

Technical Newsletter from
ADOR WELDING LIMITED
Formerly **Advani - Oerlikon Ltd.**

SAFETY PRECAUTIONS IN GAS CUTTING AND WELDING

Introduction

Oxy/fuel gas equipment has many uses - welding, cutting, heating, straightening, and descaling. Oxy fuel process may use a variety of fuel gases such as acetylene, LPG, Propane, Nitrogen, natural gas, the most common being acetylene. The equipment is versatile, easy to move and cheap. 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. This paper describes the hazards associated with portable oxy/fuel gas equipment and the precautions for avoiding injury and damage to property.

The Main Hazards are:

1. Fire caused by heat, sparks, molten metal or direct contact with the flame.
2. Explosion when cutting up or repairing tanks or drums which contain or may have contained flammable materials.
3. Explosion caused by gas leaks.
4. Explosion caused by backfires and flashbacks.
5. Fumes created during flame cutting.
6. Fire/burns resulting from misuse of oxygen.
7. Burns from contact with the flame or hot metal.
8. Crushing or impact injuries when handling and transporting cylinders.

Product Update

KINGBOND

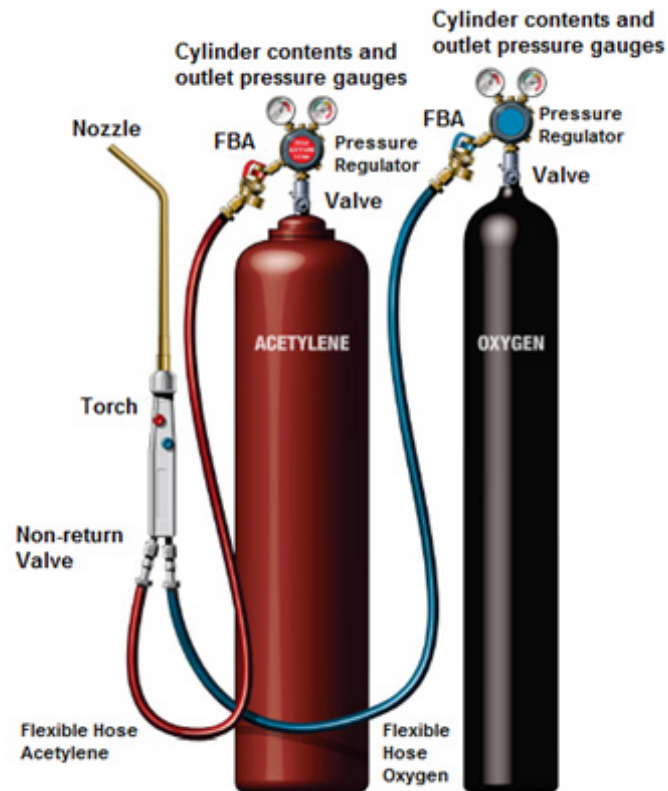
KING of E 6013 class of electrodes



- Radiographic Quality Weld
- Comes with BIS certification
- Operates at as low as 50V OCV
- Easy Arc striking / re-striking Toness upto zero degree

[read more](#)

Figure 1: Standard Oxy-Acetylene Cutting Set up



Some of the precautions to be taken to avoid injury and damage are described below.

1. Preventing fire from heat, sparks, molten metal or direct contact with flame

The flame from an oxy/fuel gas torch (often called a 'blowpipe') is a very powerful source of ignition. Careless use of oxy/fuel torches has caused many fires. The flame will quickly set light to combustible material such as wood, paper, cardboard, textiles, rubber, and plastics. Many processes also generate sparks and hot spatter which can also ignite these materials.

The following precautions will help prevent fire:

- Move the workpiece to a safe location for carrying out hot work.

