General recommendations to use a Flame installation for professional

The scope of these recommendations concerns the manual flame equipment in oxy-fuel:

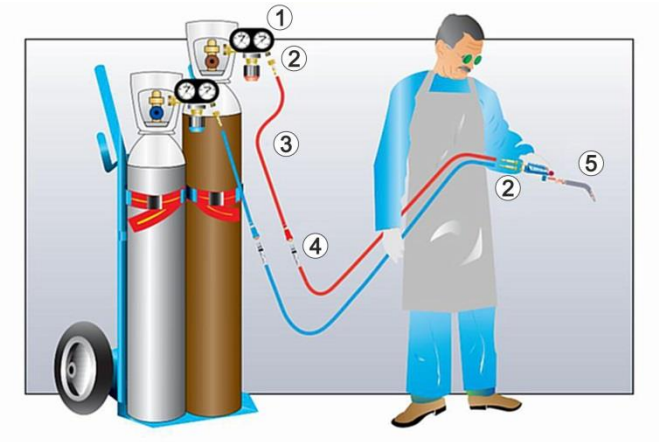
- Welding / Brazing
- Cutting
- Heating
- and related processes (Gouging, Forming, …)

These recommendations are the main ones / the list here below is not exhaustive.

Manufacturers guidelines must be strictly respected

Description of the installation:

In general, a flame installation has gas cylinders, pressure regulators, hoses, safety devices and a blowpipe.



- A cylinder of oxygen
- A cylinder of fuel gas
- pressure regulator (1)
- Flashback arrestor (2)
- Rubber hose (3)
- Quick connector and/or Flashback arrestor (4)
- A blowpipe (5)

Used Gases:

Oxy-fuel technology uses the heat combustion of a fuel gas (usually acetylene or propane) mixed with a quantity of an oxidizing gas (oxygen).
In oxy-cutting, the oxygen allows the burning of the steel and the evacuation of the slag (iron oxide) during the process.
Fuel gas and oxygen are available with different size of cylinders and / or in bundle. Valves are specific for each country following local standards.

Pressure regulator:

Pressure regulators are devices that allow pressure regulation of gases, mounted on the cylinder or at the outlet of distribution pipes in the case of a network.
They make it possible to reduce the variable gas storage pressure to a suitable and stable operating pressure.
They must comply with the standard EN ISO 2503. The inlet connection must be compatible with the valve of the cylinder and compliant with the local standards.

The outlet connection should comply to ISO TR 28821 which governs the definition of hoses connections for welding, cutting and allied processes equipment (listing of connections which are either standardized).

Commissioning

- Use only pressure regulator intended for the gas considered. Depending on the gas the fittings are different.
- Check the integrity and fleanliness of inlet connection before fitting and replace the pressure regulator when necessary.
- Be careful when attaching the pressure regulator to the cylinder.
- Do not disassemble inlet fittings of the regulator
- When using Oxygen make sure that all fittings are free from oil and grease
- After the first commissionning and regularly , check the complete installation woth and areosol leak dtector to avoid any leak

Adjustment:

- Before opening the cylinder, make sure that the pressure adjusting screw is fully unwood.
- Slowly open the cylinder valve and then adjust the pressure by tightening the pressure adjusting screw according to the settings recommended by the blowpipe manufacturer.

Safety devices:

Backfire and flashback can happen. In oxy-fuel processes it is important to use safety devices to provide maximum protection for the operator and his equipment.

Definition of backfire and flashback

In a backfire the flame burns back into the torch with an explosive sound. Either the flame is extinguished, or it is reignited at the top of the tip.
In a sustained backfire the flame continues back into the torch, often reaching the mixing point for oxygen and fuel gas. An initial explosion is followed by a whistling sound.
In a flashback, the flame recedes through the torch back into one of the supply hoses. The hose can explode. In the worst case, the flame can continue into the regulator and into the cylinder.

Causes of flashback

A gas mixture in one of the hoses in combination with a backfire when igniting a burner can cause a flashback. The gas mixture in the hose results from reverse flow, i.e. when gas at a high pressure flows into a hose with a lower pressure. If there is sufficient gas mixture in the hose the explosion can be so violent that the hose bursts.

Preventive measures

- To prevent reverse flow and flashback, safety devices incorporating check valve and flashback arrestor must be mounted on the regulators and/or the blowpipe. They are dealt with in different standards (ISO 5175 & EN ISO 5175-1.It is the best practice for operators to purge the oxy/fuel system prior for lighting.

