WELDING SAFETY

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OSHA 1910.252

HOT WORK:
Hot work is a term used to describe heat and spark producing operations such as welding, flame cutting and grinding.

WELDING:
Welding is the most common way of permanently joining metal parts. In this process, heat is applied to metal pieces, melting and fusing them to form a permanent bond.

CUTTING /GRINDING:
Any process, including grinding, which produces sparks capable of igniting combustible or flammable materials and transmits heat to the work material from a hot gas.

HOT WORK HAZARDS

HAZARDS IN A WORKPLACE:

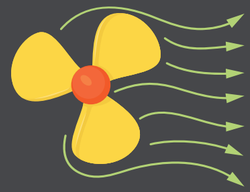
- Open flames or flying sparks that are able to ignite any flammable gases and vapors; and
- The hot work itself may produce toxic fumes and gases.
- Carrying out welding or cutting inside a confined space.

The respiratory hazards arise when welding or cutting operation may evolve toxic fumes or gases due to presence of materials such as paints, coating, oils, grease, chemicals, galvanized metals, zinc, brass, bronze and manganese steel etc.

HOT WORK CONTROL MEASURES

CONTROLS MEASURES:

- Remove all flammable or explosive materials before work commences;
- Wetting down of materials to reduce its flammability;
- Isolation of hot work area .i.e. enclosed with fire blankets;
- Availability of trained fire watcher;
- Remove the residues of flammable materials;
- Testing for flammable and fermentation gases (e.g. methane);
- Special precautions (e.g. using a lookout);
- Personal Protective Equipment (PPE);



- Suitable tools, equipment and materials to be used for the work;
- Emergency procedures;
- Availability of the firefighting equipment.

- Check that ventilation systems and fume extraction equipment are operating satisfactorily to expel toxic gas / fumes generated due to welding / cutting / soldering / brazing activities being carried out inside a tank / vessel or any confined space.
- Ensure the gas tests are carried out prior to commencement of the task and wherever required continuously, throughout the duration of the task.
- Compliance of Permit to Work procedure.

WELDING HAZARDS

HEALTH HAZARDS:

- Burns
- Electrical shock and burns
- Infrared and ultraviolet Eye injury from looking at the arc without eye protection
- Lung irritation or poisoning from toxic gases or fumes from the welding operation

PHYSICAL HAZARDS:

- Fire
- Potential Explosion when welding in close proximity to closed containers that have held flammable liquids or other combustible materials
- Potential Flash fire when welding in close proximity to flammable or combustible vapors at the worksite






TYPES OF WELDING OPERATING PROCEDURES

ELECTRIC WELDING AND CUTTING

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WELDING MACHINE

GAS WELDING AND CUTTING

↓

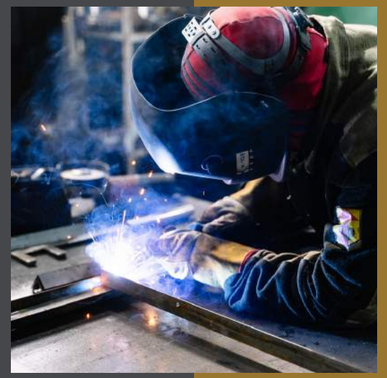
OXY ACETYLENE

GAS TUNGSTEN ARC (TIG)

welding is often used with stainless steel or aluminum. TIG uses welding rods, where the welder holds the welding rod in one hand and an electric torch in the other hand. The torch is used to simultaneously melt the rod and the workpiece.

GAS METAL ARC (MIG)

welding uses a spool of continuously fed wire, which allows the welder to join longer stretches of metal without stopping to replace the rod. The welder holds the wire feeder which functions like the alligator clip in arc welding. Instead of using gas flux surrounding the rod, TIG and MIG protect the initial weld from the environment by blowing inert gas onto the weld.



OXYGEN-FUEL GAS WELDING

The act of joining metal by generating extremely high heat during combustion.

RESISTANCE WELDING

The act of joining or cutting metals by generating heat through resistance created by the flow of an electric current.

GAS METAL ARC (MIG)

The act of joining or cutting metals by generating heat from an electric arc that extends between the welding electrode and the electrode placed on the equipment being welded.