KING Series of Gas Cutting Products



- **KING TIGER**
Portable Gas Cutting Machine
- **KING JOIN - AGWT / HT-1**
Gas Heating Torch
- **KING PANTHER**
Portable Gas Cutting Machine

[read more](#)

KING of WELDING ACCESSORIES



- **KING COOL - 600 AMPS -
Medium Duty - PART NO
.S12.06.001.0201**

- Remove nearby combustible materials (such as flammable liquids, wood, paper, textiles, packaging or plastics).
- Protect nearby combustible materials that cannot be moved. Use suitable guards or covers such as metal sheeting, mineral fibre boards or fire-retardant blankets.
- Check that there are no combustible materials hidden behind walls or in partitions, particularly if the welding or cutting will go on for some time. Some wall panels contain flammable insulation materials, e.g. polystyrene.
- Use flame-resistant sheets or covers to prevent hot particles passing through openings in floors and walls (doorways, windows, cable runs, etc).
- If the consequences of a fire are severe, eg work inside ships, you may need to appoint a fire watch during and after the work finishes. It is normal to maintain fire watch for 30 minutes after hot work finishes.
- Prevent flame, heat, sparks or hot spatter from landing on the hoses.
- Keep fire extinguishers nearby.

2. Explosion when cutting up or repairing tanks, drums and tyres

Figure 2: Cutting up scrap



If a welding blowpipe or burner is used on a tank or drum containing flammable material (solid, liquid or vapour), it can explode. Such explosions have killed people. As well as flammable liquids such as petrol, diesel and fuel oil, substances such as paints, glue, anti-freeze and cleaning agents may also release flammable vapours. Tanks and drums that are 'empty' usually still have residues in the bottom, and in seams and crevices. Just a teaspoon of flammable liquid in a drum can be enough to

- **KING SWORD - 600 AMPS - Heavy Duty** - PART NO .S12.06.001.0202
- **HEAVY DUTY EARTHING CLAMP - 600 AMPS** PART NO. .S12.06.001.0203
- **KING SHIELD- HAND (83 X 108mm)** PART NO. .S12.06.001.0204
- **KING SHIELD - HEAD** PART NO. .S12.06.001.0205
- **KING SHIELD - AUTO** PART NO. .S12.06.001.0206
- **ADOR Welding HAND GLOVES** PART NO. .S12.06.001.0207
- **ADOR SAFETY FOOTWEAR**

[read more](#)

Visit our Stand No. 6B01
at
INDIA ESSEN WELDING & CUTTING 2012
(5th International Trade Fair Joining
Cutting Surfacing)
at Mumbai, INDIA
during 30th/31st Oct & 1st Nov. 2012.

Helpline No.
1 800 233 1071

For Welding &
Cutting Equipment,
Service & Spares

FREE SERVICE CLINIC
can be arranged on
request if you have 25 or
more numbers of AWL
make welding and cutting
equipment at single site/
nearby site. For Further
Details Please E-Mail to
cmo@adorians.com

cause an explosion.

Never use an oxy/fuel gas blowpipe on a drum or tank that has contained, or may have contained, flammable material, unless you know it is safe. It may be safer for a specialist company to carry out the work. If in doubt, ask.

Tyres

The heat from hot work can generate flammable vapour from any oil or flammable residue on the inner rim of the wheel. The rubber itself can degrade when heated and release flammable materials and toxic emissions. This vapour, confined by the tyre can cause an explosion. These explosions are very violent and can kill. Avoid welding or flame cutting on wheels which have tyres fitted, even if the tyre is deflated. If you can't remove the tyre, use cold cutting methods, e.g. a saw or hydraulic shears.

3. Fire/explosion caused by gas leaks

Acetylene, LPG and other fuel gases are highly flammable, and form explosive mixtures with air and oxygen. Even small leaks can cause a flash fire or explosion, particularly if they are leaking into a poorly ventilated room or confined space where the gases can accumulate. Gas leaks are often the result of damaged or poorly maintained equipment, poor connections or not closing valves properly after use.

The following precautions will help to prevent leaks:

- Turn the gas supply off at the cylinder when the job is finished or before the cylinders are moved or transported.
- Isolate and purge or remove hoses and equipment from enclosed or poorly ventilated spaces when there is a break in work.
- Keep hoses away from sharp edges and abrasive surfaces or where vehicles can run over them.
- Do not allow hot metal or spatter to fall on hoses.
- Maintain all equipment and regularly check its condition.

Checking for leaks

Regularly check all connections and equipment for faults and leaks. Equipment used in aggressive conditions such as demolition work or heavy engineering will normally need more frequent checks, e.g. weekly.

- Use a proprietary leak detecting spray or solution suitable for use with oxy/fuel systems. Do not use soapy water or solutions containing grease or oils on oxygen systems.
- Never look for gas leaks with a naked flame.

