50 years
Excellence In Electronic Components Manufaturing

KELTRON ®
A Government of Kerala Undertaking

KELTRON COMPONENT COMPLEX LIMITED

SAFETY POLICY

Safety First Quality Always

DOC. No: KCCL/SP/01
JULY 2025

www.keltroncomp.org

KCCL Safety Policy

Purpose

The purpose of this Safety Policy is to ensure the well-being of all employees, contractors, visitors, and any other individuals who may be affected by the operations of KCCL. This policy outlines our commitment to preventing accidents, injuries, and occupational illnesses in the workplace. The document enables the company to define the safe working environment to all employees.

Scope

This policy applies to all employees, contractors, visitors, and other stakeholders at all KCCL facilities, including manufacturing plants, IT Sections, Administrative areas and Marketing offices.

Policy Statement

KCCL is committed to providing a safe workplace by:

- Complying with all relevant safety laws, regulations, and standards.
- Identifying and mitigating potential hazards in the workplace.
- Providing adequate resources, training, and equipment to support safe working practices.
- Encouraging the active participation of all employees in safety initiatives.
- Continuously improving safety performance through regular reviews and audits.

Review

This Safety Policy will be reviewed once in two years or as required to ensure its effectiveness and relevance.

This policy is approved by the management of KCCL

"Committed to create a safe working environment, complying with all relevant safety laws and regulations"

Managing Director
Keltron Component Complex Ltd

Chapter I

Vision & Mission

1. Introduction

KELTRON COMPONENT COMPLEX LTD (KCCL) was established on 8th October 1974 in technical collaboration with M/s. Sprague Electromag, Belgium for the manufacture of Aluminium Electrolytic Capacitors. KCCL went into commercial production on 19th August 1978. Since then KCCL has grown and now is the biggest manufacturer of Aluminium Electrolytic Capacitors in India. Presently the installed annual capacity is 350 Million Pcs. It also produces other passive Electronic Components including MPP Capacitors, Resistors and Crystals. Keltron's Motor Run Capacitors are BIS Certified and produced with ISI Mark.

Company's production capacities were enhanced during 1985- 90 to enhance the capacity to 150 Million Capacitors per annum. During the year 2009-10, the three sister concerns of KELTRON, viz. Keltron Crystals Ltd, Keltron Resistors Ltd and Keltron Magnetics Ltd were merged into KCCL and is working as a single entity manufacturing Aluminium Electrolytic Capacitors, Metallised Polypropylene Capacitors, Carbon & Metal Film Resistors and Piezo-electric Quartz Crystals.

KCCL has state of the art manufacturing facility with more than 300 automatic and semi-automatic machines, imported from Japan, Taiwan, Italy etc. We also have an in-house developed Forming Plant for Low Voltage and High Voltage Foils. It has a buildup area of more than 11000 sq. meters for machines alone, spread in a land area of approx 14+ acres, with a skilled workforce of more than 600 persons having an average 10+ years of experience.

KCCL's R&D named "Electronics Research & Development Centre [ER&DC]" is a DSIR recognized R&D lab with many innovative and recognized achievements. The R&D won "ELCINA Award 1993 for excellence in Research & Development" for the work done in the field of forming technology.

KCCL is ISO 9001 certified (ISO 9001:2015). Company's MPP Capacitors are BIS certified [Produced with ISI Mark]. Company's products are ROHS Certified and CE Certified. The products are approved by C-DOT, CACT, LCSO and Defence Department, UL etc. It has many awards and recognitions in hand including "National Productivity Award 1988-89" under large-scale electronic components units from National Productivity Council, Govt. of India.

KELTRON Capacitors are widely accepted by major equipment manufacturers and Consumer Electronic Industries including BEL, ITI, Crompton Greaves, V-Guard, Tata Motors, L&T, EXIDE, Onida, Railways, Water Authority, Electricity Board etc. Keltron marketing divisions are spread over the country including Delhi, Mumbai, Kolkata, Chennai, Ahmedabad, Bangalore, Trivandrum etc.

Mr. K.G.Krishnakumar is functioning as the Managing Director of "Keltron Component Complex Ltd" since October 2016.

The core domain areas from the existing business of KCCL are:
- Aluminium Electrolytic Capacitors
- MPP Capacitors
- Rectangular Capacitors
- Supercapacitors

- Resistors
- Crystals

KCCL is committed to highest standards of corporate conduct towards its various Stakeholders and the environment in which it operates. Towards this, the Company Recognizes its responsibility to ensure **Safety of its employees, Contractors, visitors and protection of Environment (HSE)** in all its manufacturing units, sales and distribution, research laboratories and offices.

This Policy document defines the vision, mission, aim, scope of safety aspect and required actions as well as the responsibility for its execution.

2. Vision

To set the benchmark in manufacturing by prioritizing uncompromised human safety and secure, resilient facilities. We envision a workplace where every individual is safeguarded through robust safety protocols and continuous education, while our facilities are protected through rigorous standards, preventive maintenance, and innovative risk management. Together, we create a safe, sustainable environment that drives excellence and upholds our values

3. Mission

Safety & Environment shall be of topmost priority to the operation of our organization and will constitute an integral part of our business process. We will realize our Vision by adopting an integrated approach to the management of Safety & Environment by focusing on People, Processes, Systems, Technology and Facilities. Safety in the organization will be driven by the leadership and will be demonstrated through employee commitment at all levels

4. Safety Principles

Our Safety & Environment Policy is based on and supported by the following eight
Principles:
a) All injuries, occupational illnesses & environmental incidents are preventable
b) All operational exposures can be safeguarded
c) Safety & environmental assessment of all business processes is vital
d) Working safely is a condition of employment
e) Training all employees to work safely & environment friendly is essential
f) Safety Management audits are a must
g) Employee involvement is essential in all Safety issues.
h) All deficiencies must be reported and corrected promptly.

5. Safety Policy

A Safety policy in KCCL outlines the organization's commitment to maintaining a safe and healthy working environment. The safety policy is stated in the preamble

6. Responsibilities

6.1.   Management Responsibilities

Management of KCCL is Responsible for ensuring safety policies are implemented and maintained. They must provide training, equipment, and resources to ensure safety protocols are followed. The following points may be ensured by the management

- Ensure that safety is considered in all planning and decision-making processes.
- Allocate appropriate resources to implement and maintain the safety program.
- Provide leadership and support to ensure a safe working environment.
- Ensure that all employees receive appropriate safety training.
- Conduct regular safety audits and inspections to identify and address hazards.
- Management is fully committed to establishing and maintaining a transparent, effective safety incident reporting mechanism. We ensure that all safety incidents, near-misses, and potential hazards are promptly reported, accurately documented, and thoroughly investigated.
- The management committee is responsible for reviewing all reported incidents in our regular meetings, analyzing root causes, assessing risk mitigation strategies, and ensuring the implementation of corrective actions.

6.2 Employees Responsibilities

- Follow all safety policies, procedures, and instructions provided by the company.
- Report any unsafe conditions, incidents, or near-misses to their superior immediately.
- Use personal protective equipment (PPE) as required and maintain it in good condition.
- Participate in safety training programs.
- Contribute to the continuous improvement of workplace safety by suggesting ideas and improvements.

Chapter II

Safety Organization

KCCL & Safety Organization

The **Safety Organization** in KCCL typically follows a hierarchical approach that ensures proper implementation, monitoring, and compliance with safety, and environmental regulations. The Apex safety committee generally includes the following key roles and responsibilities:

1. Top Management (MD/GM/DGM/CS)

- **Responsibilities**:
  - Establish safety policies and objectives.
  - Allocate resources for safety programs.
  - Ensure compliance with legal and regulatory requirements.
  - Conduct regular safety reviews and audits.
  - Promote a culture of safety across the organization.
- **Involvement**:
  - Ensure that safety is integrated into the overall business strategy.
  - Direct accountability for safety performance at the executive level.
  - Conduct safety meetings in quarterly and appraise the proceedings with actions taken to Managing Director.

2. Safety Committee

Committee constituted with One Safety officer/Manager and representatives from various departments like management, production, HR etc. The responsibilities and involvement of committee in ensuring the safety of the employees are summered below.

- **Responsibilities**:
  - Collaborate on safety planning and implementation.
  - Conduct regular safety meetings and audits.
  - Address safety concerns raised by employees.
  - Ensure coordination between departments on safety matters.
- **Involvement**:
  - Facilitates communication of safety initiatives and feedback.

3. Safety Manager/ Safety Officer

KMO's must nominate one officer by name as Safety Officer. The responsibilities and functions of the safety officer is given below.

- **Responsibilities**:
  - Lead the safety team and oversee day-to-day safety operations.
  - Develop and maintain safety policies, procedures, and programs.
  - Ensure compliance with national and international safety regulations.
  - Conduct risk assessments and hazard analysis.
  - Manage incident reporting and investigations.

o   Train employees on safety practices.
- **Involvement**:
  - o   Central figure in the implementation of safety practices and monitoring compliance.

4. Safety Engineers/Technical Safety Specialists

- **Responsibilities**:
  - o   Design and implement engineering controls to mitigate safety risks.
  - o   Conduct safety assessments on machinery, tools, and electronic components handling.
  - o   Ensure that the manufacturing processes adhere to safety and quality standards.
  - o   Collaborate with design and production teams to integrate safety features.
- **Involvement**:
  - o   Focus on technical aspects of safety, ensuring that the workplace is engineered to minimize hazards.

5.   Supervisors/Department Managers

- **Responsibilities**:
  - o   Ensure that safety protocols are followed within their departments.
  - o   Conduct regular safety talks and briefings.
  - o   Identify potential safety risks and report them to the safety team.
  - o   Provide immediate corrective actions to address any unsafe practices.
- **Involvement**:
  - o   Direct oversight of day-to-day safety within specific areas of the manufacturing process.

6.   Line Employees/Workers

- A. **Responsibilities**:
  - o   Adhere to all safety protocols and procedures.
  - o   Use personal protective equipment (PPE) as required.
  - o   Report safety hazards, near misses, and accidents immediately.
  - o   Participate in safety training and awareness programs.
- B. **Involvement**:
  - o   Front-line participation in safety culture and compliance.

- **Emergency Response Plans**: Clearly defined protocols for responding to emergencies such as fires, electrical hazards, and chemical spills.

Chapter III

Safety Protocols/ Procedures

A. First Aid

First aid procedures should be tailored to address potential hazards specific to the environment, such as electrical burns, chemical exposures, and physical injuries from machinery The following details outline the first-aid safety protocols that can be implemented to manage such situations effectively. All these guidelines may not be possible to implement. Head of Department may decide what is required for the situation and if any other aspect required.

1. General Guidelines

- **First-aid stations**: Clearly marked and equipped first-aid stations should be located at key points in the plan/unit easily accessible to all employees.
- **Trained personnel**: Ensure a sufficient number of employees are trained in first-aid and CPR. This training should be refreshed annually, and trained employees should be available during all shifts.
- **Emergency numbers**: Display emergency contact numbers (ambulance, fire department, medical professionals) prominently near first-aid stations.
- **First-aid kit accessibility**: First-aid kits should be easily accessible and properly stocked at all times. The kits should comply with local safety regulations regarding content and replenishment.

2. Essential Contents of First-Aid Kits

The following items should be available in the first-aid kits:

- **Bandages and dressings**: Sterile adhesive bandages, gauze pads, adhesive tape, triangular bandages, elastic wraps.
- **Antiseptic and cleaning supplies**: Alcohol wipes, antiseptic wipes, hydrogen peroxide, saline solution for eye rinsing.
- **Burn care**: Burn dressings, burn cream, and cooling gel.
- **Gloves and PPE**: Disposable gloves, face shields, protective eyewear.
- **Splints and support**: Splints, slings, and cold packs for immobilizing injuries.
- **CPR equipment**: Mouth-to-mouth resuscitation masks or shields.
- **Pain relievers**: Over-the-counter pain medications like aspirin or ibuprofen.
- **Scissors and tweezers**: To cut bandages or remove small foreign objects.
- **Eye wash**: Eye wash solution and eye wash stations, especially near chemical handling areas.
- **Other essentials**: Emergency blankets, adhesive tape, and sterile water.

3. Emergency Response Protocols

A. General First-Aid Response

1. **Assess the situation**: Quickly evaluate the nature of the injury or illness. Ensure the scene is safe before approaching the injured person.

2. **Call for help**: Alert trained first-aiders and medical professionals if needed. Call emergency services if the injury is severe.
3. **Provide immediate assistance**: Administer first-aid using appropriate supplies and techniques, such as applying pressure to stop bleeding or immobilizing a fracture.
4. **Use PPE**: Ensure that gloves and other protective equipment are used when handling injured personnel to avoid contamination or infection.
5. **Monitor the patient**: Stay with the injured person, monitor their condition, and provide reassurance until professional help arrives.

B. Specific First-Aid Procedures

1. Cuts, Lacerations, and Bleeding

- **Minor cuts**: Clean the wound with antiseptic, apply sterile dressing, and secure it with a bandage.
- **Severe bleeding**: Apply direct pressure to the wound using a clean cloth or bandage. If the bleeding doesn't stop, elevate the injured area above heart level and continue applying pressure. Seek emergency medical attention if necessary.

2. Burns

- **Minor burns**: Run cool water over the burn for at least 10 minutes or apply a cool, wet cloth. Avoid using ice. Apply burn cream and cover with a sterile bandage.
- **Severe burns**: Do not remove burnt clothing stuck to the skin. Cover the burn area with a clean, dry cloth, and seek medical help immediately.

3. Eye Injuries

- **Chemical exposure**: Flush the eye(s) with an eye wash solution for at least 15 minutes. Seek immediate medical attention.
- **Debris in the eye**: Do not rub the eye. Rinse it with saline or water to remove the foreign object. If the object cannot be removed or if there is severe pain, seek medical attention.

4. Fractures and Sprains

- **Fractures**: Immobilize the injured area using a splint. Do not attempt to realign the bone. Apply an ice pack to reduce swelling and seek medical attention.
- **Sprains**: Rest the injured area, apply ice to reduce swelling, and elevate the limb. Use a compression bandage to provide support.