See specific EWA recommendations on safety devices

Hoses:

Choose rubber hoses. They must comply with EN ISO 3821 “Rubber hoses for welding, cutting and allied processes”:

- Red for acetylene and marked 10 bars or 20 bars
- Blue for oxygen and marked 10 bars or 20 bars
- Orange for propane and marked 10 bars or 20 bars
- Red/ Orange for universal fuel gas except fluxed fuel gas and marked 10 bars or 20 bars

The indications 10 or 20 are indicative of the maximum service pressures in bars.
Hoses can be deteriorated and leak. As a precaution, consider the date of manufacture (it is clearly shown on the rubber hoses) and the conditions of use, and change them regularly.

Hoses assembly

To have a good and homogenous tightening, the use of ear collar or ferrule is recommended.
In order to avoid:

- Incorrect tightening
- An hose pinch
- A faster degradation of hose

Hoses assembly should be compliant with EN 1256 “Specification for hoses assemblies for equipment for welding, cutting and allied processes”

Quick coupling and coupling:

Use quick couplings according to EN 561 / ISO 7289 to connect the device to the rubber hoses. They protect the ends of the hoses and prevent leakage in case of unwanted disconnection.
Hoses must be mounted on quick coupling with the same color If used
The standard applies to cases where these coupling are used with hoses according to EN IS0 3821 or threaded unions according to EN560

Blowpipe:

There are several types of blowpipe for welding, cutting and heating, with different types of gas mixing systems (equal pressure without aspiration, injector with aspiration or nozzle mix).

Theses blowpipes must be compliant with the EN ISO 5172.

In case of use of heating blowpipe with heating power > 33 000 kcal, the recommendation of the EN TR 13259 must be followed.
The operating pressures of oxygen and fuel gas recommended by the manufacturer must be followed during the use.

Ignition Process

Welding blowpipes

1. Adjust oxygen and fuel gas pressure on pressure regulator according the manufacturer recommendations for the blowpipe type and size in use.
2. Slightly open oxygen valve (blue valve)
3. Open fuel gas valve. (red valve)
4. Light the torch. (don’t use a lighter with gas container)
5. Adjust alternatively the two valves to obtain a correct flame.

Cutting blowpipes

1. Fit the torch with a cutting nozzle, selected from the table, according to the thickness of the material to be cut and the fuel gas used.
2. Adjust oxygen and fuel gas pressure on pressure regulator according the manufacturer recommendations for the blowpipe type and size in use.
3. Slightly open the oxygen valve (blue).
4. Slightly open the fuel gas valve (red).
5. Light the torch.
6. Adjust alternatively the two valves to obtain a correct flame.
7. Make final adjustment after the cutting oxygen valve has been opened.

Heavy duty blowpipes

1. Adjust oxygen and fuel gas pressure on pressure regulator according the manufacturer recommendations for the blowpipe type and size in use.
2. Fully open oxygen valve
3. Open fuel gas valve.
4. Light the torch.
5. Adjust alternatively the two valves to obtain a correct flame.

The shut down process :

1. Close the fuel gas valve (flame is off)
2. Close the oxygen valve

IMPORTANT SAFETY WARNINGS

IN THE CASE OF BACKFIRE OR FLASHBACK, IMMEDIATELY TURN OFF THE BLOWPIPE:

1. **IN PRIORITY CLOSE THE OXYGEN BLOWPIPE VALVE**
2. **CLOSE THE FUEL GAS BLOWPIPE VALVE**
3. **MAKE SURE TO CHECK ALL THE COMPONENT PARTS, INCLUDING THE SAFETY DEVICES.**

End of use:

1. After use, shut-off the cylinder valves or the tapping point
2. Vent the gases out of hoses opening the valves of the torch.
3. Shut-off the valves of the torches.
4. Fully screw out the pressure regulator adjusting screw

Manufacturers guidelines must to be strictly respected:

Instruction for use of all equipment components shall be followed inclusive recommendation of the parameters set up to get safe, stabile and efficient flame. Equipment can only be used with the gas type it is designed for. Follow the equipment marking.

Additional recommendations:

- Secure the gas cylinders before use either at the workstation or on a suitable trolley.
- Dangerous fumes are emitted during welding, braze-welding and brazing use. Work in an area with good ventilation and/or fume extraction.

- Use appropriate personal safety equipment: goggles, gloves, apron.
- Do not carry gas cylinders in a vehicle not designed for the purpose (vehicle ventilated)
- Cylinders stowed, verify the closing of valves...
- Special attention should be paid on the fire prevention, fuel gas and oxygen related hazards, stocking and manipulation with the gas cylinders. Gases should be delivered by authorized and quality providers in the packages safe for manipulation and use.
- Cylinders shall be secured by using either trolley or chain to prevent falling in the workplace.
- The working area should be at suitable distance to prevent the overheating of the gas cylinders / gas distribution system.
- Local rules and conditions shall be followed.