

**HSE Procedures Manual Table of Contents (PRS)**

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## Alcohols and Drugs

- It is forbidden for all employees / Contractors to have any type of alcohols or drugs while working.
- In addition, it is forbidden for all contractor, sub-contractor workers to have any type of alcohols or drugs while working.
- It is not allowed for any worker (EGAS, contractor, or sub-contractor) to enter the working site if he is found under the effect of alcohols or drugs.
- A periodic analysis is done for all drivers to be sure they are not under the effect of alcohols or drugs while driving.
- All personnel who do not obey the above statements will be punished according to local law of labor no. 12 for 2003.



## Auxiliary Workshops

- Isles should be clean & free from any obstacles or materials & the workshop should be free from any litters or unused tools or equipment.
- Litters & unwanted materials should be put in special containers and get rid of it as quick as possible according to its hazardous level.
- The specified workers should do using or repairing equipment or machines.
- Switch off electricity after finishing work on machines.
- Workers carrying, lifting loads, or heavy weights should pay attention and ask for help in case of overloads & try to use any lifting device as much as possible.
- Do not clean or wash equipment or machines with benzene or any other quick flammable material, but if necessary use kerosene or solar and avoid clothes being wet by benzene or solar.
- It is forbidden to store quick flammable materials in opened containers or in any other places not specified for this purpose. Take all safety precautions.

### Working on Lathes

- Use protective glass & avoid wearing rings, gloves, any hands accessories, large or tore clothes.
- Check that all gears & belts are covered before starting work.
- Fix the work piece properly before fixing the cutting tool.
- Remove the wrench after fixing the work piece in the table.
- Do not ever try to calibrate the cutting tool or to touch the work piece during lathe rotation.
- Do not leave any wrenches on the lathe during rotation.
- Changing the chuck should be done manually.
- Remove the chip by the correct brush & not by hands.

### Mechanical Drill

- Do not ever hold the work piece by hand under the drill but use a suitable vice for drilling small work pieces & fix the work piece in the table for drilling huge work pieces.
- In case work piece gets out of the vice & rotates with the drill, do not try to stop it by hand but stop the machine immediately.
- Keep the chuck key & the wedge away from the drill before it starts to rotate.
- Do not keep the tools, the oilcan, and the brush behind the drill.
- Remove the chip by the brush & not by hand.
- Do not wear gloves & take them off before the drill is starting up.



### **Hand Tools**

- Always check the tools & keep it in a good condition changing the spoilt ones & repairing others needed to be repaired.
- Tools should be used in its specified purposes only.
- Do not use short pieces to elongate wrenches; short pieces are only used with large wrenches designed for this.
- Screwed wrenches or wrenches with movable jaws should be completely & perfectly holding pipes & nuts & keep the pulling direction always the direction of the movable jaw.
- If you have to leave handy tools in high places, do not leave them on the ground or on walking isles in order not to fell on anyone below.
- After work, clean the tools repair the spoilt ones & keep them in a safe place in a safe way.

### **Grinding Stones**

- R.P.M. should be written on the grinding stone.
- Trained & specialized workers only can work on grinding stones.
- Protective barrier should be fixed over the grinding stone.
- All workers should use the P.P.E.



## Batteries Handling

- Wear your safety goggles.
- Wear your (gloves – apron – safety shoes) for protection against acids.
- Any sparks, flames, and smoking are forbidden.
- Children are forbidden to be near batteries.
- Emergencies
  - 1- In case the acid is reached to the eyes, you must wash it with fresh water several times and see the doctor.
  - 2- In case the acid is reached to the skin, you must wash it with fresh water gently.
  - 3- In case of swallowing the acid, you must drink a lot of milk and water and see the doctor.
  - 4- In case of acid poisoning, go to hospital instantly.

### Storage of Batteries

- Batteries must be kept standing vertical.
- Even there is a tightly closed cover but the static charges could be discharged if the battery is turned down.
- The overreaching of moisture is leading to quick discharge.
- The production date must be on the battery
- The storage of batteries must be organized to let which come first to be used first and vise versa.
- The stored batteries must be inspected 3 times in a year.



## Colour Coding

A- According to international organizations of OH&S for specifying the colors used for warnings to risks in which to avoid, also all employees must know about these colors and the purpose, which used for.

### B- Color Applications

1- *Red color* : the main color for specifying :

- a- Fire extinguishers and firefighting equipment.
- b- "Danger" written in red and put in dangerous areas, also labeled on barrels containing flammable liquids having a flash point equal to or less than 80 ft.
- c- "Stop" written in red on electrical buttons or switches used for stopping machines in emergencies.

\* Red lights are used on barricades and in construction areas.

2- *Orange color*: it is the main color for identifying the dangerous parts of machines that can make harm such as cutting, electric shocks...etc.

3- *Yellow color* : it is the main color for warning of physical hazards like crashing, falling, ....etc., it can be used only or use the yellow color as a slides from yellow and black with 2" thickness or yellow and black squares with 3" for making attention .

4- *Green color*: It represents the positions of first aid places and personal protective equipment.

\* If the first aid facilities is large you can use a green cross "+" on a white background.

5- *Blue color*: It is used for warning signs while starting an operation or using or moving any equipment under maintenance.

6- *Violet color*: the main color used for warning of radiation hazards.

- a- Violet and yellow colors are used for signs, labels, and ground marks for warning of radiation hazards like X-rays,  $\alpha$ -rays,  $\beta$ -rays,  $\gamma$ -rays, and neutron, proton, deuteron, and meson rays.

7- *Black and white colors*: black & white combination is used as a traffic signs and signals; also, it is used as signals in storage.

8- You can use boosters with approved colors instead of paintings.



9- Classification of colors and signals :

1- The following symbols are used for color blinded persons :

a- Danger marks: red square in proper size.

b- Danger equipment: orange equal triangle in a proper size.

c- First aid and safety equipment: green cross "+" on a white background.

2- The physical hazards must be specified carefully and painted to warn all employees from arised risks.





## Dealing with Gas Pipelines

At commissioning a gas pipeline there should be precautions taken for Safety & firefighting & to protect these lines from corrosion, miss-operation & wrongs from others. In addition, there should be an emergency plan to be applied in case of any emergency.

### ***1- Pipeline Inspection***

Periodic inspection on pipelines using leakage equipment at steady intervals according to written & fixed regulations & programs including work procedures & reports declaring any changes along the pipeline with a width of 6m along on each side. Reports should include:

- Pipeline cathodic protection.
- Excavation works & equipment used in it.
- Construction & building works.
- Ignition sources.
- Destructive & explosive works using explosives.
- Gas leakage indications.
- Pipeline bare parts condition.
- Erosion in water path bridges, ways & railways.
- Condition of Pressure reduction stations & valves & their components.

Coordination with other authorities (Electricity – The other utilities – ways – Railway – Land owners) and anyone may do any works could affect pipeline safety and this could be achieved by sending annual letters reminding them of pipelines locations & regulations for them to follow if they intend to do any works in gas pipeline area.

### **Regulations Include**

- Sending a memorandum from the authority intending to do the work (one-week at least prior starting work) to the owner of the gas pipeline.
- Presence of gas pipeline inspector during work.
- Indicating work path correctly before starting work.
- Entering isles should be available for pipeline repairing equipment.
- Any excavation by any mechanical equipment should be at least 3 meters away from pipeline path otherwise excavation should be manual for less than 3 meters away from pipeline.
- Never use explosives unless applying explosives expert regulations for gas pipeline safety.
- Do not use pile machines unless it is completely safe for the pipeline?
- Limitation of welding & any ignition sources except after checking absence of gas leakage.



## ***2- Gas Pipelines Maintenance***

It is important to take all precautions for gas pipelines safety to avoid any damage or corrosion to pipeline & this by maintaining its components & testing its working efficiency periodically & this could be done by:

- Proactive Maintenance of gas pipeline & its components.
- Periodic Maintenance of gas pipeline & its components according to specified procedure & to be done by specialized & qualified persons.

## ***3- Gas Pipelines Maintenance Records***

- Periodic inspection regulations – periodic maintenance of all pipeline components – proactive maintenance – emergency plan – Safety regulations – persons & authorities contacted on emergency cases – valves and vents locations & shortest ways to reach them.
- Periodic inspection reports - periodic & emergency maintenance reports – proactive maintenance reports – Repairing reports.

## ***4- Emergency Plan***

Should be written by the transmitting or distribution gas company showing the responsibility of every team or individual in case of any fracture or defect in the pipeline or in case of any leakage or emergency, the plan should also include the role of firefighting, police, civil defense & governmental authorities. The plan should also indicate how to act at the following:

- Gas leakage from a pipeline-crossing river Nile or any water path indicating the used equipment & the qualified laborers that can be used.
- Gas leakage.
- Gas pipeline fracture.
- Pipeline fire or flame.
- Training on the plan by applying periodic practical experiments & modifying it to avoid any disadvantages in it.
- Coordination between the company & the other companies working in the same field owning equipment that could be helpful at emergency cases.



## Dealing with Chemicals

- Before dealing with any chemical, read its safety instructions to know its hazards & how to deal safely with it.
- Check the presence of a sticker on the package showing the components & how to deal safely with the chemical.
- Be sure that the package is perfectly closed.
- Determine the destination place before transporting the chemical packages.
- Supply tap water or washing water in place of handling.
- Use the P.P.E (rubber gloves – Helmet – glasses – Safety shoes - .....etc.) & avoid any flame source beside or near handling area.
- Use manual pumps in case of transporting flammable chemicals from one place to another, and in case of using electric pumps it should be explosion proof.
- During opening of the chemical packages, be careful not to be exposed to the vapors of the chemicals & close the packages perfectly if not using them.
- Filled packages should be separated from the empty ones.
- It is forbidden to use the empty chemical packages for any other purposes.
- Empty packages should be stored in the appropriate scrap area.
- Coordination should take place with society protection sector to get rid of the expired chemicals safely.
- When emptying a chemical package try not to leave any residuals inside as much as possible to eliminate the probability of the chemicals being spilled out of the empty packages.



## Driving

- The car / vehicle must inspected daily and before starting engine as the following:
  - Inspection of cooling liquids
  - Engine oil levels.
  - Brakes oil levels.
  - Power steering oil levels (if available).
  - Clutch oil levels (if available).
  - Inspect all lights.
  - Inspect all tires and spare tyre.
  - Inspect all car tools.
  - Hydraulic oil levels (if available).
  - Inspection of hydraulic oil leakage (if available).
  - Inspection of fire extinguisher condition.
- Driver has to keep paying attention to the road in front of him.
- Driver should be patient & decent with others.
- Try not to use the horn as much as possible.
- Lights for turning (Left & right) should be started by an enough time before turning specially if it is raining or if the streets are slippery which makes it harder for other vehicles to stop or to turn away to avoid your vehicle.
- Driver has to allow other vehicles to pass beside him & avoid obstructing them.
- Driver has to avoid following other vehicles as well as not to stop just before or after any curve or turn on the road.
- Start using the brakes with enough time & distance before the place you want to stop the vehicle at to make stopping smooth & gradual.
- Slow down the speed at any strange condition or circumstances on the road or on expecting any danger.
- Always keep on driving within the speed limits of the road you are driving on & never exceed it.
- On night driving, driver should always turn on the ordinary front lights & try not to use the high front lights as much as possible so as not to disturb other vehicles moving in his direction or at the opposite direction.