ELECTRIC WELDING AND CUTTING SAFETY PRECAUTIONS

PERFORM SAFETY CHECK ON ALL EQUIPMENT

- Ensure fire extinguisher is charged and available.
- Ensure electrical cord, electrode holder and cables are free from defects (no cable splices are allowed within 10 feet of the electrode holder.
- Ensure PPE (welding hood, gloves, rubber boots/soled shoes, aprons) are available and have no defects.
- Ensure the welding unit is properly grounded.

ELECTRIC WELDING AND CUTTING SAFETY PRECAUTIONS

PERFORM SAFETY CHECK ON ALL EQUIPMENT

Examine equipment frequently to determine that all electrical connections and insulations on holders and cables are in good condition. Loose cable connections may overheat or arc cause a fire.

Keep welding cables dry, grease and oil-free, and protected from sparks or hot metal.

Store welding rods in the container on the welding machine, do not throw on floors or staging.

ELECTRIC WELDING AND CUTTING SAFETY PRECAUTIONS

SET VOLTAGE REGULATOR NO HIGHER THAN THE FOLLOWING FOR

- Manual Alternating Current Welders – 80 volts.
- Automatic Alternating Current Welders – 100 volts.
- Manual or automatic Direct Current Welders – 100 volts.

UNCOIL AND SPREAD OUT WELDING CABLE.

- To ensure proper contact of work leads and connection.
- To remove any metal fragments from magnetic work clamps (to avoid electric shock do not wrap welding cables around a body part and avoid welding in wet conditions).

AVOID OVERHEATING

- Prior to spot welding, the material is usually cleaned in a caustic or slightly acid bath. Employees performing these wash operations shall be protected from splashing liquid.
- The operator shall make necessary adjustment to the contactors
- In hand spot welding installations, eye protection shall be required to protect the operator from the spattering metal.
- Welding of materials such as stainless and high carbon steels causes excessive spattering of metal. Operators shall be cautioned to protect against the possible penetration of the metal into the tips of the fingers.

