SAFETY MANUAL

Policy for Safety Assurance at Workplace

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OBJECTIVE

1.1 The safety guideline is a document providing proactive approach towards safety that provides the basic concept and procedures regarding managing and maintaining safety in the facility. The information presented in the document here is intended to protect personnel from personal injury, accidents and to provide a work environment while maintaining a safe workplace and to comply with applicable laws.

1.0 SCOPE

2.1 This policy is applicable to the plant Premises.

2.0 RESPONSIBILITY

3.1 The department representative shall be responsible for updating the guidelines as per the upcoming local regulations and notifications and giving training & instruction to all employees, contractual workers & visitors.

3.2 Concerned Department In charge or Representative shall be responsible for compliance of safety guideline in their respective function and to make intervention with representative while carrying out any new activities which would impact humanity and environment.

3.3 Employees and contractual workers & visitors shall be responsible for following the safety guidelines at the workplace.

3.0 ABBREVIATIONS AND DEFINITIONS

Table 1 : Abbreviation and definitions

Term/Acronym	Definition
Accident	An unexpected event that produces personal injury, illness, or death; damage to or loss of property or vehicles; or environmental
Biohazard	Biohazard is defined as an agent of biological origin that has the capacity to produce deleterious effect on humans, i.e. microorganisms, toxins and allergens derived from those organisms and allergens and toxins derived from higher plants and animals
Biosafety	Biosafety can be defined as the application of combinations of laboratory practice and procedures, laboratory facilities and safety equipment when working with potentially infectious microorganisms.
BMW	Bio Medical Waste
CCOE	Chief Controller of Explosive
DISH	Director of Industrial Safety & Health
E – Waste	Electrical & Electronic Waste
EHS	Environment, Health & Safety
First aid	One-time treatment and subsequent observation of minor scratches, cuts, splinters, burns, etc., that do not ordinarily require medical care from a physician. (Such treatment is considered first aid even if medical personnel provide it.)
GFR	Gujarat Factory Rules
GPCB	Gujarat Pollution Control Board

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Term/Acronym	Definition
Hazard	Hazard is a physical situation which may cause human injury, damage to property or the environment or some combination of these criteria
IBSC	Institutional Biosafety Committee
Incident	An unexpected occurrence that could result in an accident or illness if repeated--a `near miss.
Near Miss	A Near Miss is an unplanned event that did not result in injury, illness, or damage – but had the potential to do so.
Occupational illness	An abnormal physical condition or disorder caused by exposure to chemicals, radiation, or any other factors associated with the work environment
Off-Site Emergency Plan	If an accident takes place in a factory and its effects are felt outside the premises, the situation thus generated is called an off-site emergency.
On-Site Emergency Plan	An accident takes place in a factory and its effects are confined to the premises involving only the people working in the premises
PESO	Petroleum & Explosive Safety Organization
Reportable accident	Any accident whose consequences go beyond the administration of first aid.
Risk	Risk is the likelihood of an undesired event i.e. accident, injury or death occurring with a specified period or under specified circumstance. It may be either a frequency or a probability depending on the circumstances.
Safety	Safety means Peaceful condition free from danger of incident, particularly danger leading to human injury or casualties.
Unsafe Act	Any act that deviates from general recognized safe way of doing a job and increase the likelihood of incident.
Unsafe Condition	Any Condition that may cause or contribute to an incident

4.0 GENERAL SAFETY RULES

5.1 General Instruction

5.1.1 Use Containment palates for chemical storage if required.
5.1.2 All chemicals should have MSDS.
5.1.3 Always wear appropriate personal protective equipment.
5.1.4 Follow the Bio Medical Waste Management rules regarding safe handling of sharps (i.e., needles, scalpels, pipettes, and broken glassware).
5.1.5 Decontaminate all work surfaces before and after your experiments, and immediately after any spill or splash with an appropriate disinfectant.
5.1.6 Clean laboratory equipment routinely, even if it is not contaminated.
5.1.7 Decontaminate all materials before disposal which is more prone to get contamination (E.g. Media, Cell Culture).

