

Welding and Cutting



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 - Welding
 - Cutting



Introduction

- Many hazards are associated with welding and cutting such as fire & explosion, but as in other activities they can as well be controlled by appropriate preventive measures.
- Unless these measures are taken, the hazardous situation can easily lead to personnel injury or material damage.



Definition

- Hotworks – any work activities that will produce or may have a chance of producing sparks e.g. welding, cutting, grinding, blasting, etc.
- Welding – is the union of pieces of metal by fusing the opposing surfaces which have been made molten by heat or occasionally by pressure.
- Cutting - process in which metals are heated by an oxy-fuel gas flame followed by a chemical reaction of the heated metal with a compressed oxygen jet to effect separation.

Welding & Cutting Hazards

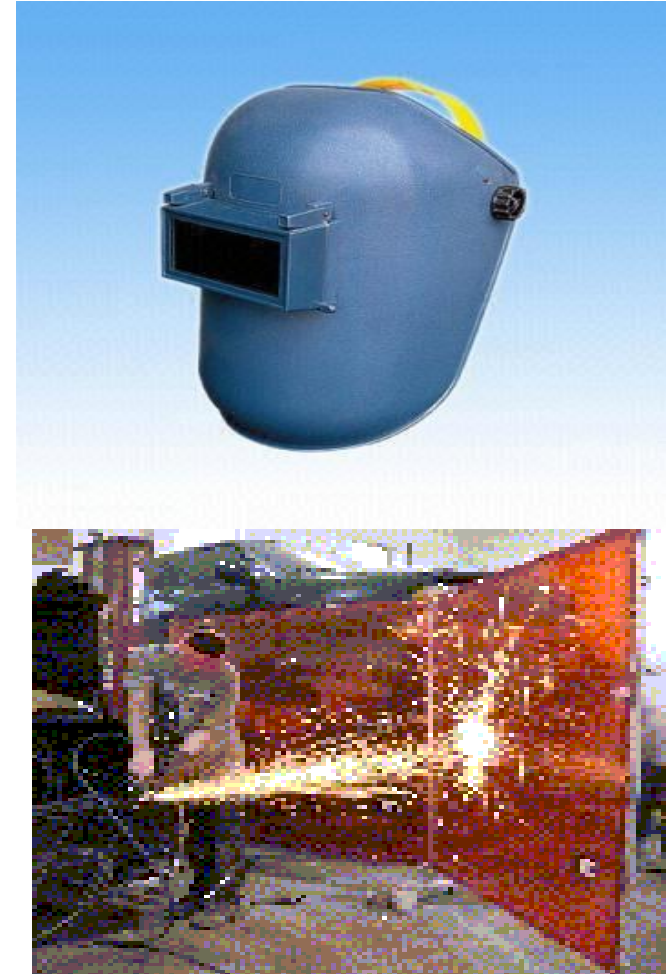
- The brilliant light of an arc (Exposure to it can result in eye injuries)
- The heat of an arc, molten slag, sparks, hot objects, etc. (Causing burns, fires/explosion)
- Toxic fumes released during the welding/cutting process
- Electrical hazards
- Mishandling of gas cylinders, especially acetylene



Prevention of Injury

Eye Injury

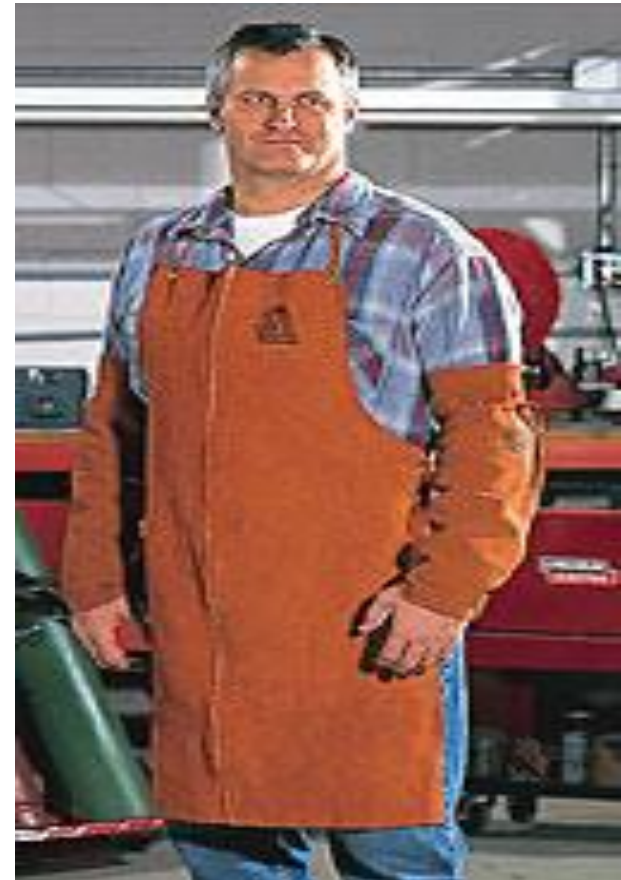
- Wearing approved eye protection in form of face shield filter with the appropriate lenses
- Erection of screen to protect other personnel working around the area
- The use of contact lenses is prohibited during welding and cutting operations



Prevention of Injury

Burns

- Thermal: Burns can be prevented by the use of protective clothings (arms and leg guards, apron, shirts and gauntlets)
- Radiant: Prevented by the use of appropriate protective clothing
- All personnel directly involved in welding and cutting shall wear suitable flame resistant protective clothing in addition to the basic PPE
 - Leather jackets
 - Leather gauntlets/glove
 - Flame proof or flame retardant overall



Prevention of Electric Shock

- All welding machines and generator must be earthed.
- All welding earths must be connected to the workplace as close as possible.
- Welding earth must not be connected to scaffold or rigging equipment.
- Welding cables must be kept dry and free from grease to prevent breakdown of insulation.
- Damaged cables must be replaced or discarded immediately.
- Oxygen/acetylene hoses and gauges must be kept free from oil or grease contaminants.
- If possible welding cables should be one continuous length or join with approve connector.

