



Introduction

This document, hereinafter referred to as Zamil Projects Employee Safety Handbook, provides an overview of the Health, Safety and Environment (HSE) requirements and working conditions that shall be followed by all Zamil Projects employees. These guidelines have been developed to ensure a safe and healthy work environment so that each employee is aware of what to expect and follow in order to work safely.

We consider the employees of Zamil Projects to be one of its most valuable resources. This handbook communicates information that is relevant and important to employees. These practices should enable both employees and management to work together in harmony to achieve efficiency and effectiveness.

The objective of this Employee Handbook is to acquaint employees with Zamil Projects and to provide them with the basic guidelines. No employee handbook can anticipate every accident or injury that can occur. To create a hazard-free workplace, everyone's collaboration and commitment to safety is critical. Supervisors and employees must work together to ensure that the company's safety policies are followed.

Employees are responsible for reading and understanding this Employee Safety Handbook. Employees are directed to discuss the hazard with the supervisor and/or any member of the management team.

ZP-HSE Department

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Health, Safety & Environment Policy

Zamil Projects is specialized in Engineering, Procurement, Construction, Maintenance and Servicing of Mechanical, Electrical, Plumbing systems, Fire protection works, testing and commissioning of jobs related to commercial as well as industrial projects.

Zamil Projects is devoted to establishing, implementing, maintaining, measuring and improving a Health, Safety and Environmental Management System and will ensure that:

- Development of HSE culture within the company that results in a commitment from both the management and employees to work safely, thereby preventing damage to property, injury & ill health to people affected by our activities and work processes while maintaining our productivity and profitability.
- To control risks in the workplace by strictly applying the hierarchy of controls such as elimination, substitution, engineering, administrative and PPE (Personal Protective Equipment).
- Deliver excellence and competitive services to our customers.
- Practical steps are taken to protect the environment in compliance with the legal requirements and standard operating practices thus limiting potential environmental impact to as low as reasonably practicable.
- Established HSE objectives & targets are reviewed and periodically if it is met on time.
- Effective training and skills enhancement programs are provided to our employees.
- HSE leadership is maintained and delegation of vibrant HSE duties, responsibilities and authority exist in all department levels.
- Aggressive improvements of our HSE Management System as well as our work performance are done continually.
- This policy shall be made available to all interested parties and reviewed periodically.

Zamil Projects shall communicate this HSE policy to all employees and make everybody understand the company's genuine commitment to HSE practices. The management encourage everyone to actively participate.

HSE Duties & Responsibilities

Manager & Supervisors'

- Establish an effective company's policy, safe work procedure and communicate them with Employees.
- Provide a safe workplace free from hassles, serious recognized hazards and comply with all standards, rules and regulations.
- Make sure to provide safe tools and equipment to employees and conduct regular inspection to maintain the equipment.
- Arrange and provide suitable health and safety training which is regularly refreshed and also consideration any changes to the workplace or processes since the last training conducted
- Informing employees about all potential hazards associated with current or proposed working practices and equipment.
- Protect the health, safety and welfare of their employees and other people who might be affected by their business.
- Investigate all near-misses, accident and other incidents promptly and initiate immediate corrective/preventive actions.
- Prepare an Emergency Action Plan and conduct emergency response drills at every interval of time as well as provide obstruction free access and egress.
- Implement recognition/awarding system for safe work practice and legitimate disciplinary actions/penalty system to curb safety violations.



Employees'

- Cooperate with employer to meet the HSE legal requirements and follow all lawful HSE rules, regulation and procedure at workplace.
- Comply with relevant laws and protect their own safety and health, as well as the safety and health of anyone who may be affected by their acts or omissions at work.
- Ensure to make proper use of all machinery, tools, substance. Avoid misuse of any tools and maintain the company's assets/properties.
- Wear or use required personal protective equipment at workplace and encourage others to follow the procedure.
- Report any defects in the workplace, tools, equipment which might endanger safety and health as well as hazardous conditions, job-related injury or illness.
- Participate in HSE trainings offered by the employer, read and follow all HSE posting/messages and communicate the same with others.
- Participate in workplace audit, cooperate with the auditor and notify them about the available potential hazard at workplace (if any).
- Participate in Incident/accident investigation. Assist the investigator and provide him with the correct information.
- Response at the emergency situation or drill and support work stop initiated by management.

HSE Committee Structure

Zamil Projects established a Health, Safety and Environmental (HSE) Committee in order to make everyone responsible for safety. The HSE committee, comprising of management and operations key persons, HSE personnel and other key employees, offers a structured approach to consultation.

- Committee conducts monthly meeting to discuss current issues that are relevant to Health, Safety and Environmental aspect of the project.
- HSE In-Charge facilitates the meeting and Committee member attends the meeting regularly.
- HSE Committee is headed by the project's manager as the chairman and co-chairman has been assigned to fill the position in chairman absence.
- Head of each department has been assigned as a member of the HSE committee and a workers' representative is there to represent workers/labours in the committee.
- HSE Issues be discussed in the meeting with corresponding corrective action, responsible person and target date of completion.



HSE Committee Meeting

HSE Training & Awareness

Zamil Projects has established a training process which improve performance of the workers at each aspect. it is one of the specific and common form of employee development and increase their knowledge, skill and attitude toward safety and prepares workers for follow rules, regulations and procedures.

Training Resources:

Orientation: Each employee (newly hired, regular and/or contractual) at workplace shall undergo HSE orientation on the very first day.

On-Job Training: Ensure that on-job training programs were given to all new and/or transferred employees. As soon as the new worker is given new duties. On-Job training consisted with topics like:

- Safety, Health & Environmental Policy
- Company policies and Procedure
- Medical policies
- Emergency exits, emergency Procedure, etc.
- Location of welfare facilities
- Workplace specific hazards, hazard assessment & controls
- Incident/ Accident reporting
- Personal Protective Equipment



HSE Training

Re-fresher Training: A training programs which conducted at fixed intervals to prevent the degradation of safety skill and enhance it. It special designed to help those who were exposed in hazardous work conditions or misconduct safety rule. Re-fresher consisted with topic like:

- Hot Work training for welding, brazing, fire watcher etc.
- Confined Space training for workers entering in confines space.
- Work at Height Training for all the workers working above the ground level.
- Defense Driving for those who are allowed to drive vehicle at site.
- Chemical Handling training for the workers exposed to harmful chemical.

HSE Inspection & Color Coding

Zamil Projects has developed and follows monthly HSE inspection program. HSE personnel Perform periodic project site visits & inspections to maintain factories & facilities in safe condition. All available aspects present at site and mentioned in the program shall be inspect as per Zamil Projects checklist form and its guidelines.

Monthly Inspection system

Tools and Equipment.	Inspection Date.	Tagging System.	Abbreviation
Hand & Power Tools	1 st of Every Month	Checklist + Color Code	HTP
Fire Extinguishers	3 rd of Every Month	Checklist + Tag + Color Code	FE

A color-coding system is followed by Zamil Projects. Each month/quarter has a separated color agreed beforehand. The inspected items are then color coded as a mark of final inspection. If anything is found to be damaged or failed the inspection, then it will not be color coded and shall be removed from the site.

	(Projects Name)	DOC No	
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		DATE	26-01-2021
EQUIPMENT INSPECTION PROGRAM			

MONTHLY COLOR-CODING SYSTEM

MONTH			Color
January	MAY	September	GREEN
February	June	October	RED
March	July	November	BLUE
April	August	December	YELLOW

Color-Coding System

Reward & Recognition

The components that contribute to employee retention and engagement and one of the great approaches to motivate employees toward workplace safety culture.

Incentive Program: Zamil Projects introduced HSE Incentive Program as a means of employee reward and recognition to improve Safety, Health & Environmental performance of department employees.

The purpose of this program is to further intensify workplace safety through positive reinforcement



Quarterly HSE Evaluation: The projects having 25+ manpower is eligible to participate in the quarterly survey for the best performer in the previous quarter. Data of the projects shall be gathered through the ZP HSE Evaluation Survey form.

Disciplinary Action

A disciplinary action is a rephension or corrective action in response to employee misconduct, rule violation, or poor performance toward ZP HSE culture.

"How does Zamil Projects Impose Penalty?"

Depending on the severity of the HSE VIOLATION AND EMPLOYEES MISCONDUCT, mentioned in Zamil Projects Penalty List, a disciplinary action can be taken accordingly and in different forms including:

- Verbal warning.
- Written warning Letter.
- Termination.
- Other applicable penalties in Admin and HR Policies.

Zamil projects has a separated procedure and penalty list for sub-contractor apart from Zamil Projects' employee as discussed above.



Permit to Work System

"Think before commencing any activity at site and ask yourself..."

Why do we need permit?

Work Permit System insures safest possible manner of work by fixes responsibility and authority of individual at workplace for the safe execution of the works.

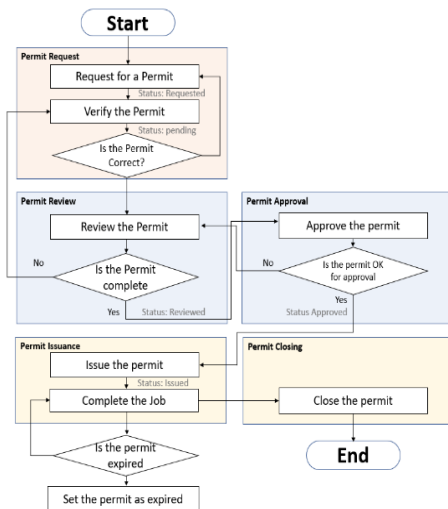
- It gives written permission to work.
- It Prescribe the nature of the work and the way of execution
- It Specify the places and equipment to be used.
- It identifies hazards and precautions to be taken.

When do we need permit?

Prior to start any activity at work place or whenever there is a significant risk to health and safety during an operation.

How to secure permit and by whom?

A trained, competent and authorized **permit Issuer** issues a Permit to Work after ensuring that necessary safety precautions are being implemented and it shall be received by the **permit receiver**.



Chronology of Permit to Work Procedure

Common types of Permit are: -

- Excavation Permit: To excavate the area having underground facilities.
- Cold Work Permit: For general activities that does not involves electricity and hot work
- Hot Work Permit: Any activity creates flame/spark and can ignite fire.
- Confined Space Permit: To enter the confined space, but not to work.
- Electrical Permit: Prior to work on electrical circuits/equipment
- Radiation Work Permit: Required for radiography test



Safety Points Need to Be Followed by Issuer/Receive/Gas tester:

- Authorized permit Issuer and receiver shall conduct joint area inspection for any hazard prior to approve the permit.
- Jobs of different categories must have separated work permit and shall only be used for it intended purpose
- Personnel involved in the job who may use the work permit shall be competent to perform the activities mentioned on the permit.
- Required attachment like MOS, JSA, RISK ASSESSMENT, AREA LAYOUT, MSDS etc. shall be attached with the permit.
- Issued permit shall be signed and closed at the end of the job or each interval and kept in file for minimum 1 year.
- Procedures in the Work Permit (WP) System are thoroughly read and shared with workers.
- discovered unsafe conditions and unsafe acts that may cause potential harm or injury shall be reported to immediate supervisor and site safety representative.
- In case of confined space entry. Gas tester shall conduct the test and record the finding prior to permits workers to access confined space.
- Confined space permit must be consisted with additional work permit which allows workers to work in confined space.
- Clean the work area after work and ensure that it is in safe condition.

Job Safety Analysis

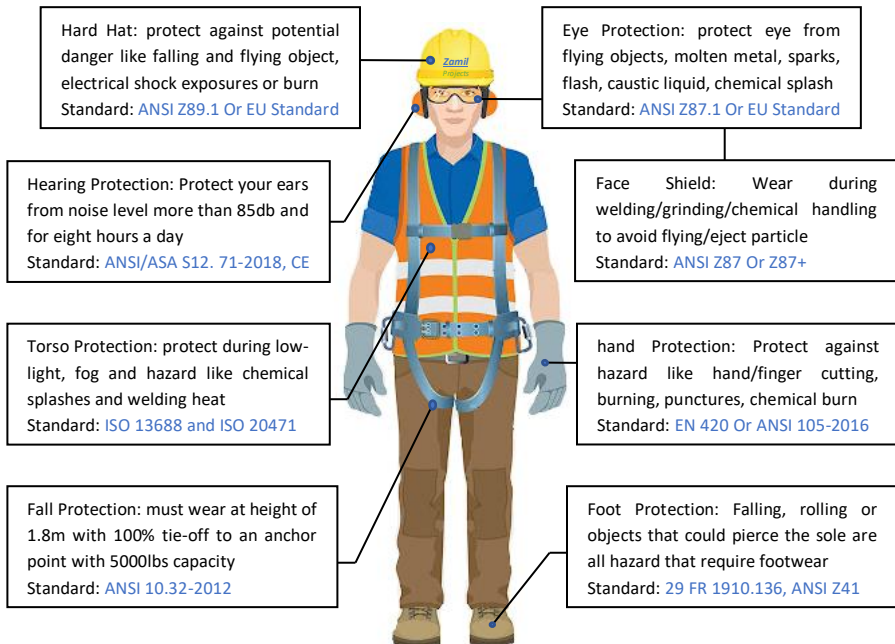
- A job safety Analysis shall be developed as per method of Statement. All the task and activities mentioned in the method of statement shall be included in the Job Safety Analysis.
- Job safety Analysis shall be reviewed by the supervisor/engineer of all job and ensure their employees are aware and follow the develop JSA.
- All employees shall go through the job safety analysis and be aware of all the hazard and it control measures of the given job.
- Job Safety Analysis shall include different type of controls for preventing potential hazards at workplace. The controls which can be included are as follows:
 - Elimination and substitution:** Physically removing and replacing the hazard with the lesser one.
 - Engineering controls:** Designs or modification to work place and equipment to reduce the source of exposure
 - Administrative and PPE:** Alter the written operating procedures of work and wore PPE to reduce the exposures.
 - Control and Discipline:** Proper way to execute the procedure and follow rules and regulation.