5.2 Traffic Rules

5.2.1 The maximum speed limit for vehicles on the premises is 10 km/ hrs.

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5.2.2 All vehicles must be parked in dedicated areas for Parking.
5.2.3 All the vehicles entering and plying within the premises must be driven by the license holders.
5.2.4 Special care and proper signaling is necessary during reversing vehicles in the premises.
5.2.5 Safety Helmet must be required while driving a two-wheeler.
5.2.6 A seat belt must be used while driving a four-wheeler.
5.2.7 All materials loading vehicles have valid insurance before entering the premises.

5.3 Hygiene

5.3.1 Eating must be done only in designated areas (Canteen).
5.3.2 Drinking water must be consumed only from drinking water stations in the premises.
5.3.3 Consumption of alcohol, Tobacco, Cigarette is not allowed within premises.
5.3.4 Wash your hand & face before eating / drinking.
5.3.5 Wash your hands after handling potentially hazardous materials.

5.4 Proactive Measures - Do's & Don'ts for Contagious Diseases

Table 2 : Proactive Measures

Sr.No.	Do's	Don'ts
01	Wash your hands before eating and start any activity in the lab area with disinfectants and water or use alcohol-based hand rub.	Don't go in crowd.
02	Routinely clean frequently touched spaces at workplace with suitable disinfectant	Don't be in close contact with others.
03	Seek medical help if you're suffering from any symptoms.	Don't ignore any symptoms.
04	Cover your nose and mouth with handkerchief/tissue while sneezing and coughing.	Don't come to the office if you have any illness or unhealthy condition.
05	Throw used tissues into bio medical waste bin immediately after use.	Don't Touch your eyes, nose, and mouth.
06	Check your body temperature at the Security gate or basement before entering the premises, ensure it should be within Normal temperature range	Don't Spit anywhere.
07	Sanitize your body through Disinfection tunnel.	Don't use a lift at a time with more than 2 people inside.
08	Practice "social distancing": Stay 3- to 6-feet away from other.	Don't come inside the facility without sanitizing your body through the Disinfection tunnel.
09	Wear a mask properly.	Don't allow visitor inside the premises without Prior permission.
10	Dispose contaminated waste through Bio Waste management.	Don't give your mobile to another person.
11	Keep social distance at Canteen while drinking tea or lunch.	
12	Use Staircase if possible.	

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Sr.No.	Do's	Don'ts
13	Sanitize all the material before moving into the workplace.	
14	Try to sit at workplace and avoid the movement inside the workplace.	
15	Frequently Sanitize your mobile before using.	
16	Use your hand elbow while opening the door or push the lift button.	

5.5 Personal Protective Equipment's (PPEs)

5.5.1 PPE is used to protect personnel from contact with hazardous materials and infectious agents. Appropriate clothing may also protect the experiment from contamination. Personal protective devices and safety equipment must be provided to all employees under the appropriate circumstances and employees have the responsibility of properly using the equipment.

5.5.2 Clothing / Full Body Protection

5.5.2.1 Loose clothing is dangerous as this may get trapped by moving parts of the machines and cause serious injuries. Tight overalls are therefore safe for working premises. Aprons must be used while handling any chemicals.

5.5.3 Safety Footwear

5.5.3.1 The employees, Contractual workers deployed in handling heavy objects, must use safety shoes with steel / Composite toe. Shoes should also have electrical resistance.

5.5.3.2 For working in chemical areas, Microfiber Safety shoes can be used if the workmen do not handle any heavy objects.

5.5.3.3 No Open Toe shoes or Chappal allowed in the premises while working.

5.5.4 Hand Gloves

5.5.4.1 Acid & Chemical resistance hand gloves must be used while handling Acid and hazardous chemicals and Suitable hand gloves must be used as per nature of work. i.e. Handling of Sharp materials (Broken Glass), Working with hot surface, Working with Liquid Nitrogen.

5.5.4.2 Change gloves when contaminated and dispose of used gloves with another contaminated laboratory waste

5.5.4.3 Heat Resistance gloves should be used while handling hot materials.

5.5.5 Helmets

5.5.5.1 Helmets must be worn by employees, Contractual workers are likely to be struck during carrying out any construction activity, any repairing work.

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5.5.6 Eye & Face Protection

5.5.6.1 Safety Googles must be used while doing the following jobs but not limited to,

a) Work which has the possibility of chemical splashes,
b) During handling of liquid Nitrogen
c) During grinding, welding and cutting

5.5.7 Respiratory Protection

5.5.7.1 For, jobs involving possibility of chemical fumes and vapor, suitable Respiratory protection or safety Nose Mask must be used.