- Driver should pay attention & drive slowly in case of driving unfamiliar vehicles or vehicles in bad condition.
- Driver should be smart enough to expect actions & reactions from others before it occurs.
- Avoid using brakes at road crossings except in emergency cases.
- Avoid any gear transmissions in turns or crossings & do it before getting into the turns or crossings.
- Speed should be decreased to a safe limit before reaching any turns by enough time & this enables the driver to accelerate during turning & after the situation is clear in front of him, & vice versa.
- Driver has to use & depend on the vehicle's interior mirror (his third eye).
- Concentration is very essential during driving & do not pay attention to anything but the road & never look at anything else such as an accident on the road while your vehicle is moving.
- Driver has to hold the steering wheel with both hands except when transmitting the gears or giving a turning flash, steering wheel should not be holded also from its center or just by the fingers.
- Driver should not rest his left leg on the clutch except during gear transmission only.
- Driver should always concentrate & do nothing but driving (such as to eat, drink, use the mobile phone, or to fix anything in front of him).
- Do not follow any person's sign to go on or to cross the road but be sure yourself from the road being clear & safe before crossing or going on.
- Do not ignore any sign from anybody meaning "Stop" or "Danger" and it is preferable to stop & see what is the problem instead of keeping going on & being a part of an accident or a problem.
- Avoid driving fast on slippery roads or if it is raining.
- Pay much attention to fogs on foggy days.
- Never drive without driving license or vehicle's license or with an invalid license of.



## Dealing with the Odorant

- Be careful during handling or transportation of odorant barrels to avoid falling of any barrel.
- During barrel transportation using vehicles, fix the barrels properly to avoid its shaking or falling.
- Cover the barrels to protect them from sunlight.
- Appropriate fire extinguishing equipment of the odorant should be available & existing.
- Adequate quantity of the sodium hypochlorite substance or any equivalent substance should be available for use in case of emergency.
- In case of any odorant spilling, spilled area should be surrounded by, sand & then apply the equalizer substance (Sodium hypochlorite or its equivalent).

### **Precautions during Storage**

- Odorant barrels should be stored in a cool & well-ventilated place & away from sunlight.
- Try to empty the barrel from the odorant during filling as much as possible before the barrel is executed.

### **Remark**

- It is completely forbidden to use empty barrels for any other purposes.



## Excavation

- Supplying & Wearing P.P.E for all workers.
- Supplying all necessary equipment for securing the site (lamps – warning marks – traffic cones – warning tapes .....etc)
- Co-ordination with traffic to secure working area
- Check the ground type (Sandy, muddy, rocky) before starting work.
- Use the appropriate equipment to the ground type.
- In case the depth of the excavation exceeds 6 feet, the following should be followed:
  - Put wooden supports at excavation sides or incline the excavation with an angle not exceeding 30°.
  - Remove the excavation products continuously to the appropriate places.
  - Excavation products should be put at least 1m away from the trench.
  - Supervisors should not stand very close to the trench sides.
  - All the company vehicles & equipment should always be opposite to the wind direction & in the exit direction.
  - Trench should be supported by wooden or steel supports to avoid excavation collapse due to vibrations in case of being beside roads for heavy trucks or railways.
  - Lighting lamps & warning marks especially at any road inclinations or deep turns should surround excavation.
  - In case of any probable hazards to any building excavation should be stopped & forbidden.
  - Wearing phosphoric jackets in case of night works.
  - During backfilling, be sure there are no individuals or equipment inside.
  - Be sure that the backfilling is clean sand free from stones or any sharp edged solids.
  - Put marker tapes after backfilling & replace any damaged tape at the same place.
  - Do not shift any cable inside except under supervision of the responsible utility.





## Electric Works

- It is completely forbidden for the unspecialized workers to try to repair any connections, fuses, electrical devices or to touch wires or electrical devices & in case of any electrical hazards; Responsible persons should be informed immediately.
- Before working in any electrical devices or connections switch off electricity and make the necessary methods of warning to prevent any person from switching on electricity during work.
- Check the existence of earthing in the used electrical devices.
- Handling parts of the electrical tools & equipment should be insulated properly.
- Electrical wires & cables should be stored away from high temperature sources or places.
- Steady maintenance should be done for tools & electrical wires taking all the necessary precautions & testing these tools to ensure its safety.
- Do not throw electrical wires or any objects over wires or electrical equipment.
- Keep electrical wires away from temperature, water or oils.
- Do not use electrical tools in case of working in a medium of flammable gases unless it is fireproof.
- In case of any electrical injury, take the injured person away from electrical circuits by switching off electricity from the nearest key, and if it is not possible to do, the injured person could be pulled away from electrical circuits by using any insulated tool like a rope or a piece of dry cloth & begin making artificial breathing to him immediately.

### **Important Warning in Case of Fire**

- Do not use water or the foamy substance in extinguishing equipment & electrical devices fires as it may shock its user, but only use :
- CO2 extinguisher - Dry chemical Powder extinguisher
- Use the suitable P.P.E. as electrical insulated gloves, insulated rubber carpets & electricity determining devices.
- Check the insulation of the electric switches board unless there is a document ensuring the insulation of the board.
- Use electrical shock safety belt during working at high altitudes.





## Forklift

- Only trained and qualified personnel are allowed to operate the forklift, the supervisor specifies them.
- Inspect all alarms, siren before using the forklift; also, it must have a back alarm.
- Inspect brakes (foot brake – hand brake), mirrors and be sure there is no leakage of hydraulic oils.
- It is forbidden to lift any worker on forks to reach the upper shelves.
- In case of lifting worker by the forklift, the worker must be in a secured cage.
- If the materials lifted are affecting your vision, you must drive very slowly.
- Avoid sharp curves.
- Be sure the forklift is not overloaded.
- The distance between forks and ground must be not more than 20cm and not less than 10cm while lifting materials.
- Do not use forklift for persons transportation.
- You must take the doors height before passing through doors.
- Do not get your body outside the cabinet while driving.
- Do not leave the forklift with engine running and go somewhere else. If you had to go somewhere, and then stop the engine, put forks touched to ground, pull hand brakes and remove contact key before leaving.
- Wear your PPE (gloves – safety shoes – helmet – overall).



## Fire or Leakage in Oxy – Acetylene Cylinders

### Fire in Gas Hose

- Close cylinder valve or regulator or squeeze the hose after folding until closing the cylinder.

### Fire in Regulator

- Fight the fire with water or dry chemical powder.
- Close the cylinder valve.

### Leakage from Cylinder Valve

- Close cylinder valve.
- Put valve cover & tight it close.
- Put the cylinder in a well-ventilated area and far from any heat source.
- Inform your direct supervisor to send the cylinder to factory or supplier.



## First Aids

- 1- The undesired persons must stay away from the patient.
- 2- Observe the breathing is not stopped.
- 3- Call the police immediately in case of injury.
- 4- Call the doctor immediately in case of injury.
- 5- Prepare all the needed staff for first aid like bandages....etc.
- 6- You must cool down the patient from the nervous shock.
- 7- In case of complete unconsciousness – leave the patient until doctor is came, taking into account warming him. (The reason may be from poisonous food, brain bleeding, metal poisoning, or increased glucose in blood in case of diabetic patient or may be decreased glucose in blood after taking a large dose of insulin – you must observe the patient breathing).
- 8- inspect the patient physically and aid him as :
  - a- Record the injury date , ask him if he can be asked , a physical inspection must be done accurately , and if he in a complete unconsciousness which doesn't represent the patient is dead or a life, he must be treated as a life till the opposite is verified .
  - b- In bleeding cases, you must working on stopping that bleeding by all available methods.
  - c- in case of bone brake – the patient is aided by temporary
  - d- Take care with patient suffering from nervous shock, give him hot drinks and warm him.
  - e- Transportation of the patient to the nearest hospital must be done.

### **Snake Bites**

#### Symptoms

Blood accumulation in the infected organ – unclear vision – inflammation – diarrhea – swatting – headache – increased temperature – vomiting.

#### Cure

- You must know the type of biting animal to know how to treat the bite.
- Tight up the infected organ upper the bitted area but take care that tighten is not affecting the blood stream. The aim of that tighten is to decrease the poison entering the body until taking the proper medicine.
- Observe the patient until going to the hospital.

#### Call a clinic

You must ask help in case anyone is exposed to snake bite and you think it may be toxic, especially when the symptoms appeared, also you must know



the time factor is very important and call emergency for preparing poison treatment unit until the patient reaches it.

#### First aid

- Try to cool down the patient and make the infected organ down the heart to decrease the flow of poison to other parts of body.
- If you have a pipette like (soyer), you can use it as stated in the manufacturer instructions.
- Release any rings or accessories because infected organ may be swelled.
- If the infected organ is colored or swelled the snake often to be poisonous.
- Observe the patient biological indicators such as temperature, breathing, blood pressure, ....etc.
- Call a doctor immediately.
- Fetch the dead snake if that would not risk you to injury and do not try to hunt a life snake. Be careful of snakehead it can bite even if it is dead until an hour from its dyeing.

#### Safety

- Even if most snakes are not of poisoning type you must avoid touching or playing with snakes.
- Several serious bites happened when the person himself is reacting with snakes on purpose.
- When you are coming to an area, which you know, that may have a snake you must wear a long shoes and pants.
- Avoid the snakes hiding places like trees branches, under rocks ....etc.
- A small knocking with a stick you can do before entering unknown area thus snakes will avoid you.

Note: not all types of snakebites need the antitoxins and do not take any antitoxin unless from the qualified clinic, also if you have the antitoxin take it with the patient to the doctor because antitoxin may be very harmful.

In case of snakebites or suspect snakebites, you must call 123 immediately or transport the patient to hospital.

Note: every site manager must search about nearest hospital that has the antitoxins of snakebites.



### **Followed Procedures in Case of Work Site Injury**

- The work supervisory ( engineer or foreman ) fill the injury form and transport the patient to the nearest public hospital or nearest medication center specified by the company for making first aid if he can be transported and if not you must call an ambulance to transport him .
- The injury form must be sent to HSE department.
- HSE officer will make the work related injury documentations.
- The patient must go to the work related injuries center in the health insurance facility.
- A copy of work related injury document will be sent to police station for recording.
- The HSE department must be informed about the treatment finishing of the patient.