Hierarchy of Control

Personal Protective Equipment

Commonly referred to as “PPE”, is equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses.



General minimum requirements that all PPE must meet: ([29 CFR 1910.132: General requirements](#))

- Provide adequate protection against the particular hazards for which they are designed
- Be of safe design and construction for the work to be performed
- Be reasonably comfortable when worn under the designated conditions
- Fit snugly and not unduly interfere with the movements of the wearer
- Be durable
- Be capable of being disinfected
- Be easily cleanable
- Be distinctly marked to facilitate identification only of the manufacturer

Prior to wear and use PPE you should check labels and tags provided by the manufacturers. PPE shall be distinctly marked to facilitate identification of the manufacturers which also indicates that the PPE has made by following international standard



General responsibilities of employees regarding PPE:

- Supervisor shall perform a “hazard assessment” of the workplace to identify health hazard.
- Identify and provide appropriate PPE to the Employee prior to access workplace.
- Train employee for proper use, care and store of the PPE.
- Clear and Maintain PPE, inform a supervisor of the need to repair or replace PPE.
- Defective and damaged PPE shall not be used and removed for the workplace.
- Monthly Inspection shall be done for employees PPE with maintain the checklist.
- Periodically review, update and evaluate the effectiveness of the PPE training.

Determining Manufacturing and Expiration Dates of Hard Hats



Underneath the hard hat, you should see a circular stamp similar to the image above. To read the date of manufacture, the arrow points to the month (9) and the number overlaying the arrow in the center is the year (9-04 = September 2004).



Other hard hats may have this print. To read the date of manufacture, 07 represents the year (2007). There are 4 segments shown (2 top and 2 bottom) which indicates that the year is split to 4 periods. The two segments on top have dots in them which mean it is manufactured in the second quarter of the year (April to June 2007).

The Occupational Safety and Health Administration's (OSHA) rules on hard hat expiration are based on the American National Standards Institute (ANSI Z89.1-2009) guidelines for personal protection equipment. Manufacturers indicate that replacement of hard hats is recommended after 4 to 5 years of use regardless of their physical appearance.

*OSHA: - Occupational Safety & Health Administration

*ANSI: -American National Standard Institute (USA)

*EN: - European Standard

*EU: - European Union (European)

*CE: - Conformance Europeene “European Conformity”

Gas Test

Before an employee enters the space, the internal atmosphere shall be tested with a calibrated direct-reading instrument: (OSHA standard 29 CFR 1910.146 (c) subsection (C) states)

Gas Testing is a pre-task requirement for:



Excavation (4 feet)



Confined Space Entry

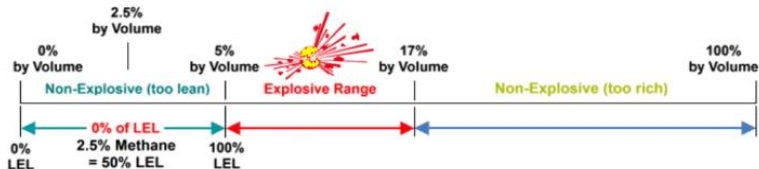
The most common gases to be tested are:

1. **Oxygen (O₂):** Atmospheric oxygen concentration must be between **19.5 to 23.5** percent.
2. **Hydrogen sulfite (H₂S):** OSHA and NIOSH established limits of an 8-hour permissible exposure limit-time weighted average (PEL-TWA) of **10 ppm** and a 15-minute short-term exposure limit (PEL-STEL) of **15 ppm** for exposed workers.
3. **Carbon Monoxide (CO):** The OSHA PEL for CO is **50** parts per million (ppm). OSHA standards prohibit worker exposure to more than **50** parts of **CO** gas per million parts of air averaged during an 8-hour time period.
4. **Lower Exposure Limit:** Concentrations above **10% (0.5% Methane)** of the LEL are considered a risk for fires or explosions and are classified as Immediately Dangerous to Life and Health (IDLH) by OSHA and NIOSH.



Gas Detector

Methane - LEL: 5% by volume in Air / UEL: 17% by volume in Air



Visual Example to show where on the scale % of LEL is measured

Barricades and Signages

One of the control measures and safety precautions which shall be taken at workplace is to isolate the hazard and the workforce by erecting barricades between them and by providing information about the hazard and it precaution by installing signages.

The following are examples of activities where barricades may be required:

- Construction area where debris is falling from height without the use of an enclosed chute. **OSHA 29 CFR 1926 Subpart T*
- Area with open energized wire which have more than 600 volts. **OSHA 29 CFR 1926 Subpart K*
- The area under the radius of the rotating crane or other equipment. **OSHA 29 CFR 1926 Subpart N*
- Temporary storage area or area where equipment left unattended at workplace.
- Around the excavation and floor opening like manholes. **OSHA 29 CFR 1926 Subpart P*
- Area where equipment is in progress like energised substation and electrical panel. **OSHA 29 CFR 1926 Subpart K*

	Fire Prevention and Protection Equipment
	Housekeeping and Aisle Marking
	Radiation Hazards
	Safety and First Aid
	Defective Machinery
	Traffic and Caution Warning
	Physical Hazards

Barricade Color Code

Signages Category

SIGNAL WORD* / TYPE OF SIGN	MEANING/PURPOSE	COLORS	ANSI STANDARD(S)	OSHA REGULATION	ANSI	OSHA
DANGER*	Indicate a hazardous situation which if not avoid will result in death or serious injury	Red, Black & White	ANSI Z53.1-1967, ANSI Z535.2-2011	1910.145(d)(2)		
WARNING*	Indicate a hazardous situation which if not avoid could result in death or serious injury	Orange & Black	Z535.2-2011 (R2017)			
CAUTION*	Indicate a hazardous situation which if not avoid could result in minor injury	Yellow & Black	ANSI Z53.1-1967, ANSI Z535.1-2006 (R2011)	1910.145(d)(4)		
NOTICE*	Used to relate non-hazard safety practices	Blue, White & Black	Z535.2-2011 (R2017)			
INSTRUCTION	General instruction and suggestions related to safety measures	Green, White & Black	ANSI Z53.1-1967, ANSI Z535.1-2006 (R2011)	1910.145(d)(6)		

**OSHA 29 CFR 1926 Subpart G*

Signs, Signals, and Barricades

Incident Reporting and Classification

Reporting any incident at workplace is a moral duty of an employees. Every incident shall be reported, and investigated to find out the root and actual cause of the incident and to preventing it from occurring again.

"What must be reported?"



Fatality



Injury



Near Miss



Vehicle Accident



Property damage



Substance Spillage



Occupational Illness



Fire

- Employees are required to report any HSE related incidents to their immediate superior and to the HSE In-Charge of the project.
- Concerned Supervisor notify and provide the necessary information regarding the incident and be familiar with the incident classification as per below table.

CLASS	DESCRIPTION	REPORTING PROCEDURE
A	•Fatality •2 Hours production loss •Equipment / Property Loss of 100,000 SR or more	Verbal – immediately inform the HSE In-Charge, Immediate Superior and PM Written – Incident Investigation Report to be completed and submitted 48 hours after the incident.
B	•LTI (Lost Time Injury)Incident •Injury/illness with 1 or more lost days. •Property Damage/Loss SR 10,000 up to SR 100,000. •Hazardous Material Spill	Verbal – immediately inform the HSE In-Charge, Immediate Superior and PM Written – Incident Investigation Report to be completed and submitted 48 hours after the incident.
C	•MTC (Medical Treatment Case) •Any injury/illness incurred by an employee having less than 1 lost day. •Property Damage/Loss less than SR 10,000. •Non-Hazardous Material Spill	Verbal – immediately inform the HSE In-Charge, Immediate Superior and PM Written – Incident Investigation Report to be completed and submitted 48 hours after the incident.
D	•First Aid or Near Miss, (No property damage or personal injury).	Verbal – immediately inform the HSE In-Charge, Immediate Superior and PM Written – Incident Investigation Report to be completed and submitted 48 hours after the incident.

- Employee incurring occupational injuries and illnesses shall be brought to GOSI accredited hospital using GOSI form (to be filled by Administration Department).
- Each accident / incident shall be immediately investigated and documented through Incident Investigation Report (IIR).
- Injured/involved employees shall be sent to the Safety Office for Post Incident Safety Talk and training upon recovery and availability.
- Lesson learned shall be prepared and communicate with all the Zamil projects employees and management.

Fire Prevention and Control

"The most important discovery and probably the most dangerous"

There are three conditions essential for fire: **Fuel**, **Oxygen**, and **Heat** (or ignition source).

These three conditions are often represented as the fire triangle.

If one of these conditions is missing, fire does not occur; and if one of them is removed, fire is extinguished.

Methods to Extinguished fire:



Cooling: Removal of Heat



Smothering: Reduce % of oxygen or cut supply of oxygen



Starvation: Removal of Fuel or combustible materials



Class of Fire and types of Extinguisher:

Color Code	Type	Method and Class of Fire Can Be Extinguished
	Water	- Fires involving Solid combustible (Paper, Wood, Coal, Plastic). - Extinguisher is identified with a red label written "WATER" on it. - Method of extinguishing fire: COOLING (Reducing Temperature/Removing Heat). - Extinguisher cannot be use on any class of fire other than SOLID or "A" Class fire
	Foam	- Fires involving Solid, Flammable liquids, Electrical (Paper, Gasoline, Live Electricity) - Extinguisher is identified with a cream color label written "FOAM" on it. - Method of extinguishing fire: SMOTHERING (Blanketing/Deprivation of Oxygen) - Extinguisher cannot be use on GAS, METAL, COOKING OIL or B,D,K/F Class fire.
	Dry Powder	- Fires involving Solid, Liquids, Gas, Metal, Electrical (Paper, Petrol, LPG, Iron, Live Electricity) - Extinguisher is identified with a Blue color label written "DRY POWDER" on it. - Method of extinguishing fire: SMOTHERING (Cutting Oxygen by Sealing Flammables) - Extinguisher cannot be use on Kitchen fire like COOKING OIL or "K/F" Class fire
	Carbon Dioxide	- Fires involving Liquid and Electrical (Acetylene and Live Electricity) - Extinguisher is identified with Black label written "CARBON DIOXIDE"/CO2 on it. - Method of extinguishing fire: SMOTHERING (CO2 Dilution/Displace Oxygen) - Extinguisher cannot be use on SOLID, GAS, METAL, COOKING OIL or A, B, D, K/F fire
	Wet Chemical	- Fires involving Cooking oil/ Fats or "K/F" class and solid combustible or "A" class - Extinguisher is identified with a Yellow color label written "WET CHEMICAL" on it. - Method of extinguishing fire: COOLING / SMOTHERING (Reducing Temp/Cutting Oxygen) - Extinguisher cannot be use on LIQUID, GAS, METAL, Electrical or B, C, D, "Electricity" fire

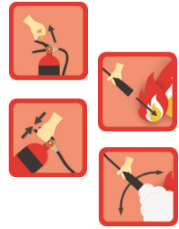
“Remember P A S S”

Pull the Pin: - This pin keeps the extinguisher from discharging accidentally.

Aim at Fire: - Aim the nozzle at the base of the fire from 10 feet away.

Squeeze the lever: - press the level to release the extinguisher agent.

Sweep: - spray the agent on fire from side to side



PASS System

Other Fire Prevention System:

Fire Suppression system, Fire Detector/Alarm, Fire Hydrant.

- Fire Pumps/Fire Hoses and Hydrants/Sprinkler Systems and Fire Alarm Systems shall be accessible and maintained in good working condition.
- Inspection, testing and maintenance shall be implemented and done periodically to meet manufacturer's instructions and in accordance with NFPA-25 (Water-Based Fire Protection System) and NFPA-72 (Fire Alarms).
- Fire Protection Systems and Fire Alarm Systems shall be operated and maintained by trained and qualified personnel.
- Appropriate PPE shall be worn by employees performing activities on FFS and FAS

Control Measures to prevent fire:

The measures are the way to make sure the continuity of operation, property protection and safety of life against fire

- Provide adequate means of escape in case of fire. The route/pathways shall be Outline clearly.
- Install and maintain smoke detection and suppression systems in offices and work place area.
- Prepare the fire emergency action plan and conduct regular fire drills.
- Use Zamil Projects monthly fire risk assessment checklist to evaluated the fire risk at workplace.
- Use flame-retardant materials in office and workplace interior.
- Store the flammable and combustible liquid/gases only in the designated area with provision of fire prevention requirements like proper ventilation and handle as per MSDS.
- Flammable substance shall be isolated and 35 feet away from any source of open flame.
- Perform hot work activities in designated hot work area which must be consisted with fire Blanket, fire extinguisher and other mean of fire control.
- Smoking shall be prohibited in workplace. Designated smoking shelter shall be provided at workplace.
- Refueling tankers are prohibited to enter a hot work zone (maintain 30-meter distance) and to pour fuel to a running engine.
- Always use DB fuse as per the circuit specification to avoid electrical fire in case of overloading.
- Suitable amount of fire extinguisher shall be installed at workplace in the distance of 50 feet each.
- Maintain good housekeeping at workplace, remove combustible waste on daily basis, do not accumulate waste and store flammable substance at workplace.