5.5.8 Respiratory Protection for Any Emergency

5.5.8.1 In any emergency of leak, suitable respirators, which are available in the respective areas, must be worn. In such a situation, I seek help of Admin team. As a makeshift arrangement, a wet cloth covering the nose can serve the purpose of coming out of a contaminated area safely or trying to reach at Assembly point. Respirators are available at security gates for emergency use only.

5.5.9 Safety Belts (Full Body Harness)

5.5.9.1 To protect serious injuries due to fall from a height, use of safety belt for work at height of 1.8 meters and above is mandatory. The lifeline is 1.8 meters, and it must be securely tied / hooked to a sturdy structure. In the absence of such a structure, I seek assistance from the Department.

5.6 Safety in Working Area

5.6.1 The employee is allowed to work only in the specified area. Access to any other part of the premises is prohibited.

5.6.2 The employee shall keep the specified area of work clean. All scrap and surplus material must be removed from the workplace promptly.

5.6.3 The employee shall not use drums, containers, wooden boxes, etc. lying on the site for any purpose.

5.6.4 The employee shall not throw any material or debris from a height. Under certain circumstances the Supervisor may give specific instructions for this, in which case the following measures should be taken:

5.6.4.1 The area in which the material is to be thrown down must be cordoned off.

5.6.4.2 An employee should be posted on the ground to warn any passerby.

5.6.4.3 None shall stand or work on moving parts of the machine unless the power been Switch Off.

5.7 Safety Related to Gas Cylinders and Piped Compressed Gases

5.7.1 Compressed gas cylinders, irrespective of the contents in it are hazardous because of pressurized system. In the event of loosening or breaking of the valve assembly, the pressurized cylinder can cause serious damage to the buildings and may be attributed to very serious / fatal accidents. It is therefore necessary to take appropriate safety precautions. Some of the main precautions are:

5.7.1.1 Industrial gas cylinder to be procured from an agency which is approved by the explosive (CCOE / PESO) department.

5.7.1.2 Use only Industrial gas cylinders which are approved by the Explosive department.

5.7.1.3 All compressed gas cylinders are subjected to periodic inspection by agency.

5.7.1.4 Before handling Compressed gas, Cylinder should have MSDS.

5.7.1.5 During transportation, unloading and movement of the cylinders, the cap must duly protect the valve assembly.

5.7.1.6 The cylinder must be transported, duly secured, by the cylinder trolley only.

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5.7.1.7 The Cylinder must be stored with a Well Ventilation & Identified Storage area with Proper Identification.

5.7.1.8 Check the identity of the contents before use. Know the color code of the cylinders.

5.7.1.9 Oxygen cylinders must not be stored with flammable gases like Hydrogen.

5.7.1.10 Store them upright with their caps on and duly chained. Do not try to hammer or tighten the valve assembly.

5.7.1.11 Use the right range and type of pressure reducing valve. Overturning may damage the mechanism. The pressure-reducing valve must not be used for controlling the flow rate, for which use an additional valve downstream.

5.7.1.12 Oil and grease must not be used on valves of any of the compressed gas cylinders.

5.7.1.13 Never hammer or tighten a compressed gas line while under pressure. Depressurize the system completely before attempting any repairs / loosening any of the joints on the pipelines.

5.7.1.14 Use Spindle key (Rubber Insulated) for valve ON / OFF for H_2 gas cylinder

5.8 Chemicals

5.8.1 All chemicals when handled improperly may become dangerous. They may cause:

5.8.1.1 Chemical burns at the place of contact including skin and eyes.

5.8.1.2 Irritation and rashes due to contact with skin and eyes.

5.8.1.3 Irritation to respiratory system when vapors / dust / fumes are inhaled.

5.8.1.4 Poisoning due to Skin absorption / inhalation / ingestion.

5.8.1.5 Fires / Explosion.

5.8.2 It is therefore necessary to take appropriate safety precautions while handling chemicals. Some of the main precautions are:

5.8.2.1 Avoid any contact with the Chemicals. Use of solvents for cleaning hands is strictly prohibited.

5.8.2.2 Many of the dangerous liquids are colorless and appear like water, do not use any liquid from any container whether labeled or unlabeled.

