

Active first aid treatment for heat exhaustion

- (i) Move the patient to a cool place with fresh air.
- (ii) Lay him down and loosen any clothing around his neck.
- (iii) Fan him vigorously.
- (iv) Cool the victim by applying cool and wet towels to the victim's head and body.

5 IMPORTANCE OF WELDING IN INDUSTRY

The industries require a number of parts with varied shapes to be joined. Sheet metal work is used to join thin sheets such as, buckets, funnel, tin vessels, oil drums, hopper etc. The thin sheets can be joined by soldering and brazing also. Thicker sheets can be joined using rivets and bolts. For example, steam boiler, roof trusses, automobile parts, railway coaches etc.

Welding joint is considered to be the strongest joint for the structures bearing an excessive weight in heavy industries. The efficiency of a welded joint is 100%, whereas the efficiency of all the other joints is 70%.

The importance of welding has increased in industries due to the following advantages-

- (i) Soldering, brazing and riveting make temporary joints whereas welding can be used to obtain permanent joints.
- (ii) It is light in weight.
- (iii) It occupies less space.
- (iv) It saves the material.
- (v) It can tolerate high temperature and pressure.
- (vi) It can perform the operations quickly.
- (vii) It does not change the colour of the joints.

It is stronger than all the other operations. Welding helps in joining any kind of metal with any kind of thickness.

6 SAFETY PRECAUTIONS IN WELDING WORKSHOP

Safety precautions are followed in welding workshops in two ways-

1. Machine tools and Equipment Safety
2. Self Safety

1. Machine Tools and Equipment Safety

- (i) The earthing of the machines in the workshop should be appropriate and proper.
- (ii) The instructions provided by the manufacturer of the machine must be followed.
- (iii) The trolleys should be used for transporting gas cylinders in the workshop.
- (iv) In case some kind of noise is erupting from any machine in the workshop then it must be first repaired before putting into use.
- (v) It should be kept in mind that the level of the water in the hydraulic back pressure valve must be appropriate before initiating the gas welding.

2. Self Safety

- (i) It should be kept in mind that loose clothes should not be worn while working in the workshop.
- (ii) Hand screen, goggles, helmet etc. should be used for the safety of eyes while working in the workshop.
- (iii) Apron, sleeve etc. should be used for the safety of the body in the workshop.
- (iv) The boots with thick soles and leg guards, socks etc. should be used for the safety of the legs while working in the workshop.
- (v) Safety guards should be fitted over machines in the workshop.
- (vi) The welding should be performed at a well-ventilated workplace.

7 PRECAUTIONS DURING OXY-ACETYLENE WELDING

It is important to be careful during any type of welding work (at machine or gas plant) so that one can protect oneself and the gas plant from accident. Following precautions can be followed for the self-safety and the safety of the gas plant-

1. The gas cylinders should be kept away from fire, heat and electricity.
2. It must be ensured that all the cylinders are properly closed.

3. Oxygen and acetylene cylinders must be kept straight.
4. Acetylene gas cylinders must be used only with pressure reducing valves.
5. The valve should be immediately closed once the welding operation has been performed.
6. The acetylene gas must be opened first and the oxygen gas later while initiating the welding.
7. A gas lighter must be used to light the flame rather than the matchstick.
8. The oxygen and acetylene gas cylinders must not be kept close to each other.
9. Firstly, acetylene and then oxygen gas must be closed once the work has been completed.
10. The valves of both the cylinders must be closed after the welding operation has been completed.
11. The oxy-acetylene flame must not strike with any of the cylinders directly.
12. Black coloured glasses should always be used for the safety of the eyes.
13. The leakage in gas must be checked with soap solution before initiating welding operation.
14. The oxygen gas should always be filled in oxygen cylinder whereas the acetylene gas must always be filled in the acetylene cylinder. They should not be interchanged.
15. Spanner should be used for opening the valve and cylinder cap. The hammer should never be used.
16. Safety caps should be used while transporting the gas cylinders from one place to another so that the valve does not get damaged.
17. The torch should never be towards the face of the person who is welding.
18. Do not light the flame near inflammable objects.
19. The tip of the welding torch must be prevented from getting excessively heated. It should be allowed to cool down at specific intervals.
20. High pressure blow pipes should not be used for low pressure gas welding.

