



PHARMA DEVILS

QUALITY ASSURANCE DEPARTMENT

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SAFETY MANUAL

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SAFETY MANUAL



PHARMA DEVILS

(Oral Solid Dosage & Injectable Facility)



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1.0 APPROVAL:

Signing of this document indicates agreement with the Environment, Health and safety manual of..... If further any changes in this document are required, document will be revised and duly approved.

Prepared By

Functional Areas	Name	Sign and Date
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Reviewed By

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General Manager-QA/QC/DRA		
Vice President- Operations		



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3.0 COMPANY PROFILE:

..... is a professionally engaged Pharmaceutical company, manufacturing various dosage forms and has emerged as a reputed pharmaceutical formulation manufacturer. The company enjoys a rich manufacturing experience of over years. This Quality Manual is related to manufacturing facility ofPlot No.,Km away from the railway Station &Km away from airport. The site manufactures Tablets, Capsules, Ointments, Oral Liquid, Liquid Injectable, Dry Syrup & Dry Injectable in General. The formulations manufactured are generic and patent and proprietary medicine and for HUMAN USE ONLY.

Number of employees and workers engaged in

Department	Managers	Staff	Workmen	Total
Production (General)				
Quality Assurance				
Quality Control				
Store (RM, PM & FG)				
Engineering				
Personal and Admin				
Total				



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4.0 USER GUIDE:

Introduction:

During the normal working by our employees or contractor employees there are possibilities of suffering an injury. The objective of the company is to reduce the accident rates and therefore it is necessary to all concerned people to be aware of Environmental, Health and Safety procedures and regulations.

Purpose:

The information manual is intended to be guidelines on Environmental, Health and Safety matters pertaining to safe working within the company.

Scope:

The information manual details the various aspects of Fire, Safety and Health and also covers the principles of management.

It has covered the topics such as Prevention of Fire and accidents; work permits system, safe working method etc.

The manual gives the guidelines about the general duties and responsibilities of employees as well as supervisors to ensure safety and fire prevention.

Identification and Distributions:

Every Manual should be identified by "Document No.:"(which shall be unique number allotted for a manual)

For the purpose of distribution the document is available with Quality Assurance Department and Environment, Health and Safety Department.

Amendments:

Only the head of Environment, Health and Safety Department is authorized to record changes to this manual and approves them. When changes are incorporated to any pages of this manual, the same shall be revised giving the revision status.



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5.0 SAFETY ORGANISATION

The company has a well set up of Safety organization. The overall objective of the safety organization is to remove Unsafe Physical conditions & suitable safe practices in place of unsafe practices. The following are the basic elements of Safety Organization.

- Leadership and Employee Involvement
- Assignment of Responsibility
- Maintenance of Safe Working Conditions
- Establishment of Safety Training
- Accident Investigation System
- Medical & First- aid System
- Acceptance of Personal Responsibility by Employees.

Top Management approach towards accident prevention is reflected in the attitude of supervisory force. The Head of Safety is responsible to provide support to Top Management in Leading and directing activities for safety management in the organization.



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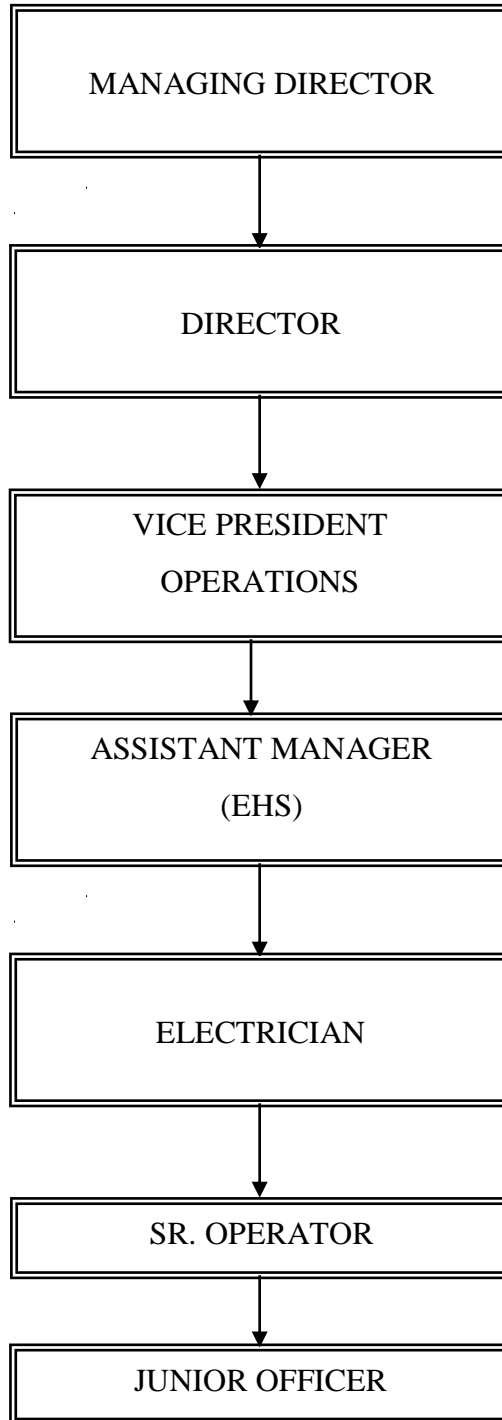
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6.0 ORGANOGRAM OF ENVIRONMENT, HEALTH & SAFETY





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7.0 EHS POLICY

EHS POLICY

.....is a responsible manufacturer of Pharmaceuticals product is committed to take adequate precautions related to environment, health and safety in developing, manufacturing, storing, handling and distribution of both existing and new products and in its business. It is our policy to provide a workplace free from accidents, injuries and exposure to hazardous chemicals, conserve natural resource and prevent pollution to protect the environment.

Towards this, we have set our objectives:

- We will comply with applicable Environmental, Health and Safety (EHS) legislation and statutory, regulatory and other requirements.
- We will respond to community concerns regarding EHS and address them proactively in our operations.
- We will integrate EHS considerations into business planning and decision making.
- We will use process safety and management techniques like safety audits, analysis \ operability studies and Documentation of safety related information to minimize EHS associated with our operations.
- We will communicate our EHS policy and other concerns to our contractors and visitors and seek their compliance.
- We will continually review objectives and set targets to improve our EHS performance.
- We will provide organizational structure support and directive to achieve these objectives.

Head-EHS

QA Head

Plant-Head



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8.0 BASIC SAFETY RULES & GUIDELINES:

The company has implemented certain safety measures in the interest of employees, contractors & visitors. It is essential that all people strictly adhere to the following safety rules.

- All employees are expected to wear clean uniforms while on duty.
- Smoking is not allowed inside the factory premises.
- Matchbox, cigarette, lighter, gutka, tobacco, camera, mobile phone, etc. is not allowed inside the premises. Mobile phones are to be deposited at security gate. Only authorized persons are allowed to carry mobile phones inside the factory.
- Photography & Use of mobile phone is strictly prohibited in hazardous area.
- In case of emergency siren, all employees and contractors are expected to assemble at designated assembly points.
- Person less than 18 years is not allowed to work inside the factory premises.
- Personal Protective Equipments (PPE), as required are issued to all employees and it is mandatory to use them as directed.
- All chemicals handled & stored in factory premises which are expensive and hazardous all must ensure that spillage is prevented.
- For any maintenance job, a work permit is necessary. Don't start any work in an operating area without obtaining proper work permit.
- For working at height, special permit must be obtained and safety belt must be used.
- Do not enter inside any Closed Vessel/Tank /pit/any equipment or confined space without authorized vessel entry permit.
- No welding, cutting or hot work is allowed without obtaining a hot work permit.
- For doing digging job or breaking of floors an Excavation Permit is required.
- Do not block access of emergency equipments like safety showers; fire fighting equipments, safety equipments, emergency exits, etc.
- Follow all safety norms, procedures and instructions established in the factory.
- You are required to work in your area/work place. Don't leave your area without prior permission of your supervisor.
- Maintain a high standard of house keeping / up keeping in your area.
- Report any incident/accident/ fire/unsafe act/unsafe conditions immediately.
- Report any kind of abnormality like sound vibration, etc. in your work area to your supervisor.



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- For safe walking inside the factory premises, all persons are requested to follow road safety rules.
- Follow the vehicle speed limit of 15 Km. /Hr. inside the premises.
- In case of emergency siren, all permits will be suspended automatically. After getting all clear siren only, new permit shall be obtained to carry out the job.
- Disobey /Disregard of any Safety rule/ procedure shall lead to disciplinary action.
- Factory has well-established On Site Emergency system. Please understand it and follow it.

Work Area Safety Awareness



When entering different or unfamiliar work areas, be aware of work being done around you and familiarize yourself with any required safety precautions.

- Before opening valves, turning on switches, or starting machinery, check the locations and safety of others in the area. Have all safety guards and covers attached.
- You should be sure that the walking surface is secured before stepping onto it. Be careful around slippery spots, loose objects, or jagged edges.
- All electrical cords, ropes, hoses, etc., shall be placed to avoid hazards such as tripping or damage from oil, grease, water, or moving equipment.
- Having adequate lights on all work areas, stairways, and in basements is very important.
- When swinging sledge hammers, elevated loads, or other materials, make sure the area involved is clear. If your work causes hazardous conditions for others, place adequate barricades and/or signs to warn of the danger, e.g., manhole barricade guards.

ALL EMPLOYEES MUST FAMILARISE WITH THE FOLLOWING:

1. Hazard Associated with your job.
2. Locations of fire hydrant points and fire extinguishers in and around your working area.
3. Methods of operation of different type of fire extinguishers.



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4. Procedure for reporting an accident, a near miss and a fire or any mishap.
5. Your individual as well as team roll in case of emergency management.
6. Properties of the hazardous materials and necessary precautions in use, handling and transfer.
7. Important telephone nos. including emergency telephone nos. (Including intercom).
8. Details of On-site emergency plan and responsibilities.

FOR EMPLOYEES WORKING IN PLANT, WORKSHOP & LABORATORIES.

In addition to above points familiarise yourself with the following.

1. Location of Safety Cupboard in your working area and its key.
2. Location of first aid box.
3. Location of respiratory mask.
4. Locations of Safety Shower cum eyes wash fountain and their use in case of contamination with chemicals.
5. Location of hydrant points & Hydrant hose boxes and their use in case of fire.
6. Lower & Higher explosive level of flammable material used.
7. Threshold Limit Values of the pollutants likely to be present in working area.
8. Use of personnel protective equipments.
9. Use of safety helmet and safety shoes inside the plant is mandatory.

GUIDELINES BEFORE STARTING ANY JOB:

1. Obtain proper work permit apart from routine job.
2. Ensure all preventive measures for safe working, if any doubt consult officer In charge/HOD. Abide by all safety rules, regulations and instructions.
3. Report all unsafe conditions and/or unsafe act to your superior immediately. If within your means correct it immediately.
4. Know the colour codes of all equipments and pipelines.
5. Drinking water should be taken only from potable water sources i.e. water cooler.
6. Do not walk through or across any operating plant unless your duty requires to do so. If you require to enter inform the officer incharge of the plant first.



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7. Do not wear shoes having nails at sole, it can may generate sparks.
8. Do not leave the table or filling cabinet drawer in open condition.
9. Smoking inside factory is strictly prohibited. Deposit lighters, cigarettes, matchboxes etc. at the security gate.
10. Do not rest under or near any vehicle.
11. Do not operate any equipment, vehicle without requisite training and authorization.
12. Park your vehicles only at authorized parking area.

GENERAL GUIDELINES:

The guidelines given here are by no means exhaustive and detail information should be obtained from superiors to maintain safe working conditions.

1. Each employee is responsible for compliance of all safety rules, safe operating procedures and practices laid down by the company.
2. Every employee should take an active part in all safety works and insist on the compliance of safety rules by fellow employee.
3. Any unsafe condition or act likely to effect the safety of company, any employee or fellow employee must be promptly reported to superior and safety department.
4. All employees must follow safety regulatory signs for prevention of any incident.
5. Horseplay around operating units are prohibited at all times.
6. Do not spread any type of rumors or panicky at all time.
7. Employees should eat their meals at authorized places only.
8. Do not use defective material/ equipment; report such observation to superiors immediately.
9. Employees are strictly forbidden against tampering with or acting in a manner to cause damage to any part/machine/valves/equipment/tags/signs/switches etc.
10. Standing on pipelines or fittings or equipments is discouraged. Do not sit on railings.
11. Use hand railings while ascending or descending through staircase.
12. Employees should keep clear of suspended loads and scaffolds and other elevations from which work is being performed.
13. Match boxes, Cigarette lighters, camera and or any equipment/instrument may lead to spark are strictly prohibited to carry inside the factory premises.



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14. Any non spark proof equipment/ instrument required for carrying any job inside the plant shall must be authorized by concerned HOD and or safety department
15. Employees holding any equipment/ instrument in their charge should inspect their safe condition before use. Any abnormality should must be reported to superior.
16. Follow evacuation route in case of Disaster Siren.
17. Avoid running inside the plant unless emergency.
18. Do not throw any material from any height.
19. Do not use V-Belt as sling for lifting any material.
20. Use of intoxicant, Narcotics, Tobacco, alcoholism is strictly prohibited inside the factory.
21. Use of cameras with flashguns and other battery-operated equipments/ can only be used under authorized permission.
22. Employees are not permitted to carry any firearms, ammunition and explosives or any other form of lethal weapons inside the factory premises.
23. Do not dry any clothing's or other combustible material on steam lines or any other hot surfaces.
24. Excavation job shall be done only after getting permit from authorized personnel.
25. Use safety belt for an overhead job more than 8 feet. Obtain Work at height permit before commencing the job.
26. Do not remove, displace, damage or misuse of any safety/Fire appliances.
27. Do not walk on Asbestos cement sheet (Fragile roof). Obtain work at height permit authorized to climb on fragile roof with proper safety belt anchorage provision.
28. Do not walk in the plant with bare foots or with chap pals.
29. Any openings, pits pump motors or drains must be kept covered. In case the cover is removed for any work it must be barricaded for means of protection.
30. Keep all exists, isles, roadways, stairs, emergency escapes free from obstacles.
31. No one is allowed to work inside any tank, vessel, reactor, pit or confined place without authorized vessel entry permit.
32. Follow electrical lock out permit while working on electrical equipments and or machines connected to electrical power.
33. Obtain work order cum permit for all non-routine work inside the plant.



