Oxy-Fuel Gas Welding

I. Competencies

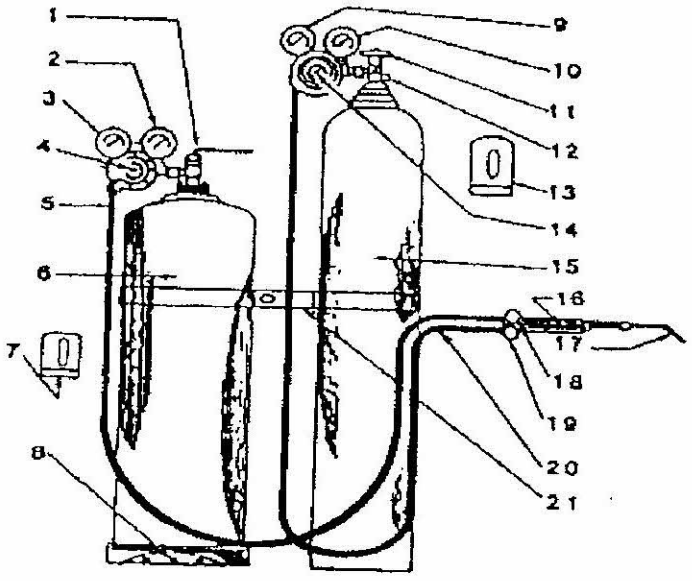
Given a functional oxy-fuel gas unit, instruction and demonstration of use, each student will be able to:

A. Identify the major parts of the oxy-fuel gas unit.
B. Pass a written test on safety and operation procedures on the oxy-acetylene unit with a minimum of 100 accuracy.
C. Demonstrate, on a performance test, ability to safely assemble, use and shut down the oxy-fuel gas unit.

II. Instructional Materials and Procedures

A. Identification of Basic Oxy-Fuel Gas Welder Parts:

1. Acetylene cylinder valve wrench
2. Cylinder pressure gauge (acetylene)
3. Line pressure gauge
4. Line pressure adjusting screw
5. Acetylene hose
6. Acetylene cylinder
7. Acetylene cylinder cap
8. Fusible plugs
9. Line pressure gauge
10. Cylinder pressure gauge
11. Oxygen cylinder valve
12. Safety valve
13. Oxygen cylinder cap
14. Line pressure adjusting screw (oxygen)
15. Oxygen cylinder
16. Torch body
17. Welding tip
18. Acetylene torch valve
19. Oxygen torch valve
20. Oxygen hose
21. Cylinder support



B. Oxy-fuel Gas Safety

1. Always refer to oxygen and acetylene by their proper names.

2. Never use oxygen or fuel gas from a cylinder except through an approved pressure-reducing regulator.

3. Connect regulators only to cylinders for which they were designed. Oxygen regulators to oxygen cylinders and acetylene regulators to acetylene cylinders.

4. Never use an acetylene hose on a oxygen cylinder or a oxygen hose on an acetylene cylinder.

5. Oil, pipe-fitting compounds, or thread lubricants should never be used on acetylene or oxygen connections.

6. Never release acetylene, or other fuel gases, into the atmosphere where they may cause a fire or explosion.

7. Systematically test all equipment with soapy water for leaks. Never use equipment that is leaking fuel gas or oxygen. This test should always be performed when full tanks are installed.

8. Do not tamper with fusible plugs or safety valves on cylinders. They are safety valves that open in case of excessive internal tank pressures.

9. Never use boiling water to thaw ice from the outlet of a fuel gas cylinder. Boiling water can melt the fusible plugs.

10. Do not open the acetylene cylinder valve more than ¾ of a turn when turning the unit on.

11. Always use the special wrench or key provided by the supplier to open and close acetylene cylinder valves not provided with handwheels. Such keys should always be left on the cylinder while in use in case of an emergency need to shut down.

12. Never use acetylene at line pressure above 15 p.s.i. Decomposition may occur and spontaneous combustion of the acetylene can result in an explosion.

13. Do not use the recessed top of any fuel gas cylinder as a place for tools.

14. Keep acetylene cylinder upright at all times.

15. Never use any cylinder, full or empty, as a roller or as a support.

16. Oxygen should never be used as compressed air. Clothing saturated with oxygen is highly combustible.

17. Do not handle oxygen cylinders on the same platform with oil.

18. Remove regulators and replace protective caps before moving cylinders unless the cylinders are secured on a suitable cylinder truck.

19. Cylinders stored inside buildings must be at least 20 feet from combustible materials.

20. Store oxygen cylinders separately from fuel gas cylinders. A non-combustible wall (block) 5 feet high should be used to separate cylinders.

21. Always store empty cylinders separate from full cylinders. Cylinders should be chained to the wall or secured in other ways to prevent them from falling or being turned over.