SAFETY PRECAUTIONS DURING GAS

8 CUTTING PROCESS

Following safety precautions should be followed during gas cutting-

1. **Equipment Safety** – The safety precautions to be followed for the equipment in the gas cutting are similar to the precautions followed for gas welding equipment.
2. **Safety Precautions During Operation** – It must be ensured that there should not be any inflammable objects near the workplace. If there are any then they should be placed at a distance of at least 3 meters. If the possibility of removing the inflammable objects is quite low in certain formidable circumstances then they can be separated using a suitable fireproof guard/divider. One should protect oneself and others from the sparks that erupt during the beginning of cutting process. The container with inflammable objects should not be carried directly for the process of cutting. The inflammable container must be washed with carbon tetrachloride and caustic soda and should be filled with argon gas and water before repair in that situation. The work piece to be cut must be balanced by providing a suitable support otherwise it can fall on feet or hose pipe. The place below the work piece to be cut must be kept clean so that the slag can flow freely and the part that has been cut falls safely.

Fire extinguisher equipment must always be placed close to the workplace.

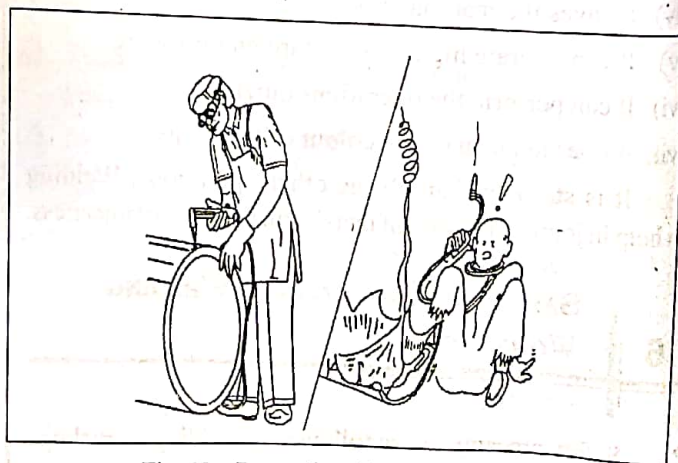


Fig. 12 : Precautions During Operations

3. **Safety Precautions for Operator** – The operator should always wear safety clothes such as, leather cap, jacket, gloves, apron, boots during cutting. Special

kind of welding goggles must be worn for the safety of eyes. Safety precautions must be followed in order to prevent the inhalation of poisonous gases.

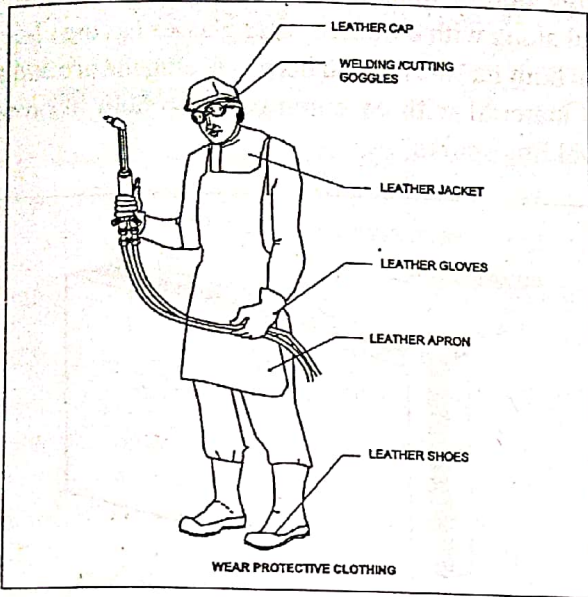


Fig. 13 : Safety Precautions for Operator

- (vii) Fireproof canvas screen
- (viii) Respirator pad and exhaust duct
- (ix) Chipping/grinding glasses

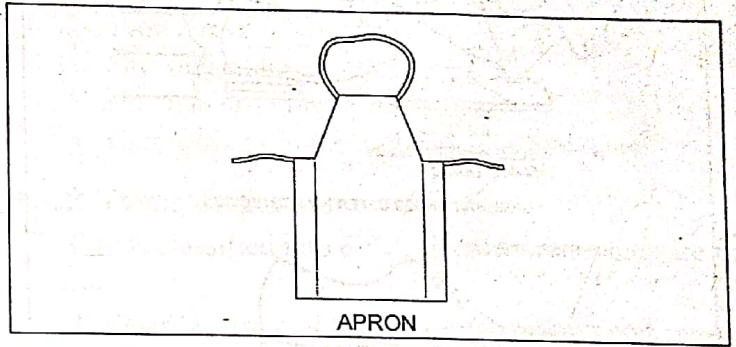


Fig. 14 : Leather Apron

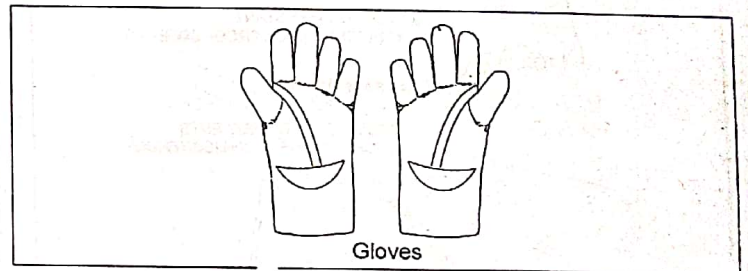


Fig. 15 : Leather Gloves

SAFETY IN SHIELDED METAL ARC WELDING

The welder performing the metal arc welding is exposed to the following hazards-

- (i) There is a risk of receiving burns at the arc temperature of about 3500°C.
- (ii) There is a risk of receiving injuries from ultraviolet and infra-red rays.
- (iii) Risk of receiving burns from the hot job.
- (iv) Risk of receiving burns from the flying spatters and slag particles.
- (v) Risk of receiving electric shock.
- (vi) Inhalation of poisonous gas.

