وزارة الأشغال العامة
MINISTRY OF PUBLIC WORKS

دولة الكويت

Safety Department
Ministry of Public Works

First Edition
2013

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Minister of Public Works
Letter of Intent

On behalf of the Ministry of Public Works, it is my pleasure to introduce the first edition of the safety booklet.

This booklet is beneficial to all safety personnel and laboratory technician, as it provides them with basic knowledge on specific occupational health and safety hazards common to any construction site. It acts as a guide showing necessary preventive safety measures.

I urge all safety personnel to follow the instructions in this booklet in order to first prevent accidents and injuries and then lessen their occurrences; each individual must be aware of his obligations towards the safety and health of workers in their charge and coworkers around them.

Safety must be the top priority in all workplaces, and I hope this booklet will help provide an accident-free environment for all employees.

Eng. Abdulaziz Al-Ibrahim
Minister of Public Works
& Minister of Electricity and Water

Undersecretary of the Ministry of Public Works Letter of Intent

The Ministry of Public Works firmly believes in maintaining a safe and healthy working environment for everybody. It is with that in mind that we present this booklet in the certainty that it will assist and inform project workers and lab technicians and help reduce the risks and hazards that occur during a project's lifetime.

This booklet strongly stresses the following:

- Maintaining workers safety and health.
- Protecting the working environment.
- Risk identification, assessment, and control.

The intention behind introducing this booklet is promoting safety awareness amongst engineers and laboratory technicians to create a comfortable working environment, which will improve the quality and precision of work performed.

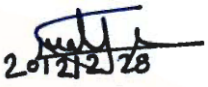
Eng. Abdulaziz Al-Kulaib
Undersecretary
Ministry of Public Works

Letter of Intent

On behalf of the Government Center for Testing, Quality Control & Researches, we present this booklet prepared by the Safety Department with a hope that it sheds light on the risks and hazards that occur while working on ongoing projects and laboratories.

Our goal is to create and maintain a healthy and safe working environment, which can be achieved by clearly identifying risks, hazards, methods of prevention and containment. This booklet provides a list of common physical hazards as well as a number of occupational health and safety issues.

Improvement in occupational health and safety is beneficial to everyone, and as such project site workers and laboratory technicians should think of this booklet as a reference and follow it accordingly in order to maintain healthy and safe working environments.



Eng. Awatef Al-Ghunaim
Assistant Undersecretary, Government Center for Testing, Quality Control & Researches
Ministry of Public Works

Introduction

The Safety Department is pleased to present the first edition of the safety booklet, which aims to provide technical workforce in the ministry's projects and laboratory technicians with basic general foundations for essential measures related to occupational health and safety.

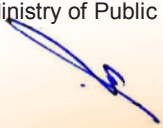
Every employee has the right to work in a safe and healthy working environment, and as such the Safety Department has taken it upon itself to provide them with the appropriate measures to prevent accident, injuries, and diseases.

Some of the topics in this booklet are:

- The broad outlines of the main elements of safety plans that employees should be trained in.
- Main hazards inherent to project construction and laboratory working environments.
- Hazard prevention safety measures.
- Main steps for evaluating risk assessment and relevant implementation of control measures.

Finally, the Safety Department is committed to fulfilling its duties, keeping in sight our goal of maintaining the health and safety of our employees and the employees of the contractors working with us, as well as the safety of our visitors and of our society as a whole. As such, we encourage and welcome all communications and contributions that serve this goal.

Eng. Alyaa Al-Mahrous
Director of Safety Department
Ministry of Public Works



Definitions

- **Health**: The condition of body and mind.

- **Safety**: Maintaining the highest degree of protection from accidents and risks, hazards, and injury and/or losses of personnel or property.

- **Hazard**: A situation that poses a level of threat (directly or indirectly) to life, health, property or work environment.

- **Accident**: Any unplanned event or chain of events that can lead to injury, death or damage.

- **Incident**: A noticeable event involving machinery or buildings that might have serious consequence.

- **Near miss**: An unplanned event or chain of events that did not result in injury, illness, or damage.

- **Safety Measures**: Steps taken for ensuring optimum security in working areas at all time to all workers' health and safety.