Emergency Action Plan

Zamil Projects has prepared an effective emergency procedure which shall be applied to all the unit and it is a responsibility of employees/workers to familiarize and follow the applicable procedure.

1. Procedure for reporting an emergency:

In case of emergency an employee shall call on the emergency contact hotline number which shall be provided to all the employees/workers during orientation/training or posted at workplace and give the following information:

- Say your name and employee number/identification number.
- Pronounce "It Is an Emergency" and tell the nature of an emergency for e.g. FIRE
- Give your specific location such as Area Number or building name.
- Mention if any one got injured and need assistance.
- Provide your number and wait for emergency services to arrive on the given location.

2. Emergency evacuation procedure in case to fire or natural disaster:

- Employee shall immediately raise the alarm as soon as he witnesses an emergency at workplace.
- The information shall be provided to the emergency director and confirm about the nature of an emergency.
- Evacuation Team leader shall immediately instruct employees/workers to evacuate the workplace from the nearest exit.
- Exit guard shall acquire the position at all the exit route and assist employees/workers during evacuation.
- Follow the exit route, stay calm and move quickly, but do not run.
- EAP key personal and volunteer emergency services like firefighting, First-Aid team and searching team shall be ready to offer support. If required.
- Assembly point coordinator shall gather all the evacuated workers at the emergency assembly point and perform the head count.
- Do not try to go back to the workplace until emergency director give "ALL CLEAR" signal.



3. Emergency response team: - Fire Fighter and First-Aid Team

- Certified first aider shall be available at the workplace.
- Trained firefighting personnel, who shall be fit to respond promptly in case of emergency shall be appointed.
- First- Aid supplies shall be available at workplace as per the number of workforces. Minimum contents of a generic first-Aid kit as per ANSI Z308.1
- Required number and types of fire extinguisher shall be available. Install fire points consisting with different types of extinguisher, sand/water bucket.
- First-Aid Team consist with personnel who is familiar to ERP procedure.



Fire Point

- Firefighting team shall regularly perform emergency mock drill as per EAP scenario and train in use of correct fire extinguisher for respective class of fire.
- Report all the minor and major injury and near miss.
- Employees/workers must be familiar with the location of facilities mentioned.

4. Emergency Contact (Hotline) number: -

SAUDI GOVERNMENT	Contact No.
CIVIL DEFENCE (Fire)	998
POLICE (Traffic)	993
POLICE (Theft, Robbery, Fighting, etc.)	999
RED CRESCENT (Medical)	997

Note: In an Emergency, a person shall contact on the hotline number of their respective projects

Hot Work Safety



Hot work refers to activities that requires using open flames, applying heat or friction, or may generate sparks or heat. Hot work includes welding, flame cutting, soldering, brazing, grinding and the use of other equipment incorporating a flame.

Hot work creates heat which is the main component of fire which make hot work activities more complex and hazardous. Thus, to perform any hot work activities, the following should be considered as guidelines and control measures to prevent fire.

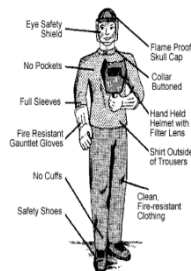
General Precaution of Hot Work:

- Hot work permit must be available prior to commence hot work activities and Secure the area by removing or protecting combustibles from ignition sources.
- Hot work must be performed only in areas that are or have been made fire-safe or performed in designated area. All combustible material shall remove from 8-meter radius of hot work
- A Fire watch must be available whenever welding or cutting is performed in locations where any combustible materials, ignitable by sparks or slag, are closer than 35 feet to the point of operation.
- Workers performing hot work and fire watcher must have adequate training and authorized by site safety department.
- Perform gas test prior to start hot work activity. Do not permit any hot work if oxygen percentage is greater than 23.5 or LEL level is not zero. It should be done around 15-meter radius of hot work
- Suitable fire equipment shall be immediately available in the work area and shall be maintained in a state of readiness for use.
- Where there is availability of fuel that cannot be removed, a fire blanket should be in place to prevent the sparks from being ignited.
- Adequate PPE should be used; Face shield, fire resistant cover-all and safety boot, hot work approved hand gloves, etc.

- Welding shield should be used to protect other workers who are not part of the task and Close supervision should be ensured throughout the job.
- Welding equipment, gas cylinders and, other apparatus used to perform hot works shall be located in a manner that it does not present a hazard to personnel.
- Good housekeeping shall be maintained at work site. All combustible material shall be removed from 8-meter radius of hot work.
- Cables and hoses shall be kept clear from access ways and be suspended on insulated cable hangers at least 2 meters higher above grade level.

Electrical Arc Welding Safety Guidelines:

- Prior to installing the arc welding you should determine if your present electrical system is adequate to handle the increased load required by the welder
- The frame or case of the welder shall be properly grounded.
- A safety-type disconnecting switch or controller shall be located near the machine
- Welding machine shall be protected by a properly sized fuse or circuit breaker on an independent circuit.
- The welder should be located in an area with adequate ventilation.
- Workplace should be made fireproof like using metal sheets or fire-resistant curtains as fire barriers. The floor should be concrete or another fire-resistant material



Engine power welding safety guidelines:

- Always operate in an open well-ventilated area or vent the engine exhaust directly outdoors.
- Never fuel the engine while running or in the presence of an open flame.
 - Wipe up spilled fuel immediately and wait for fumes to disperse before starting the engine.
 - Never remove the radiator pressure cap from liquid cooled engines while they are hot to prevent scalding yourself.
 - Stop the engine before performing any maintenance or troubleshooting. The ignition system should be disabled to prevent accidental start of the engine.
- Keep all guards and shields in place.
- Keep hands, hair, and clothing away from moving parts.



Gas/ oxy-Acetylene/Argon welding, cutting and brazing Guidelines:

- All connections shall be checked for leakage by soap solution prior to use.
- Install flash back arrestor at both the end of the hose of oxy-acetylene gas.
 - Hoses shall be hung above the ground level and kept away from sparks.
 - Light the flame with appropriate friction or spark lighter.
 - Fasten the cylinders securely on the stand and in vertical position.
 - Open cylinder slowly and correctly by wrenches provided by manufacturer.
 - Set the operating pressure carefully do not use it over 15 PSI.
- A non-combustible wall at least 5 feet high should be used to separate cylinders.
- Remove regulators and replace protective caps before transporting cylinders.



Electrical Safety

Electricity is a form of energy which used for heating, lighting, and to provide power for machines. It is a potential source of hazard of electrocution.

Below are some do's and don'ts which should be followed to avoid electrical incident at site:

Do's	
✓	Do Allow only trained and competent person to work with live circuits, panel or electrical equipment.
✓	Do ensure that workers working on the energized equipment or live circuit must wore adequate PPE like electrical gloves and Arc resistance clothes.
✓	Do provide ground fault interrupters (GFCI) with all the electrical outlets and panel.
✓	Do labeling on all the Circuit breaker panels, Distribution panel, junction boxes and similar equipment for identification in case of emergency.
✓	Do provide proper grounding with all the electrical equipment like generator, threading machine grooving machine. Normal depth of underground cables varies from 18in (457mm) up to 3ft (915mm)
✓	Do treat all the wire and cable as energized. Until get assure about the disconnection/deenergized from concern dept.
✓	Do follow logout/tagout (LOTO) procedure with energized panel and equipment and ensure to de-energized prior to remove LOTO.
Don'ts	
○	Do not use outlets or cords that have exposed wiring, repair the wire or remove from workplace.
○	Do not use portable cord-and-plug connected power tools if the guards are removed. Inspect the cable prior to use.
○	Do not block access to panels and circuit breakers or fuse boxes which can be hazardous in case of emergency.
○	Do not touch a person or electrical apparatus in the event of an electrical incident until remove/cut the source of electricity.
○	Do not work with exposed conductors carrying 50 volts or more. Provide proper insulation.
○	Do not work on Wet environments. It increases the risk of an electrical shock as water is the best conductor of electricity.
○	Do not use tools or equipment with damage or having crack in body.



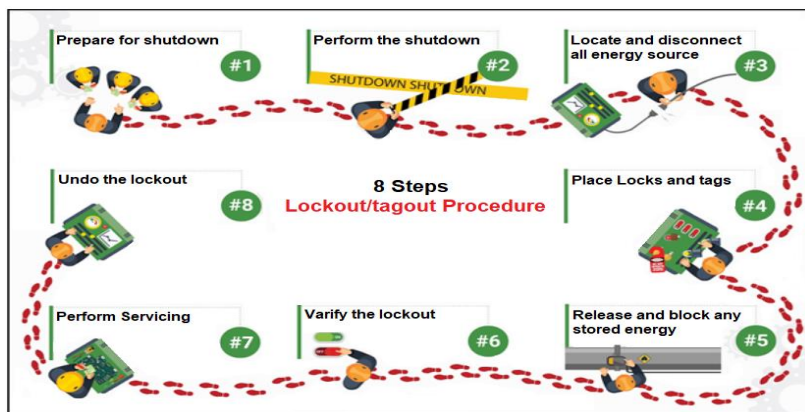
Electricity Effects on the Human Body

Condition	Effects
1-3 of current	Mild Sensation
10mA of current	Muscles Contract, releasing grip may be difficult
30mA of current	Breathing difficult, possible loss of consciousness
30-75mA of current	Respiratory paralysis
100-200mA of current	Ventricular fibrillation
50-300mA of current	Shock (Potential Fatal)
Over 1500mA of current	Tissue and organ burn
150° F	Cell destruction
200° F	Skin experience "third degree" burns

Lockout / Tagout (LOTO)

Lock out, tag out (LOTO) is a safety procedure used with energized equipment or panel to ensure that dangerous machines are properly shut off and not able to be accessed by unauthorized person.

Before beginning service or maintenance, the following steps must be accomplished in sequence and according to the specific provisions of the employer's energy-control procedure:



LOTO procedures must adhere to the Following basic Rules:

1. Follow the Developed standardized LOTO program/procedure and make sure that all employees are trained to follow.
2. Make use of tags as well as locks to prevent access to (or activation of) energized equipment and ensure that new and modified equipment can be locked out.
3. Implement guidelines for who is allowed to place and remove locks/tags. Lock shall only be removed by authorized and trained person and he is the soul responsible for locks' keys
4. Provide a means of tracking every instance of a lock/tag being applied to, or removed from, a device. This includes tracking who placed the lock/tag as well as who removed it.
5. Inspect LOTO procedures annually in order to assure that they are performing acceptably.



Electrical Panel

Hand and Power Tools

Hand Tool Safety Guidelines:

- Hand tools shall only be used for their intended purpose-use the right-hand tool suitable for the job.
- Appropriate personal protective equipment (PPE) shall be used when working with hand tools.
- Hand tools shall be inspected and maintained in accordance to manufacturer's instructions.
- Defective, worn-out or broken tools shall not be used.
- Impact tools shall be free from mushroom heads and edge tools shall be kept sharp.
- Do not use screwdrivers as chisels or pry bar. Also, the handle of the screwdriver shall be non-conductive for electrical works
- Use non-spark tools when working in flammable or highly combustible environment
- Pliers with worn out face, jaws or teeth including sprung jaws shall be replaced.
- Tools used in elevated work must be secured or placed in proper holders.



Hand Tools

Portable Power Tools Safety Guidelines:

1. Electric Tools

- Electrically portable tools shall have approved grounding unless it must be double insulated.
- Electrical equipment shall not be used in wet or damp conditions- provide ground fault circuit interrupter (GFCI) if situation cannot be avoided.
- Do not yank to disconnect and carry tools by its cord.
- Ensure that cords of electric tools do not present tripping hazard.
- Electric tools shall not be used in highly flammable areas.
- Ensure that switches and lock buttons are off before plugging to the electrical source.



Power Tools

2. Air Powered and Pneumatic Tools

- Hand and clothes shall be kept away from moving or rotating parts of air powered tools.
- Air hose connections shall be secured to prevent hoses from whipping under pressure due to accidental separation.
- A tool retainer must be connected to the pneumatic-powered equipment to prevent accidental tool ejection.
- Jackhammer handles must be covered with heavy rubber grips to reduce vibration and shock hazards.
- Pressure shall be shut off and exhausted from the air-lines before disconnecting from any tool.



Pneumatic Tools

Other Safety Guidelines:

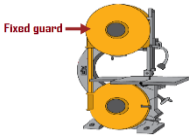
- Tasks which may require fixing of work piece must require the use of holding device, such as metal clamps or vise, rather than holding by hands.
- Hazardous moving parts of power tools shall be adequately guarded.
- Hand tools and/or portable power tools shall be stored in suitable tool box or carrier. Provide carrying belt or tool pouch when bringing sharp/pointed tools.
- Compressed air shall not be used for cleaning purposes except when reduced to 30psi.
- Operators must not wear loose or fitted clothing, neckties and jewelries when working with power tools, and must wear appropriate PPE always.

Machine Safety Guarding

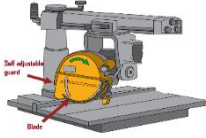
Machine guards are your first line of defense against injuries caused by machine operation.

Each machine must have adequate safeguards to protect operators and other employees from hazards created by ingoing nip points, rotating parts, sparks and flying debris.