5.8.2.3 Store Solvent in Flame Proof cabinet or Separate Store to avoid such a fire incident.

5.8.2.4 Refer incompatibility details from MSDS before handling of chemical to avoid any Incident.

5.8.2.5 Handling of fume generating chemicals should be done in Fume Hood only.

5.9 Regulatory Inspection / Testing by DISH Competent Person

5.9.1 All lifting tools and tackles must have to inspected and tested by third party agency which is approved by the DISH (Director of Industrial Safety & Health) office.

5.9.2 All pressurize equipment (more than 1 kg/cm2) must have to inspected and tested by third party agency which is approved by the DISH office.

5.10 MSDS (Material Safety Data Sheet)

5.10.1 MSDS must be required while procuring the chemical, solvent or gas cylinder etc., from suppliers.

5.10.2 Take Necessary Safety measures which is defined in MSDS while handling chemical, Solvents or gas cylinder etc.

5.10.3 MSDS copy needs to submit to the department for records and safety measures.

5.0 SAFETY WORK PERMIT SYSTEM

6.1 Safety permit to work system is a formal procedure to ensure that the system of work is properly planned and implemented for jobs which have a significant risk. or where new hazards are introduced by the work.

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6.2 Safety permit should be taken prior to performing the following activity

6.2.1 Work on a false ceiling or at a height above 1.8 meters.
6.2.2 Work on a height without proper scaffolding.
6.2.3 Welding / Gas cutting.
6.2.4 Jobs involve sources of ignition, sparks, e.g. chipping, grinding and drilling etc.
6.2.5 Materials handling with help of Hydra, Crane.
6.2.6 Working with transformer, Electrical Panels when power shut down is required or any maintenance work.

6.0 SAFETY WHILE USE OF EQUIPMENT & MACHINERY

7.1 The following equipment / machines are generally used for operational jobs. Some important rules / specifications are given below for such items:

7.2 Ladders

7.2.1 Use only ladders confirming ISI specifications.
7.2.2 Inspect ladders before use, no broken rungs, no split side rails, no worn or broken safety feet.
7.2.3 Tie all ladders, securely at the top. If this is not possible, then secure the ladder by the side at the highest point.
7.2.4 Use only ladders with slip guard.
7.2.5 Do not leave tools attached to or on the top of the ladder, after completion of the job.
7.2.6 Do not use a ladder for a makeshift platform.
7.2.7 Do not place ladders / stepladders close to any live electric wiring or against any operational piping and any Acid, solvent carboys, drum & PVC lines.

7.3 Step Ladders

7.3.1 Inspect a stepladder before use.
7.3.2 Make sure the stepladders are fully opened and the braces locked.
7.3.3 Do not use a wooden stepladder, which has loose nails, screws and bolts protruding from it.

7.4 Welding Machinery

7.4.1 Use only welding equipment conforming to ISI specifications.
7.4.2 The return lead (earth point) of the welding machine must be connected as close as possible to the location of the welding.
7.4.3 Get all equipment and circuit for welding fully insulated and connected with 30 mA ELCB OR RCCB, to ensure that the welder or any other person does not suffer an electrical shock.
7.4.4 No drum or container for chemicals will be used as platform to reach the site of the welding location.
7.4.5 Provide the welder as well as his helper, suitable goggles and leather hand gloves, Safety shoes etc. and instruct them to wear these while working.
7.4.6 Make sure the cables are so laid that they are not subjected to abuse or any damage from sharp corners or are in danger of being run over by heavy equipment.
7.4.7 Make sure the surrounding area is effectively barricaded to protect others, working in the vicinity, from any welding sparks.

7.5 Gas Cutting Equipment

7.5.1 Use Industrial Oxygen, acetylene, LPG gas cylinders approved by the Explosives Department.
7.5.2 Gas cutting torches, rubber tubing, Flash Back Arrestor etc. shall conform to ISI specifications.
7.5.3 Test all valves and joints in the tube for leaks by using soap solution daily before commencement of the job. All leaks shall be rectified before lighting the gas torch.
7.5.4 Lay the rubber tubing in such a manner that it is not abused by heavy objects, sharp corners, hot surfaces, sparks, etc.
7.5.5 Provide eye protection for the gas cutter and his helper during cutting and chipping operations and instruct them to use it.