## Housekeeping

- Most of the accidents & injuries result from uncleanliness & disorder at worksites despite they could be overcome by few efforts.
- Cleanliness & ordering means keeping materials, tools, devices & equipment clean & in good condition.
- Cleanliness & ordering is a daily responsibility of all the workers & is not done when there is available time to do it.
- Isles & passages should be always clean & free from any materials, tools or any equipment to avoid accidents.
- Work is not considered to be done completely except after cleaning & ordering tools & materials and the site is in good condition.
- Drills & sharp tools should be stored & kept in a suitable place as being a source of hazard.
- Any oil, water or any slippery stains should be removed & cleaned at once.
- Litters & work residuals should be collected & removed currently & do not accumulate them.
- Materials, tools & equipment belonging to work site should be stored & kept in a safe & suitable place and away from work area until being needed.
- Nails, wires or cables should be removed immediately from working area or to be well fixed so as not to be a source of any danger or injury.
- Materials that will be accumulated should be tied to prevent it from falling down.



## Hot Tapping Safety Precautions

- Gas flow rate in the main pipe should be calculated before starting the tapping (Min. gas velocity is 0.3 - 1 m/s).
- Leakage saddle with appropriate diameter should be available at site before starting the welding in case of any emergency.
- Work site should be secured during & after excavation by using warning marks, traffic cones, lighting lamps and a suitable barrier around the excavation place could be done.
- All emergency equipment (fire extinguishers, vehicles...etc.) should be available at site before starting work.
- Civil defense could be formerly informed with the place & time of the hot tapping to be ready for any help or rescue if needed.
- Smoking is completely forbidden during welding & drilling around work in a circle of 40 m diameter.
- Purging an inert gas like nitrogen inside the joint (valve + branch) to ensure absence of any leakage and for the drilling process to proceed in an atmosphere of an inert gas (non-explosive).
- Be sure to reach the correct excavation depth & put the marker tape correctly according to the specification.
- Do not ever leave the excavation opened under any circumstances in case of not finishing the job in one day or in one night.
- Training & informing all the people in charge at the work site of how to act & respond in different emergency cases.



## Lockout / Tagout Procedure

First, you must be sure of:

All locks and keys are numbered.

1- Keep the locks and keys in places easy to reach.

2- A spare key for each lock must be saved in specified places for emergency use only.

3- Lockout process must submit to work permit system in presence of work supervisor and safety officer and it will be as the following :

- *First Step : Preparation and Informing*

- BEFORE starting any of maintenance processes you must be sure of power types
- Used for that equipment and all resultant hazards arises from it and inform all
- Workers about the shutdown of this equipment to start the lockout / tagout process.

- *Second Step: Equipment Shutdown*

- Follow the work procedure or manufacturer's instructions for shutdown of this equipment taking into account that some equipment have a special procedure for shutdown like automated equipment.
- Be sure all power sources are identified and turned off (some machines may have more than one source of energy so you must ensure that all sources are shutdown).

- *Third Step: Equipment Isolation*

- Be sure of equipment isolation (turn off the main switches, valves and operation lines).
- For complicated equipment, you must refer to manufacturer's instructions for all points of isolation like switches, valves ...etc.

- *Fourth Step : Informing*

- Each worker responsible for maintenance process must inform the worker responsible for the equipment shutdown – also workers on this equipment must have their own keys & locks of that equipment.





- If there is more than one person in the maintenance process then there must be a multi-stage shutdown devices which facilitate each worker to make his own lockout / tagout process to prevent any other worker to operate the machine accidentally while his colleagues are working on it .
  - Release any pressure from springs or equalize the spin parts movements.
  - Chain any keys, switches... etc. that may be moved while operation mode is on.
- *Fifth Step: Testing Equipment*
    - To be sure that all power sources are switched off and remaining power in the equipment is discharged you must keep people away from that area then test all operating switches to ensure that all power is shut-down and switches can't be moved to operating mode .
    - Be sure all equipment parts are secured like chains...etc.
    - Be sure all electrical circuits have a zero volt in potential.
    - When you are actually sure that all power sources are shutdown, locks and tags are in place, then it is safe to start the maintenance process.



## Lifting & Loading Works

- Only specialized & qualified workers work on cranes & levers.
- Check & test cranes & levers before starting work.
- P.P.E should be used in all loading & downloading works as well as in transporting heavy equipment.
- Primary testing for cranes before usage is important.
- Loading & downloading works should be done at the presence of the responsible loading supervisor.
- Use safe methods for loading & downloading.
- Avoid being between the vehicles rear & any other near object & avoid downloading objects in the direction of the standing persons.
- The loading supervisor & report the check & keep it documented should do periodic check on levers at least monthly.
- Check lifting equipment before usage & declare the defected ones & change them.
- Maximum loading weight should be written & clear on the crane.
- Do not ever make the cranes, wires, chains or ropes overloaded.
- The crane driver should know exactly the weight of the load he is going to carry, and if not he should deal with it as more than the estimated weight.
- It is forbidden for anyone to pass or stand under the loaded weights, and the crane workers should not permit anyone to be over the crane or lying under the crane during work.
- Check the crane hook & that the load is in the Wright position before loading.
- At lifting, the hook should be at the vertical position above the C.G. of the load to be lifted so that it becomes stable, also check that the load is free from any obstacles.
- Pulling chains or ropes on the ground is forbidden.
- It is forbidden to hold chains or ropes when lifting loads & stand away from the lifted loads.
- Choose the correct locking stud to lock the chains.



- Protect chains, ropes & wires from the sharp edges & acute angles of the load by using soft wooden cushions.
- Do not use ropes in lifting solid loads with sharp edges.
- Do not let the ropes or wires touch any hot body.
- Do not ever knot wires or ropes when lifting to shorten the wire or rope or even to round the wire or rope around the hook of the crane.
- Do not use single woven rope between the hook & the load as it might surfeit from turning around itself during lifting.
- In case of using double or branched ropes or wires, choose wires or ropes with adequate lengths & that the load is equally distributed on the ropes or wires.
- When finishing the loading & unloading return all the tools & equipment to the stores.
- In case of crane movement take from any electric cables obstructing the crane.



## Using of Fire Extinguishers

### **Industrial Safety Responsibilities**

- Co-ordination & Co-operation with different sections to know the sight demand from the suitable extinguishing equipment.
- Maintenance & ordering of the fire extinguishers to facilitate its use in emergency cases.
- Checking that all workers are trained how to use fire extinguishers with their different types.
- Fixing fire extinguishers against the walls by special holders.
- Supplying suitable warning devices.
- Inspecting fire extinguishers periodically refilling the empty & repairing the defected ones immediately.
- Informing workers of fire hazards & checking the safety of the sight at the end of each working day.
- In case of using any fire extinguisher, industrial safety should be informed at once with a written report indicating fire circumstances or the reason of the fire extinguisher being used.

### **Precautions against Fire**

- Supplying a suitable manual or automatic warning device to fasten evacuating the place from workers in case of fire or any danger.
- Supplying good communication between the different work sections at sight as wells as between the management & the public firefighting locations to call them in case of any fire or any sudden danger.
- Never doing any works that result in existing a flame or high temperature in any flammable buildings like wood or plastic unless their walls & ceilings are lined with thermal insulating materials.
- Operations resulting in existing a flame or high temperature should take place in separate places away from working or storing places of flammable or explosive materials in addition to supplying suitable extinguishing device.
- Flammable or explosive materials such as fuels or burning materials should be kept in suitable stores & preferably to be lower than ground level & to have strong, tough and hard walls & ceilings and to be anti-explosion and



thermally insulated, well ventilated to allow lowering the temperature inside the store as well as to decrease the concentration of gases & vapors that could be dangerous for either human health or from being flammable or even for both reasons.

- Classification of materials inside the stores & its proper organization & supplying suitable methods to load it & to transport or move it & prevention of mixing chemical materials that can react with each other & avoid it being spilled on the ground.
- Well organization of materials inside the store to avoid falling, breaking or spilling of materials or their containers.
- Electric key switches of stores of flammable materials should be located outside the store & if necessary to be inside the store, then it should be anti-spark type (oil key switch).
- Choose the suitable method to get rid of the work residuals or litters whether it is solid, liquid or gaseous to avoid any probability of fire, explosion or any health hazards to anyone of the workers.
- Earthing of any electrical devices or any materials may contain any static charges is necessary.
- Do not use shoes with nails from below or to hammer with any metallic instruments that could lead to spark inside places that may contain any flammable or explosive vapors or gases.
- Water pipes, gas pipes or electric cables should be buried underground & to be covered properly to protect them against fracture, fire or being spoilt in addition to the electric switch keys to be placed outside working area for the easy control of switching off electricity or shutting down gas or water.
- Lighting should have separate electric cables than cables of machines & equipment in order to be capable of switching off electricity without cutting off lights to facilitate the exit of workers in case of any emergency.
- Presence of adequate isles between machines & in the stores to facilitate the movement of persons & materials and to facilitate exit of persons on any emergency case as well as reaching firefighting equipment to any place.
- Presence of adequate entering & exit doors free from any obstacles & at the ground level and to put clear marks showing the leading ways to the nearest exits in case of any fire or emergency at workplace.
- Presence of reserve ladders for workers at higher floors to use them in getting down in case of any fire in the building or in the main stairs.



### **Vehicles & Equipment Extinguishers**

- Industrial Safety has to determine type & capacity of extinguishers required for every vehicle or equipment.
- Stores have to issue extinguishers to vehicles & equipment drivers as a personal compact responsibility.
- Co-ordination between stores, industrial safety, workshop & repairs to follow up the company demands from various types & capacities of vehicles & equipment fire extinguishers.
- Vehicle or equipment's driver has to check the presence & good condition of extinguisher when being delivered his vehicle or equipment.
- The driver has to introduce a written report to the industrial safety in case of using a fire extinguisher indicating the reason for which it was used.
- Industrial safety has to refill used extinguishers taking the followed regulations.
- In case of losing an extinguisher, the driver has to introduce a written report indicating the reason of losing the extinguisher to the industrial safety who has to replace him with another extinguisher immediately.
- Training of the drivers is the responsibility of the industrial safety to show them how to use fire extinguishers in the vehicle or equipment.
- Periodical inspection on vehicles & equipment is done by the industrial safety to check the condition of fire extinguishers.
- Adequate stock of fire extinguishers with various types & capacities used by the company and indicated by the industrial safety is the responsibility of the stores to cover the demands of the new vehicles & equipment.
- Stores has to inform the industrial safety of the movement of fire extinguishers frequently.



