetylene, and allow unit to cool
- Always work in a well ventilated area
- Always light the acetylene first
- Oxygen cylinders must be opened the whole way
- Use an approved striker, never use matches or cigarette lighter