OXY-FUEL WELDING AND CUTTING

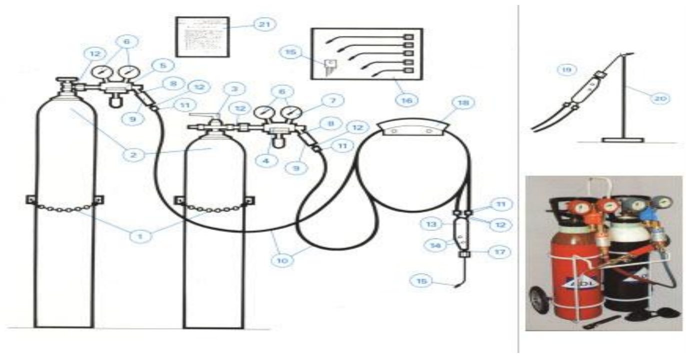
The “oxyfuel” system is an auxiliary technique to welding developed since 1903 and used to date in many industrial applications.

Flame cutting is used to make the edges of the work pieces and for sheet cutting (films of metal from 1 to 12 millimeters thin), pipes, steel bars, and other ferrous elements in repairs, being versatile to handle different materials.

These systems can easily cut ferrous materials for more than 200 mm (8 inches) and is a one of the preferred tools for manual cutting of thick steel (more than 38 mm or 1 ½ “),

The system of “oxyfuel” consists of:

- “Tanks or cylinders with fuel and comburent” (the use of these two highly inflammable gases and high pressure requires specific safety standards of maintenance, transport and storage),
- “pressure regulators” (which reduce the pressure in the tank from 150 atmospheres to pressures from 0.1 atmospheres to 10 atmospheres)
- “cutting torch” (which mixes the gases),
- “Return valves” (which allow passage of gas in one direction only)
- “Hose” (leading to the gases from the tanks to the torch and may be rigid or flexible).

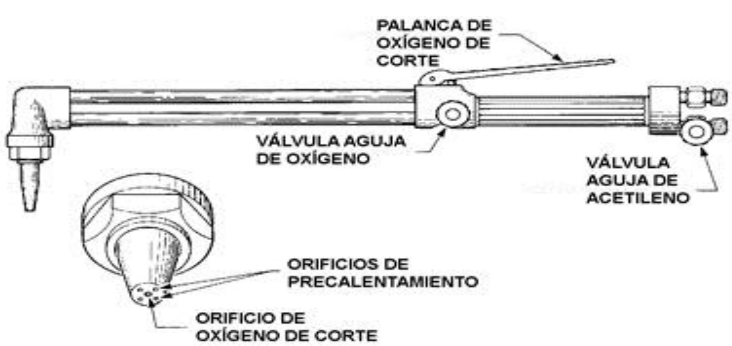


Oxygen valves and fuel should be opened at all during use to allow unrestricted passage and act as a seal.

The use of “welding goggles” is required every time to protect eyes from sparks and ultraviolet and infrared light that can damage them.

Tanks must be securely attached to a wall, post or portable cart to ensure stability.

The “cutting torch” does the gas mixture which has both hoses connection, control keys, a mixing chamber with a conduit for circulating the gas flame heating and one for cutting (oxygen), an injector, and a nozzle.

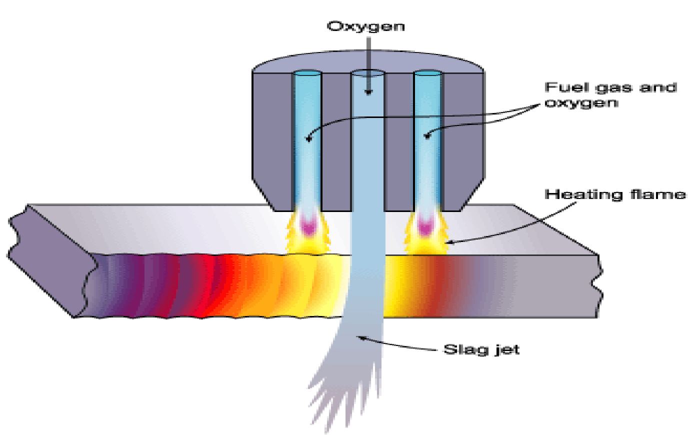


The system operates in two stages:

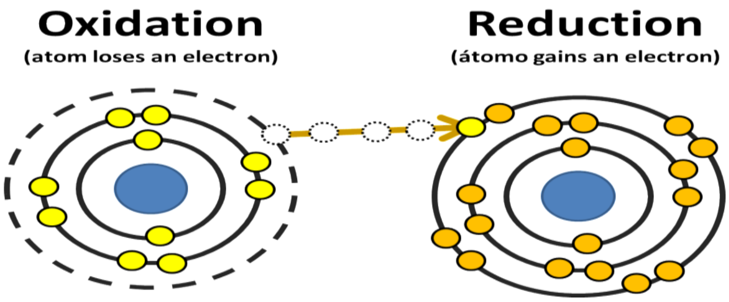
(1) the steel is heated at high temperature (900 ° C) with the flame produced by a fuel gas (contained in tanks with acetylene, propane, hydrogen or even gasoline) in the presence of oxygen (oxidizing gas that allows the focusing process) . Their goal is not to melt the metal, but take it to its ignition temperature.

An air-propane flame may reach 2000 ° C, while an oxygen-propane flame up to 2500 ° C and an oxygen-acetylene flame between 3200 ° C to 3500 ° C (although this is the combination of gas has a higher cost).

(2) an focused oxygen stream is injected (contained in high-pressure tanks) to provide the heat of flame. Because heat is released molecules combustion product has lower energy state that the molecules of fuel and oxygen.

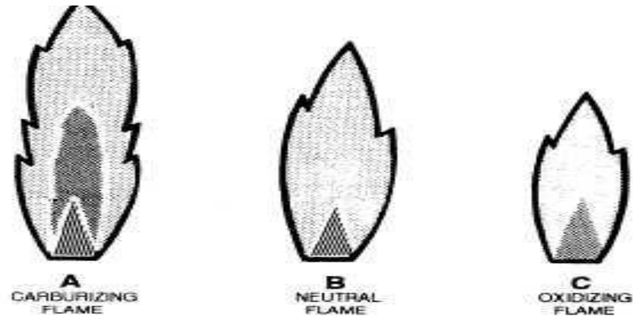


In the presence of oxygen at high temperatures focused, an exothermic oxidation occurs in the iron which supplies all the heat required to “burn” it, transforming it into ferric oxide (Fe2O3), which melts in the form of sparks because its melting is lower than that of steel or is blown across the surface.



The oxy-acetylene flame (acetylene is a hydrocarbon) can be set to be “carbonizing” (reductive, with excess of acetylene used for operations with hard surfaces that char metal), neutral (chemically neutral, with a clear blue core flame and the surroundings with dark blue or transparent about the most common and cutting or welding with ideal length of 8 mm) or oxidizing (when there is an excess of oxygen in the flame, but not recommended, only slightly on surfaces requiring bronze welding) .

Very little oxygen will make a slow ragged cut, while too much oxygen will waste oxygen and produce a concave cut, so special attention should be paid to dosage, since the cutting oxygen pressure must match the nozzle orifice.



Oxy-acetylene can only cut “low carbon” steel, “medium carbon steel” and “wrought iron.”

High carbon steel is difficult to cut because the melting point of the slag is closer to the melting point of the parent metal, so the slag does not come out as sparks but as mixtures with fused mass of the cut, which does not allows oxygen to reach the clean metal.

In the case of cast iron, graphite between grains and grain shape interfere with the cutting action. In the case of “stainless steel” cannot be cut because the material does not burn easily.

For these cases we recommend using plasma cutting.

Source: http://www.artinaid.com/2013/04/oxy-fuel-welding-and-cutting/