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OPERATIONAL INSTRUCTIONS:

01. Do not attempt to operate any machine or equipment to which you are not assigned.
02. Employees must not touch any machine they are not operating or repairing.
03. Only plant operating personnel's are allowed to operate or changeover pumps, valves or any other critical equipment as per SOP.
04. Before starting any job ensure proper work permit is obtained with due safety precaution as recommended in work permit system.
05. Avoid contact with any chemicals or inhalation of toxic chemical vapours.
06. The personnel protective equipments and proper respiratory protective equipments must be used when concentration of toxic/ corrosive material is present.
07. In case of chemical contamination wash the affected area with plenty of fresh water at least 15 minutes.
08. Foodstuffs and eatables should not be stored or eaten in plant area (other than specified area).
09. Before eating or drinking always wash your hands with soap and fresh water.
10. In case of clothes contamination with oils and or any chemicals, remove the cloth immediately and wash the body part affected with plenty of fresh water.
11. Cut down regularly excess size of nails to avoid chemical contamination.
12. Smoking inside the factory premises is totally prohibited.
13. Always carry suitable PPE's while going inside the plant. Use safety harness while working on corrosive and toxic chemicals.

9.0 CAUSES OF ACCIDENT & PREVENTION:

An accident is an undesired event that results in physical harm to a person or damage to property. It is unusually the result of a contact with a source of energy (ie ; Kinetic, electrical, chemical, thermal, ionizing radiation, non ionizing radiation, etc.) above the threshold limit of the body or structure.

For accident prevention, causes of accidents are to be controlled. The following are basic causes of accident.

- Unsafe Acts.
- Unsafe Conditions

1) UNSAFE ACTS

These are generally classified as

- Operating without authority, failure to secure or warn.



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- Operating or working at unsafe speed.
- Making device in-operative.
- Using unsafe equipment or hand instead of equipment.
- Unsafe loading, placing, mixing, etc.
- Taking unsafe position or posture.
- Working on moving or dangerous equipment.
- Distracting, teasing, abusing.
- Failure to use PPE.
- Render safety controls in effective.
- Climbing up or down a staircase without holding side rail.
- Use of Mobile phone in restricted areas.

2) UNSAFE CONDITIONS

These are generally classified as

- Unguarded equipment
- Inadequately guarded equipment
- Defective conditions, corroded, sharp ends, cracks, etc.
- Unsafe design
- Hazardous arrangement, process etc.
- Inadequate Ventilation
- Unsafe Attire
- Unsafe method, process planning, etc.
- Slippery floors
- Tripping Hazards

APPROACH TO ELIMINATE UNSAFE ACTS / CONDITIONS

UNSAFE ACTS: Unsafe acts can be eliminated by the following means.

- Personal attention and care
- Safety Education & Training
- Supervision
- Discipline.
- Knowledge of Hazardous conditions



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- Adherence to permit system

UNSAFE CONDITIONS: Unsafe conditions can be controlled/ eliminated by the following means:

- Engineering interventions
- Modification to safe operations
- Close Supervision
- Regular Inspection
- Safety Discipline
- Audits followed by corrective actions
- Safety built in Design
- Work Area clearance procedure post work completion
- Training
- Good Housekeeping

10.0 FIRE PREVENTION & CONTROL MEASURES:



Fire Prevention Purpose:

Minimize Fire Hazards/Damage
Aims to protect Employees Property,

Assure the continuity of the operations.

How can this be done?

Clean up after ourselves.

Put flammable materials in safe locations.

Observe safety precautions.

Fire is heat and light from rapid combination of oxygen and other materials. The flame, which gives the light, is composed of glowing particles of burning material and luminous gases. For fire to exist, a combustible substance must be present, the temperature must be high enough to cause combustion, and enough oxygen must be present to sustain rapid combustion. Fire is a chemical reaction .It represents as follows



ELEMENTS OF FIRE



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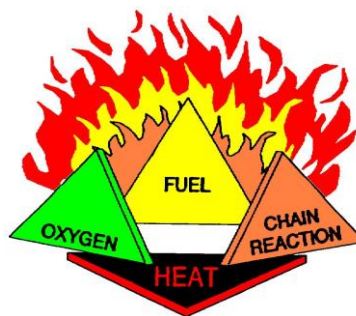
The three elements - fuel, heat and oxygen - form the fire triangle. It is chain reaction. If one part of the fire triangle is removed, the fire will go out.

To have a fire, you must have fuel, heat, and oxygen. When these 3 elements are together in the correct amounts, a fire starts.

FUEL: Solids, Liquids, and Flammable Gases.

OXYGEN: Normal Air-21%, Unconsciousness-18%, Flame-15%, Smolder-3%

HEAT: Sparks, Short circuits, Matches, Friction.



FIRE DECOMPOSITION STAGES:

Explosions accepted, most fires have quite humble beginnings and grow through four stages:

Incipient Stage - At this stage, decomposition is occurring at the surface of the fuel due to the influence of some form of heat. Products of combustion given off at this stage are invisible to the eye.

Smoldering Stage - At this stage, up to 10% of the decomposing products released at the surface of the fuel are visible.

Flaming Stage - Vapors from the decomposing fuel have ignited and are at the stage where flames are self-propagating.

Heat Stage - At this stage the burning has progressed to the point where the fire is still small but generating sufficient heat to warm the air immediately around the fire, sending warm products of combustion upwards by convection. □

The time required for a fire to develop through the first two stages is usually quite long when compared to the last two. Depending on conditions, the time involved going through all stages may be anything from seconds to days. The principles of fire extinction consist of the elimination or removal of one or more of the four elements.

These principles are:

Cooling: The most commonly used fire-fighting medium is water. Water absorbs heat from the fire and cools the fuel to a temperature where it no longer produces flammable vapors.

Smothering: By excluding the oxygen in the surrounding atmosphere, the fire will be extinguished.

Starvation: Starvation is achieved by removal of the fuel burning in the fire. Sometimes combustible material can be removed such as by shutting off gas valves or fuel flows.



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Stop Chain reaction: Stop or interrupt the chain reaction between the fuel, heat and oxygen the fire will be extinguished.

Specific methods of extinguishing fires often involve a combination of more than one of the four principles.

HOW TO OPERATE THE FIRE EXTINGUISHER?

Pull the Pin at the top of the extinguisher.

The pin releases a locking mechanism and will allow you to discharge the extinguisher.

Aim at the base of the fire, not the flames. This is important - in order to put out the fire, you must extinguish the fuel.

Squeeze the lever slowly. This will release the extinguishing agent in the extinguisher. If the handle is released, the discharge will stop.

Sweep from side to side. Using a sweeping motion, move the fire extinguisher back and forth until the fire is completely out. Operate the extinguisher from a safe distance, several feet away, and then move towards the fire once it starts to diminish. Be sure to read the instructions on your fire extinguisher - different fire extinguishers recommend operating them from different distances. Remember: Aim at the base of the fire, not at the flames!!!!

DO NOT FIGHT THE FIRE

The fire is spreading beyond the immediate area where it started, or is already a large fire.

1. The fire could block your escape route.
2. You are unsure how to properly operate the extinguisher.
3. You don't have the proper fire extinguisher
4. You don't know what is burning.
5. There is too much smoke or you are at risk of inhaling smoke.

BEFORE DECIDING TO FIGHT A FIRE, ENSURE THAT

1. The fire is small and not spreading.
2. You have the [proper fire extinguisher](#) for what is burning.
3. The fire won't block your exit if you can't control it.
4. You know [how to use your fire extinguisher](#), know its limitations.
5. You know your fire extinguisher works.

HOW TO FIGHT A FIRE SAFELY:

1. Always stand with an exit at your back.



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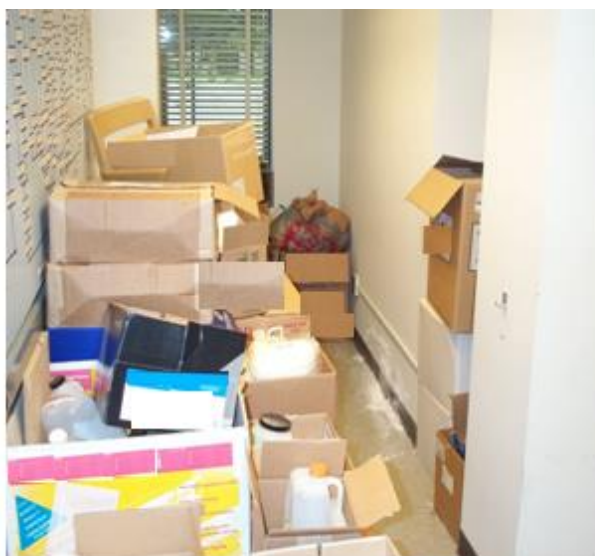
2. Stand several feet away from the fire, moving closer once the fire starts to diminish.
3. Use a sweeping motion and aim at the base of the fire.
4. Be sure to watch the area for a while to ensure it doesn't re-ignite.

COMMON CAUSES OF FIRE:

1. Heating sources are often causes of Fire.
2. Electrical wiring can cause a fire if it is not large enough to carry the load being supplied.
3. Rubbish and Waste Materials.
4. Combustible Materials
5. Hazardous Materials
6. Non-standard flameproof installations.
7. Faulty connections
8. Frayed wiring
9. Loose cords.
10. Overloads.
11. Broken plugs
12. Dirty equipment
13. Bad contacts Improper equip.
14. Extension Cords
15. Contamination.
16. Smoking should not be prohibited
17. Area identification is not done properly No proper isolations of equipments
19. Static electricity.
- 20 No proper earthing.
21. Unwanted material.
22. Uncovered flammable material, Wood, cotton, oil spillage.



Bad wiring



Bad Housekeeping



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COMMON CAUSES OF FIRE AND PREVENTION

Cause	%	Preventive measures.
Electrical	23%	Proper maintenance.
Smoking	18%	Control & Education.
Friction Spark	10%	Preventive maintenance
Hot Surfaces	7%	Safe design & good maintenance
Burner Flame	7%	Proper Operation
Combustion Spark	5%	Well designed equipment
Spontaneous ignition	4%	Good ventilation & Housekeeping
Welding & Cutting	4%	Work permit system.
Mechanical Spark	2%	Keeping stock clean & Use of Non Sparking tools
Static Spark	1%	Earthing & bonding, ionization
Chemical reaction	1%	Proper Safe operating procedure.
Lightning	1%	Lightning arrestor, earthing

FIRE EXTINGUISHER: CARBON DIOXIDE:

It is designed for use on fires involving flammable liquids and live electrical equipment.

The discharge period depends on the size of the extinguisher. CO₂ (carbon dioxide) extinguishers are for class B and C fires.

They don't work very well on class A fires because the material usually reignites.

CO₂ extinguishers have an advantage over dry chemical in that they leave behind no harmful residue.

That makes carbon dioxide a good choice for an electrical fire involving a computer or other delicate instrument.

Note that: **CO₂ is a bad choice for flammable metal fires such as Grignard reagents, alkyllithiums and sodium metal because CO₂ reacts with these materials.**

CO₂ extinguishers are not approved for class D fires!