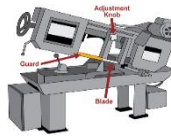
Type of Machine Guard:



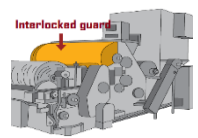
Fixed Guard



Self-adjustable guard



Adjustable guard



Interlocked Guard

All machine guards must meet these minimum general requirements:

1. **Prevent Contact** –prevent workman's body from contacting dangerous moving parts.
2. **Be Firm & Secured** – Guards and safety devices should be made of durable material and properly fixed.
3. **Protect from Falling Objects** - The safeguard should ensure that no objects can fall into moving parts.
4. **Not Create New Hazards** – The Safeguards should ensure that new Hazards are not created such as sharp edges, pinch points etc.
5. **Not Interfere with Job Performance** – Any safeguard should not impede a workman from performing the job effectively.
6. **Interlocked with machine control system** - the guard must be interlocked to disable the control system until the guard is put back in place.
7. **Allow safe Lubrication**- one should be able to lubricate the machine without removing the safeguards.

Employees must:

- ✓ Inspect all tools and guards before each use and after every interval of time.
- ✓ Use proper procedures when setting up a machine, adjusting a machine, clearing jams, and cleaning or lubricating parts.
- ✓ Never remove guards while operating a machine.
- ✓ Never introduce equipment at site without safety guard.
- ✓ Tag all damaged guards and machinery "Do Not Use" and report them immediately.
- ✓ Avoid wearing loose clothes, jewelry and any such item which can be tangled with rotating part of the machine.
- ✓ Use only that equipment having power source equipped with an emergency stopping device.
- ✓ Wear adequate PPE like gloves, safety glass, face shield while use equipment.



Power Tools

Work at Height

Work at height is work in any place at, above or below ground level, where a person could be injured if they fell from that place.

Do's	Don't
as much work as possible from the ground; work off scaffolding in preference to working off ladders; ensure workers can get safely to and from where they work at height; ensure equipment is suitable, stable and strong enough for the job, maintained and checked regularly; take precautions when working on or near fragile surfaces; provide protection from falling objects; consider emergency evacuation and rescue procedures.	overload ladders – consider the equipment or materials workers are carrying before working at height; overreach on ladders or stepladders; rest a ladder against weak upper surfaces, e.g. glazing or plastic gutters; use ladders or stepladders for strenuous or heavy tasks, only use them for light work of short duration (for example a maximum of 30 minutes at a time); let anyone who is not competent (who doesn't have the skills, knowledge and experience to do the job) work at height. go and work at height without wearing full body harness.

Scaffolding

Basically, the most common equipment to be use to perform any activity which is higher from the ground level.

A traditional way to carry out work at height in spite of having modern technology and equipment. However, just like any activity, there are risk associates with it as well.

Types of scaffolding and precaution:

Standard Tubular Frame / Tube and Clamp Scaffold



Tube and Coupler Scaffolding

- Scaffolds or work platforms shall only be erected, moved, dismantled or altered under the supervision and direction of a trained and competent scaffolders.
- The height of the scaffolding from base up to the last working level should be 4:1 and should be held back with tiers, support bracings connected to building or structure.
- Scaffolds erected 6 feet and above are required to have an inspected by scaffolding inspector prior to issue the tag. The tag shall be update at every interval of time.

- Scaffolds with a height of 40 feet and above shall be erected by a specialized scaffolding erector and proponent shall submit a scaffold safety/erection plan.
- All scaffold components shall be visually inspected before each use. Damaged or defective scaffolds shall be taken out of service immediately.

- Scaffold planks shall be of size 38mm thick and 225mm wide (1.5in x 9in), and bear a marking that it had undergone proof testing and shall have a certificate of compliance. Gaps between planks must be less than 25mm (1in).
- Planks shall not be painted and secured to prevent slippage. It may extend from a minimum of 15.2cm (6in) to a maximum of 30.5cm (12in) beyond the end of the frame.
- Complete guardrail system (top rails/mid-rails/toe boards) shall be installed along all open sides and ends of the platform. It shall be able to support without failure a side force of 200lbs (90kg).
- Set top rail 1m to 1.15m (39.5in to 45in) high, mid-rails at center between platform and top rail, and toe boards at 100mm (4in) high.
- Ladders longer than 3ft (10m) shall be secured at the center point and projection on the deck of working platform should be at least 3ft (1m).
- Scaffold base plates shall be supported by timber or other stationary means to provide stability.
- Scaffolds erected near excavations or trenches must be more than 6ft (1.8m) away.
- Work on elevated heights (including scaffolds and other temporary elevated work platforms) shall be suspended during rain, storms and/or high winds of 40mph (65kmh).
- Scaffolds shall not be overloaded; barrels, boxes, containers, drums or similar unstable objects shall not be used as work platforms or to support scaffolds.
- When guardrails are down or there is potential fall hazard, workers shall use the appropriate personal fall protection system.
- Inspection of scaffold shall be done after rain, heavy wind, accident or inspection due date.

Mobile or Rolling Scaffold

- No one is allowed to be on the mobile scaffold platform while moving.
- The height of mobile scaffolds shall not exceed four times the minimum base dimension.
- Provide locking/braking mechanism for caster wheels and it shall be locked when scaffolding is not in motion.
- Work platform shall be planked on the full width of the scaffold and secured to prevent movement.
- Obtain assistance when moving scaffolds. Ensure that the route is clear and watch out for holes and overhead obstructions.
- Secure or remove all loose materials and equipment before moving the scaffold.



Mobile Scaffolding

System, frame or aluminum Scaffolds

- All system scaffolds shall be erected as per manufacturer's instructions and requirements.
- Scaffold components of system scaffolds shall not be interchangeable.
- Unless otherwise, specified, all system scaffolds shall be vertically braced in both directions with diagonal braces (as close to 45° as possible) to its full height for each 10m (33ft) run.
- Applied loads on posts, runners, bearers and diagonal braces shall not exceed the load carrying capacity of the manufacturer's specifications.
- Properly designed scaffolds are suitable for light-duty, medium-duty or special duty loading.



System Scaffolding

Ladders

Straight, Extended and “A” type ladders

- Select the right ladder for the job. Ladder has label certifying that it complies with specifications of the American National Standards Institute (ANSI)
- Inspect the ladder each time before use. Check for loose or damaged rungs, step, rail or braces



“A” Type Ladder

- Set up the ladder with care. The area around the base be uncluttered and the ladder should be set on a solid, level surface.
- “A” Ladder should be fully opened and braces/fixed spreaders.
- Never reach too far to either side or to the rear and never climb higher than the second step from the top on a ladder
- Always face the ladder and use both hands to climb and descent. Keep three limbs on the ladder at all times
- Carry tools in a tool belt or raise and lower them with a hand line.
- If the work involves possible contact with sources of electrical current an aluminum ladder is not suitable use ladder made of fiberglass.
- Set straight/extended ladder into 4:1 ratio or in 75-degree angle.
- Erect the ladder so it extends at least 3 feet beyond the landing platform, and then tie off the top at support points

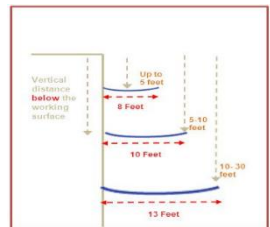
Fall Protection System

Guardrail System: - A rail at the edge of something such as a scaffolding, a cliff that prevents people from falling off.

- The height of top rails must be 45” to 38” inches above the walking-working surface
- Mid rails are installed at a height midway between the top edge of the guardrail system and the walking-working surface
- Screens and mesh shall be extended from the walking-working surface to the top rail.
- Top rails and mid rails are at least 0.25-inches (0.6 cm) in diameter or in thickness.
- Guardrail systems are capable of withstanding, without failure, a force of at least 200 pounds
- Guardrail system shall be consisted with toe-board which must be 6” inch high from the surface.

Safety net systems: - Safety nets are classified as a passive fall protection system which can be installed as either a barrier to prevent a fall, or beneath the work to catch a falling worker.

- Safety nets shall be provided when workplaces are more than 25 feet above the Surface.
- Nets shall extend 8 feet beyond the edge of the work surface and shall be installed as close as practical, but not more than 25 feet below work surface
- The mesh size of nets shall not exceed 6 inches by 6 inches. Must have 17,500 foot-pounds minimum impact resistance.
- Net sag must not less than 34 inches and not more than 39 inches above the working surface
- Net shall clearly visible from a distance of 25 feet away, and anywhere within the designated area.

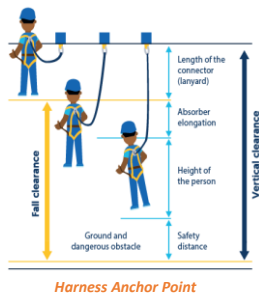


Net Distance from working surface

Hole Cover: - Every floor hole into which persons can accidentally walk shall be protected by a cover that leaves no openings more than one (1) inch wide.

- Covers shall be capable of supporting without failure, at least twice the weight of employees
- All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.
- covers shall be color-coded or they shall be marked with the work “HOLE” or “COVER” to provide warning of a hazard

Personal fall protection



- Any personnel travelling or working on elevated areas 6 feet (1.8 meters) and above are required to wear the appropriate fall protection equipment. It will be attached to an anchor point capable of supporting without failure a force of 5000lbs (2270kg) or greater.
- Employees selected to work on elevated heights shall be competent and trained in recognizing potential hazards and proper wearing of personal fall protection system.
- Employees using fall protection equipment shall inspect all parts and components, including proper fit. Do not use damaged or worn-out fall protection equipment

Steps of Wearing Full body Harness



- Step 1: Always hold harness by back D-ring. Shake harness to allow all straps to fall in place
- Step 2: If chest, wrist and legs straps are buckled, then release strap and unbuckle
- Step 3: Wear straps over shoulders so D-ring located in middle of back (between shoulder blades)
- Step 4: Pull leg strap between legs and connect to opposite end. Repeat with second leg straps.
- Step 5: Connect chest strap buckles, position in mid-cheat area and tighten and straps.
- Step 6: After all straps have been buckled, tighten all the buckles so that harness fits on the body.

General Site Safety Rules

Note: *These guidelines provide a general overview but not limited to the items stated below. Additional safety precautions may be required based on the operational activities and conditions in any ZP Project site*

- ✓ Follow company safety policies and procedures, as well as permit system.
- ✓ Wear the appropriate Personal Protective Equipment (PPE) required in the job.
- ✓ Attend daily Tool box talk and training conduct by Zamil projects or by client.
- ✓ New workers must undergo safety orientation and induction prior to introduce at workplace.
- ✓ Do not perform hot work activity other than designated hot work area, fire extinguisher is must.
- ✓ Store hazardous substances in designated area only and as per MSDS.
- ✓ Conduct housekeeping in the workplace before and after completion of job and maintain.
- ✓ Know the safe operating procedures before using any equipment and/or machines.
- ✓ Do not operate machines or equipment unless you are trained, qualified, and authorized.
- ✓ Use only the correct, inspected tools and equipment for the job, as well as safe scaffolding.
- ✓ Running, horseplaying or coming to work area in an intoxicated condition is prohibited.
- ✓ Fire extinguishers and emergency equipment shall be inspected regularly and at every fix interval.
- ✓ Emergency services shall not be obstructed with materials and must be accessible easily.
- ✓ Smoking is permitted on designated areas only. Do not smoke at work Place.
- ✓ Eating or resting is allowed in designated areas and timings, do not rest or sleep at work area.
- ✓ Vehicle operators at site shall follow traffic rule, safety sign and always wear seat belt.
- ✓ Report all unsafe acts and conditions as well as incident to your supervisor or ZP HSE.
- ✓ Conduct Risk assessment at workplace and Stop any activity that has potential to turn into hazard.



Confined Space

Any Place with limited means of access/egress but large enough to enter and conduct work. It might have hazardous atmosphere basically not suitable for human inhabitants for long is classified as confined space.

For e.g. tanks, silos, hoppers, vaults, pits, furnaces, tunnels, sewers, pipelines, crawl spaces, process vessels.

"What could be the hazardous in Confined Space!!!"

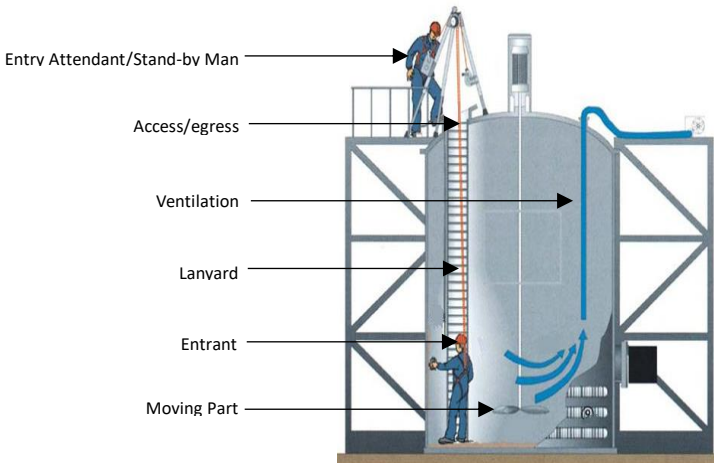
- Enrichment/deficiency of Oxygen
- Toxic gases and atmosphere
- Excessive cold/heat condition
- Fire, electricity and explosion
- Falling Hazard while access/egress
- Engulfment/trapped inside
- Sudden Flooding
- Flammable and Explosive atmosphere

Basic requirements and guidelines:

- The first requirement to enter a confined space is a valid entry permit as well as addition work permit. Verified and signed by all the concern person such as engineers, work supervisor.
- Only Trained and competent person shall be allowed to enter and work in confined space.
- Gas testing shall be performed before entry of workers in the confined space.
- Hot work shall not be allowed in oxygen enrichment atmosphere. (23.5% and above)
- Use Self-Contained Breathing Apparatus (SCBA) for oxygen-deficient or hazardous atmospheres, as well as other PPE as per assignment requires.
- A trained attendant/stand-by man must be available at the entry point. He must be fully equipped and must know about the emergency procedure.
- Stand-by man must Maintain an entry log sheet with entrants' name and time and must be signed by the confined space entrants at each access and egress.
- Confined space shall be provided by adequate lighting and good ventilation.
- Use battery powered equipment/power tools and do not use more than 24 volts in confined space.