Toxic Fumes & Respiratory Protection

- To ensure protection of the person carrying out welding or cutting operation from inhalation of toxic fumes or vapors adequate exhaust ventilation must be provided
- Mechanical Air purifier can be used to limit and purify the smoke generated during welding



Toxic Fumes & Respiratory Protection

- In location where adequate exhaust ventilation is not possible, welding and cutting can be carried out safely by personnel wearing suitable respiratory protection
 - Dust or fume mask do not provide adequate protection
- NB: Welding or cutting in enclosed spaces can deplete the oxygen content of the air



Preparation of Work

Welding

Inspection of Equipment

- All welding machines, leads, hand pieces must be inspected before use
- All welding machines (240v) power outlets must be protected by a core balance earth leakage protection circuit breaker
- All welding and associated equipment must be inspected accordingly
- Installation and removal of purge dams
- Make a procedure for the installation and removal of dam
- Obtain a confined space permit be entering into confined space for the installation or removal of purge dams

Preparation of Work

Welding

Housekeeping

- Housekeeping must be maintained to a high standard in all areas but especially where welding and cutting is taking place
- All welding studs, used grinding discs etc must be contained in a receptacle located at the work place
- Receptacles must be emptied daily at dump site



Preparation of Work

Welding

Routing of cables

- All welding and electrical lead must be suspended (2m) by an approved means (Not tied with a wire)
- All cable that can not be suspended must be protected and kept out of water

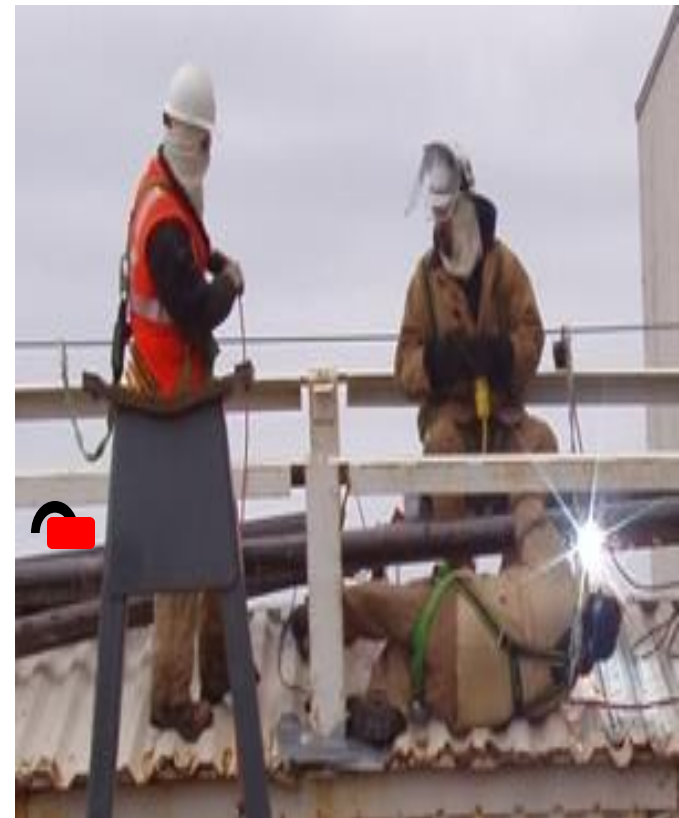


Preparation of Work

Welding

Fire Prevention

- Area must be cleared of all flammable and combustible materials
- Use of fire retardant blanket for elevated areas to capture sparks or hot metals
- Provide at least one fully charged 9kg fire extinguisher
- Trained the employees involved in the operation of the fire extinguisher



Preparation of Work

Cutting

Inspection of Equipment

- All gas cutting equipment must be inspected before use on site

Use of Flash Back Arrestor

- All gas cylinder use on the project (oxygen, acetylene or propane etc.) must have approve flash back arrestor fitted to the gauge of the cylinders



Preparation of Work

Cutting

Ignition of Torches

- Gas torches shall be ignited by the use of flint gun (Cigarettes lighters, matches or hot metal must not be use as an ignition source)

Plasma Cutting

- All equipment associated with plasma cutting must be subject to the same safety considerations as those of welding equipment



Preparation of Work

Cutting

Gas Cylinders

- Gas cylinder valves should be closed and valve protection cap in place when cylinders are no in use
- Gas cylinders must be away from all source of heat
- Oily rags, waste should not be allowed to accumulate on or near storage area
- Different gas cylinders should be store differently
- Gas cylinders in use should be kept far enough away from any welding and cutting operation



Preparation of Work

Cutting

Gauges/Valves

- Open cylinder valve slightly and close immediately before use
- Regulator should be used only for the gas indicated by the supplier
- Gas gauges must be calibrated for accuracy
- Oxygen regulator connection has right-hand tread while fuel gauge connection has left-hand tread
- Avoid oil and grease contact with oxygen regulators



Preparation of Work

Cutting

Hoses

- Red hoses is for fuel gases, green is for oxygen
- Hoses must be inspected frequently for leaks, wear and lose connections
- If hose show signs of wear replace hose immediately
- Hoses must be protected from kinking



Summary

- Training is the key to success in managing safety in the work environment.
- Detailed welding procedure and site implementation and monitoring will eliminate or minimize hazards.
- Attitude is also a key factor in maintaining a safe workplace.
- Safety is, and always will be a team effort, safety starts with each individual employee and concludes with everyone leaving at the end of the day to rejoin their families.