5. Electric Shock

- **Turn off the power**: If safe to do so, switch off the electrical source before touching the injured person.
- **Provide first-aid**: If the person is unresponsive and not breathing, start CPR and call emergency services. If the person is breathing, monitor their condition and treat any burns or injuries from the shock.

6. Chemical Exposure

- **Skin contact**: Rinse the affected area with water for at least 15 minutes. Remove any contaminated clothing. If the chemical burn is severe, seek medical help immediately.

- **Inhalation**: Move the person to fresh air immediately. If the person is having difficulty breathing, administer oxygen if available and call for medical help.

4. Reporting Injuries and Incidents

- **Incident reporting**: All injuries, even minor ones, should be reported to a superiors immediately. Employees should fill out an incident report form, and the incident should be documented for future reference.
- **Investigation**: Every injury should be investigated to identify potential hazards and prevent future occurrences. Implement corrective actions to improve workplace safety based on the findings.

5. Medical Emergency Procedures

- **Unresponsive person**: If an employee is unresponsive and not breathing, immediately call for emergency services. Start CPR if trained to do so.
- **Heart attack or chest pain**: Call emergency services immediately. Help the person to sit in a comfortable position and offer aspirin if recommended by emergency professionals.

6. First-Aid Training

- **Training programs**: Conduct regular training sessions for employees on basic first-aid procedures, including CPR, wound care, burn treatment, and handling chemical exposures.
- **Refresher courses**: Ensure that first-aid training is refreshed at least annually to maintain proficiency.

7. Record-Keeping

- **Injury logs**: Maintain accurate records of all first-aid treatments and incidents. This information will help assess the frequency of injuries and identify trends for implementing preventative measures.
- **First-aid kit inspection logs**: Ensure first-aid kits are regularly inspected and restocked. Keep records of these inspections to ensure compliance with safety standards.
- Periodically check the expiry date of items in first-aid kit and replenish the item as and when required

By following these first-aid safety protocols, the company can ensure quick and effective responses to injuries, reduce the severity of incidents, and promote a safer workplace for all employees.

B. Personal Protective Equipment

Personal Protective Equipment (PPE) is essential in any organization to protect workers from various hazards, such as exposure to chemicals, dust, electrical risks, and ergonomic issues. The specific PPE required can vary based on the tasks performed. The details of PPEs to be used in different hazardous situation is indicated in the respective sections below. (The Head of Department must ensure the required PPE for the function/activity are procured and made available.)

C. Fire Safety Protocols/Procedures

In the company fire hazards can arise from electrical equipment, flammable materials, and the processes used in production. Following strict fire safety guidelines helps prevent accidents, protect employees, and safeguard assets. Procedures to reduce fire hazards in the company is listed below.

1. Proper Equipment Installation and Maintenance

- **Use Certified Equipment**: Ensure that all electrical equipment, machinery, and installations are certified and compliant with local fire safety standards.
- **Preventive Maintenance**: Regularly inspect and maintain machines, especially those involving heat generation or electrical components. Fix any damaged wires, cables, or machinery parts immediately.
- **Grounding and Bonding**: Ensure that all electrical equipment is properly grounded to prevent static discharge or electrical sparks that could ignite a fire.
- **Overload Protection**: Use circuit breakers, fuses, and other protection devices to prevent overloads, short circuits, or electrical surges that could lead to fires.

2. Safe Handling and Storage of Flammable Materials

- **Proper Storage**: Store flammable and combustible materials (e.g., solvents, cleaning agents, and chemicals) in fire-rated containers, cabinets, or designated storage rooms with proper ventilation.
- **Spill Management**: Implement spill containment procedures for flammable liquids. Use absorbent materials and ensure proper disposal of flammable waste.
- **Minimize Quantities in Production Areas**: Limit the amount of flammable materials in production areas to what is immediately needed, keeping larger quantities in properly equipped storage areas.
- **Separation of Incompatible Chemicals**: Store incompatible chemicals (e.g., oxidizers and flammables) separately to avoid reactions that could cause fires.

3. Electrical Equipment's

- **Routine Inspections**: Inspect electrical systems, wiring, outlets, and machines for wear, damage, or signs of overheating.
- **Avoid Overloaded Circuits**: Avoid overloading electrical outlets and circuits, as this can cause overheating and sparks.
- **Use Approved Power Strips**: Use surge-protected and fire-rated power strips and avoid daisy-chaining multiple power strips together.
- **Static Control**: Implement Electrostatic Discharge (ESD) controls, such as anti-static mats and wristbands, to prevent static build-ups, which could lead to sparks and fires.

4. Proper Ventilation and Fume Extraction

- **Ventilation Systems**: Ensure good ventilation in areas where heat, fumes, or gases are generated, such as during soldering or coating processes. Proper ventilation prevents the accumulation of flammable vapors.
- **Fume Extraction**: Install fume extraction systems in soldering, painting, and cleaning areas to remove harmful and potentially flammable vapors from the air.

5. Fire Detection and Alarm Systems

- **Fire Alarms and Detectors**: Install fire alarms and smoke or heat detectors throughout the facility. Ensure detectors are regularly tested and maintained.
- **Automatic Fire Suppression Systems**: Equip high-risk areas, such as chemical storage rooms and production areas with machinery, with automatic fire suppression systems (e.g., sprinklers, gas-based suppression systems).
- **Fire Safety Monitoring**: Employ automatic fire monitoring systems that send alerts in case of an anomaly, enabling quick response.

6. Fire fighting Equipment

- **Fire Extinguishers**: Place fire extinguishers throughout the facility, especially near high-risk areas like electrical equipment and chemical storage areas. Ensure they are the correct type (e.g., CO2 extinguishers for electrical fires and foam extinguishers for chemical fires).
- **Accessible Fire Hoses**: Install fire hoses or standpipes in larger facilities where automatic sprinklers are not available or where a larger water source may be needed.
- **Regular Maintenance**: Inspect and maintain fire extinguishers, sprinklers, and other fire fighting equipment regularly.

7. Safe Work Practices

- **Avoid Smoking**: Establish a strict no-smoking policy inside the facility and designate smoking areas away from flammable materials.
- **Control Heat Sources**: Avoid open flames or exposed heat sources (such as hot plates or soldering irons) near flammable substances. Turn off equipment when not in use.
- **Clean Workspaces**: Keep workspaces free of dust, debris, and combustible materials. Regularly clean soldering areas, as build up of solder or flux residues can increase fire risks. Cleanliness is next to Godliness.

10. Regular Audits and Inspections

- **Fire Risk Assessment**: Conduct regular fire risk assessments to identify potential hazards and mitigate risks.
- **Compliance Audits**: Ensure compliance with local fire safety regulations and codes, and rectify any violations promptly.
- **Routine Inspections**: Perform regular inspections of fire safety systems, electrical systems, chemical storage, and employee work practices to ensure adherence to fire prevention guidelines.

By implementing these fire hazard prevention procedures, company can significantly reduce the risk of fire-related incidents. Regular training, equipment maintenance, and vigilant management of flammable materials and electrical systems are essential for creating a safe working environment for employees and protecting assets from fire hazards.

D. Electrical Safety Protocols/Procedures

Electrical safety in the organization is critical for preventing accidents, injuries, and equipment damage from electrical shocks. Working with high voltage (HV) and low voltage (LV) systems requires stringent safety protocols to protect personnel, equipment, and facilities. Here's a breakdown of safety measures for both environments. Establishing clear procedures and protocols ensures the safety of employees and protects assets. Here are the key electrical safety procedures and protocols that will be followed in KCCL.

1. General Electrical Safety Procedures

1. **Training**: Ensure all personnel working with electrical systems are trained in handling HV and LV systems, including hazard awareness, proper procedures, and emergency response.
2. **Permits and Authorizations**: Follow permit-to-work systems, ensuring that authorized personnel only work on HV or LV systems. Obtain necessary permits before starting work.
3. **Lockout/Tagout (LOTO)**: Implement LOTO procedures to isolate equipment from all sources of energy before beginning work. Each person working on the system should apply their own lock and tag.
4. **Emergency Response Preparedness**: Ensure the availability of emergency equipment (like fire extinguishers) and first aid kits, and that emergency response plans are understood by all employees.

2.   Specific Protocols for High Voltage Environments

1. **Clearance Zones**: Maintain safe distances around high-voltage equipment and enforce restricted access for unauthorized personnel.
2. **Insulated Tools**: Use insulated tools rated for high voltage, and inspect them regularly for damage.
3. **Grounding**: Ensure all equipment is properly grounded. Use temporary grounding and bonding cables where necessary to prevent static build-up or accidental energization.
4. **Controlled Access**: Limit access to high-voltage areas to authorized, qualified personnel only. Use signage and physical barriers to clearly indicate high-voltage zones.
5. **Two-Person Rule**: For work on HV systems, always have at least two trained individuals present, so one can assist or seek help in case of an emergency.
6. **Voltage Indicators**: Use certified voltage detectors and verify that HV lines or equipment are de-energized before touching.

3.   Specific Protocols for Low Voltage Environments

1. **Circuit Identification and Isolation**: Identify and label circuits clearly. Ensure that circuits are isolated, de-energized, and verified before any work.
2. **Arc Flash Protection**: While LV systems pose lower shock risk than HV, arc flashes are still a hazard. Wear arc-rated PPE and maintain safe distances during switching or maintenance.
3. **Testing and Verification**: Verify that circuits are de-energized using a voltage tester. Always test on a known live source to confirm the device is functioning.
4. **Secure Wiring and Components**: Ensure that all wiring and components are adequately secured and shielded. Use conduit and cable ties to minimize tripping or contact hazards.

5. **Appropriate Lighting**: Ensure that work areas are well-lit to avoid accidental contact with live parts.

4. Electrical Equipment Safety

- **Inspection and Maintenance**: Regularly inspect electrical equipment for wear and tear, damage, and compliance with safety standards. Damaged equipment should be replaced or repaired immediately.
- **Proper Grounding**: Ensure all electrical systems and equipment are properly grounded to provide a low-resistance path for fault currents, protecting both equipment and personnel.
- **Earthing Resistance**: Maintain earthing resistance within safe limits, usually below 1 ohm for sensitive equipment and below 5 ohms for general electrical installations. Test grounding systems regularly.
- **Regular Inspection**: Check grounding connections for corrosion, looseness, or damage. Clean, repair, or replace components as necessary.
- **Separate Earth for Different Systems**: Use dedicated earthing for critical systems (e.g., electronic equipment, high-voltage systems) to prevent interference and maintain safety.
- **Bonding and Equipotential Grounding**: Bond all metallic parts (frames, cabinets, enclosures) to create an equipotential grounding system, minimizing voltage differences that could result in shock hazards.
- **Insulation and Monitoring**: Regularly test insulation integrity on cables, equipment, and wiring. High insulation resistance reduces leakage currents and minimizes the risk of electric shock or fire.
- **Leakage Current Monitoring Devices**: Install Residual Current Devices (RCDs) or Earth Leakage Circuit Breakers (ELCBs) to monitor and disconnect power if leakage current exceeds safe thresholds (typically 30 mA for human safety and 300 mA for fire protection).
- **Limits on Leakage Current**: For safety, ensure that leakage current does not exceed 3.5 mA for portable equipment and 5 mA for fixed equipment. Exceeding these limits can indicate a grounding fault or insulation issue.
- **Minimize Earth-to-Neutral Voltage**: Aim to keep earth-to-neutral voltage below 1 volt. Higher voltages could indicate a poor grounding system or load imbalance, potentially causing equipment malfunction or hazards.
- **Neutral Bonding at Single Point**: Ensure that the neutral-to-earth bonding occurs only at a single point (typically at the main panel or transformer). Multiple neutral-to-earth bonds can create circulating currents and raise earth-to-neutral voltage.
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5. Lightning Protection System

- **Lightning Protection System (LPS)**: Install a lightning protection system, including air terminals, down conductors, and grounding systems, to safely dissipate lightning strikes to the earth.
- **Surge Protection Devices (SPDs)**: Install SPDs on all incoming power lines, data lines, and communication cables to protect against transient surges caused by lightning or power anomalies.
- **Grounding Lightning Protection**: Ensure the lightning grounding system is isolated from the building's primary grounding system to prevent back-feeding of high currents.

6.   Personal Protective Equipment (PPE)

- **Proper Clothing**: Employees working near electrical systems should wear non-conductive clothing, gloves, and shoes.
- **Use of Safety Gear**: Depending on the task, employees may require additional PPE like rubber insulating gloves, hard hats, and face shields.
- **Arc Flash Protection**: Employees should wear arc-rated clothing and gear (gloves, face shields, etc.) when working on or near live electrical circuits to protect against arc flash hazards.

7.   Work Environment Safety

- **Clear Signage**: Post clear and visible warning signs indicating high-voltage areas and equipment.
- **Wet Environment Precautions**: Avoid operating electrical equipment in wet environments. If necessary, use specially rated equipment for wet conditions and provide ground fault circuit interrupters (GFCIs).
- **Cord and Cable Management**: Ensure that electrical cords and cables are organized to avoid trip hazards and mechanical damage.
- **Safe Work Zones**: Keep non-essential personnel and materials away from electrical work zones.

8.   Electrical Safety Devices

- **Residual Current Devices (RCDs)/Ground Fault Circuit Interrupters (GFCIs)**: These devices must be installed to detect ground faults and prevent shocks.
- **Surge Protectors**: Install surge protection devices to safeguard equipment from electrical surges.
- **Fire Safety**: Ensure that fire extinguishers rated for electrical fires (Class C) are accessible and employees are trained in their use.

9.   Handling and Storage of Electrical Equipment

- **Proper Storage**: Electrical tools and equipment should be stored in dry, cool areas when not in use.
- **Cable Storage**: Avoid coiling cables tightly and store them in such a way that they aren't damaged.

10.   Reporting and Investigation of Incidents

- **Incident Reporting**: All electrical incidents, no matter how minor, must be reported immediately.
- **Investigation**: Conduct a thorough investigation after any electrical incident to determine the cause and prevent recurrence.

11.   Compliance with Standards

- **Adherence to Regulatory Standards**: Follow electrical safety standards such as:
    - Kerala Factories (Accident hazard control) Rule 2003/Electricity Act, 2003

▪ Occupational Safety, health and working condition code 2019

and make necessary updates to protocols.