Danger Signages



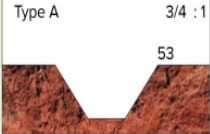
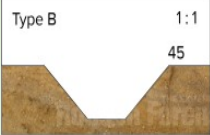
Confined Space

Excavation and Trenching

Excavation: Any man-made cut, cavity, trench, or depression in the Earth's surface formed by earth removal.

Trenches: A trench is a type of excavation or depression in the ground that is generally deeper than it is wide. But the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m)

Soil Classification

■ Stable rock -Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed -Slope at 90° or vertical -Example: Granite and sandstone	Stable Rock Vertical  90
■ Type A soil -Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot or 144KPa or greater -Slope (H:V) at ¾:1 or at angle of 53° -Examples: Soils: clay, silty clay, sandy clay or clay loam.	Type A  3/4 : 1 53
■ Type B soil -Cohesive soils with an unconfined compressive strength greater than 0.5tsf (48KPa) but less than 1.5tsf (144KPa) -Slope (H: V) at 1:1 or at angle of 45° -Examples: Soils (mixed): angular gravel, silt, silt loam	Type B  1 : 1 45
■ Type C soil -Cohesive soil with an unconfined compressive strength of 0.5tsf (48KPa) or less -Slope (H:V) at 1½:1 or at angle of 34° -Examples: Gravel, sand, loamy sand or submerged soil	Type C  1-1/2 : 1 34

Protective System

A cave-in occurs when walls of an excavation collapse

Benching: type of excavation that consists of a series of horizontal steps with near-vertical surfaces between them

Sloping: a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation.

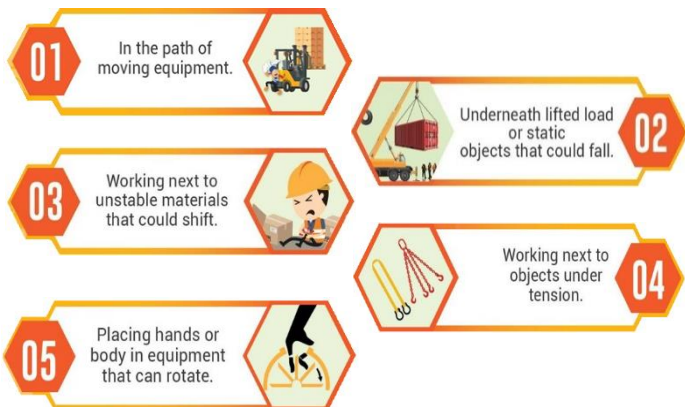
Shoring: A shoring system is used to support the face of an excavation and to prevent movement of soil.

Excavation Safety Guidelines:

- ✓ Buried utilities such as telephone lines, electrical cables, sewer lines, and water supply pipes, fire protection piping systems or any underground installations that can be potentially hit during excavation works shall be identified prior to start of digging.
- ✓ Start Excavating manually and use trenching system to avoid damaging underground/buried pipes and cables.
- ✓ Vertical excavations (trenches) that are 4ft (1.2m) deep or more shall be shored.
- ✓ Trench excavation of 4ft (1.2m) depth or more shall be considered as confined space; thus, safety requirements for confined space can be applied.
- ✓ Spoils, surcharge or any materials shall not be placed within 2 feet (0.61 meters) from the edge of any excavation or trench.
- ✓ Excavations shall not be left unsecured regardless of their depth-structural barricades, warning tapes, safety signs, suitable lightings and ropes shall be deployed.
- ✓ A watchman is required when depth of the excavation is within the shoulders of the workers who performed the digging.
- ✓ Heavy equipment (mobile or stationary) shall be prohibited from operating within 6ft (1.8m) from the edge of any excavation or trench.
- ✓ Atmospheric testing is required before workers enter an excavation greater than 4 feet (1.22 meters) in depth where an oxygen deficiency or a hazardous atmosphere is present
- ✓ Provide ladders, steps, ramps, or other safe means of access/egress not more than 25 feet (7.62 meters) for workers working in trench excavations 4 feet (1.22 meters) or deeper
- ✓ Worker who enters a bellbottom pier hole or similar deep and confined footing excavation wears a harness with a lifeline.

Line of Fire

The path of moving object, or the release of hazardous energy, intersects with an individual's body

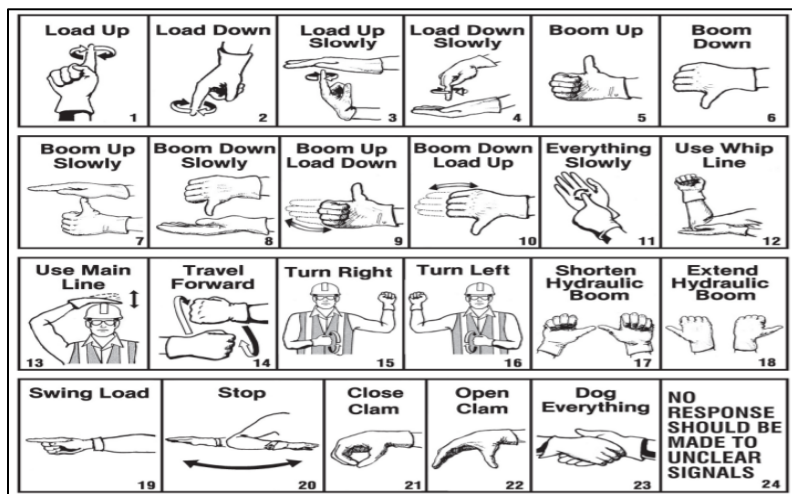


Crane, Hoisting and Rigging

A crane is a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine. Cranes whether fixed or mobile are driven manually or by power. Crane commonly used at workplace Overhead Cranes, truck mounted crane, mobile crane, crawler crane and tower crane.

Hoisting and Rigging equipment such as wire rope, sling, clevis, jacks used with cranes and other lifting equipment in material handling.

Hoisting Hand signal



Chain Hoist Safety Precaution:



Chain Hoist

- Inspect for defects prior to use.
- Do not overload, maintain the SWL.
- Working load limit (WLL) should be marked on device.
- Do not apply the load to the tip of the hook.
- Do not use the hoist chain as a sling or choker. Use separated sling.
- Do not leave the suspended load unattended. Barricade the area.
- Keep hoist chain straight. Do not tangled.
- Stand clear of load and pulling path of hoist chain.
- Keep upper and lower hooks in a straight line so that the frame is free to swivel.
- Do not use a hoist with a twisted, kinked, damaged, or worn chain.
- Ensure that anchorage and structure will support the load.
- Ensure that load chain is properly seated in wheels or sprockets before lifting.

Crane Lifting Near Powerlines!!! Keep the boom distance

Keep the Minimum Distance from Powerlines

Normal phase-to-phase voltage rating	Minimum distance
750 or more volts, but no more than 150,000 volts	3 metres
Over 150,000 volts, but no more than 250,000 volts	4.5 metres
More than 250,000 volts	6 metres
Beware: The wind can blow powerlines, hoist lines, or your load. This can cause them to cross the minimum distance.	



This crane boom could reach within the minimum distance.

- Only authorized operators with valid 3rd party Certificate shall operate the overhead cranes and mobile cranes.
- Inspect/check the equipment as per Zamil Projects Heavy equipment checklist prior to allow the lifting activity at site, any defective part shall be informed to activity supervisor.



Mobile Crane

- Do not move lifted load over other employees and do not work under suspended load. Likewise, suspended load shall not be left unattended.
- Ensure that the rated capacity printed in the crane bridge and on the rigging, equipment is not exceeded following the Safe Working Load (SWL). Following the load chart provided by manufacturer.
- Use spreader beam for long span materials and plate clamps when lifting long load like porta cabin or HVAC chiller/unit.
- Authorized operator shall be familiar with the Crane Hand Signals as well as training rigger shall be available during lifting to guide the crane operator.
- Always use correct rigging equipment as per the type of the load. Inspect all the rigging equipment like sling, shackle, chain hoist. Defective equipment shall be removed and destroyed.
- Do not leave chain sling or crane pendant hanging on the aisle ways.
- Park the overhead crane on a safer area with bottom block raised at least 7ft (2m) from the floor.
- Crane out-triggers shall be fully extended and fix on ground. Crane tires shall be suspended on the out triggers while lifting.
- Newly installed cranes and hoist shall be subjected for load testing as well as fixed cranes that have major modifications-a load test of 125% of the rated capacity is acceptable. All Cranes must have valid load test Certificate.
- Critical lift plans shall be required for some conditions and activities (i.e. operating around power lines, excessively heavy loads, tandem/multiple lifts, high level and long reach crane lifts.
- Crane boom shall maintain distance from energized powerline as per (shown is above figure). All powerlines shall be treated as energised until ensure about the disconnection from concern department.
- Check the wind speed prior to start lifting activity. The speed of the wind shall be 20mph or as per the site lifting procedure.



Tower Crane

Forklift

Only trained and certified workers may operate a forklift. Ensure operators are trained on types of trucks in use. Remove from service any forklift found to be in unsafe operating condition.

- Always operate the vehicle according to the manufacturer's instructions.
- forklift license is absolutely required to operate a forklift.
- Always wear a seatbelt when operating forklift.
- Never exceed the rated load and ensure it is stable and balanced.
- Do not raise or lower the load while traveling.
- Keep a safe distance from platform and ramp edges.
- Be aware of other vehicles in the work area.
- Have clear visibility of the work area and ensure.
- you have enough clearance when raising, loading, and operating a forklift.
- Use proper footing and the handhold, if available, when entering the lift.
- Use horns at cross aisles and obstructed areas.
- Watch for pedestrians and observe the speed limit.
- Do not give rides or use the forks to lift people.



Forklift

Aerial Lifting

An aerial lift is any vehicle-mounted equipment used to elevate or provide temporary access for people to inaccessible areas, usually at height. They may be powered or manually operated and are considered to be aerial lifts whether or not they can rotate around a primary vertical axis.

Types of aerial lift used at Zamil Projects Work Place:



Scissor lift



Man-Lift

Hazards Associated with Aerial Lifts identified by OSHA

- Fall from elevated level,
- Objects falling from lifts,
- Tip-overs,
- Ejections from the lift platform,
- Structural failures (collapses),
- Electric shock (electrocutions),
- Entanglement hazards,
- Contact with objects,
- Contact with ceilings and other overhead objects.

Safety Measures to be taken:

- Conduct a pre-start inspection to verify the equipment and its components are in safe operating condition such as Leaks of Hydraulic fluids, wheel/tires, steering & brakes, Loose or missing parts, Guardrail system, emergency control devices.
- Conduct work area inspection for hazards and take corrective actions to eliminate those hazards such as unstable surface or slope/ditch/bumps, inadequate ceiling height or other overhead obstruction, wind speed or adverse weather condition.
- Ensure that access gates or openings are closed prior to accessing height.
- Do not climb / lean over guardrails or use plank, ladder as a working platform.
- Use a body harness or a restraining belt with a lanyard attached to the boom or bucket. Do not tie-off to adjacent structures.
- Do not exceed the load-capacity limits. Take the combined weight of the worker(s), tools and materials into account when calculating the load.
- Do not use the aerial lift as a crane. Object carrying in the platform shall not be larger than the platform.
- Do not drive with the lift platform raised.
- Do not operate lower level controls unless permission is obtained from the worker(s) in the lift (except in emergencies).
- Do not operate an aerial lift in high winds above 20 MPH.
- Treat all overhead power lines as energized and stay at least 10 feet (3 meters) away. Ensure that the power line has been de-energized prior to work.
- Use wheel chocks on sloped surfaces when it is safe to do so.
- Set up work zone warnings, such as cones and signs to warn others.



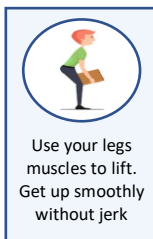
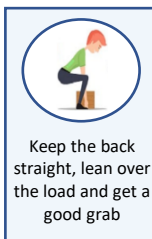
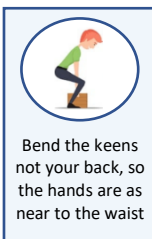
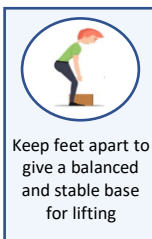
Manual Material Handling and Storage

Manual material handling is the process which does not involve any automatic equipment or system but moving and handling objects through a series of biomechanical functions including carrying, holding, lifting, pulling, pushing, and stooping on a regular basis.