- **Dangerous Goods and Hazardous Substances**: Any solid, liquid, or gas that can harm people, other living organism, property, or the environment.

- **Emergency**: Sudden, urgent, usually unexpected occurrences or events requiring immediate action.

1. Risk Assessment Procedure:

Risk assessment is a careful examination of various types of occupational accidents and illnesses that can harm people. The objective of risk assessment is highlighting project-related hazards and developing methods so that no one gets hurt or becomes ill in the workplace.

How to assess risks in your workplace:

- List all tasks that you are responsible for.
- Identify all hazards.
- Decide who might be harmed, how, and where.
- Evaluate risks and determine appropriate precautions.
- Record your findings and implement them.
- Review your assessment and update it regularly.

2. Emergency Action Plan

An emergency is an unforeseen situation threatening all personnel in a workplace, disrupting or shutting down operations, causing physical or environmental damage, or harming human life. Emergencies may occur naturally, such as earthquakes, storms, or volcano eruptions; or manmade, such as fires, toxic gas releases, chemical spills, explosions, or workplace violence.

The emergency action plan provides an outline for employees to respond calmly and professionally for a quick and positive response to mitigate the effects of any incident. All employees must be familiar with the emergency plan; this will help them become an active member of the team in case of an accident.

The emergency action plan must include:

- A preferred method for reporting emergencies.
- An evacuation policy and procedure.
- Emergency escape procedure and routes.
- Contact information of individuals responsible for managing the emergency.
- Procedures for employees assigned to perform or shutdown critical plant operations according to the emergency.
- Rescue and medical duties for workers designated to perform them.
- An assembly point and procedures to account for all employees after an evacuation.
- An alternative communications center to be used in the event of a fire or explosion.
- A secure on- or offsite location to store originals or duplicate copies of important records.

In case of emergency:

1. Report the emergency to 112.
2. Activate the approved emergency plan.
3. Establish communication with listed emergency numbers in the plan.
4. Alert staff.
5. Order evacuation.
6. Request external aid from the proper parties.

112

3. First Aid

Health and medical related incidents occur in all types of working environments. Employees should know the basic procedures of providing medical attention.

The knowledge of first aid can prevent accidents from getting worse for the safety and well-being of workers. Only trained personnel should provide first aid to an injured worker.

If someone in a workplace becomes ill or injured and requires medical attention:

- Call 112.
- Administer first aid (only with proper training).
- Give the dispatcher the following information:
  a) The location of the injured person(s), including the building, floor and room number.
  b) The nature of the illness or injury of the victim.
  c) Vital signs: consciousness, pulse, breath... etc.
- Do not hang up until told to do so by the dispatcher.
- Be aware of hazards associated with blood- or air-borne pathogens or infectious diseases.
- Do not move the injured person.
- If the victim is conscious, reassure him/her that medical assistance is on the way.
- After the victim's immediate needs have been addressed, remain to assist security or medical services with information about the incident.

4. Personal Protective Equipment (PPE)

PPE is designed to protect workers from serious workplace injuries or illnesses resulting from contact with chemical, physical, electrical, mechanical, radiological or other workplace hazards.

Hard-hats or safety helmets protect from:

- Head impact.
- Penetration injuries.
- Falling or flying objects.
- Electrical injuries.

There are three industrial classes of hard-hats:

Class A: Provides good protection from impacts but limited voltage protection. Used mainly for mining, building construction, shipbuilding, lumbering, and manufacturing.

Class B: Provides good protection against falling objects and high-voltage shock and burns. Used mainly when engaged in electrical work.

Class C: Lightweight helmets designed for limited protection from impact with fixed objects. Do not protect against falling objects or electric shock.

Safety glasses, goggles and face shields protect from:

- Airborne dusts, mists, and particles.
- Penetration injuries.
- Splash hazards such as splashing liquids, chemical application, sanding and misting.
- Impact hazards such as grinding, cutting and equipment operation.
- Ultraviolet radiation.
- Face shields are used along with safety glasses or goggles only as additional protection for the face.

Respirators protect from:

- Hazardous chemical substances.
- Hazardous waste.

Gloves protect from:

- Skin absorption of harmful substances.
- Severe cuts.
- Severe abrasions and punctures.
- Chemical and thermal burns.
- Harmful temperature extremes.