12. Emergency Response Plan

- **First Aid for Electrical Injuries**: Train employees in basic first aid, including CPR and how to treat electrical burns and shocks.
- **Emergency Contacts**: Ensure that emergency contacts, including the safety team and medical professionals, are posted in visible areas.
- **Rescue Procedures**: Establish rescue procedures in the event of electrical accidents, including how to safely cut off power and assist victims.

Implementing these safety procedures will help reduce the risk of electrical accidents in the organization and promote a safer working environment.

E. Electronics Safety Protocols/ Procedures

In any electronic assembly firm like KCCL, safety procedures and protocols are essential to protect workers from hazards related to electrical components, machinery, chemicals, and ergonomic risks. The following are detailed safety measures that should be implemented in an electronic assembly environment:

1. General Workplace Safety

- **Training and Awareness**: Provide thorough safety training for all employees, covering the handling of electronic components, machinery, and potential hazards (electrical, mechanical, and chemical).
- **Housekeeping**: Ensure that workspaces are clean, well-organized, and free from clutter to avoid slips, trips, and other accidents.
- **Signage**: Post visible safety signs and labels to warn of high voltage, hot surfaces, and hazardous chemicals.

2. ESD (Electrostatic Discharge) Protection

- **Workstation Setup**: Establish ESD-safe workstations, including grounded work surfaces, ESD mats, wrist straps, and anti-static containers.
- **Training**: Train workers on how to prevent ESD by handling components properly and using protective equipment.
- **Monitoring**: Regularly check the effectiveness of ESD protection devices, such as wrist straps and grounding systems, to ensure compliance with standards.

3. Handling of Components and Tools

- **Proper Tool Use**: Train employees on the correct use of hand tools (such as screwdrivers, pliers, and soldering irons) to avoid injury.
- **Component Handling**: Employees should handle components with care to prevent damage and avoid injury from sharp edges or fragile parts. Use appropriate gloves when needed.

- **Lifting and Moving Components**: Provide mechanical aids such as carts or lifting devices for handling heavy components to reduce strain injuries.

4.   Soldering and Heat-Related Safety

- **Ventilation**: Ensure proper ventilation or localized fume extraction to remove harmful fumes generated during soldering.
- **Protective Gear**: Workers should wear safety glasses, heat-resistant gloves, and long sleeves to prevent burns and exposure to hazardous materials.
- **Equipment Maintenance**: Regularly inspect and maintain soldering equipment to prevent malfunctions or overheating.

5.   Personal Protective Equipment (PPE)

- **Eye Protection**: Provide safety glasses or goggles to protect workers from solder splashes, flying debris, and chemical exposure.
- **Gloves**: Use gloves designed for ESD protection or heat resistance, depending on the task (e.g., soldering, handling chemicals).
- **Anti-Static Apparel**: Workers handling sensitive components should wear ESD-safe clothing to prevent static build-up.
- **Respirators and Masks**: In environments where dust, fumes, or chemicals are present, provide respirators or face masks for protection.

6.   Environmental Control and Air Quality

- **Temperature and Humidity**: Maintain controlled temperature and humidity levels to prevent damage to sensitive components and ensure worker comfort.
- **Air Quality**: Monitor air quality, particularly in areas where soldering, chemical use, or dust generation occurs. Implement appropriate ventilation systems to reduce exposure to harmful substances.

7.   Waste Management and Disposal

- **E-Waste Management**: Implement a proper disposal process for electronic waste, ensuring compliance with environmental regulations. Work with certified e-waste disposal companies.
- **Recycling**: Encourage recycling of scrap materials like metal, plastics, and packaging to minimize environmental impact.

8.   Incident Reporting and Investigation

- **Reporting Protocol**: Establish a protocol for reporting accidents, near-misses, and unsafe conditions. Ensure that all incidents are documented and reported promptly.
- **Root Cause Analysis**: Conduct thorough investigations after incidents to determine the cause and implement corrective measures to prevent future occurrences.
-

9.   Compliance with Industry Standards

- **Regulatory Compliance**: Ensure adherence to relevant safety standards, such as:

- Kerala Factories (Accident hazard control) Rule 2003/Electricity Act, 2003
- Occupational Safety, health and working condition code 2019
- **Regular Audits**: Conduct periodic safety audits and assessments to ensure ongoing compliance with industry regulations and standards.

By adhering to these safety procedures and protocols KCCL can ensure a safe working environment, minimize accidents, and maintain operational efficiency.

F. Chemical Safety Protocols/ Procedures

Chemical safety is crucial in KCCL due to the use of various hazardous substances such as solvents, acids, alkalis, and cleaning agents. Ensuring proper handling, storage, and disposal of these chemicals minimizes risks to safety, and the environment. This guide outlines key protocols for chemical safety in an electronic manufacturing company.

1. Chemical Inventory Management

a. Maintain a Chemical Inventory

- Keep an up-to-date inventory of all chemicals used in the facility, including quantity, location, and hazard classification.
- Ensure each chemical has a corresponding Material Safety Data Sheet (MSDS), readily accessible to all employees.
- Regularly review and update the inventory, ensuring expired or unnecessary chemicals are disposed of safely.

b. Chemical Substitution

- Where possible, use less hazardous or environmentally friendly alternatives to harmful chemicals.

2. Material Safety Data Sheets (MSDS)

a. MSDS Availability

- Ensure that MSDS for all chemicals used in the facility are accessible to all employees, ideally both electronically and physically in key locations.
- Train employees on how to read and interpret MSDS to understand the risks associated with each chemical and the necessary precautions.

b. MSDS Review

- Regularly review MSDS for changes in handling instructions, storage requirements, and disposal procedures.

3. Proper Labelling and Signage

a. Chemical Labelling

- All chemicals must be clearly labelled with the chemical name, hazard warnings, and handling instructions. Labels must comply with local regulatory standards.
- Secondary containers must also be labelled appropriately if chemicals are transferred from their original packaging.

b. Safety Signage

- Post hazard and warning signs in areas where chemicals are stored or used, such as "Corrosive," "Flammable," or "Toxic," to alert employees of potential dangers.
- Emergency contact numbers and procedures should be clearly posted near chemical storage and handling areas.

4. Personal Protective Equipment (PPE)

a. PPE Requirements

- Ensure all employees handling chemicals use appropriate PPE, such as gloves, goggles, face shields, and chemical-resistant clothing.
- PPE must be selected based on the specific chemical hazards as outlined in the MSDS (e.g., nitrile gloves for solvents, acid-resistant aprons for corrosives).

5. Proper Chemical Storage

a. Segregation of Chemicals

- Store chemicals based on their compatibility (e.g., acids and bases, oxidizers and flammables, must be stored separately) to prevent dangerous reactions.
- Flammable chemicals should be stored in designated flammable storage cabinets, while corrosives should be in acid-resistant cabinets.

b. Storage Conditions

- Maintain proper temperature, humidity, and ventilation in chemical storage areas to prevent degradation or accidental ignition.
- Ensure that chemicals are stored at or below eye level, and containers are tightly sealed to prevent spills and leaks.

c. Spill Containment

- Provide spill containment measures, such as bunded areas, trays, and absorbent materials, for storage zones where liquid chemicals are kept.

6. Safe Chemical Handling Procedures

a. Chemical Handling Training

- Provide regular training to employees on proper chemical handling procedures, including how to safely transfer, mix, or apply chemicals.
- Use tools like pumps or dispensers to minimize direct handling and reduce exposure risks.

b. Ventilation and Fume Control

- Ensure that work areas where chemicals are used have appropriate ventilation, such as local exhaust systems, to control fumes and vapors.
- For highly volatile or harmful chemicals, ensure that work is done under fume hoods or in designated areas with proper air filtration systems.

7. Chemical Spill Response and Emergency Procedures

a. Spill Kits

- Equip each area where chemicals are stored or used with appropriate spill kits, including absorbent materials, neutralizers, and PPE.
- Ensure spill kits are tailored to the chemicals in use (e.g., acid neutralizers for corrosive spills, or oil absorbents for solvent spills).

b. Emergency Procedures

- Train employees on the emergency procedures for chemical spills, including evacuation protocols, containment measures, and first aid responses.
- Ensure that emergency showers and eyewash stations are available in areas where chemicals are handled, and regularly test them to ensure functionality.

c. Reporting and Documentation

- Implement procedures for reporting chemical spills, exposures, or accidents. Maintain records of incidents for future safety reviews and improvements.

8. Chemical Waste Disposal

a. Waste Segregation

- Segregate chemical waste based on its type (e.g., flammable, corrosive, toxic) and ensure it is disposed of according to local environmental and safety regulations.
- Use properly labelled and compatible containers for waste storage, and ensure that containers are not overfilled.
- Take special care in avoiding the mix up of chemically active substances by thermal/solvent process.

b. Disposal Methods

- Partner with certified hazardous waste disposal companies to ensure that chemical waste is handled and disposed of in compliance with legal requirements.
- For e-waste and other materials that come into contact with hazardous chemicals, ensure proper decontamination and disposal procedures.

9. Hazard Communication Program

a. Employee Right-to-Know

- Implement a comprehensive hazard communication program that ensures all employees understand the risks associated with the chemicals they may encounter and the safety precautions to take.
- Conduct regular refresher training sessions to keep employees updated on new or changing chemical safety protocols.

b. Safety Meetings and Drills

- Organize periodic safety meetings to discuss chemical safety practices, review past incidents, and address any concerns raised by employees.
- Conduct emergency response drills for chemical spills or leaks to ensure employees are prepared to act quickly and effectively.

10. Monitoring and Auditing

a. Routine Inspections

- Conduct routine inspections of chemical storage and handling areas to identify and mitigate potential hazards.
- Ensure proper functioning of ventilation systems, spill response equipment, and storage facilities.

Implementing comprehensive chemical safety guidelines in the company ensures the protection of employees, product quality, and the environment. Through proper handling, storage, training, and emergency preparedness, risks associated with hazardous chemicals can be minimized, leading to a safer and more efficient workplace.

G. Safety Guidelines for the usage of Pneumatic tools & High Pressure Air

The use of pneumatic tools and high-pressure air in manufacturing can increase productivity and efficiency, but it also introduces potential hazards such as high-pressure air injuries, tool-related accidents, and noise-induced hearing damage. Adhering to proper safety protocols can help mitigate these risks and ensure a safe working environment.

1. General Safety Guidelines for Pneumatic Tools

a. Tool Selection and Inspection

- Always use the right pneumatic tool for the job to minimize the risk of accidents.
- Inspect pneumatic tools before each use for signs of wear, damage, or malfunction. Replace worn-out or defective tools immediately.
- Ensure that all tools have safety features such as pressure relief valves and trigger locks to prevent accidental operation.

b. Manufacturer's Instructions

- Follow the manufacturer's instructions for operating, maintaining, and storing pneumatic tools.
- Ensure that all employees are trained on the specific tools they will use, and provide operating manuals for reference.

c. Air Pressure Regulation

- Never exceed the manufacturer's recommended air pressure for pneumatic tools. Excessive pressure can cause tools to malfunction or explode, posing serious risks.
- Install pressure regulators and gauges to control the air pressure supplied to pneumatic tools.

2. Proper Tool Operation

a. Securing Connections

- Ensure that air hoses and tool connections are secure before use. Loose or improperly connected hoses can detach under pressure, causing injuries.
- Use quick-connect couplings with safety features to prevent accidental disconnection during use.

b. Trigger Safety

- Keep fingers off the trigger unless the tool is being used. Accidental triggering can cause unexpected tool movement, leading to injury.
- Always disconnect the tool from the air supply before changing accessories, performing maintenance, or when the tool is not in use.

c. Safe Working Posture

- Maintain a stable working position when operating pneumatic tools, especially heavy or high-torque tools, to prevent strain or loss of control.
- Hold the tool with both hands when required to ensure a secure grip and control over the tool's motion.

3. Hose Management and Safety

a. Proper Hose Handling

- Use hoses of appropriate length and quality for the intended application. Avoid using damaged or deteriorated hoses, as they can burst under pressure.
- Never use hoses to lift or carry tools. This can damage the hose and tool connection points, leading to leaks or disconnections.
- Secure hoses away from walkways to avoid tripping hazards and ensure that hoses are not kinked or twisted during operation.

b. Hose Storage

- When not in use, coil hoses neatly and store them in a designated area to prevent damage and tangling. Inspect and maintain hoses regularly for wear and leaks.

4. Personal Protective Equipment (PPE)

a. Eye Protection

- Always wear ANSI-approved safety goggles or face shields to protect against flying debris and high-pressure air, which can cause serious eye injuries.
- For tasks that create additional hazards (such as grinding or cutting), use face shields in conjunction with safety glasses.

b. Hearing Protection

- Pneumatic tools often generate high noise levels, which can damage hearing. Use earplugs or earmuffs rated for noise reduction in high-decibel environments.

c. Hand and Body Protection

- Wear gloves to protect hands from vibration, tool-related injuries, and cold temperatures from compressed air. Choose gloves that allow for dexterity and grip without compromising control over the tool.
- In some cases, additional body protection such as aprons or protective sleeves may be needed if tools generate sparks or other debris.

5. Air Compressor Safety

a. Maintenance and Inspections

- Ensure regular maintenance of air compressors to prevent malfunctions and pressure build-ups. This includes inspecting air filters, checking for leaks, and maintaining proper oil levels in lubricated compressors.
- Use automatic shut-off systems to stop compressors when pressure exceeds safe levels.

b. Ventilation and Noise Control

- Compressors should be installed in well-ventilated areas to prevent overheating and minimize the risk of fires.
- Consider installing compressors in noise-reducing enclosures or rooms to limit the exposure of workers to high-decibel environments.

6. Safe Use of High-Pressure Air

a. Never Use Air for Cleaning Skin or Clothes

- **Never** direct high-pressure air at yourself or others, including using it to clean clothing or body parts. High-pressure air can penetrate the skin, causing serious injuries or air embolism.
- Use only approved compressed air blowguns for cleaning equipment or surfaces, and ensure that the air pressure is regulated to less than 30 PSI for such tasks.

b. Use of Safety Nozzles

- Always use safety nozzles when blowing air for cleaning purposes. These nozzles reduce the air pressure to a safer level, minimizing the risk of injury.