The following measures should be taken to protect the welder from the above-mentioned hazards-

- (i) Leather hand gloves
- (ii) Leather apron
- (iii) Industrial safety boot
- (iv) Hand screen
- (v) Adjustable helmet
- (vi) Leather cap with sleeves

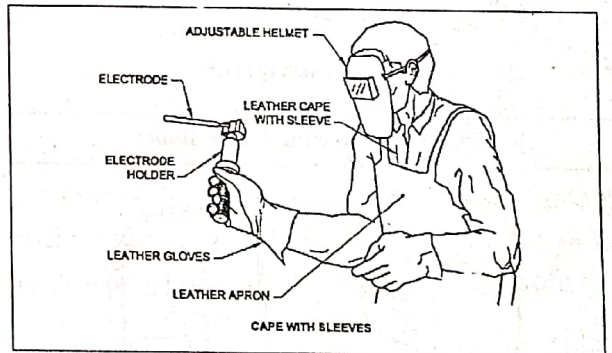


Fig. 16 : Leather Cap with Sleeve

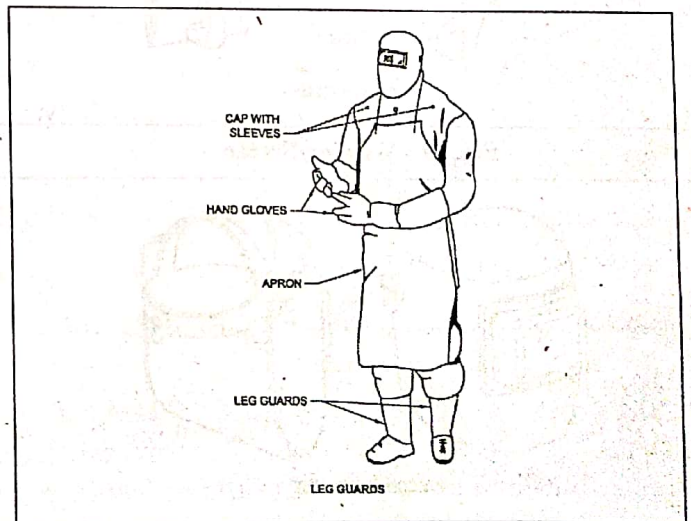


Fig. 17 : Leg Guards

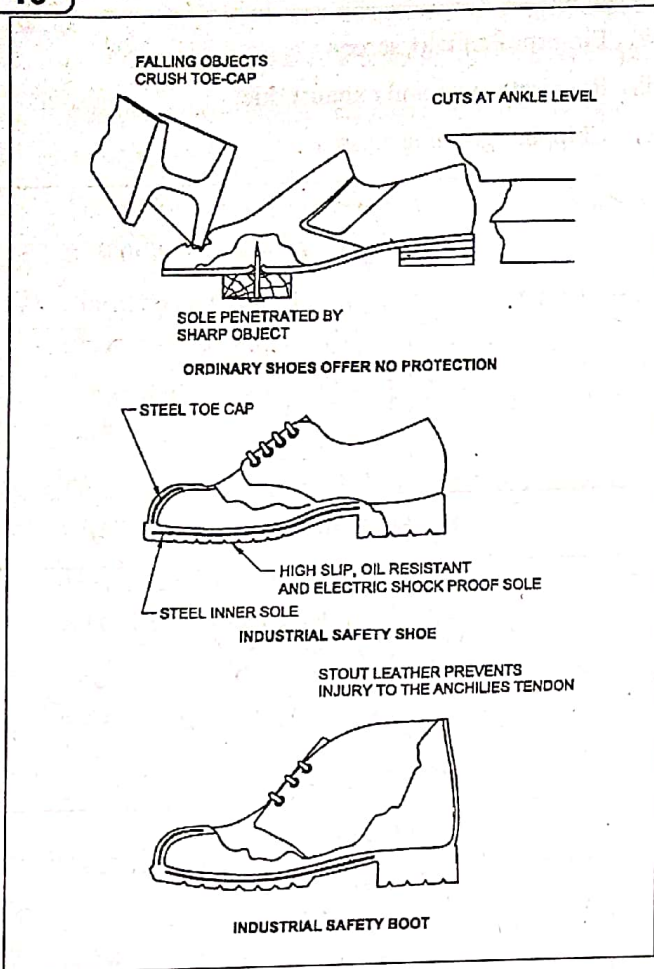


Fig. 18 : Industrial Safety Boots

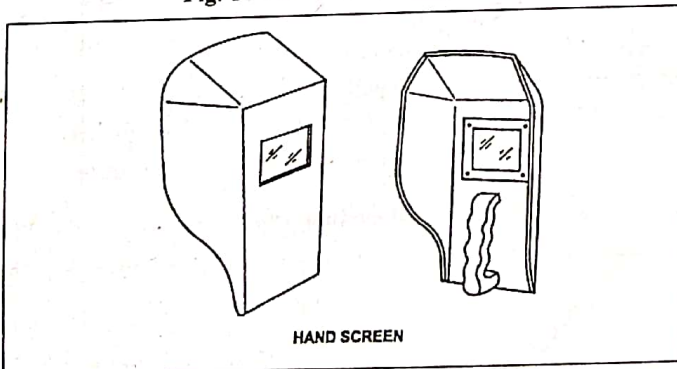


Fig. 19 : Welding Screen

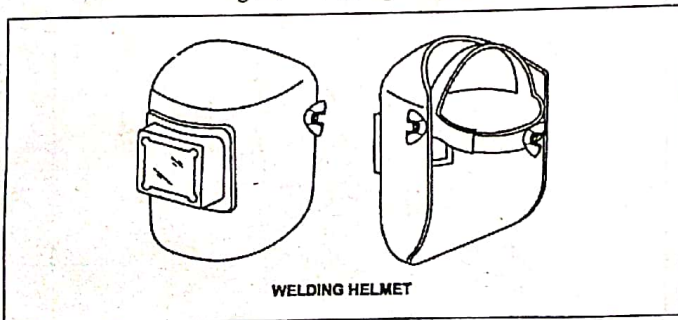


Fig. 20 : Welding Helmet

Welding should not be done with naked eyes, without welding screen. The bright light produced by the arc can damage the eyes. Welding screen is made up of non-reflecting, non-combustible, insulating, blurred, lightweight