Service Clinics During the Month of September 2012

- M/s ONSHORE CONSTRUCTION COMPANY KALAMBOLI – MUMBAI AREA - 22 Nos.
- M/s WMI CRANES JEJURI – PUNE AREA - 17 Nos.

Ador Welding Academy (AWA)



- Immediately repair or replace leaking components.

Leaking hoses should not be repaired, but they can be shortened to remove a damaged section. Refit hose tails using crimp clips designed for that task. Screw tightened crimps (jubilee clips) are not recommended. There is a risk of leaks due to over tightening or under tightening them.

If a cylinder leaks when the valve is closed

If it is safe to do so, move the cylinder outside and away from sources of ignition (naked flames, sparks, electric motors, etc). Prevent unauthorised access and notify the cylinder supplier immediately.

4. Explosion caused by Backfires and flashbacks

Backfires

A backfire is when the flame burns back into the torch, often with a sharp bang.

This may happen when the torch is held too close to the workpiece, or if the nozzle is partly blocked. The flame may go out or it may reignite at the nozzle. Sometimes the flame burns back into the torch, and burning continues inside it. Backfires do not usually cause injury or damage, but they can indicate a fault in the equipment.

If a backfire does occur:

- Shut off the torch valves, oxygen first (usually coloured blue) and then the fuel gas (usually coloured red).
- Shut off the oxygen and fuel gas cylinder valves.
- Cool the blowpipe with water if necessary.
- Check the equipment for damage or faults, particularly the nozzle.

Flashbacks

Flashbacks are commonly caused by a reverse flow of oxygen into the fuel gas hose (or fuel into the oxygen hose), producing an explosive mixture within the hose. The flame can then burn back through the torch, into the hose and may even reach the regulator and the cylinder. Flashbacks can result in damage or destruction of equipment, and could even cause the cylinder to explode.

The following precautions will help to prevent flashbacks:

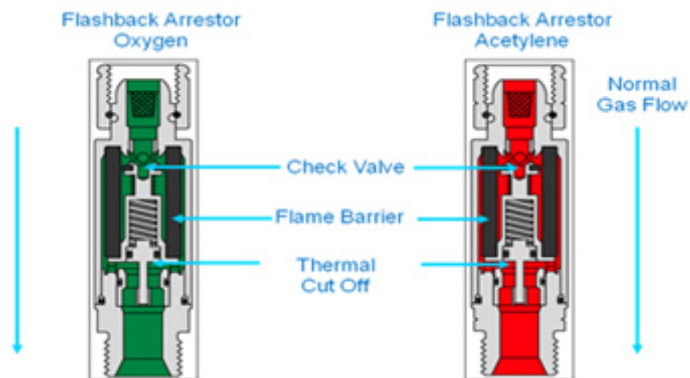
- Use the correct lighting-up procedure. Purge the hoses before lighting the torch to remove any potentially explosive gas mixtures. Use a spark igniter and light the gas quickly after turning it on.
- Make sure the blowpipe is fitted with spring-loaded non-return valves.
- Use the correct gas pressures and nozzle size for the job.
- 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.

Protecting cylinders from flashbacks

Fit flashback arresters to both the oxygen and fuel gas hoses near to the regulators. For long lengths of hose, fit arresters on both the torch and the regulator.

Figure 3: Flashback Arrestor



The fitting of a flashback arrestor is not a substitute for safe working practice.

If a flashback does occur:

- If it is safe to do so, close the cylinder valves on both fuel gas and oxygen.
- If the fire cannot be put out at once, evacuate the area and call the emergency fire services.
- After a flashback, carefully check for damage to the torch, hoses, regulators, flashback arresters and other components. Replace parts if you need to. If in doubt, consult your supplier.

Acetylene cylinders

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

5. Fumes created during welding and flame cutting

The fume from welding and flame cutting metals is harmful. You can use fume extraction and/or filtering respirators (respiratory protective equipment or RPE) to reduce the risk of ill health.

Dirt, grease and other contamination increases the amount of fume generated and can introduce very toxic substances to it. Hot work on items with lead paint, chromium (chromate) paint or cadmium plating is particularly hazardous.