## Manual lifting

- Do engineer manual lifting and lowering out of the task and workplace.
- Well-trained workers should carry out lifting. If a worker is not used to lifting and vigorous exercises, he should not attempt to do difficult lifting or lowering tasks.
- Do think before acting
- Place material conveniently within reach. Have handling aids available
- Make sure sufficient place is cleared.
- Do get a good grip on the load.
- Test the weight before trying to move it. If it is too bulky or heavy, get a mechanical lifting aid or somebody else to help, or both.
- Do get the load close to the body .Place the feet close to the load. Stand in a stable position with the feet pointing in the direction of movement.
- Do not twist the back or bend sideways.
- Do not lift or lower awkwardly.
- Do hesitate to get mechanical help or help from another person.
- Do not lift with the arms extended.
- Do not continue lifting when the load is too heavy.

### **Team Lifting and Carrying**

When two workers Carrey 1 object, they should:

- Workers should do test lifting before proceeding.
- They should adjust the load so that it rides level and so that each person carries an equal part of the load.
- When two people carry long sections of pipes or lumber, they should walk one behind the other. Shoulder pads will prevent cutting into their shoulders and will reduce fatigue.

### ***When a Team of Workers Carrying the Object***

The supervisor should make sure that proper tools are used and should provide direction for the work. Frequently, whistle or direct command can single "lift", "walk", and "set down". The key to safe carrying by gangs is to make every movement in unison.





### **Jacks**

When a jack is used, workers should do the following:

- Check the capacity plate or other marking on the jack to make sure the jack can support the load. if the identified plate is missing, workers should determine the maximum capacity of the jack and paint it on the side
- Inspect jacks before and after each use. When a jack begins to leak, malfunction, or show any sign of wear or defects, it should be removed from service, tagged, repaired, and tested under load.
- Wear protective equipment especially protective footwear
- Furnish toweling to jack operators for removing oils from their hands and from the jack handles
- A heavy jack is best moved from one location to another on a dolly or special hand truck, if it has to be manually transported, it should have carrying handles.
- The operating handle should never be left in the socket while a jack is being carried because it might strike another worker
- Never throw or drop a jack upon the floor. Such treatment may crack or distort the metal.
- If the surface upon which the jack is placed workers should set the jack base on substantial hardwood blocking (at least twice the size of the jack), so that it will not turn over, shift or sink.
- Immediately wipe up spillage of any residual oil. To prevent the load from slipping, workers should avoid metal-to-metal contact between the jack head and the load. A hardwood shim should be placed between the jack head and the load.
- never use wood or metal extenders .Instead they should either obtain a larger jack or should place higher blocking

### **Hand Trucks:**

Hand trucks fall into two categories: two-wheeled trucks and four-wheeled trucks .If used by workers who are not trained, trucks can be the source of the following accidents:

- Colliding with other trucks or obstructions
- Jamming hands and feet of operators between the trucks and other objects
- Running wheels of bridge plates or platforms

Trucks should be pushed not pulled as this may lessen the stress to the lower back They should not be loaded so high that operators cannot see where they are going. For extremely bulky items or pressurized items as gas cylinders, strap or chain the item to the truck.

Operators should place the load well forward so it will not slip, shift or fall keeping the center of gravity of the load as low as possible.





## Odorant (Mercaptan) Empty Barrels Treatment Procedure

### **This procedure concerns a quantity of 550ml of remaining odorant (Spotleak 1009):**

- Remove the large bung and add 40 liter of clean water to empty 200 liter drum
- Add 250gm of a concentrated solid detergent to the water in the drum (the detergent is used to improve the sulfur compound solubility in water).
- Add 19 liter of a 10% (weight) sodium hydroxide aqueous solution (NAOH) into the drum. The effect is to obtain the salt of the mercaptan used in large amounts in gas odorant blends. Those salts are soluble in water.
- Insert the bung , agitate the content on the drum thoroughly , wetting all interior surface by up-ending the drum 2 or 3 times and rolling it approximately 3 meters forward and back .
- Place 13.5 liter of clean water in a clean plastic bucket or container, and gradually add 4.5 liter of a 13.14% sodium hypochlorite .that final solution will contain 3.79% in sodium hypochlorite. Always prepare a fresh solution to take advantage of its full activity.
- Remove the bung; add carefully the 18 liter of fresh bleach (sodium hypochlorite) solution to the drum using a large funnel to avoid splashes.
- Insert the bung and agitate the content of the drum thoroughly by rolling the drum approximately 3 meters forward and back.
- Place drum upright, let stand for 48 hours, then remove carefully the bung and carefully smell the content of the drum to determine if the gas odorant smell has been removed.
- If the gas odorant smell is still present, the amount of bleach was insufficient. Dilute 1.1 liter of bleach 13.14% of sodium hypochlorite in 8 liters of water, add those 8 liters to the drum. Continue from step 5.
- Wear the proper PPE.



## Personal Protective Equipment (PPE)

### **Purpose**

The Personal Protective Equipment (PPE) program has been developed to provide employees and workers with the necessary information to identify work situations that require the use of PPE, the proper selection and use of PPE, and documentation of this information.

### **Identifying Potential Hazards in the Workplace: (Hazard Assessment)**

OSHA requires that employers should identify and assess the risks to health and safety present in the workplace, so enabling the most appropriate means of reducing those risks to an acceptable level to be determined.

### **Training**

Prior to conducting work requiring the use of personal protective equipment, employees must be trained to know:

- When PPE is necessary;
- What type is necessary;
- How it is to be worn;
- What its limitations are; and,
- Proper care, maintenance, useful life, and disposal.

Employers should provide appropriate PPE and training in its use to its employees. No charge can be made to employee for the provision of PPE that is used only at work.

### **Selection, Use and Maintenance of PPE:**

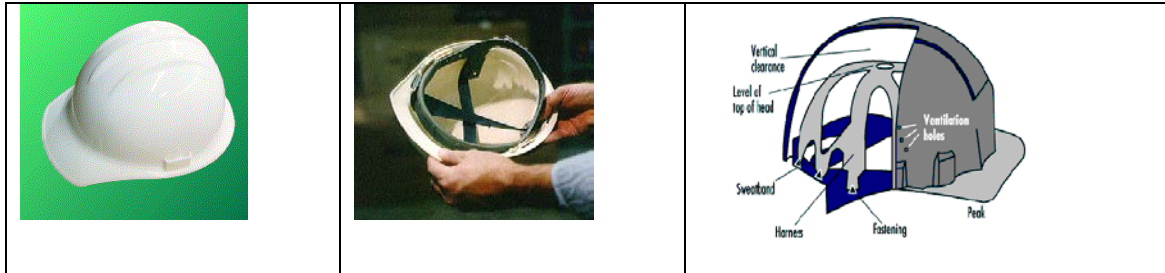
#### **A- Head Protection:**

Prevention of head injuries is an important factor in every safety program. Head injuries are caused by falling or flying objects, or by bumping the head against a fixed object.

Head protection, in the form of protective hats, must do two things:

- Resist penetration;
- Absorb the shock of the blow.

This is accomplished by making the shell of the hat of a material hard enough to resist the blow, and by utilizing a shock-absorbing lining composed of headband and crown straps to keep the shell away from the wearer's skull.



### Hazards on Head



**Electrical hazards**

**Falling objects or collision**

### Selection:

Each type and class of head protector is intended to provide protection against specific hazardous conditions. An understanding of these conditions will help in selecting the right hat for the particular situation.

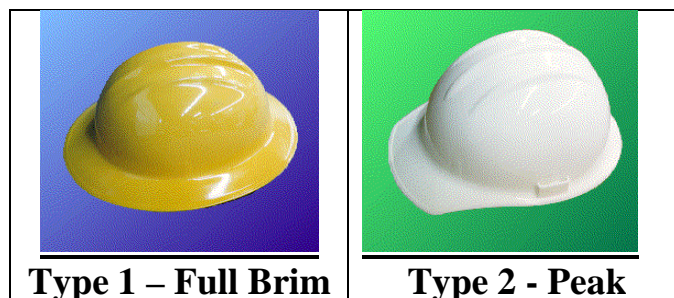
Protective hats are made in the following types and classes:

#### Type 1:

Helmets with full brim, not less than 1 and ¼ inches wide.

#### Type 2:

Brimless helmets with a peak extending forward from the crown.



**Type 1 – Full Brim**

**Type 2 - Peak**

For industrial purposes, three classes of helmets are recognized:

#### Class A

These helmets are for general service. They provide good impact protection but limited voltage protection. They are used mainly in mining, building construction, shipbuilding, and manufacturing.



### **Class B**

Choose Class B helmets if your employees are engaged in electrical work they protect against falling objects and high-voltage shock and burns. (Electrical workers use them extensively).

### **Class C**

Designed for comfort, these light weight helmets offer limited protection. They protect workers from bumping against fixed objects but do not protect against falling objects or electric shock. (This class is usually manufactured from aluminum and offers no dielectric protection).

### **B: Eye and Face Protection**

Suitable eye protectors must be provided where there is a potential for injury to the eyes for face from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially injurious light radiation or a combination of these.

#### **Types of Eye and Face Protection:**

- Safety Glasses
- Safety Goggles
- Face Shields
- Welding Goggles
- Laser Safety Glasses



#### **Selection:**

Each eye, face, or face-and-eye protector is designed for a particular hazard. In selecting the protector, consideration should be given to the kind and degree of hazard, and protector should be selected on that basis.