7. Tool Maintenance and Storage

a. Regular Tool Maintenance

- Regularly lubricate pneumatic tools to reduce wear and maintain efficiency. Follow manufacturer guidelines for cleaning, lubrication, and part replacements.
- Drain moisture from air tanks and lines regularly to prevent rust and corrosion, which can degrade tool performance and safety.

b. Safe Storage of Tools

- Store pneumatic tools in a designated area when not in use. Disconnect tools from the air supply and release any residual pressure before storage.
- Protect tools from dust, debris, and moisture to extend their lifespan and prevent damage.

8. **Spray Painting Process**

Spray painting in the organization presents unique safety concerns, given the risks posed to both equipment and personnel. Here are comprehensive safety guidelines to ensure safe spray-painting activities:

a. Personal Protective Equipment (PPE):

- **Respirators or Masks**: Use NIOSH-approved respiratory protection to prevent inhalation of toxic fumes or particles.
- **Protective Clothing**: Wear chemically resistant suits, gloves, and footwear to protect skin from harmful paint solvents.
- **Eye Protection**: Use goggles or face shields to prevent paint mist from entering the eyes.
- **Hearing Protection**: If spray painting equipment is noisy, ensure workers use earplugs or earmuffs.

b. Proper Ventilation:

- **Exhaust Systems**: Ensure that there is a proper spray booth with an efficient exhaust system that pulls fumes and vapors out of the work area.
- **Filtered Ventilation**: Use ventilation systems with filters designed to capture paint overspray, especially in clean rooms or areas with sensitive electronic components.

c. Flammability and Explosion Control:

- **No Open Flames or Sparks**: Spray painting involves flammable materials. Keep the area free of ignition sources such as open flames, hot surfaces, or electrical sparks.
- **Explosion-Proof Equipment**: Use explosion-proof lighting, fans, and other electrical equipment to minimize the risk of fire or explosion.
- **Fire Extinguishers**: Place appropriate fire extinguishers (Class B or dry chemical) in easily accessible locations.

d. Chemical Handling and Storage:

- **Proper Labelling**: Ensure all paints, solvents, and thinners are properly labeled, and employees understand their hazards.
- **Flammable Storage Cabinets**: Store paints and solvents in approved flammable storage cabinets when not in use.
- **Safe Dispensing**: Use only containers and dispensing methods that are designed for handling flammable liquids.

e. Cleanliness and Spill Control:

- **Prevent Overspray**: Ensure spray booths or areas are enclosed to contain paint overspray and prevent contamination of nearby equipment.
- **Spill Management**: Use spill containment kits for any chemical spills, including absorbents that are compatible with solvents used in spray painting.
- **Waste Disposal**: Dispose of paint, solvents, and contaminated cleaning materials as hazardous waste following local environmental regulations.

f. Worker Training and Emergency Procedures:

- **Hazard Communication**: Train workers on the hazards associated with spray painting chemicals, including safety data sheets (SDS) and the use of PPE.

- **Emergency Response**: Ensure employees know the location of safety showers, eyewash stations, and emergency exits. They should be trained in fire and chemical spill response procedures.

g. Environmental Control:

- **Temperature and Humidity Control**: Maintain optimal temperature and humidity levels in the spray painting area to ensure paint consistency and prevent condensation or electrostatic build-up.
- **Fume Extraction**: Use proper fume extraction methods that ensure hazardous vapors do not accumulate in areas housing sensitive electronic equipment.

h. Equipment Maintenance:

- **Regular Maintenance**: Ensure that all spray painting equipment, including compressors, hoses, and spray guns, is regularly inspected and maintained to prevent leaks or malfunctions.
- **Calibration**: Verify the correct calibration of spray guns to minimize overspray and reduce the risk of excess vapor release.

i. Inspection and Compliance:

- **Routine Inspections**: Regularly inspect the work area, equipment, and safety gear to ensure compliance with safety guidelines.
- **Regulatory Compliance**: Adhere to the following standards
  - Kerala Factories (Accident hazard control) Rule 2003/Electricity Act, 2003
  - Occupational Safety, health and working condition code 2019

By following these guidelines, the risks associated with spray painting activities in the company including those related to chemical exposure, flammability, and damage to electronic components, can be effectively mitigated.

9.   Risk Mitigation Strategies

a. Vibration Exposure

- Prolonged exposure to vibration from pneumatic tools can cause hand-arm vibration syndrome (HAVS) or carpal tunnel syndrome. Rotate tasks between employees to limit exposure to vibration.
- Where possible, use vibration-dampening gloves or tools designed to reduce vibration impact.

b. Noise and Hearing Protection

- Implement a hearing conservation program if noise levels from pneumatic tools exceed regulatory limits. This includes regular noise monitoring and the mandatory use of hearing protection in noisy areas.

c. Tool Lockout/Tagout (LOTO)

- Implement lockout/tagout procedures for pneumatic tools and air compressors during maintenance or when tools are not in use to prevent accidental activation.

Pneumatic tools and high-pressure air present significant safety risks, but by following these guidelines, a manufacturing firm can greatly reduce the chances of accidents and injuries. Comprehensive training, proper maintenance, and consistent use of PPE, along with regular safety audits and emergency preparedness, are key to creating a safe and efficient work environment.

H. Safety Guidelines for Machine shop

Safety in a machine shop is crucial to preventing injuries and ensuring smooth operations. Here are key safety guidelines that should be followed:

1. Personal Protective Equipment (PPE):

- **Eye protection**: Always wear safety glasses or goggles with side shields to protect against flying debris.
- **Hearing protection**: Use earplugs or earmuffs in high-noise areas.
- **Gloves**: Wear cut-resistant gloves when handling sharp or rough materials, but avoid them when operating rotating machinery.
- **Footwear**: Wear steel-toe shoes or other protective footwear to prevent injuries from falling objects.
- **Clothing**: Wear tight-fitting clothes to avoid getting caught in machinery. Avoid loose clothing, jewelry, and keep long hair tied back.
- **Respiratory protection**: Use a mask or respirator in environments with dust, fumes, or harmful gases.

2. Machine Operation Safety:

- **Training**: Only trained and authorized personnel should operate machines.
- **Machine guards**: Never remove or disable safety guards on equipment.
- **Lockout/Tagout (LOTO)**: Follow proper LOTO procedures when maintaining or repairing machines to ensure they are de-energized.
- **Emergency stops**: Know the location and operation of emergency stop buttons or shut-off switches on machines.
- **Pre-use inspection**: Inspect machines before use to ensure they are in good working condition and free from defects.

3. General Shop Practices:

- **Housekeeping**: Keep work areas clean and free of clutter. Ensure spills are promptly cleaned to avoid slips and falls.
- **Tool maintenance**: Keep tools sharp, clean, and in good repair. Dull tools can slip and cause injury.
- **Proper lifting techniques**: Use correct lifting methods when handling heavy objects to avoid back injuries.

- **Ergonomics**: Position yourself properly when operating machinery to avoid strain or repetitive motion injuries.
- **Ventilation**: Ensure proper ventilation in the workspace to avoid the buildup of fumes or dust.
- **Material storage**: Store materials properly to prevent them from falling and causing injury.

5. Handling Materials:

- **Sharp objects**: Always handle sharp objects, such as cutting tools and materials, with care.
- **Hot materials**: Use proper tools or PPE, like heat-resistant gloves, when handling hot materials.
- **Compressed air**: Never use compressed air to clean yourself or other people; only use it for machines and work surfaces.

7. First Aid and Emergency Procedures:

- **First aid kits**: Know the location of first aid kits and how to use them.
- **Emergency procedures**: Familiarize yourself with the shop's emergency response plan and evacuation routes.
- **Incident reporting**: Report any accidents, near-misses, or hazardous conditions immediately to supervisors.

Following these safety guidelines will help create a safe environment for all workers in a machine shop.

I. Safety Guidelines for the usage of Laptop and Desktop PCs

Using laptops and desktop PCs safely is important for both personal well-being and protecting your equipment. Here are the key safety guidelines for their usage:

1. Ergonomics and Posture:

- **Workstation setup**: Position your screen at eye level and about an arm's length away to avoid straining your neck and eyes.
- **Chair**: Use a chair that provides good back support, allowing your feet to rest flat on the floor. Adjust the height of your chair and desk for comfortable typing.
- **Keyboard and mouse**: Keep the keyboard and mouse at a height that allows your arms to be parallel to the floor. Use a wrist rest if necessary.
- **Frequent breaks**: Take breaks every 30-60 minutes to stretch and rest your eyes. Follow the 20-20-20 rule: every 20 minutes, look at something 20 feet away for 20 seconds to reduce eye strain.
- **Laptop stand**: When using a laptop for extended periods, use a laptop stand to elevate the screen to eye level, and a separate keyboard and mouse for better ergonomics.

2. Electrical Safety:

- **Power cords**: Ensure power cords are not frayed, damaged, or bent sharply, which can cause electrical hazards.

- **Power outlets**: Avoid overloading power outlets or power strips. Plug devices into grounded outlets, and use surge protectors to safeguard against electrical surges.
- **Battery safety**: Use only manufacturer-recommended chargers for laptops. Avoid overcharging or leaving devices plugged in for extended periods once fully charged, which can damage the battery.
- **Wet environments**: Keep laptops and desktops away from water, and never use them in wet or damp conditions.

3. Proper Ventilation:

- **Avoid overheating**: Ensure proper ventilation around your laptop or desktop. Do not place laptops on soft surfaces (like beds or couches) that block air vents. For desktops, ensure there's adequate airflow around the CPU tower.
- **Cooling pads**: For heavy use, especially on laptops, use cooling pads or external fans to help maintain optimal temperatures and avoid overheating.
- **Clean regularly**: Dust can accumulate in cooling fans and vents. Regularly clean these areas with compressed air to prevent overheating and improve performance.

4. Screen Safety:

- **Brightness and contrast**: Adjust the screen brightness and contrast to comfortable levels to reduce eye strain.
- **Glare reduction**: Position your screen to avoid glare from windows or lights. Use anti-glare screen protectors if necessary.
- **Blue light filter**: Use blue light filtering apps or settings, especially when using the computer for extended periods, to reduce eye strain and sleep disruption.

5. Data and Security:

- **Antivirus protection**: Install and regularly update antivirus software to protect your laptop or desktop from malware and security threats.
- **Backup data**: Regularly back up important data to external drives or cloud storage to prevent data loss in case of hardware failure or other incidents.
- **Password protection**: Use strong, unique passwords for your devices and accounts. Enable two-factor authentication wherever possible for added security.

6. Safe Handling of Laptops:

- **Carry carefully**: When transporting a laptop, use a padded bag to protect it from bumps or drops. Avoid carrying a laptop by its screen or applying pressure to the screen.
- **Closing the lid**: Close the laptop lid gently to avoid damaging the hinges or screen.
- **Avoid extreme temperatures**: Do not expose your laptop to extreme heat or cold, as this can damage internal components and reduce battery life.

7. Desktop PC Cable Management:

- **Organize cables**: Secure and organize cables to avoid tripping hazards and ensure that they are not pinched or twisted.
- **Cable length**: Ensure cables are long enough to avoid strain on connectors but not too long to create tangles.

- **USB safety**: Safely eject USB devices before removing them to prevent data loss or damage.

8. General Usage Tips:

- **Stable surface**: Always use laptops and desktops on stable, flat surfaces to avoid falls or accidental damage.
- **Food and drink**: Avoid eating or drinking near your laptop or desktop to prevent spills and debris from entering the keyboard or other components.
- **Software updates**: Regularly update your operating system and software to ensure security and performance improvements.

9. Well-being of Employees:

- **Lighting**: Ensure your workspace is well-lit to avoid eye strain. Use task lighting if necessary.
- **Posture reminders**: Use apps or reminders to prompt you to correct your posture, stretch, and take breaks during long work sessions.

By following these guidelines, you can ensure a safe, comfortable, and productive working environment with laptops and desktop PCs.

J. General Cleaning & House keeping

Maintaining proper housekeeping and cleanliness in the company is crucial for ensuring product quality, protecting sensitive equipment, and fostering a safe, efficient workplace. Adherence to cleanliness protocols can prevent contamination, minimize hazards, and enhance overall operational efficiency.

1. General Cleanliness Protocols

a. Daily Cleaning Schedule

- Establish a structured daily cleaning schedule to ensure that all areas of the facility, including production areas, break rooms, and restrooms, are cleaned regularly.
- Assign specific teams or staff members responsible for various areas to maintain accountability.

b. Surface Cleaning

- Clean all workstations, machinery, and assembly lines daily, using appropriate cleaning agents to prevent dust and debris accumulation.
- Use anti-static wipes and cleaning materials specifically designed for electronic components to avoid damaging sensitive equipment.
- Ensure that equipment and tools are stored in designated clean, dust-free areas after use.

c. Floor Maintenance

- Keep floors free of dust, debris, and spills to prevent contamination of products and ensure worker safety.

- Use anti-static or dust-control mats in critical areas, especially where sensitive electronic components are handled.
- Conduct regular checks for potential tripping hazards, such as loose cables or misplaced tools.

2. Waste Management and Disposal

a. Segregation of Waste

- Implement clear guidelines for waste segregation, including separate bins for hazardous materials, electronic waste (e-waste), recyclables, and general waste.
- E-waste must be disposed of following local regulations and company policies to ensure environmental responsibility.

b. Disposal Protocols

- Designated waste bins should be clearly labelled and placed at strategic points across the facility, including assembly lines, storage rooms, and testing areas.
- Empty waste bins regularly to avoid overfilling, which can lead to spillage or contamination of the workspace.

3. Component and Product Handling

a. Cleanroom Protocols

- In areas designated as cleanrooms or controlled environments, implement stringent gowning and cleanliness protocols, including the use of gloves, face masks, hairnets, and cleanroom suits.
- Enforce access control policies to limit the entry of unauthorized personnel to cleanroom areas, reducing contamination risks.

b. Anti-Static Precautions

- Ensure that all employees handling sensitive electronic components wear anti-static wrist straps and use grounded workstations.
- Workstations and tools in assembly areas should be kept free from dust and static build-up, which could damage delicate components.