Gloves fall into four groups:

- Leather, canvas or metal mesh gloves.
- Fabric and coated fabric gloves.
- Chemical and liquid-resistant gloves.
- Insulated rubber gloves.

Safety boots or shoes protect from:

- Falling and rolling objects.
- Wet or slippery surface.
- Crushing or penetrating materials.
- Electrical hazards.
- Hot substances or corrosive and poisonous materials.

Protective clothing such as laboratory coats, coveralls, vests, jackets, aprons, surgical gowns, and full body suits protect from:

- Cuts and radiation.
- Temperature extremes.
- Hot splashes from molten metals and other hot liquids.
- Potential impacts from tools, machinery and materials.
- Hazardous chemicals.

A reflective and brightly colored safety vest helps alert the position of a worker to vehicular traffic during both day and evening.

Earplugs and earmuffs provide hearing protection from:

- Noise from activities like jack hammering, grinding, table saw operation, hammering and fire alarm testing.
- Noise from heavy equipment.

5. Fire Extinguishers

Fire is a hazard on many construction sites due to the large quantity of flammable products such as paints, solvents, and adhesives, as well as activities such as welding, flame cutting, and thermal roofing.

There are five classes of fires divided according to materials:

Class A (Ordinary Combustibles)

- Such as clothes, paper, wood, plastic etc.
- Extinguishing agent: water.

Class B (Flammable Liquids)

- Such as gasoline, solvents (acetone), alcohols.
- Extinguishing agents: foams, dry chemicals and carbon dioxide.

Class C (Electrical Equipment)

- Such as electrical appliances, wiring, circuit breaker outlets.
- Extinguishing agents: dry chemical, carbon dioxide.

Class D (Combustible Metals) (chemical labs)

- Such as sodium, potassium, magnesium.
- Special types of fire extinguishers (depending on reactions between metals).

Class K (Cooking Media, e.g. greases, fats, oils)

- Such as cooking oils and fats.
- Extinguishing agents: potassium bicarbonate, sodium bicarbonate, wet chemicals.

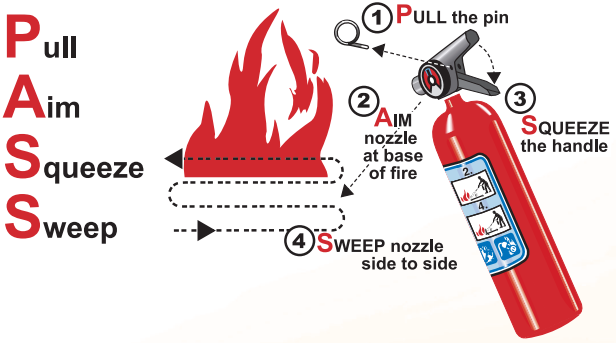
Fire extinguishers on construction sites must be:

- Accessible and regularly inspected.
- Promptly refilled after use.
- Appropriate to the type of fire hazards in the workplace; employees should be trained in their usage.

Extinguishers should be located in or near:

- Flammable materials (stored, handled, or used).
- Temporary oil- or gas-fired equipment.
- Welding or open flame cutting.
- Each story of an enclosed building being constructed or renovated.

To operate an extinguisher:



6. Fall Prevention and Protection

A. Fall Prevention:

Falls occur when a person slips or trips. In order to prevent falling, hazards must be removed. Some examples are:

- Wet or contaminated floors: grease, liquids, dust, paper, boxes, etc.
- Uneven walking surfaces, holes, change in surface levels, broken or loose floor tiles.
- Improper installation of mats and rugs.
- Obstacles and stacking objects in hallways.
- Unguarded platforms, hallways and work areas over 30 cm above ground level.
- Inadequate illumination.

Safety Measures:

- Adequate housekeeping.
- Avoid strings, cords, or lines in hallways.
- Keep aisles and passageways clear and clean.
- Promptly clean up spills and slippery substance.
- Use guard rails and hand rails for elevated workplaces.
- Provide suitable protection in excavation pits.