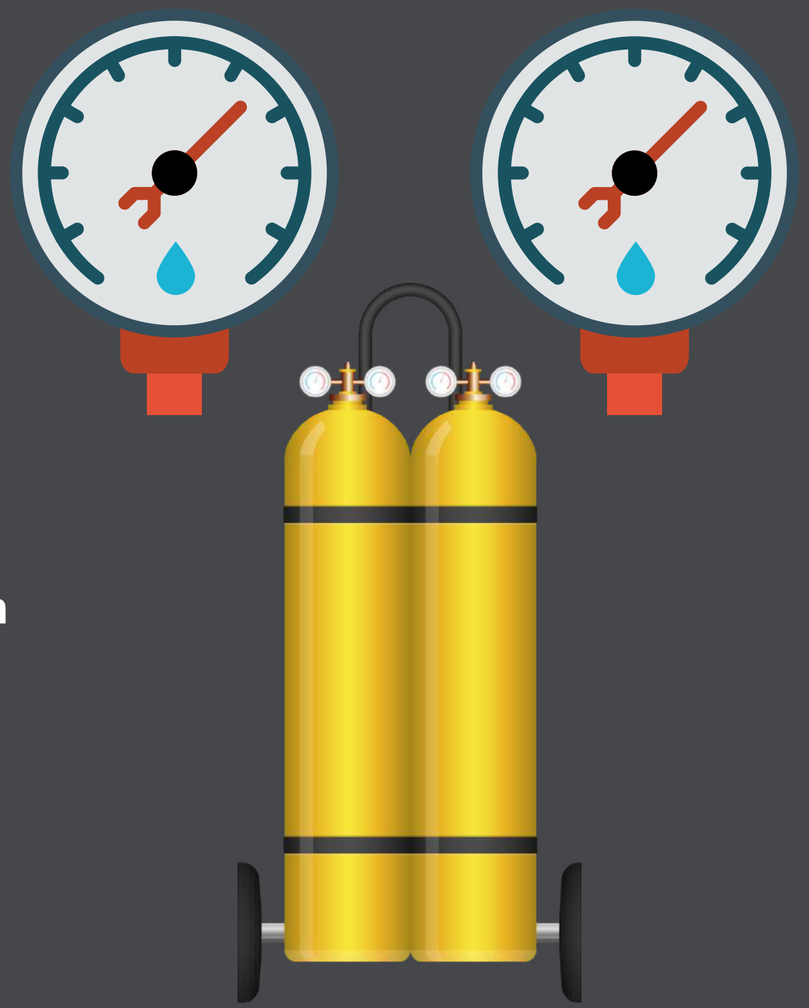
CHECK 1

CHECKING PRESSURE REGULATORS

NEVER DROP OR HIT PRESSURE REGULATORS

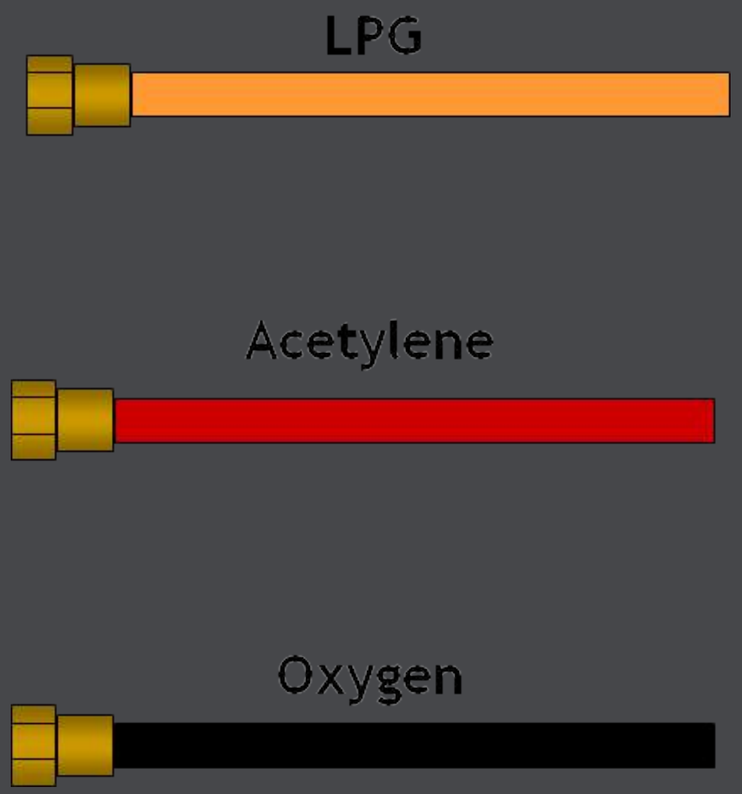
Always open the pressure adjusting screw of the regulator first .
Open the cylinder valve slowly, to prevent damage to the regulator.

- Maintain a uniform gas supply.
- Reduce gas pressure to the working pressure of the handpiece.
- If you detect a leaking regulator you must:
- close the cylinder valve;
- Remove and tag the regulator; and have it repaired.
- Always crack open the cylinder valve to blow any dust clear.
- Never allow oil, grease, diesel, petrol or soap to come into contact with an Oxygen pressure regulator.