Manual Handling can be hazardous if a worker:

- uses poor lifting techniques (lifting too fast, often or too long; back bent or while twisting)
- Has to move material over long distances and Walking surfaces that are uneven, sloping, wet.
- Lifts or handles more than they can control safely.
- Does not take appropriate rest breaks; insufficient recovery time or Working at high pace.
- Movement is restricted because of clothing or personal protective equipment.

Steps of Manual Lifting



Stacking and Storing Safe Practice:

- Stack lumber no more than 16 feet high if it is handled manually and 20 feet if using a forklift.
- Stored materials inside under construction buildings at least 6 feet from hoist ways or floor openings and at least 10 feet away from exterior walls.
- Stack and level lumber on solidly supported bracing. Ensure that stacks are stable and self-supporting
- Do not store pipes and bars in racks that face main aisles to avoid creating a hazard to passersby.
- Stack bagged material by stepping back the layers and cross-keying the bags at least every ten layers. Band boxed materials or secure them with cross-ties or shrink plastic fiber.
- Chock the bottom tier of drums, barrels, and kegs on each side to prevent shifting in either direction.
- Place planks, sheets of plywood dunnage, or pallets between each tier of drums, barrels, and kegs to make a firm and flat.
- Take extra precaution while storing hazardous material like paint, chemical or flammable substance. Do not left them exposed and store as per MSDS.
- Keep storage areas free from accumulated materials that cause tripping, fires, or explosions, or that may contribute to the harboring of rats and other pests.
- Provide walkways or passage in between stacked materials to walk. Barricade the area, provide signages and prohibited unauthorized entry.



Compressed Gas Cylinder Safety

A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg. C) (*OSHA Hazard communication standard*)

Safe Usage and Handling:

- ✓ Safety Data Sheets (SDSs) for all the compressed gases must be available as a reference for the staff.
- ✓ Do not accept or use any gas cylinder without a clear label, and without contents mentioned on it. Labels should be on the cylinders, and not on the caps, as the caps can be interchanged.
- ✓ Do not rely on color-coding of the cylinders to identify the contents, as color codes vary from one supplier to the other.
- ✓ Secure all the gas cylinders with chains at all times to prevent tipping while using or in storage.
- ✓ Cylinder valves should be capped until they are securely connected for use. Regulator must be examining prior to connect.
- ✓ Visually inspect the regulator valves, and hoses before using the cylinders with Zamil Projects CGC Checklist.
- ✓ While opening the valve, position yourself such that valve outlet faces the other direction, and slowly open the valve and use tools provided with cylinder.
- ✓ Use appropriate PPE while using compressed gases.
- ✓ Do not roll or drag the cylinders during transportation or drop the cylinders on the floor, or strike them against any surface.
- ✓ Transport the cylinders by using a suitable hand truck/wheeled cart, equipped with chains/straps to secure them.

Safe Storage of Compressed Gas Cylinder:

- ✓ Storage areas for compressed gas cylinders must be dry and well ventilated to avoid gas accumulation
- ✓ Gas cylinders should not be stored in aisles, walkways, and near exits.
- ✓ Compressed gas cylinders must be in an upright position and supported at all times, whether full or empty. Acceptable methods of support include:
 - wall-mounted or bench-mounted gas cylinder brackets;
 - chains or belts anchored to walls or benches; and,
 - free-standing dollies or carts designed for gas cylinders and equipped with safety chains or belts.
- ✓ Compressed gases must be grouped and stored as per their hazard class. Must not be mixed.
- ✓ Empty cylinders should be stored separately with labeled written "EMPTY" on it.
- ✓ Oxygen cylinders and flammable gas cylinders (acetylene) must be at least 20 feet (6-meter) of free space apart, or should have a 5 feet firewall partition having minimum half hour fire rating.
- ✓ Store the flammable gas cylinders in a well-ventilated area, away from sources of ignition.
- ✓ Never allow storage temperature to exceed 125°F (52°C). keep away from direct sunlight. Use fire blanket to cover cylinder if in direct sun light.
- ✓ Never expose cylinders to corrosive substance or materials.
- ✓ Storage area shall be equipped with suitable types and numbers of fire extinguisher.
- ✓ Remove all manifolds and regulators, secure the valve cap, and chain or strap the cylinder to the cart before moving.

Chemical Storage

- Ensure all containers of hazardous chemicals are properly labeled with proper identification.
- Segregate and store different class of chemical away from other groups may cause reaction if mixed.
- Flammable chemical should be stored in flammable materials storage.
- Chemicals should be stored no higher than eye level and never on the top shelf of a storage unit.
- Avoid storing chemicals on the floor, use dip tray instead and spill container.
- Liquids should be stored in unbreakable or double-contained packaging.
- Volatile or highly odorous chemical shall be stored in a ventilated cabinet.
- Look for unusual conditions in chemical storage areas, such as:
 - Improper storage of chemicals
 - Outdated chemical inventory and MSDS
 - Leaking or deteriorating containers
 - Spilled chemicals
 - Temperature extremes (too hot or cold in storage area)
 - Lack of or low lighting levels
 - Blocked exits or aisles
 - Doors blocked open, lack of security
 - Trash accumulation
 - Open flame or spark
 - Fire equipment blocked, broken or missing
 - Lack of information or warning signs (*"Flammable liquids", "Acids", "Corrosives", "Poisons", etc.*)
- First aid supplies, emergency phone numbers, eyewash and emergency shower equipment, fire extinguishers, spill cleanup supplies and personal protective equipment should be readily available and personnel trained in their use.
- Maintain spill kit box which must be consisted with equipment (rubber gloves and boots, safety goggles and face shield, chemical cartilage mask, disposable bag, absorbent pads/socks) required in case of chemical spill.
- Chemicals storage shall be sealed and labeled with the authorized person name and phone number.
- Keep all stored chemicals, especially flammable liquids, away from heat and direct sunlight.



An Oil Leak or Spill Can Have Disastrous Effects On The Environment

How to deal with chemical spillage!!!

- ✓ Stay calm, do not panic
- ✓ marked the spilled area and put a spill signage.
- ✓ Identify the spilled chemical and refer its MSDS.
- ✓ Wear proper PPE and use equipment from spill kit box.
- ✓ Stop all nearby hot work activities
- ✓ Shut off any possible ignition sources around if it safe to do so.
- ✓ Trained staff shall perform the cleanup.
- ✓ Evacuate the area. In case of major spill
- ✓ Call the emergency number and provide complete details of the chemical spill, and injured person(s) if any.
- ✓ Attend to injured person(s) and provide First Aid until the emergency services arrive at the location.



Spill Kit

Hazard Communication

Employees working with hazardous material must be aware of the way of hazardous communication which provides information about potential sources of injury. Specifically, hazardous chemicals in the workplace.

These employees must undergo training on safe use, handling and storage of hazardous substances. They must know the required PPE, exposure limit and the steps to be taken in the event of accidental release and emergency response procedures.

"How to Identify a chemical and related hazard?"

1. Pictogram and Hazard: (OSHA Hazard Communication Standard 29 CFR 1910.1200 (HCS))

These are the sign which can be seen on the hazardous substance container.

Health Hazard  • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	Flame  • Flammables • Pyrophoric • Self-Heating • Emits Flammable Gas • Self- Reactive • Organic Peroxide	Exclamation Mark  • Irritant (Skin & Eyes) • Skin Sensitizer • Acute Toxicity • Narcotic Effects • Respiratory Irritant • Hazardous to Ozone	Gas Cylinder  • Gases Under Pressure	Corrosion  • Skin Corrosion • Skin Burn • Eye Damage • Corrosive to Metals
Exploding Bomb  • Explosives • Self-Reactive • Organic Peroxide	Skull and Crossbones  • Acute Toxicity (Fatal or Toxic)	Flame Over Circle  • Oxidizers	Environment  • Aquatic Toxicity	

2. Material Safety Data Sheet (MSDS):

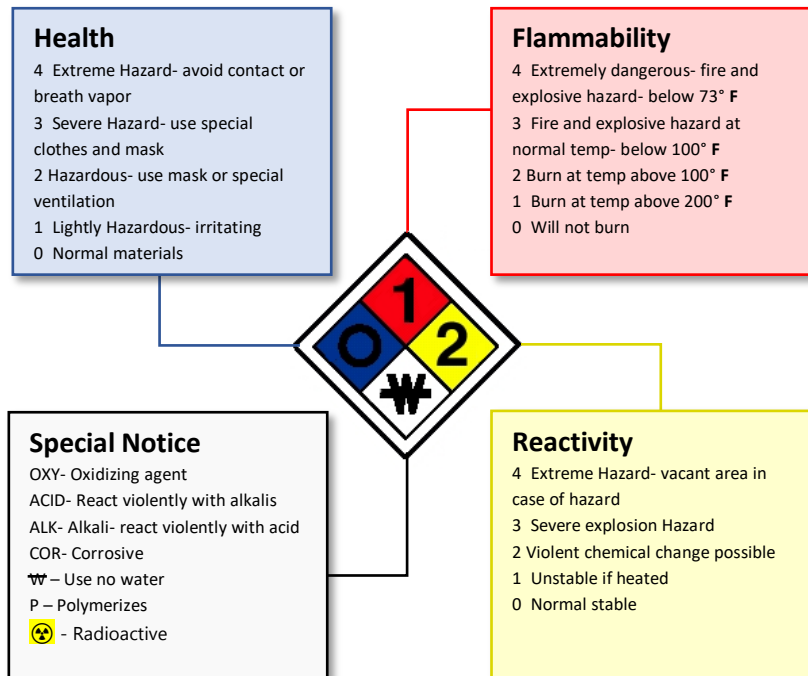
The Material Safety Data Sheet (MSDS) is a written document that provides comprehensive information of a material/mixture, especially chemicals or hazardous substances used in the workplace.

The MSDS shall have the following information:

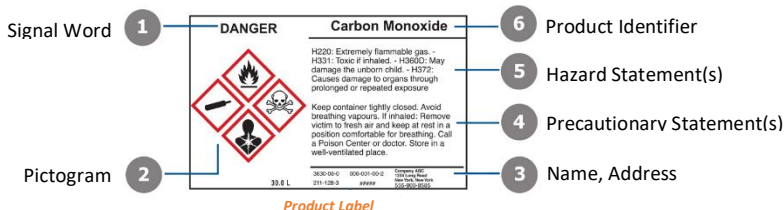
- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Identification 2. Hazard(s) identification 3. Composition/ ingredients 4. First-aid measures 5. Firefighting measures 6. Accidental release measures 7. Handling and storage 8. Exposure control/personal protection | <ol style="list-style-type: none"> 9. Physical and chemical properties 10. Stability and reactivity 11. Toxicological information 12. Ecological information 13. Disposal considerations 14. Transport information 15. Regulatory information 16. Other information |
|--|---|

3. Warning label:

How to read a warning label



4. Product Label



label must include information as per below:

- All containers/drums or hazardous substances must be labeled accurately and displayed notably.
- Employees shall be trained to understand the labels and adherence to MSDS.
- Avoid exposing employees to more than the allowed maximum concentration of chemicals.
- No waste (solid, liquid, hazardous or poisonous) shall be disposed or discharged in public sewage.
- Only authorized contractors (accredited by The Presidency of Meteorology) are allowed to transport hazardous waste generated by any Business Unit.

Non-Destructive Testing

Non-destructive testing (NDT) is a testing and analysis technique used at workplace to evaluate the properties of a material, component, structure or system for characteristic differences or welding defects and discontinuities without causing damage to the original part.

"Most common Non-Destructive Testing at Zamil Projects Workplace"

Hydrostatic Test

A way in which vessels such as pipelines, plumbing, gas cylinders, tanks fill with water and pressurized the vessels with specified test pressure to check strength and leaks.

Hydraulic testing is a hazardous process and should be performed with caution by competent personnel.

- Hydro test Area shall be barricaded and provide warning signages to prevent unauthorized entry.
- Calibrated pressure gauges and Pressure safety valves with 3rd party certificate shall only be used. Must have capacity to handle min 1.5 times of designed pressure.
- Rating of fittings, pressure gauges, vent valves, gaskets shall be suitable for the test pressure.
- Ensure air vent provided at the highest elevation and must be kept open while filling of vessels.
- Pressure should be raised gradually under control to allow time for pipes to strain and time for personnel to check for leaks.
- There shall be at least two pressure gauges, one at lowest point and another at the highest point.
- Hydro testing crew should not stay in the direction of the blind flanges to prevent injury in case of flange rupture. Access shall be free from any obstacle.
- Personnel shall not approach the system under high Pressure. Only essential and trained persons shall be allowed at the Hydro test work location
- Supervisors shall be present at work location during hydro testing activities are done. Risk assessment shall be done prior to test.
- Drain the hydrotest water on in adequate drainage.
- Always wear appropriate personal protective equipment (PPEs)

Know the Component of Hydrostatic Test



Manual Pump



Manifold



Pressure Gauge



Pressure Valve



Motor Pump



Water Hose



Air Vent



Hose Arrestor

Components Related Hazards:

1. Breaking/failure of line, gasket, flanges, hose and gauges.
2. Air entrapment inside the pipe due to unavailable of air vent.
3. Shock/Electrocution/fire due to Usage of an engine operated pump.
4. suddenly increase of pressure due to underrated or non-calibrated pressure gauges.
5. Usage of Substandard/fabricated manifold.
6. Pressure safety valve failure.

Pneumatic Test

It is potentially more dangerous than hydrostatic because of the higher level of potential energy. It is performed with gas instead of water specially nitrogen and non-flammable gas.

