

SAFETY IN GAS CUTTING

ACCIDENT STARTS WHEN SAFETY ENDS

Oxy/fuel gas equipment has many uses - welding, cutting, heating, straightening etc. The equipment is versatile, as a result, it is used widely in garages, machine shops, engineering workshops, plant maintenance and construction. It is so widely used that sometimes people forget about the dangers. Many people are injured each year by the incorrect or careless use of oxy/fuel gas equipment. Some people die.

Permit-to-work

Oxy/fuel gas equipment should not be used unless it has been authorised by a suitably experienced manager or supervisor who has knowledge of the site, the work to be carried out, the risks involved and the precautions to be taken.

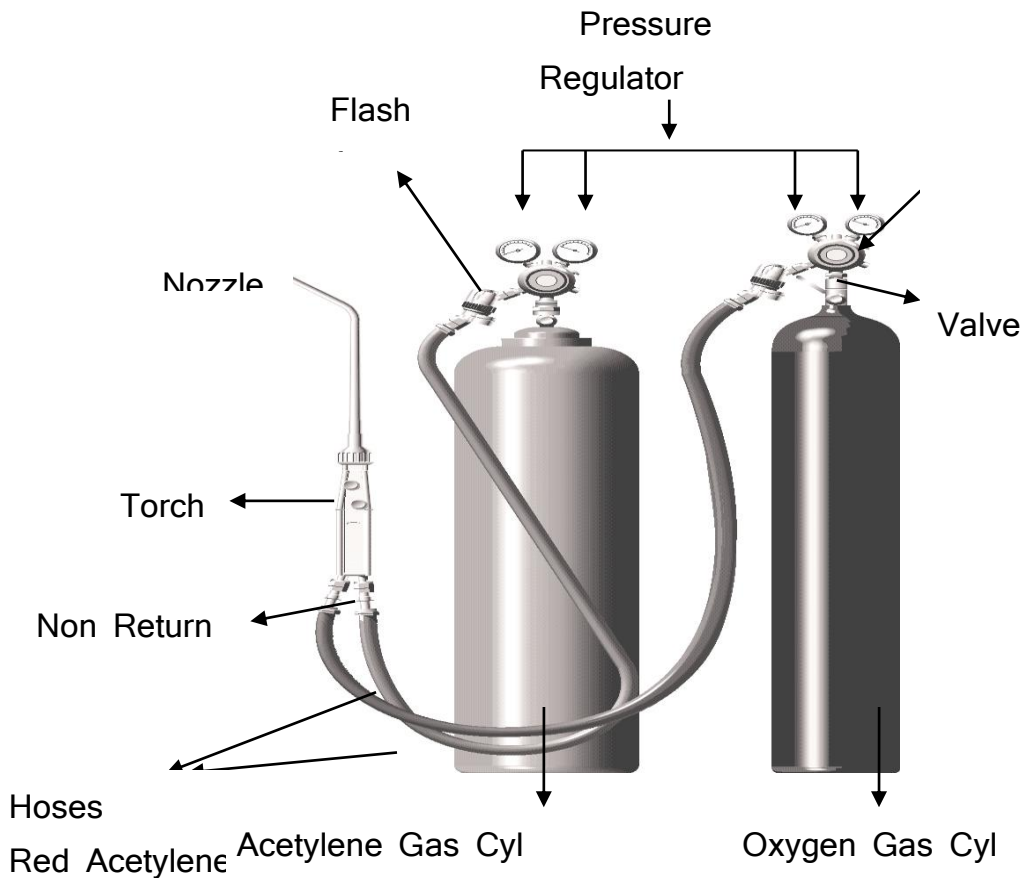
Training

No one should use oxy/fuel gas equipment unless they have received adequate training in:

1. The safe use of the equipment;
2. The precautions to be taken;
3. The use of fire extinguishers;
4. The means of escape, raising the fire alarm and calling the fire brigade.

Components of Oxy/Fuel Gas Equipment

- i. A fuel gas such as propane or acetylene is mixed with oxygen in a blowpipe (often called a 'torch') to produce a flame that is hot enough for the purpose.
- ii. Cylinders of oxygen and fuel gas (propane or acetylene);
- iii. A means to shut off or isolate the gas supply, usually the cylinder valves;
- iv. A pressure regulator fitted to the outlet valve of the gas cylinder, used to reduce and control gas pressure;
- v. A flashback arrester to protect cylinders from flashbacks and backfires;
- vi. Flexible hoses to convey the gases from the cylinders to the blowpipe;
- vii. Non-return valves to prevent oxygen reverse flow into the fuel line and fuel flow into the oxygen line;
- viii. A blowpipe or other burner device where the fuel gas is mixed with oxygen and ignited.



Hazard

Main hazards are from fire and explosion. These are caused by:

- i. Careless handling of a torch resulting in burns to the user or others;
- ii. Using the torch too close to cutting material;
- iii. Cutting up or repairing tanks or drums which contain or may have contained flammable materials;
- iv. Gas leaking from hoses, valves and other equipment;
- v. Misuse of oxygen;
- vi. Backfires and flashbacks.