Table 1. Eye and Face Protector Selection Guide:

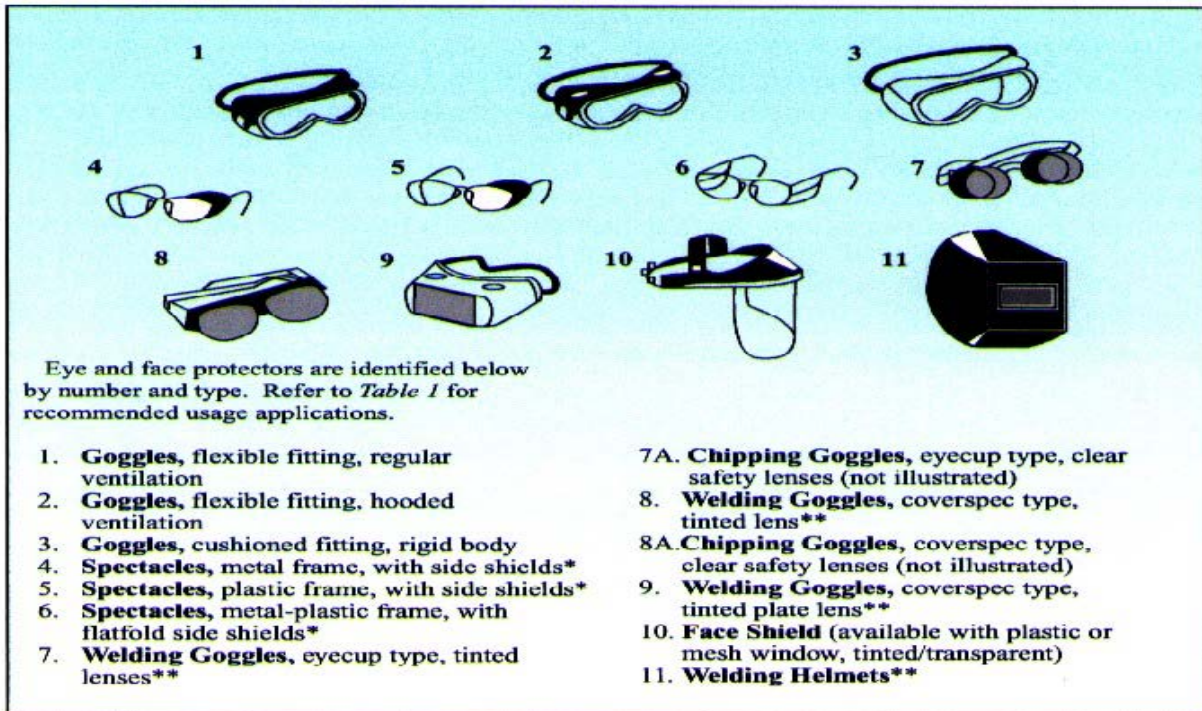




**Document Title: Health, Safety and Environment Procedures Manual for Pressure Reduction Station Construction**

Operation	Hazards	Recommended Protectors numbers refer to Fig 1
Acetylene-burning, acetylene-cutting, Acetylene-welding	Sparks, harmful rays, molten metal, flying particles.	7,8,9
Chemical handling	Splash, acid burns, fumes	2,10 (for severe exposure add 10 over 2)
Chipping	Flying particles	1,3,4,5,6,7A,8A
Electric (Arc) welding	Sparks, intense rays, molten metal	9,11 (11 in combination with 4,5,6 in tinted lenses advisable)
Furnace operations	Glare, heat, molten metal	7,8,9 (for severe exposure add 10)
Grinding - light	Flying particles	1,3,4,5,6,10
Grinding - heavy	Flying particles	1,3,7A,8A (for severe exposure add 10)
Laboratory	Chemical splash, glass breaking	2 (10 when in combination with 4,5,6)
Machining	Flying particles	1,3,4,5,6,10
Molten metal	Heat, glare, sparks, splash	7,8 (10 in combination with 4,5,6 in tinted lenses)
Spot welding	Flying particles, sparks	1,3,4,5,6,10

**Figure 1. Recommended Eye and Face Protectors**



Source: 29 CFR 1926.102 (a)(5) Table E-1.

\*These are also available without side shields for limited use requiring only frontal protection.

\*\* See Table 2. Filter Lenses for Protection Against Radiant Energy.



**Table -2**

Welding operations	Opacity
Alloy welding	2
Yellow copper welding	3 or 4
Light welding ( till 1/8 inch )	4 or 5
Medium welding ( 1/8 – 1/2 inch )	5 or 6
Heavy welding ( over 1/2 inch )	6 or 8
Light cutting ( till 1 inch )	3 or 4
Medium cutting ( 1 – 6 inch )	4 or 5
Heavy cutting ( over 6 inch )	5 or 6

**Hearing Protection**

Hearing protectors shall be made available and shall be worn by all employees exposed to an 8-hour TWA of 85 dB or greater.

Hearing protection equipment:

Its purpose to reduce the noise level to be lower the noise limits allowed in work place.

Hearing protectors will always have an assigned **Noise Reduction Rating (NRR)**, **which** should be printed on the packaging of each hearing protector.

**NRR** is the amount of decibels by which a given device will reduce noise exposure, by subtracting the NRR value from the noise exposure levels.

OSHA requires subtracting 7 from the NRR as a safety factor.

1. Ear Muffs

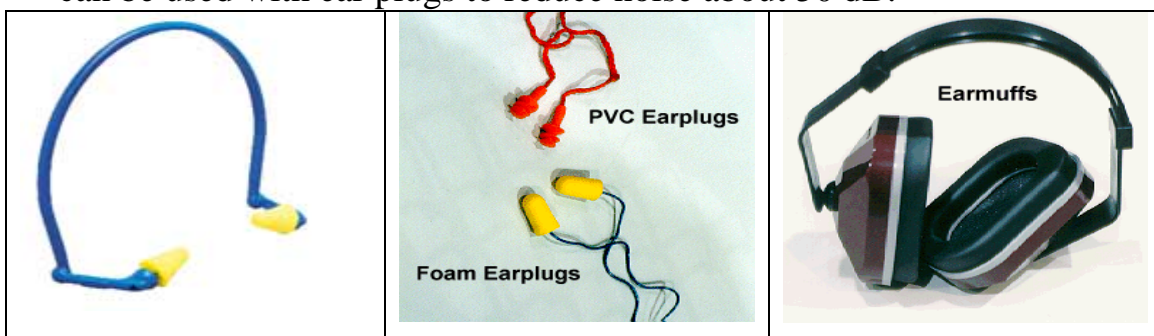
It is covering the external ear, making a sound barrier and protect ear from high levels of noise where it can reduce it by 15 – 35 dB.

It is used when noise in work place is 90 – 120 dB.

2. Ear Plugs

Placed at ear canals and manufactured from plastic or rubber and can reduce the noise by 20-30 dB and used for places which have noise of 85 – 115 dB.

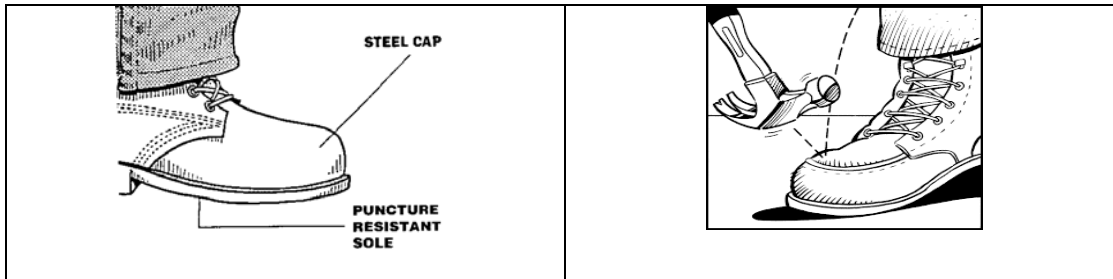
In some places, which have a high level of noise, ex. 130 dB ear muffs can be used with ear plugs to reduce noise about 50 dB.





### **C: Foot Protection**

Statistics showed that most of the workers in selected occupations who suffered foot injuries were not wearing protective foot-ware.



For protection of feet and legs from falling or rolling objects, sharp objects, molten metal, hot surfaces, and wet slippery surfaces, workers should use appropriate foot guards, safety shoes, or boots.

Safety shoes should be sturdy and have an anti-resistant toe. In some shoes, metal insoles protect against puncture wounds.

### **D- Respiratory Protection**

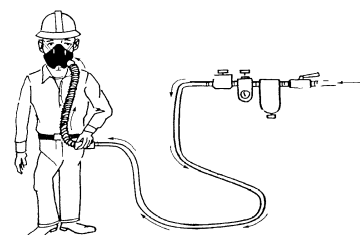
Respiratory protective devices fall into two classes:

1. Air Purifying Devices
2. Air Supplying Devices

#### **Air-supplying Devices**

Air-supplying devices are the class of respirators that provide a respirable atmosphere to the wearer, independent of the ambient air ex. Self-contained breathing apparatus (SCBA)

Which provide complete respiratory protection against toxic gases and an oxygen deficiency. The wearer is independent of the surrounding atmosphere because he or she is breathing with a system that is portable and admits no outside air.



## Air Purifying Devices

The various types of air-purifying devices include:

- ☒ Mechanical-filter cartridge
- ☒ Chemical-cartridge
- ☒ Combination mechanical-filter/chemical-cartridge
- ☒ Gas Masks
- ☒ Powered Air-Purifying Respirators (PAPR)

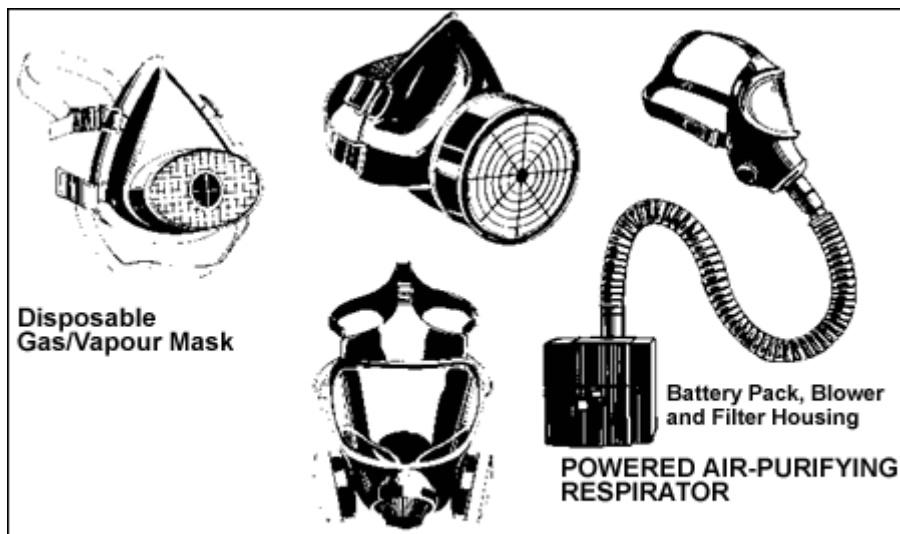


FIGURE 31  
Air-Purifying Respirators



The air-purifying devices cleans the contaminated atmosphere. Chemicals can be used to remove specific gases and vapors and mechanical filters can remove particulate matters. This type of respirator is limited in its use to those environments where the air contaminant level is within the specified concentration limitation of the device. These devices do not protect against oxygen deficiency (percentage of oxygen by volume is less than 19.5 percent oxygen).





### Proper Selection:

Respirators shall be selected based on hazards to which the worker is exposed. In selecting the correct respirator for a given circumstance, many factors must be taken into consideration:

- The nature of the hazard
- Location of the hazardous area
- Employee's health
- Work activity
- Respirator characteristics, capabilities, and limitations.

In order to make subsequent decisions, the nature of the hazard must be identified to ensure that an overexposure does not occur.