4. Tool and Equipment Maintenance

a. Cleaning Tools and Equipment

- Establish a regular cleaning schedule for machinery, tools, and equipment, ensuring that cleaning products used are compatible with the specific machinery.
- Use compressed air or vacuum cleaners specifically designed for electronics to clean inside equipment and remove dust from hard-to-reach places without causing static.

b. Calibration and Maintenance

- Schedule routine maintenance and calibration of all machinery and tools to ensure they function properly and prevent contamination of products from malfunctioning equipment.

5. Spill and Hazardous Material Management

a. Immediate Response to Spills

- Establish protocols for the immediate cleaning of spills, whether they involve water, chemicals, or other liquids that could damage electronics or pose a safety hazard.
- Ensure that spill kits are readily available in areas where chemicals or liquids are stored and that staff are trained in their use.

b. Handling Hazardous Materials

- Train employees in the proper handling, storage, and disposal of hazardous substances, including chemicals used in manufacturing processes.
- Store chemicals in clearly labelled, sealed containers and ensure that Material Safety Data Sheets (MSDS) are accessible for all hazardous materials in use.

6. Personal Workstation Cleanliness

a. Employee Responsibility

- Each worker should be responsible for the cleanliness of their individual workstation, ensuring that it is kept tidy, organized, and free of unnecessary materials at all times.
- Tools and components should be returned to their designated places after use, reducing clutter and improving efficiency.

b. End-of-Shift Protocol

- Implement an end-of-shift protocol where employees must clean their workstations, including wiping down surfaces, organizing tools, and properly storing unfinished products or components.

7. Ventilation and Air Quality Management

a. Air Filtration Systems

- Maintain clean and properly functioning air filtration systems to minimize dust and airborne contaminants, particularly in assembly and testing areas.
- Replace or clean air filters regularly, following manufacturer guidelines.

b. Humidity Control

- Ensure that humidity levels in manufacturing and storage areas are monitored and controlled, as excessive moisture can damage electronic components.

8. Periodic Deep Cleaning

a. Weekly and Monthly Deep Cleans

- Schedule weekly and monthly deep cleaning of the facility, including areas that are not part of the daily cleaning routine (e.g., storage rooms, behind machinery).

- Conduct thorough inspections to ensure all areas, including hidden or hard-to-reach spots, are free from dust and debris.

b. Cleanroom Certification

- For cleanroom environments, schedule periodic audits and recertification to ensure compliance with cleanliness standards.

9. Employee Training and Awareness

a. Cleanliness Training

- Provide ongoing training to employees on housekeeping protocols, focusing on the importance of cleanliness in maintaining product quality and safety.
- Encourage employees to report cleanliness issues and continuously monitor for any deviations from established protocols.

b. Safety Compliance

- Regularly review and update cleaning and housekeeping protocols to ensure they comply with safety regulations and best practices.

A rigorous housekeeping and cleanliness protocol is essential in the company to ensure product integrity, safety, and overall operational efficiency. By maintaining a clean and organized work environment, the company can reduce contamination risks, protect sensitive equipment, and foster a culture of safety and quality

Chapter IV

Accident Prevention Program

Preventing accidents in a manufacturing organization involves implementing comprehensive safety protocols that focus on proactive measures, training, monitoring, and response. Here's a structured approach:

1. Risk Assessment and Hazard Identification

- **Conduct a Comprehensive Risk Assessment**: Identify potential hazards associated with machinery, chemicals, ergonomics, and processes.
- **Hazard Analysis**: Use methods like Failure Mode and Effects Analysis (FMEA) or Hazard and Operability Study (HAZOP) to analyse risks and prioritize areas for safety improvements.
- **Safety Inspections**: Regularly schedule and document safety inspections to ensure compliance with safety standards.

2. Engineering Controls

- **Install Safeguards**: Use guards, barriers, and automated shutdown systems to prevent workers from coming into contact with moving parts or hazardous areas.
- **Machine Safety**: Ensure all machinery complies with safety regulations (e.g., ISO, OSHA). Equip machinery with emergency stop buttons and interlocks.
- **Ventilation and Dust Control**: Install ventilation systems to control the release of toxic fumes, dust, or airborne contaminants.

3. Administrative Controls

- **Develop SOPs (Standard Operating Procedures)**: Write and enforce SOPs for tasks, especially for high-risk operations.
- **Safety Signage**: Place clear signage for hazardous areas, emergency exits, and first-aid kits.
- **Lockout/Tagout (LOTO)**: Implement procedures to isolate energy sources and prevent unexpected equipment startup during maintenance.
- **Regular Safety Audits and Drills**: Conduct audits and emergency drills to ensure workers know protocols for fire, chemical spills, and other incidents.

4. Personal Protective Equipment (PPE)

- **Identify PPE Needs**: Provide appropriate PPE like helmets, gloves, goggles, hearing protection, or respirators depending on the task.
- **PPE Training**: Train employees on correct usage, storage, and maintenance of PPE.

5. Employee Training and Engagement

- **On boarding and Regular Training**: Ensure all new employees complete a comprehensive safety orientation. Offer ongoing training on machine use, emergency response, and safety protocols.

- **Behavioral Safety Programs**: Encourage a culture of safety by promoting safe behavior, reporting hazards, and rewarding safety compliance.
- **Ergonomic Training**: Educate workers on proper posture, lifting techniques, and ergonomic adjustments to reduce strain and injury.

6. Incident Reporting and Analysis

- **Establish Incident Reporting Mechanism**: Make it easy for workers to report near-misses, hazards, and accidents.
- **Root Cause Analysis (RCA)**: After an incident, perform RCA to identify and correct underlying issues, preventing recurrence.
- **Continuous Improvement**: Use safety data to improve protocols and ensure continuous updates based on new risks or incidents.

7. Compliance and Audits

- **Regular Compliance Audits**: Ensure adherence to the following safety regulations
    - Kerala Factories (Accident hazard control) Rule 2003/Electricity Act, 2003
    - Occupational Safety, health and working condition code 2019

- **Documentation and Record-Keeping**: Keep detailed records of training, incidents, inspections, and corrective actions.

9. Management and Leadership Involvement

- **Safety Leadership**: Foster management support for safety programs. Leaders should actively participate in safety meetings, training, and audits.
- **Set Safety Goals**: Define measurable safety performance metrics (e.g., reduction in incident rates) and track progress.

10. Use of Technology for Safety Monitoring

- **Sensors and IoT**: Integrate real-time monitoring systems for equipment and hazardous zones.
- **Predictive Maintenance**: Schedule maintenance before equipment failure to prevent accidents caused by faulty machinery.
- Video Surveillance may be installed in critical areas.

These protocols, when integrated into daily operations and supported by strong management commitment, can help prevent accidents and create a safer manufacturing environment.

Chapter V

Environmental Protection

In any organization, protecting the environment is crucial for sustainability, regulatory compliance, and minimizing the environmental impact of manufacturing activities. Below are the key procedures to be followed:

1. Waste Management

- **E-Waste Disposal**: Implement proper disposal methods for electronic waste (e-waste) such as defective products, obsolete components, and electronic scrap. Use certified e-waste recycling services to ensure responsible disposal and recycling.
- **Hazardous Waste Disposal**: Manage hazardous waste, including chemicals, solvents, and batteries, in compliance with environmental regulations. Segregate hazardous materials and follow proper labelling, storage, and transportation protocols.
- **Waste Reduction**: Minimize waste generation by adopting lean manufacturing practices, recycling materials, and reusing components where possible. Encourage practices like 5S to reduce material usage and wastage.

2. Energy Efficiency

- **Energy-Efficient Equipment**: Use energy-efficient machines and equipment with high energy star ratings. Upgrade to modern, energy-saving technologies, such as LED lighting and energy-efficient HVAC systems.
- **Regular Maintenance**: Ensure that all equipment is maintained regularly to operate efficiently, reducing unnecessary energy consumption.
- **Energy Monitoring**: Install energy monitoring systems to track and optimize energy usage in real-time, identifying areas where energy consumption can be reduced.
- **Switch off** Lights, Fans, Air Conditioners when not in use.

3. Water Conservation

- **Water Recycling Systems**: Implement systems to recycle water used in manufacturing processes such as cooling, cleaning, or rinsing. Use closed-loop water systems wherever feasible.
- **Water-Saving Devices**: Install water-efficient fixtures in restrooms and facility areas. Regularly check for leaks and repair faulty plumbing to avoid water wastage.
- **Monitoring and Management**: Track water usage and implement strategies to reduce consumption, such as water reuse in non-critical processes.

4. Chemical and Hazardous Material Handling

- **Proper Chemical Storage**: Store chemicals safely in designated areas, using appropriate containment methods to prevent leaks and spills. Ensure storage areas are equipped with spill kits.
- **Spill Prevention and Response**: Implement a comprehensive spill response plan, including training employees to handle spills promptly and safely. Use secondary containment systems for liquid chemicals to prevent contamination.

- **Use of Environmentally Friendly Substances**: Where possible, substitute hazardous chemicals with eco-friendly alternatives. Use lead-free soldering processes and environmentally benign cleaning agents.
-

5. Air Quality Control

- **Fume Extraction Systems**: Install fume extraction systems in areas where soldering, coating, or chemical use generates harmful fumes or gases. Ensure proper ventilation in manufacturing and assembly areas to maintain air quality.
- **Emission Controls**: Implement air pollution control technologies, such as scrubbers and filters, to reduce emissions of volatile organic compounds (VOCs) and particulate matter into the atmosphere.
- **Greenhouse Gas Reduction**: Minimize greenhouse gas emissions by optimizing energy consumption, reducing reliance on fossil fuels, and incorporating renewable energy sources where feasible (e.g., solar panels).

6. Sustainable Product Design

- **Eco-Friendly Materials**: Use environmentally friendly materials in product design, such as recyclable plastics, non-toxic components, and biodegradable packaging materials.
- **Design for Disassembly**: Create products that are easy to disassemble for repair, reuse, or recycling, minimizing waste at the product's end of life.
- **Energy-Efficient Products**: Design energy-efficient electronics that consume less power during operation, contributing to a reduction in the environmental impact of product use.

7. Sustainable Supply Chain

- **Supplier Assessment**: Evaluate and select suppliers based on their environmental policies and sustainability practices. Partner with suppliers that adhere to environmental regulations and sustainability goals.
- **Responsible Sourcing**: Ensure that raw materials, particularly those with high environmental impact (e.g., rare earth metals), are sourced responsibly and sustainably.
- **Transportation Optimization**: Minimize the environmental impact of transportation by consolidating shipments, using energy-efficient vehicles, and choosing suppliers located close to manufacturing facilities.

8. Employee Training and Awareness

- **Environmental Training Programs**: Conduct regular training for employees on environmental protection practices, including waste segregation, energy conservation, and proper chemical handling.
- **Encourage Sustainable Practices**: Promote environmentally friendly habits among employees, such as minimizing paper use, turning off equipment when not in use, and participating in recycling programs.
- **Green Initiatives**: Foster a culture of sustainability by engaging employees in environmental initiatives such as tree planting, energy-saving competitions, or green certifications.

9. Regulatory Compliance and Certification

- **Adherence to Environmental Laws**: Ensure compliance with national and international environmental regulations, such as the Restriction of Hazardous Substances (RoHS) Directive, Waste Electrical and Electronic Equipment (WEEE) Directive, and local environmental protection laws.
- **Environmental Certifications**: Obtain environmental certifications like ISO 14001 (Environmental Management System) to demonstrate the organization's commitment to sustainability and environmental responsibility.
- **Environmental Audits**: Conduct regular environmental audits to identify areas for improvement, ensure compliance with regulations, and enhance overall environmental performance.

10. Sustainable Packaging

- **Reduce Packaging Waste**: Use minimal, sustainable packaging materials that are biodegradable or recyclable. Eliminate unnecessary packaging layers and opt for reusable or compostable materials.
- **Recyclable Packaging**: Ensure that packaging materials can be easily recycled by end users. Label packaging with clear recycling instructions.
- **Packaging Redesign**: Redesign packaging to reduce weight and volume, thereby minimizing transportation-related carbon emissions.

11. Product End-of-Life Management

This procedure need to be followed in specific situation where in the supplied product need to be taken back after its end of life for recycling or disposal to prevent environmental protection. This applicable to products like batteries.

- **Take-Back Programs**: Implement product take-back and recycling programs that allow customers to return used or obsolete products for proper disposal or recycling.
- **Extended Producer Responsibility (EPR)**: Commit to EPR initiatives by taking responsibility for the entire lifecycle of products, including post-consumer waste management.
- **Product Refurbishment and Reuse**: Encourage product refurbishment and the reuse of components to extend the lifespan of electronic products and reduce environmental impact.

By following these environmental protection procedures, any manufacturing organization can significantly reduce its environmental footprint, enhance sustainability, and comply with regulatory requirements. These measures contribute to the long-term success of the organization while protecting the planet for future generations.

Chapter VI

Safety Audit

Conducting safety audits in the company is essential for ensuring a safe working environment, identifying hazards, and complying with safety regulations. Below are the guidelines for conducting effective safety audits in such a facility:

1. Planning the Audit:

- **Define the scope**: Identify the areas, processes, and systems that will be audited. This includes production lines, testing areas, storage facilities, and employee workstations.
- **Create an audit team**: Form a team of auditors who are knowledgeable in safety standards, industry regulations, and internal policies. Include individuals from different departments (safety officers, engineers, and supervisors) to provide a comprehensive evaluation.
- **Review relevant documentation**: Gather and review safety policies, training records, maintenance logs, incident reports, and previous audit results to understand the current safety status and compliance.
- **Develop a checklist**: Create a detailed checklist based on the following parameters
    - Leadership commitment
    - Workers participation
    - Hazard identification
    - Risk Assessment
    - Legal & Regulatory compliance
    - Emergency Planning
    - Incident investigation and continuous improvement

  The audit report may be prepared based on the above parameters and applicable regulations and local workplace safety laws, and the specific needs of the manufacturing industry. Include areas like equipment safety, electrical safety, chemical handling, ergonomics, and emergency procedures.