Basic Safety Measures to be taken:

- Ensure the permit is valid and all the necessary document has been attached.
- Inform about the activity to people working nearby and secure the area for unauthorized entry.
- Secure the gas (nitrogen) cylinder so that unauthorized person shall not be able to operate.
- Verify the gas to be used for filling vessels must be non-flammable such as argon or nitrogen.
- Always use flash back arrestor and must be fixed at both the end of hose connected with acetylene cylinder and torch.
- Ensure the cylinders are stored at vertical position and on the cylinders stands.
- Do not exceed the pressure limit mentioned on permit or in work procedure.
- Use calibrated components with 3rd party certificate such as pressure gauge.
- Only trained/competent person shall be allowed to perform the test.
- Wear appropriate PPE during test. Face shield and hearing protection is required.
- Provide fire extinguisher at the testing area and with acetylene and oxygen cylinder which might be use to rectify the leakage found during testing.



"Incidents could be occurred during testing"

Below are some examples:

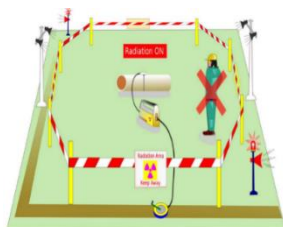
1. Vessels or pipe line blast due to high pressure present in the line.
2. Stuck-by flying object such as sharp pieces of pipes in case of pipe blast
3. Fire during rectification of leakage by welding or brazing.
4. Fire/blast of acetylene cylinder. Due to not using of flash-back arrestor.
5. Suffocation due to oxygen deficiency and enrichment of nitrogen if released in air



Radiographic Testing

Technic that involve x-ray or gamma rays to inspect the internal structure of component and welding repairs such as pipe and vessels.

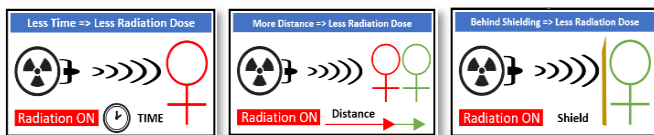
- Every member of radiography team is obliged to abide by the policies and procedures of the department.
- Dose monitoring devices should be worn at all times like pocket dosimeter
- Use proper shielding (lead apron, lead glass, thyroid shield)
- Barricade the area with warning tape and install light indicator at every access.
- Move away from the source if your presence is not necessary.
- Anybody not needed during a procedure should stay outside the radiography area.



Radiography Testing

The three principal mechanisms of radiation protection are:

1. Time: The radiation intensity decreased inversely with the square of the distance from the source.
2. Distance: The radiation exposure rate depends upon exposure time. The less time, lower the exposure rate shall be applied.
3. Shielding: Materials such as lead, steel, or concrete are commonly used to reduce radiation. Half value thickness and tenth value thickness of shielding material are shown in the table.



Annual Radiation Exposure Limits (Nuclear Regulatory Research-U.S.A.)

No.	Human Tissues and Organs	Employee Type	Duration	Equivalent Dose (mSv)
1	Lens of an eye	Ionizing Radiation (IR) Worker	1 yr. dosimetry period	150
		Other employee not engaged in IR/Public	1 calendar year	15
2	All Others (i.e. red bone marrow, breast, lungs, gonads, skin & extremities)	Ionizing Radiation (IR) Worker	1 yr. dosimetry period	500
		Other employee not engaged in IR/Public	1 calendar year	50
3	Hands and Feet	Ionizing Radiation (IR) Worker	1 yr. dosimetry period	500
		Other employee not engaged in IR/Public	1 calendar year	50
4	Whole Body	Ionizing Radiation (IR) Worker	1 yr. dosimetry period	20
		Other employee not engaged in IR/Public	1 calendar year	1
Note:	mr/hr= millirem per hour mSv = millisieverts mrem = millirem; 1 mrem = 10μSv = 0.01mSv; or 1mSv = 100 rem; mSv = millisieverts			

General Rules of Good Practice:

- Reduce unavoidable radiation exposure. Use any available shielding as additional safeguards.
- Maintain maximum distances while still keeping direct visual contact of radiation areas
- Consider all hazards involved in the work, such as mechanical, electrical, chemical, biological and fire.
- Keep radioactive containers covered when not in use. Monitor work surfaces and equipment for contamination.
- After working with radioactive materials, personnel should wash their hands and check hands and shoes for contamination.
- Use additional shielding such as bags of lead shot if we need any time.
- Use a survey meter, dosimeter, and film badge. Ensure that radiation exposure record keeping is available.
- Eating, drinking, smoking, food storage shall be prohibited in area where radiation may be present.
- Surround radiation areas with suitable barriers, bunker shields and warning signs. Do not allow workers who are not trained to enter any radiation sites or areas
- Personnel or technicians performing ionizing radiation activities must be experienced, qualified, adequately trained and competent. He shall wear the appropriate PPE (compliant to ISO 8194 or equivalent standard)



Radiation Symbol

Motor Solo Run Test

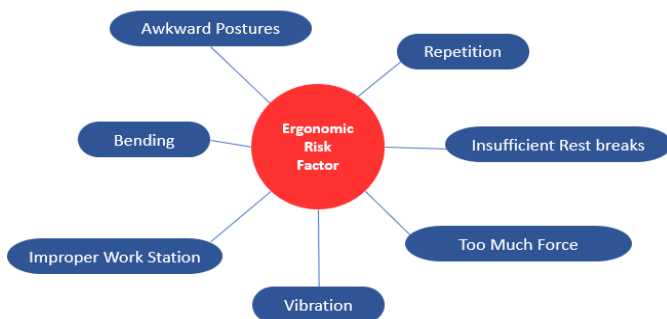
A condition when an electric motor is subjected to a running/spinning test without any attachment to its own shaft or other part of the equipment. It may be non-destructive depends on the type of equipment.

- Work Permit shall be prepared prior to start activities. All safety materials/ equipment like warning signs, barricade, fire extinguisher etc. must be in place at work area.
- Visually inspect the motor for proper grounding as well as foundation to ensure that the motor is properly secured.
- Ensure that the motor has been disconnected from its own shaft or from any part of the equipment.
- Check if motor has been properly lubricated prior to start the activity to avoid any friction or heat.
- Wear adequate PPE like hand gloves and ear plugs to avoid unusual noise.
- Check that start/stop pushbutton on the switchgear is functioning properly.
- Only competent person shall be allowed to commence the activity and unauthorized person shall keep away.
- Area shall be barricaded. Provision of fire prevention shall be available at the workplace.
- Other electrical safety precaution (motioned in electrical safety section) shall be followed during motor solo run.
- Procedure of LOCKOUT/TAGOUT shall be implemented during motor solo run testing activity.

Workplace Ergonomic

Ergonomics safety ensures that the products, methods, and environment that a worker uses are appropriate to fit the worker's job requirements and personal capabilities. The goal is to reduce Work-Related Musculoskeletal Disorders (WRMSDs) and eliminate injuries associated with the overuse of muscles, bad posture and repeated tasks.

Factor Affecting Workplace Ergonomic:



Engineering Control for ergonomic hazard:

- Breaking down tasks and weight loads to reduce the exertion necessary by employees
- Limiting employee exertion by using equipment for heavy lifting
- Redesigning work spaces to accommodate individuals in order to reduce strain and improve posture
- Ensuring that all work spaces provide employees the full range of motion required to complete a task
- Repositioning objects and surfaces such as tables in the workplace to reduce the need for reaching
- Reducing power tool vibration to the hand by insulation/rubber grips.
- Adequate hand tool handles that spread the stress more evenly across the palm of the hand.

Administrative Control for ergonomic hazard:

- Provide employees with break periods that help to reduce short-term strain
- Adjusting the pace of work to reduce exertion
- Rotate employees working in repetitive or strenuous tasks, to reducing exposure
- Store objects and tools where employees can retrieve them while maintaining neutral position
- Label any heavy loads with their weight amount
- Place requirements on weight loads by introducing group lifting policies

Motor Vehicle Safety

2,080 deaths were the result of occupational transportation incidents. That number is 39 percent of the 5,221-annual number of fatalities from occupational injuries in 2018. (OSHA)

Vehicle Requirements: -

- ✓ Vehicles shall have service, emergency and a parking brake system. These systems shall be maintained in operable condition.
- ✓ Vehicles shall have brake lights in operable condition regardless of light conditions.
- ✓ Vehicles shall be equipped with an adequate audible warning device in an operable condition.
- ✓ Vehicle shall have a reverse signal alarm audible above the surrounding noise level
- ✓ Vehicles with cabs shall be equipped with windshields and powered wipers. Cracked and broken glass shall be replaced.
- ✓ Vehicles operating in fogging or frosting of the windshields shall be equipped with operable defogging or defrosting devices.
- ✓ All haulage vehicles, whose pay load is loaded by means of cranes, power shovels, loaders, or similar equipment, shall have a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.
- ✓ Vehicles used to transport employees shall have seats firmly secured and adequate for the number of employees to be carried.
- ✓ Seat belts and anchorages meeting the international requirements shall be installed in all motor vehicles.



Seat Belt Buckle

Defensive Driving is the best way to preserve life, property and environment. Below point must be followed.

- Wear seat belts and instruct passenger to wear it first, before driving any motor vehicle
- Be physically and mentally alert-do not drive when you are sleepy.
- Conduct monthly vehicle inspection through ZP monthly equipment inspection program.
- Check tire pressure regularly and do not forget a spare tire. Never hesitate to replace damaged tires.
- Drive at the same speed as the traffic around you without going over the speed limit.
- A safe following distance is at least two (2) seconds space behind the vehicle in front of you.
- Have an in-depth understanding and obedience to local driving and traffic laws.
- Familiarize and follow posted traffic and warning signs on the road.
- When bad weather affects driving conditions, adjust driving time and habits.
- Be extra careful when driving on wet and slippery roads, it is not the same as dry roads.
- Keep yourself free from any distractions-avoid using mobile phones while driving or refueling.
- Familiarize and observe correct use of the road lanes and traffic lines.
- Never overtake or give pass to another vehicle at the blind turn.
- Drive responsibly, don't be aggressive or retaliate from any aggression by other motorists.
- Do not use company-owned or leased vehicles for personal use, unless approved by dept. head.
- The authorized driver of any company-owned or leased motor vehicle shall report immediately to his supervisor/department head any deficiencies/damages found in the motor vehicle assigned to him.

Extreme Weather Condition

The atmospheric conditions that comprise the state of the atmosphere in terms of temperature (Hot/Cold), wind, sand storm, clouds and rain.

Heat Stress – Heat related Illness and First Aid

Heat Stroke	When body unable to control its temperature and reach up to 106°F
	<i>Symptoms: Confusion, hot/dry skin, seizures, very high body temp, unconsciousness.</i>
Heat Exhausted	Excessive loss of body's water and salt usually through excessive sweating.
	<i>Symptoms: Headache, Nausea, Dizziness, Weakness, Irritability, Thirst, Heavy sweating</i>
Heat Cramps	Heat injury and consist of painful muscle cramps and spasms due to strenuous activities
	<i>Symptoms: Muscle spasms or pain, Usually in legs, arms, or trunk</i>
Heat rash	Skin irritation caused by excessive sweating during hot, humid weather.
	<i>Symptoms: Clusters of red bumps on skin</i>

- ✓ Move the affected worker to a cooler area (e.g., shade or air conditioning).
- ✓ Try to cool down the worker's temperature immediately. Follow the cooling techniques such as:
 - Immerse the worker in cold water or an ice bath. Create the ice bath by placing all of the available ice into a large container with water, standard practice in sports. This is the best method to cool workers rapidly in an emergency.
 - Remove outer layers of clothing, especially heavy protective clothing.
 - Place ice or cold wet towels on the head, neck, trunk, armpits, and groin.
 - Use fans to circulate air around the worker.
- ✓ Never leave a worker with heat-related illness alone. The illness can rapidly become worse. Stay with the worker.



Cold Stress – Cold Related Illness and first Aid

Hypothermia	when body heat is lost faster and the normal body temperature drops to less than 95°F
	<i>Symptoms: shiver, lose coordination, unable to walk or stand, pupils become dilated</i>
Frost bite	<i>injury to the body that is caused by freezing of the skin and underlying tissues</i>
	<i>Symptoms: Reddened skin, gray/white patches, Numbness, Feels firm or hard, Blisters</i>
Trench foot	known as immersion foot, It Cause by prolonged exposure to wet and cold temperatures
	<i>Symptoms: Redness of the skin, numbness, blisters, swelling and bleeding under skin</i>

- ✓ Move the person to a warm and dry area.
- ✓ Remove wet clothes, shoes, socks and replace with dry clothes, cover the body with layers of blankets; and with a vapor barrier (e.g. tarp, garbage bag). Do not cover the face.
- ✓ If medical help is more than 30 minutes away:
 - Give warm sweetened drinks if alert (no alcohol), to help increase the body temperature. Never try to give a drink to an unconscious person.
 - Place warm bottles or hot packs in armpits, sides of chest, and groin
- ✓ Do not rub the affected area to warm it because this action can cause more damage.
- ✓ Do not apply snow/water. Do not break blisters. Loosely cover and protect the area.
- ✓ Do not try to rewarm the frostbitten area before getting medical help; for example, do not place in warm water



Red Crescent

Weather Related illness can be Reduce/prevented by:

- provision of adequate ventilation, air treatment cooling fans, radiant heaters, shields for Hot/cold winds and insulation.
- Drinking plenty of fluid like water and salt/sugar water avoiding caffeine or alcohol.
- Make body habitual to heat/cold exposure slowly and to a certain extent or reschedule the activity to avoid heat/cold during the day.
- Using a Buddy System – monitor your condition and that of your co-workers
- Wearing appropriate clothing – lightweight and light-colored for hot day and wind sheeter/warmer clothes to avoid cold.
- Maintaining dry body/clothing and personal hygiene.
- Training of employees on signs, symptoms and prevention of cold-induced illnesses.
- Apply sunscreen and moisturizer prior to expose to heat/cold weather.
- Avoid using scaffolding and lifting activity during heavy wind or sand storm.
- Do not use scaffolding just after rain to avoid slip trip hazard.
- Shut down electrical generator during rain and do not use power tools and equipment.
- Wear adequate PPE at the time of sand storm like safety goggles and face mark and insulated gloves and waterproof boots in rain.