One very important factor to consider is oxygen deficiency. Air-purifying respirators can be used only at atmospheres containing greater than 19.5 percent oxygen.

### Training and Fitting:

The user must be instructed and trained in the selection, use and maintenance of respirators. Every respirator user shall receive fitting instructions including demonstrations and practice in how the respirator should be worn, how to adjust it, and how to determine if it fits properly.

### Fit Testing:

Fit testing is done to find both a style and a size of respirator that fits the individual best and is most comfortable. There are two types of fit testing: Quantitative fit testing and qualitative fit testing.

### Field Testing:

Once the fit test has been performed and a respirator selected, the user should perform "field tests" on his respirator each time before entering the toxic atmosphere. These consist of both a negative-pressure test and a positive-pressure test.

These tests apply to respirators with either a cartridge, canister, or filter.

### Negative-Pressure Test:

In this test, the user closes off the inlet of the canister, cartridge(s), or filter(s) by covering with palm(s) or squeezing the breathing tube; inhales gently so that the face-piece collapses slightly; and holds the breath for about 10 seconds. If the face-piece remains slightly collapsed and no inward leakage is detected, the respirator is probably tight enough.



### Positive-Pressure Test

The positive-pressure test is conducted by closing off the exhalation valve and exhaling gently into the face-piece. The fit is considered satisfactory if slight positive pressure can be built up inside the face-piece without any evidence of outward leakage.



### Medical considerations

The workers who must use respirators according to job nature must make a medical examination to eliminate individuals who are suffering from (chronic respiratory system diseases – cardiac diseases – difficult breathing diseases – hearing weakness).

Doctor specify the individuals who can use respirators and others who cannot according to the medical examination.

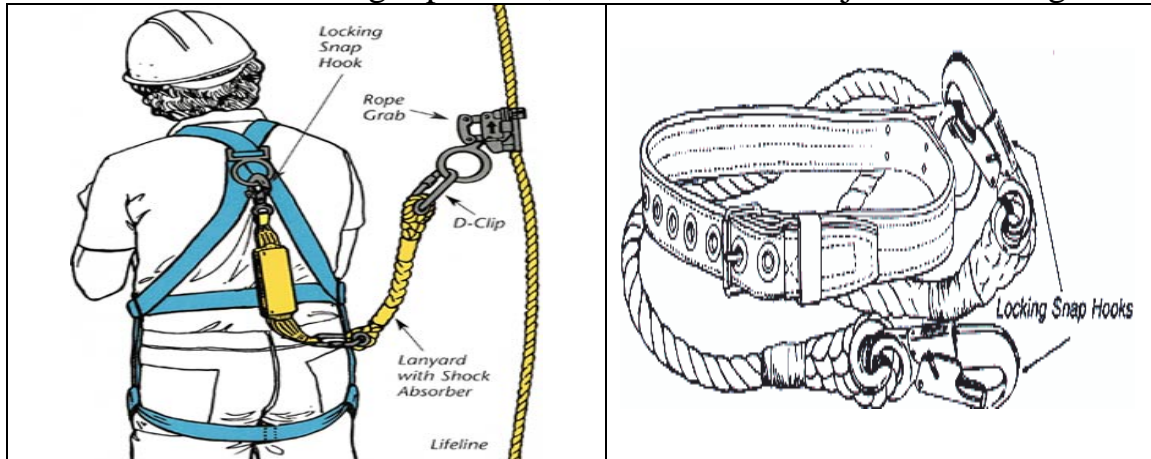
### Cleaning and storage of respirators

- Disassembly the respirator parts and wash it with detergents, hot water and brush then wash the parts with cold water, after that leave the parts to be dried in a clean and dry place.
- Do not use organic solvents in washing because it can damage the plastic parts.
- Be sure it is washed well with water and no traces of soap exists because it may make irritation to the user.
- Storage of respirators is done in a clean place for saving from dirt and dusts.
- After washing respirators, keep them in sealable plastic bags.

### **E- Safety belts and lifeline**

They are used while working at heights for workers safety, also now using the parachute belts instead of regular belts.

In case of confined spaces working, use a safety harness and lifeline for getting the worker outside in a straight position, which eliminate injuries in emergencies.



### **F- Hand Protection:**

Employees are required to use appropriate hand protection when their hands are exposed to hazards such as:

- Absorption of harmful substances.
- Severe cuts or lacerations.
- Severe abrasions.
- Punctures.
- Chemical burns.
- Thermal burns.
- Harmful temperature extremes (cold/heat).

### **Kinds of Protective Gloves:**

Gloves made from a wide variety of materials are designed for virtually every workplace hazard. They may be divided into groups as the following:

#### **1- Metal Mesh, Leather, or Canvas Gloves:**

Sturdy gloves made from metal mesh, leather, or canvas provide protection against cuts, burns, and sustained heat.





## 2- Chemical-and Liquid-Resistance Gloves

Gloves made of rubber (latex, nitrile, or butyl), plastic, or synthetic rubber-like material such as neoprene protect workers from burns, irritation, and dermatitis caused by contact with oils, greases, solvents, and other chemicals. The use of rubber gloves also reduces the risk of exposure to blood and other potentially infectious substances. Some common gloves used for chemical protection are described below. (In addition, table 4 rates various gloves as protectors against specific chemicals.)



## 3- Heat resistance Gloves

These gloves provide protection against heat like steam pipes and hot glassware in laboratories or welding operations.



## G- Body Protection

Overalls and aprons are used at working near machines or in workshops.

Plastic safety suits and coats are used for body protection against chemicals like acids and bases.



## Painting Works (Paints – Solvents – Removals)

- Store in a separate place away from any chemical or oxidized substances.
- The store should be dry & well ventilated & the thinner should be keep away from any thermal source or the direct sun light.
- Material should be treated as any flammable material in a way that smoking or presence of any flame source is forbidden.
- In case of using electrical equipment in storage or transportation, they should be fulfilling the technical specifications in dealing with flammable materials.
- Materials should be kept in packages originally, of the same material you are going to keep.
- Do not use any unsafe method to get the chemical out of the package.
- Do not eat or drink in place of chemical handling.
- Keep away from any source of heat, spark or open flame during working with chemical.
  - **In case of Injury Due to Dealing with Chemicals**
    - Respiratory system cases
      - Patient should be taken to a well-ventilated place.
      - In case, respiratory system stops start making artificial respiration.
      - In case of unconsciousness, contact the doctor for consultancy.
    - Skin injury cases
      - Take off clothes contaminated with chemicals.
      - Wash the skin with soap & water.
      - Contact doctor in case of injury continuity.
    - Eye injury cases
      - Take off medical contact lenses if found.
      - Wash the eyes with clean water for ten minutes.
      - Contact doctor in case of non-improvement.
- Use PPE (Respiratory mask – protective glasses) especially if the painting splash is heavy.
- In case of presence of opened flame, painting is forbidden.
- Do not store painting boxes or packages in place of work, but bring the needed only from the stores.
- Do not eat in place of work & painting workers have to wash their hands with soap properly before eating.
- Do not paint vehicles inside the garage.



## Purging

***The inert gas used in purging media must have the following characteristics:***

- a) Inflammable.
- b) Not support combustion
- c) Contain less than 2% oxygen.

Inert gases most commonly used for purging are Carbon Dioxide, nitrogen, or mixtures of the two.

**Notes must be considered in Purging Operation:**

- ❖ Using blank behind valve to isolate the part of the pipeline, which will be purged from the part that will be in service.
- ❖ The inert gas must be adequate and efficient.
- ❖ Devoid of purge, gas from moisture or other constituents, which might contaminate the material, protected.
- ❖ The vapors from enclosures being shall be vented to a safe point outside of enclosures and away from ignition sources.
- ❖ After the completion of purging operation and the procedure of work which had been prepared and reaching to the end point, a test must be done to the air around the place of purging to ensure that there is no gases or condensate or leakage or any circumstances can lead to any chemical reaction can form combustible substances or self-ignition.

### **Vent Pipes**

These pipes used to vent the gases present in the equipment to a point at which a dilution for these gases without any harm for the labors.

Therefore, it is advised that the lowest height for this joining is 3 m from the surface of the earth or from the nearest platform. also, the size of the vents is an important factor in identifying the speed of gas vented, and for safety the speed of the gas out from these vents at least ( 3- 4m/s ) and to consider that the total of area of the vent points is less than the points entering purging media.

### **Ignition Sources**

Ignition sources must be removed from the area near the purging operations and it may control the ignition sources that is open flame, electric spark and hot surfaces and welding operations...etc. but the static electricity is an ignition sources that cannot be controlled. So, the pipeline should be earthed.



## Sand Blasting

- Cleaning & rearranging site before and during working.
- Be sure that the sand blasting equipment are in good conditions and safe for working in hazardous sites.
- Be sure that the hoses, connections, pressure gauges, filters, vent valves and safety valves are safe & in good condition.
- The worker on the sand blasting must wear the protective mask and be sure that the air hose is working efficiently along working period.
- Workers must wear appropriate PPE ( dust respirator – gloves – safety goggles – safety shoes – overall )
- Making safety meeting before starting work.
- If the job will done in the confined spaces a work permit must be done including all actions required for the job.





## Storing

- Industrial safety person should ensure the presence & condition of adequate number of fire extinguishing equipment.
- Smoking is completely forbidden in the stores.
- Storing places should be always clean & tidy & free from any litters, papers.
- Do not use benzene in cleaning or in removing grease but use nonvolatile cleaning liquids.
- Flammable materials should be stored separately.
- Periodically check barrels & packets against any leakage or holes.
- Correct methods of handling, loading & putting materials should be followed & checked by supervisors.
- On lifting loads manually, take the correct position of legs, chest & back & to bend the knees with the chest upright as much as possible & making the load as close as possible to the body to transfer the load to the muscles of the legs & the knees.
- Be sure the load to be lifted is within the limit that can be lifted or ask for others help or use any mechanical lifting method.
- Long loads or pipes should be lifted by two persons on the same shoulder of each person & to be in one direction & with homogeneous footsteps.
- Use the P.P.E.
- Materials, equipment & spare parts should be stored in an organized & safe way & avoid putting them in high rows or columns to prevent falling down or collapsing.
- Heavy materials & equipment should be stored properly & near to the ground.
- Avoid materials being extended out more than the depth of the storing shelves.
- Use proper ladders to go up to put, load or unload high materials & do not go up over material rows.
- It is forbidden to pass or stay under the crane or the lifted loads during loading & unloading especially of heavy materials or equipment.
- Switch off electricity after work is finished.
- Any unsafe work conditions or cases should be declared & told to the responsible authorities & persons.





