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 its freezing point
- Oxygen does not burn or explode
- Oxygen is an accelerant, 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 4,600° F, 5,700° F when burned with oxygen
- Auto-ignition temperature is 763° - 824° 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°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
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

<table>
<thead>
<tr>
<th>Metal Thickness</th>
<th>Tip Size</th>
<th>Cutting Oxygen</th>
<th>Pre-heat Oxygen</th>
<th>Acetylene</th>
<th>Speed IPM</th>
<th>Kerf/Width</th>
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<tbody>
<tr>
<td></td>
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<td>Flow *** SCFH</td>
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*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**

Recommended Procedure for
Efficient Flame Cutting of Steel Plate

1. Preheat the cutting area.
2. Make a rough cut along the edge.
3. Finish the cut with a precise pass.
4. Clean and inspect the cut edges.

**Welding Procedure**

- **Welding Rod**
- **Welding Tip**
- **Gap in Seam**
- **Convex Bead**
- **Good Penetration**

- **Torch Angle**:
  - 30° to 45°
  - 1/16" to 1/8"

- **Average Per Oval**:
  - About 1/16"

- **Direction of Weld**:
  - Flame Rotation
  - About 5/16"
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