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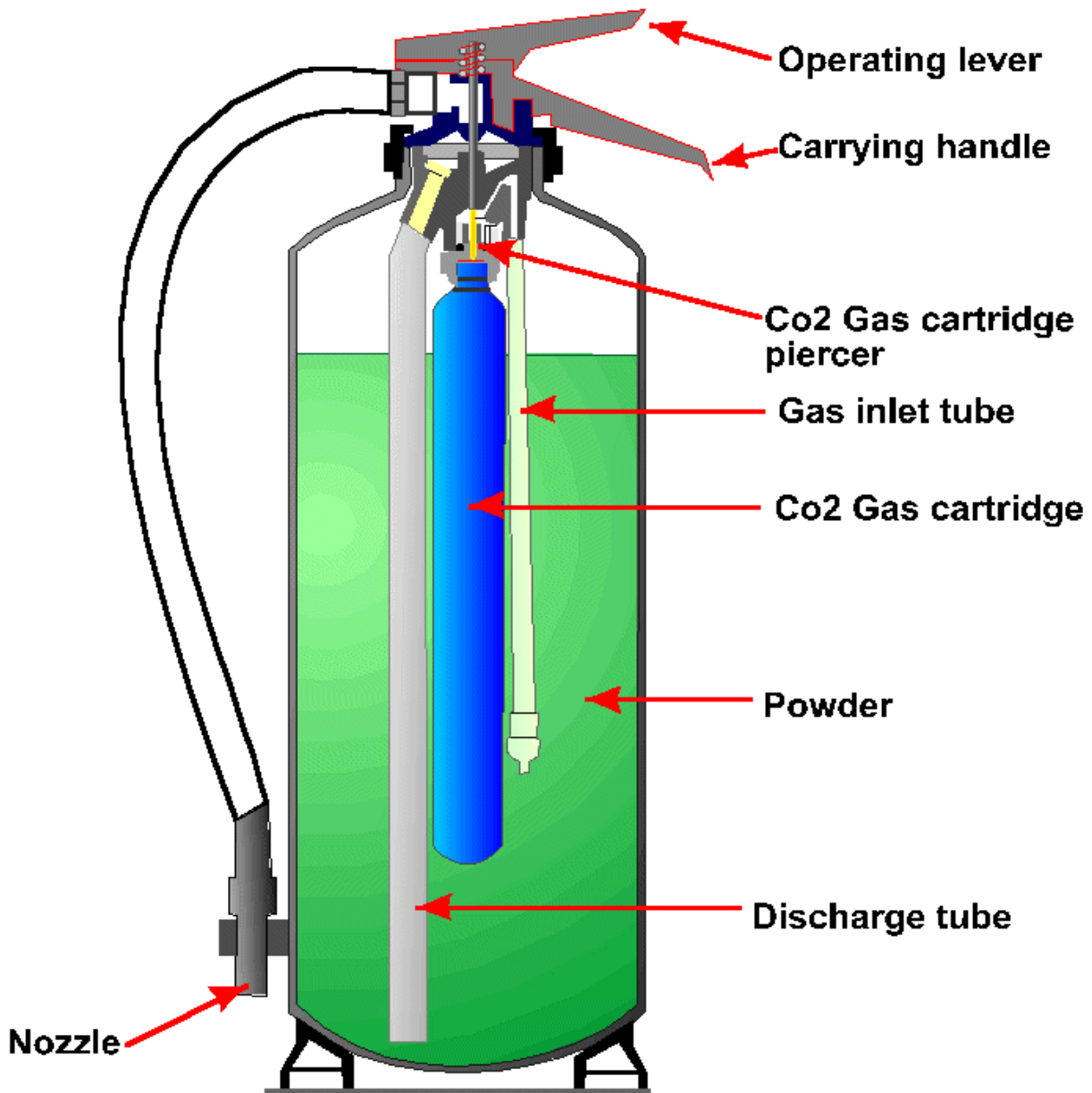
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Powder extinguisher (gas-cartridge type)





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FIRE EXTINGUISHER: DRY CHEMICAL POWDER.

It contains a bi-carbonate based powder and is suitable for fires involving flammable liquids and live electrical equipment.

The discharge period depends on the size of the extinguisher.

Dry chemical extinguishers are useful for class ABC fires and are your best all around choice.

They have an advantage over CO₂ extinguishers in that they leave a blanket of non-flammable material on the extinguished material that reduces the likelihood of reignition.

There are two kinds of dry chemical extinguishers! Dry chemical extinguishers are useful for class ABC fires and are your best all around choice.

They have an advantage over CO₂ extinguishers in that they leave a blanket of non-flammable material on the extinguished material, which reduces the likelihood of reignition.

There are two kinds of dry chemical extinguishers!

A) Type BC fire extinguishers contain sodium or potassium bicarbonate.

B) Type ABC fire extinguishers contain ammonium phosphate.

1) Fire squad and fire training:

Fire squad and training employees are available in all shifts to security personals. Employees inare trained in basic fire fighting, first aid & rescue in the mock drills. Mock drills are conducted during every year to assess response time and effectiveness of the action team. On site emergency plan which has been revised from time to time.

2) Fire fighting system:

All the factory area are covered with well established and maintained Fire extinguishers of foam, CO₂ water, DCP, as per requirement of area made available

FIRE DRILL

Fire drill should be conducted on the occasions like safety day & Fire service day.

FIRE EXTINGUISHERS MAINTAINANCE & RECHARGING

Fire extinguishers should be checked every month. Some standard equipments etc. used for fire fighting are given below to help selection as per your own equipment.

Like disease fire also need to be diagnosed and treated. It is important to identify nature and class of fire to select appropriate extinguishing media and equipment.

- Fire extinguishers should only be removed from their wall brackets in an emergency. The removal of fire extinguishers in other cases without good reason will be considered as misconduct.
- Flammable materials must never be exposed to hot surfaces or direct heat sources.



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- In the event of a gas leak switch off all equipment and evacuate the premises immediately.
- Contact the Emergency Services immediately.
- In the event of a fire the premises should be evacuated immediately following the information provided on the fire notices.
- Fire exits must be kept clear at all times.
- All employees are required to familiarise themselves with the fire drill before commencing work. Exercises will be arranged at regular intervals.

PORTABLE TYPE (FIRE EXTINGUISHERS):

These are called first-aid fire fighting appliances. According to the fire hazards, Dry Chemical powder, Carbon dioxide and Mechanical Foam type fire Extinguishers have been installed in all operating areas. Selection & Installation of Fire Extinguishers have been done on the basis of type of fire.

SELECTION OF FIRE EXTINGUISHERS:

S.No.	TYPE OF FIRE	MATERIALS INVOLVED IN FIRE	TYPE OF FIRE EXTINGUISHERS
1	A Class	Solid Combustible Materials, ie; Wood, Paper, Grass, etc.	Water Type
2	B Class	Flammable Solvents	Foam, DCP& CO ₂
3	C Class	Flammable Gases & Electrical Equipments	CO ₂ , DCP, Sand
4	D Class	Metals – Sodium, Lithium, Magnesium, Ra-Nickel, etc.	Special Dry Chemical Powder, Sand

Fire fighting Equipment are well maintained in good operating condition at all times. All plant personnel are well trained in fire fighting operations. We have adequate trained persons in all depts. round the clock to meet the Emergency requirement. We conduct regular training program for our emergency squad team. Fire drills are also being conducted on regular basis for assessment of our preparedness.



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11.0 ACCIDENT, INCIDENT REPORTING & ANALYSIS



An accident is any unforeseen or unexpected event that may or may not result in injury or damage to property or equipment.

The failure of people, equipment, supplies, or surroundings to behave or react as expected cause most of the accidents. Accident investigations determine how and why these failures occur.

By using the information gained through an investigation, a similar or perhaps more disastrous accident may be prevented.

Conduct accident investigations with accident prevention in mind. Investigations are NOT to place blame.

When the personal injury requires little or no treatment, it is minor.

If it results in a fatality or in a permanent total, permanent partial, or temporary total (lost-time) disability, it is serious. Similarly, property damage may be minor or serious. Investigate all accidents regardless of the extent of injury or damage.

Whenever accident took place, the concerned officer / Shift in charge prepares an Accident report containing particulars of the accident, the type of injury, causes of injury and other relevant factors.

Based on this report, the safety / personnel department provides treatment to the injured person and decides whether further treatment / action is required i.e. sending to hospital etc.

Investigates the accident in all its details including whether accident occurred due to defects in equipments, failure of safety devices or human failure.

The investigation report is then prepared & sent to the concerned area in charge or plant Head. This report will indicate the corrective steps to be taken to prevent recurrences.

When the investigation indicates purely human failure, the concerned employee is called & explained the necessity to abide by the safety rules.

Any injury causing total disablement for more than 48 hrs is reported to factory inspectors.



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ACCIDENT ANALYSIS: ALL SAFETY STATISTICS ARE AS PER IS 3786.

FREQUENCY RATE:

The frequency rate shall be calculated both for Lost Time injury & Reportable Lost Time Injury as follows.

$$FA = \frac{\text{Number of Lost Time Injury} \times 1000000}{\text{Man Hours Worked}}$$

$$FB = \frac{\text{Number of Reportable Lost Time Injury} \times 1000000}{\text{Man Hours Worked}}$$

Since frequency rate FB is based on the lost time injuries reportable to the statutory authorities, it may be used for official purpose only. In all other cases, frequency rate FA should be used for comparison purposes.

SEVERITY RATE:

The severity rate shall be calculated from man-days lost in time injury & reportable lost time injury as follows,

$$SA = \frac{\text{Man days lost due to lost time injury} \times 1000000}{\text{Man Hours worked.}}$$

$$SB = \frac{\text{Man days lost due to reportable lost time injury} \times 1000000}{\text{Man Hours worked.}}$$

Note: Since severity rate SB is based on the lost time injuries reportable to the statutory Authorities, it should be used for official purposes only. In all other cases severity rate SA should be used for comparison purposes.

Calculation of man days lost shall be based on the following.

Man-days lost due to temporary total disability.

Man-days lost according to schedule of charges for death & permanent disabilities. In case of multiple injuries, the sum of schedule charges shall not be taken to exceed 6000 person-days.

Days lost due to injury in previous periods that is if any accident, which occurred in previous period is still causing loss of time in the period under review.

In the case if intermittent loss of time, each period should be included in the severity rate.



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For the period in which the time is lost. If any injury is treated as a lost time injury in one statistical period & subsequently turns out to be a permanent disability, the man days charged to the injury shall be subtracted from the schedule charge for the injury when permanent disability becomes known.

GENERAL WORK HABITS:

- Reducing accidents means reporting to work physically and mentally rested, prepared to perform your job safely and properly.
- Always report any unsafe condition or unsafe act to your supervisor or to Environmental Health & Safety as soon as possible.
- Whenever you're performing your job, keep your mind on your work. Always keep your temper and thoughts under control.
- Report any injury to your supervisor as soon as possible.
- If you are taking a prescribed drug that may have a side effect, inform your supervisor before beginning the day's work.

12.0 VISITORS & CONTRACTORS:

- 1.All visitors and contractors must report to the main reception.
 - 2.Before entering into the plant all visitors and contractors has to take entry permit (Visitor gate Pass) from security department.
 - 3.The Identity card given by security has to be display.
 - 4.Before leaving the plant the entry permit (Visitor gate Pass) is to be submitted to security.
 - 5.Any contractor carrying out work at the premises may be required to provide the following details to the security in advance of the work commencing.
 - 6.Liability Insurance Cover.-The contractor should submit the paper to Personal and Administration dept . regarding the Insurance coverage.
 7. Contractors carrying out electrical, gas or hot works will be issued with a permit to work before commencing work.
 - 8.A permit to work will also be required for persons working at height or in confined spaces.
- All contractors working for the company are required to comply with this safety policy and with all other written safety instructions.



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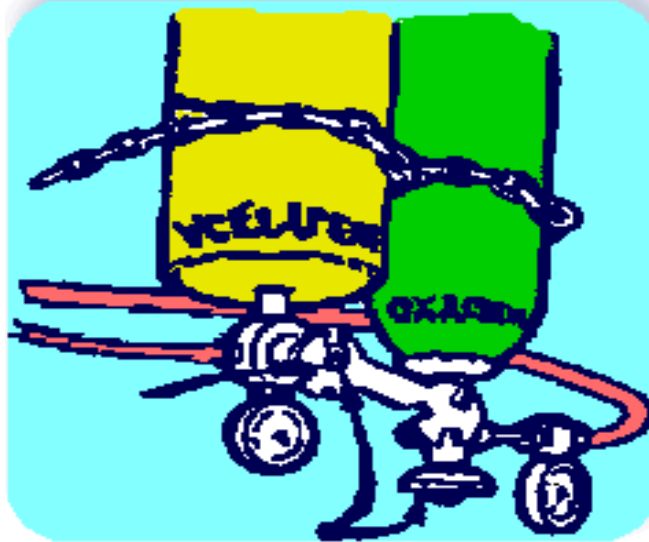
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13.0 SAFETY OF COMPRESSED GAS CYLINDERS:



Compressed gases present a unique hazard. Depending on the particular gas, there is a potential for simultaneous exposure to both mechanical and chemical hazards. Gases may be:

- Flammable or combustible
- Explosive
- Corrosive
- Poisonous
- Inert
- or a combination of hazards

If the gas is flammable, flash points lower than room temperature compounded by high rates of diffusion present a danger of fire or explosion. Additional hazards of reactivity and toxicity of the gas, as well as asphyxiation, can be caused by high concentrations of even "harmless" gases such as nitrogen. Since the gases are contained in heavy, highly pressurized metal containers, the large amount of potential energy resulting from compression of the gas makes the cylinder a potential rocket or fragmentation bomb.

Careful procedures are necessary for handling the various compressed gases, the cylinders containing the compressed gases, regulators or valves used to control gas flow, and the piping used to confine gases during flow.



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IDENTIFICATION:

The contents of any compressed gas cylinder must be clearly identified. Such identification should be stenciled or stamped on the cylinder or a label.

No compressed gas cylinder should be accepted for use that does not legibly identify its contents by name.

If the labeling on a cylinder becomes unclear or an attached tag is defaced to the point the contents cannot be identified, the cylinder should be marked "contents unknown" and returned directly to the manufacturer.



Always read the label!!

1. Never rely on the color of the cylinder for identification. Color coding is not reliable because cylinder colors may vary with the supplier. Additionally, labels on caps have little value because caps are interchangeable.
2. All gas lines leading from a compressed gas supply should be clearly labeled to identify the gas, the laboratory or area served, and the relevant emergency telephone numbers.
3. The labels should be color coded to distinguish hazardous gases (such as flammable, toxic, or corrosive substances) (e.g., a yellow background and black letters).
4. Signs should be conspicuously posted in areas where flammable compressed gases are stored, identifying the substances and appropriate precautions (e.g., HYDROGEN - FLAMMABLE GAS - NO SMOKING - NO OPEN FLAMES).

HANDLING & USE:



GAS CYLINDERS MUST BE SECURED AT ALL TIMES TO PREVENT TIPPING.

Cylinders may be attached to a bench top, individually to the wall, placed in a holding cage, or have a non-tip base attached. Chains or sturdy straps may be used to secure them. If a leaking cylinder is discovered, move it



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to a safe place (if it is safe to do so) and inform the Environmental Health & Safety Department. You should also call the vendor as soon as possible.