## Storing & Handling of Air & Compressed Gases Cylinders

- Check the cylinders before storage that they are safe & valve & regulator covers are in place & reject any cylinder without any cover. Do a periodic check for the cylinders in the store.
- Be careful during handling or transporting compressed gas cylinders to prevent them from falling down or from collision with each other or from any mechanical impacts.
- Avoid exposing the cylinders to heat or to direct sun light.
- Compressed gas cylinders should be stored vertically (valves upwards) & to be tied properly in order not to fall.
- Store gas cylinders separately according to type of gas & specially butane, hydrogen & acetylene.
- Do not ever store oxygen cylinders with butane cylinders or any other flammable material.
- Empty cylinders should be separated from full ones with a label showing that it is empty but to be treated as the full ones.
- Do not oil or grease valves of compressed oxygen, acetylene or hydrogen cylinders as well as not to touch it with contaminated oily or greasy hands or gloves.
- Always put a label on each cylinder indicating type of gas inside & whether it is inert or flammable.
- Do not use wires or ropes to lift cylinders by cranes but use the suitable & correct lifting method.



## Storing Tyres & Rubber Materials

- Storage should take place in a closed area for protection against :
  - A. Temperature & humidity.
  - B. Direct & indirect sunlight.
  - C. Ultra violet rays in intensive artificial light.
  - D. Light of mercury lamps.
- Storing place should be well ventilated & avoid high humidity which decreases the condition of the tyre & its efficiency during service.
- Store temperature is preferably to be between 10°C & 20°C.
- Store should be clean & free from petroleum solvents, grease, oils that decrease the tire condition.
- Issued tires should be the earliest stored tires.
- Tires to be stored in a way that enables issuing the older stocks before the newer ones.
- Storage is preferably to be vertical in wooden ballets.
- Avoid horizontal storage; & if happened due to limited space to be with a maximum of 6 tires over each other & to be completely rotated every two months to change its order in Storage.
- In case the cycle of storing & issuing is fast (less than 1 year), no need to take strict or expensive precautions, in many cases it is just the temporary maintenance by spreading talc powder over the tires & the rubber materials.



## Storing & Handling of Acids

- Acids should be stored in a sealed or shielded store & away from sun heat & from any other flammable materials.
- Acid name should be written clearly on barrels.
- Use the P.P.E.

### **Storing Acid Glass Bottles:**

- Always leave an empty space for safety inside every glass bottle (½ Gallon)
- Stoppers of the glass bottles should be fitted in a way to allow relieving the acids' vapors.
- Glass bottles should be stored in a cool & well-ventilated place.
- Do not store full glass bottles beside or near any flammable materials.
- Glass bottles' Stoppers should be made of anti-corrosion & anti flammable material.
- At loading glass, bottles in a hot weather wash them with water & ventilate the stoppers.
- Do not store more than ten glass bottles in one place & to be stored in the form of one or two rows maximum & avoid storing in square shape & leave a passage between rows that allows moving safely.
- Try to store glass bottles on shelves with openings under which there is a path to discharge any acid leakage from the glass bottles.



## Storing Flammable Liquids

### **Lighting**

It is preferable not to use electric connections or preparations inside the stores & to depend for lighting on natural daylight or on electric lamps directed on the stores from outside so that its lights could penetrate through fireproof glass openings, and if necessary, any electric preparations should be of flameproof type.

### **Ventilation**

Preferable to be natural by making suitable openings in the stores covered with metallic wires of narrow lattice.

### **Flame Causes Prevention**

- Do not allow smoking or using uncovered flame or any other thermal sources inside the stores or outside the stores by a minimum distance of 6 meters all around.
- Be careful in moving or handling any metallic items inside the stores & for protection against static charges, packets & tubes should be tied with electric conductors or to be earthed.

### **Liquid Packets**

- Should be protected from any mechanical impacts & to be kept upright in its proper position.
- Do not leave any packets opened & always keep them properly closed.
- Try not to exceed two rows in storing the packets.

### **Escaping in Case of Fire**

- There should be enough isles between the stored packets & to be always clear, clean & free from any obstacles as well as the emergency exits.
- Stores should be kept opened as long as there are is person inside.

### **Recommendations**

- Do not allow unspecialized persons to enter the stores.
- Marks should be written & put clearly declaring (Danger – Flammable liquids – Forbidden to get close – No smoking).



## Storing & Handling of Pipes

- Store the pipes properly & safely & put suitable barriers to prevent sliding.
- Keep the correct pyramid shape by keeping the correct number of pipes in each row.
- Always inspect the correctness of pipe storage position & rearrange its position if necessary.
- Make the manual loading always by two persons on the same shoulder of the two persons and in one direction.
- Polyethylene pipes should be covered with a non-flammable cover.
- Leave adequate spaces between bundles for the maneuvering of cranes & trailers.



## Storing & Handling of Barrels

- Put the barrels properly in a horizontal manner as much as possible.
- Separate barrels according to its type & put suitable barriers to prevent sliding.
- Check the cleanliness of containers used in discharging oils & grease.
- Do not throw barrels from heights & be careful when sliding a barrel in order not to change its direction.
- At lifting barrels, make the knees bended & the back to be upright.
- Be careful that fingers do not get trapped between barrels.
- Use wooden sheets for sliding the barrels from heights & be sure that sheets are in a good condition, properly fixed & its length is suitable.
- It is forbidden for persons to get down using these sheets.



## Using of Hand Tools

- Inspect all the tools periodically & keep them always clean & in good condition.
- Unsafe tools should be excluded.
- Handy tools should not be thrown from one person to the other.
- Handy tools should be kept away from oils & grease to avoid slipping in workers' hands.
- After cleaning the tools by the cleaning liquid, the worker has to wash his hands with water & soap.
- Do not carry tools or put in clothes' pockets during moving upwards or downwards on a ladder.
- Avoid working (except if must) in areas in which handy tools are used in higher planes over the workers' heads (use safety helmet).
- Tools with wooden hands should be rounded & free from breaks & scratches to be holded safely.
- Workers should use the P.P.E.



## Using of Ladders

- Check the rubber fixtures and pay attention.
- Ladder stairs should be free from grease or oil.
- Continuous inspection of the ladders to ensure absence of any defects.
- Inspecting the ladder in case of falling down to be sure there are no defects in the standing bars.
- Ladders on vehicles should be fixed in a way to minimize impacts & friction during transportation.
- Ladders should be stored in a well-ventilated place & away from any radioactive source or any high temperature source like ovens or steam pipes or boilers.
- In case of horizontal storage of ladders put suitable supports to prevent collapsing or falling.
- Well fixation of the ladder to prevent any slipping.
- Avoid leaving ladders in front of doors or windows.
- Use suitable barriers around ladder in case of using it in isles or vehicles ways.
- Do not put ladders over any unstable bases to obtain extra height.
- Do not ever assemble short ladders to obtain a long one.
- Carefully move ladders in places with electric circuits.
- Always look in front of you during moving up or down on ladders (face faces the ladder).
- Hands should be free during moving up or down on ladders and in case of using any tools or equipment use ropes to get it up or down.
- Shoes should be free from any grease or oil or any slipping substances during using ladders.
- Avoid using the upper stairs of the ladder as an ordinary stair.
- Carefully adjust & lock the extended ladders before usage and do not try to adjust it during work and try to make the distance between the ladder & its mounting wall  $\frac{1}{4}$  the required height from the ladder.
- Use the ladder stairs for its purposes & not as supports.
- In case of using the long ladder, somebody should be standing at the bottom of the ladder while the technician is working at the top.





## Using Gamma ( $\gamma$ ) Ray in Welding Inspection

- Be sure of the insulation of the  $\gamma$  Ray device & that it is completely safe.
- Be sure entering the radioactive source inside the insulated device (at the beginning of the cable) after finishing shooting.
- Be sure of applying the human safety circle around the shooting place.
- Specialists with good experience & official certificates are the only persons to do this job.



## Working on Scaffolds

- Well supervision should be done on the scaffold & report any defect immediately.
- Daily supervision in case of working on the scaffold for more than one day.
- Use safety belt during working on scaffolds.
- Do not put any equipment, instruments or anything not in need on scaffold.
- Use scaffold stairs to move up & down and not the crossbars.
- Do not look down during going up or down.
- Use correct, suitable tools and to be in good condition.
- Do not make extensions to increase Stillson lengths.
- Check for safe electrical connections for the used tools and devices.
- Do not remove chip during working with screwing machines.
- Remove chip using suitable brushes & not by hands.
- Always keep working place neat & tidy after work.
- Work should be immediately stopped in case of heavy wind or rain or any emergency case at the work site.
- Wear appropriate P.P.E to protect you from injury (helmet – gloves – safety shoes – safety belt).
- Check the suitability of the ground in the place for the scaffolds to be installed.
- Install scaffolds 30 cm away from the pipe location.
- Check all parts of the scaffold & remove any defected parts.
- Be sure of installing all cross bars, standing bars and that all the safety locking benz are in good condition.
- Make the scaffold away from electric cables & ducts by an adequate distance.
- Combine the scaffolds with the building every 3 floors by using clamps.
- Be sure of fitting the stairs & standing bars with a minimum of 2 on each floor.
- Put one safety floor on the last working floor.
- Do not ever throw any of the scaffolds components during installing or reinstalling.



- Work should be immediately stopped in case of heavy wind or rain or any emergency case at the work site.
- Do not move scaffold from any place to another except after reinstalling & installing at the new place.
- All components of the scaffold should be well-locked & secured during transportation on vehicles & without any exceeding edges on the vehicle.
- Work should be done under the supervision of the qualified supervisor or anyone qualified replacing him.
- All workers should use P.P.E (helmet – safety belt – safety shoes – gloves – overall suit).

### **Bracket Installations**

- Check the suitability of the ground inside the customer's apartment.
- Check all parts of the bracket & remove any defected parts.
- Check installing 2 clamps and 2 standing bars.



## Working on Roads / Open Areas

- Put warning signs and signals along sides of the excavation for protection of workers, people, and vehicles.
- Put all traffic signs required for the job.
- In case of night working, you must put all warning flashers & phosphorescence signs.
- You must put all required bridges for vehicles in case of excavation is crossed with the road.
- Put the needed human bridges specially beside schools and hospitals
- Put all the required barriers and signs around the excavation if it is in open area.
- All warning signs and signals must put in places that are clear for the public and traffic.