CHECK 2

CHECKING HOSES

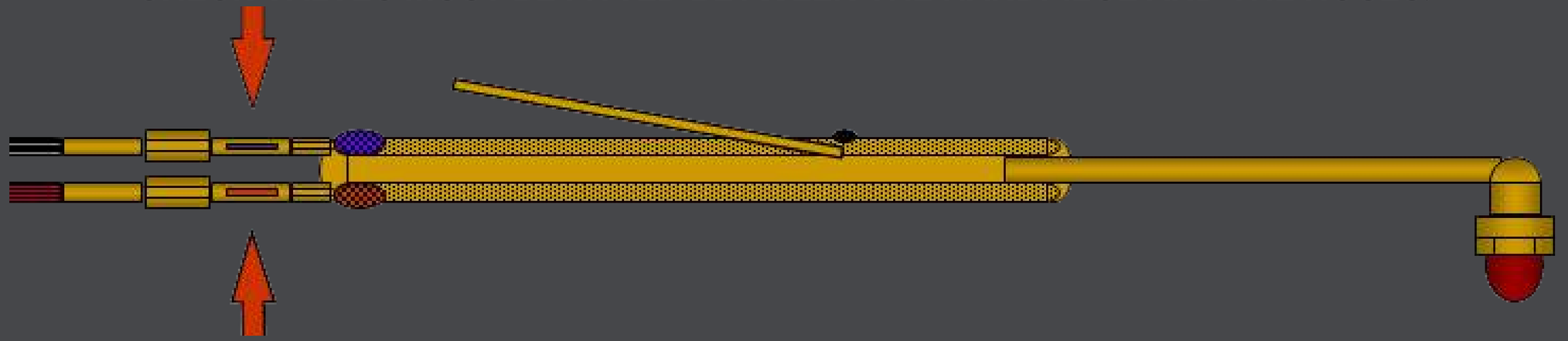


- Hoses must be free of cuts, cracks, burns or worn patches.
- Never use the wrong coloured hose for the type of gas being fed to the handpiece.
- Check valves must be fitted downstream between the torch and the hoses and flash back arrestors fitted upstream of the regulator and the hoses.
- Repair leaking hoses immediately.
- Never use insulation tape to repair leaks.
- Use soapy water or detergent on all connections to check for leaks.
- Always shut off the cylinder valve and vent the equipment before tightening any connections.

CHECK 3

CHECKING THE HANDPIECE

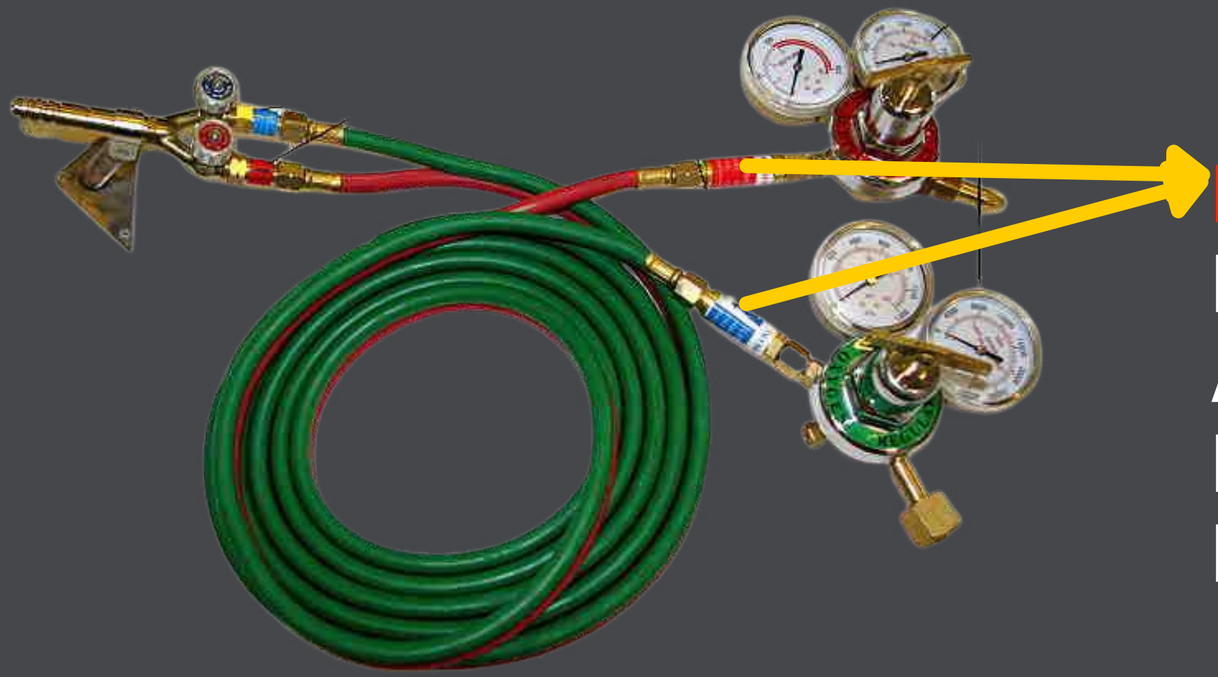
CHECK VALVES MUST BE FITTED BETWEEN THE HANDPIECE AND THE HOSES.