UNDER NO CIRCUMSTANCES SHOULD ANY ATTEMPT BE MADE TO REPAIR A CYLINDER OR VALVE.

Standard cylinder-valve outlet connections have been devised by the Compressed Gas Association (CGA) to prevent mixing of incompatible gases. The outlet threads used vary in diameter; some are internal, some are external; some are right-handed, some are left-handed. In general, right-handed threads are used for non-fuel and water-pumped gases, while left-handed threads are used for fuel and oil-pump gases.

To minimize undesirable connections, only CGA standard combinations of valves and fittings should be used in compressed gas installations; the assembly of miscellaneous parts should be avoided. The threads on cylinder valves, regulators and other fittings should be examined to ensure they correspond and are undamaged.

Cylinders should be placed with the valve accessible at all times. The main cylinder valve should be closed as soon as it is no longer necessary that it be open (i.e., it should never be left open when the equipment is unattended or not operating). This is necessary not only for safety when the cylinder is under pressure, but also to prevent the corrosion and contamination resulting from diffusion of air and moisture into the cylinder after it has been emptied.

Cylinders are equipped with either a hand wheel or stem valve. For cylinders equipped with a stem valve, the valve spindle key should remain on the stem while the cylinder is in service. Only wrenches or tools provided by the cylinder supplier should be used to open or close a valve. At no time should pliers be used to open a cylinder valve. Some valves may require washers; this should be checked before the regulator is fitted.

Cylinder valves should be opened slowly. Oxygen cylinder valves should be opened all the way. Open up the oxygen cylinder valve stem just a crack. Once the needle on the high pressure gauge has stopped, open up the valve all the way.

This back-seats the valve. Oxygen cylinders must have the valve opened up all the way because of the high pressure in the cylinder. There is a back-seating valve on the oxygen cylinder. This prevents the high-pressure gas from leaking out through the threaded stem. When opening the valve on a cylinder containing an irritating or toxic gas, the user should position the cylinder with the valve pointing away from them and warn those working nearby.





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Cylinders containing flammable gases such as hydrogen or acetylene **must not** be stored in close proximity to open flames, areas where electrical sparks are generated, or where other sources of ignition may be present.

CYLINDERS CONTAINING ACETYLENE SHALL NEVER BE STORED ON THEIR SIDE.

An open flame shall never be used to detect leaks of flammable gases. Hydrogen flame is invisible, so "feel" for heat. One common practice is to use a natural bristle broom to "sweep" the air in front of you. All cylinders containing flammable gases should be stored in a well-ventilated area.

Oxygen cylinders, full or empty, shall not be stored in the same vicinity as flammable gases. The proper storage for oxygen cylinders requires that a minimum of 20 feet be maintained between flammable gas cylinders and oxygen cylinders or the storage areas be separated, at a minimum, by a fire wall five feet high with a fire rating of 0.5 hours. Greasy and oily materials shall never be stored around oxygen; nor should oil or grease be applied to fittings. **Regulators are gas specific and not necessarily interchangeable! Always make sure that the regulator and valve fittings are compatible.**



If there is any question as to the suitability of a regulator for a particular gas, check with Environmental Health & Safety Services or call your vendor for advice. After the regulator is attached, the cylinder valve should be opened just enough to indicate pressure on the regulator gauge (no more than one full turn) and all the connections checked with a soap solution for leaks. **Never use oil or grease on the regulator of a cylinder valve.**

The following rules should always be followed in regards to piping:

- Copper piping shall not be used for acetylene.
- Plastic piping shall not be used for any portion of a high-pressure system.
- Do not use cast iron pipe for chlorine.
- Do not conceal distribution lines where a high concentration of a leaking hazardous gas can build up and cause an accident.
- Distribution lines and their outlets should be clearly labeled as to the type of gas contained.
- Piping systems should be inspected for leaks on a regular basis.



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- Special attention should be given to fittings as well as possible cracks that may have developed.

A cylinder should never be emptied to a pressure lower than 172 kPa (25 psi/in2) (the residual contents may become contaminated if the valve is left open). When work involving a compressed gas is completed, the cylinder must be turned off, and if possible, the lines bled.



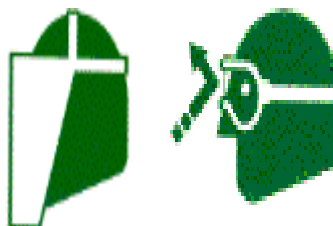
When the cylinder needs to be removed or is empty, all valves shall be closed, the system bled, and the regulator removed. The valve cap shall be replaced, the cylinder **clearly marked as "empty,"** and returned to a storage area for pickup by the supplier.

Empty and full cylinders should be stored in separate areas.

Where the possibility of **flow reversal** exists, the cylinder discharge lines should be equipped with approved check valves to prevent inadvertent contamination of cylinders connected to a closed system. "Sucking back" is particularly troublesome where gases are used as reactants in a closed system. A cylinder in such a system should be shut off and removed from the system when the pressure remaining in the cylinder is at least 172 kPa (25 psi/in2). If there is a possibility that the container has been contaminated, it should be so labeled and returned to the supplier.

Liquid bulk cylinders may be used in laboratories where a high volume of gas is needed. These cylinders usually have a number of valves on the top of the cylinder. All valves should be clearly marked as to their function. These cylinders will also vent their contents when a preset internal pressure is reached, therefore, they should be stored or placed in service where there is adequate ventilation.

Always use safety glasses (preferably with a face shield) when handling and using compressed gases, especially when connecting and disconnecting compressed gas regulators and lines.



All compressed gas cylinders, including lecture-size cylinders, must be returned to the supplier when empty or no longer in use.



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TRANSPORTATION OF CYLINDERS

The cylinders that contain compressed gases are primarily shipping containers and should not be subjected to rough handling or abuse. Such misuse can seriously weaken the cylinder and render it unfit for further use or transform it into a rocket having sufficient thrust to drive it through masonry walls.

1. To protect the valve during transportation, the cover cap should be screwed on hand tight and remain on until the cylinder is in place and ready for use.
2. Cylinders should never be rolled or dragged.
3. When moving large cylinders, they should be strapped to a properly designed wheeled cart to ensure stability.
4. Only one cylinder should be handled (moved) at a time.

14.0 ELECTRICAL SAFETY

Introduction: It takes very little electric current to kill--less than one-tenth of an ampere. With good contact, 115 volts is sufficient voltage to cause death. There have been fatal electric shocks where voltage as low as 60 to 70 volts was involved.

Management must ensure that with regard to all fixed electrical installations and to all portable electrical equipment there is in place a safe system of work that ensures: -

- Compliance with relevant legislation
- All fixed installations are safe and tested
- All electrical appliances and cables are tested and maintained
- Only safe equipment is used
- This system applies to all places of work
- There are no voltage restrictions

Requirements:

1. Any installation, use and maintenance of equipment must reflect specific safety requirements with regard to adverse conditions i.e. weather effects, exposure to corrosive or flammable environments, and operation in a dusty atmosphere.
2. Connections should always be suitable for the purpose for which they are being used and the use of electrical tape alone for connections is forbidden.
 1. It must be ensured that any protection for electrical installations and equipment e.g. fuses and residual current devices (RCD's), are suitably rated, sufficient and within safe working limits. In the case of RCD's the test trip button should be operated regularly.
 2. All electrical installations and equipment must have adequate means to enable them to be isolated from the electric supply in order to prevent danger.
 3. All isolator switches should be easily accessible and passageways to them kept clear at all times.
 4. All switches and fuse ways must be clearly labeled as to indicate the circuit or function controlled and all switches and distribution covers must be kept closed at all times unless being worked on by a competent authorized person.
 5. Adequate working space means access and lighting must be provided at all electrical equipment on which or near which work is being carried out which may give rise to danger.



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6. There should be adequate arrangements to ensure that electrical equipment that has been made 'dead', while work is being carried out on or near such equipment, cannot be electrically charged if this would then present danger.
This can be physically achieved by ensuring that a 'lock-out' system is used, i.e. the isolator controlling equipment is physically locked in the 'off' position. Where a 'lock-out' system cannot be used then there should be a procedure for ensuring that fuses are removed and held by the authorized person carrying out the work.
Any work being undertaken on an electrical installation or equipment should be subject to a safe system of work and the Permit-to-Work Procedure.
7. Where 'in-house' competent persons are undertaking work on electrical equipment then suitable protective equipment must be provided. Examples of such equipment may be goggles, gloves insulated tools and test probes.
8. Notices giving details of emergency resuscitation procedures in the event of electric shock should be displayed at those locations where the risk of electric shock is greater e.g. sub-stations and electrical test areas.
9. No electrical work should be performed "hot" when it can be done "cold".
10. Switches, fuses, circuit breakers, and other control devices in areas where explosives or other flammable liquids or gasses exist shall be the type designed for use in these areas.
11. All electrical equipment should be periodically inspected and record is to be maintained.
12. Suitable means should be provided for identifying all electrical equipment and circuits.
13. All electrical tools and equipment should be properly grounded or be of the double insulated type.
14. You should never use electrical equipment when standing in or near water. In places such as bathrooms, kitchens, laundries, and out-of-doors, where a person having wet hands or standing on a wet surface is likely to touch objects that may be energized, a ground-fault circuit interrupter (GFI) shall be installed in the circuit to prevent electrical shock. Portable ground-fault circuit interrupters are available in the Tool Room for use in wet environments.
15. All exposed electrical wires should be considered "hot" or "live" until checked by the Electrical Department. Electrical repairs or electrical installations shall be made only by the Electrical Department.
16. Standing on metal ladders or wearing metal hard hats near high voltage electrical power can result in death or serious injury.
17. Ensure that all electrical equipment you use is in good order. Do not use any electrical equipment that does not appear to be in good order but report it to your supervisor without delay.
18. Changes to the electrical system (including new plugs) should only be undertaken by competent persons who have been trained and all works required should be reported to the safety Coordinator.
19. Work on 3 phase electrical systems or unqualified personnel must never undertake live plant and live working requires a specific risk assessment to be undertaken.
20. Switch off all electrical equipment after use. Do not overload sockets.
21. Do not allow wires to project into the walkways where they present a tripping hazard.
22. Use a residual circuit breaker when operating a portable hand tool.
23. Electrical permit is to be used to perform any type of electrical work.
24. Only competent authorized persons, i.e. those with sufficient experience and training, should be engaged in any work on an electrical installation or equipment.



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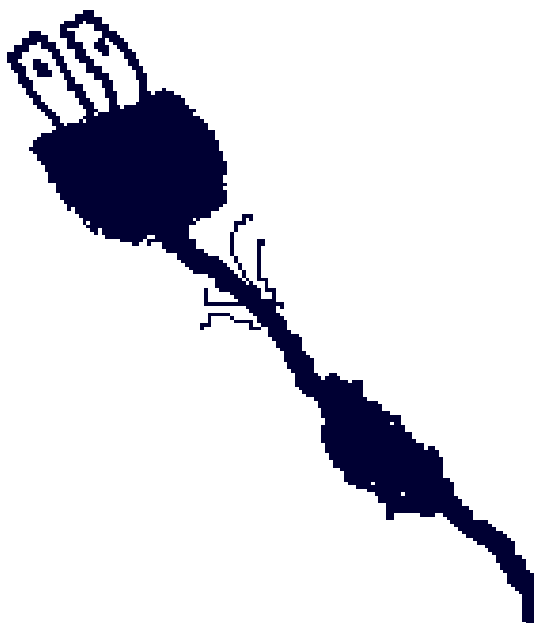
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VISUAL CHECKS BY USERS

All persons about to use an item of electrical equipment should carry out a visual check. The check should look for:

- damage to plug
- damage to cable
- taped joints are poor wire connections
- insecure cable at entry to plug
- exposed internal insulation showing below cable sheath
- evidence of dampness or water contamination
- evidence of physical damage to equipment
- missing guarding to equipment

Spliced or damaged electrical cords shall not be used until properly repaired. Electrical cords on power tools and extension cords shall have heavy-duty rubber insulation.





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15.0 SAFETY IN HAND TOOLS

Hand & Power Tools



Always know how to properly use hand and power tools before starting the job by following operating instructions and using the proper accessories. If you are unfamiliar with how a tool operates or is to be used, get the advice and instruction of your supervisor or the Tool Room attendant as appropriate.

- ✓ Tools should not be used for other than their intended use.
- ✓ Keep all cutting tools sharp.
- ✓ Tools shall be kept in a safe condition without broken or damaged parts.
- ✓ Never use tools which have burred or mushroomed heads and never carry loose tools in your pockets.
- ✓ If tools or equipment are found to be faulty, report them to your supervisor and return the equipment to the Tool Room or appropriate department for repair.
- ✓ When possible, pull on a hand tool rather than push since it can slip and cause a serious cut or bruise.
- ✓ Never leave hand tools lying around loose where they may fall on someone below.
- ✓ Non-sparking, non-magnetic tools are provided for your use in the Tool Room. They shall be used in areas such as grain storage, sewers, steam tunnels, spray-paint booths, radar unit locations, and rooms with electromagnets.

Remember; use the right tool for the job.