## Welding

- Avoid welding or flame cutting in any area, rooms or stores containing any flammable materials.
- Distance between cylinders of gases used for welding or flame-cutting places should be 5 meters or more.
- Chains or belts to prevent falling down should fix vertical cylinders.
- The specialized persons of the company should do repairing of regulators defects & cylinder valves only.
- Used hoses should be at least 5 meters long & should be installed by clips so that it would be fixed properly.
- Hoses should be stored properly to avoid knotting or ignition from near heat sources.
- Proper ones should change defected hoses immediately.
- Check the correct working pressure of the flame hose.
- Welder should not lift hoses on his shoulder during welding so that his clothes do not absorb oxygen or any gases from leakage locations & catch fire.
- Welder should not keep matches in his pockets.
- Leave adequate distance (not less than 15 meters) around welding location free from any papers, clothes, litters or any empty or full gas cylinders.
- Welder should use welding mask with special glasses to protect his eyes from ultra violet rays.
- It is forbidden for any vehicles or cranes or any heavy equipment to pass over gas hoses or electric cables.
- Avoid welding or cutting in barrels, tanks or gas cylinders with unknown contents.
- On welding or cutting pipes or tanks containing any flammable contents, it should be emptied from these contents & consulting the concerned persons before starting welding or cutting.
- On welding or cutting in boiler areas, gas shut down should be done & check absence of leakage before starting work.
- On working in closed workshops on a table or a vice, do not flame hose beside the work piece to avoid catching fire.



- Welder clothes & gloves should be completely free from any grease, oils, benzene or kerosene or any flammable materials or fluids.
- Inform the safety persons & check work place if it is outside the workshop, in this case a work permit could be done also.

### ***Electric Arc Welding***

- Perform steps 1, 12, 13, 14 & 19
- Check the electric cable from any cuts or uninsulated parts, also check the plug.
- Welding hose should be insulated properly, and during stop or rest periods it should be left on an insulated holder so that it will not touch the work piece.
- Stop welding during raining.
- If working at high places & at stop or rest periods, welding hose should not be thrown down except after switching off electricity.
- Periodically, pass by welding or cutting location after work finishes.



## Work Permit

What is work permits?

Work permit is not just a permit to do dangerous works; its essential part of the system, which identify how can the job, is done safely.

Work permit is a document, which gives the right for worker to do his job, taking into account all risks, precautions, equipment that are exist, and how to do his job safely.

The getting of work permit does not also mean the process is safe, it must mention that well trained personnel are controlling all hazards by means of control measures and precautions.

The work permit is based on written procedure used to control special types of works that have potential hazards and it is a communication method between sites, workers, supervisors, and management.

### Instructions for the permit issuance:

General:

- a- Specify the responsibilities of supervision personnel for every process and precautions to take into account.
- b- There must be a clear instructions and training for using and issuance of work permits.
- c- The system of work permit must be followed up.

\* The following points have to be clear stated in permits:

- 1- Specify the department or sector responsible for the job, type of job, and location of the job.
- 2- Specify type and nature of job to all related personnel with clarification of all related hazards.
- 3- Illustration of all control measures required to protect from possible hazards and risks.
- 4- Be sure that worker is qualified for the job also be sure that a continuous supervision is applied and qualified person reviews all precautions.
- 5- Illustration of various work procedures on site and temporary work stopping procedures.
- 6- Illustration of the followed procedures for elongation of working period's more than one shift also be sure that all procedures that guarantee that the job is safe are fully illustrated.



### Permit preparation

1- it's very important that all activities related to the job to be taken into account to avoid any risks obtained from the job , that is done by one who is responsible for the job ( site manager ) who monitor the issuance of permits till job is finished .

In addition, it is important in some cases to participate more than one in the responsibility, each in his field and site manager has the all authority for supervision for all responsible personnel.

2- The permit requires a good planning from all related personnel, where they must be informed about the work places that may be affected by the work and taking all precautions to avoid any effect could be happened to any of work activities. Also giving the time required to identify all risks, control measures, and preparation of site for work, the supposed technical method to achieve that is the procedure of: "Job Hazard Analysis ".

3- The most important stage of permit issuance is the risk assessment which done by permit maker with work supervisor also may be other specialists participate in the risk assessment , the following have to be done at the assessment:

- a- Get the detailed information about the process to be done from supervisor with taking into account all alternatives that can achieve the work safely, like timing, method of work... Etc.
- b- Taking into account all risks that may arise from handling materials and working by equipment.
- c- Evaluation of difficulties and expected effects on working environment also expected hazards that affect the work.

#### \* Types of Works

Types of works include works such as maintenance, repairing, inspection, testing, construction, re-construction, machines disassembly, modification and cleaning.

#### \* Activities Interference

The main aim is to verify that no hazardous interference between activities that may contain risks for people or equipment.





\* Permit Validity

It is important to specify the validity of work permit to the work permit system under control also it's favorable to eliminate permit at the end of the working shift and issue a new one if the job is continued for more than one shift .

\* Isolation

It is an essential part of safely working system; also, each company makes its own isolation procedures based on working activities and associated risks.

\* Precautions

You must know the nature, type of job for defining the required precautions that will be wrote and reviewed in its form, and each supervisor must be sure that all precautions are implemented.

\* Gas Test

A test for gas leakage must be done on sites, which contain flammable or toxic gases or expected decreasing / increasing of oxygen.

The results of the test must be recorded in the permit.

\* Approval (signature)

The number of work permit approval personnel are specified according to nature and type of work and permit, as a minimum requirement the permit issuance person and the work supervisor must sign on the permit and any other person who participated in the permit issuance and if the responsibility is changed to other personnel, he must sign on the permit.

\* **Process**

- permit using

The permit must be communicated to all related parties or personnel and copies of permit must sent to these related parties.

- Permit validity

The permit issue personnel must re-evaluate the conditions of work that he issued for the permit at the first time and be sure that conditions are not changed – (it is common that this evaluation is done at the end of each work shift).

- Changing Shifts

The points of changing shifts are considered very critical for work permit and any fault of information transfer is a reason for many accidents. In addition, information transfer methods are:



- a- Work permit logbook.
- b- Files of permits.
- c- Signs and information boards.
- d- Computer screen.

- Emergency Procedures

The permit must contain the followed procedures in case of emergencies like limitations of some activities ...etc. and re-evaluate the job which the permit is issued for, to ensure that conditions are not changed by existing emergency.

- Permit Monitoring

The monitoring must not be stopped to ensure not all the conditions are changed along with the process progress.

- Finishing job in permit

When the job is finished, the permit copies are collected and sent back to the issuance parties, which will sign on the permit with the supervisor stating that the job is finished; also other related parties are informed.

- Site Inspection

The permit party's representative must make a site inspection after the job to ensure that it is leaved in good conditions.

- Coming back to operation mode

There must be some procedures for equipment to come back to operating mode like:

- a- The work on machines is finished.
- b- The facilities and equipment are leaved in safe and good conditions.
- c- All isolation and outreaches procedures are terminated.
- d- The responsible personnel must accept officially the existing conditions of the facility and equipment.

- Records

The permits must recorded in a specified logbook.



## Working in Confined Spaces

### **Description of confined spaces, which need to work permit**

- |              |   |
|--------------|---|
| 1- Manholes  | 2- Petroleum tanks                          |
| 3- Tunnels   | 4- Ground tanks                             |
| 5- Pipelines | 6- Digging for depth more than 2 m.....etc. |

### **Confined space entry**

#### **Entry into any confined space cannot proceed unless:**

- All other options have been ruled out.
- A responsible person issues permit with authorization.
- Permit is communicated to all affected personnel and posted as required.
- All persons involved are competent to do the work.
- All sources of energy affecting the space have been isolated.
- Testing of atmosphere is conducted, verified and repeated as often as defined by the risk assessment.
- Stand-by person is stationed.
- Unauthorized entry is prevented.



## Workshops

- Smoking is completely forbidden.
- Isles should be clean & free from any obstacles & oils should be removed daily.
- Litters should be put in special baskets or containers & to get rid of it continuously & as quick as possible.
- It is forbidden for anyone to work on machines except the specified workers.
- Do not clean or wash equipment or machines with benzene or any other quick flammable material, but if necessary use kerosene or solar and avoid clothes being wet by benzene or solar.
- It is forbidden to store quick flammable materials in opened containers or in any other places not specified for this purpose.
- Switch off electricity after work finishes & check the safety of wires & connections.
- Use the suitable PPE for every job to protect the worker.
- Check the safety & condition of the handy tools & equipment used in repairs.
- Avoid oil spilling on the ground during changing oils for vehicles & machines.
- Expired oils should be collected in barrels.
- Expired filters should be collected in barrels with special color.
- Switch off electricity & do the daily cleaning after work time.



## Washing by Solvents

- The workers handling diesel or hydrocarbon solvents must read the using instructions on cans before use.
- Washing by diesel must be done in its specified place and the washing residuals are collected into separated barrels.
- Do not spill diesel or hydrocarbon solvents into sewages.
- Use the proper PPE (rubber gloves – safety goggles – safety shoes ...etc).
- Do not use diesel in compressed form for spraying to avoid fire and inhalation risks.
- Wash by diesel in a well-ventilated area.
- Smoking or other hot works are forbidden in washing by diesel area.
- The residual barrels are moved to collecting place for disposal and be sure the barrels are closed tightly.
- Labels must be put on the solvents residual barrels.
- Keep the washing area and collecting barrels area clean to avoid slipping and environmental contamination.



## Waste Management

### **1- Purpose**

Making a system to collect, classify and dispose of wastes.

### **2- Range**

All wastes that produced by working in all activities of the company.

### **3- Responsibility**

Responsibility of every working site manager.

### **4- Forms**

Security person at the exit area and storing places of the company records waste trucks.

### **5- Definitions**

#### **5.1- Dangerous wastes**

It is all types of wastes that effect on working site and Surrounding environment safety (used oils – residual paints – residual thinner – odorant drums – residual kerosene – batteries – printing inks empty cans ,...etc.)

#### **5.2- Liquid wastes**

It is including the cooling liquids of screwing & lathing Machines

#### **5.3- Solid wastes**

It is including (scrap – wood – paper – residual steel residual pipes – used tires – residual digging & civil works – organic substances ,.....etc)

### **6- Steps**

#### **a- Dangerous wastes**

It has collected in convenient containers & prepared by convenient method.

The responsible person collects the dangerous waste containers to a specified place until its disposal.



- Dangerous wastes are disposed according to the following:
  - Used oils are sent to company storing place and disposed by selling.
  - Batteries are sent to company storing place and disposed by selling.
  - A waste contractor disposes empty cans of (paints – thinner – kerosene.
  - Residual kerosene is reused in pipes washing works.
  - Cans of printing inks are disposed by sending it back to the supplier.

#### **b- Liquid wastes**

- Collected in convenient containers and marked then sent to company storing place prepared to be disposed by selling.

#### **c- Solid wastes**

- The wastes of (residual pipes – scrap – wood – tires – empty drums – residual steel) are sent to company storing place and disposed by selling.
  - The wastes of human activities, administrative buildings and activities are collected by a contractor and disposed by government.
  - Gas odorant empty drums are chemically treated and collected in company storing place, prepared to dispose it.
- 