- If you flame cut outdoors and the metal is clean and unpainted you will not normally need RPE. Try to work in a position where the wind blows the fume cloud away from you and other people.
- If you flame cut indoors or in conditions where there is little air movement, the need for extraction and/or RPE depends on how much cutting you are going to do.
- Automated flame cutting machines, particularly multi-head machines need fume extraction fitted to them.
- Work on materials coated with lead or chromate paints, galvanised or cadmium plated or metal contaminated with oil, grease etc are likely to require fume control such as extraction and/or RPE.

6. Fire/burns from misuse of oxygen

Oxygen leaks also increase the fire risk. Clothing contaminated with oxygen, even fire-retardant clothing, will catch fire easily and burn very fiercely. Oxygen can cause explosions if used with incompatible materials. In particular, oxygen reacts explosively with oil and grease.

You must take the following precautions:

- Never use oxygen to blow dust off clothing.
- Never attempt to improve air quality inside confined spaces by releasing oxygen in the space.
- Never allow oil or grease to come into contact with oxygen valves or cylinder fittings.
- Only use equipment designed for use with oxygen. In particular, check that the regulator is safe for oxygen and for the cylinder pressure.

7. Contact burns

The following precautions will help to prevent burns from contact with the flame, hot metal, sparks and molten slag:

- Work in a safe location away from other people.
- Wear protective clothing, boots, gauntlets and eye protection.

- Shut off the torch when not in use. Do not leave a lighted torch on a bench or the floor as the force of the flame may cause it to move.
- Clamp the workpiece, avoid holding it by hand.

8. Crushing or impact injury

The following precautions will help prevent injury when handling and transporting cylinders:

- Prevent cylinders from falling or being knocked over by securing them with a stout chain or strap. It is normal to chain them to a wheeled trolley or against a wall.
- If a cylinder falls over and its valve strikes something and is knocked off, the cylinder will become a deadly missile.
- Avoid moving a cylinder by tilting it on its base and rolling it. It is better to use a trolley.
- If transported in a road vehicle, the cylinders should be secured so they don't come loose in an accident.

Training

Oxy/fuel equipment is relatively easy to use but users may still need some instruction or training in:

- The safe use of the equipment, including the correct methods to purge the gas, light and shut down.
- General safe working practices and the precautions to take.
- Ensure personal safety by wearing eye goggles and protective work clothing during operation.
- Hose pipes have a colour code. Use the right colour hose pipe for the particular gas eg LPG should not be used in pipe coded for acetylene.
- Use genuine spares when replacing/ repairing equipment.
- When and how to use the fire extinguishers.
- Information about escape routes, how to raise the fire alarm and emergency procedures.

Permit-to-work

The potential for injury and property damage are such that many companies want to control hot work very closely. One way to achieve this is to operate a written permit system for welding and flame cutting work. Sometimes called hot work permits, they aim to ensure that welding and flame cutting does not start until after the risks for that particular task are identified and measures to eliminate or control risk are in place.

A permit should specify:

- What work will be done.
- How and when it is to be done.
- What safety and health precautions are needed.
- Who is responsible for checking it is safe to start.
- Who will check the work is done safely.
- Who is responsible for confirming that work is complete and there is no longer a risk from, or to, the people doing the work.

Preventing fire or explosion when storing and transporting cylinders

Small leaks may not be detected immediately. If they leak into a poorly ventilated room, a van or confined space, a dangerous concentration of gas may accumulate.

To prevent gas accumulating:

- Close the cylinder valves when the equipment is not in use.
- Always provide adequate ventilation during welding and cutting operations.
- Store gas cylinders outside whenever possible, or in a well-ventilated place.
- Avoid taking gas cylinders into poorly ventilated rooms or confined spaces.

The most important safety measure when transporting cylinders in vehicles is to close the cylinder valve. It is preferable to carry cylinders in an open-backed, pick-up style van. Fitting cages to the load bed may help prevent theft of the equipment. If cylinders are carried in enclosed load spaces then there should be additional ventilation fitted. Cabin ventilation is not sufficient.

For further information on safety precautions and to know more about AWL range of Gas Cutting Products and Accessories, please do write on cmo@adorians.com or visit us www.adorwelding.com



Welding Consumables



Welding & Cutting Equipment



Welding Automation



Project Engineering



WELDERS TO THE NATION SINCE 1951

ADOR WELDING LIMITED

(Formerly known as Advani-Oerlikon Limited)



www.adorwelding.com

cmo@adorians.com

Contact us