Hand & Power Tool Audit			
Facility _____		Area _____	
Auditor _____		Date _____	
Area	Satisfactory	Action Required	Corrective Action (date)
Employee Knowledge			
Date Last Tool Training			
Hazards of faulty or improperly used tools			



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Pre-Use Inspection			
Electrical Hazards			
Tool Adjustments			
Sharpening Procedures			
Proper Storage			
Program Administration			
Person Assigned for tool checkout / repair			
Designated Area for tool storage			
Respirators required when cutting fluid use creates mist			
Safeguards			
Engineering Safeguards			
Administrative Safeguards			
Training Safeguards			
Area Inspection			
Eye Hearing Protection Used			
Bench Grinders Adjusted			
Equipment mounted to floor			
Machine guards in place			
Warning signs posted in shops			
Storage area neat, dry			
Tools in good condition			
Blades & cutting edges sharp			
Face Shields used at grinders			
Grinding wheels dressed			
Rigging equipment tested			
Operational Questions			
01	Are all tools and equipment (both company and employee owned) used by employees at		



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	their workplace in good condition?
02	Are hand tools such as chisels and punches, which develop mushroomed heads during use, reconditioned or replaced as necessary?
03	Are broken or fractured handles on hammers, axes and similar equipment replaced promptly?
04	Are worn or bent wrenches replaced regularly?
05	Are appropriate handles used on files and similar tools?
06	Are employees made aware of the hazards caused by faulty or improperly used hand tools?
07	Are appropriate safety glasses, face shields, etc. used while using hand tools or equipment, which might produce flying materials, or be subject to breakage?
08	Are jacks checked periodically to ensure they are in good operating condition?
09	Are tool handles wedged tightly in the head of all tools?
10	Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?
11	Are tools stored in dry, secure locations where they won't be tampered with?
12	Is eye and face protection used when driving hardened or tempered spuds or nails?
13	Are grinders, saws and similar equipment provided with appropriate safety guards?
14	Are power tools used with the correct shield, guard, or attachment, recommended by the manufacturer?
15	Are portable circular saws equipped with guards above and below the base shoe? Are circular saw guards checked to assure they are not wedged up, thus leaving the lower portion of the blade unguarded?
16	Are rotating or moving parts of equipment guarded to prevent physical contact?
17	Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?
18	Are effective guards in place over belts, pulleys, chains, sprockets, on equipment such as concrete mixers, and air compressors?
19	Are portable fans provided with full guards or screens having openings ½ inch or less?
20	Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?
21	Are ground-fault circuit interrupters provided on all temporary electrical 15 and 20 ampere circuits, used during periods of construction?
22	Are pneumatic and hydraulic hoses on power operated tools checked regularly for deterioration or damage?
NOTES:	



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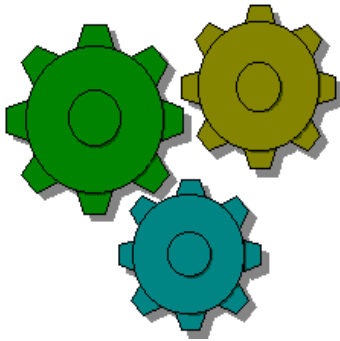
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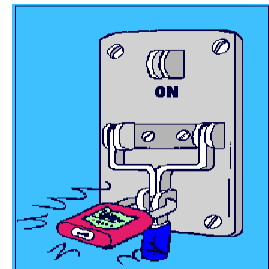
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16.0 MACHINERY & GUARDING



Supervisors shall allow only properly trained employees to operate power equipment or machinery and shall give proper instructions in their safe operation.

- All electrical equipment and machinery shall be properly grounded. Control switches shall be properly located at the point of operations best suited to control the equipment.
- You should never adjust, repair, clean, or oil machinery or equipment while any of its parts are in motion. Use lock out switches to prevent accidental start-ups.
- Be sure all of the components have stopped.
- Always replace guards after repairs have been made.
- Always perform proper maintenance on all machinery and equipment to prevent premature failure or possible accident. Have all safety guards in place while testing repaired equipment.
- You should regularly inspect for cracks, stretching, etc. on cables, chains, clamps, hooks, and other equipment that are frequently placed under stress. Spreading, crimps, or cracks are warning signs of danger. If you feel the equipment is damaged or creating a possible hazard, report this to your supervisor immediately.



Tag-Out Procedure

- Before starting maintenance or repair, the equipment should be checked to make sure all energy has been released or disconnected.
- Each trade should remove its tag after the equipment is repaired and notify affected personnel.
- When more than one trade is involved in repair or maintenance of such equipment, a compound-locking device shall be used.
- A tag shall be placed on the junction box of stationary permanently-wired equipment with the energy activating device placed in the "off" position.
- This lockout/tag out procedure should reduce accidents caused by the unexpected start up or release of energy.
- The equipment shall not be put back in service until after the last trade removes its lock and tag.
- Only trained personnel may use machinery provided in the workplace.



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- If you have not received training then under no circumstances should you attempt to operate it.
- Prior to authorization being given to operate machinery an assessment of your competence will be carried out.
- If at any stage whilst using any item of machinery you begin to feel unwell you must stop what you are doing, isolate the plant concerned via the remote electrical supply switch and report to your supervisor.
- Never talk to another member of staff when you are operating machinery. Do not approach or distract any other employee operating machinery.

GUARDING

It is not only dangerous but also illegal to remove a guard from a machine unless you need to clean or repair it.

Only trained personnel may clean or repair items of plant, which require guarding to be removed. Equipment, which is to be cleaned, must be isolated electrically. The electrical supply should be locked out and a notice should be fixed to the switch point advising that re-connection of the supply can be hazardous.

If any part of the equipment you are using is unguarded you should stop work immediately, isolate the plant concerned, and report the matter to the safety officer without delay.

17.0 SAFETY IN MANUAL MATERIAL HANDLING:

Lifting and moving loads by hand is the biggest cause of injury in the work place Lifting should be carried out in accordance with the following guidelines:

Avoid Lifting and Bending Whenever You Can!



Place objects up off the floor. If you can set something down on a table or other elevated surface instead of on the floor, you won't have to reach down to pick it up again.

Raise/lower shelves. The best zone for lifting is between your shoulders and your waist. Put heavier objects on shelves at waist level and lighter objects on lower or higher shelves.

Over 250,000 industrial workers, housewives, and office workers injure themselves each year through poor lifting techniques.



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The practice of stooping over from the waist to lift, accompanied with the added factors of uneven footing, poor balance, or awkward positioning is a direct invitation to eventual injury, because undue strain is thrown on the back and abdominal muscles.



The following rules should be observed for safe lifting:

1. Determine if you need help--consider the distance and the object's weight.
2. Look over the pick-up and delivery area for (1) tripping hazards, (2) slippery spots, (3) small doors, (4) sharp corners, (5) blind spots, etc.
3. Inspect the object for sharp corners, wet surfaces, splinters, etc.
4. Place feet correctly--one foot close to the side of the object to provide stability--and one directly behind the object to provide lift or thrust.
5. Keep the object close to your body.
6. Get a correct grip or hold on the object by using a full grip--not just your fingers.
7. Keep your back straight--this does not mean vertical--just aligned from head to pelvis.
8. You should tuck in your chin when lifting to insure alignment from head to pelvis.
9. Do the actual lifting with your legs only.
10. Just as important as lifting correctly is the ACT OF LOWERING CORRECTLY. You should lower objects in the same manner as you lifted them.
11. The body should never be turned or twisted while under the stress of heavy weight. Instead, you should turn your whole body if you desire to change your position after you have made the lift.
12. When team-lifting large, heavy loads, one person should inform all others--prior to lifting--of the safe, correct method of lifting and transportation to be used.



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18.0 SAFE STORAGE AND HANDLING OF CHEMICALS:



As the factory is handling materials, which are flammable and hazardous, these are well laid down safety system for handling storing and processing of the chemical factory layout divided into flammable and non-flammable area.

- Bulk storage, warehouse and chemical unloading are kept away from production blocks.
- Chemicals are stored based on their compatibility.
- Flammable and non-flammable liquids are stored in separate tank farm area and identified as explosive and non-explosive tank farm.
- Tankers awaiting unloading are parked away from areas of regular operations.
- Tankers without spark arrestors are not allowed to enter in tank farm area.
- Minimum inventory of hazardous chemicals is maintained.
- Low boiling (flammable) solvents are stored in insulated tanks provided with chilled water condenser, flame arrester and breather valve on vent.
- Static discharge earthing connections are provided to connect the tanker before unloading.
- Suitable type of portable fire extinguishers, tool box and personnel protective equipment box is kept available in the tank farm.
- Use of complete PPE's is made mandatory.
- No unloading operations are carried out after sun set unless approved by location head.
- Chemicals stored in drums are kept in chemical drum storage yard with proper labels and locations.
- Special transfer facility for hazardous chemicals is provided.



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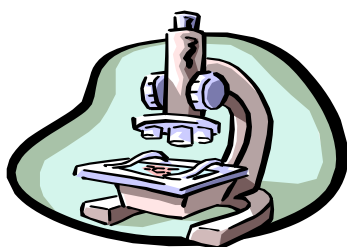
19.0 SAFETY IN TANKER UNLOADING

Wear Personal protective equipments as per following –

1. Apron
2. Goggles
3. Gum boots
4. Hand gloves

1. Check the level of the tank in which the tanker is to be unloaded.
2. Ensure that there is enough space in the tank or enough drum for storage to unload all the tanker material.
3. Before starting unloading activities of LDO ensure that the pipes are fixed properly.
4. If there is any problem in the system, get it repaired through Maintenance department and then follow unloading activities.
5. Ensure that the tanker stands firmly on the ground.
6. Do not allow any maintenance work of tanker during unloading.
7. Get the tanker material sampled by Q.C. department and only after their approval of sample start following activities.
8. If there is leakage, either on the suction or discharge side, stop the unloading and all connecting valves immediately, report Maintenance department, and restart the unloading operation after attaining the leakage.
9. In case of emergency is declared either by raising siren or by announcing so stop the unloading and gather at assembly point if siren of evacuation is raised.
10. Ensure that the tanker driver is available near the tanker at all the time while the tanker is in the premise.
11. Do not allow tanker driver to switch on the tape recorder while tanker is in the factory premise.
12. Do not allow tanker driver or his assistance to move elsewhere other than the tanker unloading area without permission of unloading supervisor.
13. After unloading of the tanker, keep unloading accessory in the HDPE container.

20.0 SAFETY IN LABORATORIES:





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Various chemicals are used in laboratories day-to-day basis, so risk is also too high. Everyone must be responsible for everyone else in lab. No horseplay is ever allowed. Lack of pre-lab preparation is the biggest problem related to lab safety.

- Safety Glasses must be worn any time you are in lab.
- Contact lenses should NOT be worn in lab.
- Long hair, bulky clothing, rings, watches, dangling jewelry are dangerous in lab

Broken Glass:

- Stop and report it immediately.
- There may be small slivers of glass that you do not notice.
- More minor cuts occur after this type of accident than during it.
- Chemical spills are often involved with glass breakage.
- Use appropriate hand gloves to clean up area.

Chemical Spills:

- Depending on the chemical spilled, we might just have to clean it up or we might have a more dangerous situation.
- The most potentially dangerous chemicals used in our lab are corrosive acids and bases.
- You are to treat all spills as DANGEROUS.

Each employee must take reasonable care of their own health and safety and the health and safety of others by:

- Taking action to avoid, eliminate or minimize hazards of which they are aware.
- Complying with all occupational health and safety instructions, policies, and procedures including departmental safety manuals;
- Making proper use of all safety devices and personal protective equipment;
- Complying with the instructions given by emergency response personnel such as emergency wardens and first aiders;
- Seeking information or advice where necessary before carrying out new or unfamiliar work;
- Maintaining dress standards appropriate for the work being done. Appropriate protective clothing and footwear must be worn at all times;
- Not consuming or storing food and drink in laboratory areas;
- Being familiar with emergency and evacuation procedures and the location of emergency equipment;
- Reporting all incidents, hazards and 'near miss' incidents on the company's Hazard & Incident Report form.

GENERAL SAFETY REQUIREMENTS

All personnel entering, working in a laboratory must:

- Maintain the minimum quantity of hazardous substances at all times;
- consider and manage the risks to themselves and others working in the laboratory;
- Wear appropriate enclosed footwear with a non-slip sole;
- Wear appropriate protective clothing as specified by the Laboratory Manager,



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- Use and maintain any other personal protective equipment as required by safe work practices (e.g. safety glasses);
- Know the emergency procedures for the facility;
- Ensure access and egress for fire exits and emergency equipment are kept free of obstruction at all times;
- Do not run in the laboratory or the corridors leading to them;
- Always exercise care when opening and closing doors;
- Food is not stored or consumed in the laboratory;
- Do not undertake unauthorized experiments;
- Maintain work areas in a clean state to reduce the risk of exposure to hazardous substances and slip and trip hazards;
- Ensure all spills are cleaned up immediately;
- Do not pipette by mouth;
- The use of mobile phones in laboratories is strictly prohibited except in circumstances where it does not pose a risk to the user or others as demonstrated by the risk assessment undertaken;

LABORATORY INSPECTIONS CHECKLIST

PLANT/LOCATION:

DATE:

Any items marked "No" are in need of attention

Fire Protection (Yes/No)	Electrical (Yes/No)
<input type="checkbox"/> Easy extinguisher access?	<input type="checkbox"/> Absence of overloaded circuits?
<input type="checkbox"/> Inspection current?	<input type="checkbox"/> Elec. cords in good condition?
<u>How many of each?</u>	<input type="checkbox"/> Proper grounding?
<input type="checkbox"/> Dry Chem,	<input type="checkbox"/> Absence of extension cords?
<input type="checkbox"/> CO ₂ ,	
Biological Safety (Yes/No)	First Aid (Yes/No)
<input type="checkbox"/> Absence of live animals?	<input type="checkbox"/> Is the stock adequate?
<input type="checkbox"/> Are the workers trained?	<input type="checkbox"/> Is the stock labeled?
<input type="checkbox"/> Is PPE adequate?	<input type="checkbox"/> Is there easy access?
<input type="checkbox"/> Are there BioSafety cabinets?	<input type="checkbox"/> Are procedures posted?
Eye Wash Stations (Yes/No)	Safety Showers (Yes/No)
<input type="checkbox"/> Proper location?	<input type="checkbox"/> Proper location?
<input type="checkbox"/> Inspected/tested?	<input type="checkbox"/> Tested/sealed?
<input type="checkbox"/> Plumbed system?	<input type="checkbox"/> Workable?
<input type="checkbox"/> Labeled?	<input type="checkbox"/> Labeled?