Preventing injury from Torch

The following precautions will help to prevent injury:

- i. Work in a safe location away from other people;
- ii. Wear protective clothing and eye protection;
- iii. Shut off the torch when not in use.
- iv. Do not leave a lighted torch on a bench or the floor as the force of the flame may cause it to move;
- v. Clamp the work piece, do not hold it by hand;

- vi. Keep hoses away from the working area to prevent contact with flames, heat, sparks or hot spatter;

Preventing fire

The following precautions will help to prevent fire:

- i. Move the work piece to a safe location for carrying out the hot work process
- ii. Remove any combustible materials (such as flammable liquids, wood, paper, textiles, packaging or plastics) from within about 10 metres of the work
- iii. Ventilate spaces where vapours could accumulate, such as vehicle pits or trenches
- iv. Protect any combustible materials from close contact with flame, heat, sparks or hot slag. Use suitable guards.
- v. Check for hidden combustible materials behind walls or partitions which could be ignited. Some wall panels contain flammable insulation materials;
- vi. Use guards or covers to prevent hot particles passing through openings in floors and walls (doorways, windows, etc);
- vii. Maintain a continuous fire watch during the period of the work, and for at least an hour afterwards
- viii. Keep fire extinguishers nearby.

Explosion

You must never use an oxy/fuel gas blowpipe/Torch on a drum or tank that has contained or may have contained flammable material unless you know it has been made safe.

Tyres

Similarly, you must never weld or flame cut wheels to which tyres are fitted. The heat may generate flammable vapour from any oil or lubricating fluid on the inner rim of the wheel. This vapour, confined by the tyre may be enough to cause an explosion, if ignited. These explosions are very violent and can kill. Always remove the tyre.

Preventing Gas leaks

The following precautions will help to prevent leaks:

- i. Keep hoses clear of sharp edges and abrasive surfaces or where vehicles can run over them;
- ii. Do not allow hot metal or spatter to fall on hoses;
- iii. Handle cylinders carefully. Keep them in an upright position and fasten them to prevent them from falling or being knocked over. For example, chain them in a wheeled trolley or against a wall;
- iv. Always turn the gas supply off at the cylinder when the job is finished;
- v. Maintain all equipment and keep in good condition;
- vi. Regularly check all connections and equipment for faults and leaks.

Checking For Gas Leaks

- i. You should take suitable precautions when checking for gas leaks. You should use solution suitable for use with oxy/fuel systems.
- ii. When the leak is found, you should repair or replace the component immediately. Any detergent should be flushed off with clean water to remove any corrosive salts. You must never look for gas leaks with a naked flame.
- iii. If a cylinder leaks when the valve is closed, the cylinder should be taken outside to a ventilated area, away from sources of ignition. You should notify the supplier immediately.

Ventilation

Small leaks may not be detected immediately. If they leak over a period of time into a poorly ventilated room, a dangerous concentration of gas may accumulate. To prevent gas accumulating:

- i. Always provide adequate ventilation during welding and cutting operations;
- ii. Store gas cylinders outside whenever possible or in a well-ventilated place;
- iii. Avoid taking gas cylinders into poorly ventilated rooms or confined spaces.

Backfire and Flashback

- i. Backfire and flashbacks are usually caused by defective or incorrectly operated equipment. A backfire is when the flame burns back into the blowpipe/Torch often with a sharp bang.
- ii. Backfire happen when the blowpipe is held too close to the work piece, or
- iii. if the nozzle is blocked or partly blocked. The flame may go out or it may re-ignite at the nozzle. Sometimes the flame burns back into the blowpipe, and burning continues at the mixing point.

If a backfire does occur:

- i. Shut off the blowpipe valves, oxygen first and then the fuel gas;
- ii. Shut off the oxygen and fuel gas cylinder valves;
- iii. Cool the blowpipe with water, if necessary;
- iv. Check the equipment for damage or faults, particularly the nozzle.

Flashback

Flashbacks are caused by a reverse flow of oxygen into the fuel gas hose (or fuel into the oxygen hose), producing an explosive mixture in the hose. The flame can then burn back through the blowpipe, into the hose and may even reach the pressure regulator and the cylinder. They can result in damage or destruction of equipment, and could even cause the cylinder to explode. This could end in serious injury to personnel and severe damage to property.

Preventing Flashback

The following precautions will help to prevent flashbacks:

- i. Use the correct lighting up procedure. Wash out the hoses before lighting the blowpipe/Torch to remove any potentially explosive gas mixtures. Use a spark igniter and ignite the gas quickly after turning it on;
- ii. Ensure the blowpipe/Torch is fitted with spring-loaded non-return valves to prevent a backflow of gas into the hoses;
- iii. Use the correct gas pressures and nozzle size for the job. In particular, the acetylene pressure must not exceed 0.62 bar
- iv. Maintain the equipment in good condition.

These measures will reduce the risk of a flashback but will not completely eliminate it. Non-return valves will not stop a flashback once it has occurred. As the consequences of a flashback are potentially very serious, cylinders should be protected.

Protecting cylinders from flashbacks

- i. To protect a cylinder, you should fit flashback arresters onto the regulator, on both the fuel and oxygen supply.
- ii. The fitting of a flashback arrester should not be considered as a substitute for safe working practice.

Prevent Flashback

Immediately close the cylinder valves, both fuel gas and oxygen, if it is safe to do so. The flame should go out when the fuel gas is shut off. If the fire cannot be put out at once, evacuate the area and call the emergency fire services;

The blowpipe, hoses, regulators, flashback arresters and other components may have been damaged. Check carefully and replace if necessary before reuse.

Acetylene Cylinder

You should pay particular attention to any acetylene cylinder which has been involved in a flashback or has been affected by fire. There is a risk that the acetylene could start to decompose, and the cylinder could explode within a few minutes. If an acetylene cylinder becomes hot or starts to vibrate, you must evacuate the building immediately and call the emergency fire services.