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7.5.6 Engineering & Department should check the Gas Cutting set before starting job.
7.5.7 Use proper color code as per ISI specifications.
7.5.8 Mount the cylinder in use on a trolley with safety cap or tie the cylinder with chain so that it will not topple. Use only proper hose connectors while repairing leaks. DO not bind with wire or fix with tape.
7.5.9 Keep the nozzle of the gas-cutting torch clean and free from defects as otherwise it may lead to distortion of the flame resulting in backfire.

7.6 Electrical Hand Tools

7.6.1 Electric shock is a major hazard from electrically operated tools. Other types of indirect injuries are electric flash burns and falls due to sudden shock. The following measures, if strictly adhered to will help prevent accidents:
7.6.2 Use electrical hand tools such as grinders, drills, chippers, etc. conforming to ISI specifications.
7.6.3 All electrical hand tools must be earthed while in use. The earth resistance of such hand tools must be checked annually, and record maintained.
7.6.4 Get all equipment is fully insulated with 30 mA ELCB OR RCCB, to ensure that the user or any other person does not suffer an electrical shock.

7.7 Electrical Cables for New Works

7.7.1 Get the approval of the Engineering team on all temporary / electrical connections, to ensure earthing / grounding arrangement, quality of cable.
7.7.2 Make sure that all cables are protected against abuse and possible damage.
7.7.3 All electric bulbs have a protective wire mesh guard.
7.7.4 Make sure the insulation and the plugs are intact.
7.7.5 Make sure the cord is protected against abuse and possible damage, from welding sparks, hot surfaces, etc. and from being run over by heavy equipment.
7.7.6 If it is likely to pass through a passage, make sure it is raised to at least 2 meters above the ground, to avoid damage.
7.7.7 Only qualified people should undertake electrical repairs.
7.7.8 Ensure that the extension cord is free from cuts, damaged insulation links or joints, etc.
7.7.9 Check that the pins of the sockets are not loose.
7.7.10 Ensure easy access to put off the supply. M
7.7.11 Use switches, which clearly indicate “ON” or “OFF” and are of appropriate amperage.
7.7.12 Frequently check the values of the electrical parameters like voltage & amperage and ensure that they are appropriate.
7.7.13 While using any portable electrical equipment ensures that it is properly earthed, there is no leakage of current through the body of the equipment, cable is reinforced where it enters the plug, with stout rubber tubing and there is no strain on wires.
7.7.14 Use work permits in areas of flammable atmosphere.
7.7.15 Identify electrical hazards and report them immediately.
7.7.16 In case of a short circuit or fire, take off the main switches immediately.
7.7.17 Know first aid procedure.
7.7.18 Only low voltage equipment (24 V) shall be used in tanks and wet areas.

7.8 Guarding of Tools

7.8.1 Use grinders, cutters and saws, which have proper guards.
7.8.2 The guards should be movable and capable of being operated on freely.
7.8.3 Provide proper eye and face protection to contractual workers and instruct them to use it while handling these tools.

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7.0 ACCIDENTS / INCIDENTS REPORTING & INVESTIGATION

8.1 The primary purpose of an incident or accident investigation is to identify the hazard control systems that either failed or were lacking. By determining the direct, contributing, and root causes, corrective actions & Preventive action that can help prevent similar occurrences can be identified and used.

8.0 FIRE PREVENTION AND PROTECTION SYSTEM

9.1 Classification of Fire and Extinguishing media

(A) **(B)**

Figure 1: Fire Extinguisher (A) Clean Agent Fire Extinguisher, (B) Ceiling Mounted Clean Agent

Table 3 : Classification of Fire

Sr. No	Type of Class	Fire involving	Extinguishing media
01	Class – A	Wooden, Paper, Rubber, Plastic	ABC, CO2, Clean Agent
02	Class – B	Flammable liquids	ABC, CO2, Clean Agent
03	Class – C	Flammable gases, Electrical fire	CO2, Clean Agent

9.0 WHAT TO DO IN CASE OF EMERGENCY OR MOCK DRILL

10.1 Emergency is notified by siren of Fire Detection and Alarm system or Public Address system. Siren**:** Evacuate the building and assemble the Assembly Point at Security gate. In case it is not known, ask the Security person Representative. Resume work only after “ALL CLEAR INSTRUCTION” given by Admin team.

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