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Staff Summary (Yes/No)

- Safety practices
- Hazard Communication
- PPE / Spill training
- Chemical Hygiene Plan

Hazard Communications (Yes/No)

- Lab sign-in?
- Safety rules posted?
- Emergency procedures?
- Containers labeled?
- Emergency labels on entrance?

Refrigerators (Yes/No)

- Absence of food storage?
- "Explosion-proof?"
- Properly installed?
- Marked for flammables?
- Absence of domestic refrigerator?

General Use (Yes/No)

- Absence of hazardous materials?
- Absence of explosives?
- Absence of cryogenics?
- Absence of laser hazard?
- Absence of corrosives?

Housekeeping (Yes/No)

- Aisles clear?
- Exits clear?
- Haz-Waste collection?
- Absence of eat/drink/smoke?
- Absence of previous spills?

Equipment Summary (count)

- | | |
|---|--------------------------------------|
| <input type="checkbox"/> Fume Hoods | <input type="checkbox"/> Expl. Frig. |
| <input type="checkbox"/> Perc Hoods | <input type="checkbox"/> Eye Wash |
| <input type="checkbox"/> Cano Hoods | <input type="checkbox"/> Exits |
| <input type="checkbox"/> BioSfty Cabs. | <input type="checkbox"/> Sfty Shwr |
| <input type="checkbox"/> Cylinder Dolly | <input type="checkbox"/> Flam. Cab. |
| <input type="checkbox"/> Spill Kit | <input type="checkbox"/> Spill PPE |

General Storage (Yes/No)

- Absence of leaking containers?
- Glass containers all < 4 liters?
- Segregation of chemicals?
- Absence of corroded containers?
- Containers capped?
- Glass shatter-proof?

Ventilation (Yes/No)

- Adequate ventilation?
- Absence of storage in hood?
- Fume hoods adequate?
- Velocity tested?
- Lab negative to other rooms?
- Hazardous exhaust labeled?

PPE (Yes/No)

- Goggles/shields?
- Gloves?
- Aprons?
- Respirators?
- Eye protection worn?
- Other necessary equipment?

Flammables (Yes/No)

- Adequate cabinets?
- Absence of excess storage?
- Spill plan?
- Safety cans?
- Bonded / grounded?
- Less than 300 gallons?
- Absence of storage by exits?

Security (Yes/No)

- Intrusion alarms?
- Security procedures?
- Absence of past vandalism?
- Key control?
- Absence of custodial service?
- Dead bolt?
- If 2nd exit, emergency lights?

Gas Cylinders (Yes/No)

- Cylinders secured?
- Contents identified?
- Caps on tightly?
- If NFPA rating >2, 2nd exit?
- Two gauges?
- Fewer than 3 cylinders in use?
- Fewer than 9 cylinders in lab?



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Shutoffs?

Personal Protective Equipment

Type:	Material Used On:	Condition:

Cylinders

Number:	Contents:	Size:

Fume Hoods

Apply checklist to each fume hood

Type of work performed:

Location of hood in lab:

If located by an exit, is there a 2nd exit?

Type of hood (check)

- Chemical
- Perchloric Acid
- Wash down?
- Canopy
- Biological
- Radioactive

Last inspection date:

Average face velocity (feet per minute):

Location of exhaust fan that serves the hood:



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Hood Inspector's name:

Filters (check)

- HEPA
- Charcoal
- Scrubber
- Other:

Ducts: (Yes/No)

- Negative pressure?
- Absence of manifold?
if answer is no, is there a duct in the shaft?

21.0 WORK PERMIT SYSTEM:

Introduction

A permit to work system is a formal safety control system designed to prevent accidents including injury to employees, contractors and third parties as well as to property. The permit sets out the work to be done and the precautions to be taken.

.....has developed and implemented Work Permit System by virtue of which the risk is brought to minimum level by showing the concerned person about the hazard involved in the particular job and corrective action and precaution to be undertaken during the work.

The various permits used in the factory are,

S.No.	PERMIT NAME	Reference SOP NO.
1.	General Work Permit	
2.	Hot Work Permit	
3.	Height Work Permit	
4.	Excavation Permit	
5.	Confined Space Work Permit	

Work Permit.

Work permits the person who has adequate standard of technical knowledge and experience to be able to competently assess all the conditions for the permit purpose is authorized to sign the permit.

Before signing any permit the person himself by personal inspection that the site/equipment/plant is safe for the work. Unless and until he is satisfied on the compliance of the permit condition, no certificate should be given by him.

The safety permit is also signed by Respective authorities after ensuring that the equipment is isolated from all sources of motive power, electrical supply and otherwise presents no mechanical hazards.

The name of the supervisor actually supervising the job is mentioned on the permit. It is duty and the responsibility of the named supervisor to ensure that the work starts and continue only after all the precautions mentioned is fully met.

Issuing authority:



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Work permit is initiated & signed by the immediate supervisor/ officer/ shift in-charge of the area where work is to be carried out & the concern maintenance engineer. If any representative from safety department is available then he should check & sign.

Validity of work permit:

Work permit may be renewed for an extended period on the same day. The extended period should be authorized by the immediate in-charge/ supervisor in-charge. After making sure than condition mentioned in original permit have not changed & the area is safe for working.

Issue of Work permit:

Before issuing the work permit the immediate supervisor in-charge of the area should issue that area/ equipment is rendered safe for working. All manpower sources are isolated & locked out. The surrounding are clean and safe. Supervisor should be describe clearly the nature of the work, precaution to be taken. PPE to be used while working.

Regulation:

- i) Hot job like welding, gas cutting are not permitted without sufficient fire extinguishers, water arrangement, etc.
- ii) One or more fireman or section operator & running water hoses kept present while hot work is being carried our. Area is watched for spark for 30 min. after completion
- iii) Adequate earthing is provided to eliminate from static charge.
- iv) Section supervisor In charge must comply with all stipulated condition in permit before commencement of work.
- v) Person entering to confined space; the work permit must indicate the name of each employee who makes the entry in confined space.
- vi) Confined space should be effectively banked of using isolation reference card system.
- vii) Confined space should be emptied & flushed with water followed by purge with steam or air & then should be tested for presence of hydrocarbon toxic gases availability of sufficient oxygen.
- viii) Excavation in any part of the factory should be properly barricaded and proper signboard should be displayed.

Lock out system:

The proposed of electrical lock out is to ensure that electrical or mechanical equipment under maintenance, inspection, cleaning is made safe by locking & tagging the main power thereby controlling its sources of power.

On completion of job shift Incharge sign the log out tag after confirming the safety. The electrician will close the circuit by replacing fuse & removing the tag.



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Protection from fall:

- a) Falls prevented by proper guardrails.
- b) Falls protected by fall arrest harness with proper attachment point.
- c) 3 points of contact at all times between worker and ladder, ladder tied and /or footed.

Precautions:

- a) Firm level ground for scaffold mobile access or ladders.
- b) Overhead services and obstructions avoided or precautions taken.
- c) Lifting equipment (if any) installed properly (e.g. winch, hoist etc.).
- d) Barriers and warnings placed for these below.
- e) Roof boards, ladders and other permanent access in good condition.
- f) Fragile areas (e.g. roof lights) identified and protected.
- g) Adverse weather not expected (strong wind, lightning etc.).
- h) Falling materials prevented (tools secured, toe boards, side sheeting etc.).
- i) No person shall work at height above 8 feet without the use of safety belt, having proper anchored.
- j) Person suffering from dizziness due to height (Vertigo) will not be allowed.
- k) Ensure that flammable /harmful gases do not escape through the roof of Chimney in vicinity which may affect the person working on roof.
- l) The scaffolding provided is mechanically strong.

The precautions were read out and explained to me in a language understood by me. I promise to observe the same.

22.0 PERSONAL PROTECTIVE EQUIPMENT

Company has provided Personal Protective Equipments to the workers for safe working are as follows: Hand Gloves, Gum Boots, Masks, Goggles, PVC apron.

The term personal protective equipment (PPE) covers any specialized clothing or equipment designated to create a barrier against work place hazards.

REQUIREMENT OF PPE:

- (i) When elimination or substitution of hazard is not possible
- (ii) When engineering controls safe working practices as administrative control do not sufficiently protect employees
- (iii) As an interim measure until the installation of engineering controls
- (iv) As a supplement to engineering and administrative controls

SELECTION OF PPE:



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The following criteria are used for selecting PPE

- (a) Nature of hazard
- (b) Degree of protection required
- (c) Acceptable exposure concentration
- (d) Ease of Use by employee

When engineering controls safe work practices or administrative controls do not sufficiently protect employees, suitable PPE should be used.

Personal protective equipments are generally divided into two groups:

Non-Respiratory & Respiratory

General Protection

1) Non Respiratory PPE:

These are used for protection of body parts against the hazards. As per **SOP**.

S.No.	Type of safety equipment	Body parts protect	Recommended use in operation
1.	Safety goggle, spectacles	EYE protection	Chipping, buffing, grinding, drilling
	Welding goggle, welding shield		Welding, cutting
2.	Face shields	Face protection	Chemical flash
3.	Ear muff Ear plugs	Ear protection	Noise pollution area as Air compressor Power plant
4.	Safety helmet and caps	Head protection	Risk of falling object, chemical & protection from chemical dust
5.	Apron, fire suit, made from leather, rubber, plastics	Body protection	Risk of dust, spark, chemical fumes, etc
6.	Gloves Acid proof Alkali proof Shock proof Leather Asbestos	Hand protection	Operation where risk of chemical contacts, Electrical contacts, Hot surface contact, Cold burn, etc.
	Barrier cream		Used against protection from oil and solvent.
7.	Safety shoes with toe protection	Foot and leg protection	Where potential hazard of foot injury due to falling objects while holding heavy material.



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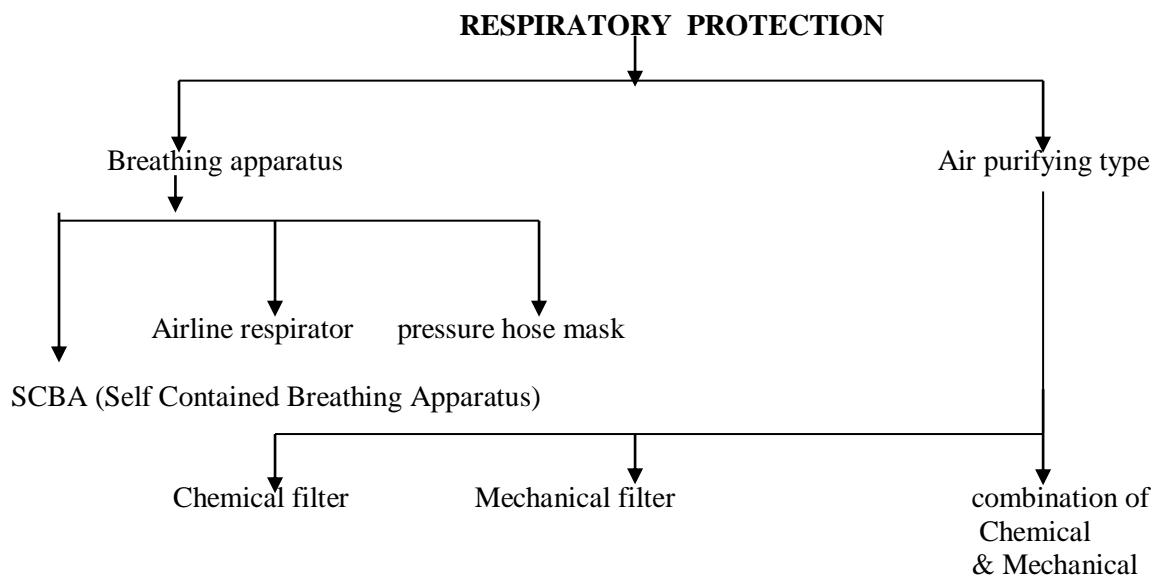
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2) RESPIRATORY PROTECTION: -

The areas where contamination take place in form of dusts (Nuisance, irritant, toxics, poisonous), gases, smoke, fumes mist, etc.

Proper respiratory PPE are available and are designed to provide adequate protection



GENERAL PROTECTION:

SAFETY BELT:

Safety belt with lifeline is used for working at height and confined spaces to protect the person from falling.

SAFETY SHOWER and EYE WASH

It is used for washing chemicals in case of splash of Chemicals in eyes and/or on body.

DISPOSAL OF CONTAMINATED PPE's: The PPE's that are contaminated should be detoxified in the same manner as done for contaminated containers with 5% sodium hydroxide and then processed as general scrap. (Like disposable Head Gear, Nose mask, Shoe covers and any other PPE's).

23.0 SAFETY PROMOTIONAL ACTIVITIES

PROMOTIONAL ACTIVITIES:

SAFETY WEEK:

4th March to 11th March safety Day/Week celebration will be conducted by arranging various safety competitions like Slogan, Poster, Safety quiz, etc.
During prize distribution ceremony the chief guest will distribute certificates and prizes.