22. Approved goggles or face shields must be worn when welding or cutting. A number 4 shade lens is <u>minimum</u> for oxy-fuel gas welding and cutting.

23. Wear gauntlet gloves when gas welding or cutting.

24. Wear flame resistant clothing when gas welding or cutting.

25. Never use matches or a cigarette lighter to ignite the oxy-acetylene torch; an approved friction lighter should be used. Matches or butane lighters should <u>not</u> be carried in pockets when using the oxy fuel gas welder.

26. Make sure there is adequate ventilation before welding or cutting with the oxy-fuel gas welder.

27. Never do welding or cutting on containers that have held flammable or toxic substances. Welding such containers should only be done by personnel familiar with the American Welding Society practice recommendation (AWS A 60-65).

28. Never lay a burning oxy-fuel gas torch down.

29. Do not stand in front of a regulator when opening the cylinder valve.

30. Be sure that cylinders are turned off and <u>all</u> valves closed before leaving the gas welder.

31. Never leave hot metal where others may touch it and be burned.

32. Protect hoses from sparks, hot slag, hot objects, sharp edges, and open flames.

33. Replace damaged hoses before using an oxy-fuel gas welder.

C. Oxy-fuel Gas Operating Procedures

1. Attaching pressure-reducing regulators

   a. Chain acetylene and oxygen cylinders in an upright position so they cannot be knocked or fall over.

   b. Remove the protective caps from the oxygen and acetylene cylinders.

   c. "Crack" the cylinder valves by opening the valve quickly, about one-fourth turn, then close it immediately. This will clear the valve outlet of accumulated dust and dirt. Failure to crack the cylinder valves may cause the regulator seat to be marred or dirt to be carried into the regulator.

   d. Connect the oxygen regulator to the oxygen cylinder and the acetylene regulator to the acetylene cylinder; tighten securely.

   e. Turn the pressure-adjusting screw of each regulator to the left (counter-clockwise) until it rotates freely.

   f. Open the oxygen tank valve fully to prevent leaking around the valve stem. The oxygen tank valve is a double seated valve.

   g. Open each cylinder valve slowly. Always leave the wrench in place on the acetylene cylinder valve while the valve is open. Open the acetylene cylinder valve 3/4 of a turn to allow for fast turn-off if the need arises.

2. Connecting gas supplies to the torch

   a. Connect the end of the oxygen hose (green) and the acetylene hose (red) to the regulator and the torch body. Torch connection are normally marked "oxy" and "acet". It is impossible to attach hoses incorrectly since oxygen connections have right hand thread and acetylene connections have left hand threads.

b. Select the cutting tip or blow pipe that is suitable for the job you are to do. Refer to the manufacturers recommendation for specific sizes for given applications.

c. Hand tighten the welding tip or cutting torch on the torch body; make sure that all sealing rings are in place.

3. Adjusting operating pressures

a. Partially open the oxygen torch valve and adjust the oxygen regulator until the pressure corresponds to recommended pressure for the tip you are using. Close the oxygen torch valve.

b. Partially open the acetylene torch valve and adjust the acetylene regulator until the pressure corresponds to the recommended pressure for the tip you are using, then close the acetylene valve. For braze or fusion welding, oxygen and acetylene line pressures should be equal; for cutting oxygen line pressure will be greater than acetylene line pressure.

c. Test all connections for leaks using non-detergent soap (Ivory) and water solution.

4. Lighting and adjusting the flame

a. Open the acetylene torch valve about one-fourth turn.

b. Immediately light the flame with a friction lighter. NEVER USE A MATCH OR FLAMMABLE LIGHTER.

c. Adjust the acetylene flow, by turning the torch acetylene valve, until the flame just starts to produce black smoke around its edges; then increase acetylene flow just enough to get rid of the black smoke. Another method is to open the acetylene valve until the flame leave the end of the tip then reduce the acetylene flow until the flame comes back to the tip.

d. Open the oxygen torch valve slowly until the desired flame is obtained. The point at which the feather and the inner cone come together is the neutral flame. The carburizing flame is the flame reached before reaching the neutral flame. An oxidizing flame is one which has excess oxygen beyond the neutral flame.

5. Shutting down the oxy fuel gas welder

    a. First close the acetylene torch valve, then close the oxygen valve. Closing the acetylene valve first reduces the chance of allowing unburned fuel gas to escape and be ignited accidentally.

    b. First close both cylinder valves, then open the acetylene and oxygen valves on the torch body, one at a time. Allow the gas in each line to escape and see the line pressures go to zero on the regulator gauge.

    c. Close the acetylene and oxygen torch valves after the gas in each line has been released. This is to prevent the reverse flow of gas into an opposite line.

    d. Release the line pressure-adjusting screws on the acetylene and oxygen regulators.

BASIC FUEL-GAS WELDER PARTS