2. Audit Focus Areas:

a. Workplace Safety:

- **Electrical safety**: Inspect for compliance with electrical safety standards. Ensure that machines and equipment are properly grounded, cords are undamaged, and electrical panels are accessible.
- **Machine guarding**: Check that machines have proper guards to protect workers from moving parts, sharp edges, and high-voltage areas.
- **Personal protective equipment (PPE)**: Ensure employees are provided with and are using appropriate PPE (e.g., anti-static wrist straps, safety glasses, gloves, etc.). Verify that PPE is properly maintained.
- **Ergonomics**: Evaluate workstations for ergonomic design to prevent repetitive strain injuries. Ensure that employees have proper seating, adjustable monitors, and keyboard placement to minimize physical strain.

b. Hazardous Material Handling:

- **Chemical safety**: Review how chemicals (such as solvents, flux, and cleaning agents) are stored, labelled, and handled. Ensure that Material Safety Data Sheets (MSDS) are available, and employees are trained in the proper use of chemicals.
- **ESD (Electrostatic Discharge) protection**: Check that appropriate ESD control measures are in place, such as anti-static mats, grounding wrist straps, and ionizers. Confirm that employees are trained to handle static-sensitive components.
- **Waste disposal**: Ensure that hazardous electronic waste (e-waste), chemicals, and materials are disposed of according to local environmental regulations. Verify the use of approved disposal methods for batteries, circuit boards, and other electronic materials.

c. Fire Safety and Emergency Preparedness:

- **Fire safety equipment**: Ensure that fire extinguishers, sprinklers, and fire alarms are installed, maintained, and accessible. Conduct regular inspections of fire exits and emergency lighting.
- **Evacuation plans**: Review the company's emergency evacuation plans, ensuring that they are clearly posted and employees are trained in emergency procedures.
- **Emergency drills**: Verify that fire and emergency evacuation drills are conducted regularly and that employees know their roles in case of an emergency.

d. Electrical and Machinery Safety:

- **Lockout/Tagout (LOTO) procedures**: Ensure proper LOTO procedures are in place for machinery maintenance. Verify that employees are trained to de-energize and isolate machines during repair or service.
- **Equipment maintenance**: Review the maintenance records of manufacturing equipment to ensure regular servicing and timely repairs to avoid malfunctions or unsafe operation.
- **Portable equipment**: Inspect portable tools and equipment for proper functioning, wear and tear, and safe use practices.

3. Documentation and Compliance:

- o **Regulatory compliance**: Verify that the facility complies with the following standards and environmental laws.
  - Kerala Factories (Accident hazard control) Rule 2003/Electricity Act, 2003
  - Occupational Safety, health and working condition code

- all relevant local, national, and international safety regulations, including ISO standards, and environmental laws.
- **Training and certification**: Ensure that employees are properly trained and certified in safety procedures, equipment handling, hazardous material management, and emergency response.
- **Safety data sheets (SDS)**: Ensure that SDS for all chemicals and hazardous substances are up to date and readily available to workers in applicable areas.

4. Employee Well-being:

- **Noise levels**: Measure noise levels in the workplace and ensure they are within acceptable limits. Provide hearing protection for employees in noisy areas.
- **Air quality and ventilation**: Check for proper ventilation systems, especially in areas where soldering, chemical processes, or other hazardous fumes are generated. Ensure air quality is monitored and air purification systems are in place.
- **Temperature and lighting**: Assess the facility for adequate lighting and temperature control, especially in areas where precision work is conducted.

5. Incident Reporting and Response:

- **Incident records**: Review records of any workplace incidents, accidents, or near-misses. Ensure that appropriate corrective actions were taken and that the root causes were addressed.
- **First aid**: Verify the availability of first aid kits and medical assistance, and ensure employees are trained in basic first aid procedures.

6. Review and Recommendations:

- **Document findings**: After the audit, compile detailed documentation of the findings, including any non-compliance or safety hazards identified during the audit.
- **Risk assessment**: Conduct a risk assessment to prioritize hazards and determine the likelihood and potential severity of incidents occurring.
- **Corrective actions**: Provide recommendations for addressing the issues found during the audit. Include short-term fixes as well as long-term safety improvements.
- **Follow-up**: Schedule follow-up audits to ensure that corrective actions have been implemented and to review improvements. Continuous monitoring and regular audits are essential for maintaining safety standards.

7. Continuous Improvement:

- **Safety culture**: Foster a safety-conscious culture by encouraging employees to report unsafe conditions, suggest improvements, and actively participate in safety initiatives.
- **Audit frequency**: Perform safety audits regularly (quarterly, annually, or as needed based on risk levels) to keep safety protocols up to date and ensure ongoing compliance with safety standards.

By adhering to these guidelines, the company can significantly reduce risks, ensure compliance with safety regulations, and promote a safe working environment for all employees.

Emergency Preparedness Plan/ Procedures

1   INTRODUCTION

This On-Site emergency plan has been prepared with a view to bring rational improvement in the matter of Safety and Environment and to avoid damages due to various types of emergencies like Fire, Chemical spillages, Explosions, Electric shock etc.

2.   SCOPE

This plan covers whole factory as per the approved (licensed) factory plan for the emergencies arise during the manufacturing process as specified under clause 2.2. This does not cover natural disasters or sabotage activities. The plan is applicable to all employees of the factory as well to the contract labourers working inside the factory.

3.   OBJECTIVE

The objective of this plan/document is

- To locate the emergency and if possible eliminate it.

- To minimize the impacts of aspects and accidents on people, property and environment.

4.   EMERGENCY: Definition

An emergency is the occurrence of event which has the potential to cause serious injury or loss of life or damage to property in the factory or to the environment. (Factory means each unit/SBU/KMOs/Corporate Office)

4.1   Types of emergencies:

In the factory the emergency may manifest itself in the following seven basic forms.

2.1.1   Fire

2.1.2   Explosion

2.1.3   Spillage of Chemicals

2.1.4   Electric Shock

2.1.5   Accident during machine operation

2.1.6   Snake Bite

2.1.7   Falling from Height

2.1.8   Refrigerant leakage

5. REFERENCES

5.1   Environmental Management System – ISO 14001

5.2   Safety standards (Material Safety data sheets) issued by the respective suppliers of equipment's/ chemicals etc.

5.3   Electrical safety standards

6. PLANT RISK EVALUATION

6.1   **Identification List:** The following situations and their locations have been identified as the possible areas of creating emergency conditions. (*To be identified by units*)

Sl. No.	Emergency Situation	Location
1	Fire	1. Production Centre 1 2. Production Centre 2 3. Supercapacitor Production Facility
2	Explosion	
3	Chemical Spillage	1. Etching and Forming Section 2. Impregnation Section
4	Electric shock	1. Production Centre-1&2
5	Accident during machine operation	1. Production Centre-1&2
6	Snake Bite	1. In yard and company compound

7	Falling from Height	
8	Refrigerant leakage	1. Condenser Unit

6.2   **List of Hazardous materials:** The list of hazardous materials that are used in the company are given in Annexure – 1

6.3   **Material safety Data sheets:** These data sheets contain the following information. The material safety data sheets are given in Annexure 2

- Physical and Chemical property
- Fire Hazards
- First Aid Procedure
- Storage and Handling Procedure
- Disposal Procedure

7.   EMERGENCY OPERATION

a.   **Key Coordinators**

Name, Designation and other information regarding key persons who shall work as Coordinators and alternative Coordinators during emergency are given in Annexure –3

b.   **Duties and Responsibilities**

Duties and responsibilities of key Coordinators will be as follows:

- **Chief Emergency Coordinator**

  The Factory Manager/Designated officer will work as the Chief emergency Coordinator and will take over the command with the following duties and responsibilities.

  1. To assess the magnitude of the situation and decide if the staff needs to be Evacuated.

  2. To direct other operational areas for the possibility of the risk involved.

  3. To assign responsibilities to different Coordinators

  4. To inform higher authorities of the Organization about emergency and seek the help of State/Central Govt. authorities, if required.

  5. To give technical and management advice to other Coordinators to deal with the Situation.

  6. To maintain updated information of Local, District, State and other statutory bodies whose services are likely to be required in case of emergency.

- **Emergency Coordinator**

  On hearing/receiving emergency signal/messages he shall proceed to the emergency site and perform the following duties.

  1. To ensure that the personnel from Electrical maintenance Dept. and other concerned personnel are available for assisting in the emergency operations like switching off A/C etc.

  2. Direct the electrical Plant for shutting down the power supply to the affected area and   providing additional power points if required.

  3. To direct the transport in charge to make the vehicles available for use by different Coordinators and also arrange for ambulances, if required.

- **Fire Fighting Coordinator**

  On hearing/receiving emergency signal/messages he shall proceed to the emergency site and perform the following duties.

  1. Give necessary instructions to the crew members for effective control of the fire.

  2. Contact the outside agencies if necessary, to help in controlling the fire.

  3. Inform Safety Coordinator, and Chief Emergency Coordinator about the emergency situation Supervise the control and rescue operations

- **Safety Coordinator**

  1. On hearing the information of emergency, he will reach immediately to the emergency site and coordinate safety of personnel, in consultation with the Fire fighting, Electrical Plant and Medical Coordinators.

  2. Arrange personal protective equipment required to control the emergency.

  3. Seek help from the process Coordinators regarding the process and material involved in the emergency.

  4. Ensure that the danger is completely eliminated before giving the clear siren.

- **Security Coordinator**

  On hearing emergency, he will immediately reach the site and perform the following duties:

  1. Instruct all the security personnel to help in maintaining law and order.

  2. Ensure that systematic and effective efforts are launched so that no "free for all" situation chaos or panic is created.

  3. To ensure evacuations and assemble at safe assembling points, if necessary.

  4. Close all visitor entry points and allow only the authorized persons to enter in the factory with their vehicles.

  5. Send out contractors, workers, casual laborers and all those employees who are not involved in emergency operations.

6. Cordon off the area of accident till clearance by the Chief Emergency Coordinator.

- **Medical Coordinator**

    1. On getting information of emergency, he will coordinate with HR department to extend required medical facility from external sources.

    2. He will inform the authorities of external Hospital for treatment of serious case.

    3. He will arrange hospitalization of the injured persons.

    4. He will communicate with Emergency Coordinator for requirement of vehicles.

  a. **Public Relation Coordinator**

    1. He will assist in evacuating of personnel, if necessary.

    2. He will keep himself abreast of the latest situation from Chief Emergency Coordinator.

    2. He will entertain media people, Govt. officials and other external agencies and provide them the required information.

Emergency Response Plan

8.   EMERGENCY SITUATION: FIRE

8.1   MASS COMMUNICATION

  a. **Fire Alarm Management**

Fire Alarm arrangement for the plant shall consist of Automatic Fire Alarm, shouting by individuals, Telephone and Plant Siren. The fire alarm shall be conveyed to the Fire Control Room or Central security office through **Telephone.** There shall be display boards in different parts of the plant indicating **"In case of Fire/Emergency Dial".**

The plant siren shall be used to raise general fire alarm in case of very serious fire. Fire alarm shall be given by repeated long and short blast for a continuous period of 3 minutes. 'All clear' indication shall be by blowing the siren at steady pitch, continually for one minute.

  b. **Information System in case of emergency**

Information may be passed on to officers/ officials depending on the emergency.

ACTION DURING EMERGENCIES

8.1.1 BY THE PERSON NOTICING THE FIRE

Any person noticing the fire shall

a) Attempt to put it put out the fire by using First Aid Firefighting equipment's available nearby.

b) Simultaneously start shouting FIRE…, FIRE…, THEE…, THEE…
till the assistance arrives.

c) Inform the fire station by the quickest means available.

8.1.2 BY THE PERSONS ARRIVING NEXT TO THE SCENE OF FIRE

d) All persons on hearing the sound FIRE…, FIRE
will immediately rush to the scene of fire.

e) They shall assist in rescue and fire fighting by the use of extinguishers available nearby.

f) They shall intimate the fire station, if not done.

g) They shall guide the fire tender to the correct location.

8.1.3 BY THE IN-CHARGE OF SHOP/AREA AFFECTED BY FIRE

Immediately on receiving information about the outbreak of a fire, he shall rush to the scene of fire and take action as follows:

a) Assume charge of the rescue and fire fighting operations

b) Ensure that all personnel trained in fire fighting proceed to the scene of fire and engage in extinguishing/controlling the fire.

c) Ensure that the fire does not spread.

d) Ensure that the fire brigade has been informed.

e) Depute a person to guide the fire service.

f) Apprise the fire staff about the technical aspects and any special risk and hazards about the material involved.

g) Coordinate the working of the fire wing and plant staff to achieve the best results.

h) Ensure that a responsible person mans the nearest telephone and messengers are available to transmit messages

i) Keep the senior most officers informed about the situation hand over the charge of fire fighting operations to superior officer as soon as he arrives and keep assisting him.

j) It is necessary to keep the evidences and proofs to find out the cause of fire. The section heads are responsible to see that such evidences are not removed/disturbed/erased.

8.1.4 BY IN-CHARGE OF THE MANUFACTURING /AREAS NOT INVOLVED IN FIRE

Immediately on receiving information about the outbreak of a fire, he shall act as follows:

a) Relieve all personnel who are trained in fire fighting and instruct them to proceed to the scene of fire to render assistance as required.

b) Remain alert to check that there is no chance of the fire spreading to his area. If there is any such danger, he shall immediately inform the fire brigade and other authorities.

c) Ensure that his staff, other than those detailed to assist in fire fighting, do not leave the section and crowd at the affected area.

d) Rest of the work shall go on uninterrupted.

8.1.5 BY OFFICER IN-CHARGE OF FIRE FIGHTING OPERATIONS

a) The senior most Officer present at the scene of fire will be the officer in-charge for fire fighting operations, irrespective of his normal controlling jurisdiction. Immediately after arrival, he will assume control, assess the situation, and take action to control and extinguish the fire as expeditiously as possible. He will check that all

necessary action has been taken by in-charge, shop/area. He shall summon further assistance from the neighboring industrial and civil fire brigades, if required.