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All winning slogan, poem and posters will be displayed in the plant. Safety has been given prime importance and included in annual employee appraisal.

WORLD ENVIRONMENT DAY:

5th June will be celebrated as a world environment day by arranging tree plantation activities & various competitions like slogan, poster, essay etc. Entries

will be evaluated by panel of judges . Prize winners will be rewarded on the concluding function. Winning slogans, Poem & Posters will be displayed in plant.

24.0 HAZOP STUDY

H AZOP Study Method was developed by ICI in 1960s & CIA (Chemical Industries Association guide was published in 1977. This is being used by the Chemical industry to Identify the hazard & Modification of System. The Technique designed to study such Deviations from Intentions is known as HAZOP Study.

HAZOP PROCEDURE:

- 1) Examine the process & the Equipment on the a system by System basis.
- 2) Review the process parameters using a set of Guide Words Which Suggest Deviations from the normal operating intentions.
- 3) Assesses the consequences and the causes that might bring it about.
- 4) If deemed significant then addressed on the spot and a situation proposed for action.

ESSENTIAL FEATURES:

- 1) Systematic and detailed Series of Guide Words used for Consistency and repeatability.
- 2) Conducted by a team who know most about the project or facility, typically those who designed and those who operate/maintain it.
- 3) Concentrates on exploring conditions & Intentions.

GUIDE WORDS & MEANING FOR HAZOP STUDY:

GUIDE WORDS	MEANING	PARAMETER	DEVIATION
No	Negation of the design intent	Flow	No flow
Less	Quantitative decrease	Temperature	Less temperature
More	Quantitative increase	Pressure	High pressure
Part off	Quantitative Decrease	Quantity	Less than intent material
As well as	Quantitative increase	One Phase	Two Phase
Reverse	Logical Opposite of the intent	Chilling	Heating instead of chilling
Other than	Complete substitution	Material	Other than intent material



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JOB HAZARD ANALYSIS

It is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools and the work environment. After identifying uncontrolled hazards, steps are taken to eliminate or reduce them to an acceptable risk level.

APPROPRIATE JOBS FOR JOB HAZARD ANALYSIS:

- 1) Accident frequency and Severity
- 2) Potential for Severe injuries or illnesses
- 3) Newly established Jobs
- 4) Modified Jobs

BASIC STEPS FOR CONDUCTING JOB HAZARD ANALYSIS:

- Selecting the job to be analyzed.
- Breaking the job down into a sequence of steps.
- Identifying potential hazards.
- Determining preventive measures to overcome these hazards.

After a job has been chosen for analysis the next stage is to break the job into steps. A job step is defined as a segment of the operation necessary to advance the work.

25.0 RISK ASSESSMENT

'Risk' is the probability of an event occurring in a given set of circumstances. The 'event' is an exposure to a hazard. The 'hazard' is the potential to cause harm. Risk Assessment is the technique of evaluating not just the likelihood of an event occurring, but also what the outcome will be in terms of injury, loss damage or harm.

RISK = PROBABILITY OF EVENT AND SEVERITY OF OUTCOME

Risk Assessment Procedure

How do you perform a risk assessment?

There are eight steps to performing a satisfactory risk assessment

1. Focus for assessment
2. Identify activities
3. Identify hazards
4. Who at risk
5. Evaluate risk
6. Review controls
7. Record Decisions
8. Review Regularly



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How do you assess risk levels?

Risk levels are categorized in a numbered format. Each hazard is given a rating and this is multiplied by the probability that these hazards will occur, as shown in the following equation.

$$\text{Risk level} = \text{Hazard severity} \times \text{Likelihood of occurrence}$$

Step One Give each hazard a severity marking as indicated in the table below:

Risk Level	Effect of hazard
5	Fatal injury
4	Permanent disabling injury
3	Disabling injury
2	Injury causing time off work
1	First aid only

For example:

If slipping on the stairs (hazard), could result in death or disablement, then it must be given a rating of 4 or 5.

Step Two

The next step is to consider how often each hazard is likely to occur as indicated in the table below

Risk Level	Likelihood of occurrence
5	Certain
4	Near certain
3	Very likely
2	Frequent
1	Seldom



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For example:

If slipping on the stairs (hazard), was very likely to happen, then it must be given a rating of 3.

Step Three

Multiply the two scores together and you will get the risk level. This figure should be entered into the risk assessment form.

For example:

5 (hazard) multiplied by 3 (occurrence) = 15

Step Four

The following bullet points are **guidelines** to help you gauge how quickly you need to put the controls in place, so dates will vary from office to office.

- Where any hazard is given a risk ranking of 22-25 then action must be taken **immediately** to reduce that risk.
- Where any hazard is given a risk ranking of 16-22 then the line manager must be informed before the end of that working day.
- Where any hazard is given a risk ranking of between 1 and 15, then action needs to be taken at the earliest opportunity, as soon as it is reasonably practicable to do so, taking into account local circumstances.

Employers must ensure that risks are reduced to the lowest extent **reasonably practicable**. Risk Assessments must be made available to all relevant personnel and they must be kept up to date.

Additional Checklists for Risk Assessment form

Potential hazards in the workplace

- Portable and fixed electrical appliances
- Tools and equipment
- Storage of materials
- Handling of materials
- Trailing cables
- Stairs and stairways
- Congested walkways and corridors
- Access and egress
- Fire exits
- Seating and workstations
- Heating and ventilation
- Lighting levels
- Cleanliness and waste materials
- Sanitary conveniences
- Washing facilities
- Facilities for eating and drinking
- Chemicals
- Cleaning substances
- Dusts & powders



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- Biological hazards (bacteria, viruses, etc.)
- Repetitive actions
- Vehicle safety
- Traveling for business
- Working alone
- Workplace violence (physical or verbal)
- Stress

People affected by hazards

- Staff
- Visitors
- Contractors
- Maintenance staff
- Emergency staff
- Maintenance staff
- Emergency staff
- People with special needs (such as people with physical or learning difficulties, young persons and pregnant women)
- General public

Other specialist areas of assessment

- Manual Handling Operations
- Hazardous Substances
- Construction Work

Identified Hazards

The following hazards have been identified in the operation of This Corporation:

Assessed Hazards

- Burns from fire
- Inhalation of smoke
- Burns from electrical/gas plant
- Burns from hot water
- Cuts from plant
- Cuts from broken glass
- Contact with chemicals
- Inhalation of Chemicals
- Ingestion of Chemicals
- Falls on slippery floors
- Falls on obstructed floors
- Falls down stairs
- Contact with electricity



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- Manual handling injuries
- Collision with others
- Entanglement with equipment
- Contact with equipment
- Blood borne pathogens
- Water safety & pathogens
- Injury from objects falling
- Falls from heights
- Burns from electricity
- Escape of gas
- Airborne harmful substances
- Working in isolation
- Use of vehicles
- Handling of hazardous materials & spillage
- Use of counterbalanced trucks
- Use and handling of liquid petroleum gas

EXAMPLES OF RISK ASSESSMENT:

Electrical and Gas Burns

Hazard:	Burns from electrical/gas plant
	Burns from electricity
Control Methods:	Elimination
	Guarding
	Training
	Instruction
Persons at Risk:	Delete as appropriate
	Staff
	Third Party Contractors



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	Members of the Public
	Emergency Services
Risk Rating:	3 x 4 = 12

Recommended Controls:

1. Only gas and electrical appliances conforming to relevant current National Standards are to be installed in the facility.
2. Equipment must be maintained in accordance with manufacturers recommendations.
3. Only trained personnel are permitted to work on gas and electrical systems.
4. A list of the current trained first aiders should be provided in a prominent position.
5. Contractors staff must only work on gas and electrical systems when they have been issued with a valid permit to work.
6. Contractors should only be permitted to work on isolated electrical supplies. Work on live systems should be strictly prohibited.

Hot Water Burns

Hazard:	Burns from hot water
Control Methods:	Elimination
Persons at Risk:	Delete as appropriate
	Staff
	Third Party Contractors
	Members of the Public
	Emergency Services



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Risk Rating:

3 x 5 = 15

Recommended Controls:

1. The maximum water temperature at any tap should not exceed 46°C.
2. Routine checks should be made of hot water temperatures at each tap to ensure the maximum temperature is being maintained. This should include weekly checks of random taps to ensure the maximum temperature is being adhered to.
3. Any work on plant containing hot water must only be permitted with a valid permit to work. Work on such plant must only be carried out when the water system has had ample opportunity to cool to a temperature where the water is not warmer than 35°C.

GENERAL RISK ASSESSMENT FORM

Unit	Department	Room / Area
ACTIVITY		
A. HAZARDS		
B. WHO IS AT RISK?		
C. EXISTING CONTROL MEASURES		RISK RATING
		Probability Score (A)
		➤ Severity
		➤ Score (B)
		➤ Risk Rating
		➤ A x B
D. PROPOSED ACTION		



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E. Assessed By Date	Line Manager Date	EHS Date
F. Action taken and signed off complete. Operations Manager Date		Health & Safety Manager Date

RISK ASSESSMENTS LISTED AND REVIEW DATES

SITE

Risk Assessment No	Assessor	Date Assessed	Reviewed Date	Changes Yes / No	Reviewed Date

26.0 SAFETY AUDIT & INSPECTIONS

Safety Audit is a technique for critical, in-depth appraisal in a qualitative manner to establish the Compliance and laid down Safety policy and system including environmental aspects of an organization as well as to a loss of potential risk of undesired events leading to a loss of personnel and assets or damage to environment.

It is a legal, economic and a moral necessity.

BENEFITS OF SAFETY AUDIT:

A Professionally managed safety audit system result in

- 1) Strengthening of the organizations Safety Standards and programmes.
- 2) Improve the skill and performances of managers
- 3) Create group and self awareness
- 4) Provides motivation
- 5) Identifies specific deficiencies in the Safety Programme
- 6) Provides timely information before any loss producing incident take place
- 7) Increase management participation in a Safety Programme

FREQUENCY:

- *As a general thumb rule, audit by an external team can be carried out once in a year.
- *Internal Safety Audit checking important points can be then be conducted with a periodicity of 3/6 months.
- *If no external team then depending upon the nature of operation a frequency for internal auditing can be set up.



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SAFETY AUDIT CHECK LIST:

Items for Safety Audit for evaluation in operating area:

A) DOCUMENTATION

- Facility Drawings
- Installation documents
- Special tooling drawings
- Shop planning & Procedures
- Work order in progress
- Other documentation
- Check lists
- Training
- Hazards Identification & analysis.
- Prior Safety requirements.

B) BUILDING & AREA:

- Storage of explosives material
- Access/Walkway
- Fire Protection
- Electrical
- Water & other Utilities.
- Lighting
- Ventilation & Hood
- Heating ,Cooling & Air Conditioning Systems
- Escapes
- Storage/Rackes/Shelves
- Waste handling & Disposal

C) MISCELLANEOUS:

- Noise
- Vibration
- Fumes/Dust/Vapours
- Temperature
- Physical/Ergonomic Conditions
- Communication
- Confined Space.

SAFETY INSPECTION:

Safety inspections are made at all levels to ensure a safe and healthy working environment and to demonstrate a personal commitment to safety. Safety inspections of all plant and facilities are carried out regularly. Safety Coordinator make safety inspections in their respective department.



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SAFETY SURVEY LIST

Working Areas

- Adequate lighting in the work area?
- Laboratory work areas reasonably clean and tidy?
- Area kept as clean as work allows?
- Guards on fan blades that are located within 7 ft. of the floor?
- Ladders and step-stools in good condition and used in the manner for which they were designed?
- Two and four-wheeled carts and hand trucks in good condition?
- List of emergency numbers, First Aid, and CPR certified employees clearly displayed?
- No foods, beverages, tobacco, or cosmetics in laboratory?
- Eating, drinking, use of tobacco, and use of cosmetics prohibited in the laboratory?
- No chipped or broken glassware in use?

Means of Egress

- Sidewalks kept free of snow and ice?
- Stairs well lit?
- Stairs of sturdy design?
- Railings provided on all open sides of exposed stairways?
- Anti-skid walking surfaces on the stairs?
- Stairs clean?
- All non-exit doors and passages which could be mistaken for an exit marked as such?
- All exits clearly designated?
- All exits unobstructed?
- All exit signs illuminated? (They must be illuminated by general room lighting or internal lighting.)
- Emergency lighting provided for fire escape routes?
- All fire doors unobstructed and free of locks and devices that could prevent free egress?
- Designated fire doors closed and operable?

SAFETY SURVEY LIST

Working Areas

Means of Egress

Materials Handling & Storage

Compressed Gases

Electrical

General Safety Equipment

Personal Protection

Noise Levels



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- All fire doors side hinged and swing in the direction of the escape?
- Floors free from protrusions and large holes?
- Floors free from litter and obstructions?
- Floors clean and dry?
- Drainage provided for continuously wet floors?
- Mats and carpeting in good condition?
- Aisles and passageways well lit?
- Aisles and passageways kept clear to provide safe movement of materials handling equipment or employees?
- No loose or protruding shelving or edging that could cause a safety problem?
- Covers or guardrails provided for open pits, vats, etc.?
- Guardrails provided for platforms greater than 4 feet above the adjacent floor?