- SELECT THE PROPER WELDING OR CUTTING TIP FOR THE JOB.
- MAKE SURE THE TIP IS CLEAN AND NOT BLOCKED.
- ALWAYS SHUT THE GAS OFF AT THE PRESSURE REDUCING REGULATORSWHEN CHANGING TIPS.
- NEVER SHUT OFF THE GAS BY CRIMPING OR PINCHING OFF THE HOSE

CHECK 4

CHECKING THE FLASHBACK ARRESTERS



FLASHBACK ARRESTERS MUST BE FITTED TO BOTH OXYGEN AND GAS HOSES IMMEDIATELY DOWN STREAM OF THE REGULATOR

CHECK 5

POSITIONING CYLINDERS AND HOSES

- Never store or locate cylinders:
- in a confined space;
- in front of the designated entry/exit point of a confined space; or
- near the ventilation intake point for a confined space.

- Keep cylinders away from other sources of heat and flames.

Position the hoses so they will not be:
- burned by sparks and molten slag;
- cut by sharp metal or objects; and
- crushed or damaged by vehicles.

- Make sure the hoses do not become a trip hazard for other people.

CHECK 6

STARTING UP THE EQUIPMENT

- Always open the pressure adjusting screw of the regulator before opening thecylinder valve.
- Open the cylinder valve slowly, using the standard valve key.
- Never extend the length of the key by attaching it to a spanner or steel pipe.

When lighting a handpiece always:

- use a friction flint lighter;
- point the handpiece tip away from you; and
- point the tip away from other people.

Never use matches, cigarette lighters, burning paper, or lit cigarettes to light handpieces.

CHECK 7

PPE FOR GAS CUTTING AND WELDING

Always wear:

Goggles with the correct filter shade for the type of work being performed.

A face shield when gas cutting or welding for long periods of time.

Pliable, flame proofed leather gloves or aluminised gloves for very hot work.

Leather shoulder covers, apron or jacket while working on overhead cutting and welding.

Safety boots and leather spats.

CHECK 8

SHUTTING DOWN THE EQUIPMENT

- Use the handpiece valves for short shutdowns.

For overnight, you must:

- close the oxygen and fuel gas at the cylinder valve;
- open the handpiece valves and vent all gas from the hoses and regulators; and
- close the handpiece valves.

Always close the oxygen and fuel gas valves in the order recommended by the handpiece manufacturer.

Never put a handpiece down until the gases have been completely shut off.

Never hang a handpiece from a regulator

ELECTRIC WELDING AND CUTTING SAFETY PRECAUTIONS

UNCOIL AND SPREAD OUT WELDING CABLE.

- To ensure proper contact of work leads and connection.
- To remove any metal fragments from magnetic work clamps (to avoid electric shock do not wrap welding cables around a body part and avoid welding in wet conditions).

AVOID OVERHEATING

- PRIOR TO SPOT WELDING, THE MATERIAL IS USUALLY CLEANED IN A CAUSTIC OR SLIGHTLY ACID BATH. EMPLOYEES PERFORMING THESE WASH OPERATIONS SHALL BE PROTECTED FROM SPLASHING LIQUID.
- TE OPERATOR SHALL MAKE NECESSARY ADJUSTMENT TO THE CONTACTORS
- IN HAND SPOT WELDING INSTALLATIONS, EYE PROTECTION SHALL BE REQUIRED TO PROTECT THE OPERATOR FROM THE SPATTERING METAL.
- WELDING OF MATERIALS SUCH AS STAINLESS AND HIGH CARBON STEELS CAUSES EXCESSIVE SPATTERING OF METAL. OPERATORS SHALL BE CAUTIONED TO PROTECT AGAINST THE POSSIBLE PENETRATION OF THE METAL INTO THE TIPS OF THE FINGERS.

THANK YOU

ABOUT SPEAKER

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