8.1.6 BY SHIFT IN-CHARGE, SECURITY CONTROL ROOM

Immediately on receipt of information regarding the outbreak of fire, he shall act as follows:

b) Inform the Safety officer/Security officer/Welfare officer.

c) Alert all guards to be more vigilant and ensure protection of the plant, stores etc.

d) Send one guard to the pump room for starting the fire pumps.

e) Mobilize maximum number of security personnel, arrange for immediate cordoning of the affected area and ensure strict control over the movement of Plant personnel and material from the affected area.

f) Keep the gates and approach roads clear to allow Fire tenders and other essential services for immediate entry.

g) Inform or transmit messages of assistance to the State Fire Control when such assistance is called for from the fire ground.

h) Guide the assisting fire brigade and ambulance to the scene of fire without delay.

i) Detail personnel to maintain traffic control at the affected areas at the instance of Officer in-charge of fire fighting operations.

j) Inform Unit Head, Medical Officer, Electrical Department and other officers, if required.

k) Inform Duty Officer, Transport department.

l) Attend all telephone calls and take action as directed by the Officer in-charge of operations.

m) Alert the off-duty staff and arrange for their arrival to the factory, if required for manning of extra appliances.

n) Keep contact with the fire wing and inform the latest position from time to time.

o) Keep proper and exact records of all movements through the gate and any messages received or passed.

p) Keep the gate telephone free and properly attended for receipt and transmission of urgent message.

8.1.7 BY THE SECURITY OFFICER

Immediately on getting the information about outbreak of any fire, he shall rush to the scene of fire and act as follows:

a) Assess the situation and take charge of fire fighting operation from the fire crew.

b) Assist the fire crew in rescue and fire fighting operation, advising him correctly of the implications of various actions.

c) Arrange for extra fire crew, fire appliances, water supply and other major fire fighting equipment.

d) He may call for assistance from outside agencies, if necessary.

e) Coordinate the working of the Plant Fire Service and assist Fire brigade.

f) Take suitable measures to ensure the safety of all personnel engaged in Fire fighting.

g) He shall ensure that proper information is given from time to time to Senior Executive/Factory Manager.

8.1.8 BY DUTY OFFICER, IN CHARGE OF VEHICLE

On receipt of information regarding outbreak of fire he shall act as follows:

a) Ensure that no buses, cars or other vehicles are blocking the passage of fire tenders or standing in the vicinity of scene of the fire thus hindering fire fighting operations.

b) Immediate arrangements are to be made to remove vehicles containing flammable materials to a safe distance from the vicinity of fire.

c) Keep ready maximum number of drivers and transport for movement of fire crew, fire appliances and accessories and evacuation of casualties.

d) Direct the vehicles to the scene of fire or any other location, when called for.

e) He will keep the van or ambulance with driver, First Aid kit (if possible Oxygen cylinder also) to meet any eventuality.

8.1.9 BY STAFF OF ELECTRICAL PLANT In CHARGE

On receipt of information regarding outbreak of fire he shall act as follows:

a) Ensure that electric connection to the fire hydrant pumps and other water pumps are kept "ON" uninterrupted.

b) Switch off electrical circuits to the affected areas on receipt of information to this effect from the Fire control room.

c) Arrange for alternative lighting arrangements to the affected area, if required.

d) Keep alert and be ready to obey any instructions by the Officer-In charge of Firefighting operation

e) Inform officer in-charge, Plant.

8.1.10 ACTIONS AFTER THE FIRE IS EXINGUISHED

a) Officer in charge, fire fighting operation, after ensuring that the fire is completely extinguished and there are no chances of re-ignition, shall order the "ALL CLEAR" signal to be founded on the Electric siren in consultation with the Security Officer.

b) On hearing "ALL CLEAR" signal, personnel other than the fire staff and fire fighting party of the shop/Plant concerned shall return to their place of duty and resume work.

c) Fire fighting party of the shop/plant concerned, assisted by other staff, if required, shall return all first Aid fire fighting appliances to their exact locations. They may also assist in salvage work if so requires.

d) Fire personnel shall check all their appliances/equipments for damages/ deficiency. All equipment shall be thoroughly cleaned/ replenished on the appliance before returning to the fire station. At the fire station, immediate action shall be taken to replenish petrol, water etc. and make the appliances fit in all respects for next use. Arrangement shall also be made to refill the extinguishers discharged.

e) Security staff shall continue guarding the area till recoverable articles are kept in safe custody in stores, plants etc.

f) All fires shall be thoroughly investigated and fire reports prepared and submitted to the authorities as early as possible. Smaller fire may be investigated by the Safety Officer assisted by the operational staff but all major fires shall be investigated by a Board of Officers. The Unit Head will detail the Board where the fire is of a serious nature involving loss of life and/or property. The enquiring Board shall include a technical expert of fire as far as possible. In case of major and serious fires there shall be least movements of debris and other materials involved in fire till the Board has assessed the situation and has given clearance for their removal.

9.   **EMERGENCY SITUATION: EXPLOSION**

All actions will be as per those mentioned for the situation of Fire at clause 8.1

10.   **EMERGENCY SITUATION: CHEMICAL SPILLAGE**

10.1   **BY SECTION IN-CHARGE**

Section in-charge where the chemical spillage has taken place will act as follows:

a)   Remove all unwanted persons from the scene.

b)   Prevent spillage from entering drains/waterways.

c)   Contain spills with the help of sand, earth or saw dust.

d)   Collect recoverable material into labelled containers for recycling.

e)   Absorb remaining material with sand, earth or saw dust and place in separate labelled container for disposal.

f)   For major spillage, inform fire control room and Safety officer.

10.2   **BY THE OFFICER IN-CHARGE OF SAFETY**

On getting information about chemical spillage, the Officer in-charge of safety will rush into the scene and act as follows:

a)   Help the Section in-charge in containing the spillage.

b)   Provide appropriate personnel protective equipments to avoid contact.

11.   **EMERGENCY SITUATION: ELECTRICAL SHOCK**

11.1   **BY THE PERSON WHO NOTICES THE INCIDENT**

a)   Make the equipment dead by opening the switch and release the victim. If this is not possible and the victim is in contact with live parts of 230 volts or 400 volts, stand on a rubber mat or dry wooden chair while removing the victim otherwise pull him free by using a dry cloth, dry rope, or any other dry non-conducting board or stick.

b)   If the victim is aloft, measures must be taken to prevent him from falling or to make him fall safe.

c)   Do not touch victim with bare hands until the circuit is made dead or he is moved away from the equipment.

d)   Tight clothing which may interfere with the victims breathing must be loosened, all foreign matters such as false teeth, tobacco pan, etc., should be removed from his mouth and the mouth opened. DO NOT delay artificial respiration for loosening the clothes or even if the mouth is closed tightly. Delay even by a few seconds may be dangerous. DISPLAYED METHODS OF ARTIFICIAL RESPIRATION IN WORKPLACES.

e)   Avoid violent operations to prevent injury to internal organs.

  f) He shall inform the fire station, Medical Center, Plant HOD, senior officers, etc., by the quickest means available i.e., by telephone.

12. EMERGENCY SITUATION: ACCIDENT DURING MACHINE OPERATION

12.1 ACTIONS BY A COLLEAGUE

  a) Immediately switch off the concerned machine

  b) Help the victim to isolate the affected part of the body away from the machine

  c) Give artificial respiration, if required.

  d) Arrange the required first aid to the victim

  e) Inform the Supervisor, Sectional Head and Head of the Department

12.2 ACTIONS BY SUPERVISOR/ SECTIONAL HEAD/HEAD OF DEPARTMENT

  a) Make arrangement to shift the victim to the nearest hospital

  b) Take further necessary action in consultation with the Doctor

  c) Investigate the reasons for the accident and take corrective actions to prevent reoccurrence of the problem

13. EMERGENCY SITUATION: SNAKE BITE

13.1 ACTIONS BY THE PERSON NOTICING THE INCIDENT

  a) Advice the victim to take rest and not to take any body movement

  b) To tie with kerchief / towel / other means, near the wound (between heart and the wound). DO NOT TIE SO TIGHTLY.

  c) Do not cover or tie on the wound.

  d) Transport to a Medical Facility

- **Arrange Immediate Transport**: Get the victim to a medical facility that can handle snake bites as quickly as possible.
- **Provide Information**: Share all known details with medical personnel, including the time of the bite, any first aid steps, and a description of the snake if available

14. EMERGENCY SITUATION: FALLING FROM HEIGHT

In the event of a fall from height inside factory premises, immediate and structured action is essential for the victim's safety. Here are the recommended procedures to handle such incidents effectively:

1. Immediate Response

- **Ensure Scene Safety**: Before approaching the victim, ensure there are no additional hazards (e.g., unstable platforms, electrical risks) that could put rescuers at risk.

- **Call for Help**: Immediately notify the on-site medical team and emergency responders. Alert supervisors and the factory's emergency response team.
- **Do Not Move the Victim**: Avoid moving the individual unless absolutely necessary (e.g., if the area is unsafe). Moving someone with a potential head, neck, or spinal injury can worsen the damage.

2. Initial Assessment and First Aid

- **Check Responsiveness**: Assess the victim's level of consciousness by gently speaking to them. If unresponsive, immediately proceed to check for breathing.
- **Check Breathing and Circulation**: If the person is not breathing or lacks a pulse, trained personnel should begin CPR while awaiting emergency responders.
- **Stabilize Head and Neck**: If there's any suspicion of a head or neck injury, stabilize the head and neck to prevent further spinal injury. Use hands or an improvised brace if necessary, but avoid moving the spine.

3. First Aid for Visible Injuries

- **Control Bleeding**: If there are any visible bleeding wounds, apply gentle pressure with a clean cloth or bandage to control bleeding. Do not apply excessive force.
- **Immobilize Fractures**: If a limb appears broken, immobilize it using splints if trained personnel are available. Avoid repositioning the limb.
- **Monitor Vital Signs**: Continuously monitor breathing, heart rate, and level of consciousness until medical personnel arrive.

4. Transportation to a Medical Facility

- **Prepare for Safe Transport**: If the victim requires transport and emergency responders have arrived, ensure proper equipment, such as a spine board or stretcher, is used to prevent further injury.
- **Provide Information to Medical Staff**: Share details of the fall, the height from which they fell, any visible injuries, and first aid provided. This information can be vital for further treatment.

5.   Preventive Measures and Training

Review and Update Safety Protocols: Based on the incident, assess and improve safety protocols to prevent future falls. This might include better harnesses, guardrails, or safety training.

Conduct Regular Safety Training: Ensure all employees are trained on fall prevention, safe working practices at heights, and proper equipment use.

Frequent Inspections and Drills: Conduct periodic safety drills and inspections of fall protection equipment to ensure everything is in proper working order.

15.   EMERGENCY SITUATION: REFRIGERANT LEAKAGE

15.1   BY THE OPERATOR ON DUTY

The operator on duty where the refrigerant leakage has taken place will act as follows:

Switch off the Centralized AC plan

Prevent leakage by closing the valves if any.

Inform the section in charge.

15.2   BY SECTION IN-CHARGE

Section in-charge where the refrigerant leakage has taken place will act as follows:

a)   Remove all unwanted persons from the scene.

b)   Identify the leakage spot.

c)   Prevent leakage by closing the valves if any.

d)   If the leakage is in the LP side start the plant and pump down the refrigerant to the condenser.

e)   Inform the HOD and Safety Officer.

15.3   BY THE OFFICER IN-CHARGE OF SAFETY

On getting information about refrigerant leakage, the Officer in-charge of safety will rush into the scene and act as follows:

f)   Help the Section in-charge in arresting the leakage.

g)   Control unwanted persons coming to the scene.

h)   Provide appropriate personnel protective equipments to avoid inhaling the gas.

i)   Inform immediately to Fire Station, Senior Officials etc.

16.   EVACUATION PROCEDURE

An effective evacuation procedure is an essential part of an organization's emergency preparedness plan. Below is a step-by-step procedure that company can adopt to ensure a safe and efficient evacuation during an emergency

16.1   Establish Clear Roles and Responsibilities

- **Emergency Response Team (ERT)**: Form a team responsible for overseeing evacuation, guiding employees, and communicating updates.
- **Evacuation Wardens**: Appoint wardens for each department or area. They will lead and monitor the evacuation process, ensuring everyone is accounted for.

- **First Aid Responders**: Identify trained first aid personnel to assist injured individuals and provide medical support if needed.

16.2   Define Evacuation Routes and Exits

- **Primary and Secondary Routes**: Establish clear primary and secondary evacuation routes. Make sure these routes are free from obstacles and well-marked with visible signage.
- **Exit Points**: Ensure all emergency exits are accessible, unblocked, and clearly marked. Exit doors should be easily openable in an emergency.
- **Assembly Points**: Designate assembly points at a safe distance from the building. Multiple points may be needed for larger organizations.

16.3   Install Evacuation Maps and Signage

- Post evacuation maps at key locations throughout the building, such as stairwells, break rooms, and hallways.
- Clearly mark all emergency exits, routes, fire extinguishers, and first aid kits.

16.4   Create an Evacuation Alarm System

- **Alarm Activation**: Install a reliable alarm system to notify everyone in the building when an evacuation is necessary.
- **Alert Types**: Use both audible (sirens, alarms) and visual alerts (flashing lights) to cater to all employees, including those with hearing impairments.
- **Intercom Announcements**: If possible, supplement alarms with verbal announcements providing specific evacuation instructions.

16.5   Implement an Evacuation Procedure

1. **Alarm Sounds**: Once the alarm is activated, all employees should immediately stop their work, secure any sensitive information, and prepare to evacuate.
2. **Follow Designated Routes**: Employees should leave through the designated evacuation routes and avoid using elevators.
3. **Assisting Those with Disabilities**: Trained personnel should assist individuals with disabilities to ensure their safe evacuation. Some may require specialized assistance, such as the use of evacuation chairs.
4. **Close Doors**: As employees exit, they should close doors behind them to contain the spread of fire or smoke.
5. **Proceed to Assembly Points**: Employees should go directly to the designated assembly point and wait for further instructions.

16.6   Conduct a Roll Call

- **Attendance**: Each department's warden or supervisor should take a roll call at the assembly point to ensure everyone has evacuated safely.
- **Report Missing Persons**: If someone is missing, immediately report this information to the Emergency Response Team.

16.7 Do Not Re-Enter Until All-Clear is Given

- **Wait for Clearance**: Employees should not re-enter the building until emergency services or the designated Emergency Response Team leader has given the all-clear.
- **Maintain Communication**: Regular updates should be communicated to employees at the assembly point until the emergency is resolved.