Materials Handling and Storage

- Area free of the accumulation of materials that could cause tripping, fires, explosions, or pest harboring?
- Sprinklers clear of stored materials (18 inch clearance)?
- Materials stored to prevent sliding, falling, or collapse?
- Storage shelving secure, in good condition, and not over-loaded or crowded?
- Storage shelving provided with a lip on forward edge?
- Hazardous chemicals not stored on floor?
- Sufficient waste containers provided?
- A closable metal container provided for oily rags (if necessary)?
- Reagents used at the bench properly labeled to prevent accidental use of the wrong reagent or wash bottle?
- Containers labeled with the identity of contents and general hazard(s) of contents?
- Containers properly capped or sealed?
- Flammable liquids in quantities greater than one liter stored in safety cans designed for flammable liquid storage?



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- Flammable and combustible liquids stored in containers labeled as such?
- Flammable and combustible liquids stored in approved cabinets marked "Flammable"?
- Cabinets properly ventilated?
- If flammable liquids are used in large volumes, is the mechanical ventilation adequate to remove vapors before they reach hazardous concentrations?
- Stored combustibles and flammables separated from any heat source by at least 20 feet?
- Areas where flammables are used or stored designated "NO SMOKING - NO OPEN FLAMES"?
- Metal drums used for storage and dispensing of flammable liquids properly grounded?
- Materials stored only with other compatible materials? (e.g., solvents, acids, bases, reactives, oxidizers, and toxins stored separately)

Compressed Gases

- Each compressed gas cylinder marked with the identity of its contents?
- Compressed gas cylinders inspected visually for safe operating condition?
- Gas cylinders secured so they will not tip over or fall?
- Valve caps in place on all gas cylinders that are not in use?
- All gas lines leading from compressed gas supplies labeled as to identity of gas, laboratory served, and emergency telephone numbers?
- Gas cylinder storage areas properly ventilated?
- Areas where flammable compressed gases are stored posted "NO SMOKING - NO OPEN FLAMES"?
- Oxygen cylinders not stored in the same vicinity of greasy or oily rags?
- Oxygen cylinders stored a minimum of 50 feet from flammable gas cylinders or a minimum five feet high fire wall with a 0.5 hour fire rating separates them?

Electrical

- All electrical equipment properly grounded? (Double insulated tools are exempt.)
- All electrical equipment U.L. listed approved?
- All circuit breakers and fused circuits labeled to indicate whether they are in the open (off) or closed (on) position?
- Properly rated fuses used?



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- All electrically live parts guarded? Electrical boxes and panels covered with face-plates to prevent exposure to live wires?
- Tool, appliance, instrument, and extension cords in good repair?
- Has permanent wiring been installed to alleviate the use of extension cords?
- Electrical cords or other lines not suspended unsupported across rooms or passageways?
- Cords not routed over metal objects?
- Cords not run through holes in walls or ceilings or through doorways or windows?
- Cords not placed under carpet, rugs, or heavy objects?
- Cords not placed in pathways or other areas where repeated abuse can cause deterioration of insulation?
- Octopus (multi-outlet) plugs not used? Approved multiple outlets with circuit breakers used instead?

General Safety Equipment

- Fire extinguishers located where flammable or combustible liquids are used?
- A fire extinguisher located between 10 feet and 25 feet of a door opening to rooms used for storage?
- Other extinguishers ready and accessible?
- Extinguishers mounted so that the top is not more than 5 feet above the floor, and not more than 3 feet if it weighs more than 40 lbs?
- Extinguishers suitable for the class of fire anticipated in each area?
- Extinguishers inspected and labeled as inspected on a yearly basis?
- Employees instructed in the proper use of fire extinguishers on an annual basis?
- Eyewash and safety showers installed within 25 feet of laboratory work areas where corrosive chemicals are used?
- Safety showers and eyewash fountains easily accessible?
- Employees familiar with operation of safety showers and eyewash fountains?
- Safety showers and eyewash fountains tested at least annually?
- First aid kits available, in good condition, and plainly marked?
- Explosion-proof refrigerators not used for storage of food?
- Fume hoods in proper operating condition?
- Function of fume hoods periodically checked and results recorded and posted?



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- Equipment properly placed in fume hoods? (i.e., nothing within 6 inches of sash and all instruments elevated a minimum of 2 inches from hood floor.)
- Fume hoods not used for storage?

Personal Protection

- Eye protection provided and used by all personnel when in the laboratory area?
- Eye protection provided for all guests that enter the laboratory?
- Proper laboratory clothing provided and used by all personnel when in the laboratory area?
- Laboratory clothing clean and in good repair?
- Gloves provided and used when needed?
- Proper gloves provided for each different solvent type?
- Employees who are required to wear steel toe shoes comply?
- Area provided outside the laboratory for eating and drinking; lab coats and protective clothing prohibited in this area?
- Change rooms provided for each sex where it is necessary to change clothes?
- Change rooms provided with separate storage facilities for street clothes and protective clothing?
- Personal hygiene facilities provided and kept in sanitary condition?

Other

- Noise levels checked and protection provided when needed?

27.0 ENVIRONMENT MANAGEMENT:

Our Company is highly committed to control & prevent Environmental pollution by adopting suitable means. We have taken proper measures for the treatment of wastes and effluents, which are being generated from the manufacturing processes. We have well designed Effluent Treatment Plant & fully dedicated operational team. Disposal of Solid waste is also being done as per the guidelines of Pollution Control board.

EFFLUENT TREATMENT PROCESS:

The factory has installed an ETP to treat liquid effluents generated from the formulation. Wastewater is generated from the use of water for various activities in the factory such as domestic purpose, process, vessel washing floor/ Equipment wash and QC laboratory.

Parameter

The discharge from all sources is received in an equalization tank where effluent is received.



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The overflow from the final treated water shall collect in tank then pumped to V-Notch to give treated effluent of desired quality at the outlet.

PROCESS MAINTAINING

Sample

1) Final treated water of ETP.

BOD	:	Twice in a month
COD	:	Twice in a month
Oil and Grease	:	Once in a six month
Total Suspended Solid	:	Twice in a month
pH of Inlet and Outlet	:	Every Day

2) Final treated water of Sewage Treatment Plant.

BOD	:	Twice in a month
COD	:	Twice in a month
Oil and Grease	:	Once in a six month
Total Suspended Solid	:	Twice in a month
pH of Inlet and Outlet	:	Every Day

GREEN BELT COVERAGE:-

The company has taken steps to bring the available open land under green coverage in order to minimize pollution & comply with consent terms & conditions.

28.0 HOUSEKEEPING:

Work Area Housekeeping: Good Housekeeping is an essential part of every job. Work areas, aisles, walkways, and equipment shall be kept clear of loose materials, tools, and scraps.



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Materials such as lumber and pipe shall be stored in an orderly and secure manner.



Spills such as grease, water, or oil shall be cleaned up as soon as possible; a delay could result in an accident to you or a fellow worker.

A safe access shall be maintained to work areas. Short cuts should be avoided. Never block aisles, traffic lanes, or fire exits with equipment or materials

Good housekeeping in all areas is an essential feature of safety and the prevention of accidents.

Employees working in all areas must have regard to the following:-

Ensure that loose and worn flooring is reported to your supervisor.

- Ensure all entrances, corridors, walkways and exit doors are kept clear of obstructions at all times.
- Close all cabinets, cupboards and drawers after use.
- Never overload shelving or store heavy items above head height except on load bearing purpose built racking.
- Never leave a lit cigarette unattended in the designated smoking area.
- Clear away immediately any dangerous substance or spillage. Dangerous substances are marked and are defined as toxic, harmful, irritant, flammable or oxidizing.
- Dust and fumes should not be inhaled. If dust or fumes are produced by any activity then cease the task immediately until protective measures have been put into place.
- Equipment must not be left where it can be a tripping hazard.

ON SITE EMERGENCY ORGANISATION

In spite of various preventive and precautionary measures taken in the plant, the possibility of mishap cannot be totally ruled out. Hence, the need to prepare a contingency plan for dealing with incidences which may still occur and are likely to affect LIFE and /or PROPERTY, both within the plant and in the immediate neighborhood.

Such an emergency could be the result of malfunction of the Plant & Equipment or non-observance of operating instruction .It could, at times, be the consequences of acts outside the control of plant management like severe storm, earthquake, flooding or deliberate acts of sabotage.

A major emergency in the plant is one that may cause serious injury or loss of life and damage to the property.



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An **On site Emergency Plan (OEP)** explains the code of conduct of all personnel in the plant along with the action to be carried out in case of an emergency. This plan gives the guideline for employees, contractors, transporters, etc. It not only defines responsibilities but also informs about prompt rescue operations, evacuations, rehabilitation, co-ordination and communication.

OBJECTIVE OF THE PLAN:

- a) To control the emergency, isolate it and if possible eliminate it.
- b) To avoid confusion, panic and to handle the emergency with clear-cut actions.
- c) To minimize loss of life and property in the plant as well as to the neighborhood.
- d) To carry out head count and rescue operations.
- e) To treat the injured persons.

Responsibility will be automatically delegated in the absence of concerned persons as mentioned in the Plan:

29.0 SAFETY COMMITEE

Safety committee is most successful means of Promoting Safety at work place. it plays a vital role in accident prevention programme. The basic function of safety committee is to create and maintain an active interest of employees in safety to control unsafe act & unsafe condition at workplace to reduce accidents. The safety committee will also help us to meet the requirement of Implementation of EHS policy in the organization. Looking into the benefits & effectiveness of safety committee, we have constituted safety committees. HOD would be Chairman of the departmental safety committees and members from the department, Engineering and EHS. The details of safety committees are given below.

➤ **Departmental Safety Committee:**

HOD will be chairman of the committee & all concerned person will be members.

➤ **Central Safety Committee:**

Location head will be Chairman of the committee & Safety Site

Will be secretary of the committee. This committee will be constituted

With equal No. of Management representative & staff members. Staff

Members will be selected from the Departmental safety committee.



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FUNCTION OF DEPARTMENTAL SAFETY COMMITTEE:

- 1) Departmental Safety Committee will meet in Every Month .It shall be chaired by the Chairman of the committee. In absence of chairman, meeting can be chaired by vice chairman.
- 2) The Chairman will call safety Committee meeting by giving advance information to all concerned persons. MOM of the same will be prepared & to be circulated to all concerned dept for necessary action.
- 3) The chairman will review compliance status in every month before starting of meeting. Pending points will be carry over till compliance.
- 4) Accident/Incident will be discussed in every month for the Safety Awareness of the Employees.
- 5) All employees will discuss only safety & Environment related issue and action plan will be circulated for compliance the same.
- 6) The chairman of the safety committee would resolve all departmental safety related issues. If some major issues which are out of his jurisdiction then he will discuss these issues in Central Safety Committee Meeting for getting final decision of compliance.

FUNCTION OF CENTRAL SAFETY COMMITTEE:

- 1) Central Safety Committee will meet once in three month, the Chairman of the committee shall chair the meeting. In absence of chairman, meeting can be chaired by vice chairman.
- 2) The Chairman will call safety Committee meeting by giving advance information to all concerned persons. MOM of the same will be prepared by the secretary of the committee & same will be circulated to all concerned dept for necessary action.
- 3) The chairman will review compliance status of previous meetings before starting the CS meeting. Pending points will be carry over till compliance.
- 4) Accident/Incident will be discussed in meeting for the Safety Awareness among the Employees.
- 5) All employees will discuss only safety & Environment related issue and action plan would be circulated for compliance the same.
- 6) The chairman of the safety committee will resolve safety related issues and necessary advice will be given by him for necessary action for compliance of safety related issue.



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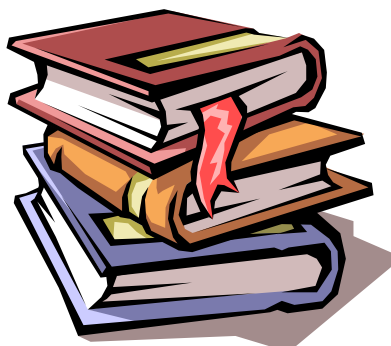
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30.0 SAFETY EDUCATION AND TRAINING PROGRAM:



Training is the systematic development of the attitude, knowledge & skill pattern required by all individuals to perform adequately a given task or job.

Thishas fixed there training policy as follows,

- a) Training to be need based i.e., relevant to their jobs.
- b) Well designed training programme i.e., formulate training plans.
- c) Assessment of training effectiveness.

Indifferent types of training activities are going on. They are mainly conducting i.e.,

- I) On- job training (Shop Floor Talk)
- II) Off-job (Classroom) training
- III) Induction training for new comers.
- IV) Fire fighting drill
- V) Contractors basic safety induction
- VI) First Aid training.
- VII) Health programme (Medical checkup).

31.0 MEASURES TAKEN IN MICRO FOR SAFETY PROMOTION

Safety Promotion is essential for accident prevention. Accident prevention is our prime concern and we have taken various steps for the same in our organization. Out of the different possible approaches, viz. Engineering approach, Human Factor approach and the Participative approach is found to be most effective for achieving Safety Promotion at work place.



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For safety promotion, the following activities are being done.

- Safety Education & Training
- Safety Meetings
- First-aid Training
- Safety Inspection
- Safety Audit
- Safety Committees
- Job Safety Analysis
- Hazop Study
- Process Safety Study
- Celebration of **National Safety Day - 4th March & Safety Week Programme**
- Celebration of **World Environment day - 5th June**
- Celebration of Energy Conservation week
- Celebration of Fire Service Day -**14th April**
- Participation in Celebration of **Industrial Disaster day - 3rd December**
- Safety Suggestion Scheme
- Accident /Incident investigation
- Display of Safety Slogan, Posters, Cartoons, Poems.
- Safety Performance Evaluation System

IN CONCLUSION:

.....has full-fledged SMS (Safety Management System) in place to prevent accidents and to achieve our goal of ZERO ACCIDENT COMPANY.