B. Fall Protection:

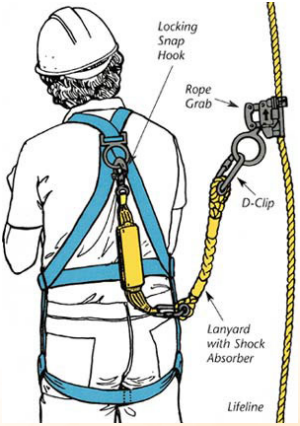
Falls are the lead cause of accident in construction. The main types of falls in the workplace are:

- Falls from ladders.
- Falls from scaffolds.
- Falls into holes and confined spaces.
- Falling on top of equipment.

Safety Measures:

- Guarded rail systems are the most common and convenient means of fall protection.
- Personal fall arrest system (anchorage, connectors, body belt or body harness).
- Positioning device system.
- Safety monitoring system.
- Safety net system.
- Warning line system.

Full Body Harness



7. Scaffolding

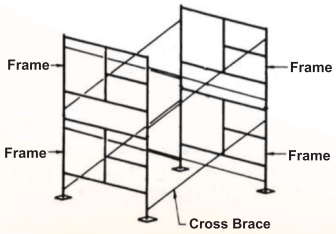
Working on scaffolds is one of the main causes of falling. Employees erecting, dismantling or moving scaffolds should be provided with full fall protection.

Hazards:

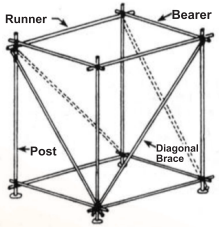
- Scaffold planks or decks failing can lead to falls.
- Damaged, defective and incorrectly installed scaffold parts might tip over or collapse.
- Suspension systems can fail.

Safety Measures

- Choose the appropriate type of scaffolding for the work, keeping in mind height and load (live load and dead load).
- Properly place and secure guardrails, toe boards, planking, and locking pins.
- Erect all scaffolds level and plumb, and on a solid footing.
- In suspension scaffolding, use fall arrest systems with full body safety harness, lanyard, rope grab, lifeline and lifeline anchor (Refer p11).



Frame Scaffolding



Tube and Clamp Scaffold

8. Ladder Safety

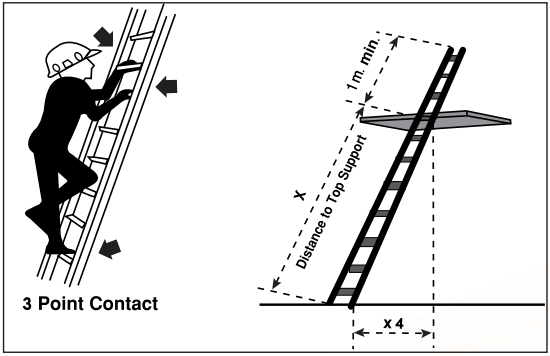
Stepladders and straight or extension ladders are commonly found on construction sites and cause frequent accidents.

Hazards:

- Falls are the biggest risk.
- Power line contact.

Safety Measures:

- When climbing a ladder, maintain three points of contact with two hands and one foot or two feet and one hand firmly on the ladder at all times.
- Do not use the top two steps of a ladder as a step or stand.



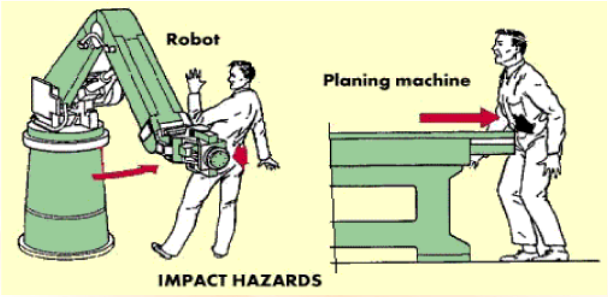
- All straight or extension ladders must extend at least one (1) meter beyond the supporting object.
- Straight or extension ladders must be used with a horizontal distance of one-fourth (¼) its working length as is shown in the illustration.

9. Machine Safety

Handling machines and tools improperly can lead to serious injuries or death.