16.8 Post-Evacuation Procedures

- **First Aid Assistance**: Provide medical assistance for any injuries at the assembly point until emergency services arrive.
- **Incident Reporting**: Document the incident and the evacuation process, noting any challenges or delays for future improvements.
- **Debriefing**: Conduct a debrief session with the Emergency Response Team and staff to discuss what went well and areas for improvement.

16.9 Training and Drills

- **Employee Training**: Train all employees on evacuation procedures, location of exits, and use of safety equipment.
- **Regular Drills**: Conduct evacuation drills at least twice a year to ensure everyone is familiar with the procedure and prepared for an actual emergency.
- **Refresher Courses**: Offer periodic training sessions on emergency procedures, first aid, and fire safety.

17. MOCK DRILLS

Mock drills will be conducted at frequent intervals at least once in 6 months to test the efficiency of the Plan.

18. UPDATION PLAN

This plan will be reviewed and updated if required regularly.

Chapter VIII

Ergonomics

Ergonomics is the science of designing workplaces and systems that align with the capabilities and limitations of workers, improving efficiency and minimizing risks. In KCCL, a multi- product electronic manufacturing firm, where various tasks such as assembly, soldering, testing, and quality control are performed, implementing ergonomic principles can significantly reduce work-related injuries and enhance productivity.

Key Ergonomic Considerations

a. Workstation Design

- **Adjustable Workstations:** Ensure that workstations are adjustable to accommodate workers of different heights and body types. This prevents strain caused by reaching, bending, or poor posture.
- **Optimal Reach Zones:** Tools and components should be placed within easy reach to avoid overextending, reducing the risk of musculoskeletal disorders (MSDs).
- **Proper Lighting:** Adequate lighting reduces eye strain and fatigue, especially in tasks involving small components or delicate work such as soldering.

b. Seating Arrangements

- **Ergonomic Chairs:** Workers who are seated for extended periods should use chairs with proper lumbar support, adjustable height, and armrests to reduce strain on the lower back, neck, and shoulders.
- **Anti-Fatigue Mats:** For employees working while standing, anti-fatigue mats can be used to reduce foot and leg strain.

c. Tool and Equipment Design

- **Ergonomic Tools:** Hand tools, such as soldering irons, should be ergonomically designed to reduce grip force and awkward wrist positions. Lightweight tools with cushioned handles minimize strain.
- **Automation:** Where feasible, implement automation for repetitive tasks to reduce physical exertion and the risk of repetitive strain injuries (RSI).

Safety Protocols in Ergonomics

a. Lifting Techniques and Assistance

- **Manual Handling Training:** Train workers in safe lifting techniques, such as bending at the knees and keeping the back straight, to prevent back injuries.
- **Mechanical Aids:** Use hoists, conveyors, or other mechanical aids for lifting heavy components or products, reducing the strain on workers.

b. Task Rotation and Breaks

- **Rotating Tasks:** Workers should rotate between tasks to avoid prolonged repetition of the same motions, which can lead to RSI or MSDs.
- **Scheduled Breaks:** Encourage regular breaks to prevent fatigue, especially in tasks requiring concentration or fine motor skills.

Ergonomic Training and Awareness

Conduct regular ergonomic training sessions to educate employees on proper posture, tool usage, and safety protocols. Employees should also be trained to report early signs of discomfort or strain to prevent long-term injuries.

Monitoring and Continuous Improvement

- **Ergonomic Assessments:** Regularly assess workstations and processes for ergonomic risks and adjust as necessary.
- **Feedback Mechanism:** Establish a system where workers can provide feedback on ergonomics and safety issues to continually refine protocols and processes.

By incorporating ergonomic principles and adhering to safety protocols, KCCL can reduce workplace injuries, improve employee well-being, and enhance overall operational efficiency. Continuous monitoring, training, and adaptation are key to maintaining an ergonomic-friendly environment.

Chapter IX

Cyber Security and Data protection

A comprehensive cyber security and data protection framework is essential in any manufacturing organization to safeguard both operational technology (OT) and information technology (IT) systems. Here's an outline of key cyber security needs and data protection mechanisms that could be followed in KCCL.

1. **Cyber Security Needs**

   Protection of Sensitive Data: Company often handle sensitive data, including proprietary designs, customer information, and supply chain details. Protecting this data from unauthorized access or breaches is critical.

   Protection of Operational Technology (OT): Cyber-attacks targeting OT systems, such as industrial control systems (ICS) and supervisory control and data acquisition (SCADA) systems, can disrupt production, pose safety risks, and lead to financial losses.

   Supply Chain Security: Ensuring cyber security within the supply chain is essential to prevent unauthorized access to systems and protect against third-party vulnerabilities.

   Compliance with Regulations: Adherence to data protection laws and industry standards (e.g., ISO/IEC 27001, NIST) is required to avoid legal repercussions.

   Mitigating Insider Threats: Safeguarding against both unintentional and malicious insider threats are necessary to prevent internal breaches.

2. **Data Protection Mechanisms**

   Data Encryption: Encrypt sensitive data both at rest and in transit to protect it from unauthorized access and tampering.

   Access Control and Identity Management: Use role-based access control (RBAC) to limit access to sensitive information based on job roles. Implement multi-factor authentication (MFA) for critical systems.

   Network Segmentation: Segregate OT networks from IT networks, and isolate critical systems to limit access points for potential attackers.

   Regular Software Updates and Patch Management: Ensure all software, including OT systems, is regularly updated with the latest security patches to address known vulnerabilities.

   Incident Detection and Response: Establish a Security Operations Center (SOC) or partner with a third-party SOC to monitor systems for potential threats. Develop an incident response plan that outlines steps for identifying, containing, and recovering from security incident**s.**

   Data Backup and Recovery: Regularly back up critical data and establish clear data recovery protocols to minimize downtime and data loss in case of an attack.

Network Security Controls: Implement firewalls, intrusion detection systems (IDS), and intrusion prevention systems (IPS) to protect the organization's network from external and internal threats.

Employee Training and Awareness: Provide training on recognizing phishing attempts, maintaining strong passwords, and following data protection best practices to prevent human errors.

Regular Security Audits and Penetration Testing: Conduct regular audits and vulnerability assessments to identify and address potential security weaknesses.

Vendor and Third-Party Risk Management: Implement policies for evaluating and monitoring the cyber security practices of vendors and partners to ensure compliance with security requirements.

3. **Roles and Responsibilities**

Cyber Security Officer (CSO): Responsible for overseeing the organization's cyber security policies, procedures, and incident response.

Data Protection Officer (DPO): Ensures compliance with data protection regulations and manages data privacy risks.

IT and OT Teams: Collaborate to ensure the security of both IT and OT environments, applying security controls relevant to each area.

Employees: Each employee is responsible for adhering to the organization's cyber security protocols and reporting any potential security incidents.

4. **Review and Continuous Improvement**

Periodic Review of Cyber Security Policies: Review and update cyber security policies at least annually or as needed to address evolving threats.

Regular Cyber Security Drills and Incident Response Testing: Conduct regular cyber security exercises and incident response drills to ensure preparedness.

Management Oversight: Senior management should review cyber security incident reports in regular meetings, assess trends, and make strategic adjustments to enhance cyber defenses.

This procedure ensures that all employees and stakeholders understand the critical importance of cyber security, as well as the specific mechanisms in place to protect the organization's data and infrastructure

Chapter X

Training and Education

Safety training is a crucial component of any organization's operational structure. It ensures that all employees understand the risks associated with their work environment and are equipped with the knowledge to prevent accidents and respond effectively to emergencies. By prioritizing safety, companies not only protect their workers but also enhance productivity, reduce downtime, and ensure compliance with industry standards and regulations.

Objectives of Safety Training

The primary objectives of safety training in an electronic manufacturing organization are:

1. **Promote a Safe Work Culture**: Establish a culture where safety is a priority and every employee takes personal responsibility for adhering to safety protocols.
2. **Prevent Accidents and Injuries**: Minimize the risk of injuries, equipment damage, and production delays by educating employees on hazard recognition and prevention.
3. **Ensure Regulatory Compliance**: Comply with safety regulations, such as OSHA standards and ISO certifications, to avoid legal and financial penalties.
4. **Reduce Operational Downtime**: Prevent disruptions caused by safety incidents or equipment malfunction due to improper use or handling.
5. **Increase Employee Confidence**: Empower employees to work safely and efficiently by giving them the necessary skills to handle machinery and equipment securely.

Key Components of Safety Training

1. **Machine and Equipment Safety**
   - **Understanding Equipment Operations**: Employees must be trained on the correct operation of machines, focusing on safe start up, operation, shutdown, and emergency procedures.
   - **Lockout/Tagout (LOTO) Procedures**: Train employees in proper LOTO procedures to prevent unexpected machine start-ups during maintenance or repair.
   - **Emergency Stop Systems**: Demonstrate the locations and operations of emergency stop buttons or switches on all equipment.
   - **Personal Protective Equipment (PPE) Use**: Training on the proper use and care of PPE, such as safety glasses, Safety shoes, gloves, and anti-static wristbands, is critical for protecting against potential hazards.
2. **Electrical Safety**
   - **Electrical Hazards Awareness**: Teach employees to identify electrical hazards, such as frayed wires, malfunctioning circuits, and improperly grounded equipment.
   - **Handling High Voltage Equipment**: Provide detailed instruction on working safely with high-voltage equipment and the use of insulated tools and protective gear.
   - **Static Electricity Control**: Introduce electrostatic discharge (ESD) safety practices, such as grounding procedures and the use of anti-static mats and wristbands, to protect sensitive electronic components.

3. **Chemical Safety and Hazardous Materials Handling**
    o **Chemical Safety Data Sheets (MSDS)**: Employees should be trained to read and understand MSDS for the chemicals they work with, including potential hazards and first aid measures.
    o **Proper Chemical Storage and Disposal**: Educate workers on how to store chemicals safely, use spill containment systems, and dispose of hazardous materials in accordance with environmental regulations.
    o **Ventilation and Fume Control**: Teach employees about the importance of using proper ventilation systems, especially in areas where soldering or coating processes produce harmful fumes.
4. **Ergonomics and Safe Handling Practices**
    o **Ergonomic Workstations**: Train employees on how to set up and adjust workstations to reduce strain and avoid repetitive stress injuries.
    o **Proper Lifting Techniques**: Instruction on safe lifting techniques and the use of mechanical aids for moving heavy or bulky equipment.
    o **Minimizing Repetitive Strain Injuries**: Provide training on rotating tasks, using ergonomic tools, and stretching exercises to avoid strain injuries from repetitive tasks common in assembly line work.
5. **Fire Safety and Emergency Response**
    o **Fire Prevention Measures**: Employees should be trained to recognize fire hazards, such as overheated equipment or improperly stored flammable materials, and take action to mitigate them.
    o **Emergency Evacuation Plans**: Conduct regular fire drills and train employees on how to evacuate the facility safely, including the use of emergency exits and meeting points.
    o **Fire Suppression Equipment**: Employees should be trained in the proper use of fire extinguishers, fire blankets, and other fire suppression tools available on-site.
6. **Mechanical Safety**
    o **Guarding Moving Parts**: Train workers on the risks posed by moving parts in machines, including pinch points, rotating gears, and conveyor belts, and the importance of safety guards.
7. **Workplace Environmental Safety**
    o **Maintaining Clean and Organized Work Areas**: Teach employees to keep their workspaces organized and free of clutter to reduce the risk of tripping, slipping, or causing damage to sensitive equipment.
    o **Ventilation and Air Quality**: Ensure employees understand the importance of maintaining good air quality and using ventilation systems, especially when working in cleanroom environments.
8. **Emergency Medical Response and First Aid**
    o **First Aid Training**: Offer first aid and CPR training to employees, particularly those working with high-risk equipment or materials.
    o **Response to Electrical Injuries**: Provide specific training on how to handle electrical burns or shocks, as these can occur when working with malfunctioning equipment.
    o **Incident Reporting Procedures**: Employees should be aware of the company's procedures for reporting accidents or near-misses, so incidents can be investigated, and corrective action taken.

Methods for Conducting Safety Training

1. **Classroom Training**: Provide employees with classroom-based learning on safety standards, including lectures, presentations, and safety videos.
2. **Hands-On Training**: Practical, hands-on training allows employees to practice safety procedures directly on the machines and equipment they will be using.
3. **On-the-Job Training**: Supervisors or safety officers can guide new employees through on-the-job safety training as part of their orientation.
4. **Simulation and Drills**: Conduct regular safety drills, such as fire evacuations, emergency shutdowns, and first aid simulations to reinforce safety training.
5. **Refresher Courses**: Periodic refresher courses should be conducted to reinforce safety protocols and introduce new safety measures as technologies or regulations evolve.
6. Physically challenged individuals shall be briefed on the safety aspect of the work environments as the case may be.

Safety training is an ongoing commitment that plays a vital role in the smooth operation of can organization. By providing comprehensive safety training programs, companies can ensure the well-being of their employees, reduce accidents, and maintain regulatory compliance. Regular training and a proactive safety culture will help protect workers, equipment, and the overall productivity of the organization.

Contractor and Visitor Safety

- **Contractor Safety Requirements**:
  - o Contractors must comply with all safety procedures and report any unsafe conditions to the Safety Officer.
  - o Contractors working with hazardous materials or equipment must have prior approval and training.
- **Visitor Safety**:
  - o Visitors must sign in and out at reception, wear visitor badges, and be escorted by an employee at all times.

Continuous Improvement

- **Safety Audits**:
  - o Periodic safety audits will be conducted to identify potential risks and areas for improvement.
- **Employee Feedback**:
  - o Employees are encouraged to provide feedback on safety protocols and suggest improvements

Chapter XI

Conclusion

In conclusion, safety is a shared responsibility in KCCL, integral to the well-being of every employee and the success of the company. By adhering to the safety protocols outlined in this manual, we not only protect ourselves but also contribute to a safer, more productive workplace.

Continuous awareness, vigilance, and commitment to these safety practices are essential. Each individual plays a vital role in maintaining a culture of safety, where hazards are promptly identified, reported, and resolved. Regular training, collaboration, and adherence to these guidelines will ensure that we minimize risks and work together towards a secure, incident-free environment.

We are committed to supporting every team member in understanding and applying these safety measures. Together, we can ensure a Safe and secure workplace, fostering innovation and growth while prioritizing the safety of all.

Stay informed, stay vigilant, and work safely.

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