material along with coloured filter glasses having clear glass plate on both its sides. It can help in seeing the arc and storing molten material with ease and can also help in protecting from welding sparks.

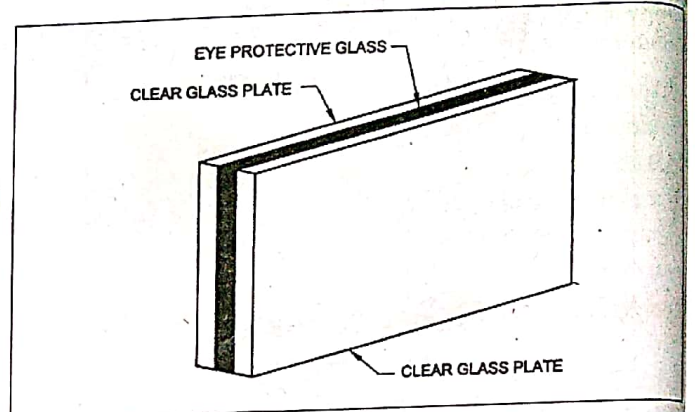


Fig. 21 : Coloured Filter Glasses

Helmet screen helps welder in using both the hands freely with greater protection. It has coloured filter glasses of varied shades, which depends on different current ranges.

Table : Filter Glass

Serial No.	Shade number of the coloured glass	Welding range (current – in amperes)
1.	8-9	Till 100
2.	10-11	100 to 300
3.	12-14	More than 300

Backlight frame common glasses are used during the abrasion of the job and peeling off the slag.

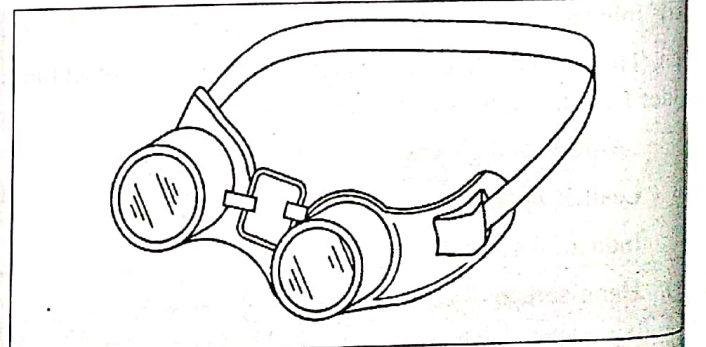


Fig. 22 : Backlight Frame Common Glasses