Safety Measures:

- Evaluate your work area for potential hazards to decrease the possibility of injuries.
- Wear proper clothing.
- When operating or working near heavy machinery, do not wear personal accessories, such as headscarves, dangling jewelry, rings, bracelets and watches.
- Use proper PPE based on present or potential hazards and before starting machinery.
- Report all defects to the supervisor.
- Do not yank a cord or hose to disconnect it from the socket.
- Do not use damaged tools or machinery.
- Do not operate tools or machinery if you are not trained or qualified.
- Do not remove machine guards.
- Perform periodic maintenance prior to handling machines, preferably by using a checklist.

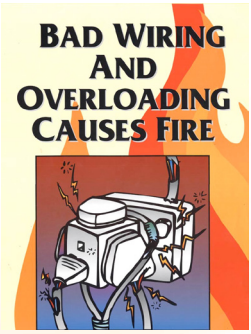


10. Electrical and Power line Contact

Overhead power lines, severed electrical wires, temporary electrical circuits and buried cables can pose a danger of shock or electrocution. To help minimize the hazard, use low voltage equipment with ground fault circuit interrupters (GFCI) and watertight corrosion resistant connecting cables.

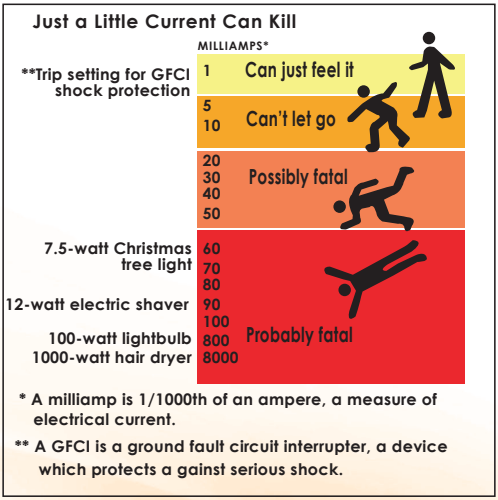
A. Electrical Safety Measures:

- Use ground-fault circuit interrupters whenever possible.
- Inspect electric cords daily and repair or replace as necessary.
- Do not operate any power tool or equipment unless you are trained in its operation.
- Use tools only for their designated purpose.



B. Power line Contact Safety Measures:

- Do not store material and equipment below overhead power lines.
- Beware of the power line moving (e.g. due to wind).
- Beware of contact when moving extension ladders, rolling scaffolds, or long lengths of pipe.
- To determine power line voltage, check the markings on pole or call the utility service.
- Use a signaler to direct equipment operators and truck drivers.
- The signaler must warn drivers and operators when any part of their equipment or load approaches the minimum distances set by law.
- When erecting or moving a ladder or scaffold, do not let it lean or drift toward overhead power line. Always maintain minimum allowable clearances.



11. Housekeeping

Housekeeping includes keeping work areas neat and orderly, ensuring adequate access to hallways, exits, maintaining halls and floors free of slip and trip hazards.

Safety Measures:

- Immediately clean up any objects creating slip hazards, such as water, grease, paper, and debris.
- Keep hallways clear of boxes and other obstructions.
- Keep storage cabinets closed when not in use.
- Never block fire exits or fire equipment.
- Make sure that stacked materials do not impede vision.
- Never store items in or on electrical panels or control boxes.
- Store tools in their proper location immediately after use.
- Keep ventilation systems clear of dust, debris and stored items.
- Make sure waste and debris receptacles are conveniently located.
- Remove combustible waste to minimize fire hazards.
- Set a good example for other employees by maintaining good housekeeping in your work area.

12. Excavation

A significant number of deaths and injuries in sewer and water main work are directly related to excavation or trenching.

Hazards:

- Improper contact with underground pipes and wires may lead to fires, electrocutions, or explosions.
- Tools or workers falling into the excavation site.
- Holes collapsing due to lack of support.
- Toxic and flammable gases entering the excavation from vehicles' exhausts or broken service pipes.
- Oxygen depletion.
- Back and shoulder injuries due to incorrect digging methods.

Safety Measures:

- Obtain copies of plans for underground services before beginning excavation.
- Support the sides of excavation.
- Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop log.
- Remove or minimize all surface obstacles at the worksite that may cause injuries.
- Monitor gas levels periodically.
- Wear proper PPE at all times.
- Ensure that no heavy equipment is vibrating in the excavation site when workers are present.
- Provide a rescue team.