Heat Index										
Heat Index	SEVERITY	WATER							Work: Rest (min.) Periods	CONTROL
27-34 °C	Caution	1/4L per 30 mins							45:15min	Close Monitoring
35-46 °C	Extreme Caution	1/4L per 20 mins							30:30Mins	No work alone
47-50 °C	Danger	1/4L per 10 mins							15:45 Min	No elevated work
ALL WORK STOPPED										
*1 cup = 250 ml										
Heat Index		Relative Humidity (%)								
		10	20	30	40	50	60	70	80	90
Air Temp °C	25	22	23	24	24	25	25	25	26	28
	26	22	24	25	26	26	27	27	28	29
	27	24	25	26	26	27	29	29	30	32
	28	25	26	27	27	29	30	32	33	35
	29	26	27	29	29	30	32	33	34	37
	30	27	29	30	32	32	33	36	38	43
	31	28	30	31	32	34	35	38	41	45
	32	29	31	32	33	36	38	41	44	
	33	31	32	33	36	38	41	42		
	34	32	34	35	38	41	46			
	35	32	34	36	39	41				
	36	33	35	37	40	42				
	37	34	36	38	41	43				
	38	35	37	41	43					
	39	36	38	42						
	40	37	40	43						
	41	38	41	45						
	42	38	43	46						
	43	39	44							
	44	40	46							
	45	41	46							
	46	41								
	47	42								
	48	43								
	49	43								
	50									

Environment Protection

- Proponent departments shall identify and control environmental hazards from operations processes and task of employees.
- Project management and employees shall be knowledgeable and must abide with environmental laws, rules and regulations in using/handling/storing/disposing hazardous substances or wastes.
- Eliminated the use to fuel powered equipment as much as possible or try to reduce by using battery powered equipment.
- Prevent pollution and report release of hazardous substance to the environment, whether air, water or ground.
- Avoid environmental offenses such as:



Recycle Signage

- Discharge of materials dangerous to public health and degradation of environment.
 - Disposal of harmful wastes other than designated areas.
 - Failure to operate pollution abatement system.
 - Failure to comply with the procedures related to handling emissions and leaks, etc.
- Reduce the volume of hazardous materials sent to disposal sites to reduce accumulation of wastes and build-up of pollutants.
- Conduct waste management and promote recycling in accordance to general industry standards.

Hazardous Waste Management and Chemical Hygiene:

- The proponent is responsible for its hazardous wastes from generation to final disposal.
- Follow the procedure (if any) to neutralized to toxic chemicals/acid by using weak bases.
- Implement engineering controls and safe work practices to eliminate or reduce potential chemical exposure-emissions shall be monitored to ensure chemicals do not exceed the permissible exposure limits (PEL).
- Limit user contact with chemicals even if substances have no known hazard. Prevent entry routes of chemicals into the body (through Inhalation, Ingestion, Absorption or Injection).
- Eye wash and hand wash stations shall always be available in areas using chemicals. Wash immediately the affected body part with clean water for at least 15 minutes whenever hazardous chemicals has contacted with the skin.
- Waste shall be classified, segregate and disposed separately in designated disposable bin.
- Provision of spill kit shall be there for cleaning and disposing of chemical spillage and waste.



Color Coded Skip Bin for Segregated Waste

General Workplace Requirement

Following are the general requirement need to be fulfilled by supervisor prior to commence activity at workplace.

Housekeeping and Sanitization

The employer shall establish and maintain good housekeeping practices to eliminate hazards to employees to the extent practicable. (OSHA 1915.81(a)(1))

- ✓ The floor of workplace must be kept clean and in dry condition.
- ✓ Floor, working place and passageway must be kept free from nails, splinters, holes.
- ✓ Stack materials carefully so they won't fall or block fire point access.
- ✓ Toilets and wash facilities must be maintained clean and functioning properly.
- ✓ Adequate supply of potable water shall be provided in all work areas-drinking fountains or water coolers are kept clean and in good condition.
- ✓ Clean up all spills immediately and properly according to the procedure in MSDS.
- ✓ Keep food and beverages away from the work area.
- ✓ Properly dispose of all trash after completion of activity. Segregate and dispose different kind of waste in designated waste bin.
- ✓ Keep paper and other combustibles away from electrical equipment/hot work area.
- ✓ Keep containers of flammable closed. Use dip tray to store chemical to avoid spillage
- ✓ Remove scarp from workplace on daily basis and stored material only in designated storage area only.
- ✓ Hang the electrical power cable 2 meter above the walking surface. Do not left tangled on floor.



Waste Skip
Signage



Hand Wash
Signage

Benefits of Good Housekeeping:

- Eliminates accident and fire hazards
- Improves productivity and quality.
- Maintains safe and health work condition
- Boosts employee's morale
- Reflects good safety culture and good organization.

Ventilation

Enclosed spaces that are used by workers must be ventilated during work hours. fresh air comes in through open windows, doors or air vents. This is also known as 'passive air flow' and mechanical ventilation such as fans and ducts bring and exhaust air at workplace.

- ✓ Hot work area shall be consisted with exhaust fan to remove welding or cutting fumes.
- ✓ Ensure good storage practice-provide adequate ventilation for storage of flammable materials and chemical storage area to avoid buildup toxic in air
- ✓ Confined spaces shall be provided with adequate exhaust ventilation system (especially if welding is conducted) to suck out accumulated air contaminants.
- ✓ Provide suitable ventilation on utility rooms or substations by leave space for electrical equipment that generates heat.
- ✓ Provide adequate ventilation/exhaust systems for spray painting booths and properly designed dust extraction system for abrasive blasting operations
- ✓ welfare facilities like toilet, smoking shelter, mess hall shall consist with good ventilation system.



Illumination

Work environments should be illuminated whenever necessary to allow sufficient sight. Appropriate lighting, without glare or shadows, can reduce eye fatigue and headaches; it can prevent workplace incidents by increasing the visibility of moving machinery and other safety hazards.

- ✓ Make sure desks, tables and other task areas have supplemental lighting. Install blinds on exterior windows to prevent bright light.
- ✓ Make sure computers in workspaces are oriented so outside light is at a right angle to the screen.
- ✓ General Construction shall have 5 ft-c (foot candle) and Warehouses, walkways, exits 10 ft-c.
- ✓ All light fixtures must have protective plates and must not exposed or live parts.
- ✓ Fixtures should not be allowed to have opening large enough to put a finger through.
- ✓ Must be a minimum of seven feet above work surfaces.
- ✓ Light shall not be kept on the floor. Must be firmly mounted to wall or ceiling.

Welfare Facilities

It is necessary for the well-being of your employees, such as washing, toilet, rest and changing facilities, and somewhere clean to eat and drink during breaks

1. Toilet and Washing Facilities.



Portable Toilet

- Enough toilets and washbasins according to the number of workforces. People should not have to queue for long periods to go to the toilet;
- Clean facilities with walls and floors should preferably be tiled (or covered in suitable waterproof material) to make them easier to clean;
- Adequate amount of toilet paper, washing soap and sanitizer shall be provided.
- Facilities with proper illumination, ventilated with running hot and cold water.
- A basin large enough to wash hands and forearms if necessary;
- Showers where necessary, e.g. for particularly dirty work.

No. of Manpower	Number of Toilets	Number of Urinals
1-15	1	1
16-30	2	1
31-45	2	2
46-60	3	2
61-75	3	3
75-90	4	3
90-100	4	4

2. Drinking Water Station.

- Water shall be free from contamination and is preferably from the public water supply.
- Drinking station shall be easily accessible by all employees and must be available as per number of work area.
- There are adequate supplies taking into consideration the temperature of the working environment and types of work activity.
- Paper Cups/glasses or a drinking fountain shall be provided with drinking station. Maintain daily checklist.



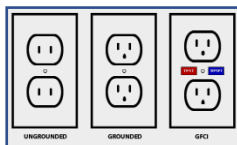
Drinking water
Signage

Office Safety

- All office employees shall familiarize themselves with all the applicable safety instructions, including the emergency evacuation procedures from the building.
- All fire exits and access routes in office buildings shall be clearly marked and kept clear from any obstructions at all times.
- Workstation shall be setup in such a way that it shall not create work-related upper limb disorders (WRULDs) to employees.
- Suitable fire extinguishers/firefighting equipment shall be installed in strategic areas, inspected regularly with proper tags and always free of access.
- Report emergencies through the designated emergency contact numbers in your respective Business Units (*see Emergency Action Plan-Emergency Contact Numbers*).
- Keep the office work area free of tripping or slipping hazards (i.e. power/telephone/machine cords on aisle ways, unsafe storage in walk ways, spilled drink or water, damaged flooring).
- Keep file drawers, desk drawers and locker doors closed when not in use. Open only one file or desk drawer one at a time.
- Use handles when closing files, desk drawers and safe or vault doors.
- Walk and do not run on corridors and/or stairs, and use handrails where provided.
- Proper posture shall be established; keep elbows in and arms level, avoid overreaching and take regular breaks.
- Sufficient ventilation and open floor spaces shall be provided in individual workstations.
- Provide adequate lightings at work areas and emergency lights shall be maintained in good operating condition.
- Office Electrical Safety Practices:
 - ✓ Office machines and equipment are properly grounded or double insulated.
 - ✓ Circuits are equally loaded.
 - ✓ Extension cords used shall have a maximum length up to 10ft (3m).
 - ✓ Power cords, plugs and wall outlets are free from defects.
- Check office furniture regularly for sharp edges, splinters and loose casters or bolts on chairs.
- Do not use any defective office utility, machine or equipment.
- No smoking policy shall be implemented inside all offices as it may activate the smoke detection system-proponent shall provide a designated smoking area in approved locations.



Work Station Ergonomic



Types of Electrical Socket

Conversion Table

Temperature																		
-18	-10	0	10	21	32	38	43	49	54	60	66	71	77	82	88	93	100*	C
0	14	32	50	70	90	100	110	120	130	140	150	160	170	180	190	200	212*	F
																		C=5/9 (F-32) F=9/5 (C+32)

ENGLISH MEASUREMENTS AND EQUIVALENTS		
Length		
1 inch (in)		= 2.54 cm
1 foot (ft)	= 12 in	= 0.3048 m
1 yard (yd)	= 3 ft	= 0.9144 m
1 mile	= 1760 yd	= 1.6093 km
1 int. nautical mile	= 2025.37 yd	= 1.852 km

Area		
1 sq inch (in ²)		= 6.4516 cm ²
1 sq yd (yd ²)	= 9ft ²	= 0.8361 m ²
1 acre	= 4840 yd ²	= 4046.9 m ²
1 sq mile (mile ²)	= 640 acres	= 2.59 km ²

Volume / Capacity		
1 cu inch (in ³)		= 16.387 cm ³
1 cu foot (ft ³)	= 1728 in ³	= 0.0283 m ³
1 fluid ounce (fl oz)		= 29.57 ml
1 pint (pt)	= 16 fl oz	= 0.4732 lit
1 gallon (gal)	= 8 pt	= 3.785 lit

Mass (Weight)		
1 ounce (oz)	= 437.5 grains	= 28.35 g
1 pound (lb)	= 16 oz	= 0.4536 kg
1 hundredweight (cwt)	= 112 lbs	= 50.802 kg
1 ton	= 20 cwt	= 0.907 t

METRIC MEASUREMENTS AND EQUIVALENTS		
Length		
1 millimeter (mm)		= 0.0394 in
1 centimeter (cm)	= 10 mm	= 0.3937 in
1 meter (m)	= 100 cm	= 1.0936 yd
1 Kilometer (km)	= 1000 m	= 0.6214 mile

Area		
1 sq cm (cm ²)	= 100 mm ²	= 0.1550 in ²
1 sq meter (m ²)	= 10,000 cm ²	= 1.1960 yd ²
1 hectare (ha)	= 10,000 m ²	= 2.4711 acres
1 sq km (km ²)	= 100 ha	= 0.3861 mile ²

Volume / Capacity		
1 cu cm (cm ³)	= 1000 mm ³	= 0.0610 in ³
1 cu decimeter (dm ³)	= 1000 cm ³	= 0.0353 ft ³
1 cu meter (m ³)	= 1 dm ³	= 1.3080 yd ³
1 liter (lit)	= 1 dm ³	= 0.2642 gal
1 hectoliter (hl)	= 100 l	= 26.42 gal

Mass (Weight)		
1 milligram (mg)		= 0.0154 grain
1 gram (g)	= 1000 mg	= 0.0353 oz
1 kilogram (kg)	= 1000 g	= 2.2046 lb
1 ton (t)	= 1000 kg	= 0.9842 ton



Zamil ***Projects***

Health, Safety & Environment Department