13. Confined Space Entry

A confined space is any space that has limited or restricted means of entry or exit. It is not designed or configured for continuous human occupancy.

Examples:

- Vessels
- Tanks, Furnaces
- Culverts
- Excavations
- Pits or manholes
- Sewers
- Trenches deeper than 1.2m
- AC duct system

Hazards:

- Depletion or excess of oxygen.
- Hazardous gases.
- Engulfment.
- Hazardous configurations leading to asphyxiation.

Safety Measures:

- Obtain an entry permit and a work permit.
- Standby rescue team.
- Wear proper PPE.
- Ensure adequate ventilation and lighting.
- Isolate electrical and mechanical devices.
- Follow binding procedure.
- Check gas concentration levels.

Classification of Confined Spaces:

1. Non-Permit confined space

- Does not contain atmospheric hazards that might cause death or serious physical harm.
- Examples for these are vented vaults or motor control cabinets. They have natural or permanent mechanical ventilation.
- Entries into these areas must include adequate illumination and ladders.

2. Permit-required confined space

- Contains a hazardous atmosphere (material that has the potential for engulfing a person).
- Has an internal configuration so that a person can be trapped inwardly converging walls or by a floor.
- Examples include hazardous material storage tanks, which do not contain ventilation shafts or fans.
- Similarly, tunnels and pipes in sewage systems should have adequate ventilation and lighting.

14. Manual Handling in Construction Sites

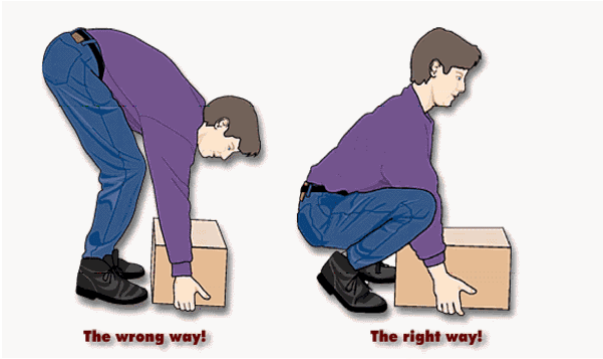
Work in construction sites involves a lot of manual handling, which puts great stress on the lower back muscles. It's important to take precautions to avoid severe injuries.

Hazards:

- Back, neck, and shoulder injuries are common.

Safety Measures:

- Avoid lifting above shoulder height.
- Push rather than pull.
- Don't try to catch falling objects; it can lead to spinal injury.

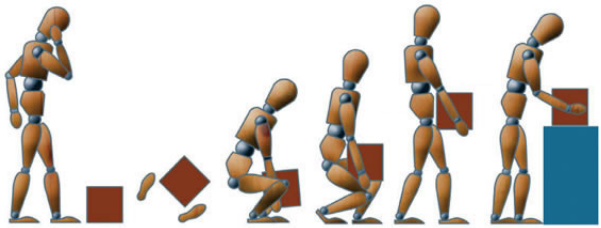


Safe lifting starts with planning:

- Size up the load.
- Move on a clear path.
- Use handling equipment (such as a dolly) when available.

The proper style of lifting:

- Get as close to the load as possible.
- Use a well-balanced stance with one foot slightly ahead of the other.
- Tighten the stomach muscles when lifting.



Proper Manual Handling

15. Heat Stress

High temperatures greatly affect the health condition of a worker, and this applies to the weather as well as the temperature in work environments. It might result in heat stress or even a heat stroke.

Hazards:

A. Heat exhaustion:

Heat exhaustion occurs when the body cannot keep blood flowing to vital organs and the skin for cooling.

Symptoms: weakness, feeling faint, headache, breathlessness, vomiting, and difficulty in continuing work.

Control measures: Get medical aid and cool down the body by moving to a shaded area, loosening clothing, and drinking cool water.

Note: It takes 30 minutes at least to cool the body down from heat exhaustion, and if it is not treated promptly, it can lead to heat stroke.

B. Heat stroke:

Heat stroke follows after heat exhaustion if it is not treated, and is more dangerous and may lead to death. It happens because the body uses up all its water and salt and cannot cool itself, causing the body temperature to rise.

Symptoms: confusion, irrational behavior, convulsions, unconsciousness, no sweating; hot, dry skin and high body temperature, 40°C or more.

Control measures:

If a coworker shows symptoms of heat stroke, one should act fast:

- Call 112 or get them to a hospital.
- Cool them down with cool water or a cool shower, or by wrapping in cool, wet sheets and fanning rapidly.
- If unconscious, don't give them anything to drink.

Safety Measures:

- Provide shaded areas to avoid direct sunlight.
- Limit working hours and assign break times.
- Provide rest facilities with proper air circulation.
- Provide water coolers.
- Perform health checkups before work starts.
- Drink small amounts of water frequently.
- Avoid coffee, tea, or other drinks that make one go to the restroom frequently.
- Avoid eating hot, heavy meals during working hours.
- Remember that age, weight, fitness, heart diseases, high blood pressure, recent illness, or medications can affect the ability to withstand high temperature.

16. Traffic Control in Construction Sites

When construction work affects traffic on public roads, there is a risk to both construction workers and to ordinary drivers and pedestrians.

The first priority of a traffic control person (signaler person) is to protect workers and the public from accidents and injury by regulating traffic flow. Keep traffic moving at normal or reduced speed to avoid tie-ups so that work goes ahead safely and efficiently.

Safety Measures:

- Do not be distracted by talking to anybody.
- Always face oncoming traffic.
- Stay alert to work nearby.
- Stand where you can see and be seen by approaching traffic for at least 150 meters.
- Stand alone. Do not let a group form nearby.
- Stand at the post. Sitting is hazardous because one cannot fully see or be seen by drivers.
- Always have a quick escape route ready in case a driver does not see you or disregards your signals.
- In addition to hard-hats and safety boots, wear a safety vest and use STOP/SLOW sign as per requirements of construction regulations.

Traffic Signs

17. Office Safety

The risk of injury to office workers is statistically lower than industrial workers. Negligence is one of the prime causes of office accidents.

Safety Measures:

- Ensure good housekeeping.
- Ensure you know where the fire alarm, fire extinguishers, and escape routes are situated.
- The file cabinets must be arranged so that drawers do not open into aisles.
- Use appropriate heavy lifting equipment, and ask for aid when lifting.

Bad House Keeping

18. Lab Safety

Incidents in laboratories can lead to serious injuries or health problems due to dangerous chemicals, equipment, glass tools... It's important to have a clear plan and working procedures, detailing how to prevent, minimize and deal with hazards in case of accidents.

Safety plan:

- Clearly written, legible, and announced.
- Emergency response plan.
- Evacuation plan, regularly activated.
- Emergency phone numbers.

Safety Measures:

- No running; walk slowly.
- Do not block passages and hallways with tools or equipment, especially emergency exit routes.
- Wear safety goggles in the lab at all times.
- It is not recommended to wear contact lenses while working in the lab.
- Do not wear overly wide clothing.
- Tie back long hair.
- Wear proper shoes in the lab (covering feet).
- No eating or storing food in the lab. Do not drink the water designated for lab usage.
- Do not attempt to directly smell chemical substances as some are very dangerous.
- Provide the Material Safety Data Sheet (MSDS) for all materials used in the lab.

19. Material Safety Data Sheet (MSDS)

Information about chemical products that must be found on the packaging:

1. Chemical Product and Company Identification.
2. Hazard Identification.
3. Composition Information.
4. First Aid Measures.
5. Firefighting Measures.
6. Accidental Release.
7. Handling and Storage.
8. Exposure Controls & Personal Protection.
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.

Safety Measures:

- Do not store hazardous chemicals in personal lockers outside the lab.
- Avoid inhaling fumes and gasses. Wear gas masks. Utilize the fuming cupboard when dealing with noxious fumes producing chemicals.
- Do not conduct unauthorized experiments.
- Dispose of all broken pipes.
- Use warning stickers on vials and containers with chemical substances.
- Do not try to transport chemical substances outside the lab. If needed follow MSDS guidelines.
- Always read and follow instructions and warning labels found on the containers of chemical substances before using them.
- Wash hands properly using running water when you have finished working in the lab.
- No smoking inside the lab at all times.

Remarks

Remarks